StarWind iSCSI Target for Microsoft Windows: Using StarWind iSCSI Target and VMware Workstation Virtual Machines

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If you have questions about installing or using this software, check this and other documents first - you will find answers to most of your questions here or there. If you need further assistance, please contact us.

INTRODUCTION

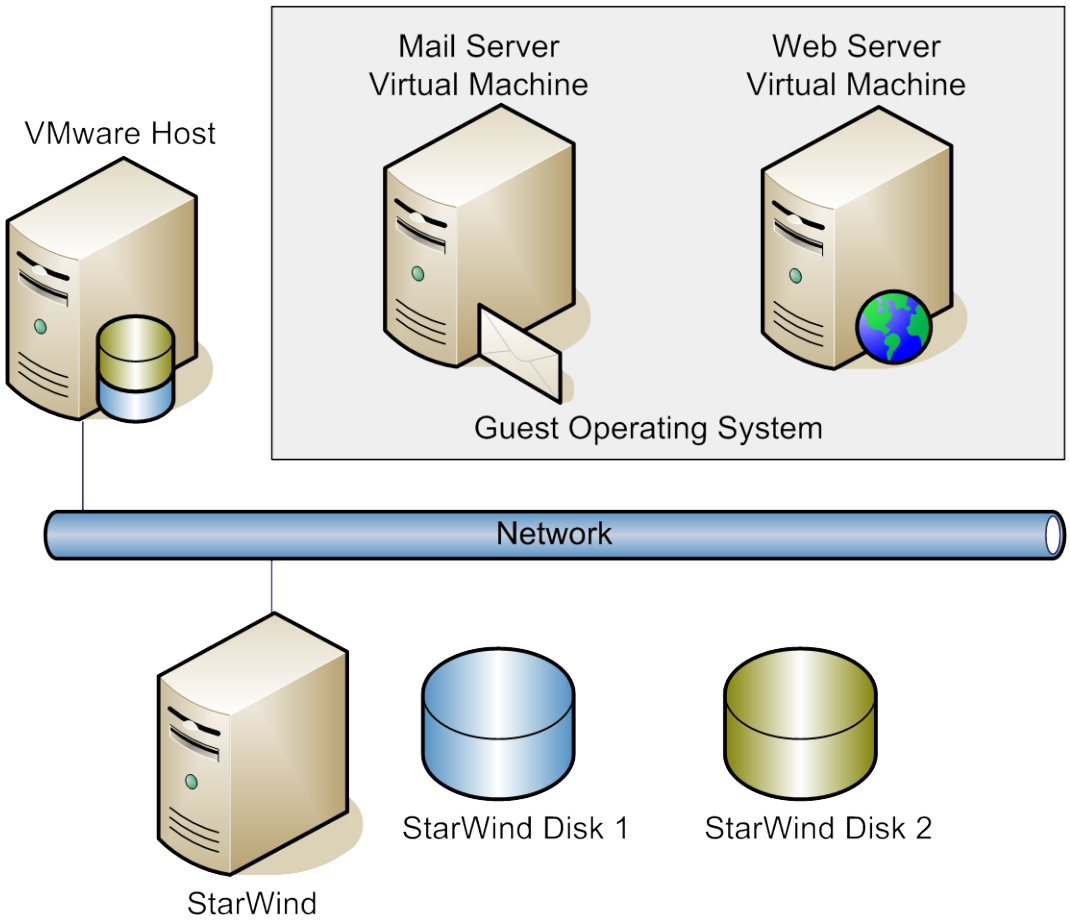


Figure 1. Virtual Machines stored on StarWind Disks

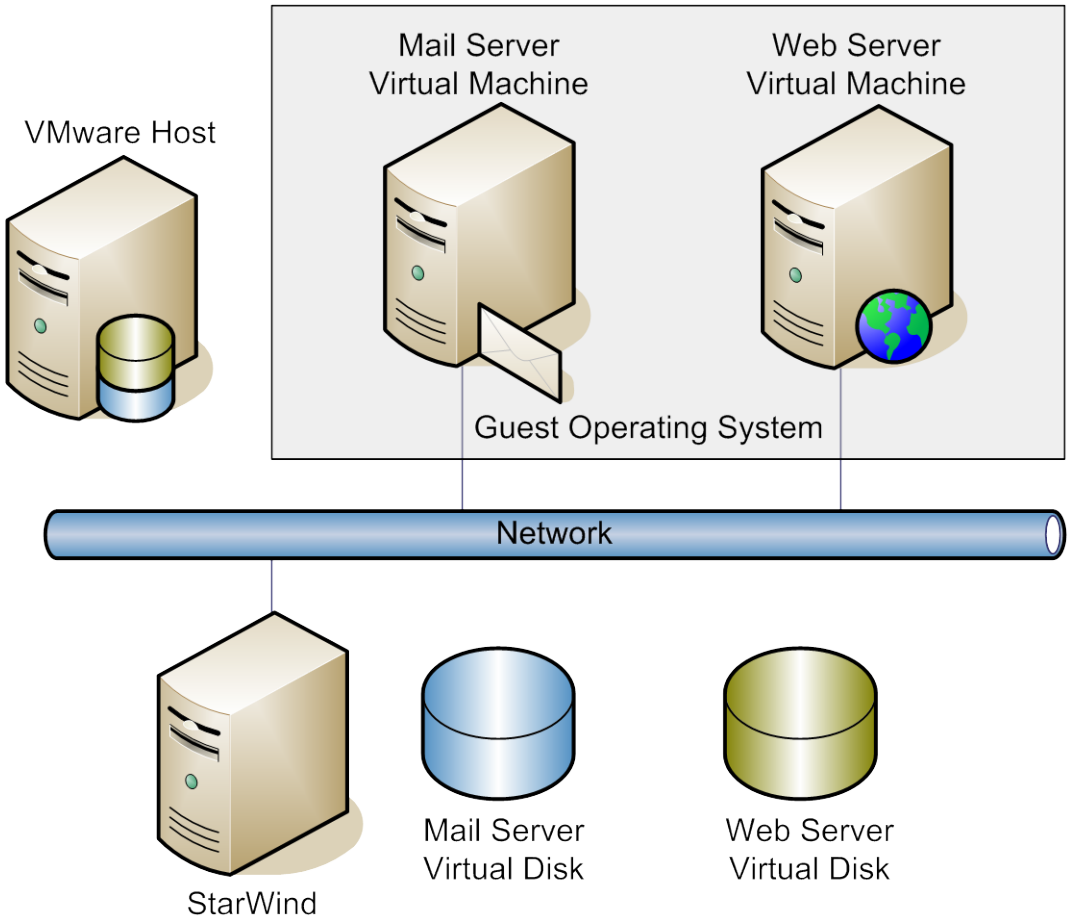


Figure 2. StarWind providing iSCSI Storage to Virtual Machines

CONFIGURING VMWARE HOST

At the first step you need to install the software that is required to create the virtual environment. You will need **Microsoft iSCSI Software Initiator** or/and **StarPort** and **VMware Workstation**. Please download the **MS iSCSI Software Initiator** at http://www.microsoft.com/downloads/details.aspx?FamilyID=12cb3c1a-15d6-4585-b385-befd1319f825&DisplayLang=en and **StarPort** at http://www.rocketdivision.com/downloads/starport.exe .

Please complete the following operations:

- Install the MS iSCSI Software Initiator or/and StarPort on the host that will be mastering the virtual machines.
- When the installation is complete, install VMware Workstation on the same host.
- Follow the instructions on the installation wizard to complete the process.

CONFIGURING ISCSI STORAGE

The **StarWind** configuring is detailed in this section. Before you start please ensure that **StarWind** is installed on the host that is providing storage services to the VMware Workstation.

Create StarWind Disk

VMware needs a disk to store the settings of the virtual machine and a virtual hard drive to install a guest OS.

With **StarWind** you can share the virtual disk using various alternative methods. Depending on the physical type of the storage you use, you can create:

- Image File device
- SPTI device
- Disk Bridge device
- IBVolume device
- Mirror (RAID-1) device

Image File device

The **Image File** device creates a virtual iSCSI drive using the space of your real physical HDD. The resulting iSCSI storage will have the same structure as a "normal" HDD. The users connecting to the **Image File** drive will be able to format it using a custom file system, copy data to/from it, install applications and so on.

Physically the **Image File** device is represented as a file on your HDD. When you connect to the system with the **Image File Device** and properly mount the drive, it will appear as standard HDD on the computer, from which you connect. On the system where the image file device is actually stored it will be represented as a usual file ordinal file.

There are some limitations for the **Image File** device usage:

- As a virtual HDD uses the space of your real physical HDD the available volume is limited by the free space on that hard drive. If the size of your image file is close to the size of its host HDD you will not be able to store additional files on that disk.

- You cannot change the volume of the image file online (without disconnecting users from it). However, you can extend the volume while it is offline.

These limitations are obviously caused by the nature of the described method and actually no worse than using a physical HDD, which is limited by space and cannot be dynamically adjusted.

SPTI device

By using the **SPTI** device you can share any physical drive, be it a hard drive, CD burner, flash etc. The **SPTI** device support enables you to share a device as it is, no image files are required. All available space on a device is accessible. An **SPTI** device, physically located on a remote host, appears as a fully operational local drive on your PC.

Disk Bridge device

By using the **Disk Bridge** device you can share any physical drive. The **Disk Bridge** device support enables you to share a device as it is, no image files are required.

It works like sharing of the device with the SPTI module, but unlike the later the Disk Bridge module does complete emulation of the SCSI layer that allows any type of hard drives (PATA/SATA/RAID) to be used by remote initiator clients that are strongly demand iSCSI targets to be SCSI-3 compatible. For example, Vmware ESX can work with **Disk Bridge** targets well.

All available space on a device is accessible. A **Disk Bridge** device, physically located on a remote host, appears as a fully operational local drive on your PC.

IBVolume device

The **IBVolume** device support is the most advanced and powerful approach to sharing virtual drives. In contrast to general image file device, the **IBVolume** target does not allocate all required space on a hard drive at once. **IBVolume** target allocates as much space, as it required by the actual data. The allocated space is increased as more data is being written to the volume.

However, an **IBVolume** device cannot extend the volume, specified by the user at the beginning. If you specified 1 GB as the maximal **IBVolume** size than the **IBVolume** image will grow up to 1 GB but no more. Thus, if you plan to store much data, specify the large volume limit as you create a new **IBVolume** target. The volume size is limited by 2 TB.

The **IBVolume** plugin is not just a virtual storage. It provides you with tools to create a robust solid backup system.

The **IBVolume** plug-in can operate in one f the following modes:

- In the **Growing Image** mode the **IBVolume** device operates as the **ImageFile** eliminating its main limitation. The disk space is allocated dynamically as the actual data is written. No space is allocated for unused sectors. The Growing Image mode does not include snapshot and recovery support

- In the **Incremental Backup Volume** mode each initiator session is written to new journal. Journals are separate disk files that store data for user sessions. Use this option to add automatic backup to the basic functionality of **IBVolume** plug-in.

- The **Auto-Restored Snapshot** can be applied to support automatically restored images for environments like Internet cafe, remote training classes and so on. In this mode all changes done to the **IBVolume** device during an initiator session are discarded at the end of that session. When the new session is created it accesses a “clean” **IBVolume** device. All changes the user has done to the system during a session are discarded and a new session starts from the initial state.

- The **Read-Only** image mode enables you to secure the read-only access, which eliminates the ability to write any data to a volume.

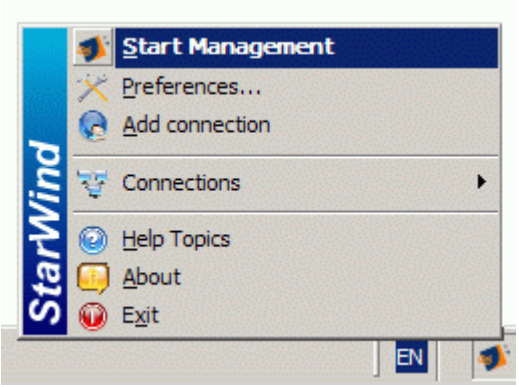
Mirror (RAID-1) device

Mirror (RAID-1) device creates virtual iSCSI target devices based on two source devices called mirrors. These devices can be local ImageFile-compatible data files or remote iSCSI targets. The first mirror is the main (or primary) mirror. The second one is used for failover or backup purposes. You can configure mirrors replication during creating new device and selecting the first mirror as local image file and the second one as remote iSCSI target. Also it is possible to set slow channel caching mode for the remote image to improve performance in slow networks.

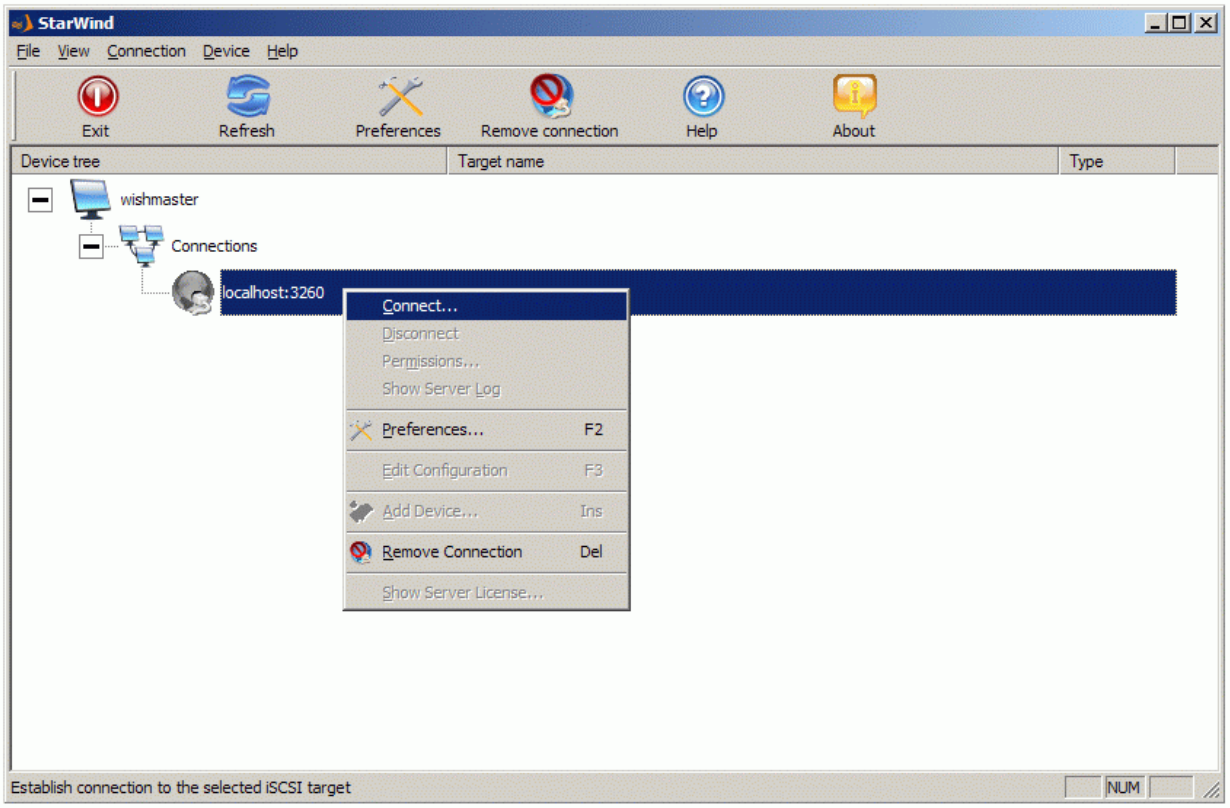
Configuring StarWind

Please follow the instructions below to create the **Image File** device share:

Launch the StarWind console selecting **Start->All Programs->Rocket Division Software->StarWind->StarWind**. After the console is launched its icon appears in the system tray. Double click the icon with the left mouse button or single click it with the right and select **Start Management** menu item from the pop-up menu.

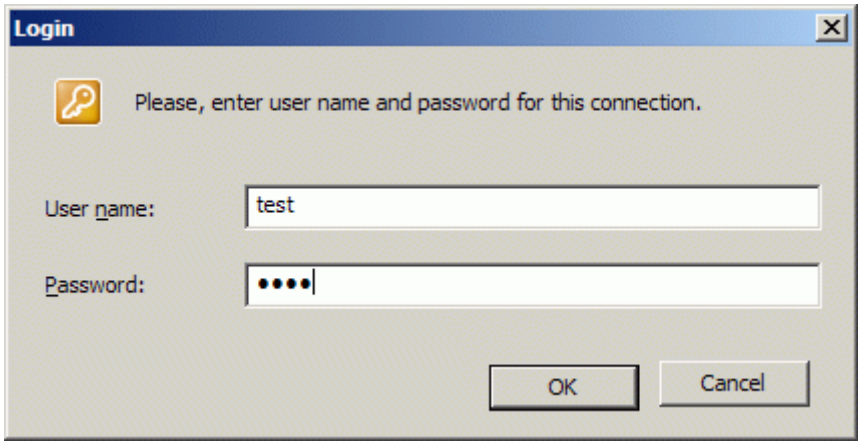


From the **Connections** tree please select the computer you wish to connect to. By default, there is a single item in the tree (localhost) which represents a loopback connection. Press the right mouse button over the desired host (computer) and select the **Connect…** menu item. You will be prompted to enter the login and password. Default ones are: **test**, **test**. You can always change them later.



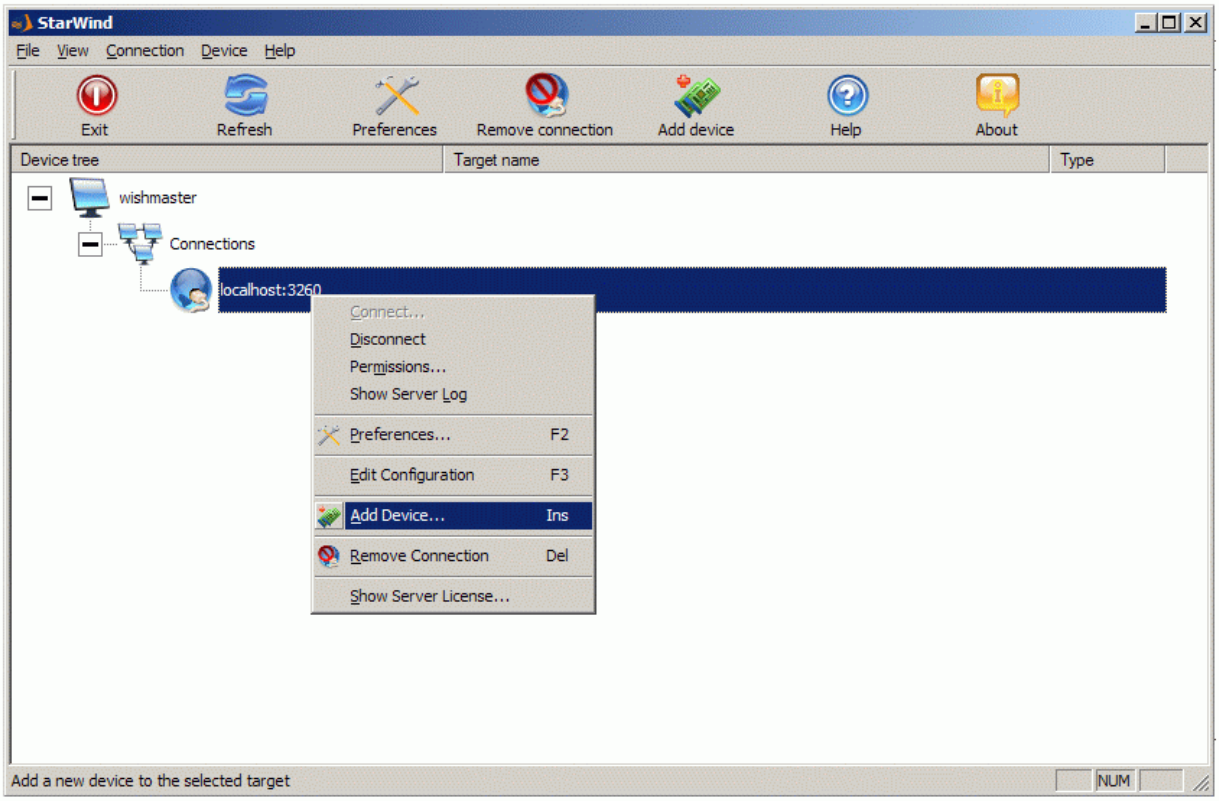
Select **Connect…** menu item to continue.

The Login dialog asking for the **User name** and the **Password** input looks like the one on the image shown below.



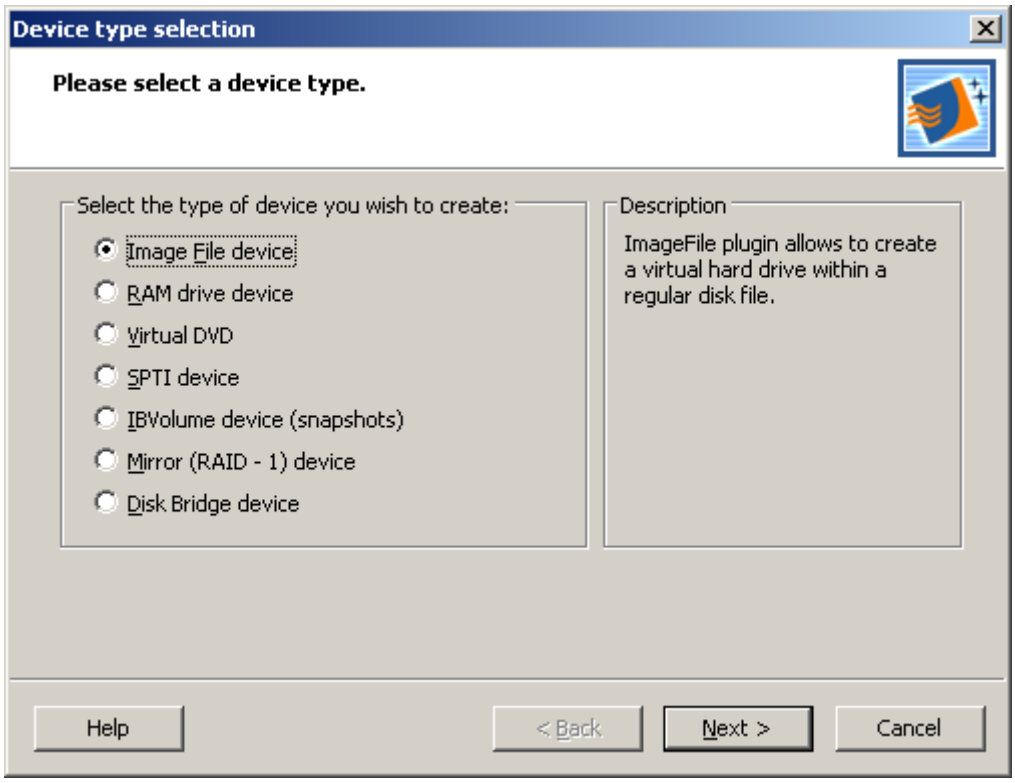
Press the **OK** button to continue.

After you have successfully connected to the **StarWind** service on the remote machine, please click the right mouse button over the desired host (computer).



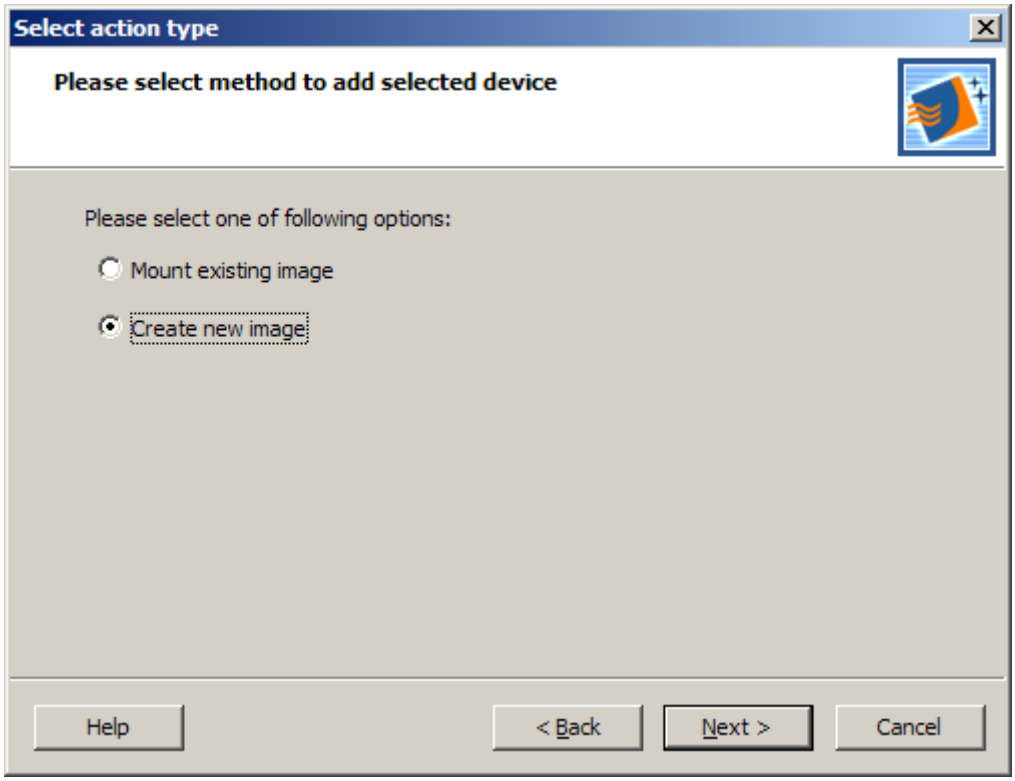
Select **Add device…** menu item to continue.

In the wizard that appears, please select **Image File device** (the brief description of each option is displayed in the right area of the wizard window). You can display the online help by pressing the **Help** button.



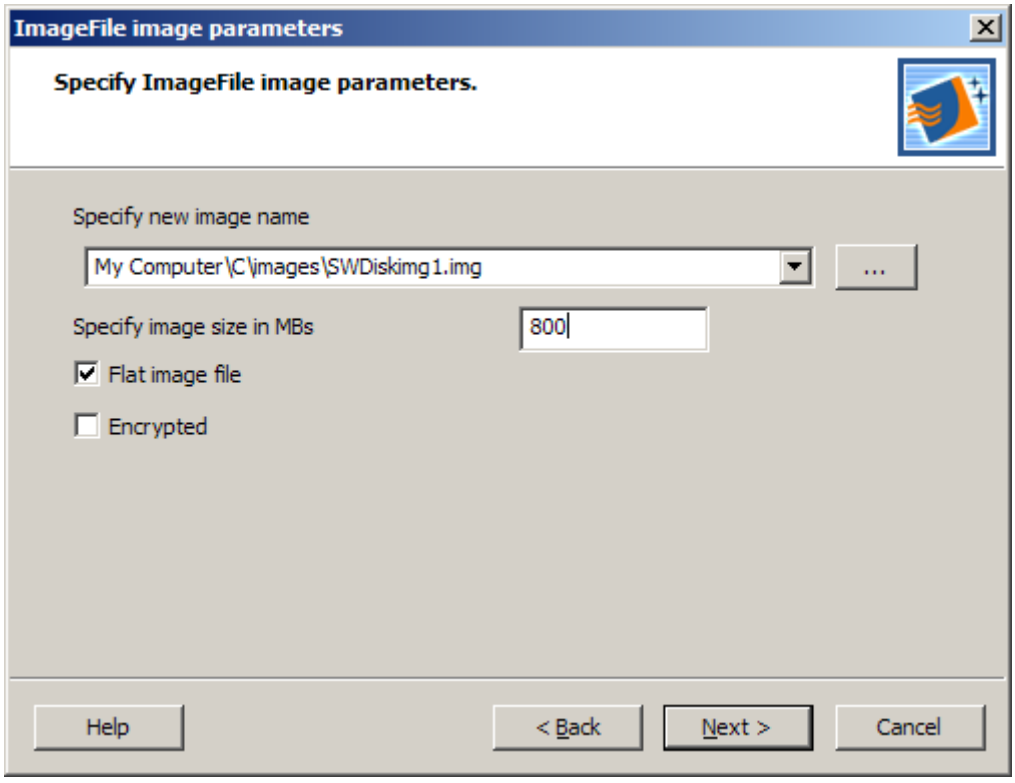
Press the **Next** button to continue.

Select **Create new image** to create a new hard disk image or **Mount existing image** to mount an existing image that you've prepared before.



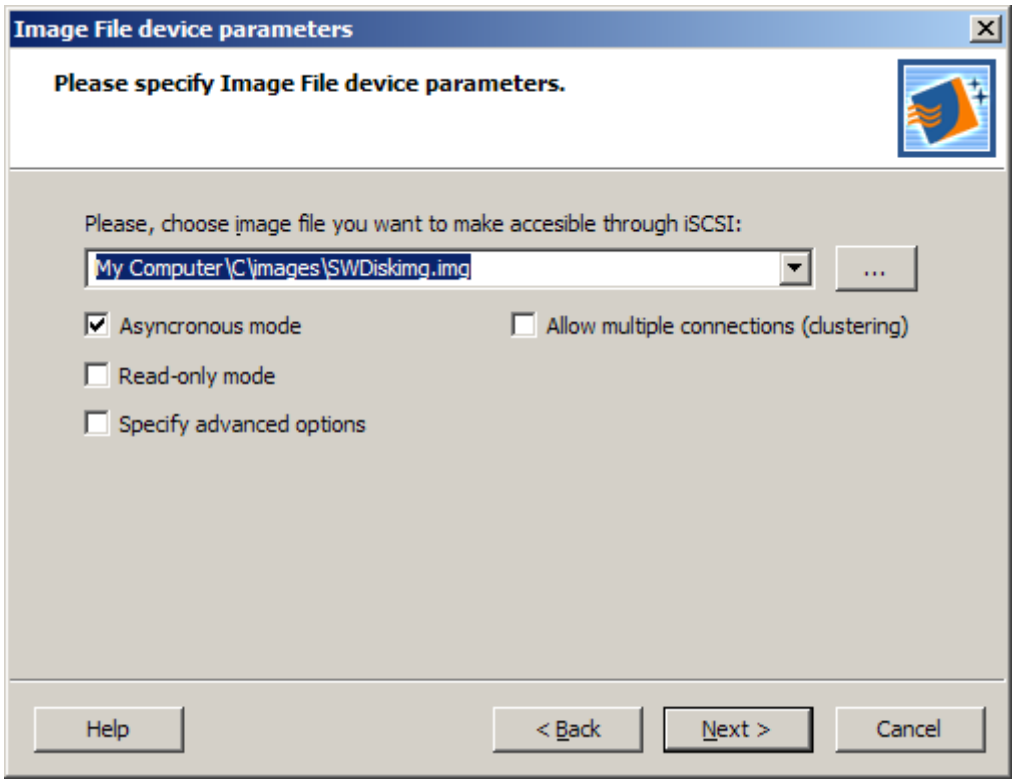
Press the **Next** button to continue.

If you have decided to create a new image file please specify the location and the name of the image you wish to be created. Also you have to provide the image size in megabytes. Check any additional parameters of the image you wish to create. Please refer to the online help for details regarding those additional parameters (**Flat image file**, **Compressed** and **Encrypted**).



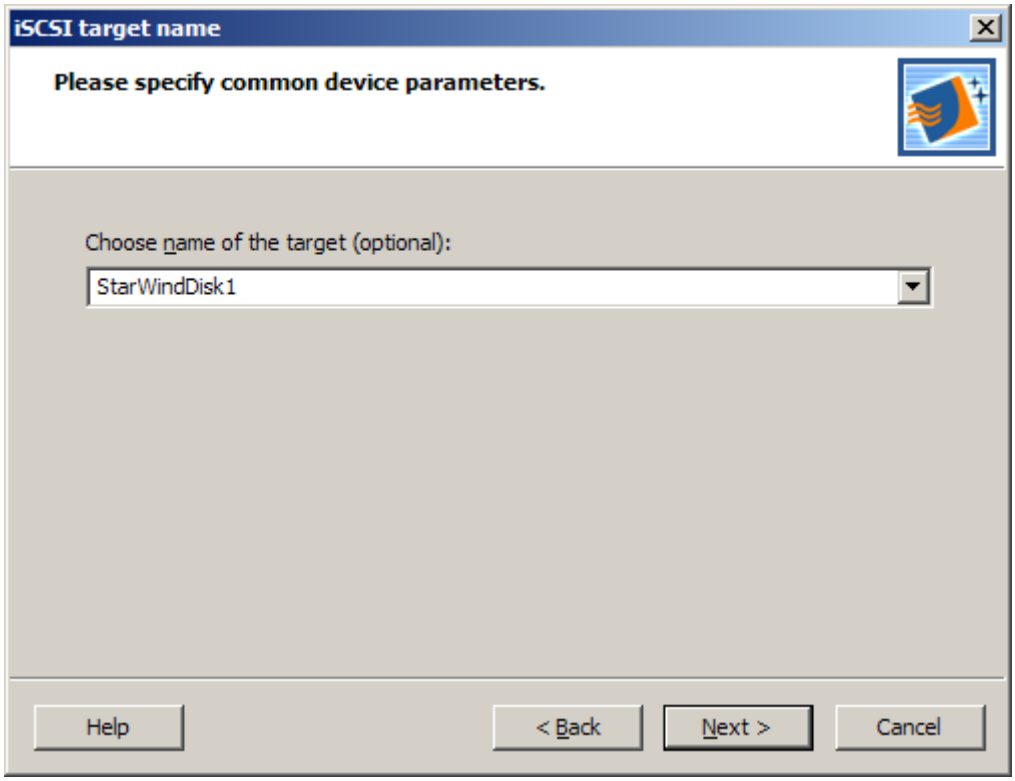
Press the **Next** button to continue.

Image file device has some extra parameters. Please refer to the online help for details regarding those additional parameters (**Asynchronous mode, Allow multiple concurrent iSCSI connections (clustering), Read-only mode and Specify advanced options**).



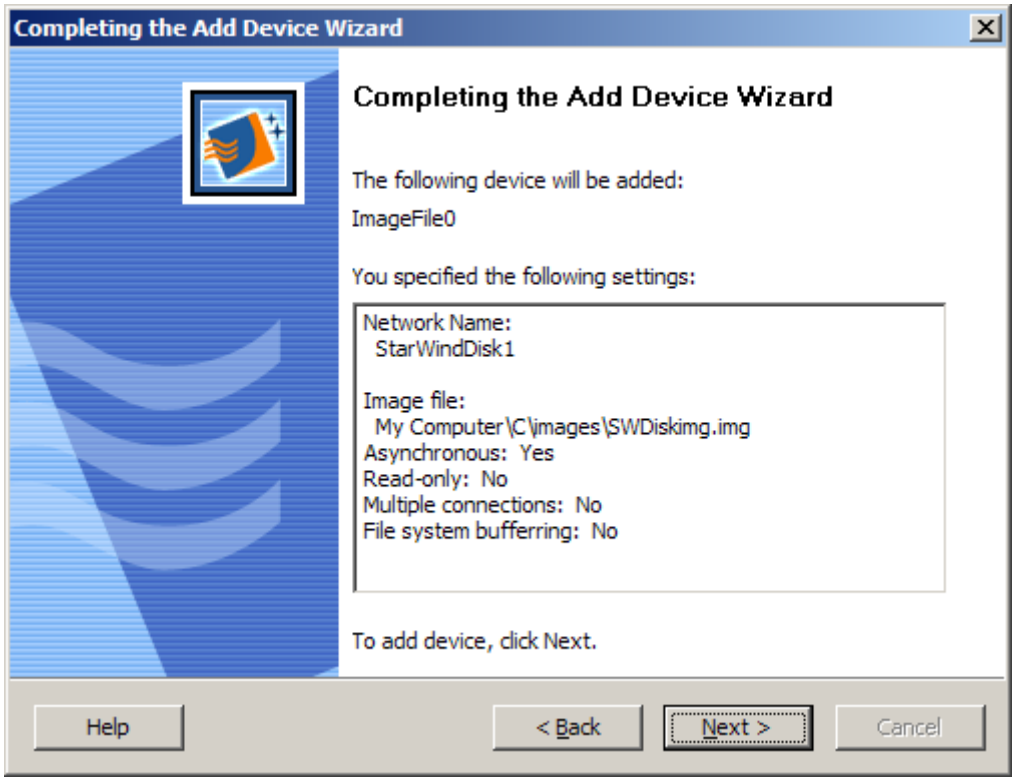
Press the **Next** button to continue.

Select an optional target name. Under this target name, the device will be declared to the iSCSI initiators connecting to the **StarWind** over an IP network.



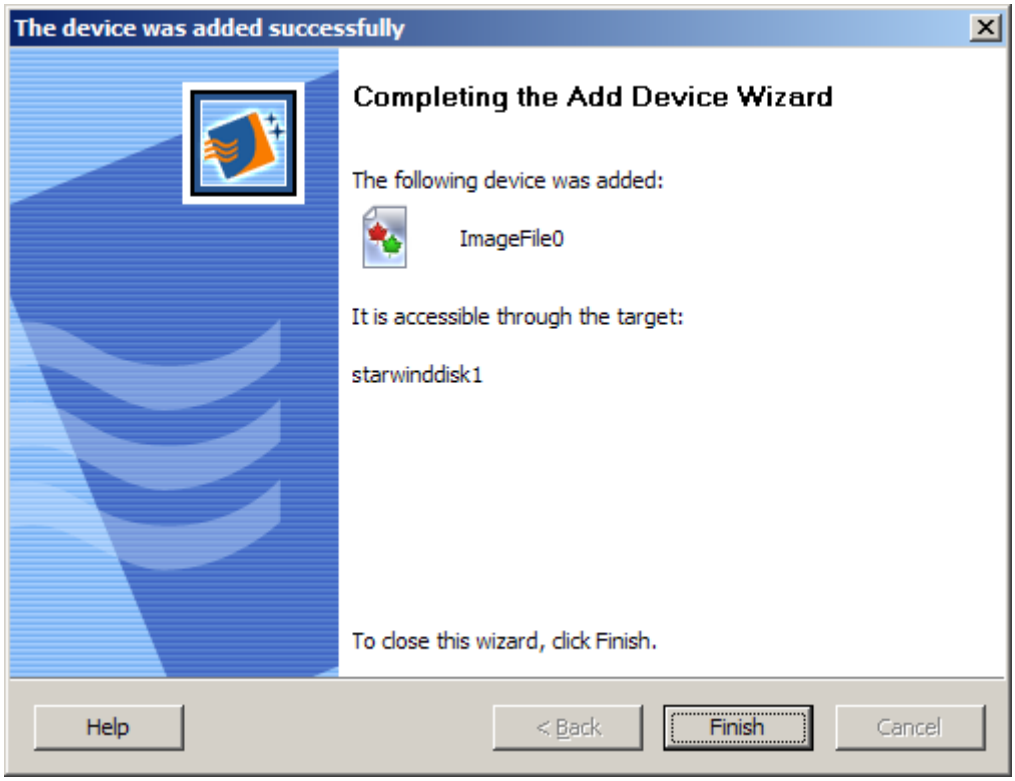
Press the **Next** button to continue.

Check if all of the device parameters are correct. Press the **Back** button if any changes are required.



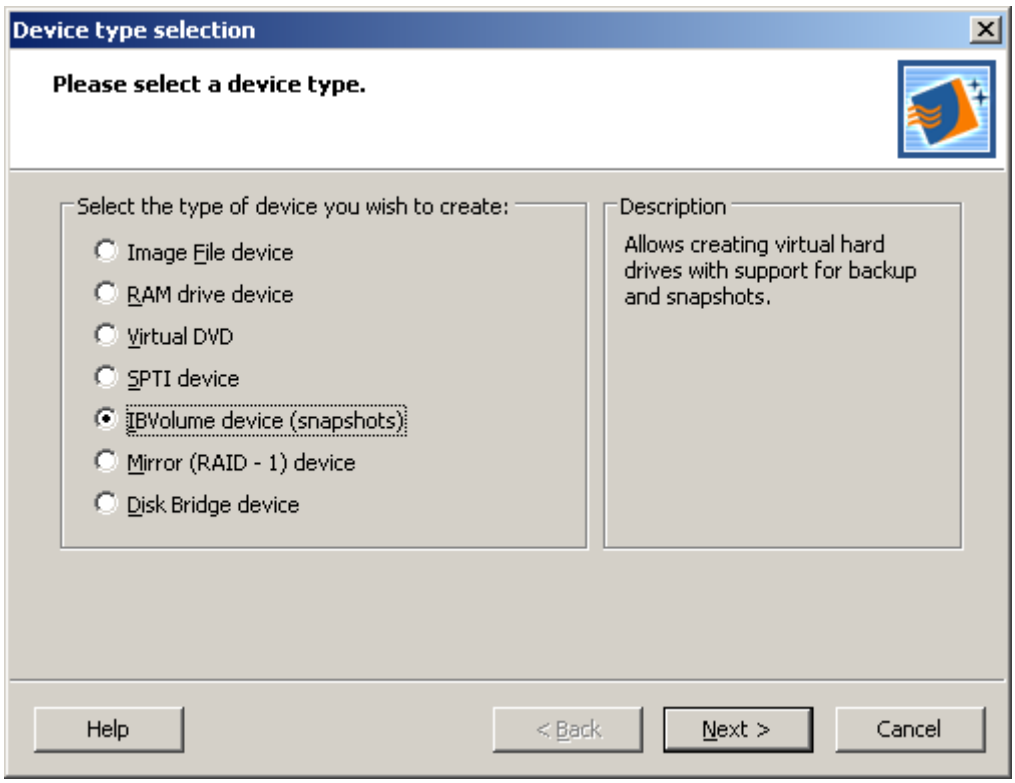
Press the **Next** button to continue.

The information about the recently created device is displayed on the last wizard page (see image below).



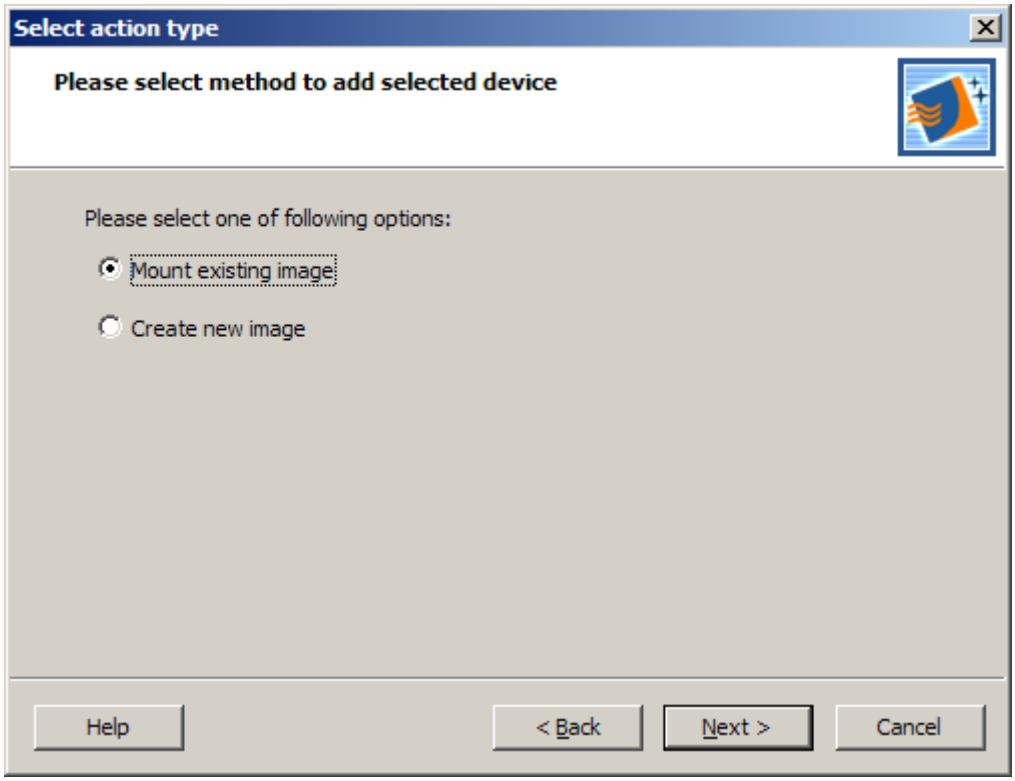
Press the **Finish** button to close the wizard.

Creating the IBVolume image is similar to the image file creating. In the Add Device Wizard that appears, select **IBVolume device**. A brief description of each option is displayed in the right area of the wizard window and context sensitive help is also available by pressing the Help button.



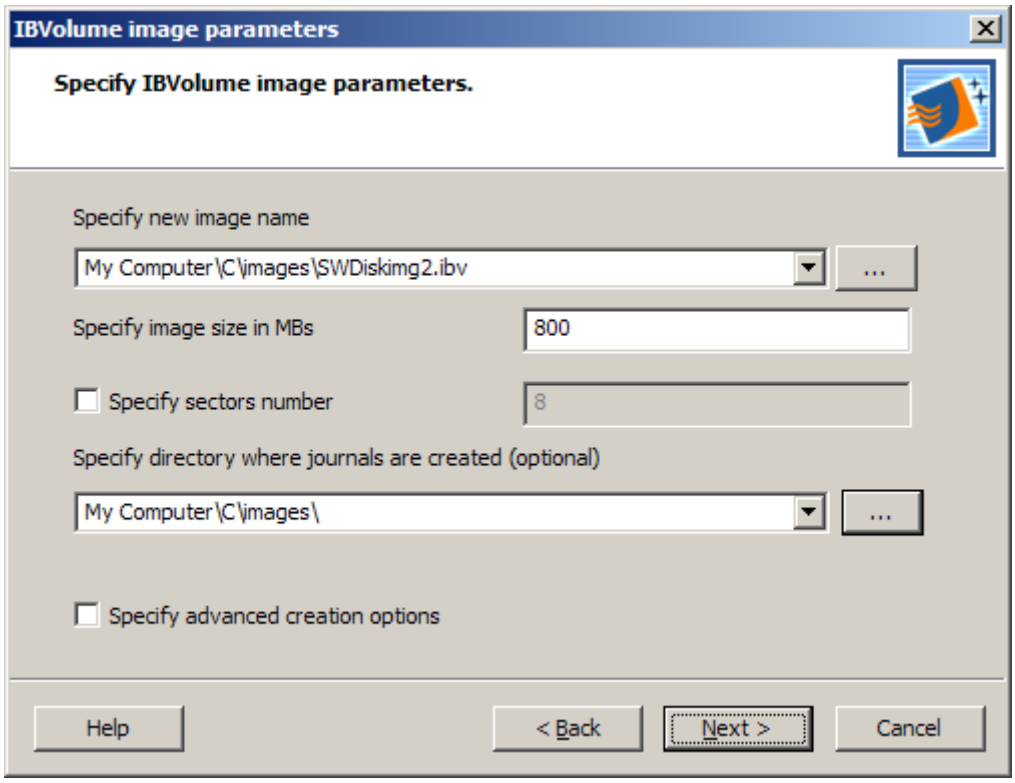
Press the **Next** button to continue.

Select **Create new image** to create a new hard disk image or **Mount existing image** to mount an existing image that you've prepared before.



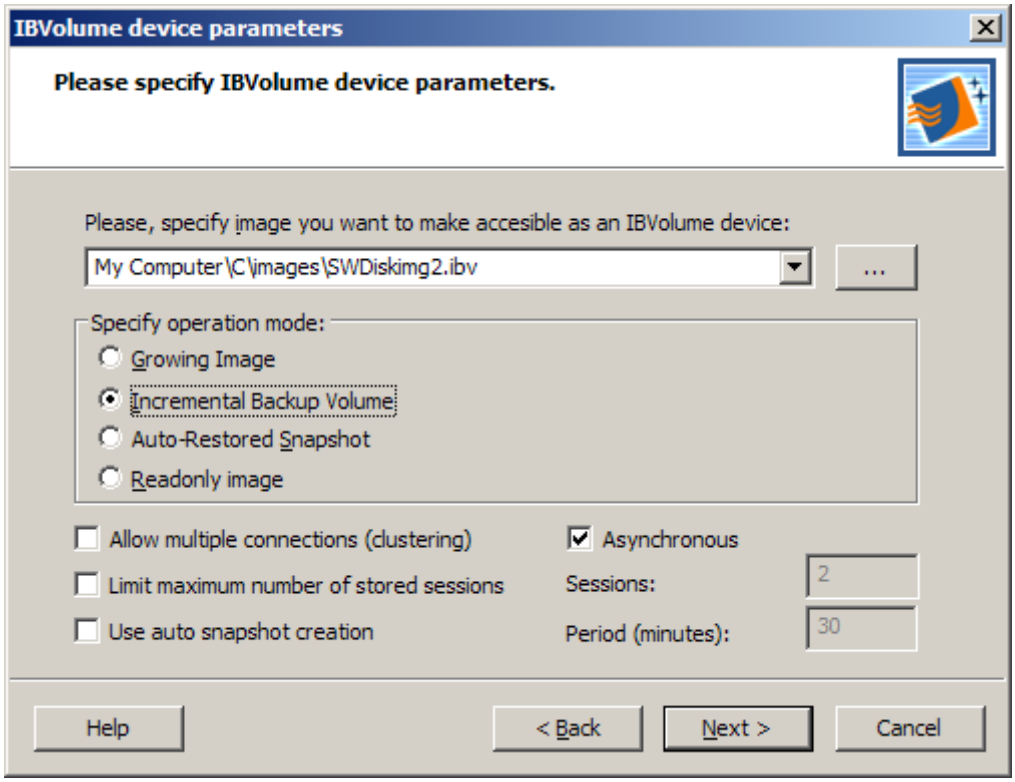
Press the **Next** button to continue.

If you have decided to create a new image file, specify the location and the name of the image you wish to be created. The image size is specified in megabytes. Refer to the online help for details regarding additional parameters.



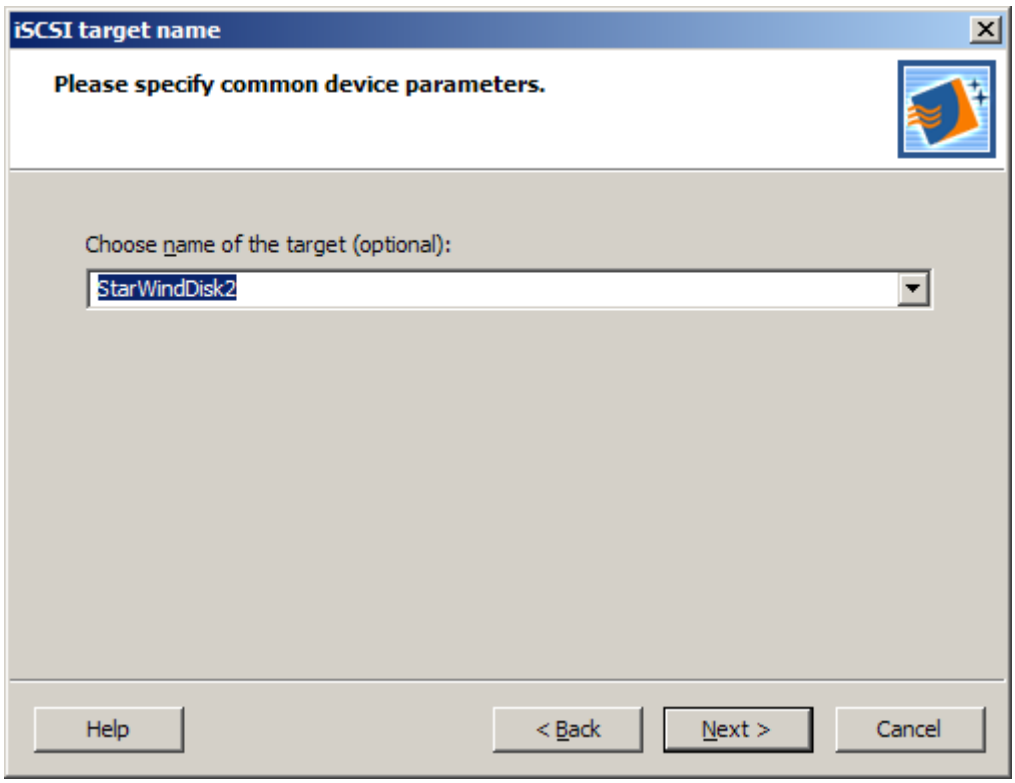
Press the **Next** button to continue.

You can create an IBVolume image by making a new image or cloning of the existing one. Also it is possible to create an IBVolume image from an existing ImageFile image. You can do this using advanced creation option. Please, refer to the corresponding help topics for details.
After the image is created, you can select the type of the device operation and other relevant options (please refer to the online help for details).



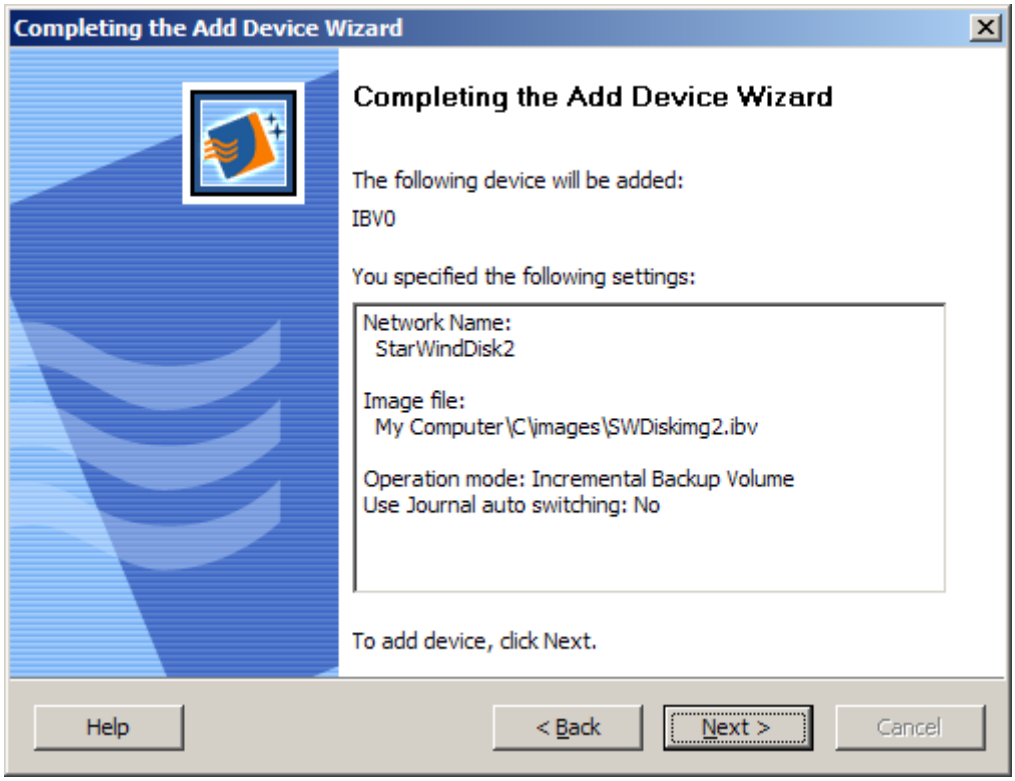
Press the **Next** button to continue.

Select an optional target name. The name must be a unique name by which the device will be declared to the iSCSI initiators connecting to StarWind over an IP network. It is also best practise to name the devices using recognisable sequences such as ‘host machine name’.’type of device’.’name of device’.



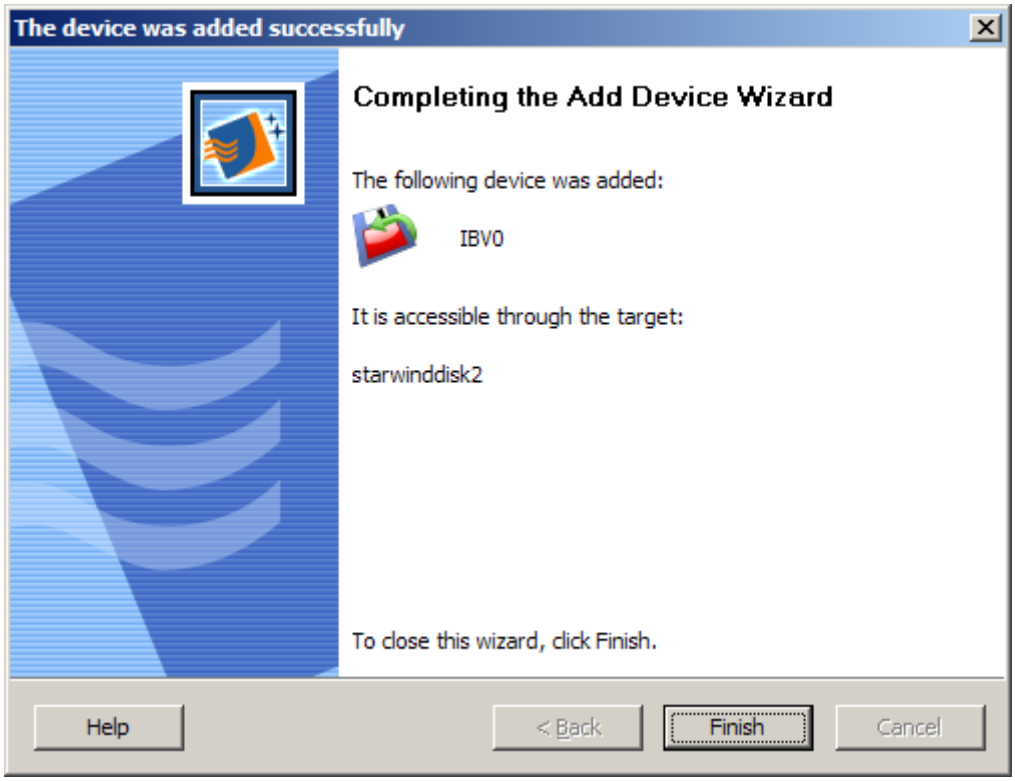
Press the **Next** button to continue.

Check the device parameters are correct. Press the Back button should any changes be required.



Press the **Next** button to continue.

A summary of the created device is displayed on the last wizard page (see image below).



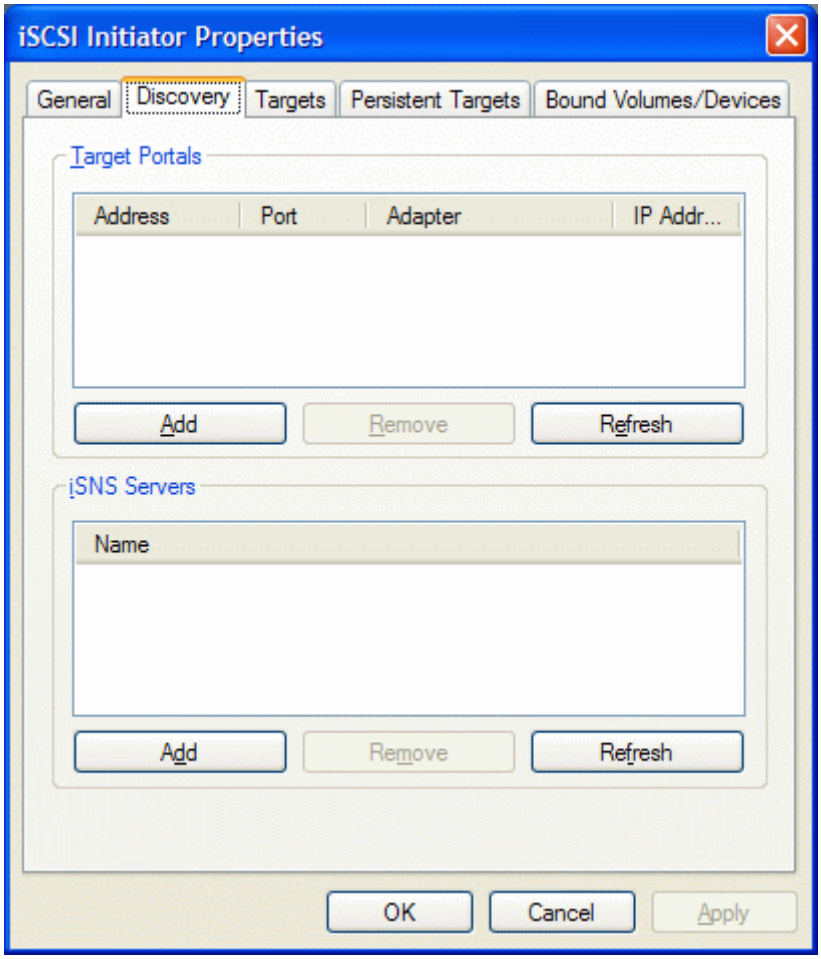
Press the **Finish** button to close the wizard.

CONNECTING REMOTE DEVICE IN MS ISCSI INITIATOR

Launch the Microsoft iSCSI Software Initiator application

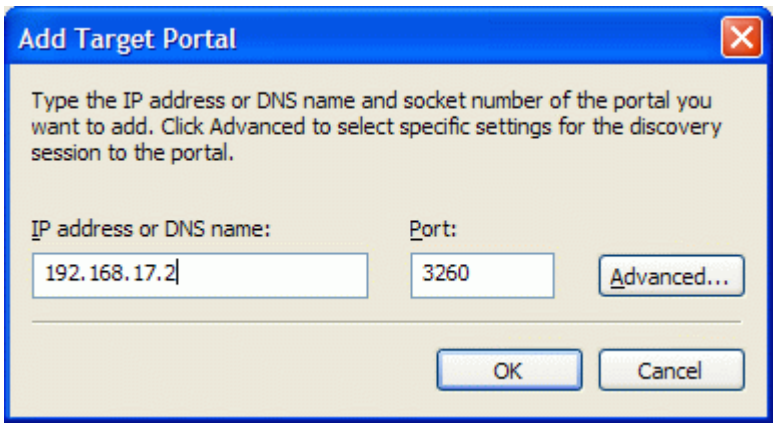
Start->All Programs->Microsoft iSCSI Initiator-> Microsoft iSCSI Initiator.

Switch to the Discovery tab.



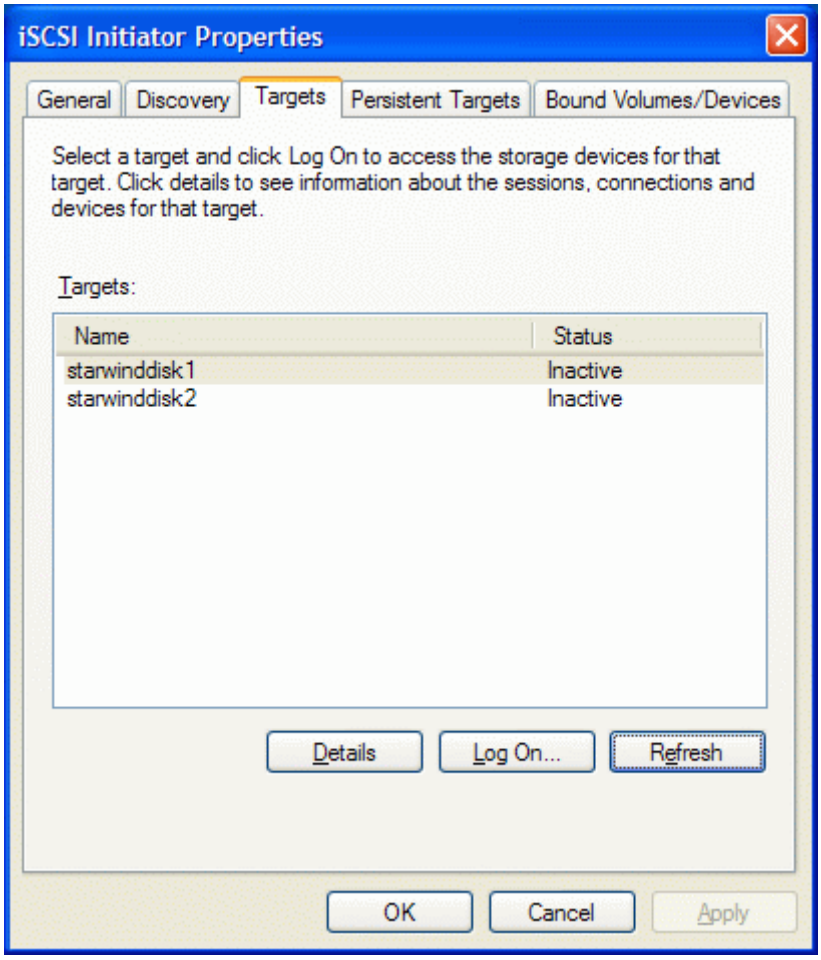
Click **Add** in the Target Portals group.

In the 'Add Target Portal' dialog, type in the **IP address** of the computer with **StarWind** installed and port number assigned to **StarWind** (default : 3260).



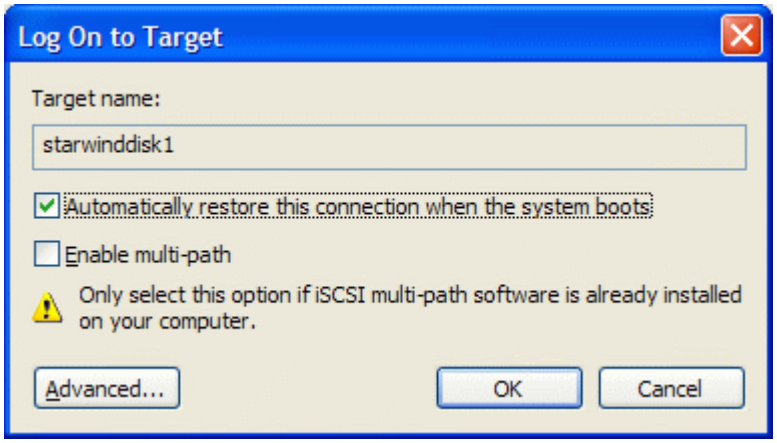
Press the **OK** button to continue.

Switch to the Targets tab. Select the target name from the list (if no targets are listed, press the Refresh button).



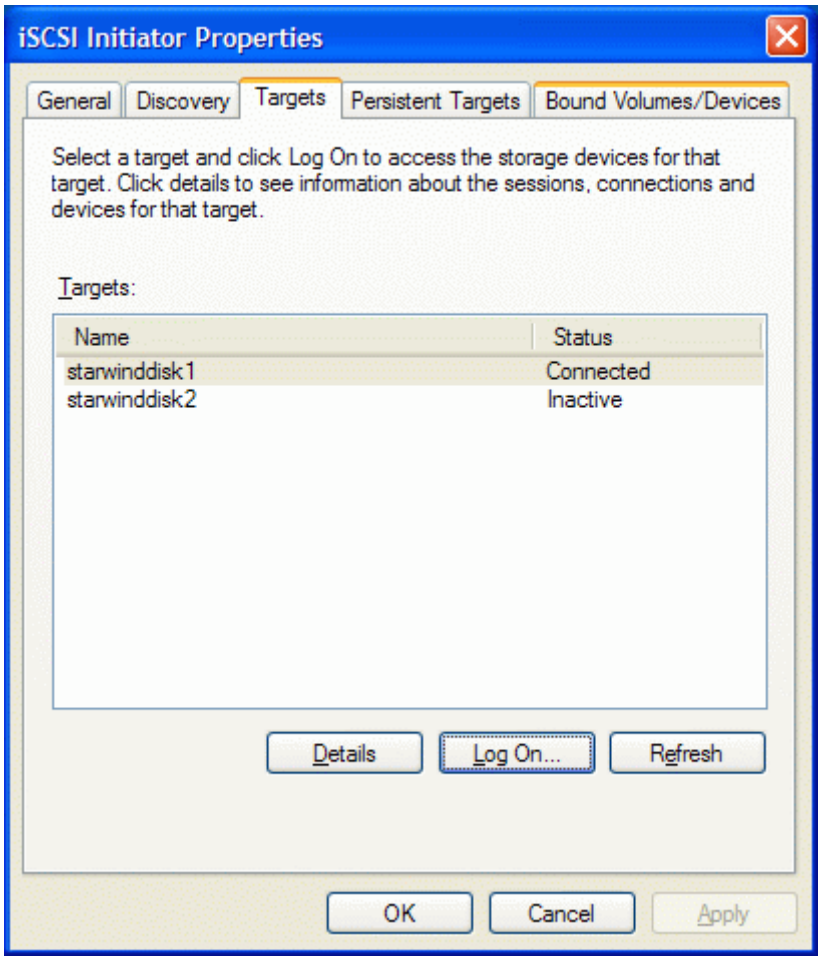
Press the **Log On…** button.

In the ‘Log On to Target’ dialog, enable the ‘Automatically restore this connection when the system boots’ checkbox.



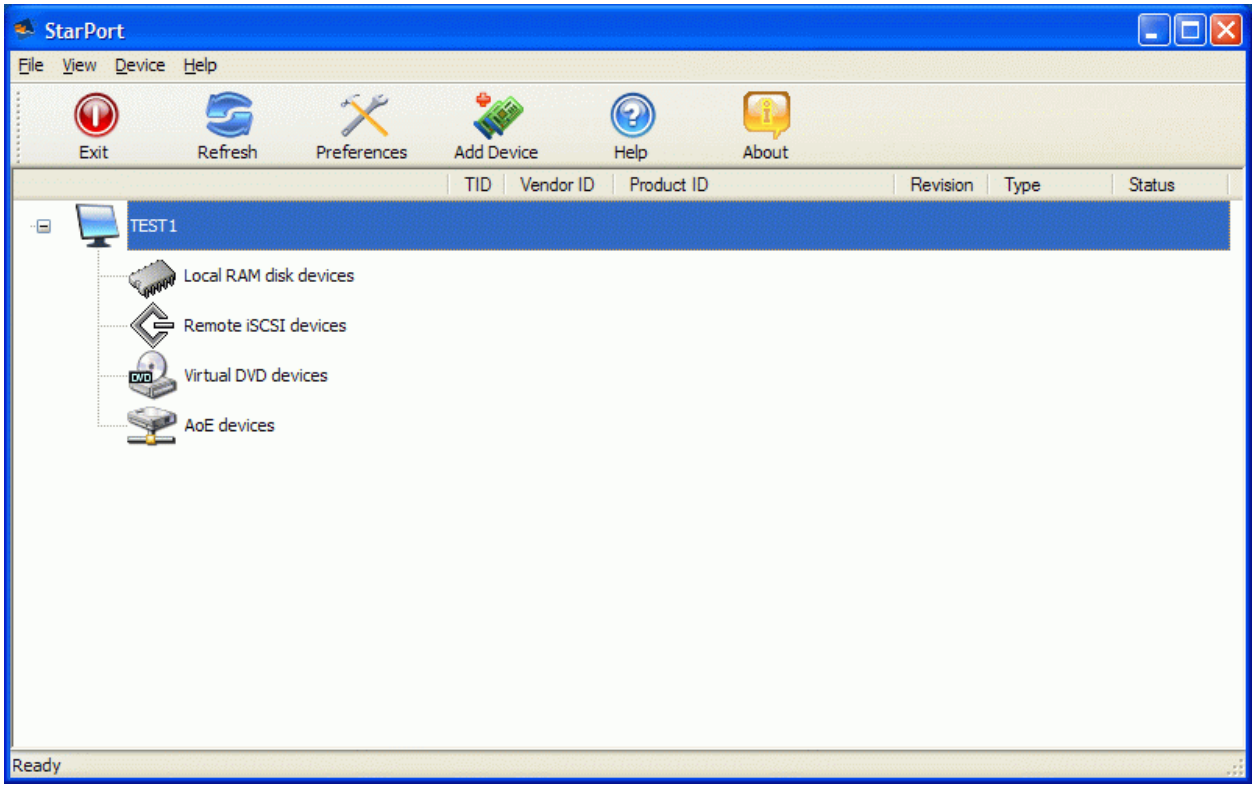
Press the **OK** button to continue.

If the logon is successful, the iSCSI device will show as ‘Connected’. It may take a few seconds for the device to appear in Windows.



CONNECTING REMOTE DEVICE IN STARPORT

Launch the **StarPort** console by selecting **Start**->**All Programs**->**Rocket Division Software**->**StarPort**->**StarPort**. Whenever the **StarPort** console is running, its icon appears in the system tray.
The **StarPort** console may be accessed by either double clicking the icon using the left mouse button or single click with the right mouse button and selecting the **Start Management** menu item from the pop-up menu.

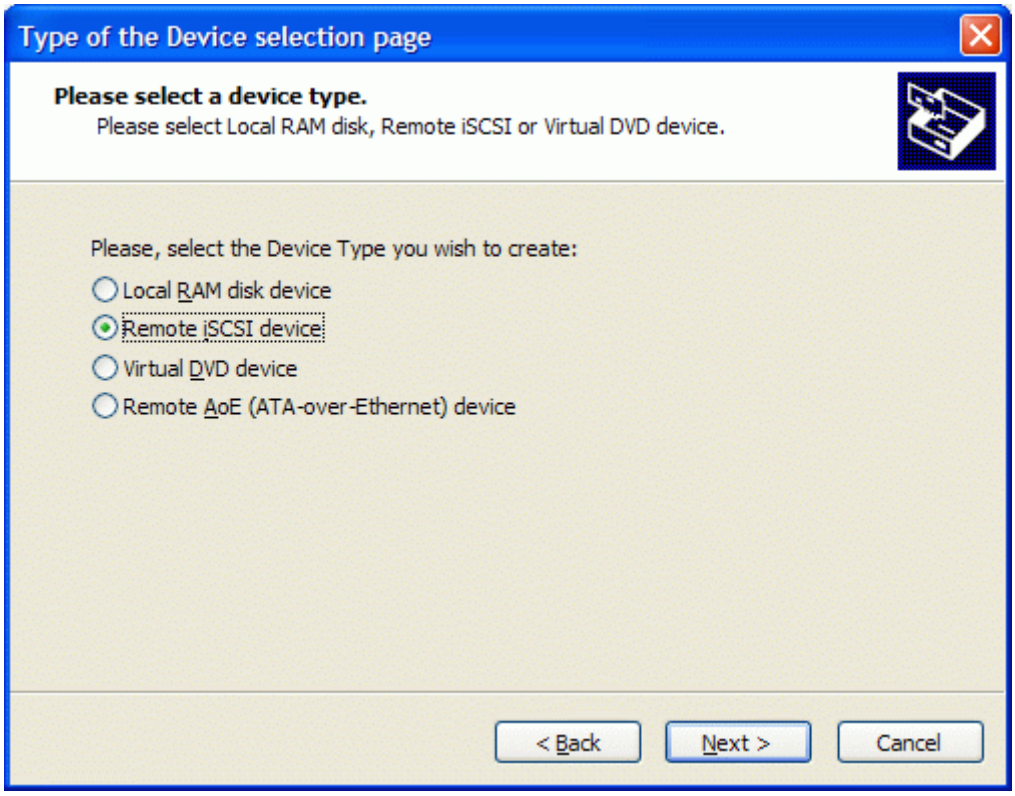


Select the **Add Device…** menu item to continue.

Welcome to new device installation wizard will appears.

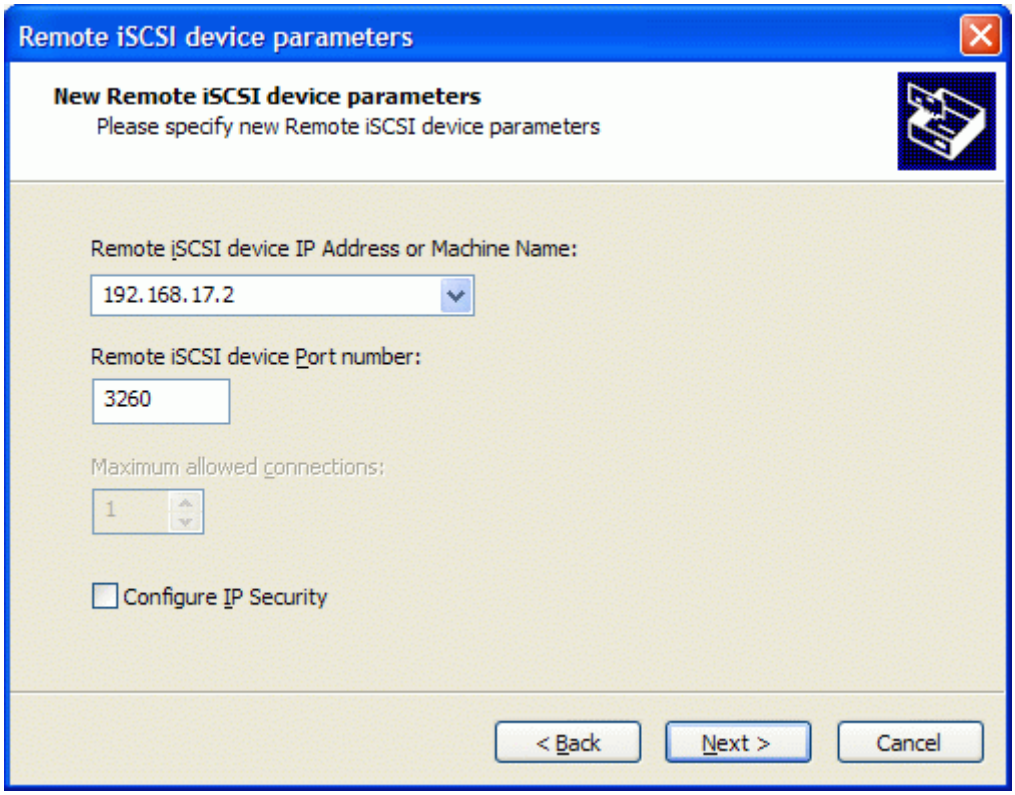
Press the **Next** button to continue.

Select **Remote iSCSI device** option.



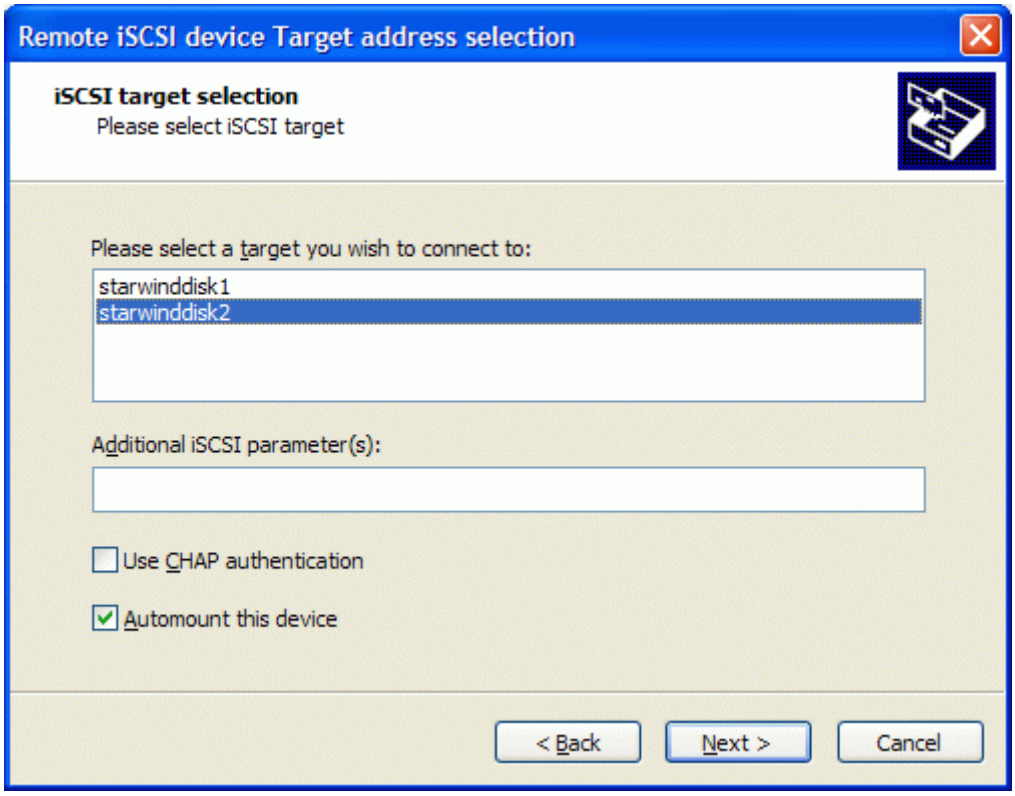
Press the **Next** button to continue.

Type in the **IP address** of the computer with **StarWind** installed and port of that machine.



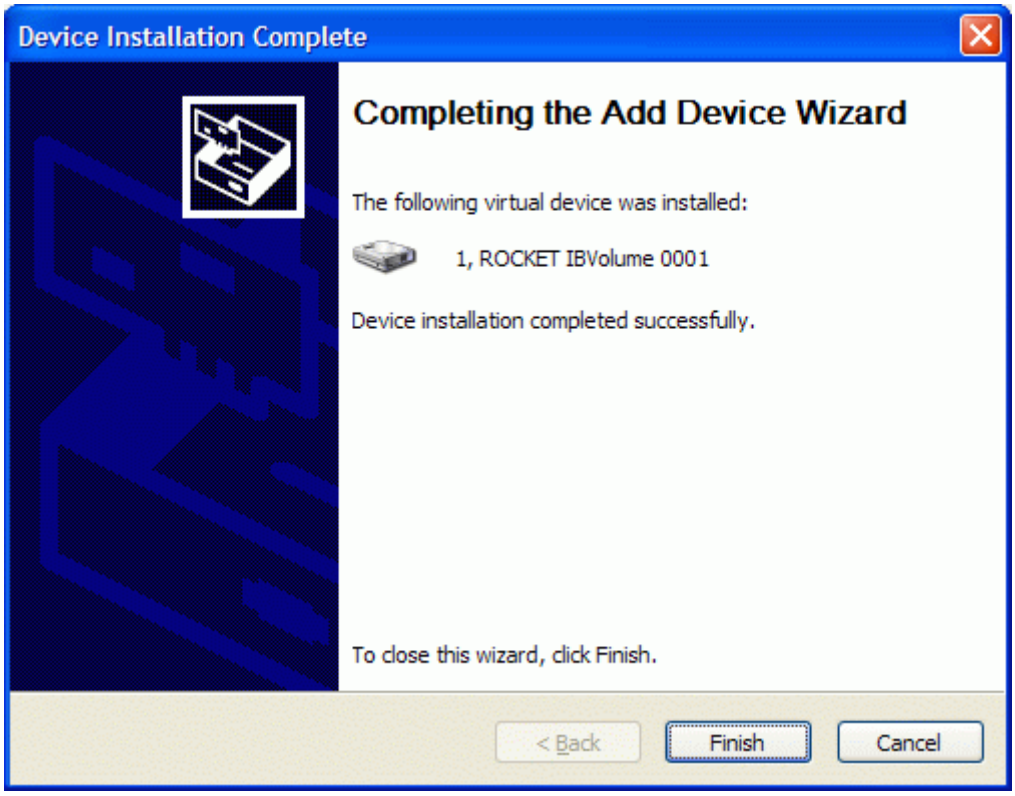
Press the **Next** button to continue.

Select the target from list.



Press the **Next** button to connect to the target.

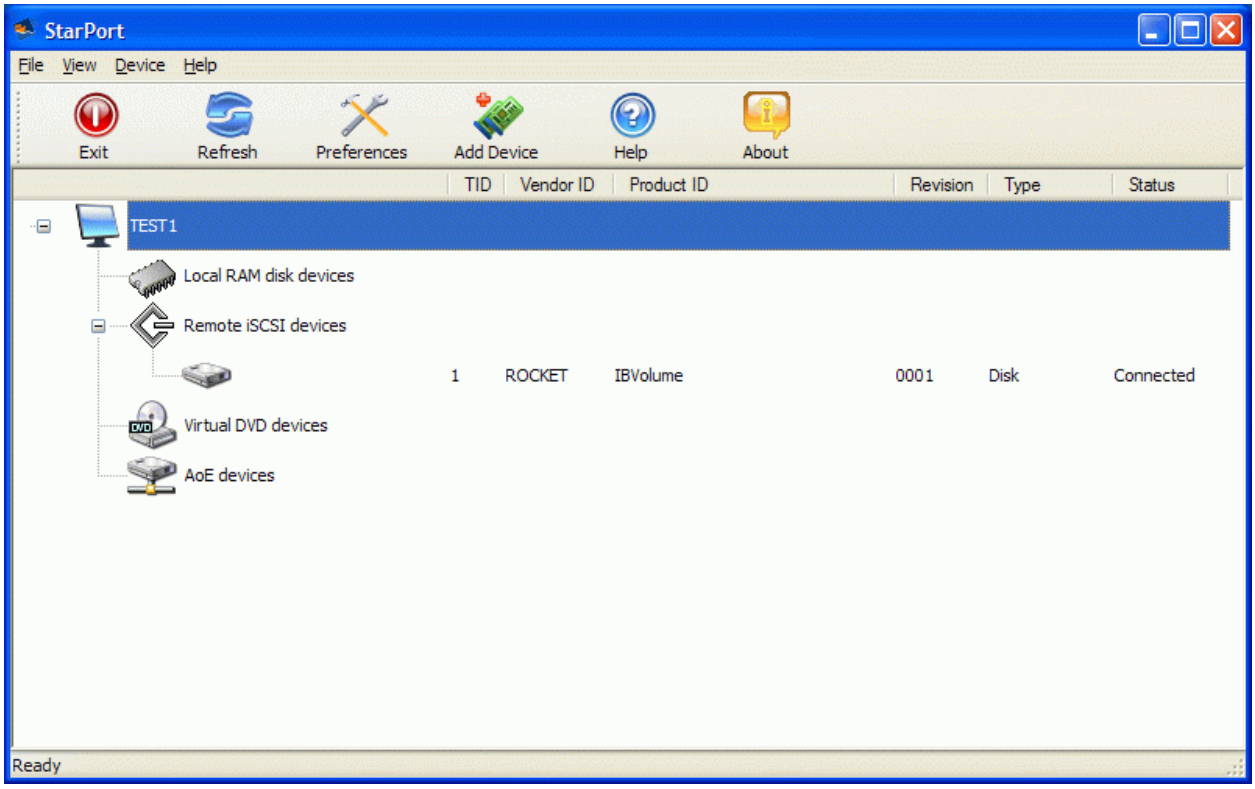
On the last step of the Wizard press finish button.



Press the **Finish** button to close the wizard.

After these steps the device will be accessible from client computer.

If everything went fine, the StarPort console should look like the sample image provided below.



You can connect both of these devices using only StarPort or MS iSCSI Initiator.

CONFIGURING HOST

After you have created a **StarWind** iSCSI target, it is ready to service connections. After you have established a connection to an iSCSI target, it appears as a new disk resource in the Disk Management Console. This section describes the operations you need to complete to create and format the partition in the way that VMware can create and install virtual machines on it.

INITIALIZE ISCSI DEVICE

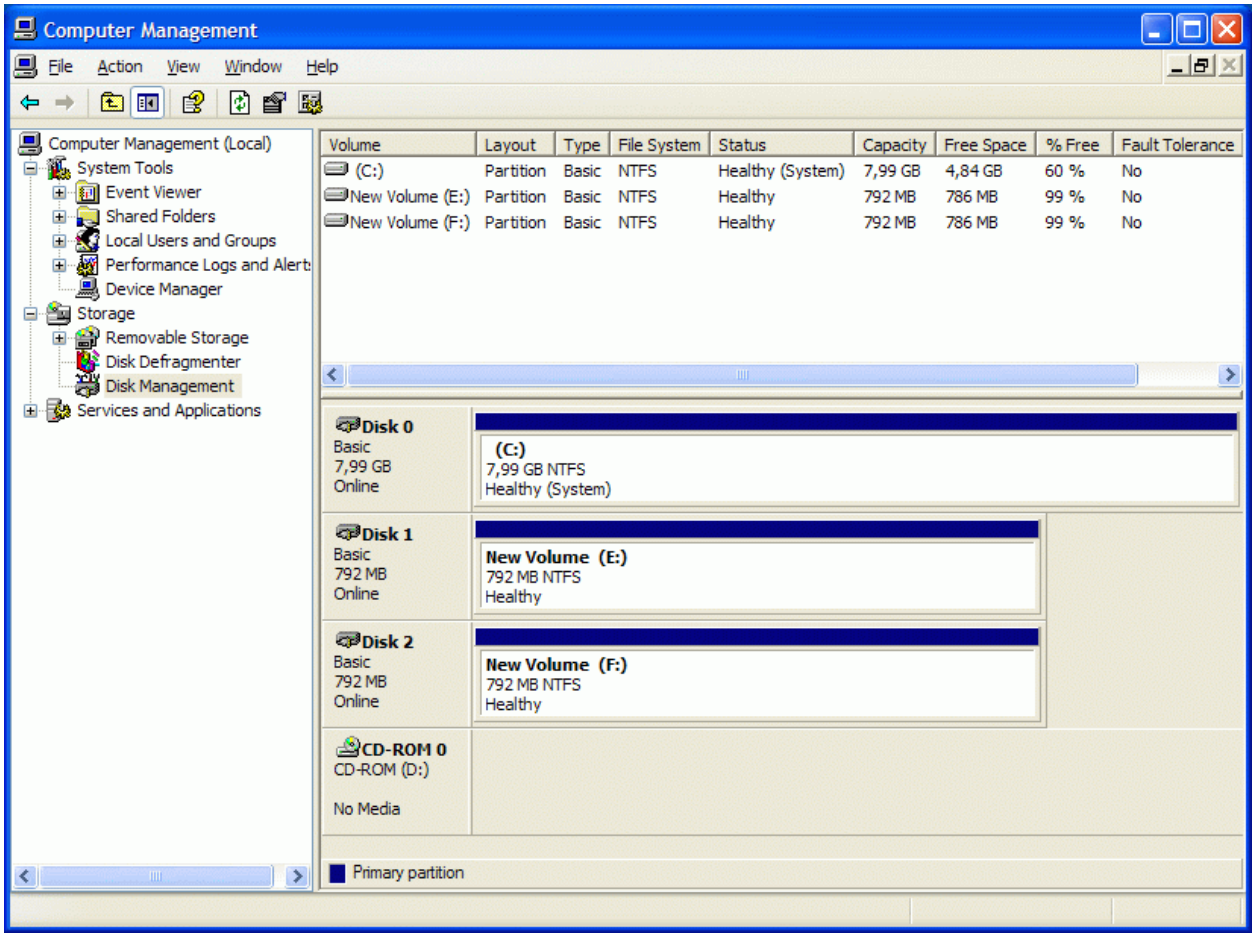
Launch the **Computer Management Console** and expand the **Disk Management** group in the **Storage** section.
If the new iSCSI disk is not initialized yet, the **Initialize and Convert Disk Wizard** will appear (on Windows 2000 systems the **Write Disk Signature Wizard** will appear). If the disk is already been initialized, the Wizard does not appear. Follow the instructions on the wizard to initialize the disk.

Press the **Next** button and follow the wizard instruction to initialize the disk.

Keep the disk as a **Basic Disk**. Use **Disk Management** to create and format the partition.

Press the **Next** button and follow the wizard instruction to create a new partition.

The disks are initialized, partitioned and formatted.



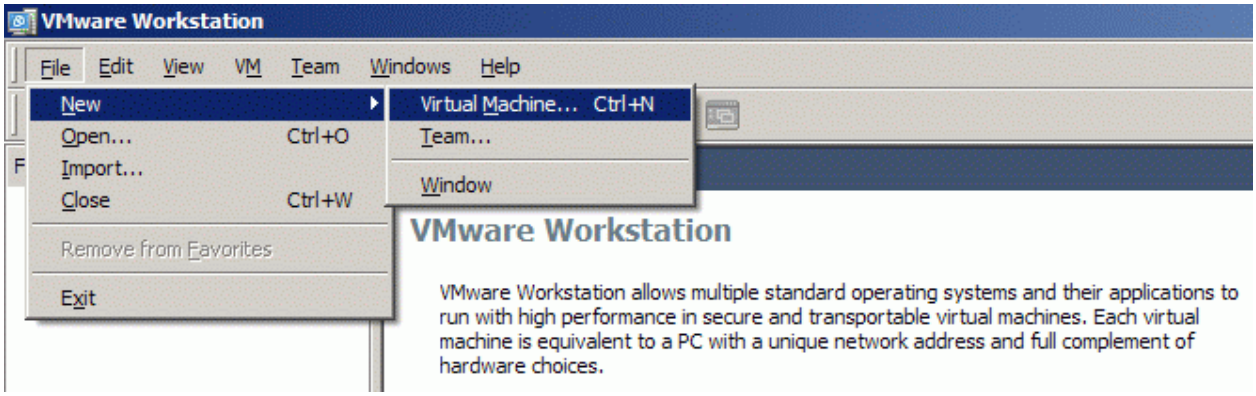
CONFIGURING VMWARE WORKSTATION

After you have partitioned and formatted the iSCSI disk, you can start configuring VMware Workstation to use it. This section describes the steps that you need to take to create a virtual machine and install the guest operating system onto the newly created drive. For more detailed information about VMware, please refer to the VMware help resources.

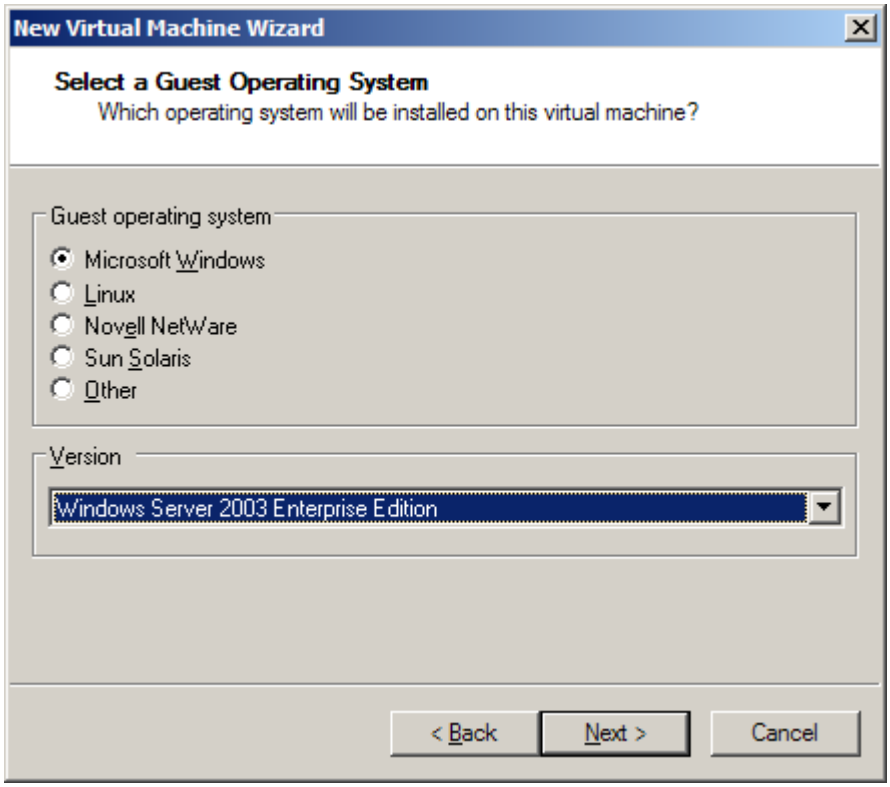
Launch VMware Workstation

Start->All Programs->VMware->VMware Workstation

Select File->New->Virtual Machine…

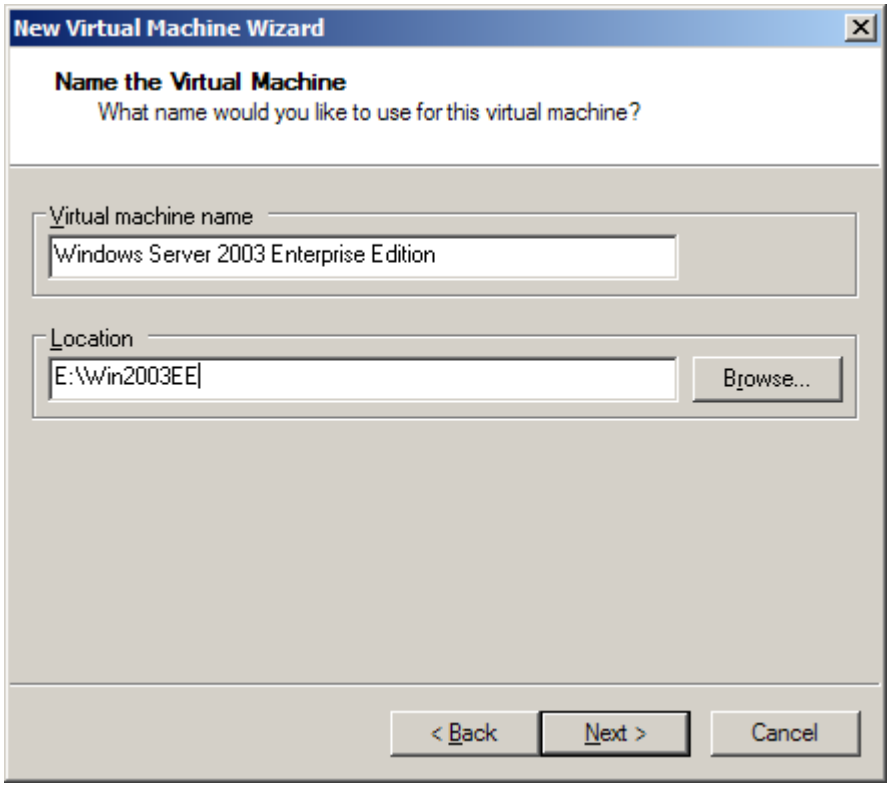


Select a Guest Operation System to be installed.



Press the **Next** button to continue.

Specify the name of the virtual machine you wish to create in the **Virtual machine name** field and the location (full path) of the virtual machine.

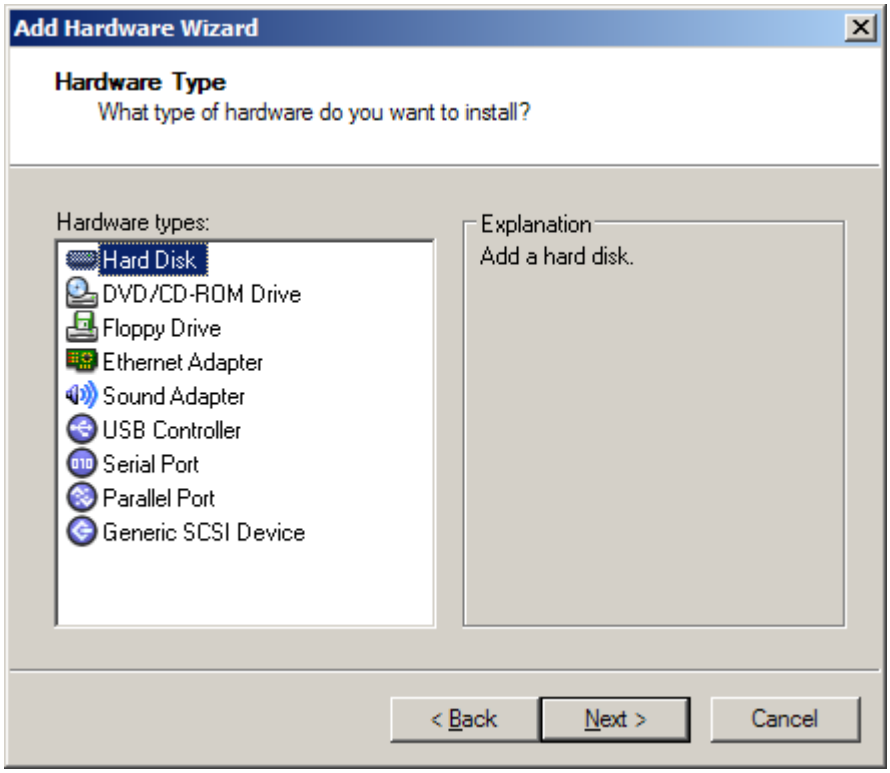


Press the **Next** button to continue.

Optionally you can customize the other options (for example network adapter, memory etc.) by selecting VM ->Settings. For example to create new hard disk you must complete the following steps.

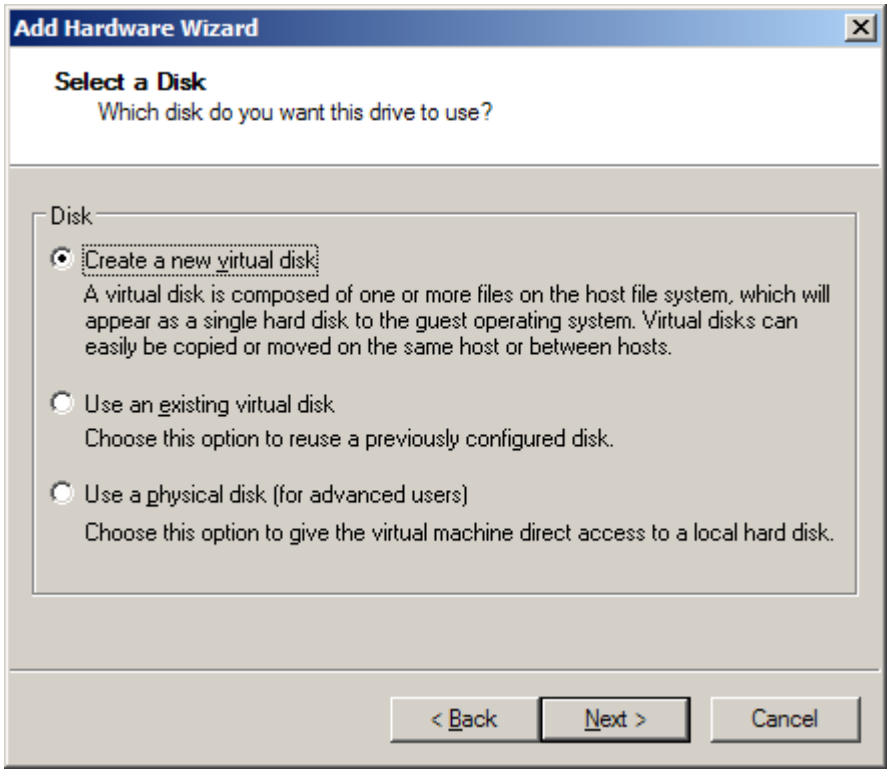
In Virtual Machine settings press the **Add…** button

Add hardware wizard will appears. Select a hardware type you wish to add. In our case it is hard disk.



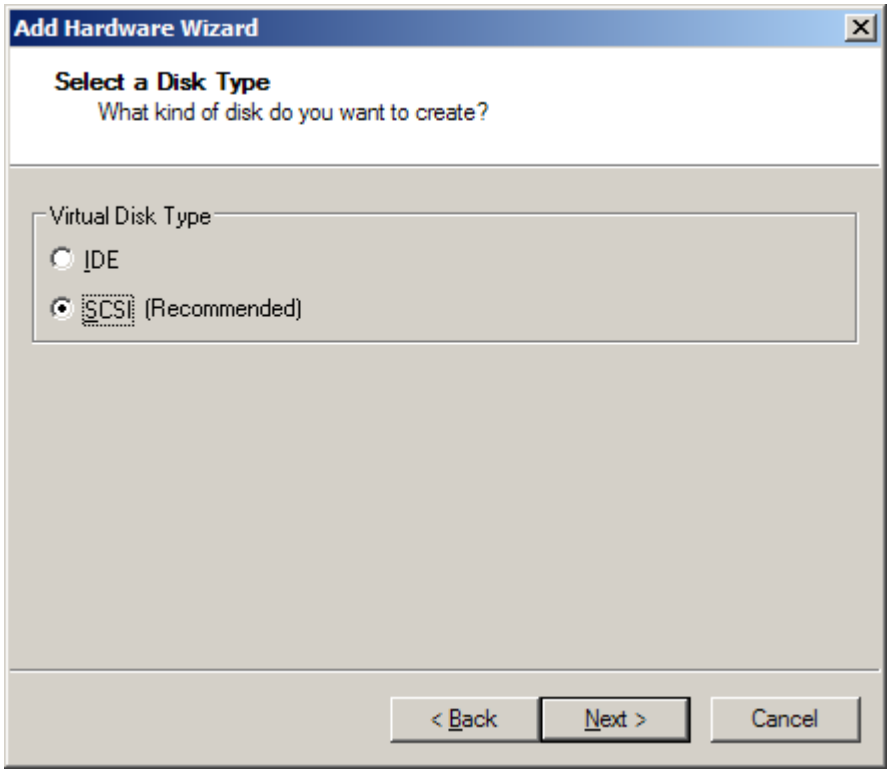
Press the **Next** button to continue.

Select Create a new virtual disk.



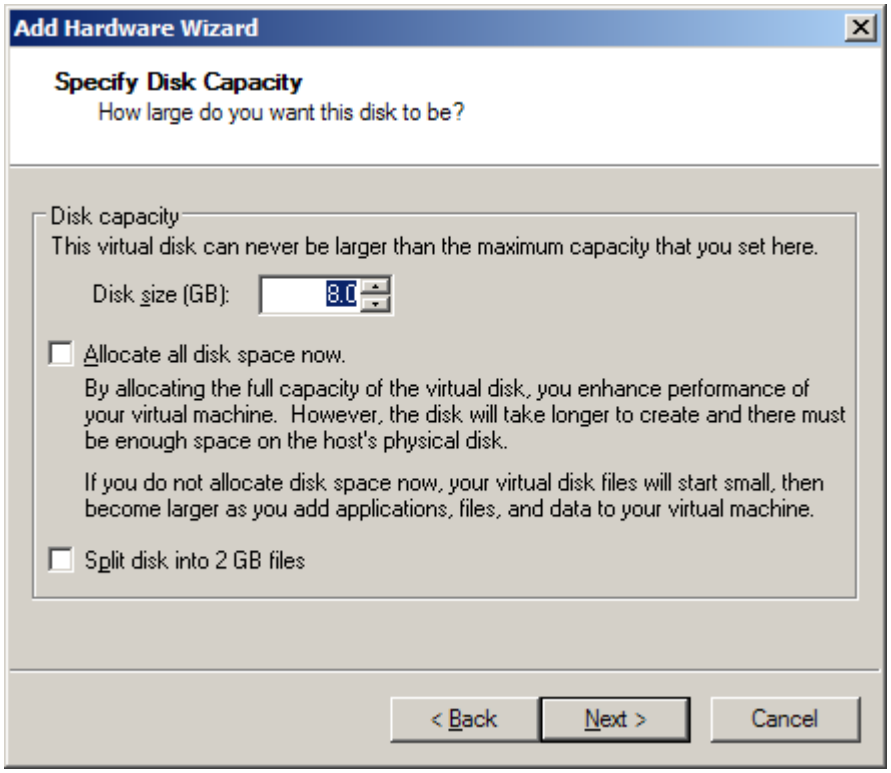
Press the **Next** button to continue.

Specify a Disk Type.



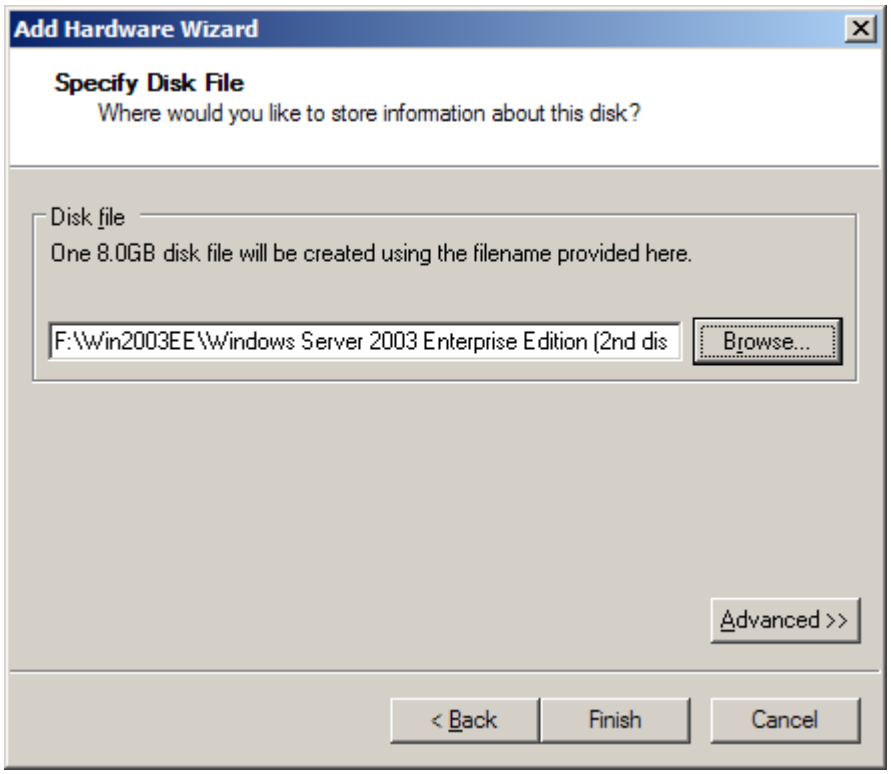
Press the **Next** button to continue.

Specify Disk Capacity.



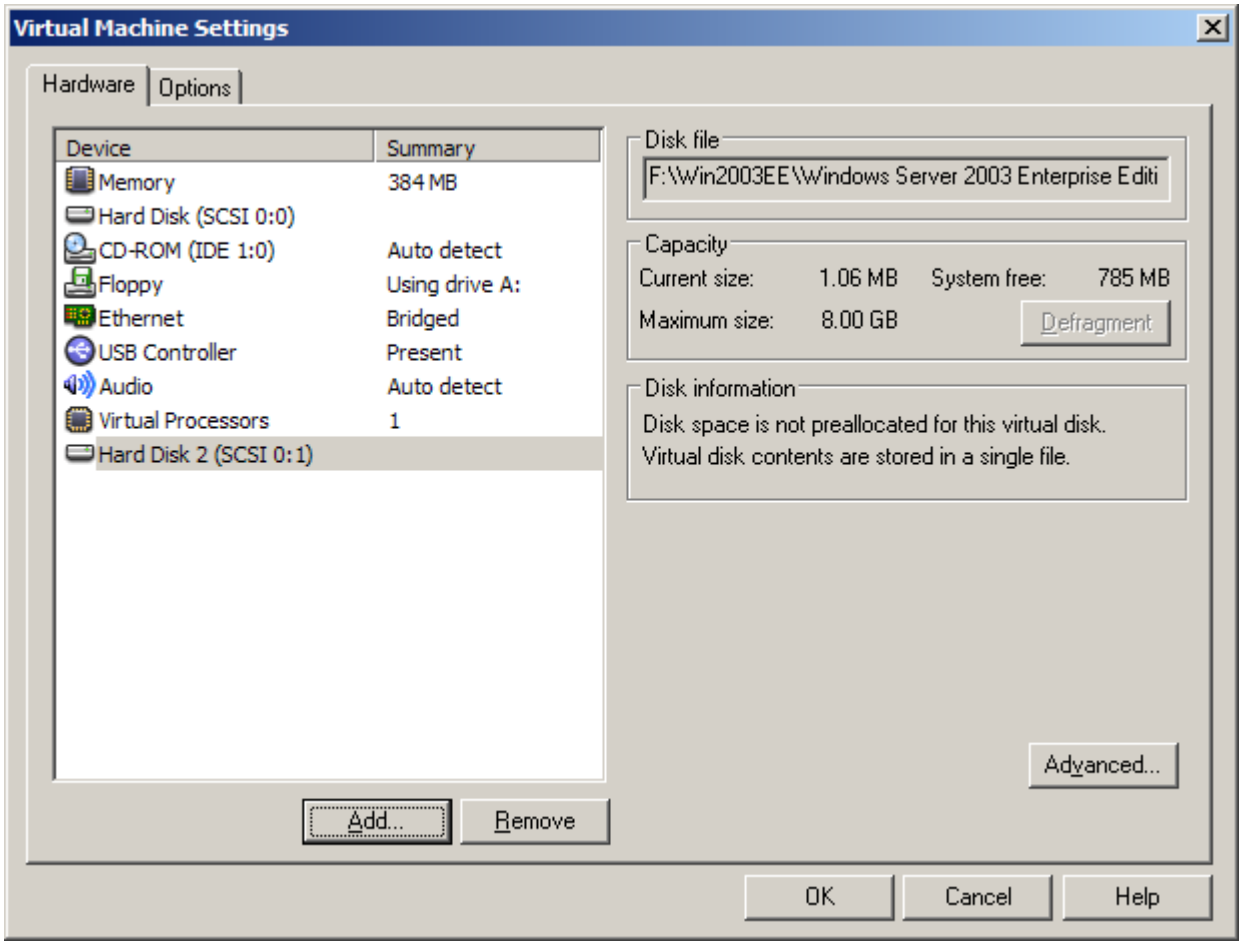
Press the **Next** button to continue.

Specify the full path of the disk file, which you wish to create, in the **Disk file** field. For example, if you have assigned F letter to your iSCSI drive, the path may look like this: F:\Win2003EE\<disk name>.



Press the **Finish** button to exit the wizard.

If everything went fine, the dialog should look like the sample image provided below.



MOVING VIRTUAL MACHINES

When a physical host is upgraded, taken off for maintenance or upgraded it may be required to move a virtual machine from one system to another.
StarWind enables to reduce the downtime for applications running on the virtual machine from hours to minutes.
This section details the operations that you need to complete to move a virtual machine to another host.

Re-assign StarWind Disk

Follow the instructions given in the **Configuring VMware Host** section to install the initiator and VMware Workstation on a new machine.
Shutdown the “old” VMware host. Make sure that the services are not running and the system is off before continuing.

Mount iSCSI Device

- Run the **MS iSCSI Software Initiator** or **StarPort** on the new VMware host.
- Add the target portal and logon to **StarWind** (follow the instructions detailed in the **Steps** of the **Initialize iSCSI Device** section).
- Open the **Computer Management Console** and expand the Disk Management node in the Storage section.
- A new physical disk should appear. This is the same disk that was previously used on the “old” VMware host. The volume on this disk may or may not have a drive letter assigned to it. If a drive letter is not assign, use **Disk Management** to map a drive letter to the volume. To avoid application paths conflicts, use the same drive letter as on the “old” host.

Add a Virtual Machine

This section details the operations that you need to complete to add an existing virtual machine to VMware. For more information, please refer to VMware help resources.

- Launch VMware Workstation.
- Select File->Open. The **Open dialog** appears.
- Specify the full path of the virtual machine. Click **Open** to add the virtual machine.

Providing iSCSI Device to Virtual Machine

You also can receive benefits from using **StarWind** with VMware by providing storage for a virtual machine.

By that it is not needed to create a virtual hard drive. The virtual machine will obtain a block storage device, which is not physically resided on the host machine.

- Login to the virtual machine and install the MS iSCSI Software Initiator or StarPort.
- Follow Create **StarWind** Disk section.
- Connect the initiator to **StarWind**. See the Initialize iSCSI Device for the exact steps in this process.
- Once the initiator successfully logs on and the new drive is initialized and formatted, it is ready for use by this virtual machine.

CONCLUSION

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