

WASABI SYSTEMS INC.

# Using Wasabi Storage Builder® for IP-SAN with VMware ESX Server 3.0

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January 2007



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## Font Conventions

This manual uses the following highlighting conventions:

- **Boldface** indicates graphical user interface (GUI) controls such as the names of menus and fields, the text found within the fields, or drop box entries and selections. It is also used to highlight terms in the glossary.
- **Bold Helvetica** indicates buttons.
- *Italics* indicates book titles and emphasized words.
- Courier font indicates code samples:  
`syslog`
- Blue Courier font indicates complete Internet addresses (URLs):  
<http://www.wasabisystems.com/>

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REV. WSB\_IPSAN\_VMware\_20070117

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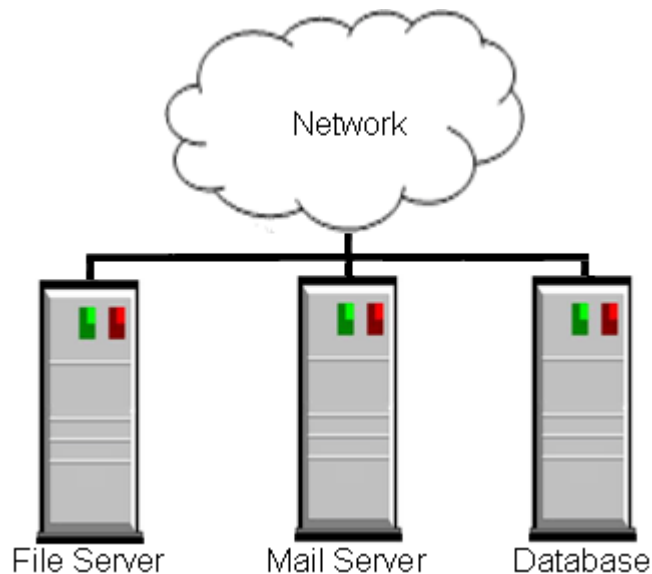




# Wasabi Storage Builder<sup>®</sup> for IP-SAN and VMware<sup>®</sup>

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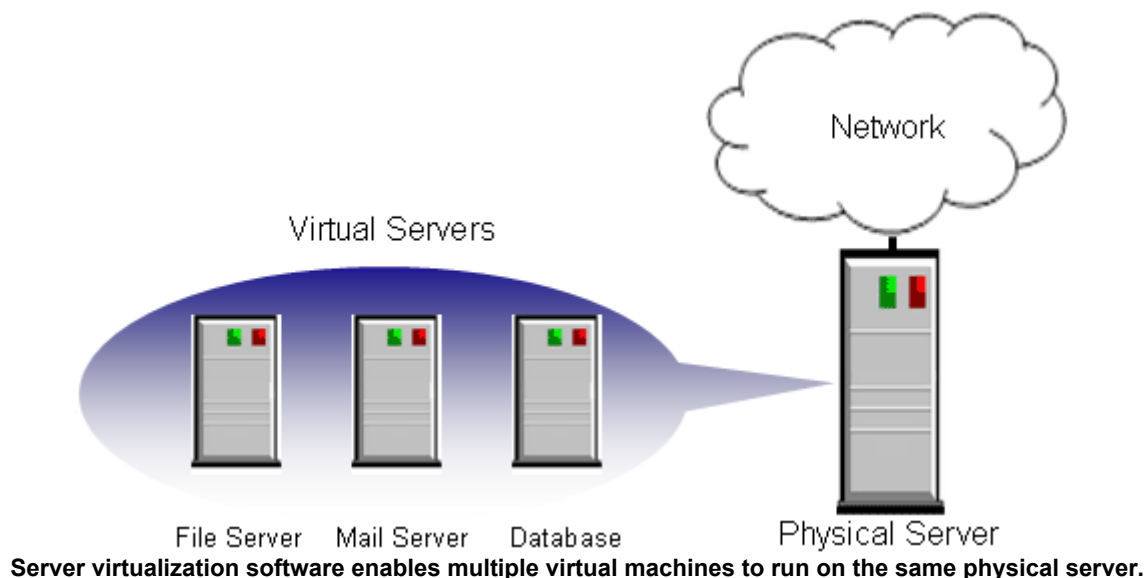
In the server room of a typical organization there are separate, dedicated servers providing various functions – for example, a file server, a mail server, and a database server. However, industry analysts estimate that servers that are running a single application are utilizing as little as 10% of each server’s resources. It is easy to do the math and realize how much money is unnecessarily being spent on unused resources. While it is possible to run multiple applications on the same physical server, this is only feasible if the applications all run on the same operating system. Furthermore, even if the applications do run on the same operating system, there is the potential for conflicts between applications.



**Typical configuration with multiple servers running a dedicated application.**

# Introduction to VMware

VMware® ESX Server 3.0 uses server virtualization, a technology that enables users to run multiple operating systems concurrently on a single physical server, where each of the operating systems runs in its own virtual computer, called a virtual machine. Each virtual machine has its own virtual CPU, virtual memory, virtual hard disks, and so on, and an operating system and applications are installed on the virtual machines, just as if they were actual physical servers. The operating system and applications are not aware that they are running in a virtual machine and will function just as if they were on physical servers.



## Virtualization Benefits

Using virtualization software to consolidate servers delivers several benefits:

**Reduced Hardware Costs** - Making efficient use of hardware resources means less hardware purchases. In addition, maintenance and management overhead is reduced.

**Bare Metal Recovery** - Virtual machines can be backed up and copied to other physical servers. If a physical server fails, the virtual machines can be quickly up and running on another physical server.

**Faster Deployment** - Fewer physical servers to configure and connect to the network means servers can be put online more quickly.

**Pre-deployment Testing** - Enables the creation of “sand box” virtual machines where new software can be tested without disrupting the existing virtual machines already in production.

# WSB for IP-SAN: Virtual Disks for Virtual Machines

Just as consolidating physical servers into virtual machines provides many benefits, so does consolidating storage. It is not only the servers that are being underutilized, but oftentimes also the storage within each server is not being used efficiently. Furthermore, if one of the physical servers fails, in addition to having to purchase a new server, reinstall the operating system and applications, the failed servers data must be migrated over to the new server. This could entail removing the hard disks from the failed server and installing them into the new server, resulting in costly downtime.

Wasabi Storage Builder for IP-SAN iSCSI storage abstracts storage from the physical server, delivering a storage solution that is the perfect complement to virtualization software. Storage Builder for IP-SAN connects to the physical server(s) using standard Ethernet cables, adapters, and switches, making it a powerful, yet cost-effective storage solution.

Using Storage Builder for IP-SAN enables all of the storage to be available to any of the physical servers and virtual machines in the network. This allows storage to be more efficiently allocated. It also provides better scalability. Should more storage capacity be required, simply attach an additional IP-SAN storage target into the switch. There is no need to shutdown any of the physical or virtual servers and the existing IP-SAN targets will remain online and continue to be accessible.

Virtual machines can be migrated from one physical server to another. Migration may be done to move a virtual machine to a faster physical server, or to move the virtual machine off of a failing physical server. With VMware ESX Server 3.0 virtual machines can also reside on iSCSI storage. Virtual Machines on iSCSI storage shared by physical servers can be migrated rapidly between physical servers because only the virtual machine's configuration and state information needs to be migrated. The virtual machine's virtual disk remains on the iSCSI storage. Additionally, using VMotion, part of the VMware Virtual Infrastructure, virtual machines residing on shared iSCSI storage can be migrated while they are still running, meaning there is no interruption in service to users of the virtual machines.

The following application notes will describe how to configure VMware ESX Server 3.0 for use with Storage Builder for IP-SAN iSCSI targets.

# Using WSB for IP-SAN with VMware ESX Server 3.0

## Assumptions

The scope of the following sections of this document is to describe the steps to configure VMware Server 3.0 for use with Storage Builder for IP-SAN iSCSI targets. This document assumes the reader has basic knowledge of VMware ESX Server 3.0 and Virtual Infrastructure 2.1 configuration and setup. It also assumes that the reader knows how to set up the Storage Builder target, including the creation of iSCSI Nodes.

## Hardware and Software Components

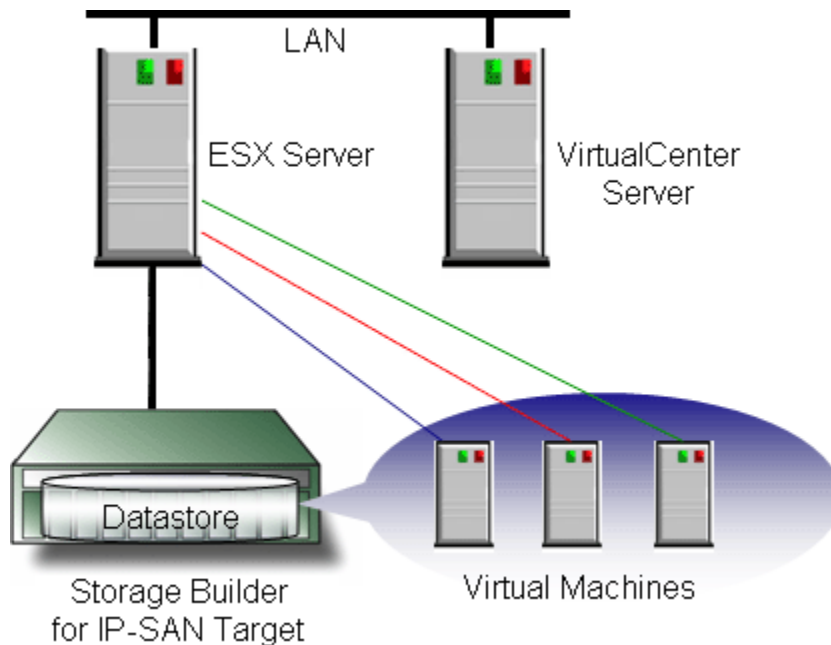
The Windows server cluster consists of the following components:

- Storage Builder for IP-SAN iSCSI Storage Target  
Running: Wasabi Storage Builder for IP-SAN v2.2
- ESX Server  
Running: VMware ESX Server 3.01 (Build 32039)
- Virtual Infrastructure Server  
Running: VMware Virtual Infrastructure Server 2.0.1 (Build 27704)

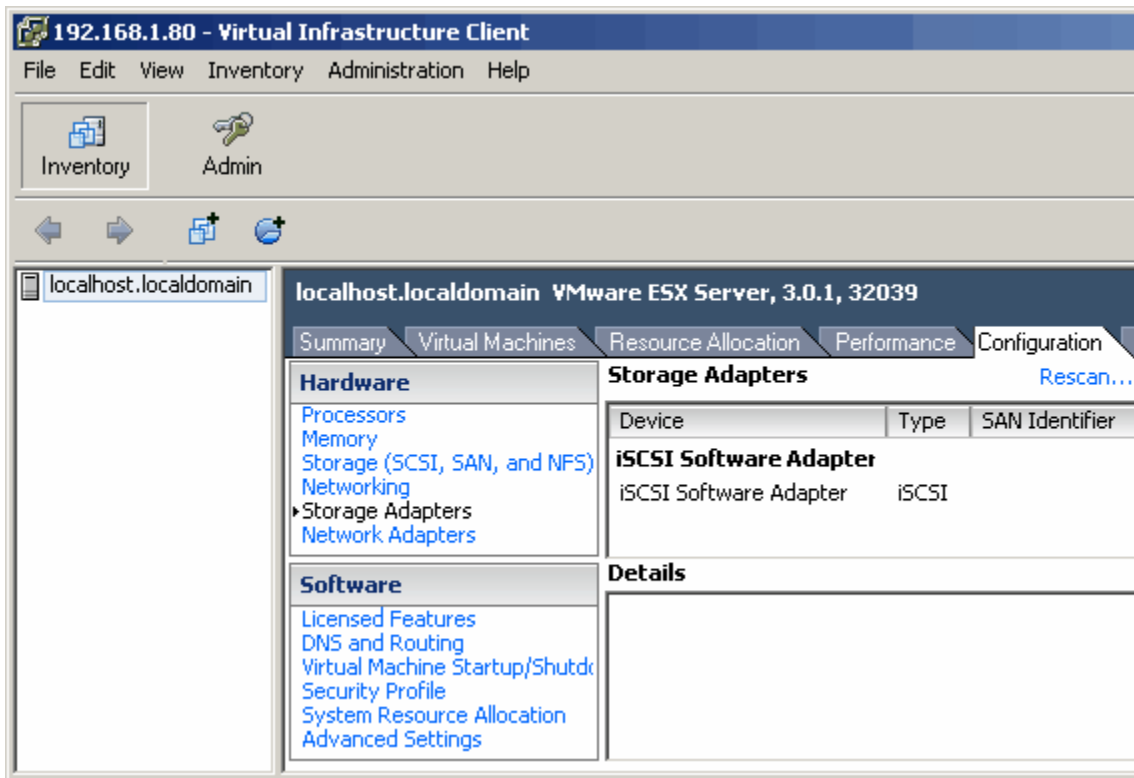
**NOTE** The Virtual Infrastructure Server system was also used to run Virtual Infrastructure Client 2.0.1 (Build 32042).

## Configuring VMware for iSCSI

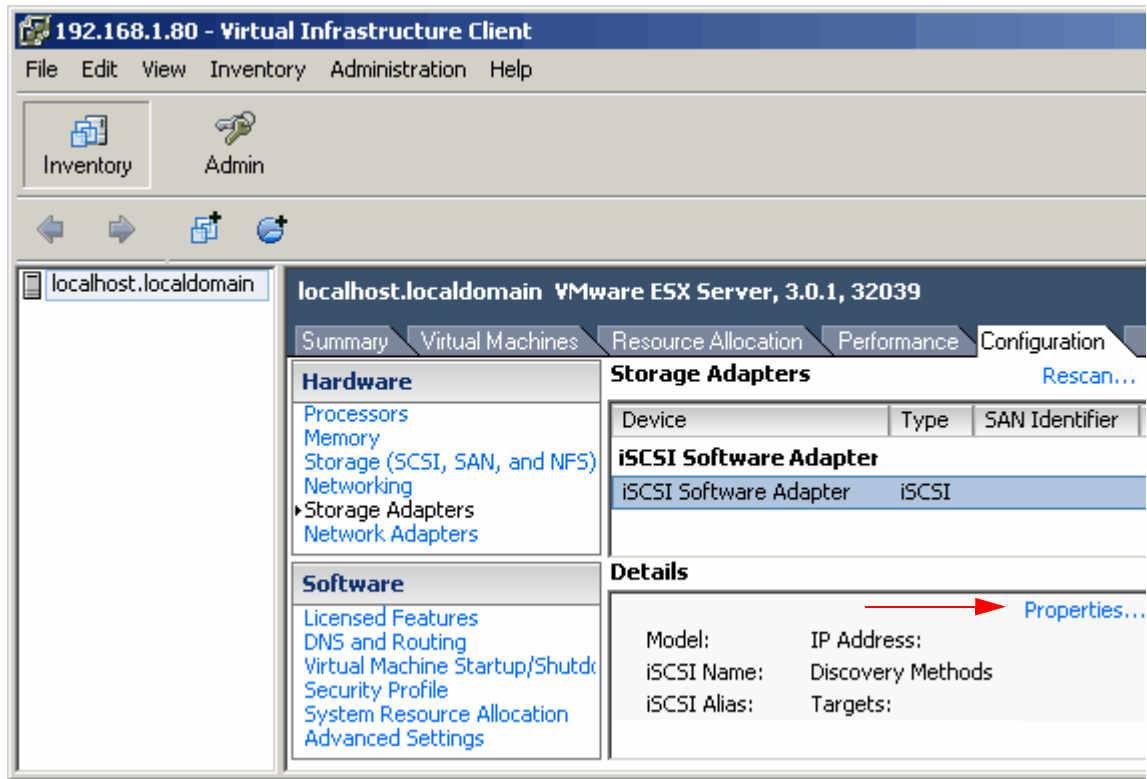
In this example VMware's software iSCSI initiator and a single Storage Builder iSCSI Node will be configured for use as a Datastore, which is the formatted logical container VMware uses to hold virtual machine files. The VMware Virtual Infrastructure Client is used to configure VMware's software iSCSI initiator.



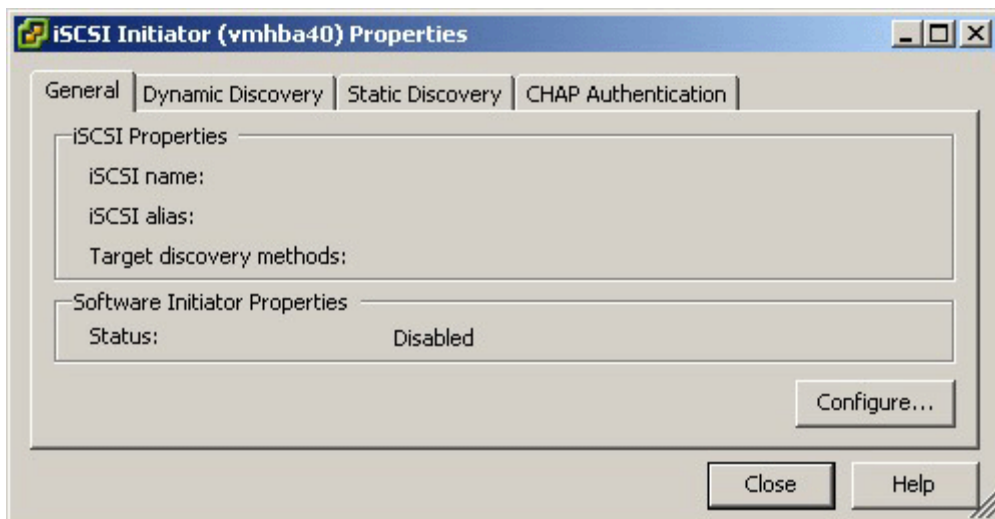
1. Log into the ESX Server using the Virtual Infrastructure Client.
2. Click the **Inventory** button in the menu bar.
3. Click the **Configuration** tab.
4. Click **Storage Adapters**.



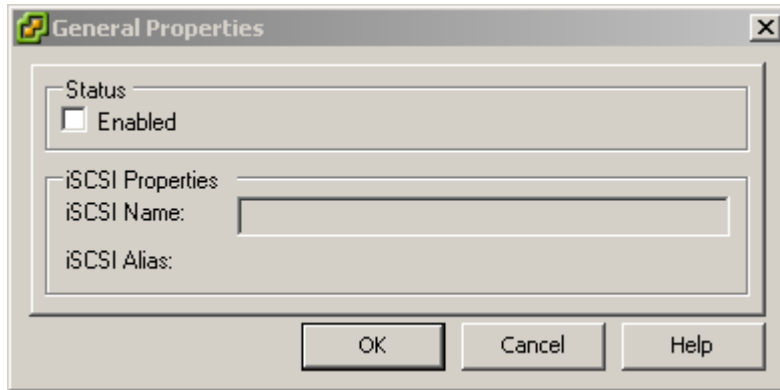
5. In the **Storage Adapters** pane, highlight the **iSCSI Software Adapter** (vmhba40).



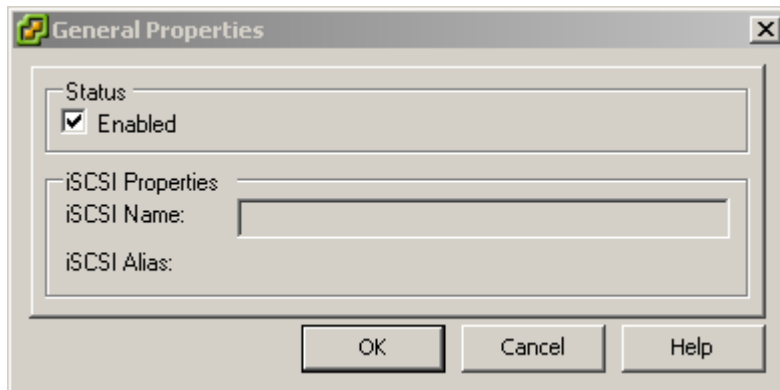
6. In the **Details** pane, click **Properties...**



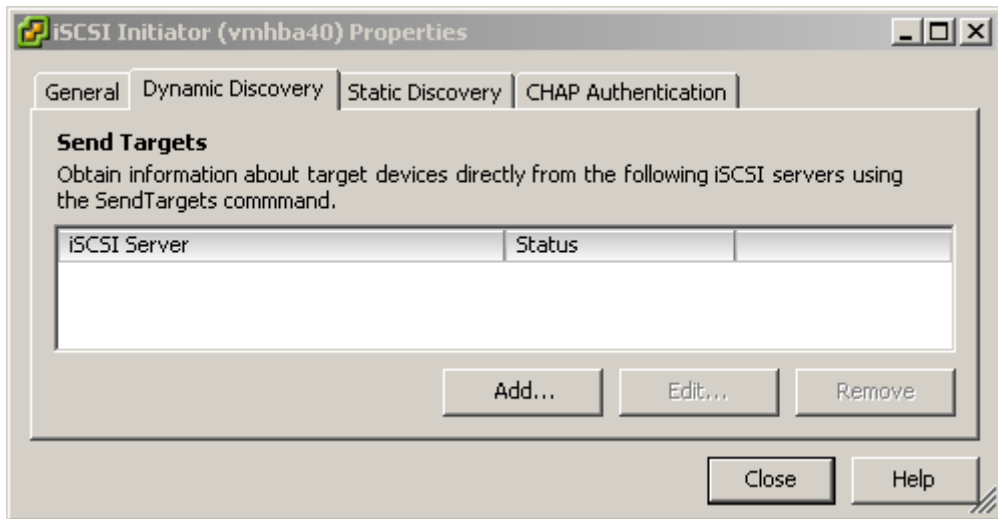
7. Click the **Configure** button.



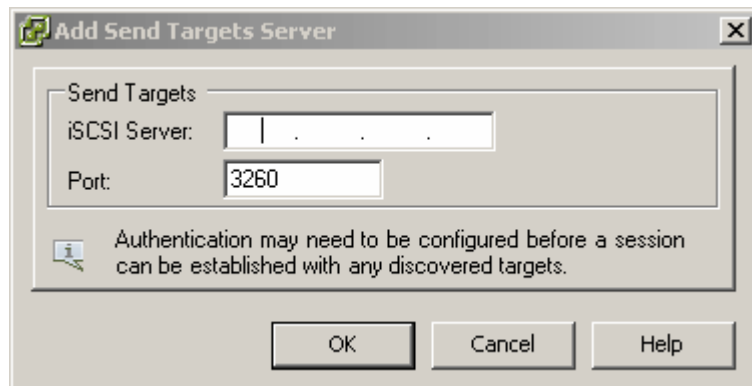
8. Check the **Enabled** box and then click **OK**.



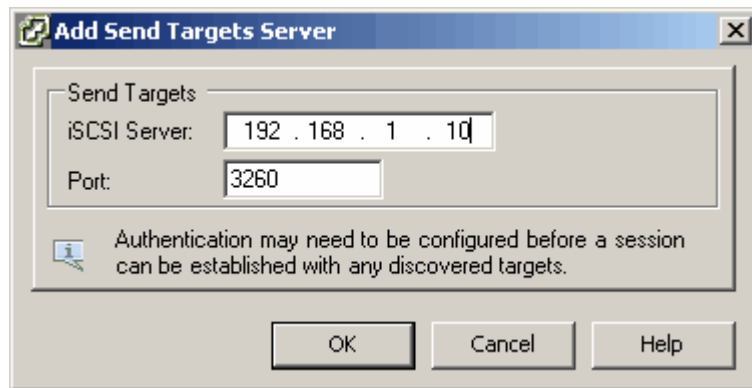
9. The VMware iSCSI initiator is now enabled.
10. Click the **Dynamic Discovery** tab.



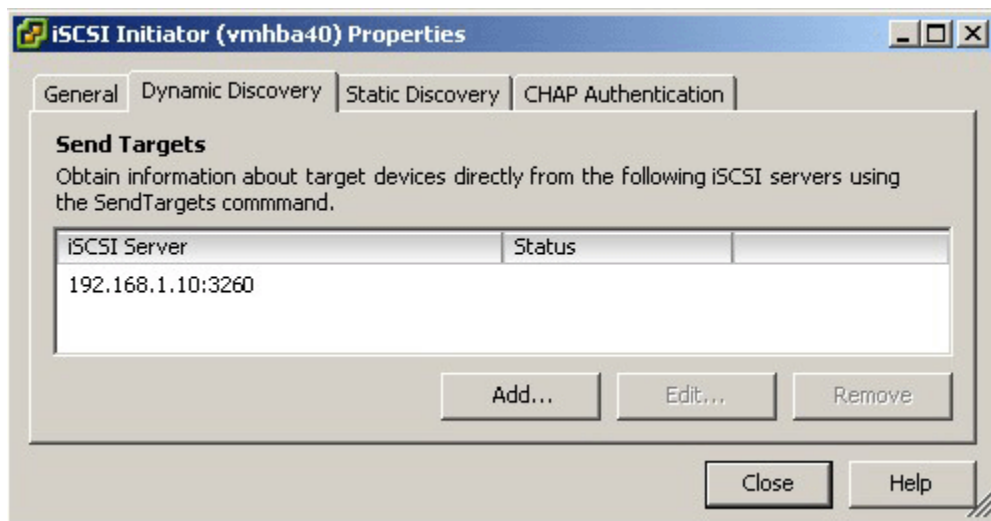
11. Click the **Add...** button.



12. Enter the IP address of the Storage Builder for IP-SAN target. The Port address should be left at 3260.

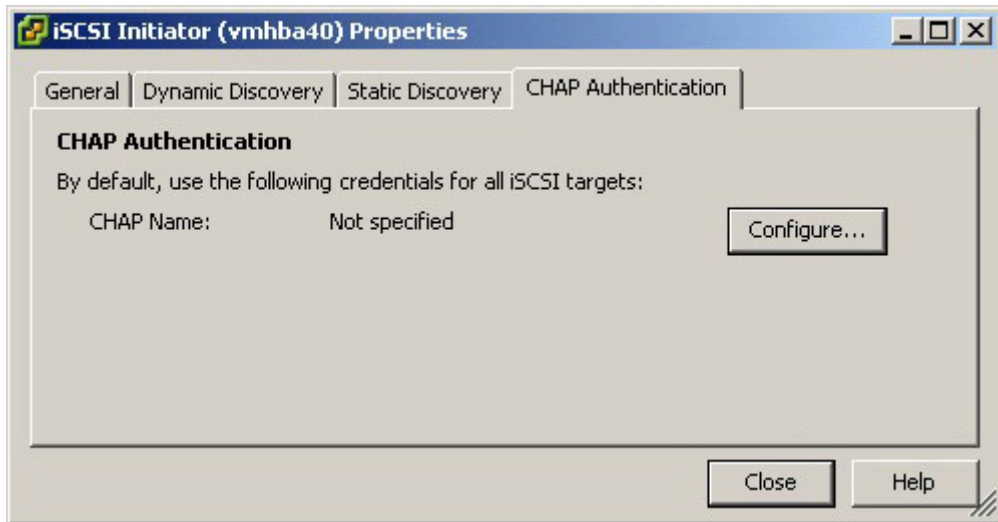


13. Click **OK**. The IP-SAN target IP address appears in the **Send Targets** pane.



If you will be using a CHAP credential with the iSCSI node follow the next steps 14 through 17 for configuring CHAP. If not using CHAP then skip to step 18.

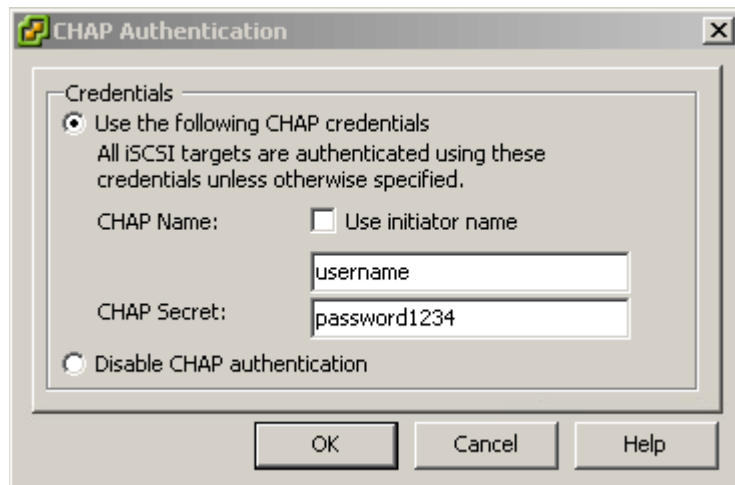
14. In the **iSCSI Initiator Properties** window, click on the **CHAP Authentication** tab.



15. Click the **Configure** button

16. Enter the CHAP name and CHAP secret.

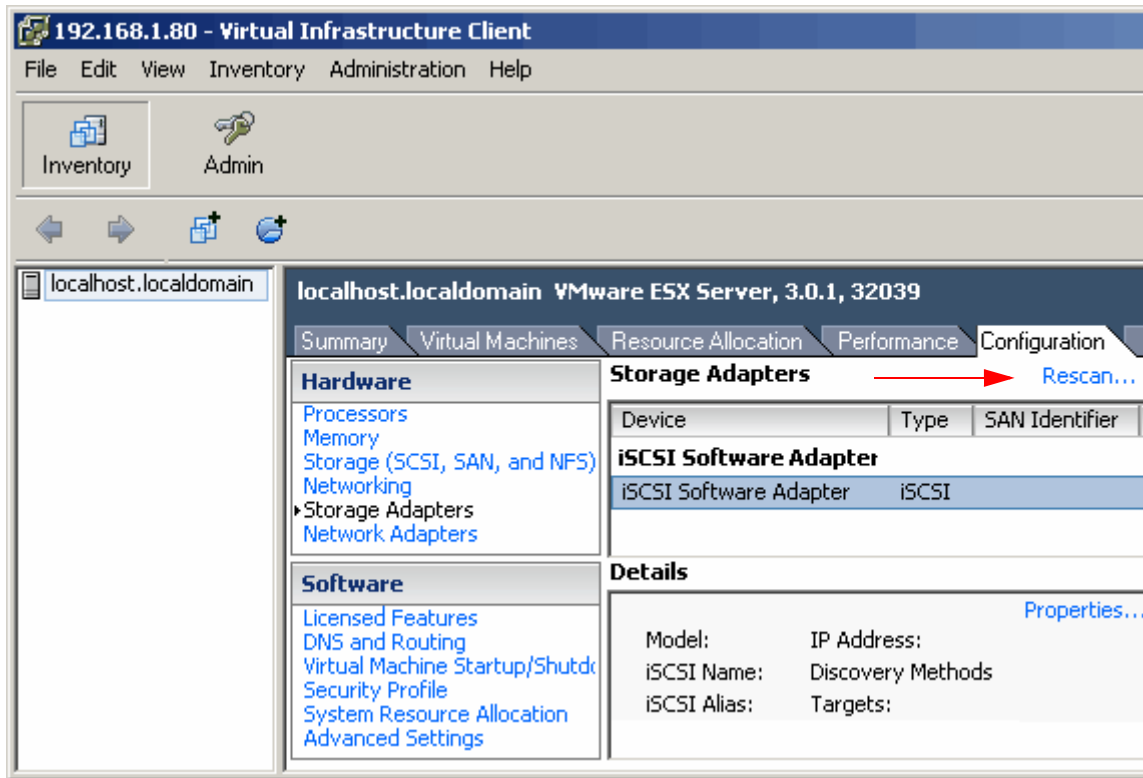
**NOTE** The CHAP Name and Secret would correspond to the Username and Secret set in the iSCSI Credential that is being used by the Storage Builder iSCSI Node.



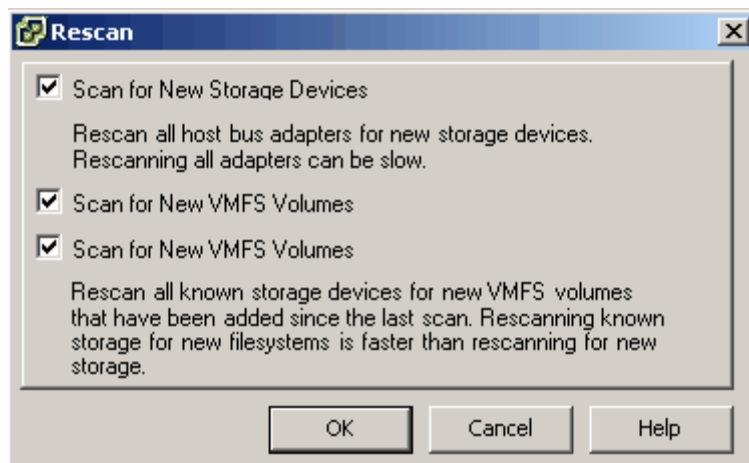
17. Click **OK** in the **CHAP Authentication** dialog window.

18. Click the **Close** button in the **iSCSI Initiator Properties** tab.

19. Highlight vmhba40 in the **Storage Adapters** pane.



20. Click on **Rescan**. Make sure the **Scan for New Storage Devices** box is checked.



21. Click **OK**.

22. Highlight vmhba40 in the **Storage Adapters** pane. The iSCSI targets will be displayed in the **Details** page.

**Storage Adapters** [Rescan...](#)

Device	Type	SAN Identifier
<b>iSCSI Software Adapter</b>		
vmhba40	iSCSI	iqn.1998-01.com.vmware...

**Details**

**vmhba40** [Properties...](#)

Model:	iSCSI Software Adapter	IP Address:	
iSCSI Name:	iqn.1998-01.com.vmware;localhost-6c38fb86	Discovery Methods:	Send Targets
iSCSI Alias:	localhost.localdomain	Targets:	1

**SCSI Target 0**

iSCSI Name: iqn.2000-05.com.wasabisystems.storagebuilder:-1  
iSCSI Alias:  
Target LUNs: 1 [Hide LUNs](#)

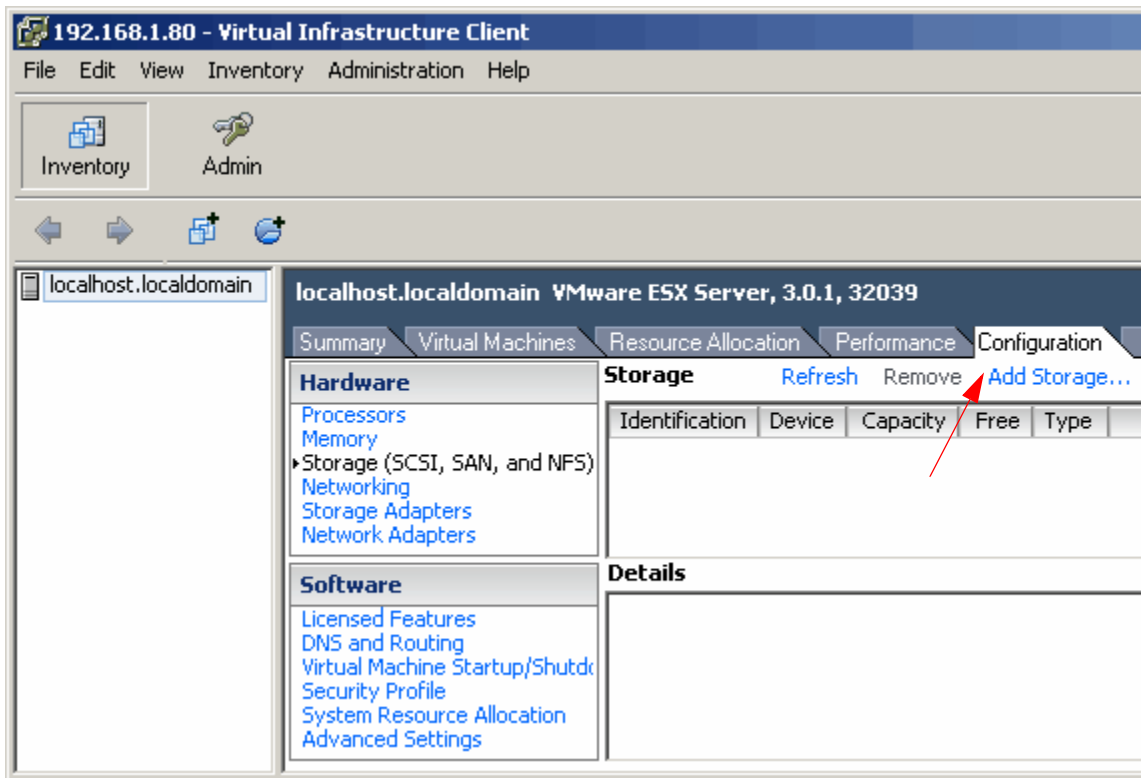
Path	Canonical Path	Capacity	LUN ID
vmhba40:3:0	vmhba40:3:0	195.31 GB	0

**NOTE** What VMware refers to as an SCSI target corresponds to what Wasabi refers to as an iSCSI Node.

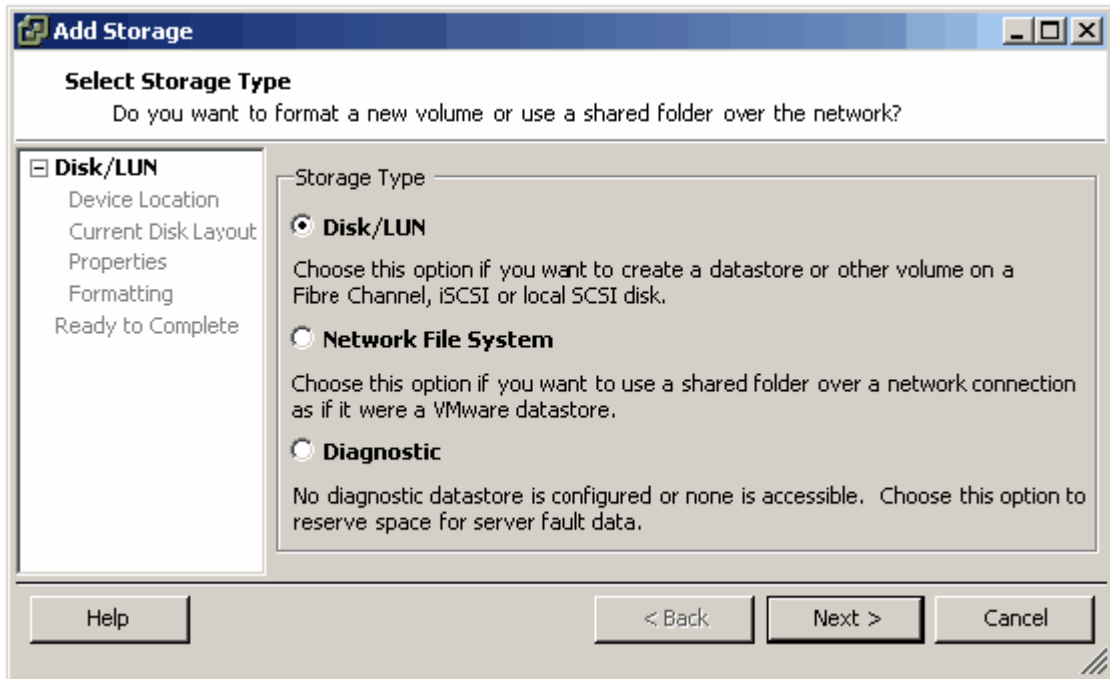
## Creating a Datastore

Now that the VMware Software iSCSI Adapter has been configured, a datastore can be created on the iSCSI volume.

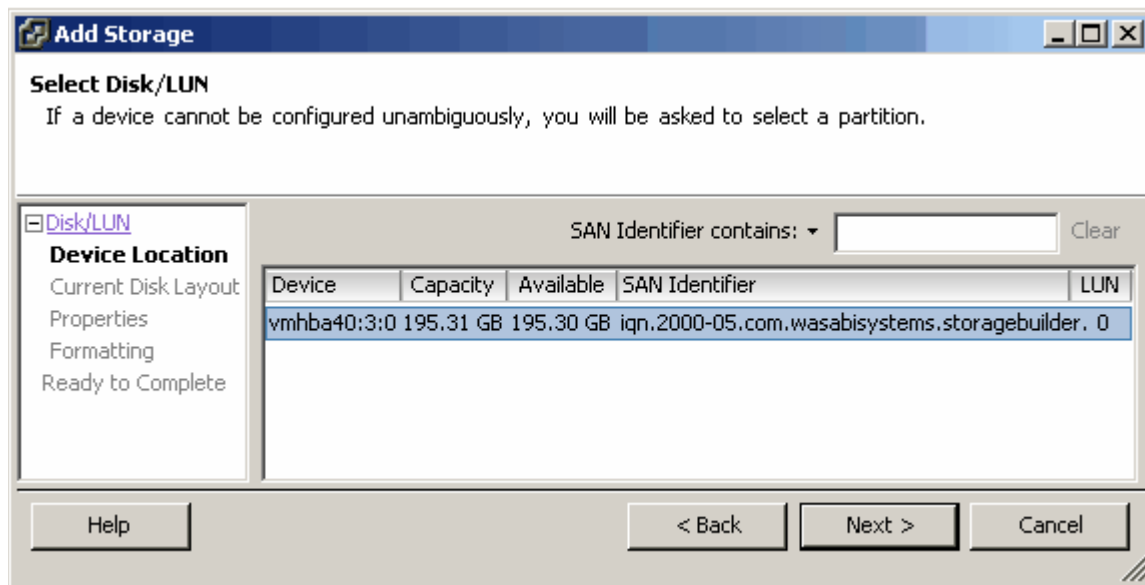
1. In the **Virtual Infrastructure Client** click the **Configuration** tab.
2. Click **Storage (SCSI, SAN, and NFS)**.



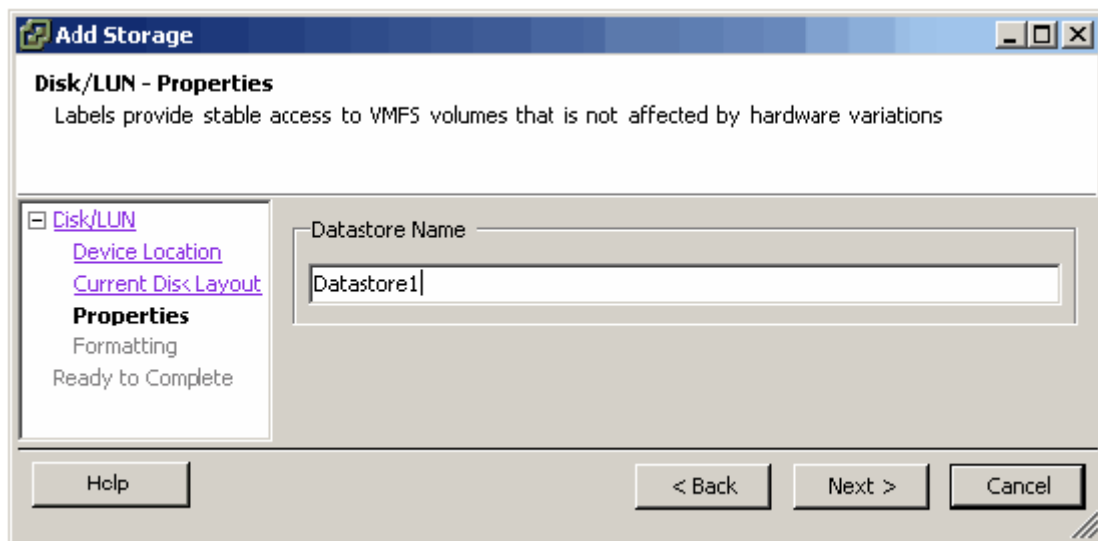
3. Click on **Add Storage....**
4. Select **Disk/LUN** from the Storage Type options.



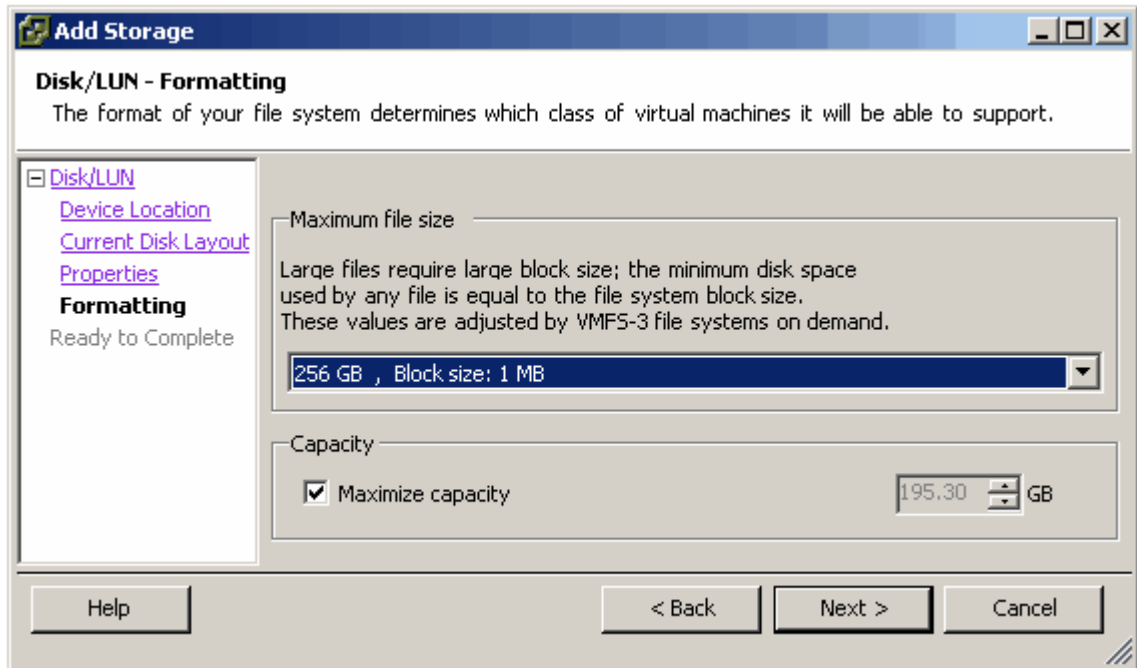
5. Click **Next**.
6. Select the Device Location. In this example we are selecting the iSCSI target.



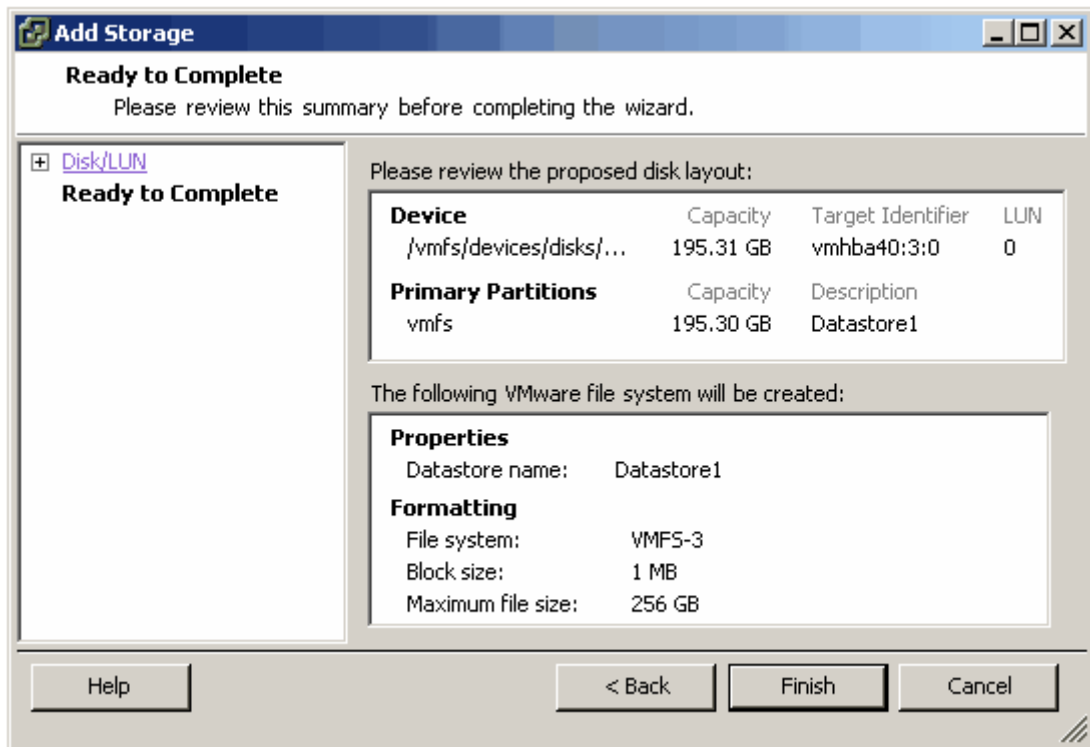
7. Click **Next**.
8. The Current Disk Layout will be displayed.
9. Click **Next**.
10. On the **Properties** page, type in a name for the datastore in the **Datastore Name** field.



11. Click **Next**.
12. In the **Formatting** page, select the Maximum File Size and the Capacity. In this example, the default options are used.



13. Click **Next**.
14. A summary page will be displayed.



15. Click **Finish**.

16. The datastore has been created and is ready for use by virtual machines.

# Migrating Virtual Machines

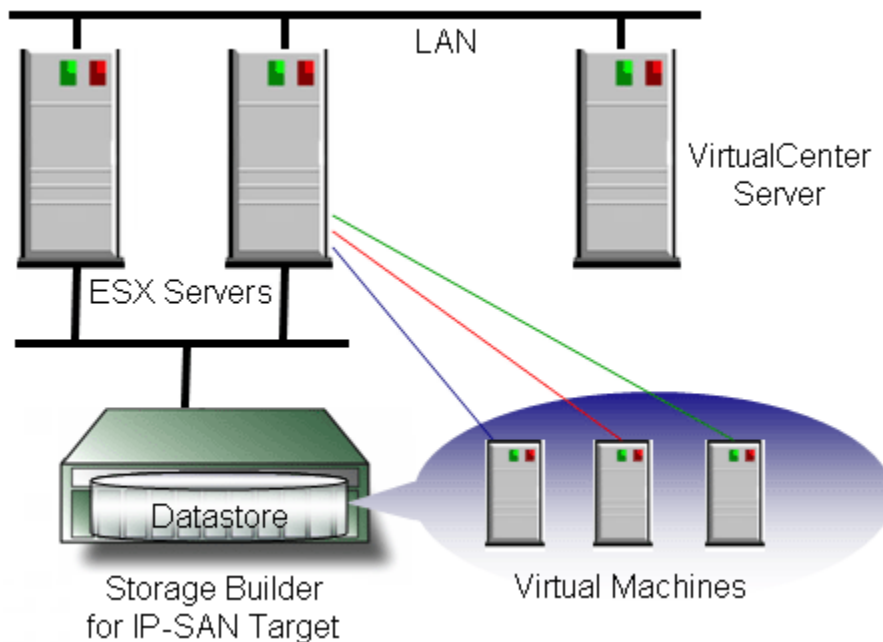
VMware ESX Server has the capability to migrate virtual machines from one physical server to another. This enables moving a virtual machine to a more powerful physical server, or to move it off of a failing physical server. There are two types of migration:

## Migration

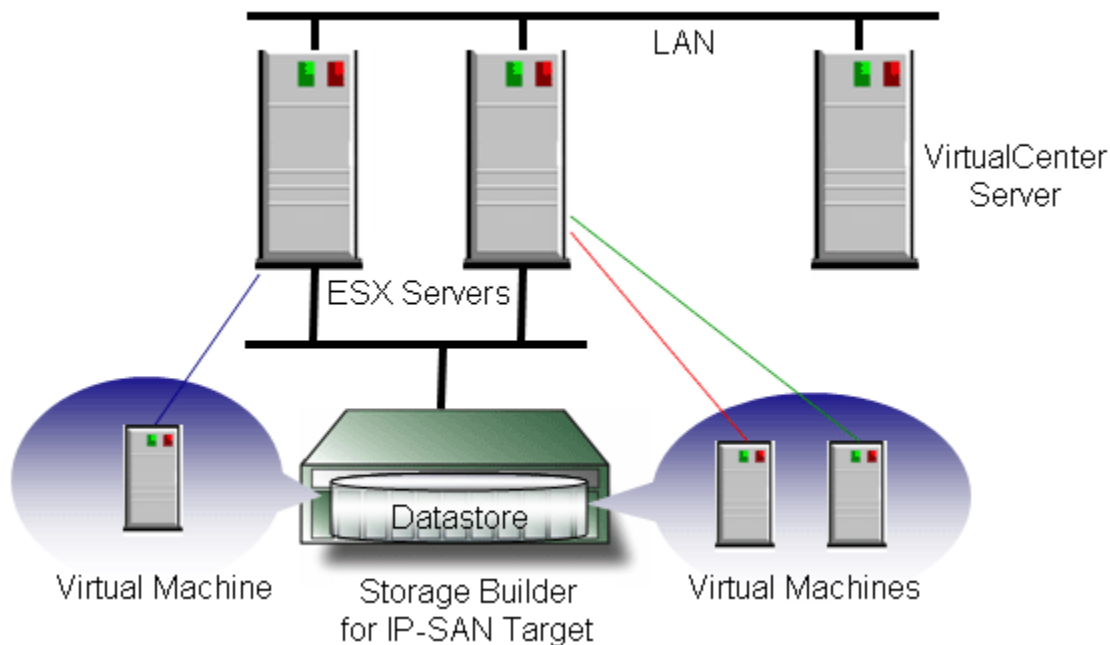
Moving a powered-off or suspended virtual machine from one physical server to another.

## Migration with VMotion

Moving a virtual machine from one physical machine to another while the virtual machine is powered-on. Migration with VMotion requires that the virtual machine to be migrated resides on storage, such as a Storage Builder for IP-SAN target, that can be shared by both the source and destination physical machines.



Before Migration – The virtual machines reside in the datastore on the Storage Builder for IP-SAN target and are using the hardware resources of one of the ESX servers.

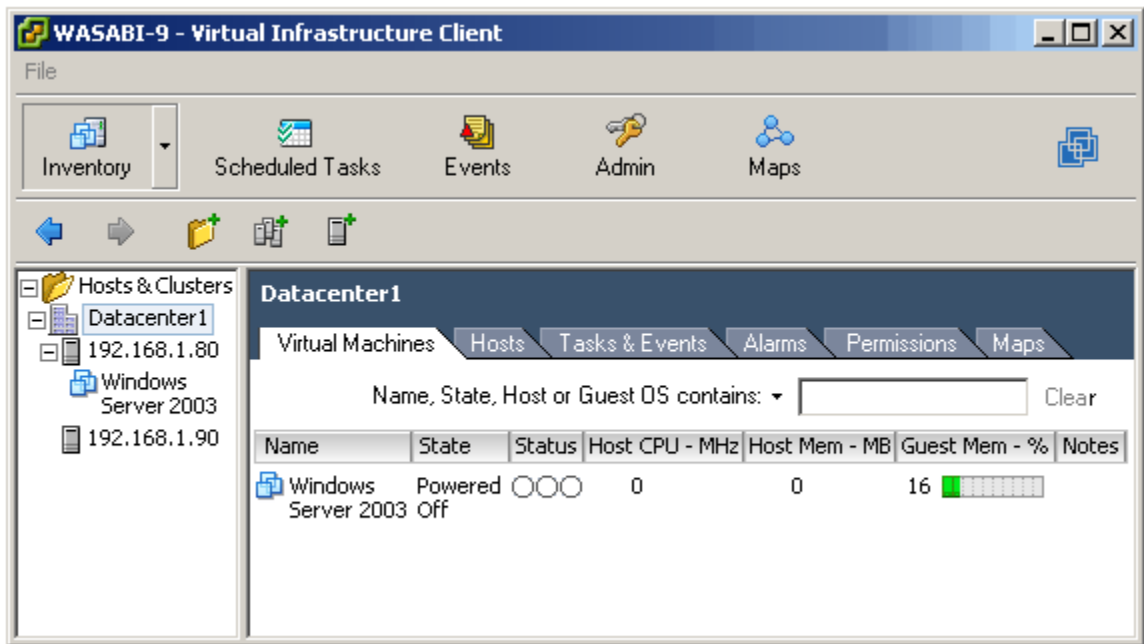


After Migration – One of the virtual machines has been moved to the other ESX server. It still resides on the same datastore as the other virtual machines, but it is using the hardware resources of the new ESX server.

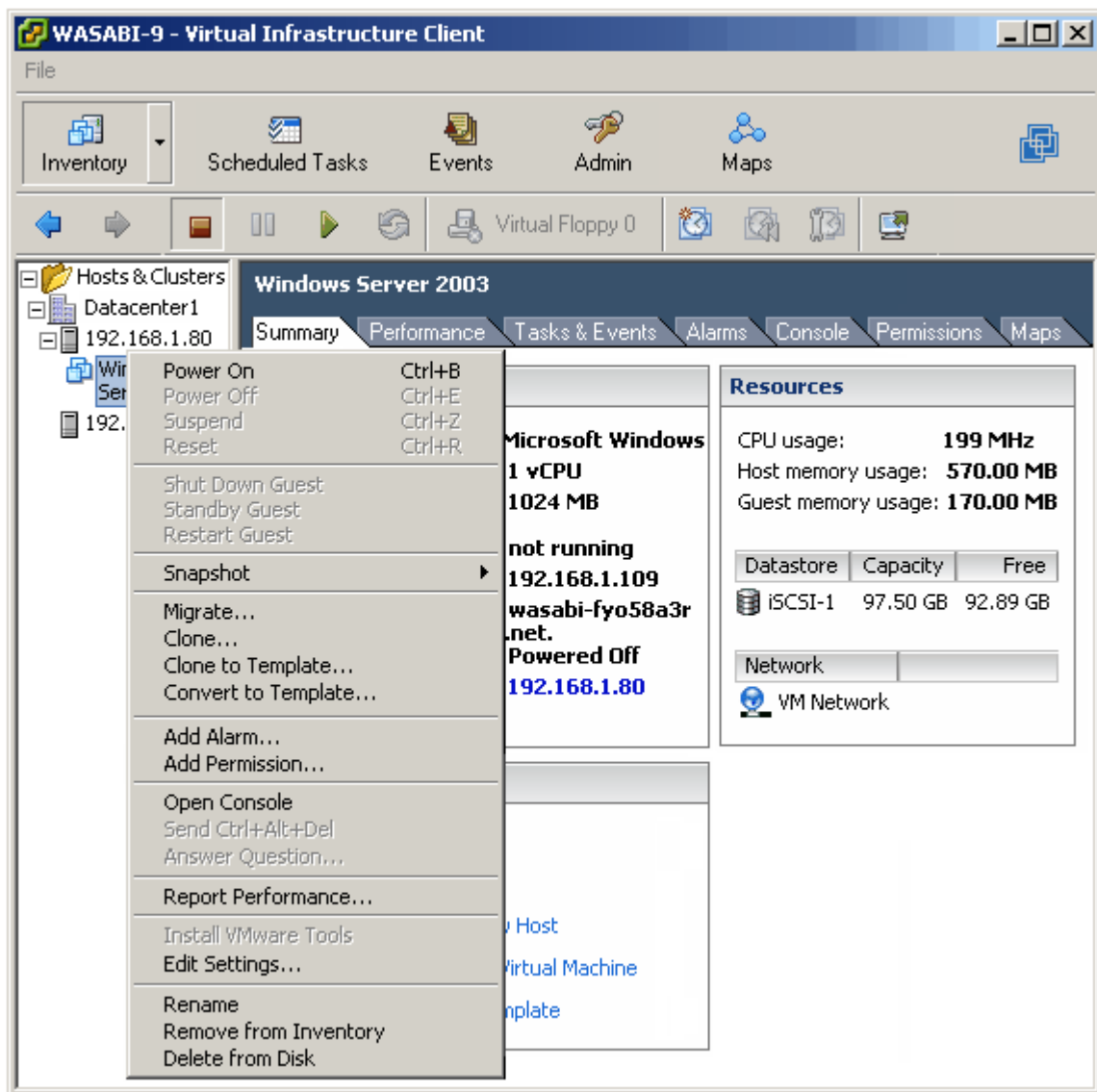
## Steps to Migrate a Physical Machine

These steps assume that you are using the Virtual Infrastructure Client to connect to the Virtual Center Server, and that you have created a Datacenter that includes the Hosts (ESX Servers) that will be the source and destination Hosts for the virtual machine(s) to be migrated. Follow the steps in the Configuring VMware for iSCSI section above for each of the ESX servers that will be connecting to the Storage Builder for IP-SAN target.

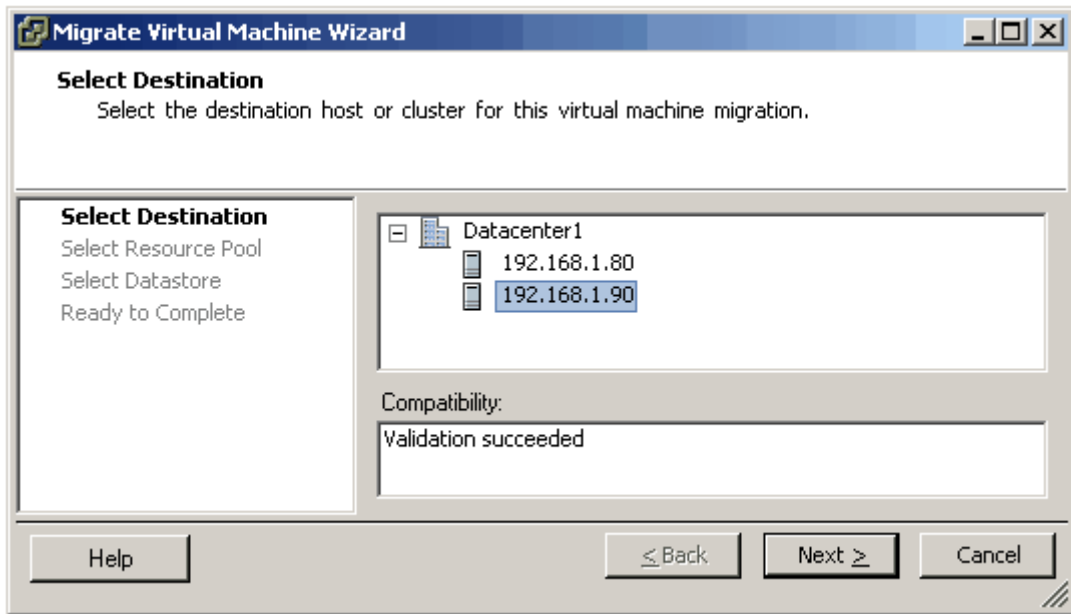
1. In the Virtual Center client click the **Inventory** button in the navigation bar.
2. Expand the Datacenter which contains the virtual machine to be migrated. In this example, the source host (the current ESX server that is hosting the virtual machine) is the one at IP address 192.168.1.80. The destination host will be the host at IP address 192.168.1.90.



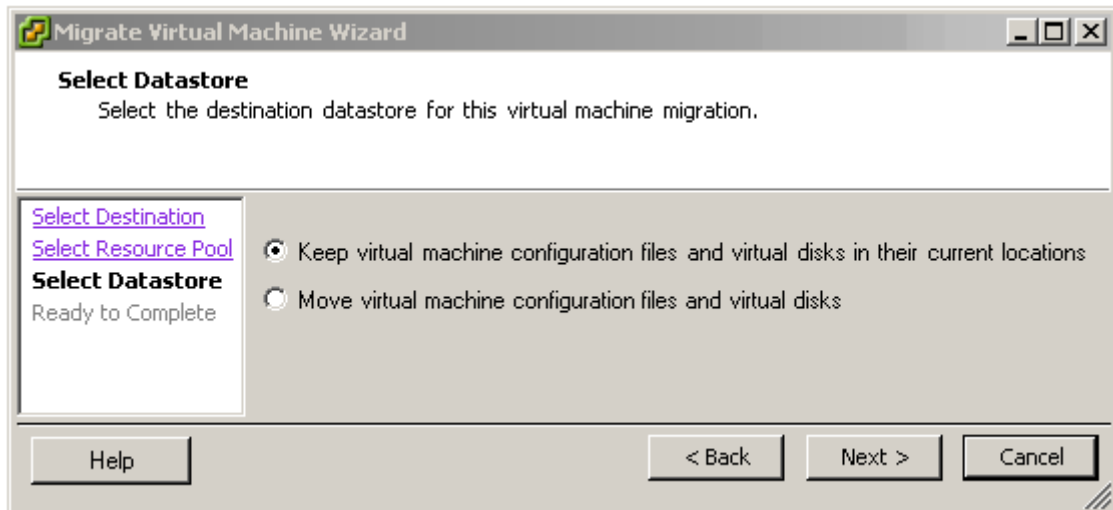
3. Right-click on the virtual machine to be migrated, and when the pop-up menu appears, select **Migrate...**



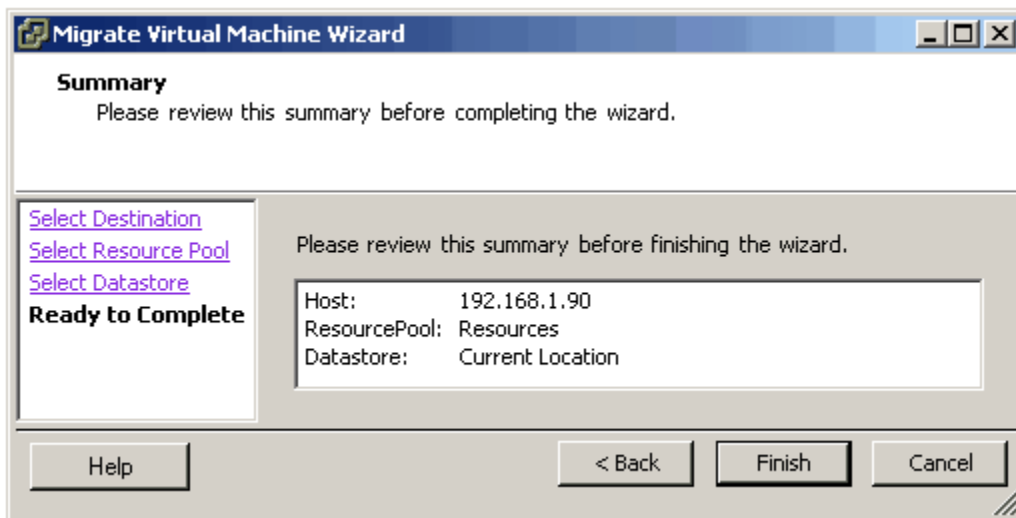
4. Select the host to which the virtual machine will be migrated. The Migration Wizard will make sure that the destination host is compatible with the source host. If there are any compatibility problems they will be displayed in the Compatibility pane. Any compatibility errors must be resolved before a virtual machine can be migrated.
5. Click **Next**.



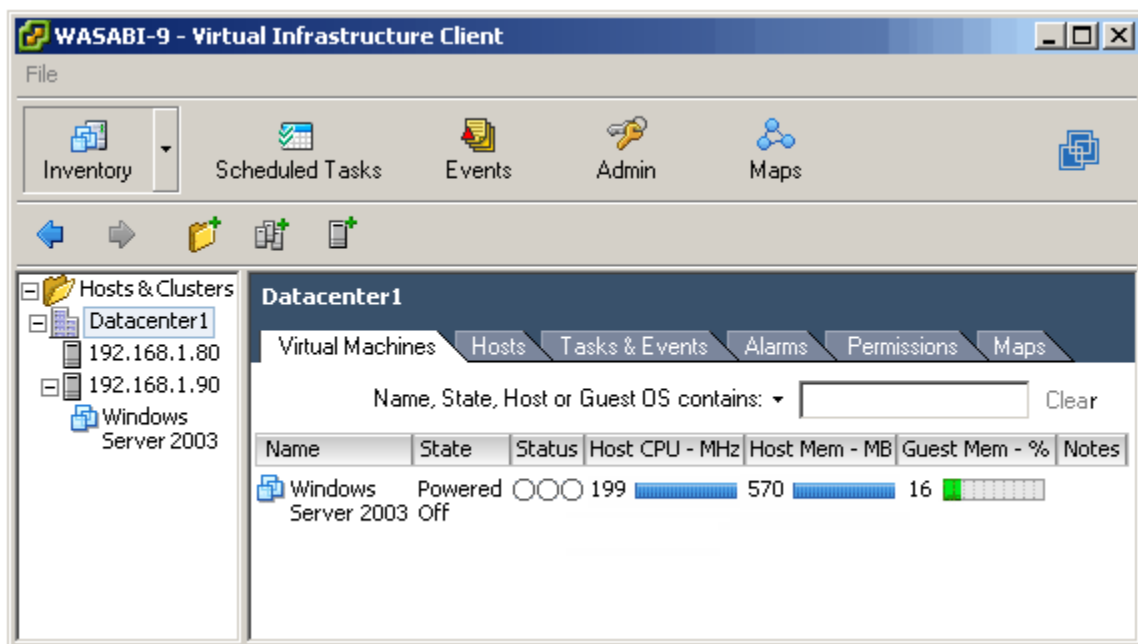
6. Select the destination resource pool and click **Next**.
7. Select the destination datastore for the virtual machine. In this example the virtual machine will be kept in their current locations, which is the datastore that is on the Storage Builder IP-SAN target.



- Click **Next**. A summary page will be displayed.



- Click **Finish** to complete the migration. Notice that the virtual machine is residing on the new host.



# Migrating Virtual Machines with VMotion

Migrating a virtual machine using VMotion is similar in concept to basic migration. Basic migration requires that the virtual machine be stopped or suspended. With VMotion, a virtual machine can be migrated while it continues to run so that users of the virtual machine experience no disruption during the migration.

## Requirements for VMotion

- Both source and target host must be licensed to use VMotion, have VMotion enabled, and be accessing the same shared datastore.
- The CPUs on the source and the destination hosts must be compatible. For more detailed information regarding this requirement, consult the VMware “Basic System Administration” guide.
- VMware recommends dedicating a Gigabit Ethernet NIC for VMotion in each of the ESX servers.

## Steps to Migrate a Physical Machine Using VMotion

The steps to migrate a virtual machine using VMotion are the same as those to Migrate a powered-off or suspended virtual machine. Follow the steps in “Steps to Migrate a Physical Machine” on page 20.

## Summary

Server virtualization using VMware ESX Server 3.0 enables more efficient utilization of hardware resources and provides more flexibility and cost-savings.

Wasabi Systems Storage Builder for IP-SAN is the perfect storage for server virtualization.

### **Cost-effective**

Storage Builder For IP-SAN uses standard Ethernet components. It does not require expensive specialized hardware.

### **Simplifies Management**

Consolidation of storage makes management and maintenance less complex.

### **Easy-to-use**

Storage Builder For IP-SAN uses TCP/IP, which is widely used and understood.

### **Scalable**

Storage Builder For IP-SAN storage targets can be connected to a standard Ethernet switch. If more storage is needed, it is easy to deploy additional iSCSI targets – just plug a new iSCSI target into the switch.

### **Flexible**

Storage Builder For IP-SAN storage can be allocated for multiple servers, making more efficient use of disk capacity and making storage management less complex.

### **Extensible**

Using Ethernet and the internet infrastructure. Storage Builder For IP-SAN storage targets can be located next to a server, in the next room – even across the world.

Wasabi Systems Storage Builder for IP-SAN software enables OEMs and systems integrators to transform off-the-shelf computer hardware into cost-effective IP-SAN (iSCSI) storage systems. Storage Builder for IP-SAN delivers all of the software needed to build an iSCSI target pre-installed on a reliable IDE Compact Flash Disk-On-Module (DOM). No other software needs to be purchased or installed. This significantly speeds up the installation and assembly process.

Storage Builder for IP-SAN, in conjunction with VMware ESX Server 3.0 and Virtual Infrastructure, opens up exciting new market opportunities by delivering a server virtualization solution that is cost-effective, flexible, and scalable.

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# References

The VMware and Virtual Infrastructure documentation can be found at:

[http://www.vmware.com/support/pubs/vi\\_pubs.html](http://www.vmware.com/support/pubs/vi_pubs.html)

The following VMware documents were used during the creation of this document:

***Introduction to VMware Infrastructure***

[http://www.vmware.com/pdf/vi3\\_intro\\_vi.pdf](http://www.vmware.com/pdf/vi3_intro_vi.pdf)

***Quick Start Guide***

[http://www.vmware.com/pdf/vi3\\_esx\\_quickstart.pdf](http://www.vmware.com/pdf/vi3_esx_quickstart.pdf)

***Installation and Upgrade Guide***

[http://www.vmware.com/pdf/vi3\\_installation\\_guide.pdf](http://www.vmware.com/pdf/vi3_installation_guide.pdf)

***Basic System Administration***

[http://www.vmware.com/pdf/vi3\\_admin\\_guide.pdf](http://www.vmware.com/pdf/vi3_admin_guide.pdf)

***Server Configuration Guide***

[http://www.vmware.com/pdf/vi3\\_server\\_config.pdf](http://www.vmware.com/pdf/vi3_server_config.pdf)

***Resource Management Guide***

[http://www.vmware.com/pdf/vi3\\_esx\\_resource\\_mgmt.pdf](http://www.vmware.com/pdf/vi3_esx_resource_mgmt.pdf)

***SAN Configuration Guide***

[http://www.vmware.com/pdf/vi3\\_esx\\_san\\_cfg.pdf](http://www.vmware.com/pdf/vi3_esx_san_cfg.pdf)

***Configure iSCSI in a VMware ESX Environment***

[http://www.vmware.com/pdf/vi3\\_iscsi\\_cfg.pdf](http://www.vmware.com/pdf/vi3_iscsi_cfg.pdf)

VMware has a discussion forum with many helpful and knowledgeable participants. If you run into problems or have questions, chances are you will find an answer here:

<http://www.vmware.com/community/index.jspa?categoryID=1>

