



Storage / SAN Compatibility Guide For ESX Server 3.x

Last Updated: January 31, 2007

What's New

Changes since the last edition of this guide include:

- Added support for the NEC iStorage S550. See [“NEC”](#) on page 12.
- Updated information for the IBM N5000 Series and N7000 Series. See [“IBM”](#) on page 11, [“IBM”](#) on page 15, and [“IBM”](#) on page 19.
- Added support for the Dell CLARiiON CX3-20c and CX3-40c. See [“Dell”](#) on page 5.

Introduction

VMware ESX Server software has been tested and deployed in a variety of storage area network (SAN) environments. This guide describes the storage devices currently tested by VMware and its storage partners.

NOTE The use of an external enclosure, or JBOD connected to a supported SAS/SCSI controller in a supported server is supported, as long as there is no disk sharing among multiple servers or SAS/SCSI cards.

This document discusses the following topics:

- [“Maximum Storage Specifications Supported”](#) on page 1
- [“Third-Party Software”](#) on page 2
- [“Fibre Channel SANs”](#) on page 2
- [“Network Attached Storage”](#) on page 14
- [“iSCSI”](#) on page 16
- [“OEM SAN Array Model Reference”](#) on page 20

Maximum Storage Specifications Supported

The following system and virtual machine maximums are supported for ESX Server hosts:

Table 1. Supported system and virtual machine maximums

	ESX Server 3.0.x
Maximum LUNs per system	256 (128 during install)
Maximum HBAs per system	16 ports (4 quad-port cards, 8 dual-port cards, etc.)
Maximum virtual HBAs per virtual machine	4
Maximum targets per virtual HBA	15
Maximum virtual disks per Windows virtual machine	60

Table 1. Supported system and virtual machine maximums

	ESX Server 3.0.x
Maximum virtual disks per Linux virtual machine	60
Maximum number of VMFS file systems per server	256
Maximum disk space per VMFS	2TB * # of extents
Maximum file size per VMFS-3 file	Default max file size for VMFS-3 is 256GB (block size of 1MB). This can be configured to a block size of 8MB which will allow a 2TB file.
Maximum number of files per VMFS-3	Supports enough files to hold the maximum number of VMs per VMFS volume supported by ESX 3.0 (typically greater than 30,000 files)
Maximum number of paths per LUN	32
Maximum number of total paths	1024
Maximum number of targets per HBA	15
Minimum VMFS-3 volume size	1.1 GB

Third-Party Software

Third party backup, replication, and snapshot software is certified and supported by the providers of the software. The ESX Server 2.5 guide at http://www.vmware.com/pdf/esx25_san_cfg.pdf shows the list of software that was supported with ESX Server 2.5. Please contact your SAN vendors regarding their plans to support ESX Server 3.0. As vendors certify software, we will create a list of certified software for ESX Server 3.0.

Microsoft Cluster Service (MSCS) with ESX

Clustering refers to the use of Microsoft Cluster Services (Windows 2003 and 2000) in a shared disk configuration between two virtual machines or a virtual machine and a physical system.

When clustering physical machines with virtual machines, third-party multipathing software cannot be used in the physical machine or the virtual machine (native ESX multipathing is automatically used on the ESX host). One effect of this is that for active/passive arrays, both hosts can only be connected to a single storage processor.

Application-level clustering using MSCS on virtual machines is certified only with certain arrays listed in this guide. Before installing VMware ESX Server software with your storage array, please examine the lists on the following pages to find out whether your array and configuration are supported.

Please refer to the *Setup for Microsoft Cluster Service with ESX Server 3 and Virtual Center 2* documentation for more information.

Fibre Channel SANs

For Fibre Channel SANs, VMware tests the following configurations:

- **Basic Connectivity** — The ability of ESX Server 3.0 hosts to recognize and interoperate with the storage array. This configuration does not allow for multipathing or any type of failover.
- **Multipathing** — The ability of ESX Server 3.0 hosts to handle multiple paths to the same storage device.
- **HBA Failover** — In this configuration, the ESX Server 3.0 host is equipped with multiple HBAs connecting to one or more SAN switches. The server is robust to HBA and switch failure only.
- **Storage Port Failover** — In this configuration, the ESX Server 3.0 host is attached to multiple storage ports and is robust to storage port failures.

- **Clustering Support** — Clustering support applies to Windows 2000 SP4, and Windows 2003 RTM. Clustering is supported only with a limited set of HBAs; please refer to the *I/O Compatibility Guide* (http://www.vmware.com/pdf/vi3_io_guide.pdf) for the list of HBAs not supported with MSCS.
- **Boot from SAN** — In this configuration, the ESX Server 3.0 host boots from a LUN stored on the SAN rather than a local disk.
- **Direct Connect** — In this configuration, the ESX Server 3.0 host directly connects to the array (no switches).

In the following tables, an X in a table cell indicates the storage array or an equivalent configuration has been tested. All storage products listed in this compatibility guide are supported. For further details about array firmware, storage product configurations and best practices, please contact the storage vendor

There are several items on the ESX 2.5.x Compatibility Guide (http://www.vmware.com/pdf/esx_SAN_guide.pdf) that are not on this 3.0 list. Please contact your storage vendors for plans regarding these items.

VMware works closely with each of its OEMs to drive towards mutual support of ESX Server at the time of announcement. Due to different product release cycles, levels of testing, and OEM agreements, not all OEM devices will be supported at the general availability date of a new version of ESX Server. We recommend contacting the OEM vendor for the best information on when their device is planned to be certified with Virtual Infrastructure 3.

This section contain information on storage arrays from the following vendors:

- [“3Par”](#) on page 4
- [“Bull”](#) on page 4
- [“Compellent”](#) on page 5
- [“Dell”](#) on page 5
- [“EMC”](#) on page 6
- [“Fujitsu”](#) on page 6
- [“Fujitsu Siemens”](#) on page 8
- [“Hewlett Packard”](#) on page 9
- [“Hitachi, Ltd.”](#) on page 10
- [“Hitachi Data Systems \(HDS\)”](#) on page 11
- [“IBM”](#) on page 11
- [“NEC”](#) on page 12
- [“Network Appliance”](#) on page 13
- [“Pillar Data Systems”](#) on page 13
- [“Sun”](#) on page 14
- [“Xitech”](#) on page 14

Table 2. 3Par

	ESX Server 3.0					ESX Server 3.0.1						
	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
E200	X	X	X	X ²	X		X	X	X	X ²	X	
S400	X	X	X	X ²	X		X	X	X	X ²	X	
S800	X	X	X	X ²	X		X	X	X	X ²	X	

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

² Supported with 2G Qlogic HBAs only.

Table 3. Bull

		ESX Server 3.0					ESX Server 3.0.1					
		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN
StoreWay	FDA1500	X	X	X	X		X	X	X	X		X
	FDA2500	X	X	X	X		X	X	X	X		X
	FDA2800	X	X	X	X		X	X	X	X		X

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

Table 4. Compellent

	ESX Server 3.0				ESX Server 3.0.1							
	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
Storage Center	X	X	X	X	X	X	X	X	X	X	X	X

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

Table 5. Dell

		ESX Server 3.0				ESX Server 3.0.1							
		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
AX	AX100	X	X	X		X	X	X	X	X		X	X
	AX150	X	X	X		X	X	X	X	X		X	X
Dell CLARiON	CX200	X	X	X	X	X		X	X	X	X	X	X
	CX300	X	X	X	X	X		X	X	X	X	X	X
	CX400	X	X	X	X	X		X	X	X	X	X	X
	CX500	X	X	X	X	X		X	X	X	X	X	X
	CX600	X	X	X	X	X		X	X	X	X	X	X
	CX700	X	X	X	X	X		X	X	X	X	X	X
	CX3-20	X	X	X		X		X	X	X		X	X
	CX3-20c	X	X	X		X		X	X	X		X	X
	CX3-40	X	X	X		X		X	X	X		X	X
	CX3-40c	X	X	X		X		X	X	X		X	X
	CX3-80	X	X	X		X		X	X	X		X	X

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

Table 6. EMC

		ESX Server 3.0					ESX Server 3.0.1						
		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
AX	AX100	X	X	X		X	X	X	X			X	
	AX150	X	X	X		X	X	X	X			X	
EMC CLARiiON	CX200	X	X	X	X	X	X	X	X	X	X	X	X
	CX300	X	X	X	X	X	X	X	X	X	X	X	X
	CX400	X	X	X	X	X	X	X	X	X	X	X	X
	CX500	X	X	X	X	X	X	X	X	X	X	X	X
	CX600	X	X	X	X	X	X	X	X	X	X	X	X
	CX700	X	X	X	X	X	X	X	X	X	X	X	X
	CX3-20	X	X	X	X	X	X	X	X	X	X	X	X
	CX3-20c	X	X	X	X	X	X	X	X	X	X	X	X
	CX3-40	X	X	X	X	X	X	X	X	X	X	X	X
	CX3-40c	X	X	X	X	X	X	X	X	X	X	X	X
	CX3-80	X	X	X	X	X	X	X	X	X	X	X	X
EMC Symmetrix	8000 Series	X	X	X	X	X	X	X	X	X	X	X	X
	DMX/DMX2	X	X	X	X	X	X	X	X	X	X	X	X
	DMX-3	X	X	X	X	X	X	X	X	X	X	X	X

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

Table 7. Fujitsu

		ESX Server 3.0					ESX Server 3.0.1						
		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
ETERNUS 3000 ²		X	X	X	X	X	X	X	X	X	X	X	X
ETERNUS 4000	Model 80 ² and 100 ²	X	X	X	X	X	X	X	X	X	X	X	X
	Model 300 and 500	X	X	X	X	X	X	X	X	X	X	X	X

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

² Contact your Fujitsu representative for the required setting to enable support

Table 7. Fujitsu

		ESX Server 3.0				ESX Server 3.0.1							
		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
ETERNUS 6000	Model 400	X	X	X		X		X	X	X		X	
	Model 500	X	X	X		X		X	X	X		X	
	Model 600	X	X	X		X		X	X	X		X	
	Model 700	X	X	X		X		X	X	X		X	
	Model 800	X	X	X		X		X	X	X		X	
	Model 900	X	X	X		X		X	X	X		X	
	Model 1000	X	X	X		X		X	X	X		X	
	Model 1100	X	X	X		X		X	X	X		X	
ETERNUS 8000	Model 700	X	X	X		X		X	X	X		X	
	Model 900	X	X	X		X		X	X	X		X	
	Model 1100	X	X	X		X		X	X	X		X	
	Model 2100	X	X	X		X		X	X	X		X	

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

² Contact your Fujitsu representative for the required setting to enable support

Table 8. Fujitsu Siemens

		ESX Server 3.0					ESX Server 3.0.1						
		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
FibreCAT	AX100	X	X	X		X		X	X	X		X	
	CX200	X	X	X	X	X		X	X	X	X	X	X
	CX300	X	X	X	X	X		X	X	X	X	X	X
	CX400	X	X	X	X	X		X	X	X	X	X	X
	CX500	X	X	X	X	X		X	X	X	X	X	X
	CX600	X	X	X	X	X		X	X	X	X	X	X
	CX700	X	X	X	X	X		X	X	X	X	X	X
	CX3-20	X	X	X		X		X	X	X		X	
	CX3-40	X	X	X		X		X	X	X		X	
	CX3-80	X	X	X		X		X	X	X		X	
	SX 60	X	X	X		X		X	X	X		X	
	SX 80	X	X	X		X		X	X	X		X	

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

Table 9. Hewlett Packard

		ESX Server 3.0					ESX Server 3.0.1						
		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
HP Modular Systems Array (MSA)	1000 ²	X	X	X	X	X		X	X	X	X	X	
	1500	X	X	X	X ^{3,5}	X		X	X	X	X ^{3,5}	X	
HP Enterprise Virtual Array (EVA)	3000	X	X	X	X ⁴	X		X	X	X	X ⁴	X	
	4000	X	X	X	X	X		X	X	X	X	X	
	5000	X	X	X	X ⁴	X		X	X	X	X ⁴	X	
	6000	X	X	X	X	X		X	X	X	X	X	
	8000	X	X	X	X	X		X	X	X	X	X	
HP XP	128	X	X	X	X	X		X	X	X	X	X	
	1024	X	X	X	X	X		X	X	X	X	X	
	10000 ⁶	X	X	X	X	X		X	X	X	X	X	
	12000 ⁶	X	X	X	X	X		X	X	X	X	X	

Please contact your local HP account or service representative for definitive information about supported HP storage product configurations including Guest OS types, array firmware and best practices when used with VMware products..

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

² These are active/passive versions, FW 4.xx (MSA1000)

³ Support for Windows 2000 SP4 only.

⁴ MSCS supported with active/active version FW 4.0xx only.

⁵ MSCS supported with active/passive version, FW 5.xx (MSA1500).

⁶ Restricted to internal storage configurations only.

Table 10. Hitachi, Ltd.

		ESX Server 3.0					ESX Server 3.0.1				
		Basic connectivity Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
SANRISE	AMS 200 ²	X	X	X	X	X	X	X	X	X	
	AMS 500 ²	X	X	X	X	X	X	X	X	X	
	AMS 1000 ²	X	X	X	X	X	X	X	X	X	
	NSC 55 ^{2,3}	X	X	X	X	X	X	X	X	X	
	WMS 100 ²	X	X	X	X	X	X	X	X	X	
	USP 100 ^{2,3}	X	X	X	X	X	X	X	X	X	
	USP 600 ^{2,3}	X	X	X	X	X	X	X	X	X	
	USP 1100 ^{2,3}	X	X	X	X	X	X	X	X	X	

Contact Hitachi, Ltd. for additional information, including Hitachi, Ltd. storage array microcode levels and the specific guest operating system, HBA, and switched fabric configurations that Hitachi, Ltd. supports.

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

² Support for 2Gb HBA only. Please refer to <http://kb.vmware.com/kb/1560391>.

³ Limited to internal storage configurations only.

Table 11. Hitachi Data Systems (HDS)

		ESX Server 3.0				ESX Server 3.0.1							
		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
TagmaStore	AMS 200 ²	X	X	X		X		X	X	X		X	
	AMS 500 ²	X	X	X		X		X	X	X		X	
	AMS 1000 ²	X	X	X		X		X	X	X		X	
	NSC 55 ^{2,3}	X	X	X		X		X	X	X		X	
	WMS 100 ²	X	X	X		X		X	X	X		X	
	USP 100 ^{2,3}	X	X	X		X		X	X	X		X	
	USP 600 ^{2,3}	X	X	X		X		X	X	X		X	
	USP 1100 ^{2,3}	X	X	X		X		X	X	X		X	
Thunder	9500V Series	X	X	X		X		X	X	X		X	

Contact HDS for additional information, including HDS storage array microcode levels and the specific guest operating system, HBA, and switched fabric configurations that HDS supports.

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

² Support for 2Gb HBA only. Please refer to <http://kb.vmware.com/kb/1560391>.

³ Limited to internal storage configurations only.

Table 12. IBM

		ESX Server 3.0				ESX Server 3.0.1							
		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
DS3400								X	X	X		X	
DS4100/ FAStT100		X	X	X		X		X	X	X		X	
FAStT200		X	X	X		X		X	X	X		X	
DS4200 ²		X	X	X		X		X	X	X		X	
DS4300/ FAStT600		X	X	X		X		X	X	X		X	

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

² Support for 2GB and 4GB HBA. Please refer to <http://kb.vmware.com/kb/1560391>.

³ Support for internal storage only.

Table 12. IBM (Continued)

	ESX Server 3.0					ESX Server 3.0.1						
	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
DS4400/ FAStT700	X	X	X	X	X		X	X	X	X	X	
DS4500/ FAStT900	X	X	X		X		X	X	X		X	
DS4700 ²	X	X	X		X		X	X	X		X	
DS4800 ²	X	X	X		X		X	X	X		X	
DS6000	X	X	X		X		X	X	X		X	
DS8000 ²	X	X	X		X		X	X	X		X	
ESS750/800	X	X	X		X		X	X	X		X	
F10/F20	X	X	X		X		X	X	X		X	
N5000 Series ³	X	X	X		X		X	X	X		X	
N7000 Series ³	X	X	X		X		X	X	X		X	

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

² Support for 2GB and 4GB HBA. Please refer to <http://kb.vmware.com/kb/1560391>.

³ Support for internal storage only.

Table 13. NEC

		ESX Server 3.0					ESX Server 3.0.1						
		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
iStorage	S500	X	X	X	X			X	X	X	X	X	
	S550							X	X	X		X	
	S1400	X	X	X		X		X	X	X		X	
	S1500	X	X	X		X		X	X	X		X	
	S2500	X	X	X		X		X	X	X		X	
	S2800	X	X	X		X		X	X	X		X	

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

Table 14. Network Appliance

	ESX Server 3.0				ESX Server 3.0.1							
	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
FAS3000 Series ²	X	X	X	X	X	X	X	X	X	X	X	X
FAS6000 Series	X	X	X	X	X	X	X	X	X	X	X	X

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

² Support for 2Gb HBA only. Please refer to <http://kb.vmware.com/kb/1560391>.

Table 15. Pillar Data Systems

	ESX Server 3.0				ESX Server 3.0.1							
	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
Axiom Storage System 500	X				X		X				X	

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

Table 16. Sun

		ESX Server 3.0					ESX Server 3.0.1						
		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
Sun StorageTek	3510 ²	X	X	X		X		X	X	X		X	
	3511 ²	X	X	X		X		X	X	X		X	
	6130 ²	X	X	X		X		X	X	X		X	
	6140	X	X	X		X		X	X	X		X	
	6920 ^{3,4}	X	X	X		X		X	X	X		X	
	6540	X	X	X		X		X	X	X		X	
	9990 ^{2,4}	X	X	X		X		X	X	X		X	
	9985 ^{2,4}	X	X	X		X		X	X	X		X	
Sun StorageTek Flexline	380	X	X	X		X		X	X	X		X	

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

² Support for 2Gb HBA only. Please refer to <http://kb.vmware.com/kb/1560391>.

³ Only supported with MRU failover policy

⁴ Limited to internal storage configurations only

Table 17. Xiotech

		ESX Server 3.0					ESX Server 3.0.1						
		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Microsoft Clustering support ¹	Boot from SAN	DirectConnect and multipathing with HBA failover
Magnitude 3D	3000 ²	X	X	X		X		X	X	X		X	

¹ MSCS supported with 2Gb HBAs using Qlogic 7.04.00 and Emulex 7.1.14 drivers only. Please refer to <http://kb.vmware.com/kb/1560391>.

² Support for 2Gb HBA only. Please refer to <http://kb.vmware.com/kb/1560391>.

Network Attached Storage

This section contains information on the support for network attached storage with ESX Server software.

NOTE MSCS clustering is not supported with NAS.

The following sections are included:

- [“Supported Linux Distributions”](#) on page 15
- [“Supported Storage Devices”](#) on page 15

Supported Linux Distributions

The following Linux distributions support network attached storage when used with ESX Server 3.x software:

- Red Hat Enterprise Linux 3 NFS Server (Update 5).
- Fedora Core 4 NFS Server (2.6.12-1.1456_FC4.9550smp).

Supported Storage Devices

This section lists all of the supported devices for network attached storage with ESX Server 3.x software from the following vendors:

- [“IBM”](#) on page 15
- [“Network Appliance”](#) on page 15
- [“EMC”](#) on page 15

Table 18. IBM

		ESX Server 3.0	ESX Server 3.0.1
N3700	Data ONTAP 7.2	X	X
N5000 Series ¹	Data ONTAP 7.2	X	X
N7000 Series ¹	Data ONTAP 7.2		X
¹ Supports internal storage only.			

Table 19. Network Appliance

		ESX Server 3.0	ESX Server 3.0.1
FAS900 Series (920, 940, 960, 980)	Data ONTAP 6.5.3P4	X	X
FAS200 Series (250, 270)	Data ONTAP 7.0	X	X
FAS3000 Series	Data ONTAP 7.0.4	X	X
	Data ONTAP 7.2		X
FAS6000 Series	Data ONTAP 7.2		X

Table 20. EMC

	ESX Server 3.0	ESX Server 3.0.1
Celerra NS 500/700 series, CNS, and NSX DART version 5.4	X	X
Celerra NS 40/80 series, NS 350, NS 500/700 series, CNS, and NSX DART version 5.5		X

NOTE Celerra models noted are family names and cover all model numbers and model types (integrated and gateway) within the family.

iSCSI

VMware supports the iSCSI Storage listed in this section.

The following maximums are in place when using iSCSI arrays with ESX Server hosts:

Table 21. Storage parameter maximums with iSCSI Arrays

Parameter	Initiator type used	Limit
Number of HBAs	software	1
	hardware	2
Maximum number of targets	both software and hardware initiator	64
Number of LUNs	both software and hardware initiator	254
Number of paths to storage	software	4
	hardware	8

VMware supports connections to iSCSI arrays using either the software initiator in the kernel or a hardware initiator (iSCSI HBA). Please refer to the *I/O Compatibility Guide* at http://www.vmware.com/pdf/vi3_io_guide.pdf for a list of hardware initiators that can be used with ESX.

The following configurations are supported for iSCSI storage with the software initiator over a supported NIC:

- **iSCSI Base Connectivity** – The ability of an ESX Server host to recognize the target and interoperate with it.
- **SP failover** – In this configuration the ESX Server host is attached to multiple ports and is robust to storage port failover
- **NIC failover for software initiator** – If the Ethernet adapters are teamed and one fails, the other one takes over. Both adapters must be connected to the same physical switch and be on the same subnet (both NICs and iSCSI storage ports).

The following configurations are supported for iSCSI storage with hardware initiators:

- **iSCSI Base Connectivity** – The ability of an ESX Server host to recognize the target over an iSCSI HBA and interoperate with it.
- **SP failover** – In this configuration, ESX Server host is attached to multiple ports over an iSCSI HBA and is robust to storage port failover.
- **Boot from iSCSI** – In this configuration, ESX Server hosts boot from the target iSCSI array rather than from a local disk.
- **iSCSI hardware initiator failover** – The ESX server host is equipped with multiple hardware initiators and is robust to hardware initiator failover.

NOTE Clustering is not supported with iSCSI.

NOTE Software initiated iSCSI is supported fully in ESX 3.0 and later releases. Hardware initiated iSCSI is supported in experimental mode only in ESX 3.0. It is supported fully in ESX 3.0.1 with iSCSI arrays that have been qualified/certified for use with the hardware initiators.

iSCSI Storage devices from the following manufactures have been tested for the stated release of ESX Server 3.x:

- **“Compellent”** on page 17
- **“Dell”** on page 17
- **“EMC”** on page 18

- [“EqualLogic”](#) on page 18
- [“Fujitsu Siemens”](#) on page 19
- [“Hewlett Packard”](#) on page 19
- [“IBM”](#) on page 19
- [“LeftHand Networks”](#) on page 20
- [“Network Appliance”](#) on page 20

Table 22. Compellent

	ESX Server 3.0						ESX Server 3.0.1					
	iSCSI software initiator			iSCSI hardware initiator			iSCSI software initiator			iSCSI hardware initiator		
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI initiator failover	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI initiator failover
Storage Center	X	X	X				X	X	X			

Table 23. Dell

	ESX Server 3.0						ESX Server 3.0.1					
	iSCSI software initiator			iSCSI hardware initiator			iSCSI software initiator			iSCSI hardware initiator		
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI initiator failover	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI initiator failover
AX100i FLARE 02.19.100.5.07	X		X	X		X ^{1,2} X ²	X		X			
CX300i FLARE 02.19.500.5.109	X	X ²	X	X	X ²	X ² X ²	X	X	X	X	X	X X
CX500i FLARE 02.19.500.5.109	X	X ²	X	X	X ²	X ² X ²	X	X	X	X	X	X X

¹ SP/datamover or cluster failover is not supported during boot from iSCSI.

² iSCSI hardware initiator support is experimental only

Table 24. EMC

	ESX Server 3.0						ESX Server 3.0.1							
	iSCSI software initiator			iSCSI hardware initiator			iSCSI software initiator			iSCSI hardware initiator				
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover
AX100i FLARE 02.19.100.5.07	X		X	X		X ^{1,2}	X ²	X		X				
AX150i ³	X		X					X		X				
CX3-20c ³	X	X	X					X	X	X	X	X	X	X
CX3-40c ³	X	X	X					X	X	X	X	X	X	X
CX300i FLARE 02.19.500.5.109	X	X ²	X	X	X ²	X ²	X ²	X	X	X	X	X	X	X
CX500i FLARE 02.19.500.5.109	X	X ²	X	X	X ²	X ²	X ²	X	X	X	X	X	X	X
Celerra 500/700 series, CNS, and NSX DART 5.4	X		X	X		X ^{1,2}	X ²	X		X				
Celerra NS 40/80 series, NS 350, NS 500/700 series, CNS, and NSX DART 5.5								X		X	X	X	X ¹	X

¹ SP/datamover or cluster failover is not supported during boot from iSCSI.

² iSCSI hardware initiator support is experimental only.

³ Contact EMC for additional information including supported array firmware versions.

Table 25. EqualLogic

	ESX Server 3.0						ESX Server 3.0.1							
	iSCSI software initiator			iSCSI hardware initiator			iSCSI software initiator			iSCSI hardware initiator				
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover
PS Series	PS50E V3.1							X		X	X		X	X
	PS70E V3.1							X		X	X		X	X
	PS100E V3.1							X	X	X	X	X	X	X
	PS300E V3.1							X	X	X	X	X	X	X
	PS400E V3.1							X	X	X	X	X	X	X
	PS3600X V3.1							X	X	X	X	X	X	X
	PS3800XV V3.1							X	X	X	X	X	X	X

Table 26. Fujitsu Siemens

	ESX Server 3.0				ESX Server 3.0.1										
	iSCSI software initiator		iSCSI hardware initiator		iSCSI software initiator		iSCSI hardware initiator								
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	
AX100i FLARE 02.19.100.5.07	X		X	X		X ^{1,2}	X ²	X		X					
CX300i FLARE 02.19.500.5.109		X ²	X		X ²	X ²	X ²		X	X			X	X	X
CX500i FLARE 02.19.500.5.109	X	X ²	X	X	X ²	X ²	X ²	X	X	X	X	X	X	X	X
¹ SP/datamover or cluster failover is not supported during boot from iSCSI. ² iSCSI hardware initiator support is experimental only															

Table 27. Hewlett Packard

	ESX Server 3.0				ESX Server 3.0.1										
	iSCSI software initiator		iSCSI hardware initiator		iSCSI software initiator		iSCSI hardware initiator								
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	
MSA 1510i ¹ FW 1.30								X		X					
¹ Single Controller only.															

Table 28. IBM

	ESX Server 3.0				ESX Server 3.0.1										
	iSCSI software initiator		iSCSI hardware initiator		iSCSI software initiator		iSCSI hardware initiator								
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	
N5000 Series ¹ Data ONTAP 7.2 RC2								X	X	X	X	X	X	X	X
¹ Supports internal storage only.															

Table 29. LeftHand Networks

	ESX Server 3.0				ESX Server 3.0.1									
	iSCSI software initiator		iSCSI hardware initiator		iSCSI software initiator		iSCSI hardware initiator							
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover
HP® ProLiant DL380 and SAN/iQ® 6.6								X	X	X				

Table 30. Network Appliance

	ESX Server 3.0				ESX Server 3.0.1									
	iSCSI software initiator		iSCSI hardware initiator		iSCSI software initiator		iSCSI hardware initiator							
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover
FAS200 series (250/270) Data ONTAP 7.0	X	X ²	X	X	X ²	X ^{1,2}	X ²	X	X ²	X				
FAS900 series (920, 940, 960, 980) Data ONTAP 6.5.3 P4	X	X ²	X	X	X ²	X ^{1,2}	X ²	X	X ²	X				
FAS3000 series Data ONTAP 7.0.4	X	X	X	X	X	X ¹	X	X	X	X	X	X	X ¹	X
FAS3000 series Data ONTAP 7.2RC4								X	X	X	X	X	X ¹	X

¹ SP/datamover or cluster failover is not supported during boot from iSCSI.
² iSCSI hardware initiator support is experimental only

OEM SAN Array Model Reference

Table 31. SAN Array Model Reference

OEM	Array Type	Mode	Recommended Path Policy	Model String
3Par	S200	Active-active	Fixed	3PARdata
3Par	S400	Active-active	Fixed	3PARdata
3Par	S800	Active-active	Fixed	3PARdata
Bull	FDA1500	Active-active	Fixed	iStorage 1000
Bull	FDA2500	Active-active	Fixed	iStorage 2000
Bull	FDA2800	Active-active	Fixed	iStorage 2000
Compellent	Storage Center	Active-active	Fixed	Compellent Vol
EMC (Dell)	AX-100	Active-passive	MRU – Most Recently Used	DGC
EMC (Dell)	AX-150	Active-passive	MRU – Most Recently Used	DGC
EMC (Dell)	CX-200 → CX-700	Active-passive	MRU – Most Recently Used	DGC

Table 31. SAN Array Model Reference (Continued)

OEM	Array Type	Mode	Recommended Path Policy	Model String
EMC (Dell)	CX3 series	Active-passive	MRU – Most Recently Used	DGC
EMC (Dell)	CX3-20c, CX3-40c	Active-passive	MRU – Most Recently Used	DGC
EMC (Dell)	DMX	Active-active	Fixed	Symmetrix
EMC (Dell)	Symmetrix 8000	Active-active	Fixed	Symmetrix
EqualLogic	PS Series	Active/Active	Fixed	
Fujitsu	ETERNUS 3000	Pseudo-active-active	Fixed	E3000
Fujitsu	ETERNUS 4000 Models 300 and 500	Active-active	Fixed	E4000
Fujitsu	ETERNUS 4000 Models 80 and 100	Pseudo-active-active	Fixed	E400A
Fujitsu	ETERNUS 6000	Active-active	Fixed	E6000
Fujitsu	ETERNUS 8000	Active-active	Fixed	E8000
Fujitsu Siemens	SX 60	Active-active	Fixed	FibreCAT_SX1
Fujitsu Siemens	SX 80	Active-active	Fixed	FibreCAT_SX1
Hewlett Packard	EVA3000 v. 3.0	Active-passive	MRU – Most Recently Used	HSV100
Hewlett Packard	EVA3000 v. 4.0	Active-active	Fixed	HSV101
Hewlett Packard	EVA-4000	Active-active	Fixed	HSV200
Hewlett Packard	EVA-5000 v. 3.0	Active-passive	MRU – Most Recently Used	HSV110
Hewlett Packard	EVA-5000 v. 4.0	Active-active	Fixed	HSV111
Hewlett Packard	EVA-6000	Active-active	Fixed	HSV200
Hewlett Packard	EVA-8000	Active-active	Fixed	HSV210
Hewlett Packard	MSA-1000 V4	Active-passive	MRU – Most Recently Used	MSA1000_VOLUME
Hewlett Packard	MSA-1500 V5	Active-passive	MRU – Most Recently Used	MSA1000_VOLUME
Hewlett Packard	MSA-1500 V6	Active-active	MRU – Most Recently Used	MSA VOLUME
Hewlett Packard	XP-10000	Active-active	Fixed	OPEN-
Hewlett Packard	XP-1024	Active-active	Fixed	OPEN-
Hewlett Packard	XP-12000	Active-active	Fixed	OPEN-
Hewlett Packard	XP-128	Active-active	Fixed	OPEN-
Hewlett Packard	XP-48	Active-active	Fixed	OPEN-
Hewlett Packard	XP-512	Active-active	Fixed	OPEN-
Hitachi, Ltd.	AMS1000	Active-passive	MRU – Most Recently Used	
Hitachi, Ltd.	AMS200	Active-passive	MRU – Most Recently Used	
Hitachi, Ltd.	AMS500	Active-passive	MRU – Most Recently Used	
Hitachi, Ltd.	NSC55	Active-active	Fixed	
Hitachi, Ltd.	USP100	Active-active	Fixed	
Hitachi, Ltd.	USP1100	Active-active	Fixed	
Hitachi, Ltd.	USP600	Active-active	Fixed	
Hitachi, Ltd.	WMS100	Active-passive	MRU – Most Recently Used	
Hitachi Data Systems	AMS1000	Active-passive	MRU – Most Recently Used	
Hitachi Data Systems	AMS200	Active-passive	MRU – Most Recently Used	
Hitachi Data Systems	AMS500	Active-passive	MRU – Most Recently Used	
Hitachi Data Systems	HDS-9500V	Active-passive	MRU – Most Recently Used	
Hitachi Data Systems	NSC55	Active-active	Fixed	

Table 31. SAN Array Model Reference (Continued)

OEM	Array Type	Mode	Recommended Path Policy	Model String
Hitachi Data Systems	USP100	Active-active	Fixed	
Hitachi Data Systems	USP1100	Active-active	Fixed	
Hitachi Data Systems	USP600	Active-active	Fixed	
Hitachi Data Systems	WMS100	Active-passive	MRU – Most Recently Used	
IBM	DS-4000		MRU – Most Recently Used	1814
IBM	DS-4100 or FastT-100	Active-passive	MRU – Most Recently Used	1724-100
IBM	DS-4300 or FastT-600		MRU – Most Recently Used	1722
IBM	DS-4400 or FastT-700		MRU – Most Recently Used	1742
IBM	DS-4500 or FastT-900		MRU – Most Recently Used	1742
IBM	DS-4800		MRU – Most Recently Used	1815
IBM	DS-6000		Fixed	
IBM	DS-8000		Fixed	2107900
IBM	FastT-200	Active-passive	MRU – Most Recently Used	3542
IBM	FastT-500	Active-passive	MRU – Most Recently Used	3552
IBM	N7000 Series	Active-active	MRU – Most Recently Used	LUN
LeftHand Networks	HP® ProLiant DL380 and SAN/iQ® 6.6	Active-passive	MRU – Most Recently Used	iSCSIDisk
NEC	S1500	Active-active	Fixed	iStorage 1000
NEC	S2500	Active-active	Fixed	iStorage 1000
NEC	S2800	Active-active	Fixed	iStorage 1000
NEC	S500	Active-active	Fixed	iStorage 1000
NEC	S550	Active-active	Fixed	iStorage 1000
NetApp	FAS6000	Active-active	Fixed	LUN
Pillar Data Systems	Axiom Storage System 500	N/A: No separate modes	MRU – Most Recently Used	Axiom 500
Sun	StorageTek 3510	Active-active	Fixed	StorEdge 3510
Sun	StorageTek 6130	Active-passive	MRU – Most Recently Used	CSM100_R_FC
Sun	StorageTek 6140	Active-passive	MRU – Most Recently Used	CSM200_R
Sun	StorageTek 6540	Active-passive	MRU – Most Recently Used	FLEXLINE 380
Sun	StorageTek 6920	Active-active	MRU – Most Recently Used	SE6920
Sun	StorageTek 9985	Active-active	Fixed	HITACHI OPEN-V
Sun	StorageTek Flexline 380	Active-passive	MRU – Most Recently Used	FLEXLINE 380
Sun	StorEdge 3511	Active/Active	Fixed	SE3511
Xiotech	Magnitude 3D 3000	Active-active	Fixed	Magnitude 3D

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