



Storage Compatibility Guide for ESX Server 3.0 RC

VMware ESX Server software has been tested and deployed in a variety of storage area network (SAN) environments. This guide describes the combinations of HBAs (host bus adapters) and storage devices currently tested and planned to be tested by VMware and its storage partners.

This document discusses the following topics:

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- [Network Attached Storage on page 8](#)
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Third-Party Software

Third party replication and snapshotting 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.

Status of Release Candidate Software

In the following tables, an X in a table cell indicates the storage array or an equivalent configuration has been tested with the current release candidate. A **P** indicates the storage array is planned for future testing by either VMware or its partners. VMware cannot guarantee that each of these items will be supported at the time of final release. Please contact your storage vendor or VMware representative for a detailed timeline.

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

Note: The **P** notation is not meant to be a commitment by VMware. Contact your storage vendor for more specific details and schedules.

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.

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- **Clustering Support** — Clustering support applies to Windows 2000, its service packs, and Windows 2003 RTM, but not Windows 2003 SP1. Please refer to KB article 2021 (www.vmware.com/support/kb/enduser/std_adp.php?p_faqid=2021) for the latest information.
- **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).

Dell

For information about Dell CLARiiON, see [EMC on page 3](#).

EMC

	AX		EMC CLARiiON						EMC Symmetrix			
	AX100	AX150	CX200	CX300	CX400	CX500	CX600	CX700	DMX800/ DMX1000	8000 Series	DMX/ DMX2	DMX3
Basic connectivity	X	P	X	X	X	X	X	X	X	X	X	P
Multipathing with HBA failover	P	P	X	X	X	X	X	X	X	P	P	P
Multipathing with storage port failover	P	P	X	X	X	X	X	X	P	P	P	P
Clustering support	P	P	P	P	X	X	P	P	P	P	P	P
Boot from SAN	P	P	X	X	X	X	X	X	P	P	P	P
DirectConnect and multipathing with HBA failover	X											

X indicates the storage array has been tested with the current release candidate.

P indicates the storage array is planned to be supported but has not yet been tested, by either VMware or its partners.

VMware cannot guarantee that each of these will be supported at the time of ESX 3.0 general availability.

EMC Array Notes

- Naviagent is supported with CLARiiON Arrays only in the Service Console. Use of Naviagent from a guest operating system is not supported.
- Ax100 supports `axnaviserverutilcli` only in the Service Console. Use from a guest operating system is not supported.
- Emulex HBAs (such as LP101) can be directly connected to the AX100 using firmware version 1.91a1 and BootBIOS version 1.70a3 for Boot-From-SAN. VMware supports only direct-connect topology on the AX100. Direct Connect support does not apply to other arrays.

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Fujitsu

	ETERNUS			
	S3000	S4000	S6000	S8000
Basic connectivity	P	P	P	P
Multipathing with HBA failover	P	P	P	P
Multipathing with storage port failover	P	P	P	P
Clustering support	P	P	P	P
Boot from SAN	P	P	P	P

P indicates the storage array is planned to be supported but has not yet been tested by either VMware or its partners. VMware cannot guarantee that each of these will be supported at the time of ESX 3.0 general availability.

Fujitsu Siemens

	FibreCAT						
	AX100	CX200	CX300	CX400	CX500	CX600	CX700
Basic connectivity	X	X	X	X	X	X	X
Multipathing with HBA failover	P	X	X	X	X	X	X
Multipathing with storage port failover	P	X	X	X	X	X	X
Clustering support	P	P	P	X	X	P	P
Boot from SAN	P	X	X	X	X	X	X

P indicates the storage array is planned to be supported but has not yet been tested by either VMware or its partners. VMware cannot guarantee that each of these will be supported at the time of ESX 3.0 general availability.

Hewlett Packard

	HP Modular Systems Array (MSA)		HP Enterprise Virtual Array (EVA) ²						HP XP			
	1000	1500	3000 ¹	4000	5000 ¹	6000	8000	48	128	512	1024	
	Basic connectivity	X	X	X	X	P	X	X	P	X	P	P
Multipathing with HBA failover	X	X	X	X	P	X	X	P	X	P	P	

¹These are active/passive versions.

²2Gb version only.

X indicates the storage array has been tested with the current release candidate.

P indicates the storage array is planned to be supported but has not yet been tested by either VMware or its partners.

VMware cannot guarantee that each of these will be supported at the time of ESX 3.0 general availability.

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	HP Modular Systems Array (MSA)		HP Enterprise Virtual Array (EVA) ²					HP XP			
	1000	1500	3000 ¹	4000	5000 ¹	6000	8000	48	128	512	1024
Multipathing with storage port failover	X	X	X	X	P	P	X	P	X	P	P
Clustering support	P	P	X	P	P	P	P	P	P	P	P
Boot from SAN	X	X	X	X	P	P	X	P	X	P	P

¹These are active/passive versions.
²2Gb version only.
X indicates the storage array has been tested with the current release candidate.
P indicates the storage array is planned to be supported but has not yet been tested by either VMware or its partners.
VMware cannot guarantee that each of these will be supported at the time of ESX 3.0 general availability.

Contact HP for additional information.

Hitachi Data Systems (HDS)

		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
	99xx	P	P	P	P
Freedom Lightning	99xxV	X	X	X	X
Thunder	9585V	X	X	X	X
TagmaStore	AMS100	P	P	P	P
	AMS200	P	P	P	P
	AMS500	P	P	P	P
	NSC55	P	P	P	P
	USP	P	P	P	P
	WMS100	P	P	P	P

P indicates the storage array is planned to be supported but has not yet been tested by either VMware or its partners.

VMware cannot guarantee that each of these will be supported at the time of ESX 3.0 general availability.

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.

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IBM

IBM entry-level and FASTT/DS4000 Systems

	FASTt100/ DS4100	FASTt200/ DS4200	FASTt600/ DS4300	FASTt700/ DS4400	FASTt900/ DS4500
Basic connectivity	X	X	X	X	X
Multipathing with HBA failover	X	P	X	X	X
Multipathing with storage port failover	X	P	X	X	X
Clustering support	P	P	P	P	P
Boot from SAN	X	P	X	X	X

DirectConnect and Multipathing with HBA failover

X indicates the storage array has been tested with the current release candidate.

P indicates the storage array is planned to be supported but has not yet been tested by either VMware or its partners.

VMware cannot guarantee that each of these will be supported at the time of ESX 3.0 general availability.

IBM ESS/DS6000/DS8000 (Shark) and IBM SAN Volume Controller (SVC) Systems

	F10/F20	ESS 750/ 800	DS6000 Series	DS8000 Series	SVC
Basic connectivity	X	P	P	P	P
Multipathing with HBA failover	X	P	P	P	P
Multipathing with storage port failover	X	P	P	P	P
Clustering support	P				P
Boot from SAN	X	P	P	P	P

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Network Appliance

	NetApp Fibre Channel SAN Attached Filer			
	FAS200 Series	F800 Series	FAS900 Series	FAS3000 Series
Basic connectivity	P	P	P	P
Multipathing with HBA failover	P	P	P	P
Multipathing with storage port failover	P	P	P	P
Clustering support	P	P	P	P
Boot from SAN	P	P	P	P

P indicates the storage array is planned to be supported but has not yet been tested. VMware cannot guarantee that each of these will be supported at the time of ESX 3.0 general availability.

3PAR

	s400	s800
Basic connectivity	P	P
Multipathing with HBA failover	P	P
Multipathing with storage port failover	P	P
Boot from SAN	P	P

P indicates the storage array is planned to be supported but has not yet been tested. VMware cannot guarantee that each of these will be supported at the time of ESX 3.0 general availability.

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Network Attached Storage

Storage devices listed in this section are planned for support with the GA version of ESX 3.0.

Network Appliance

The following Network Appliance SAN Attached Filers storage devices have been tested with this release candidate:

- FAS200 Series (250, 270): Data ONTAP 7.0 current
- FAS900 Series (920, 940, 960, 980): Data ONTAP 6.5.3P4

Linux Distributions

- Red Hat Enterprise Linux 3 NFS Server (Testing was done with update 5)
- Fedora Core 4 NFS Server (Testing was done with 2.6.12-1.1456_FC4.9550smp)

EMC

- Celerra NS700/500 series (700, 700G, 704G,500, and 500G)

Note: MSCS clustering is not supported with NAS.

iSCSI

VMware supports the iSCSI SANs listed in this section.

Note: The maximum number of HBAs supported for iSCSI is 2.

For iSCSI SANs, VMware tests the following configurations:

- iSCSI base connectivity hardware and software —The ability of ESX server 3.0 hosts to recognize and interoperate
- iSCSI hardware and software (SP failover)—In this configuration, the ESX 3.0 host is attached to multiple storage ports and is robust to storage port failures
- Boot from iSCSI (hardware only)—In this configuration, ESX 3.0 host boots from the target iSCSI array rather than from a local disk
- 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)
- iSCSI hardware initiator failover—The ESX Server 3.0 host is equipped with multiple hardware initiators; the server is robust to the hardware initiator failover

Note: Clustering is not supported with iSCSI.

Note: Hardware-initiated iSCSI is only supported experimentally with ESX Server 3.0. That is, it is not recommended for use in production environments. Software-initiated iSCSI is supported fully and is the recommended configuration for production iSCSI deployments with ESX Server.

The following devices have been tested for this release candidate:

EMC	AX100i	CX300i	CX500i	Celerra NS700/500
iSCSI Base Connectivity	X	P	X	X
iSCSI Hardware & Software (SP failover)	Not supported	P	P	Not supported
Boot from iSCSI (hardware only)	Not supported	P	X	X

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EMC	AX100i	CX300i	CX500i	Celerra NS700/500
NIC failover for software initiator	X	X	X	X
iSCSI hardware initiator failover	X	P	X	Not supported

Fujitsu Siemens	AX100i	CX300i	CX500i
iSCSI Base Connectivity	X	P	X
iSCSI Hardware & Software (SP failover)	Not supported	P	P
Boot from iSCSI (hardware only)	Not supported	P	X
NIC failover for software initiator	X	X	X
iSCSI hardware initiator failover	X	P	X

Network Appliance	FAS 200 series (250, 270) Data ONTAP 7.0 current	FAS900 series (920, 940, 960, 980) Data ONTAP 6.5.3 p4
iSCSI Base Connectivity	X	X
iSCSI Hardware & Software (SP failover)	P	P
Boot from iSCSI (hardware only)	X	X
NIC failover for software initiator	X	X
iSCSI hardware initiator failover	X	X

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Maximum Storage Specifications Supported

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

	ESX Server 3.0 Support
Maximum LUNs per system ¹	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
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

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OEM SAN Array Model Reference

OEM	Array Type	Mode	Recommended Path Policy	Model String
EMC (Dell)	DMX	Active-active	Fixed	
EMC (Dell)	Symmetrix 8000	Active-active	Fixed	
EMC (Dell)	CX-200 → CX-700	Active-passive	MRU – Most Recently Used	DGC
EMC (Dell)	AX-100	Active-passive	MRU – Most Recently Used	DGC
Fujitsu	ETERNUS 3000	Pseudo-active-active	Fixed	
Fujitsu	ETERNUS 6000	Active-active	Fixed	
Fujitsu-Siemens	S-80	Active-active	Fixed	FC2502
Fujitsu-Siemens	S-60	Active-active	Fixed	
HDS	HDS-9500V	Active-passive	MRU – Most Recently Used	DF600F
Hewlett Packard	XP-12000	Active-active	Fixed	OPEN-
Hewlett Packard	XP-10000	Active-active	Fixed	OPEN-
Hewlett Packard	XP-1024	Active-active	Fixed	OPEN-
Hewlett Packard	XP-512	Active-active	Fixed	OPEN-
Hewlett Packard	XP-128	Active-active	Fixed	OPEN-
Hewlett Packard	XP-48	Active-active	Fixed	OPEN-
Hewlett Packard	EVA-8000 v. 5.0	Active-active	Fixed	HSV210
Hewlett Packard	EVA-6000 v. 5.0	Active-active	Fixed	HSV200
Hewlett Packard	EVA-4000 v. 5.0	Active-active	Fixed	HSV200
Hewlett Packard	EVA-5000 v. 4.0	Active-active	Fixed	HSV111
Hewlett Packard	EVA-3000 v. 4.0	Active-active	Fixed	HSV101
Hewlett Packard	EVA-5000 v. 3.0	Active-passive	MRU – Most Recently Used	HSV110
Hewlett Packard	EVA3000 v. 3.0	Active-passive	MRU – Most Recently Used	HSV100
Hewlett Packard	MSA-1500 V5	Active-passive	MRU – Most Recently Used	MSA1000_VOLUME
Hewlett Packard	MSA-1000 V4	Active-passive	MRU – Most Recently Used	MSA1000_VOLUME
Hewlett Packard	HSG80	Active-passive	MRU – Most Recently Used	HSG80
IBM	DS-8000		Fixed	2107900
IBM	DS-6000		Fixed	
IBM	DS-4000		MRU	1814
IBM	DS-4800		MRU – Most Recently Used	1815
IBM	DS-4500 or FastT-900		MRU – Most Recently Used	1742
IBM	DS-4400 or FastT-700		MRU – Most Recently Used	1742

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OEM	Array Type	Mode	Recommended Path Policy	Model String
IBM	DS-4300 or FastT-600		MRU – Most Recently Used	1722
IBM	FastT-500	Active-passive	MRU – Most Recently Used	3552
IBM	FastT-200	Active-passive	MRU – Most Recently Used	3542
IBM	DS-4100 or FastT-100	Active-passive	MRU – Most Recently Used	1724-100
IBM	SVC	Active-active	MRU-Most Recently Used	2145
NEC	S400	Active-active	Fixed	iStorage 1000
NEC	S1400	Active-active	Fixed	iStorage 1000
NEC	S2400	Active-active	Fixed	iStorage 1000
NEC	S2800	Active-active	Fixed	iStorage 1000
NetApp	FAS200	Active-active	Fixed	LUN
NetApp	FAS800	Active-active	Fixed	LUN
NetApp	FAS900	Active-active	Fixed	LUN
NetApp	FAS3000	Active-active	Fixed	LUN
StorageTek	FLX -210	Active-passive	MRU – Most Recently Used	BladeCtrl B210
StorageTek	FLX-220	Active-passive	MRU – Most Recently Used	BladeCtrl B220
StorageTek	FLX-240	Active-passive	MRU – Most Recently Used	BladeCtrl B240
StorageTek	FLX-280	Active-passive	MRU – Most Recently Used	BladeCtrl B280
StorageTek	FLX-380	Active-passive	MRU – Most Recently Used	BladeCtrl B220
StorageTek	BC82	Active-passive	MRU – Most Recently Used	BladeCtrl BC82
StorageTek	BC84	Active-passive	MRU – Most Recently Used	BladeCtrl BC84
StorageTek	BC88	Active-passive	MRU – Most Recently Used	BladeCtrl BC88
StorageTek	9176	Active-passive	MRU – Most Recently Used	OPENstorage 9176
StorageTek	D173	Active-passive	MRU – Most Recently Used	OPENstorage D173
StorageTek	D178	Active-passive	MRU – Most Recently Used	OPENstorage D178
StorageTek	D210	Active-passive	MRU – Most Recently Used	OPENstorage D210
StorageTek	D220	Active-passive	MRU – Most Recently Used	OPENstorage D220
StorageTek	D240	Active-passive	MRU – Most Recently Used	OPENstorage D240

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OEM	Array Type	Mode	Recommended Path Policy	Model String
StorageTek	D280	Active-passive	MRU – Most Recently Used	OPENstorage D280
Sun	StorEdge 6920	Active-active	Fixed	
3Par	S200	Active-active	Fixed	
3Par	S400	Active-active	Fixed	
3Par	S800	Active-active	Fixed	

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