

# Configuration Maximums

VMware® vSphere 4.0

---

When you select and configure your virtual and physical equipment, you must stay at or below the maximums supported by vSphere 4.0. The limits presented in the following tables represent tested, recommended limits, and they are fully supported by VMware.

- [“Virtual Machine Maximums”](#) on page 1
- [“ESX Host Maximums”](#) on page 2
- [“vCenter Server Maximums”](#) on page 6
- [“vCenter Server Extensions”](#) on page 7

The limits presented in this document can be affected by other factors, such as hardware dependencies. For more information about supported hardware, see the appropriate ESX hardware compatibility guide. Please consult individual solution limits to ensure that you do not exceed supported configurations for your environment.

The *Configuration Maximums for vSphere 4.0* covers ESX, ESXi, and vCenter Server.

## Virtual Machine Maximums

[Table 1](#) contains configuration maximums related to virtual machines.

**Table 1.** Virtual Machine Maximums

Item	Maximum
<b>Compute</b>	
Virtual CPUs per virtual machine (Virtual SMP)	8
<b>Memory</b>	
RAM per virtual machine	255GB
Virtual machine swap file size	255GB <sup>1</sup>
<b>Storage Virtual Adapters and Devices</b>	
Virtual SCSI adapters per virtual machine	4 <sup>2</sup>
Virtual SCSI targets per virtual SCSI adapter	15 <sup>3</sup>
Virtual SCSI targets per virtual machine	60
Disk size	2TB minus 512B <sup>4</sup>
IDE controllers per virtual machine	1 <sup>5</sup>
IDE devices per virtual machine	4 <sup>6</sup>
Floppy controllers per virtual machine	1
Floppy devices per virtual machine	2 <sup>7</sup>

**Table 1.** Virtual Machine Maximums (Continued)

Item	Maximum
<b>Networking Virtual Devices</b>	
Virtual NICs per virtual machine	10 <sup>8</sup>
<b>Virtual Peripheral Ports</b>	
Parallel ports per virtual machine	3
Serial ports per virtual machine	4
<b>VMDirectPath</b>	
VMDirectPath PCI/PCIe devices per virtual machine	2 <sup>9</sup>
VMDirectPath SCSI targets per virtual machine	60
<b>Miscellaneous</b>	
Concurrent remote console connections to a virtual machine	40
<ol style="list-style-type: none"> <li>1. Same as the maximum virtual machine memory size.</li> <li>2. Any combination of supported SCSI virtual storage controllers. Four Paravirtual SCSI adapters may be used only if the virtual machine boots from a device attached to an IDE controller, or from the network.</li> <li>3. Any combination of disk, CDROM or VMDirectPath SCSI target.</li> <li>4. Limited by maximum VMFS file size (assumes 8MB VMFS block size).</li> <li>5. Supports two channels (primary and secondary) each with a master and slave device.</li> <li>6. Devices can be either CDROM or disk.</li> <li>7. BIOS is configured for one floppy device.</li> <li>8. Any combination of supported virtual NICs.</li> <li>9. Requires I/O MMU on host.</li> </ol>	

## ESX Host Maximums

The following tables contain configuration maximums related to ESX hosts.

- [“Storage Maximums”](#) on page 2
- [“Compute Maximums”](#) on page 4
- [“Memory Maximums”](#) on page 4
- [“Networking Maximums”](#) on page 5
- [“Resource Pool and Cluster Maximums”](#) on page 6

## Storage Maximums

VMFS-2 is supported on ESX 3.0 through 3.5.

[Table 2](#) contains configuration maximums related to ESX host storage.

**Table 2.** Storage Maximums

Item	Maximum
<b>VMFS-General</b>	
Raw device mapping (RDM) size	2TB minus 512B
Volume size	64TB minus 16K
Virtual machines per volume	256
Volumes per host	256
Extents per volume	32
Hosts per cluster	32

**Table 2. Storage Maximums (Continued)**

<b>Item</b>	<b>Maximum</b>
Extents size	2TB minus 512B
Max I/O size (before splits)	32MB
<b>VMFS-2</b>	
Files per volume	256 + (64 x additional extents)
Blocksize	256MB
File size (block size=1 MB)	456GB
File size (block size=8 MB)	2TB
File size (block size=64MB)	27TB
File size (block size=256MB)	64TB
<b>VMFS-3</b>	
VMFS-3 volumes configured per host	256
Files per volume	~30,720 <sup>1</sup>
Block size	8MB
File size (block size=1MB)	256GB minus 512B
File size (block size=2MB)	512GB minus 512B
File size (block size=4MB)	1TB minus 512B
File size (block size=8MB)	2TB minus 512B
<b>Fibre Channel</b>	
LUNs per host	256 <sup>2</sup>
LUN size	2TB minus 512B
Paths to a LUN	32
Total paths on a host	1024
LUNs concurrently opened by all virtual machines	256
LUN ID	255
HBAs per host	8
HBA ports	16
Targets per HBA	256
<b>NFS</b>	
Default NFS datastores	8
NFS datastores	64 (requires changes to advanced settings)
<b>Hardware iSCSI Initiators</b>	
LUNs per host	256 <sup>2</sup>
LUNs concurrently used	256
Initiator ports per host	4
Total paths on a host	1024
Paths to a LUN	8
Dynamic targets per adapter port	64 <sup>2</sup>
Static targets per adapter port	61 <sup>2</sup>

**Table 2.** Storage Maximums (Continued)

Item	Maximum
<b>Software iSCSI Initiators</b>	
LUNs per host	256 <sup>2</sup>
LUNs concurrently used	256
NICs port bound with the software iSCSI stack per server	8
Targets (the sum of static targets and dynamic targets may not exceed this figure)	256 <sup>2</sup>
Paths to a LUN	8
Total paths	1024
1. Sufficient to support the maximum virtual machines.	
2. Includes local devices/disks.	

## Compute Maximums

Table 3 contains configuration maximums related to ESX host compute resources.

**Table 3.** Compute Maximums

Item	Maximum
Virtual CPUs per host	512
Virtual machines per host	320 <sup>1</sup>
Logical processors per host	64 <sup>2</sup>
Virtual CPUs per physical core	20 <sup>3</sup>
1. Specific solution limits may be lower; please check individual solution limits for maximum supported configurations.	
2. Logical CPUs per host = CPU sockets x cores/socket x threads/core. Regardless of the host's configuration of CPU sockets, cores/socket or threads per CPU core, the total number of logical CPUs (hardware threads) may not exceed this number. Logical CPUs in excess of this number are ignored.	
3. The achievable number of vCPUs per core depends on the workload and specifics of the hardware. For more information see the <i>vSphere 4.0 Performance Best Practices and Benchmarking Guidelines</i> .	

## Memory Maximums

Table 4 contains configuration maximums related to ESX host memory.

**Table 4.** Memory Maximums

Item	Maximum
Size of RAM per host	1TB
Maximum RAM allocated to service console	800MB
Minimum RAM allocated to service console	300MB
Swap files	1 per virtual machine
Swap file size	Same as max virtual machine RAM

## Networking Maximums

The following limits represent achievable maximum configuration limits for networking in environments where no other more restrictive limits apply. For example, vCenter Server limits, the limits imposed by features such as HA or DRS, and other configurations that might impose restrictions must be considered when deploying large scale systems.

Table 5 contains configuration maximums related to ESX host networking.

**Table 5. Networking Maximums**

Item	Maximum
<b>Physical NICs<sup>1</sup></b>	
e1000 NICs Ethernet ports (Intel PCI-x NIC)	32
e1000e NICs Ethernet ports (Intel PCI-e NIC)	32
igb 1GB Ethernet ports (Intel)	16
tg3 1GB Ethernet ports (Broadcom)	32
bnx2 1GB Ethernet ports (Broadcom)	16
forcedeth 1GB Ethernet ports (Nvidia)	2
s2io 10GB Ethernet ports (Neterion)	4
nx_nic 10GB Ethernet ports (NetXen)	4
ixgbe Oplin 10GB Ethernet ports (Intel)	4
bnx2x 10GB Ethernet ports (Broadcom)	4
Infiniband ports (refer to VMware Community Support)	N/A <sup>1</sup>
<b>PCI VMDirectPath Devices<sup>2</sup></b>	
PCI VMDirectPath devices per host	8
<b>vNetwork Standard Switch</b>	
Total virtual network switch ports per host (vDS and vSS ports)	4096
Virtual network switch ports per standard switch	4088
Port groups per standard switch	512
Standard switches per host	248
<b>vNetwork Distributed Switch</b>	
Total virtual network switch ports per host (vDS and vSS ports)	4096
Distributed virtual network switch ports per vCenter	6000
Distributed port groups per vCenter	512
Distributed switches per vCenter	16
Hosts per distributed switch	64
<ol style="list-style-type: none"> <li>1. Mellanox Technologies InfiniBand HCA device drivers are available directly from Mellanox Technologies. Please refer to Mellanox for support status of InfiniBand HCAs with ESX. Infiniband drivers for ESXi hosts are not available. <a href="http://www.mellanox.com">http://www.mellanox.com</a></li> <li>2. These limits are supported with standard switches and distributed virtual switches.</li> </ol>	

## Resource Pool and Cluster Maximums

Table 6 contains configuration maximums related to ESX host resource pools.

**Table 6.** Resource Pool Maximums

Item	Maximum
<b>HA Cluster</b>	
Hosts per HA cluster	32
Virtual machines per host in HA cluster with 8 or fewer hosts	100
Virtual machines per host in HA cluster with 9 or more hosts	40
Failover hosts per cluster	4
Failover as percentage of cluster	50%
<b>DRS Cluster</b>	
Hosts per DRS cluster	32
Virtual machines per DRS cluster	1280 <sup>1</sup>
Virtual machines per host in DRS cluster	256
<b>Resource Pool</b>	
Resource pools per host	4096
Children per resource pool	1024
Tree depth per resource pool	12
Tree depth per resource pool in a DRS cluster	10
Resource pools per cluster	512

1. Powered on virtual machines.

## vCenter Server Maximums

Table 7 contains configuration maximums related to vCenter Server.

**Table 7.** vCenter Server Maximums

Item	Maximum
<b>vCenter Server Scalability</b>	
Hosts (32-bit OS server)	200
Powered-on virtual machines (32-bit OS server)	2000
Registered virtual machines (32-bit OS server)	3000
Hosts (64-bit OS server)	300
Powered-on virtual machines (64-bit OS server)	3000
Registered virtual machines (64-bit OS server)	4500
Linked vCenter Server systems	10
Hosts in Linked-mode environment	1000
Powered-on virtual machines in Linked-mode environment	10000
Registered virtual machine in Linked-mode environment	15000
Concurrent vSphere client connections (32-bit OS server)	15
Concurrent vSphere client connections (64-bit OS server)	30
Hosts per datacenter	100

**Table 7.** vCenter Server Maximums (Continued)

Item	Maximum
<b>Concurrent Operations</b>	
Concurrent provisioning operations per host	8 <sup>1</sup>
Concurrent provisioning operations per datastore	8 <sup>1</sup>
Concurrent VMotion operations per host	2 <sup>2</sup>
Concurrent VMotion operations per VMFS3 datastore	4 <sup>2</sup>
Concurrent Storage VMotion operations per host	2 <sup>2</sup>
Concurrent Storage VMotion operations per datastore	4
Concurrent operations per vCenter Server	96
1. Configurable, provisioning operations include clone, relocate.	
2. Configurable.	

## vCenter Server Extensions

The following tables contain configuration maximums related to vCenter Server extensions.

- [“VMware vCenter Update Manager”](#) on page 7
- [“VMware vCenter Orchestrator”](#) on page 8
- [“VMware vCenter Converter”](#) on page 8
- [“vSphere Storage Management Initiative - Specification \(SMI-S\)”](#) on page 8

## VMware vCenter Update Manager

[Table 8](#) contains configuration maximums for vCenter Update Manager.

**Table 8.** vCenter Update Manager Maximums

Item	Maximum
<b>vCenter Update Manager Scalability</b>	
Concurrent hosts scanned (64-bit OS server)	300
Concurrent hosts scanned (32-bit OS server)	200
Concurrent virtual machines scanned (64-bit OS server)	4000
Concurrent virtual machines scanned (32-bit OS server)	200
Cisco VDS update and deployment	70
<b>Concurrent Operations</b>	
Virtual machine remediation per ESX host	5
Powered-on Windows virtual machine scan per ESX host	6
Powered-off Windows virtual machine scan per ESX host	6
Powered-on Linux virtual machine scan per ESX host	145
VMware Tools scan per ESX host	145
VMware Tools upgrade per ESX host	145
Virtual machine hardware scan per host	145
Virtual machine hardware upgrade per host	145
Virtual machine remediation per VUM server	48
Powered-on Windows virtual machine scan per VUM server	72
Powered-off Windows virtual machine scan per VUM server	10

**Table 8.** vCenter Update Manager Maximums (Continued)

Item	Maximum
Powered-on Linux virtual machine scan VUM server	145
VMware Tools scan per VUM server	145
VMware Tools upgrade per VUM server	145
ESX host scan per VUM server	72
ESX host remediation per VUM server	8
ESX host upgrade per VUM server	48
ESX host upgrade per cluster	1

## VMware vCenter Orchestrator

Table 9 contains configuration maximums for vCenter Orchestrator.

**Table 9.** vCenter Orchestrator Maximums

Item	Maximum
Connected vCenter Server systems	10
Connected ESX/ESXi servers	100
Connected virtual machines	3000
Concurrent running workflows	150

## VMware vCenter Converter

Table 10 contains configuration maximums for vCenter Converter.

**Table 10.** vCenter Converter Maximums

Item	Maximum
Concurrent import/export tasks (assumes no load on vCenter Server system)	16

## vSphere Storage Management Initiative - Specification (SMI-S)

Table 11 contains configuration maximums for vSphere SMI-S.

**Table 11.** vSphere SMI-S Maximums

Item	Maximum
Number of vCenter Server systems connected	1
Number of ESX/ESXi hosts connected	1
Number of ESX/ESXi hosts managed in vCenter Server	100
Number of virtual machines registered in vCenter Server	1000
Number of datastores registered in vCenter Server	100

If you have comments about this documentation, submit your feedback to: [docfeedback@vmware.com](mailto:docfeedback@vmware.com)

VMware, Inc. 3401 Hillview Ave., Palo Alto, CA 94304 [www.vmware.com](http://www.vmware.com)

Copyright © 2008, 2009 VMware, Inc. All rights reserved. This product is protected by U.S. and international copyright and intellectual property laws. VMware products are covered by one or more patents listed at <http://www.vmware.com/go/patents>. VMware is a registered trademark or trademark of VMware, Inc. in the United States and/or other jurisdictions. All other marks and names mentioned herein may be trademarks of their respective companies.

Item: EN-000103-02