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Knowledge Base

Setting the number of cores per CPU in a virtual machine (1010184)

Last Updated: 8/5/2020 **Categories:** How to **Total Views:** 169468
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Purpose

This article provides information on setting number of cores per CPU in a virtual machine.

Support Assistant

Resolution

Important:

- You can add, change, or configure CPU resources to improve virtual machine performance.
- Most of the CPU parameters can be set when you create virtual machines or after the guest operating system is installed.
- Some actions require that you power off the virtual machine before you change the settings.
- For more information on maximum CPUs allowed, see vSphere Configuration Limits (https://configmax.vmware.com/guest?vmwareproduct=vSphere&release=vSphere%207.0&categories=1-0).

Prerequisites:

- If CPU hot add is not enabled, turn off the virtual machine before adding CPUs.
- To hot add multicore CPUs, verify that the virtual machine compatibility is ESXi 5.0 and later.
- Required privilege: Virtual Machine > Configuration > Change CPU Count on the virtual machine

Procedure to set the number of cores per CPU in a VM:

Step 1: Determine the total number of vCPUs to allocate to the virtual machine.

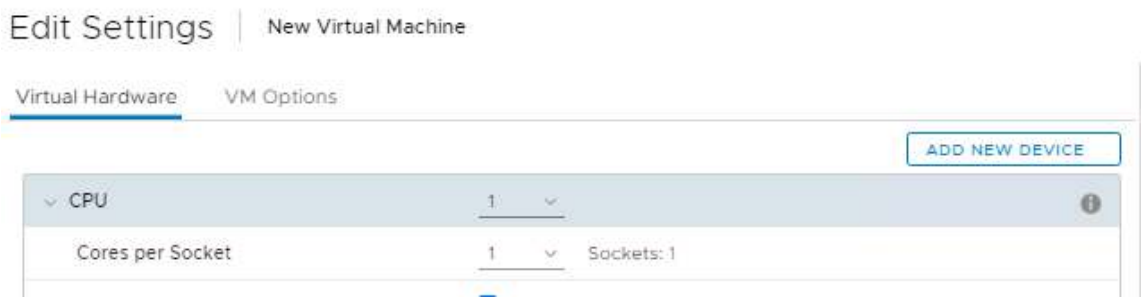
To calculate virtual machine CPUs within the vSphere Client, multiply the number of sockets selected by the number of cores selected.
This table provides the examples of socket determination based on CPU and Cores per Socket within the vSphere Web Client:

Total Number of virtual CPUs (CPU)	Cores per Socket	Number of Sockets determine by the vSphere Web Client
1	1	1

Total Number of Virtual CPUs (CPU)	Cores per Socket	Number of Sockets determined by the vSphere Web Client
2	2	1
2	1	2
4	4	1
4	2	2
4	1	4
8	8	1
8	2	4
8	4	2
8	1	8

Step 2: Set the number of vCPUs.

1. Login to the vSphere Web Client and select the virtual machine in question.
2. Right-click on the virtual machine and select **Edit Settings**.
3. Under the **CPU** field within the Virtual Hardware tab, select the total number of vCPUs determined in Step 1.
4. Under the **Core per Socket** field, enter the total number of cores you would like to allocate to a socket. See illustration below:



Related Information

Understanding the terminologies

VMware uses the following terminology. Understanding these terms can help you plan your strategy for CPU resource allocation.

Terminology	Description
CPU	The CPU, or processor, is the component of a computer system that performs the tasks required for computer applications to run. The CPU is the primary element that performs the computer functions. CPUs contain cores.
CPU Socket	A CPU socket is a physical connector on a computer motherboard that connects to a single physical CPU. Some motherboards have multiple sockets and can connect multiple multicore processors (CPUs).
Core	A core contains a unit containing an L1 cache and functional units needed to run applications. Cores can independently run applications or threads. One or more cores can exist on a single CPU.

Setting the Number of Virtual CPUs in the vSphere Client

To set the Number of Virtual CPUs in the vSphere Client, refer the Virtual CPU Configuration section of **Virtual Machine Administration** Guide.

Notes: When configuring virtual CPUs within the vSphere Web Client, you can configure:

- The total number of vCPUs for the virtual machine
- The total number of Cores per Socket

Admin guide links:

- ESXi 7.0 - Change the Number of Virtual CPUs (https://docs.vmware.com/en/VMware-vSphere/7.0/vsphere-esxi-vcenter-server-70-virtual-machine-admin-guide.pdf)
- ESXi 6.7 - Change the Number of Virtual CPUs in the VMware Host Client (https://docs.vmware.com/en/VMware-vSphere/6.7/com.vmware.vsphere.vm_admin.doc/GUID-3CDA4DEF-3DE0-4A64-89C7-F31BB77222CB.html)
- ESXi 6.5 - Change the Number of Virtual CPUs in the VMware Host Client (https://docs.vmware.com/en/VMware-vSphere/6.5/vsphere-esxi-vcenter-server-65-virtual-machine-admin-guide.pdf)

- ESXi 5.5 - Change the Number of Virtual CPUs in the VMware Host Client (https://docs.vmware.com/en/VMware-vSphere/5.5/vsphere-esxi-vcenter-server-552-virtual-machine-admin-guide.pdf)
- ESXi 5.1 - Change the Number of Virtual CPUs in the VMware Host Client (http://pubs.vmware.com/vsphere-51/index.jsp?topic=%2Fcom.vmware.vsphere.vm_admin.doc%2FGUID-73B63A2C-96D4-4C14-80A3-3A698DC48F06.html)
- ESXi 5.0 - Change the Number of Virtual CPUs in the VMware Host Client (http://pubs.vmware.com/vsphere-50/index.jsp?topic=%2Fcom.vmware.vsphere.vm_admin.doc_50%2FGUID-73B63A2C-96D4-4C14-80A3-3A698DC48F06.html)

Tweaks to consider when you are using older Guest OS versions:

If you are using operating systems that were released when SMP was a high-end server-only, you expect that you need to do some tweaks such as selecting SMP kernel for Linux virtual machines and Multiprocessor PC HAL for Windows virtual machines.

Note: You do not encounter problems with recent operating systems. XP and newer and RHEL5 and newer either always install SMP kernel or automatically switch to it.

Some examples of the older operating system versions are:

- RHel3-ES32
- RHel3-ES64
- RHel4.8-AS32
- RHel4.7-ES32
- RHel4.7-ES64
- Win2000-Pro
- Win2000-Serv

Notes:

- In vSphere 5.0 with Enterprise Plus Licensing and Virtual Machine Hardware Version 8, the maximum number of vCPUs per Virtual Machine is 32.
- In vSphere 5.0 with Virtual Machine Hardware Version 7, the maximum number of vCPUs per Virtual Machine is 8.
- For more information on maximum CPUs allowed, see vSphere 5.0 Configuration Maximums (https://www.vmware.com/pdf/vsphere5/r50/vsphere-50-configuration-maximums.pdf).

Best Practices

Actions

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- Performance Best Practices for VMware vSphere 6.7 - https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/techpaper/performance/vsphere-esxi-vcenter-server-67-performance-best-practices.pdf (https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/techpaper/performance/vsphere-esxi-vcenter-server-67-performance-best-practices.pdf)

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Related Versions:

VMware vSphere ESXi 7.0.0
VMware vSphere ESXi 6.7
VMware vSphere ESXi 6.5
VMware vSphere ESXi 6.0
VMware vCenter Server 7.0.x
VMware vCenter Server 6.7.x
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