

vCenter Performance Counters

Introduction

The following table of vCenter (VC) performance counters lists the counters with a description of their purpose. This page has been updated for vSphere 4, so the counter levels will differ slightly on older versions of VC.

Remember, with the exception of ready time, statistic levels one and two are the only ones needed for 99% of the performance monitoring and analysis out there. Don't spend many of your own cycles worrying about levels three and four!

For information on enabling VC to display and archive these counters see the [Understanding vCenter Performance Statistics](#) article.

Understanding vCenter Measurement Windows

Before you continue, you should know that all total count metrics reported by VC are reported over the sample window. When you're looking at live stats, this sample window is 20 seconds. When you're looking at archive stats, it will depend on the interval duration. That duration could be five minutes, 30 minutes, two hours, or one day.

This causes a lot of confusion when comparing esxtop results to live VC results to archived VC results. As an example, ready time might be reported as 10% in esxtop. In live VC results this amount of ready time would be reported as 2000 ms (10% of the 20s window.) In one day archive results, the same number would be reported as 30,000 ms (10% of the five minute interval duration.) All of these numbers reflect the same amount of ready time.

CPU Statistics

Level	Counter name in API	Description	Units
1	cpu.ready.summation	Ready time is the time spend waiting for CPU(s) to become available in the past update interval.	millisecond
1	cpu.usagemhz.average	The CPU utilization. The maximum possible value here is the frequency of the processors times the number of cores. As an example, a VM using 4000 MHz on a system with four 2 GHz processors is using 50% of the CPU ($4000 / (4 * 2000) = 0.5$)	megaHertz

vCenter Performance Counters

1	cpu.usage.average	The CPU utilization. This value is reported with 100% representing all processor cores on the system. As an example, a 2-way VM using 50% of a four-core system is completely using two cores.	percent
2	cpu.reservedCapacity.average	CPU Reserved Capacity	megaHertz
2	cpu.idle.summation	CPU Idle	millisecond
2	cpu.swapwait.summation	Swap wait time is time that the world spent waiting for memory to be swapped in. When the VM is waiting for memory, it is not doing work.	millisecond
3	cpu.system.summation	System time is the time spent in VMkernel during the last update interval. This does not include guest code execution.	millisecond
3	cpu.wait.summation	Wait time is the time spent waiting for hardware or VMkernel lock thread locks during the last update interval.	millisecond
3	cpu.extra.summation	CPU extra is the time above the statically calculated entitlement. Entitlement is the share of processing time that a VM should get as a result of its vCPU count and assigned shares. <i>You should not use or care about this counter in any of your own analysis.</i>	millisecond
3	cpu.used.summation	CPU Used	millisecond
3	cpu.guaranteed.latest	Guaranteed time is reported as the amount of the reservation time that the VM used in the past update interval. As an example, if 2000 MHz have been reserved for the VM on an four-way, 2 GHz host, that's 25% of	millisecond

		the CPU resource. In a 20s update interval, there are 80,000 ms available on this four-way system. That means 20,000 ms of time has been reserved. If a VM used only half of its available cycles, the guaranteed time is 10,000 ms.	
4	cpu.usage.none	CPU Usage (None)	percent
4	cpu.usage.minimum	CPU Usage (Minimum)	percent
4	cpu.usage.maximum	CPU Usage (Maximum)	percent
4	cpu.usagemhz.none	CPU Usage in MHz (None)	megaHertz
4	cpu.usagemhz.minimum	CPU Usage in MHz (Minimum)	megaHertz
4	cpu.usagemhz.maximum	CPU Usage in MHz (Maximum)	megaHertz

Memory Statistics

Level	Counter name in API	Description	units
1	mem.consumed.average	The amount of machine memory that is in use by the VM. While a VM may have been configured to use 4 GB of RAM, as an example, it might have only touched half of that. Of the 2 GB left, half of that might be saved from memory sharing. That would result in 1 GB of consumed memory.	kiloBytes
1	mem.overhead.average	The memory used by the VMkernel to maintain and execute the VM.	kiloBytes
1	mem.swapinrate.average	The swap in rate reports the rate at which a VM's memory is being swapped in from disk.	kiloBytesPerSecond

vCenter Performance Counters

1	mem.swapoutrate.average	The swap out rate reports the rate at which a VM's memory is being swapped out to disk.	kiloBytesPerSecond
1	mem.usage.average	The percentage of memory used as a percent of all available machine memory. Available for host and VM.	percent
1	mem.vmmemctl.average	The amount of memory currently claimed by the balloon driver. This is not a performance problem, per se, but represents the host starting to take memory from less needful VMs for those with large amounts of active memory. But if the host is ballooning, check swap rates (swpin and swapout) which would be indicative of performance problems.	kiloBytes
2	mem.granted.average	The amount of memory that was granted to the VM by the host. Memory is not granted to the host until it is touched one time and granted memory may be swapped out or ballooned away if the VMkernel needs the memory.	kiloBytes
2	mem.active.average	The amount of memory used by the VM in the past small window of time. This is the "true" number of how much memory the VM currently has need of. Additional, unused memory may be swapped out or ballooned with no impact to the guest's performance.	kiloBytes
2	mem.shared.average	The average amount of shared memory. Shared	kiloBytes

vCenter Performance Counters

		memory represents the entire pool of memory from which sharing savings are possible. The amount of memory that this has been condensed to is reported in shared common memory. So, total saving due to memory sharing equals shared memory minus shared common memory.	
2	mem.zero.average	The amount of zero pages in the guest. Zero pages are not represented in machine memory so this results in 100% savings when mapping from the guest to the machine memory.	kiloBytes
2	mem.unreserved.average	Memory Unreserved (Average)	kiloBytes
2	mem.swapused.average	The amount of swap memory currently in use. A large amount of swap memory is not a performance problem. This could be memory that the guest doesn't need. Check the swap rates (swpin, swapout) to see if the guest is actively in need of more memory than is available.	kiloBytes
2	mem.swapunreserved.average	Memory Swap Unreserved (Average)	kiloBytes
2	mem.sharedcommon.average	The average amount of shared common memory. Shared memory represents the entire pool of memory from which sharing savings are possible. The amount of memory that this has been condensed to is reported in shared common memory. So, total saving due to memory sharing equals shared memory minus shared common memory.	kiloBytes
2	mem.heap.average	Memory Heap (Average)	kiloBytes

vCenter Performance Counters

2	mem.heapfree.average	Memory Heap Free (Average)	kiloBytes
2	mem.state.latest	Memory State	number
2	mem.swapped.average	Memory Swapped (Average)	kiloBytes
2	mem.swaptarget.average	Memory Swap Target (Average)	kiloBytes
2	mem.swapin.average	The rate at which memory is being swapped in from disk. A large number here represents a problem with lack of memory and a clear indication that performance is suffering as a result.	kiloBytes
2	mem.swapout.average	The rate at which memory is being swapped out to disk. A large number here represents a problem with lack of memory and a clear indication that performance is suffering as a result.	kiloBytes
2	mem.vmmemctltarget.average	Memory Balloon Target (Average)	kiloBytes
2	mem.sysUsage.average	Memory Used by vmkernel	kiloBytes
2	mem.reservedCapacity.average	Memory Reserved Capacity	megaBytes
4	mem.usage.none	Memory Usage (None)	percent
4	mem.usage.minimum	Memory Usage (Minimum)	percent
4	mem.usage.maximum	Memory Usage (Maximum)	percent
4	mem.granted.none	Memory Granted (None)	kiloBytes
4	mem.granted.minimum	Memory Granted (Minimum)	kiloBytes
4	mem.granted.maximum	Memory Granted (Maximum)	kiloBytes
4	mem.active.none	Memory Active (None)	kiloBytes
4	mem.active.minimum	Memory Active (Minimum)	kiloBytes
4	mem.active.maximum	Memory Active (Maximum)	kiloBytes
4	mem.shared.none	Memory Shared (None)	kiloBytes
4	mem.shared.minimum	Memory Shared (Minimum)	kiloBytes

vCenter Performance Counters

4	mem.shared.maximum	Memory Shared (Maximum)	kiloBytes
4	mem.zero.none	Memory Zero (None)	kiloBytes
4	mem.zero.minimum	Memory Zero (Minimum)	kiloBytes
4	mem.zero.maximum	Memory Zero (Maximum)	kiloBytes
4	mem.unreserved.none	Memory Unreserved (None)	kiloBytes
4	mem.unreserved.minimum	Memory Unreserved (Minimum)	kiloBytes
4	mem.unreserved.maximum	Memory Unreserved (Maximum)	kiloBytes
4	mem.swapused.none	Memory Swap Used (None)	kiloBytes
4	mem.swapused.minimum	Memory Swap Used (Minimum)	kiloBytes
4	mem.swapused.maximum	Memory Swap Used (Maximum)	kiloBytes
4	mem.swapunreserved.none	Memory Swap Unreserved (None)	kiloBytes
4	mem.swapunreserved.minimum	Memory Swap Unreserved (Minimum)	kiloBytes
4	mem.swapunreserved.maximum	Memory Swap Unreserved (Maximum)	kiloBytes
4	mem.sharedcommon.none	Memory Shared Common (None)	kiloBytes
4	mem.sharedcommon.minimum	Memory Shared Common (Minimum)	kiloBytes
4	mem.sharedcommon.maximum	Memory Shared Common (Maximum)	kiloBytes
4	mem.heap.none	Memory Heap (None)	kiloBytes
4	mem.heap.minimum	Memory Heap (Minimum)	kiloBytes
4	mem.heap.maximum	Memory Heap (Maximum)	kiloBytes
4	mem.heapfree.none	Memory Heap Free (None)	kiloBytes
4	mem.heapfree.minimum	Memory Heap Free (Minimum)	kiloBytes
4	mem.heapfree.maximum	Memory Heap Free (Maximum)	kiloBytes
4	mem.swapped.none	Memory Swapped (None)	kiloBytes

vCenter Performance Counters

4	mem.swapped.minimum	Memory Swapped (Minimum)	kiloBytes
4	mem.swapped.maximum	Memory Swapped (Maximum)	kiloBytes
4	mem.swaptarget.none	Memory Swap Target (None)	kiloBytes
4	mem.swaptarget.minimum	Memory Swap Target (Minimum)	kiloBytes
4	mem.swaptarget.maximum	Memory Swap Target (Maximum)	kiloBytes
4	mem.swapin.none	Memory Swap In (None)	kiloBytes
4	mem.swapin.minimum	Memory Swap In (Minimum)	kiloBytes
4	mem.swapin.maximum	Memory Swap In (Maximum)	kiloBytes
4	mem.swapout.none	Memory Swap Out (None)	kiloBytes
4	mem.swapout.minimum	Memory Swap Out (Minimum)	kiloBytes
4	mem.swapout.maximum	Memory Swap Out (Maximum)	kiloBytes
4	mem.vmmemctl.none	Memory Balloon (None)	kiloBytes
4	mem.vmmemctl.minimum	Memory Balloon (Minimum)	kiloBytes
4	mem.vmmemctl.maximum	Memory Balloon (Maximum)	kiloBytes
4	mem.vmmemctltarget.none	Memory Balloon Target (None)	kiloBytes
4	mem.vmmemctltarget.minimum	Memory Balloon Target (Minimum)	kiloBytes
4	mem.vmmemctltarget.maximum	Memory Balloon Target (Maximum)	kiloBytes
4	mem.overhead.none	Memory Overhead (None)	kiloBytes
4	mem.overhead.minimum	Memory Overhead (Minimum)	kiloBytes
4	mem.overhead.maximum	Memory Overhead (Maximum)	kiloBytes
4	mem.consumed.none	Memory Consumed (None)	kiloBytes
4	mem.consumed.maximum	Memory Consumed (Maximum)	kiloBytes

4	mem.consumed.minimum	Memory Consumed (Minimum)	kiloBytes
4	mem.sysUsage.none	Memory Used by vmkernel	kiloBytes
4	mem.sysUsage.maximum	Memory Used by vmkernel	kiloBytes
4	mem.sysUsage.minimum	Memory Used by vmkernel	kiloBytes

Disk Statistics

Level	Counter name in API	Description	units
1	disk.maxTotalLatency	The highest reported total latency (device and kernel times) in the sample window.	milliseconds
1	disk.usage.average	Average disk throughput over the sample period.	kiloBytesPerSecond
2	disk.read.average	Average disk throughput due to read operations over the sample period.	kiloBytesPerSecond
2	disk.write.average	Average disk throughput due to write operations over the sample period.	kiloBytesPerSecond
2	disk.commands.summation	Disk Commands Issued	number
2	disk.commandsAborted.summation	The number of aborts that have occurred in the last window of time. Abort commands are issued by the guest when the storage system has not responded within an acceptable amount of time (as defined by the guest OS or application.)	number
2	disk.busResets.summation	Disk Bus Resets	number
2	disk.deviceReadLatency.average	Device read latency. This is the time the physical device from the HBA to the platter takes to service an IO request.	millisecond
2	disk.kernelReadLatency.average	Kernel read latency. This is the time the VMkernel takes to service an IO. This is the time between	millisecond

vCenter Performance Counters

		the guest OS and the device.	
2	disk.totalReadLatency.average	Total read latency. The sum of the device and kernel read latencies.	millisecond
2	disk.queueReadLatency.average	Queue Read Latency	millisecond
2	disk.deviceWriteLatency.average	Device write latency. This is the time the physical device from the HBA to the platter takes to service an IO request.	millisecond
2	disk.kernelWriteLatency.average	Kernel write latency. This is the time the VMkernel takes to service an IO. This is the time between the guest OS and the device.	millisecond
2	disk.totalWriteLatency.average	Total write latency. The sum of the device and kernel write latencies.	millisecond
2	disk.queueWriteLatency.average	Queue Write Latency	millisecond
2	disk.deviceLatency.average	Physical Device Command Latency	millisecond
2	disk.kernelLatency.average	Kernel Disk Command Latency	millisecond
2	disk.queueLatency.average	Queue Command Latency	millisecond
3	disk.numberRead.summation	The number of IO read operations in the previous sample period. Note that these operations may be variable sized up to 64 KB.	number
3	disk.numberWrite.summation	The number of IO write operations in the previous sample period. Note that these operations may be variable sized up to 64 KB.	number
3	disk.totalLatency.average	This is the average total latency over the sample window. Total latency is the sum of kernel and device latency for both read and write commands.	millisecond
3	disk.write.average	Disk Write Rate	kiloBytesPerSecond
4	disk.usage.none	Disk Usage (None)	kiloBytesPerSecond

4	disk.usage.minimum	Disk Usage (Minimum)	kiloBytesPerSecond
4	disk.usage.maximum	Disk Usage (Maximum)	kiloBytesPerSecond

Network Statistics

Level	Counter name in API	Description	units
1	net.usage.average	Network Usage (Average)	kiloBytesPerSecond
2	net.droppedRx.summation	The number of received packets that were dropped over the sample period.	number
2	net.droppedTx.summation	The number of transmitted packets that were dropped over the sample period.	number
2	net.received.average	Average network throughput for received traffic.	kiloBytesPerSecond
2	net.transmitted.average	Average network throughput for transmitted traffic.	kiloBytesPerSecond
3	net.packetsRx.summation	Network Packets Received	number
3	net.packetsTx.summation	Network Packets Transmitted	number
4	net.usage.none	Network Usage (None)	kiloBytesPerSecond
4	net.usage.minimum	Network Usage (Minimum)	kiloBytesPerSecond
4	net.usage.maximum	Network Usage (Maximum)	kiloBytesPerSecond

Other Statistics

Level	Counter name in API	Description	units
1	sys.uptime.latest	Uptime	second
1	sys.heartbeat.summation	Heartbeat	number
1	clusterServices.cpufairness.average	CPU Fairness	number
1	clusterServices.memfairness.average	Memory Fairness	number
1	clusterServices.effectivecpu.average	Effective CPU Resources	megaHertz
1	clusterServices.effectivemem.average	Effective Memory Resources	megaBytes

vCenter Performance Counters

1	clusterServices.failover.latest	Current failover level	number
3	sys.resourceCpuUsage.average	Resource CPU Usage (Average)	megaHertz
3	managementAgent.memUsed.average	Memory Used (Average)	kiloBytes
3	managementAgent.swapUsed.average	Memory Swap Used (Average)	kiloBytes
3	managementAgent.swapIn.average	Memory Swap In (Average)	kiloBytesPerSecond
3	managementAgent.swapOut.average	Memory Swap Out (Average)	kiloBytesPerSecond
3	rescpu.actav1.latest	CPU Active (1 min. average)	percent
3	rescpu.actpk1.latest	CPU Active (1 min. peak)	percent
3	rescpu.runav1.latest	CPU Running (1 min. average)	percent
3	rescpu.actav5.latest	CPU Active (5 min. average)	percent
3	rescpu.actpk5.latest	CPU Active (5 min. peak)	percent
3	rescpu.runav5.latest	CPU Running (5 min. average)	percent
3	rescpu.actav15.latest	CPU Active (15 min. average)	percent
3	rescpu.actpk15.latest	CPU Active (15 min. peak)	percent
3	rescpu.runav15.latest	CPU Running (15 min. average)	percent
3	rescpu.runpk1.latest	CPU Running (1 min. peak)	percent
3	rescpu.maxLimited1.latest	CPU Throttled (1 min. average)	percent
3	rescpu.runpk5.latest	CPU Running (5 min. peak)	percent
3	rescpu.maxLimited5.latest	CPU Throttled (5 min. average)	percent
3	rescpu.runpk15.latest	CPU Running (15 min. peak)	percent
3	rescpu.maxLimited15.latest	CPU Throttled (15 min. average)	percent
3	rescpu.sampleCount.latest	Group CPU Sample Count	number

vCenter Performance Counters

3	rescpu.samplePeriod.latest	Group CPU Sample Period	millisecond
4	sys.resourceCpuUsage.none	Resource CPU Usage (None)	megaHertz
4	sys.resourceCpuUsage.maximum	Resource CPU Usage (Maximum)	megaHertz
4	sys.resourceCpuUsage.minimum	Resource CPU Usage (Minimum)	megaHertz