VMware vSphere Pro Series

TRAINSIGNAL

THE GLOBAL LEADER IN PROFESSIONAL COMPUTER TRAINING

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Performance with PowerCLI

VMware vSphere Pro Series

Instructor: Hal Rottenberg, vExpert

Performance with PowerCLI

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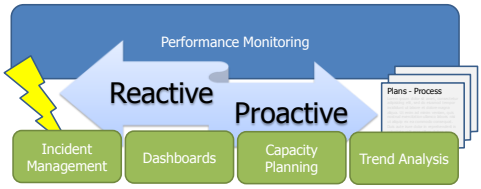
In This Lesson:

- ❑Introduction to Performance Monitoring
- ❑Vocabulary Lesson
- ❑Performance Manager
- ❑Counter Groups
- ❑Metrics & Counters
- ❑Rollup Types
- ❑Sampling Periods & Intervals
- ❑Statistics Collection Levels
- ❑Working with the Get-Stat Cmdlet
- ❑Demos

vSphere Performance Monitoring

- PowerCLI includes one performance tool: Get-Stat
- Performance monitoring is not capacity planning



Vocabulary Lesson

- **Performance Manager —** collects the statistics
- **Counter —** individual statistic that can be tracked (the metadata)
- **Metric —** actual value of a counter
- **Counter Group —** logical collection of counters
- **Rollup Type —** how metric is summarized
- **MetricID —** dotted-triad of "group.counter.rollup"
- **Sampling Period —** how often a metric is measured
- **Retention Period —** how long metric is stored
- **Historical Interval —** variable retention period over time
- **Statistics Collection Level —** which metrics are sampled during an interval

Performance Manager

- Collects statistics from performance providers
- Performance providers include:
  - Hosts
  - VMs
  - Clusters
  - Resource pools
  - Datastores
  - Networks
- And physical & virtual devices:
  - virtual host-bus adapters
  - network-interface controllers (NICs)

Counter Groups

- Most commonly-used groups:
  - Cpu (cpu)
  - Disk I/O (disk)
  - Memory (mem)
  - Network (net)
  - System (sys)
- Other groups include:
  - Cluster
  - Storage utilization
  - Management agent
  - VM operations

Photo credit: Fabio Aro
http://www.flickr.com/photos/fabioaro/3849182245/

Metrics & Counters

- Available counters vary by product and version
- Described in PowerCLI as a dotted-triad MetricID

```
[vSphere PowerCLI] Scripts:\trainsignal> get-stat -Entity $vh -MaxSamples 1 -Common | sele
ct metricID, description | Format-Table -AutoSize -Wrap

MetricId
--------
cpu.usage.average     CPU usage as a percentage over the collection interval
cpu.usagemhz.average  CPU usage in MHz over the collection interval. For hosts, this can b
                      a per virtual machine basis as a stacked graph.
mem.usage.average     percentage of total configured or available memory
disk.usage.average    Aggregate storage performance statistics. For hosts, this can be rep
                      resent                                ual machine basis as a stacked graph.
net.usage.average     Aggreg                                ormance statistics. For hosts, this can be rep
                      resented on a per virtual machine basis as a stacked graph
sys.uptime.latest     Total time elapsed since last startup

[vSphere PowerCLI] Scripts:\trainsignal>
```

Counter Group
Counter Name
Rollup Type

Available Counters

- Use the Get-StatType cmdlet to query the Performance Manager
- Different entities (vm, vmhost, etc.) have different counters

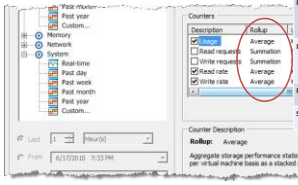
```
[vSphere PowerCLI] C:\> Get-VM vcenter | Get-StatType | sort | group { $_.split(".")[0] }

Count Name                      Group
----- ----                      -----
   16 cpu                       {cpu.ready.summation, cpu.ready.summation, cpu.swapwai...
    6 datastore                 {datastore.numberReadAveraged.average, datastore.numbe...
   15 disk                      {disk.busResets.summation, disk.commands.summation, di...
   48 mem                       {mem.active.average, mem.active.maximum, mem.active.mi...
    9 net                       {net.packetsRx.summation, net.packetsTx.summation, net...
    2 power                     {power.energy.summation, power.power.average}
   17 rescpu                    {rescpu.actav1.latest, rescpu.actav15.latest, rescpu.a...
    2 sys                       {sys.heartbeat.summation, sys.uptime.latest}
    6 virtualDisk               {virtualDisk.numberReadAveraged.average, virtualDisk.n...

[vSphere PowerCLI] C:\> Get-VMHost 10.0.0.30 | Get-StatType | sort | group { $_.split(".")
[0] }
```

Rollup Types

- Describes how counters are consolidated between intervals
- Consolidating data saves space
- Available rollup types vary by counter and collection level



Name	Description
average	The actual value collected or the average of all values collected during the summary period.
latest	The most recent value of the performance counter over the summarization period.
maximum	The maximum value of the performance counter value over the summarization period.
minimum	The minimum value of the performance counter value over the summarization period.
none	The counter is never rolled up.
summation	The sum of all the values of the performance counter over the summarization period.

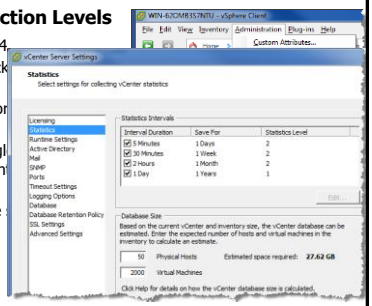
Sampling Periods & Intervals

- ESX/ESXi systems collect statistics for the past 24-hours
- Managed hosts send statistics to vCenter
- vCenter consolidates the performance data from the ESX/ESXi systems that it manages and stores that information in its database
- Use Get-StatInterval cmdlet to query your environment

Sampling Period	Retention Period	ESX, ESXi	vCenter Server
20 seconds	1 day	Yes	Yes
5 minutes	24 hours	Yes	Yes
1 hour	7 days	No	Yes
6 hour	30 days	No	Yes
24 hour	365 days	No	Yes

Statistics Collection Levels

- Range from 1 to 4
- Higher levels track statistics
- ...and take up mor space
- Stats are the singl consumer of vCen database by size
- Use the database estimate growth

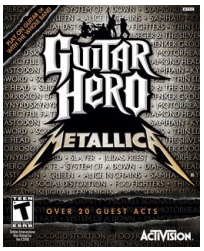


Statistics Collection Levels

Level	Description
1	Basic counters defined with "**average**" rollup type for CPU, Memory, Disk, and Network; plus counters for System Uptime, System Heartbeat, and DRS (Distributed Resource Scheduler, tracked in the "clusterServices" group). Does not include counters for devices.
2	Counters defined with "average," "**summation**," and "**latest**" rollup types for CPU, Memory, Disk, and Network; plus counters for System Uptime, System Heartbeat, and DRS (clusterServices). Does not include counters for devices.
3	Counters defined with "average," "summmation," and "latest" rollup types for CPU, Memory, Disk, Network, **and all devices**; plus counters for System Uptime, System Heartbeat, and DRS (clusterServices).
4	All counters defined for all entities and devices, for every rollup type, including "**minimum**" and "**maximum**."

The Get-Stat Cmdlet

- Features
  - Ability to read performance stats from host or vCenter database
  - Flexible selection of stats and intervals
  - Supported entities: Clusters, Hosts, VMs, Resource Pools
- Limitations
  - Difficulty: ●●●●○
  - Entities not supported: Datastores, NICs, other devices



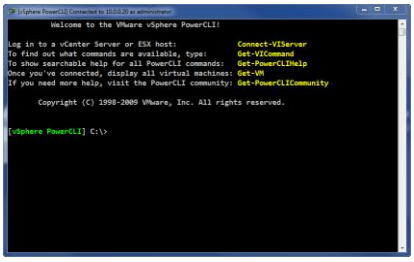
Get-Stat Parameters

Name	Type	Description
Entity	VIObject[]	Object containing counters to query
Common	Boolean	Returns a selection of commonly-used stats
Memory	Boolean	Returns memory stats
Cpu	Boolean	Returns CPU stats
Disk	Boolean	Returns disk stats
Network	Boolean	Returns network stats
Stat	String[]	Manually select stats to return

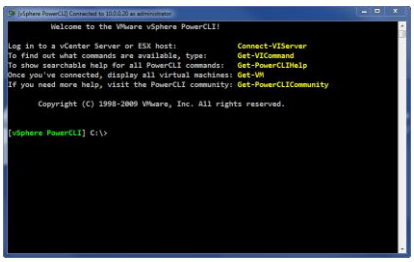
Get-Stat Parameters, Continued

Name	Type	Description
Start	DateTime	Start of time interval
Finish	DateTime	End of time interval
MaxSamples	Integer	Maximum number of stats to return
IntervalMins	Integer	Deprecated
IntervalSecs	Integer	Number of seconds between samples
Realtime	Boolean	Return realtime (20-sec) interval stats

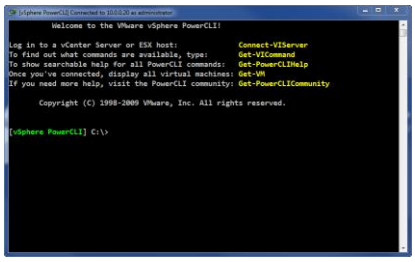
Demo - Exploring Get-Stat



Demo - Get-StatType

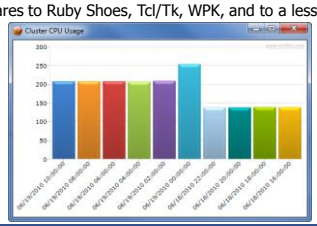


Demo - Export to CSV



Creating Charts with PowerBoots

- Domain Specific Language (DSL) for creating GUI applications based on Microsoft's WPF
- Hosted on CodePlex: http://powerboots.codeplex.com/
- Compares to Ruby Shoes, Tcl/Tk, WPK, and to a lesser extent, HTA



Script: Get-ClusterChart.ps1

```
# Requires the installation of PowerBoots from http://powerboots.codeplex.com/
# Run this next line in your profile, or uncomment it here.
# Import-Module PowerBoots

$chart = Boots {
  Chart -MinWidth 500 -MinHeight 300 -Theme Theme1 {
    DataSeries -ToolTipText "$AxisXLabel`nValue: $YValue mHz" {
      Get-Cluster | Get-Stat -stat cpu.usagemhz.average -max 10 -IntervalSecs 7200 | ForEach-Object {
        DataPoint -YValue $_.Value
          -AxisXLabel $_.TimeStamp
      }
    }
  }
} -Async -Title "Cluster CPU Usage"

# Run (or uncomment) the below to write the chart to an image file.
# Get-BootsWindow | Export-BootsImage chart.png
```

Additional Resources

1. VI SDK documentation for PerformanceManager (http://www.vmware.com/support/developer/vc-sdk/visdk400pubs/ReferenceGuide/vim.PerformanceManager.html)
2. VI SDK Programmer's Guide, Ch. 12 "Monitoring Performance" (http://www.vmware.com/support/developer/vc-sdk/visdk400pubs/sdk40programmingguide.pdf)

What We Covered

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