Performance Monitoring of ESX(i) environment with HP Performance Agent, version 5.00 (on vSphere Management Assistant 4.0)

Performance and Scalability guide

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1.Introduction

Overview

HP Performance Agent (PA) is used for monitoring system performance of physical and virtual servers. The latest version of Performance Agent, 5.00 supports monitoring of many virtualized environments including VMware ESX(i) environment.

To monitor the VMware-ESX(i) environment, install Performance Agent 5.00 in the vMA (vSphere Management Assistant). PA allows you to monitor the following:

- ESX(i) hosts(registered with vMA)
- Guests on those ESX(i) hosts
- Resource pools.

Hence with one instance of PA 5.00 running on vSphere Management Assistant (vMA) , it is possible to monitor several ESX(i) hosts , guests and resource pools. Therefore, it is important to understand the performance impact while designing the solution.

Refer to the Glossary at the end of this document.

About this document

The Performance and Scalability guide provides information and recommendations to deploy and configure PA 5.00 for monitoring ESX(i) environment. Refer to *HP Performance Agent User Manual* for information on the using Performance Agent for data collection in ESX(i) environments.

Check the following web site periodically for the latest versions of Performance Agent documentation:

http://support.openview.hp.com/selfsolve/manuals

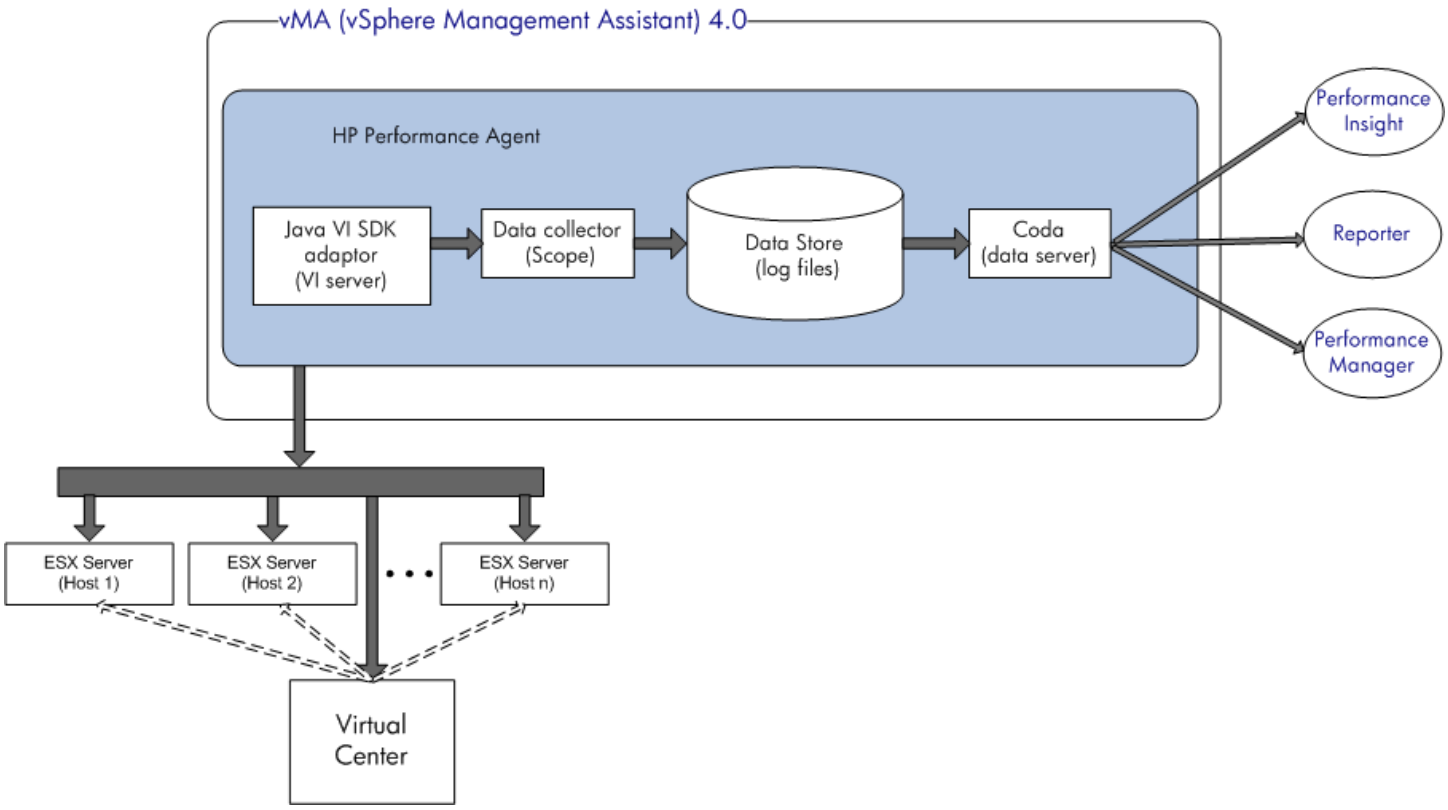
Login using your HP Passport ID and select product as “Performance Agent “, Version as 5.00, and Operating System as Linux.

To register for an HP Passport ID, go to:

http://h20229.www2.hp.com/passport-registration.html

2. Architecture

The following diagram represents the architecture of PA 5.00 on a vMA (vSphere Management Assistant).



With this solution the HP Performance Agent is installed on a vMA and uses a Java VI SDK provided by VMware to collect performance data from ESX(i) hosts. PA 5.00 includes a Java VI SDK adaptor (VI server) which sources performance data from various ESX(i) hosts, guests and Resource pools. Scopeux, the data collector component of PA spawns the Java VI SDK adaptor which is also known as **VIServer (or VIdaemon)**.

3. Factors to be considered while using PA 5.00 to monitor the VMware environment

Volume of data collected by PA

The volume of data gathered by PA 5.00 depends on a number of factors. Some of major factors affecting size/amount of data collected by PA 5.00 are as follows:

- The number ESX(i) hosts registered on vMA
- The number of guests on those registered ESX(i) hosts
- The number of resources pools attached with registered hosts

The number of Java Threads Created on vMA (by PA) is proportional to the number of ESX(i) Hosts for which data is being collected. Resources consumed in the vMA partition (CPU, Memory, and Disk space) by the data collectors (scopeux and VIdaemon) are directly impacted by the amount and the frequency of the data being collected.

Chapter 4. Sizing recommendations provides details on the impact on CPU/Memory with varying of number of ESX hosts/guests.

The Logical System class of metrics (BYLS class)

The BYLS class of metrics in PA 5.00 represents data gathered from ESX(i) hosts, guests and resource pools. PA provides the following key metrics in the BYLS class to identify and relate the instances:

- BYLS_LS_ROLE
- BYLS_LS_PARENT_TYPE
- BYLS_LS_PARENT_UUID
- BYLS_LS_HOST_HOSTNAME

Log File for BYLS data (logls)

The data collected from hosts, guests and resource pools is stored in the log file "**logls**". This log file stores data from BYLS class of metrics. The size of "logls" is proportional to amount of data being collected which in turn depends on factors mentioned above. If there are a large number of BYLS instances of data stored in the log file, the file size will be huge. The log file roll over occurs as per configuration specified for the parameter 'file size' in parm file.

Number of BYLS instances

The total of number of BYLS instances = Total ESX(i) hosts registered with vMA + Sum of guest systems on all ESX(i) hosts registered + Sum of resource pools associated with ESX(i) hosts

If this number is high, then amount of data collected is also high. This will affect all other factors mentioned in the following section. It is recommended that you have a moderate number of BYLS instances being collected on vMA so that performance of the PA is not affected.

Other Factors influencing the performance of HP Performance Agent on vMA

Listed below are some factors which have an impact on the performance of HP Performance Agent on a vMA.

CPU

CPU is one of the factors which influence PA 5.00 running on a vMA . This is because there are java threads running for every ESX(i) host instance. Additional CPU units on vMA can enhance the performance if there are large numbers of ESX(i) hosts registered with vMA.

Memory

It is recommended that you always keep sufficient physical RAM in the system. The amount of memory consumed by Java JRE is configurable and hence you can specify a maximum limit. If there are large number of BYLS instances to be collected (for instance around 200), it is recommended that vMA system has minimum of 1 GB of memory and also it should have the maximum limit of JRE on the higher side. If the system contains sufficient memory, increasing the JRE limit may improve performance significantly since the JRE needs to perform garbage collection less often.

Other Agents on vMA

A vMA can also have other agents and applications (apart from Performance Agent) installed on it and this can have an affect on the performance of PA 5.00 on vMA. It is possible that other agents may compete with PA 5.00 for system resources such as CPU, Memory and other resources.

Virtual Memory

Virtual memory affects amount of memory processes on the vMA system allocate. The following chapter provides details about virtual memory consumed by PA data collectors with respect to number of BYLS instances.

Disk space

The disk space requirement is same as standalone PA installation on any platform. But if the volume of data to be collected is huge (more BYLS instances), then it is recommended to increase the disk space to store “logls” file. Maximum size “logls” can reach is 2 GB and log file

roll over depending on the value in the configuration parameter (Parm) file. Disk space is not a major consideration or influencing factor.

Network Bandwidth

Network bandwidth is a factor for vMA. This is because vMA gathers data from all the registered ESX(i) hosts through the network. If there are many ESX(i) hosts in the network from where we need to gather data, then it is recommended that we plan for sufficient network bandwidth accordingly.

The following chapter contains results of various performance/scalability tests performed on PA installed on a vMA.

4. Sizing recommendations

To evaluate the effect of CPU and Memory on the number of BYLS instances, performance tests were performed on systems with the following configurations:

Configuration Used for Performance Tests

ESX(i) Host system

Processor Type: Intel Xeon(R) CPU		
Model : ProLiant DL380 G5		
CPU	**8 vCPU**	8x 1.99 GHz
Memory	**4 GB**	

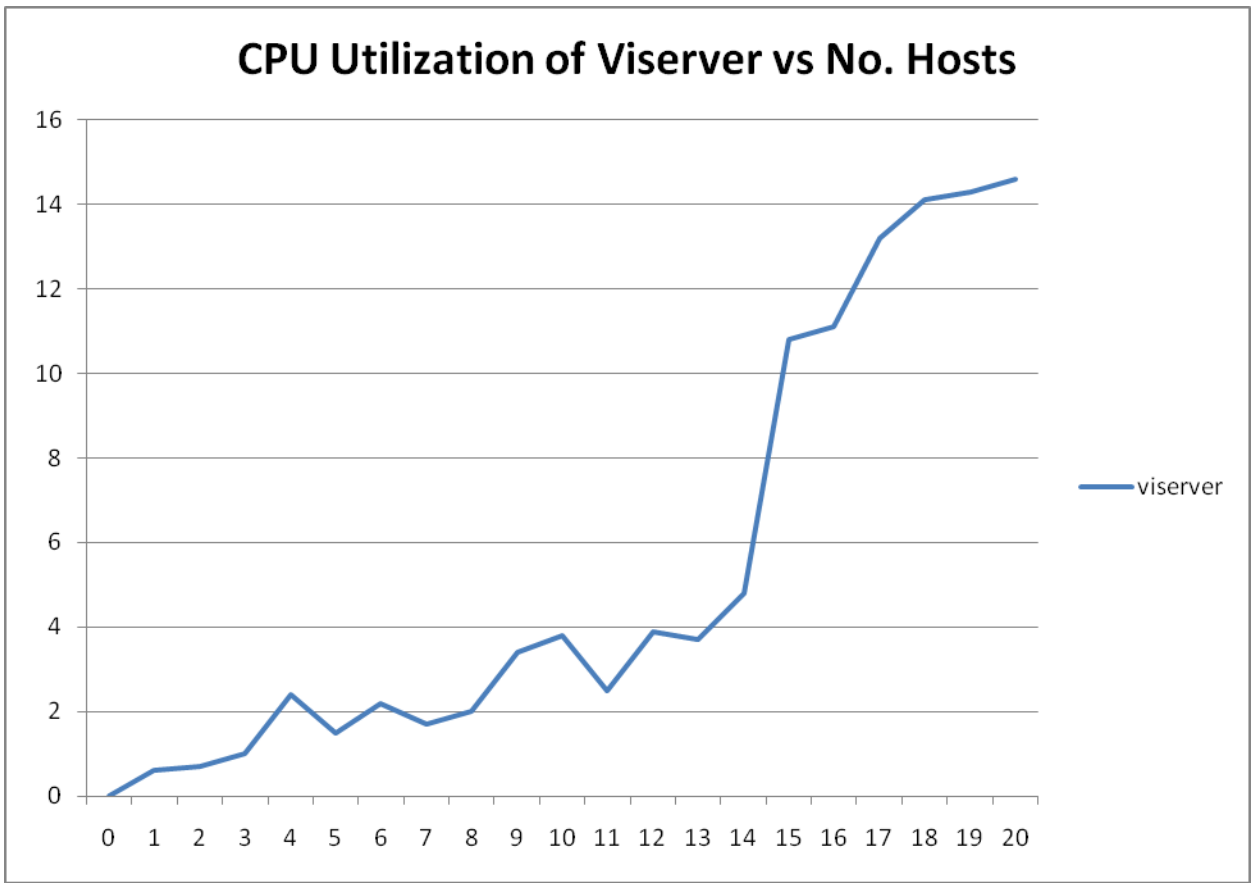
vMA configuration

CPU	**2 vCPU**	**2 x 1.99 GHz**
Memory	**1024 MB**	**166 MB overhead**
Disk	**5 GB**	

CPU utilization of data collectors with increasing number of ESX(i) hosts or BYLS instances

Here term data collector refers to VIServer and Scopeux. VIServer is the VI SDK adapter and scopeux is the daemon which logs the data collected by VIServer.

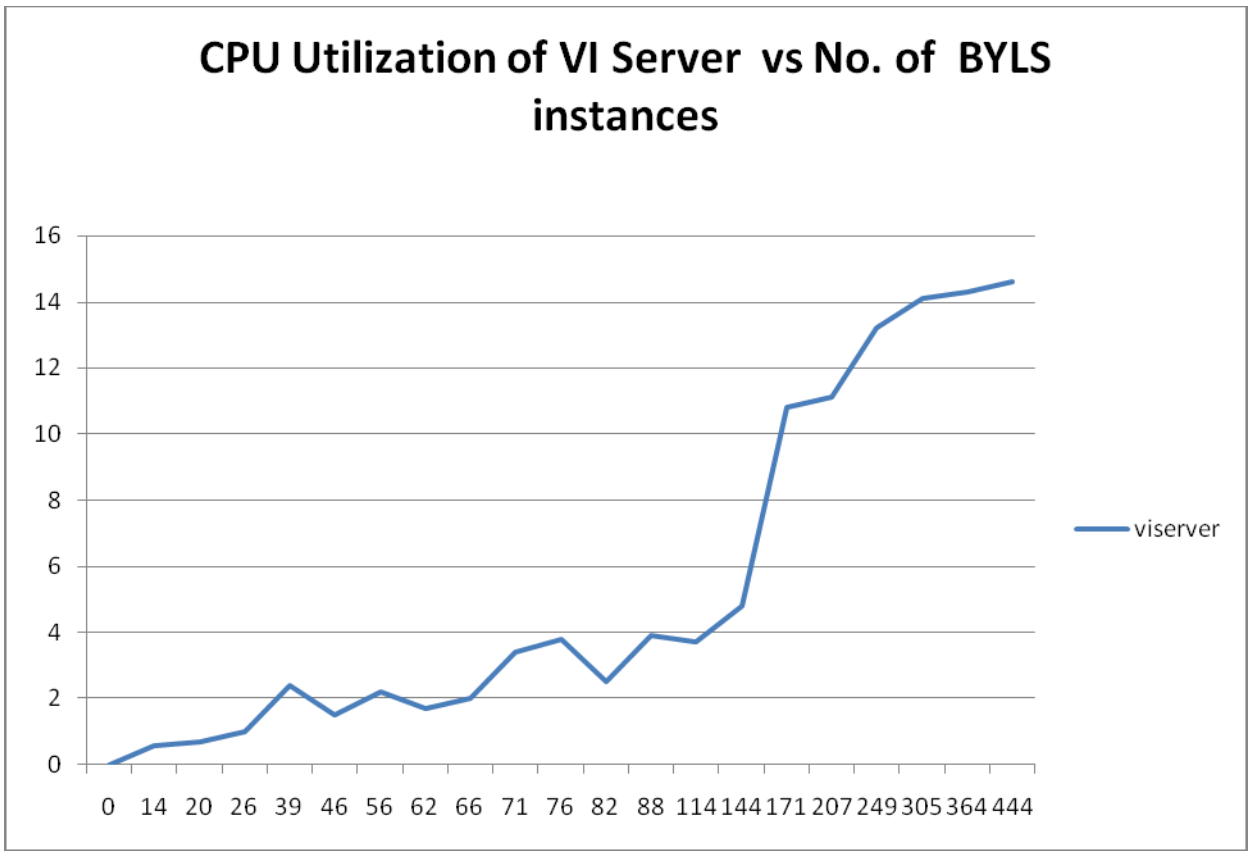
With the increase in number of ESX(i) hosts that are registered with vMA where PA is running , there is an impact on the CPU utilization of VIServer(VIdaemon) of PA. The graphical representation is as follows:



As the number of ESX(i) hosts increases, the CPU utilization of VIServer stays with a range (0-5 %) up to 14 ESX(i) hosts. After number of ESX(i) hosts is increased and is more than 14, CPU utilization gradually increases during data collection with every host added. Note that this CPU utilization peaks at end of the sampling interval (which is 1 minute or 5 minutes).

HP recommends	It is recommended to have 20 or less ESX(i) hosts registered per vMA if you are monitoring the performance with PA.

A graphical representation of increasing number of BYLS instances collected with vMA and impact on CPU utilization on the VIServer(VIdaemon) is as follows.



The above graph indicates that after number of BYLS instances crosses 170, there is steady increase in CPU consumption by VIServer during data collection. When number of BYLS instances is below 170, there is varying CPU consumption.

HP recommends	It is recommended that if you want to maintain CPU utilization of VIServer (in turn PA 5.0) in the range 10- 12 %, number of BYLS instances has to be kept at 200 or below.

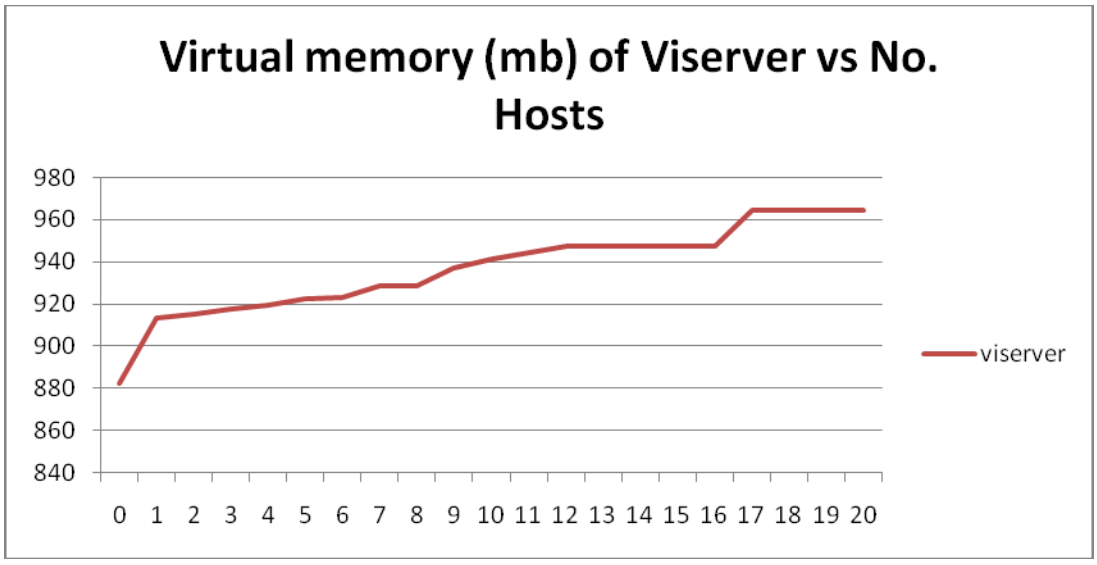
Example: It was observed that with data collection for 444 BYLS instances, VIServer was consuming close to 15% CPU.

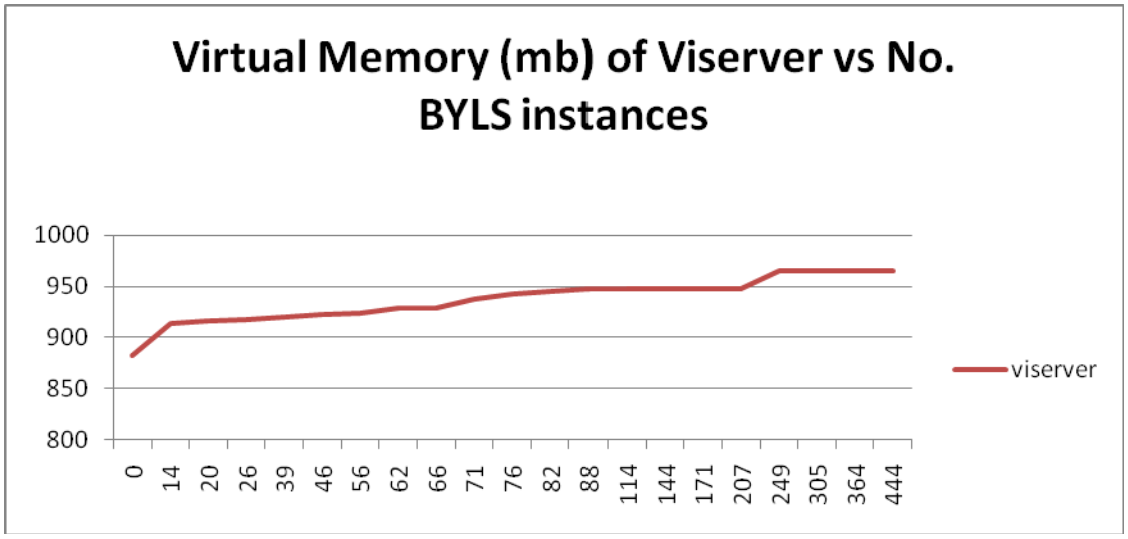
CPU utilization of scopeux under the same circumstances is constant and an increase of BYLS instances has little or no impact on it (hence graphical analysis of scopeux with BYLS instances is not given here).

Note: There is a one to one mapping between the CPU utilization graphs for 'Number of hosts' and 'Number of BYLS' instances (refer to the graph above). In this example, for 26 guests, there are 3 ESX hosts and similarly when the number of ESX hosts is 10, there are 71 guests hosted among them the 10 ESX hosts.

Virtual/Resident Memory usage of Data collectors with increasing number of BYLS instances

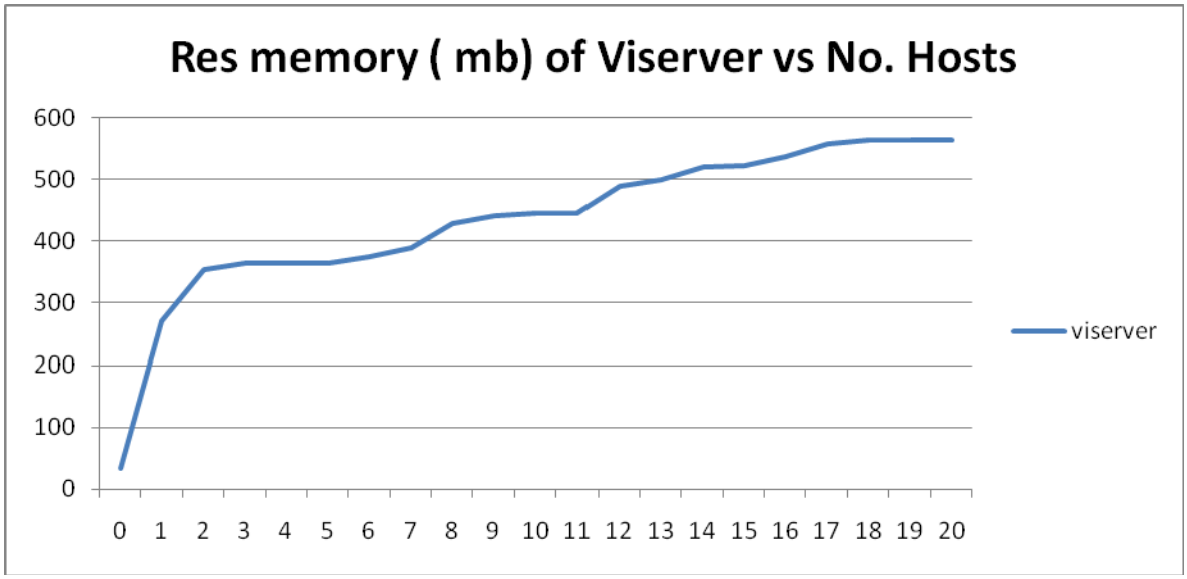
With increasing number of ESX(i) hosts(0-20) /BYLS instances (0 – 444), the virtual memory usage of VIServer is in the range of 880 MB – 960 MB. Virtual memory usage of VIServer increases as we have more number of ESX(i) hosts or BYLS instances. See the graphical representation of the same below.

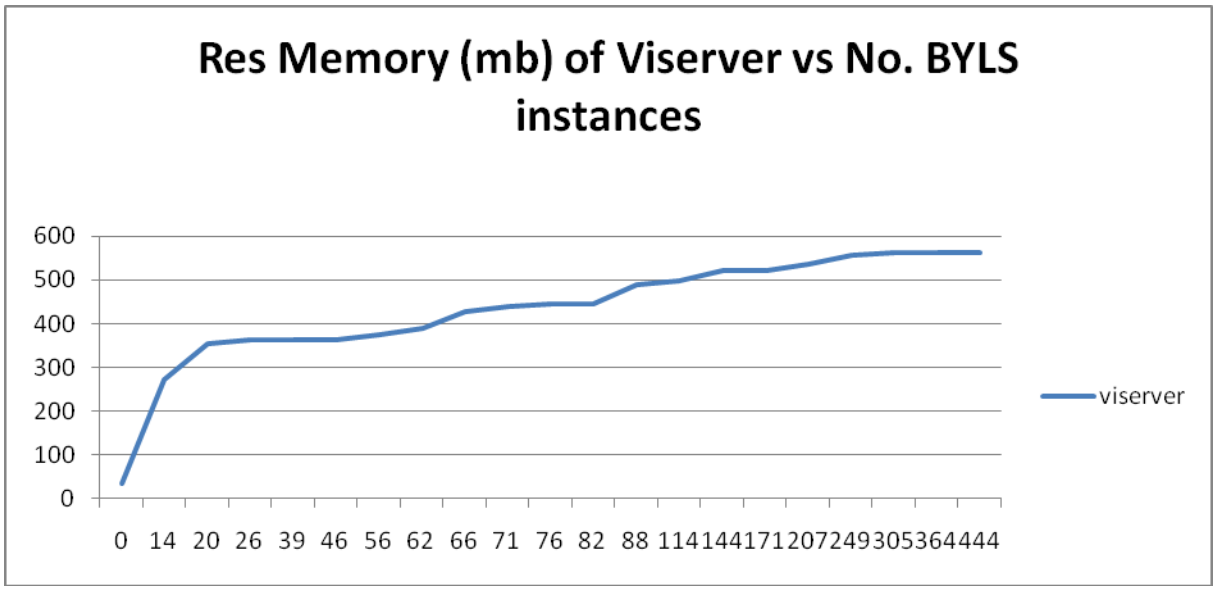




For scopeux the virtual memory usage is in the range of 36MB – 39 MB for BYLS instances ranging from 0-444.

Resident memory usage of VIServer with increasing number of ESX(i) hosts/BYLS instances is given below.





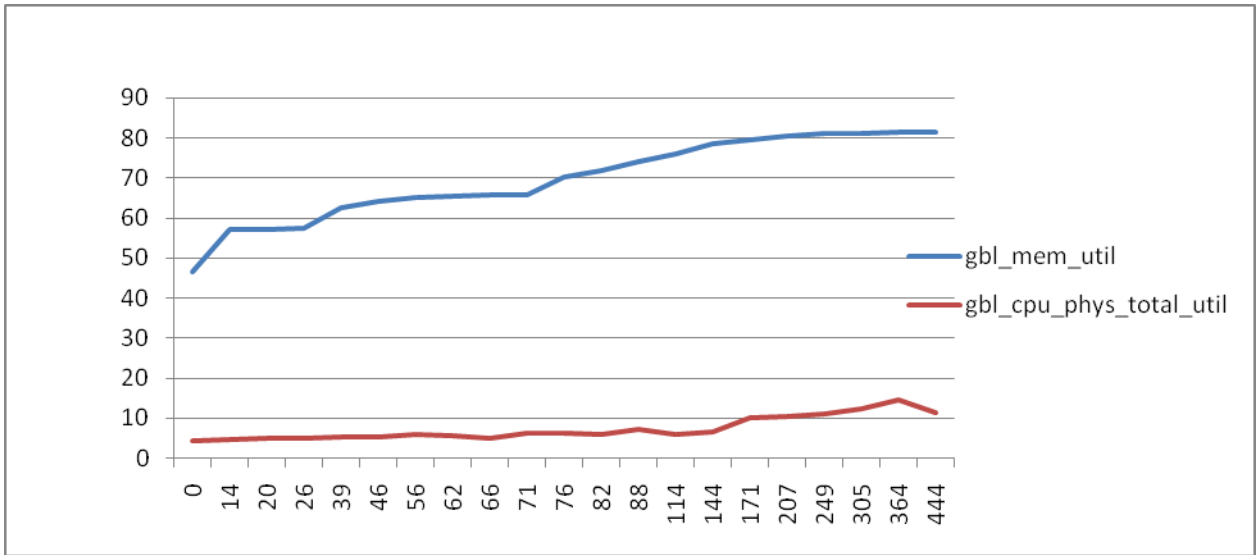
Resident memory for VIServer is close to 600 MB when number of ESX(i) hosts registered is 20 or number of BYLS instances collected is close to 440 plus. Make note of the resident memory

requirement of VIServer if you have lot of ESX(i) hosts/BYLS instances collected in your environment.

HP recommends	It is recommended that you monitor the virtual/Resident memory consumption of VIServer while monitoring large number of ESX (i) hosts or when you have lot of BYLS instances being collected in PA.

Physical CPU and Memory requirement on a vMA systems with increasing number of BYLS instances

With no other load on the vMA system, with increasing number of BYLS instances physical CPU utilization by a vMA system is shown below. **With 200 or lesser BYLS instances, vMA system's physical CPU utilization stays below 10 %.** Similarly **memory utilized on vMA systems is in the range of 45%-80 %**. Refer to the graph shown below.



HP recommends	It is recommended that vMA system has minimum of one CPU and 1 GB of memory.

Impact of number of BYLS instances on the size of log files

Default size of "logls" file will be 30 MB. For every instance of BYLS, the increase in size of the logfile is approximately 0.37 KB. This means for 200 instances of BYLS with logging every 5 minute, ~ 21 MB log file (logls) is filled per day.

Thus increase in LS size per BYLS instance * number of instances * 5 minute instances per day

370 bytes * 200* 288 = ~ 21 MB

HP recommends	• It is recommended to have sufficient log file size to avoid losing data with log file rollover. If you have 200 or more instances being monitored, it is recommended that you have a minimum log file size of 1 GB (1024 MB). • If data logging is every minute, data logged per day for 200 BYLS instances will be 106 MB. Hence it is recommended that you configure logls size as max size (2 GB) when data logging is set to 1 minute.

Glossary

Logical system class (BYLS class)

The BYLS class of metrics provided by HP Performance Agent. This class is responsible for storing data of logical systems.

vMA

The VMware vSphere Management Assistant (vMA) is a prepackaged Linux virtual machine in which administrators can deploy scripts and select third-party agents to manage ESX and ESXi systems. More information about vMA including the download information can be found at:

http://www.vmware.com/support/developer/vima/

Scope(scopeux)

The data collection component of Performance Agent.

VIServer

This is the java SDK adapter spawned by scope for collecting data from ESX hosts. This uses VI SDK to gather data from remote ESX hosts.

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