

SolarWinds®

Server & Application Monitor Hardware Health Guide



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Monitoring Hardware Health

SAM monitors hardware by polling nodes and utilizing the *Hardware Monitoring Agent* software provided by the hardware manufacturer. SAM can monitor hardware from VMware hosts, HP ProLiant, Dell PowerEdge, and the IBM X-Series using this software, which can be found using the links below:

- [HP System Insight Manager \(SIM v6.2 or higher is recommended\)](#) [†]
- [Dell OpenManage Server Administrator](#) ^{††}
- [IBM Director \(Common Agent, v6.3 or higher is recommended\)](#) ^{†††}

Hardware monitoring is achieved by polling via SNMP or WMI, depending upon the node. For SNMP and WMI nodes, hardware monitoring must be enabled manually through SAM's web console. For more information, see "Adding Server Hardware Monitoring" on page 7.

If you run a scheduled *Network Sonar Discovery* of your existing servers, SAM will automatically collect any servers that support hardware health information the next time the discovery runs.

Note: Only SAM administrators can enable hardware health monitoring.

[†] *HP Insight Management WBEM Providers for Windows Server 2003/2008* is an optional component for *HP System Insight Manager* that must be installed for SAM to monitor hardware via WMI. This component can be found using the following link:

[HP Insight Management WBEM Providers for Windows Server 2003/2008](#)

Additionally, you may need to install the *HP ProLiant Support Pack* for Windows. This link can be found here:

[HP ProLiant Support Pack](#)

^{††} Dell does not make array and hard disk health information visible from WMI managed nodes. To monitor storage health on Dell servers, use SNMP.

^{†††} IBM's ServeRAID Manager software must be installed on IBM X-Series servers for storage hardware health information to be displayed in SolarWinds SAM. Installation instructions can be found using the following link:

[IBM's ServeRAID Manager](#)

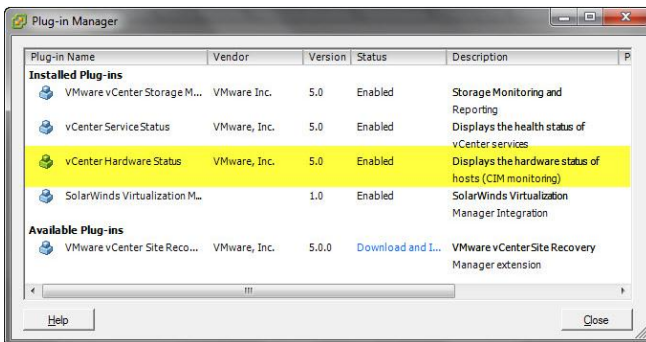
Hardware Items Monitored by SAM

- Fan status
- Power Supply status
- Temperature
- Disk status
- Battery status
- Array Controller status
- Physical Memory status
- Chassis Intrusion status
- CPU Temperature and/or status

Hardware Monitoring and VMware

Hardware monitoring is automatically enabled for VMware ESX and ESXi servers. Monitoring of VMware servers uses the CIM protocol which should be enabled by default after the installation of ESX/ESXi hosts. If installing *Hardware Monitoring Agent* software on a VMware host, hardware information will be detected by SAM and the checkbox to monitor **Hardware Health of Servers** will be displayed, even where hardware information might already be collected via the vCenter using the VMware API. When this option is displayed for a VMware host, checking it will not change the hardware polling method when **Poll for VMware** is also selected.

If you are polling your hosts through the vCenter, you will not see the hardware option listed when you click **List Resources** as these nodes tend to be ICMP. This information is automatically collected by SAM, when available, through the VMware API. You will need to ensure you have the vCenter Hardware Status plug-in enabled on your V-Center for this information to be available through the VMware API, as shown below:



Note: Port **5989** must be opened when polling VMware servers using the CIM protocol.

If you run a scheduled *Network Sonar Discovery* of your existing servers, SAM will automatically collect any servers that support hardware health information the next time the scheduled discovery runs.

Accessing Hardware Monitoring Agent Software

Each vendor's hardware monitoring agent software includes a web server that operates on a unique port.

Navigating to `https://{remote.ip.address}:{Port}` successfully will validate that the agent software is installed. Refer to the table below for the list of ports used by each vendor.

Vendor:	HP	Dell	IBM
Port:	2381 [†]	1311	423 ^{††}

For example: Navigating to `https://10.186.16.100:1311` in your web browser will take you to the Dell OpenManage Server Administrator page on the remotely monitored host.

[†] If *HP Insight Management WBEM Providers for Windows Server 2003/2008* is installed for *HP System Insight Manager*, the **Data Source** in the SIM web interface will read "WBEM." If this component is not installed, the **Data Source** will read "SNMP."

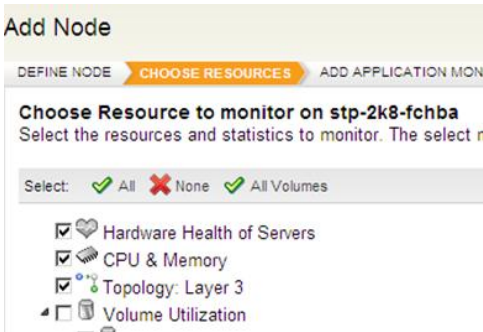
^{††} The IBM Director web-based access is an optional component for version 6.x and is not installed by default.

Adding Server Hardware Monitoring

There are two ways for administrators to add server hardware monitoring for nodes; through the **Add Node** wizard, and through the **Node Details** group of the *Node Details* page.

Add Node Wizard

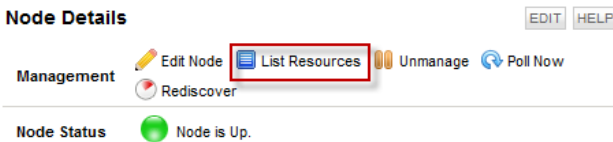
From the **Add Node** wizard, the option to display **Hardware Health of Servers** is available after a node has been defined. Check this box to enable hardware health monitoring.



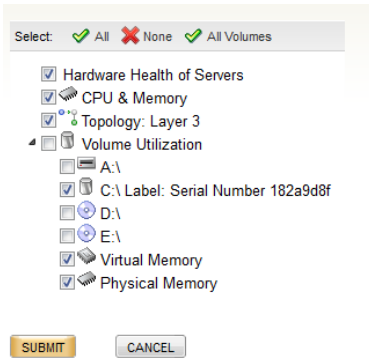
Manually Add Hardware Monitoring

To add hardware health monitoring without using the **Add Node** wizard, follow these steps:

1. Click the *Home* tab in the SAM web console.
2. In the **All Nodes** group, click the node you want to monitor.
3. In the **Node Details** group of the *Node Details* page, click the **List Resources** button as shown below:



The following screen appears:



Here you can select the available hardware you want to monitor by checking the appropriate boxes and then clicking **Submit**.

To disable hardware monitoring, navigate back to this screen and uncheck **Hardware Health of Servers**, then click **Submit**.

Hardware Details

Once you have chosen the hardware you want to monitor, the **Hardware Health Details** group appears on the **Node Details** page and looks similar to the following illustration, providing general information about your hardware and its status:

Hardware Details EDIT

	Hardware Status	Up
	Manufacturer	IBM IBM
	Model	IBM eServer 306m -[8491AC1]-
	Service Tag	KQKW328
	Last Poll Time	11/22/2011 6:44:00 PM

Note: This view will be hidden if hardware monitoring is disabled.

For more information, see "Current Hardware Health Status" on page 8.

Current Hardware Health Status

The current status of your hardware's health can be determined by the **Current Hardware Health** grouping, as shown below. The status for most items will read *Ok*, *Warning*, or *Critical*, depending upon the set threshold values and the returned values. The icon colors for each item will change between green, yellow, and red, respectively. Gray icons indicate a status of *Unknown*, which suggests a polling failure.

You can click on the **[+]** and **[-]** icons to expand and collapse a particular tree branch of hardware that is being monitored. When collapsed, the top level view (or roll-up status) of each hardware item will display the worst status of an item in that branch.

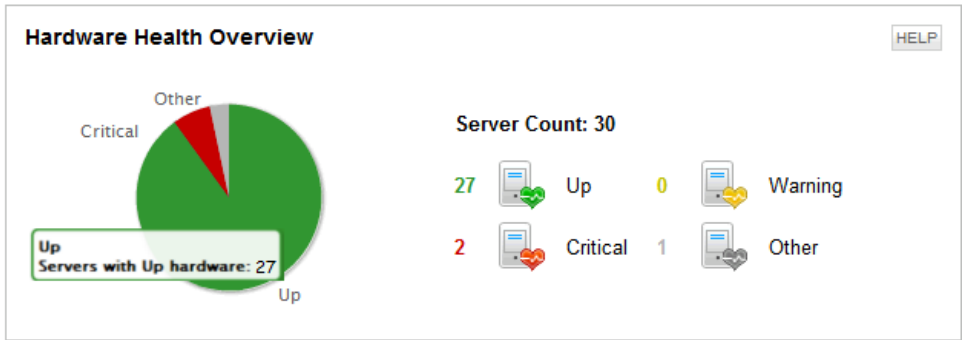
Current Hardware Health EDIT

SENSOR NAME	STATUS	VALUE
Fan		
System Board 1 FAN 1 RPM	Ok	3600 rpm
System Board 1 FAN 2 RPM	Ok	3600 rpm
Temperature		
System Board 1 Ambient Temp	Ok	73.4 °F
Disk		
Drive 0 in enclosure 32 on controller 0 - ONLINE	Ok	
Drive 1 in enclosure 32 on controller 0 - ONLINE	Ok	
Battery		
Battery 26.3	Fully Charged	
Battery 7.1	Fully Charged	
Array		
RAID 1 Virtual Disk 0 Logical Volume 0 on controller 0, Drives(0e32,1e32) - OPTIMAL	Ok	
Memory		
Memory	Ok	64 GB
Intrusion		
System Board 1 Intrusion 0: General Chassis intrusion	Ok	
Power Supply		
1.5V Sense	OK	1.53 V
1.8V Sense	OK	1.86 V

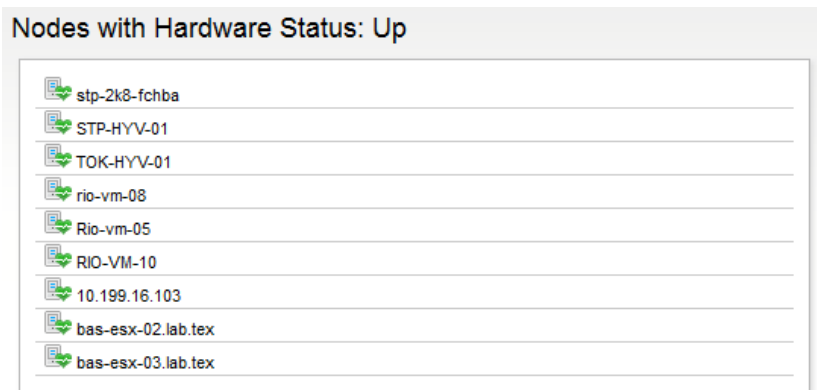
Note: The default temperature measurement is in degrees, Fahrenheit (°F). To change this to Celsius (°C), from the web console, navigate to **Settings > Manage Accounts > Select Account > Edit**. The **Temperature Unit** dropdown menu can be found under the **Server & Application Monitor Settings** category.

Hardware Health Overview Chart

This resource provides a status overview of your monitored hardware's health. Mousing over each pie segment will provide a tooltip with more detailed information.



Clicking a server icon in the Overview Chart, as highlighted above in red, will bring up a list of the servers with the indicated status, as shown below. From here, you can navigate to the *Details* page of each server by clicking any icon in the list.



Changing Threshold Values

Threshold values for each monitored item cannot be set within SAM; however, some values can be configured through the *Hardware Monitoring Agent Software* installed on your hardware. **Dell OpenManage Server Administrator** is one such example. The illustration below shows how threshold values for the temperature can be changed from the default values using Dell's software.

The screenshot shows the Dell OpenManage Server Administrator interface. The top navigation bar includes the Dell logo, 'OPENMANAGE™ SERVER ADMINISTRATOR', and links for 'Preferences', 'Support', 'About', and 'Log Out'. The left sidebar shows a tree view with 'System' expanded, and 'Temperatures' selected. The main content area is titled 'Temperature Probes' and shows a 'BMC Ambient Temp' gauge. The gauge has a color scale from red (47.0°C) to blue (5.0°C), with a current reading of 22.0°C. To the right of the gauge are 'Threshold Settings' for 'Status' (OK), 'Reading' (22.0 C), 'Minimum Failure Threshold' (5.0 C), and 'Maximum Failure Threshold' (47.0 C). Below these are 'Threshold Settings' for 'Minimum Warning Threshold' (10.0 C) and 'Maximum Warning Threshold' (42.0 C). At the bottom right are buttons for 'Go Back To Temperature Probes Page' and 'Apply Changes'.

Different default thresholds exist for different items in the *Hardware Monitoring Agent Software*. Some of these thresholds may be accessible and open to editing, some may not. Consult your *Hardware Monitoring Agent Software* user guide for specific information about editing thresholds.

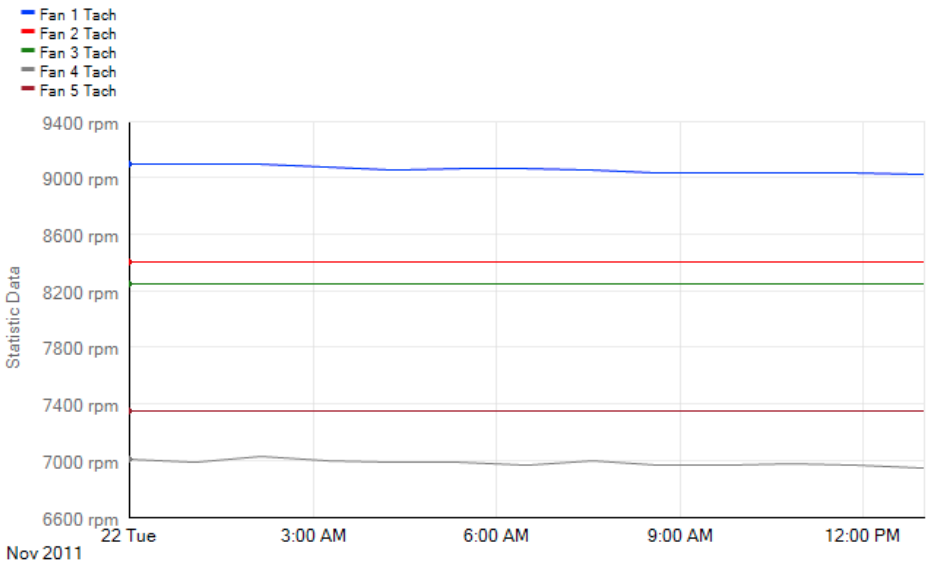
You can manually define alerting thresholds for any hardware sensor or category in the **Advanced Alert Manager**.

Hardware Health Chart

This chart allows you to visualize multiple hardware statistics simultaneously. The advantage of this view is that you can easily see how your hardware objects are performing over a given period of time in relation to one another.

Tabs at the top of the chart allow you to quickly navigate between different groups of hardware, allowing you to see the performance and status of an entire group of the same hardware on a single page.

Hardware Health

[EDIT](#)[Fan](#)[Power Supply](#)[Temperature](#)

STATISTIC NAME	STATUS	VALUE
Fan 1 Tach	OK	9000 rpm
Fan 2 Tach	OK	8400 rpm
Fan 3 Tach	OK	8250 rpm
Fan 4 Tach	OK	6900 rpm
Fan 5 Tach	OK	7350 rpm

Note: This view will be hidden if hardware monitoring is disabled.

Customizing the Hardware Health Chart

Click **Edit** at the top-right of the chart to be taken to the following screen. You can customize the following user-specific aspects of the chart display:

- **Sample Interval** – This is the interval of time that will be displayed on the chart.
- **Title** – This will give a title to display for your chart.
- **Subtitle** – This will give a subtitle to display for your chart.

- **Temperature Display** – This allows you to set the temperature units. This will affect all charts that display temperature for the current user.
- **Time Period for Chart** – This allows you to select the span of time the chart will display.

Edit Resource: Hardware Health

Sample Interval:

A single point / bar will be plotted for each time period. Data within each sample is automatically summarized.

Every 30 Minutes ▾

Title:

Hardware Health

Subtitle:

Temperature Display:

Fahrenheit

Celsius

Time Period for Chart:

Today ▾

SUBMIT

Click **Submit** to save the settings.

Clicking the chart itself opens the following screen which allows you to edit multiple, self-explanatory settings pertaining to the Hardware Chart.

Customize Chart

Chart Titles

Title:

Subtitle:

Subtitle #2:

Time Period

Select a Time Period: ▾

- or -

Beginning Date/Time:

Ending Date/Time:

Dates and Times can be entered in **many** different formats including: **11/16/2011** or **Wednesday, November 16, 2011** or **3:31 PM** or **3:31:13 PM** or **11/16/2011 3:31:13 PM**

Sample Interval: ▾

A single point / bar will be plotted for each time period. Data within each sample is automatically summarized.

Chart Size

Width:

Height:

You can maintain the same Width / Height aspect ratio by entering a Width, but entering '0' for the Height

Font Size: ▾

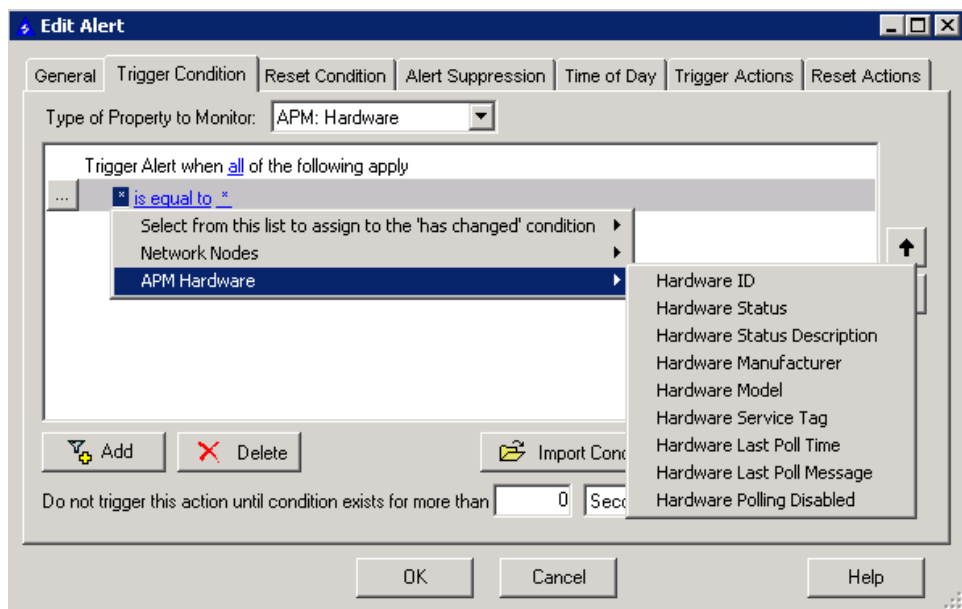
Display Chart Data

Click **Submit** to save the settings.

Note: The **Raw Data** button will deliver the chart data by downloading an Excel spreadsheet. The **Chart Data** button displays the data in a web page.

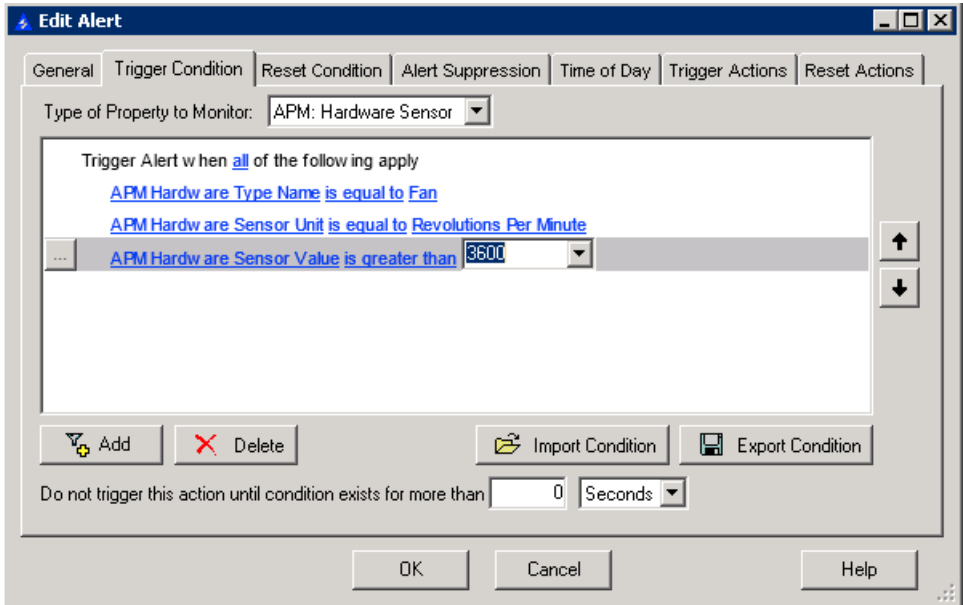
Alerting on Hardware Health

SAM has the ability to create alerts on all aspects of monitored hardware. You can access these alerts in the **Advanced Alert Manager** by navigating to the *Trigger Condition* tab, then selecting either *APM: Hardware*, *APM: Hardware Type*, or *APM: Hardware Sensor* from the *Type of Property to Monitor* dropdown menu, as shown in the following illustration:



Manually Changing Alert Thresholds

You can manually define alerting thresholds for any hardware sensor or category in the **Advanced Alert Manager**. The illustration below shows an example of how to define an alert for when a fan's speed exceeds 3600 RPM.



Troubleshooting Hardware Health

This section describes possible causes and solutions concerning hardware resources either not being reported or being reported incorrectly.

Hardware Prerequisite Checklist

If the following conditions cannot be met, the Hardware Health resources will not be displayed. To monitor hardware in SAM, the following must be true:

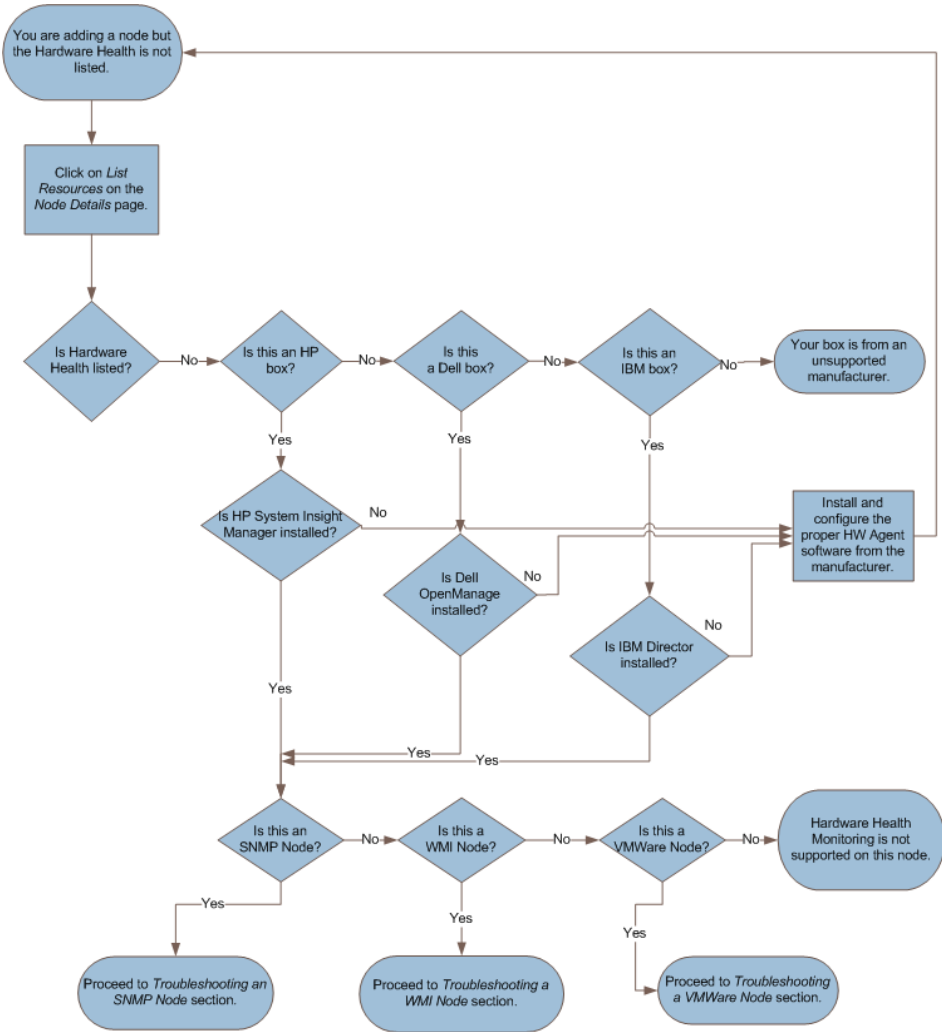
- The monitored node must be *HP ProLiant*, *Dell PowerEdge*, or *IBM X-Series*.
- The node must be monitored using one of the following protocols:
 - SNMP
 - WMI
 - ICMP nodes are allowed for VMWare when the **Poll for VMware** option is selected.
- The *Hardware Monitoring Agent* software, (provided by the vendor), is installed on the remote server. This applies for both SNMP and WMI.
- For VMware, the minimum requirements are as follows: ESX server version 3.5, 4.0, 4.1, ESXi version 5.0, vCenter version 4.0, 4.1, 5.0.

The following systems have been verified to work properly with SAM's hardware monitoring features. **Note:** Other systems may work as well.

- Dell PowerEdge M610, R210, R610, R710, R900, 1950, 2850, 2950, 2970, 6850
- HP ProLiant DL320 G4, DL360 G3, DL360 G4, DL380 G4, DL380 G6, ML570 G3
- IBM IBM System x3550, System x3550 M2, System x3550 M3, System x3650, System x3650 M2, System x3650 M3, x3850, eServer 306m

Note: IBM's ServeRAID Manager software must be installed on IBM X-Series servers for storage hardware health information to be displayed in SolarWinds SAM. HP's WBEM providers are required for HP servers polled via WMI.

Hardware Troubleshooting Flowchart



Note: Dell does not make array and hard disk health information visible from WMI managed nodes. To monitor storage health on Dell servers, use SNMP.

Troubleshooting an SNMP Node

The most common issue customers face is that hardware information is not available via SNMP because the *Hardware Monitoring Agent* software was installed **before** SNMP was installed. This means MIBs were never installed and/or configured correctly. The easiest solution is to uninstall and then re-install the *Hardware Monitoring Agent* software **after** installing SNMP on the server. If this is not the case, follow the troubleshooting steps as outlined below:

Before troubleshooting can begin, verify the node was successfully added using SNMP.

1. Verify the polling method on the *Node Details* page as shown below:

Polling Details		EDIT	HELP
Polling Engine	DONDERKA-VM (10.140.127.6)		
Polling Method	SNMP		
Polling Interval	120 seconds		
Next Poll	12:27		
Statistics Collection	10 minutes		
Enable 64 bit Counters	Yes		
Rediscovery Interval	30 minutes		
Next Rediscovery	12:43		
Last Database Update	7.2.2012 12:25		

2. Verify the *Hardware Monitoring Agent* software is installed on the remote server and running. For verification instructions, see "Accessing Hardware Monitoring Agent Software" on page 6.
3. Determine if SNMP responds for the proper OID. Below are the correct OIDS for each vendor:

For HP: 1.3.6.1.4.1.232.2.2.2.1.0

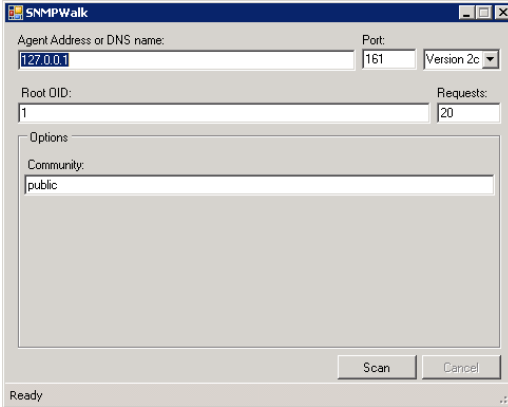
For Dell: 1.3.6.1.4.1.674.10892.1.300.10.1.8.1

For IBM: 1.3.6.1.4.1.2.6.159.1.1.60.3.1

- To determine if the remote server responds to the correct OID, you can use the MIB browser from *SolarWinds Engineer's Toolset*, which can be downloaded from <http://www.solarwinds.com/downloads/>. Additionally, you can use other applications capable of making SNMP requests.

If you do not have a tool for checking OIDs on the remote server, you can create an SNMP walk by using the `SNMPWalk.exe` installed with SAM, normally located at `C:\Program Files (x86)\SolarWinds\Orion\SnmpWalk.exe`. `SNMPWalk.exe` will be used in this demonstration.

Using SNMPWalk.exe:



1. Start `SNMPWalk.exe` and type in the IP address of the remote server and the community string for SNMP.
2. Click **Scan**.
3. After completing the scan, save the SNMP walk in a text file.
4. Open the text file and manually search for the OIDs.

If the Remote Server does not respond on this OID, the *Hardware Monitoring Agent* software may not be properly configured. Check to see if the *Hardware Monitoring Agent* software has imported the correct MIBs as outlined in the following table.

For information on verifying *Hardware Monitoring Agent* software, see "Accessing Hardware Monitoring Agent Software" on page 6.

HP	Dell	IBM
CPQSTDEQ-MIB	MIB-Dell-10892	IBM-SYSTEM-HEALTH-MIB
CPQSINFO-MIB	StorageManagement-MIB	IBM-SYSTEM-ASSETID-MIB
CPQIDA-MIB		IBM-SYSTEM-LMSENSOR-MIB
CPQHLTH-MIB		IBM-SYSTEM-MEMORY-MIB
CPQSTSYS-MIB		IBM-SYSTEM-POWER-MIB
CPQIDE-MIB		IBM-SYSTEM-PROCESSOR-MIB
		IBM-SYSTEM-RAID-MIB
		ADAPTEC-UNIVERSAL-STORAGE-MIB

Troubleshooting a WMI Node

The following conditions must be met before you can proceed troubleshooting WMI nodes:

- The node has successfully been added via WMI.
- WMI is working properly on the remote server.
- The *Hardware Monitoring Agent* software is installed on the remote server and running.

Using Wbemtest.exe to troubleshoot WMI:

1. Open `wbemtest.exe`, usually located at `C:\Windows\System32\wbem\wbemtest.exe`.
2. Connect from the problematic node (either the SAM server or the additional poller server) to the remote server using `wbemtest.exe`.
3. Click **Connect**.
4. In the *Namespace* field enter:

For **IBM** and **HP** enter: `\\RemoteServerIpAddress\root`

For **Dell** enter: `\\RemoteServerIpAddress\root\cimv2`

The screenshot shows the 'Connect' dialog box in Wbemtest.exe. The 'Namespace' field is highlighted with a green box and contains the text '\\10.199.6.123\root'. The dialog includes the following fields and options:

- Connection:**
 - Using: WbemLocator (Namespaces)
 - Returning: WbemServices
 - Completion: Synchronous
- Credentials:**
 - User: Administrator
 - Password: masked with asterisks
 - Authority: empty
- Locale:** empty field
- How to interpret empty password:**
 - NULL
 - Blank
- Impersonation level:**
 - Identify
 - Impersonate
 - Delegate
- Authentication level:**
 - None
 - Packet
 - Connection
 - Packet integrity
 - Call
 - Packet privacy

Buttons for 'Connect' and 'Cancel' are visible in the top right corner.

5. Enter administrator credentials.

Connect

Namespace: \\10.199.6.123\root

Connection:

Using: IWbemLocator (Namespaces)

Returning: IWbemServices Completion: Synchronous

Credentials:

User: Administrator

Password: *****

Authority:

Locale:

How to interpret empty password:

NULL Blank

Impersonation level:

Identify Impersonate Delegate

Authentication level:

None Packet Connection Packet integrity Call Packet privacy

Connect Cancel

6. Click **Connect**.
7. Once connected, click **Query...** from the main screen. The **Query** dialog appears.
8. Enter: `select * from __Namespace`

Query

Enter Query

select * from __Namespace

Query Type

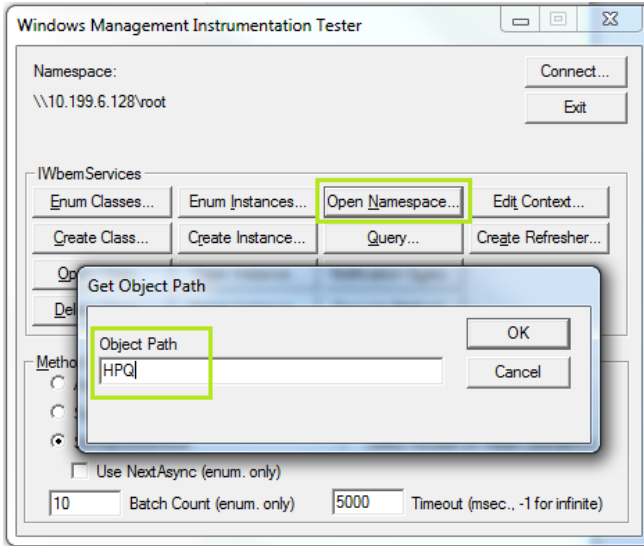
WQL Retrieve class prototype

Apply Cancel

Replace *Namespace* with the following:

- For **HP** nodes, replace `Namespace` with `HPQ`
- For **Dell** node replace `Namespace` with `Dell`
- For **IBM** node replace `Namespace` with `IBMSD`

9. If the proper *Namespace* is found, connect to this *Namespace*.
- `\\RemoteServer\IpAddress\root\IBMSD` for **IBM**.
 - `\\RemoteServer\IpAddress\root\HPQ` for **HP**.
 - `\\RemoteServer\IpAddress\root\cimv2\Dell` for **Dell**.



10. Run a **Query** for specific information.

Select Manufacturer, Model, SerialNumber from CIM_Chassis

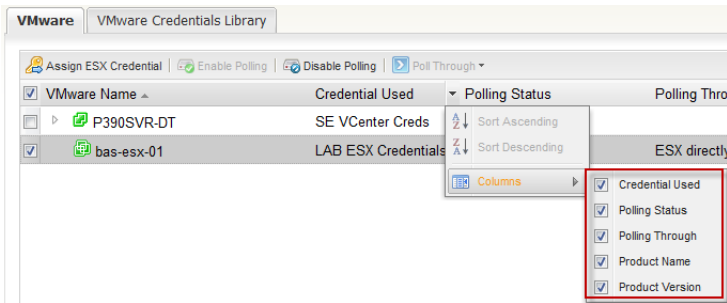
- If the test was not successful, re-install the platform or *Hardware Monitoring Agent* software on the remote server with the latest release.

Troubleshooting a VMWare Node

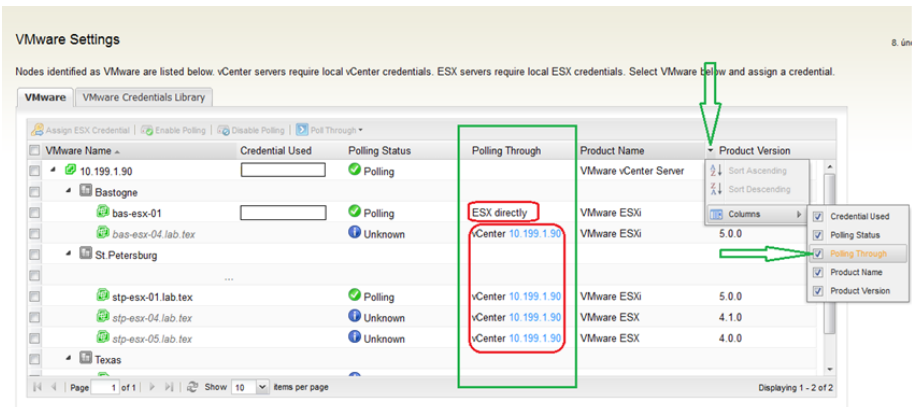
VMWare nodes can be polled for Hardware information either through the vCenter or directly by using the CIM protocol. Polling through the vCenter uses VMWare's native API interface. Polling the ESX server directly uses the CIM protocol to get Hardware information.

To determine if a node is polled through the vCenter or directly:

1. From the web console, navigate to **Settings > VMWare Settings**
2. Listed will be table of all the currently polled VMWare nodes. This table contains the **Polling Through** column. **Note:** This column may be hidden. If the column is hidden, unhide it by clicking the dropdown menu of an adjacent column and check the **Polling Through** option:



3. Use the illustration below to determine how your VMWare is being polled.



Links to Vendor Software

SAM monitors hardware by polling nodes and utilizing the *Hardware Monitoring Agent* software provided by the hardware manufacturer. Following is a list of the latest required software from each vendor used to monitor hardware health.

HP System Insight Manager (SIM)

<http://h20000.www2.hp.com/bizsupport/TechSupport/SoftwareIndex.jsp?lang=en&cc=us&prodNameId=3288134&prodTypeId=15351&prodSeriesId=1121516&swLang=8&taskId=135&swEnvOID=1005#7832>

- * RECOMMENDED * HP Insight Management Agents for Windows Server 2003/2008
<http://h20000.www2.hp.com/bizsupport/TechSupport/SoftwareDescription.jsp?lang=en&cc=us&prodTypeId=0&prodSeriesId=1121516&prodNameId=3288134&swEnvOID=1005&swLang=8&mode=2&swItem=MTX-af947919eeef45499382780cc4>
- HP Insight Management WBEM Providers for Windows Server 2008
<http://h20000.www2.hp.com/bizsupport/TechSupport/SoftwareDescription.jsp?lang=en&cc=us&prodTypeId=0&prodSeriesId=1121516&prodNameId=3288134&swEnvOID=1005&swLang=8&mode=2&swItem=MTX-2ae698eeda724804aedb19f71b>

Dell OpenManage Server Administrator Managed Node

- <http://www.dell.com/support/drivers/us/en/555/DriverDetails/DriverFileFormats?DriverId=HPRYT&FileId=2898402194&productCode=poweredge-r720&urlProductCode=False>

IBM Systems Director

- https://www14.software.ibm.com/webapp/iwm/web/reg/download.do?source=dmp&S_PKG=dir_63_x86_MDagents&lang=en_US&cp=UTF-8&dmethod=http

Note: You will need an account to log in.

- **ServeRAID**
<http://www-947.ibm.com/support/entry/portal/docdisplay?brand=5000008&Indocid=MIGR-61707>

In SAM 5.2 the MegaRAID Storage Manager needs to be installed for LSI RAID Controllers to see their MegaRAID storage information in SAM.

- **MegaRAID**
<http://www-947.ibm.com/support/entry/portal/docdisplay?Indocid=migr-5077712>