

Groundwork monitoring for HP Lefthand P4000 SANs

revision 1.0b

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P4000 Monitoring part 2: Creating Service Checks and Storage Hosts

presented by:



Business Partner



Introduction:

This document attempts to explain how to configure a groundwork monitor nagios server to monitor HP Lefthand P4000 series SAN modules and virtual appliances. The concepts should be applicable to any Nagios implementation; however the specific instructions and screenshots included were using [Groundwork Community Edition](#). These methods were specifically tested against GWCE versions 5.6.1 CentOS is used in the examples. The version of ESX used was vSphere 4 Update1



Prerequisites:

Completed PART 1, initial configuration of your GroundWork Monitor appliance.
Working knowledge of the console and configuration interfaces for Linux.
Properly installed, configured, HP Lefthand P4000 series Cluster
Ability to work with vi/nano or other Linux editor

Goals:

Our end-result should be monitoring capabilities of multiple HP Lefthand P4000 series storage modules, Virtual Storage Appliances (VSA), clusters, management groups, hardware resources, volume statistics and utilization. Trending and historical graphing of the utilization and alerting based on warning and critical thresholds supplied.

About the Author:

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Began the IT career in 1994; Areas of competence have included the following focus areas:
Virtualization (VMware ESX/vSphere, Capacity Planning, SRM, XenServer, HyperV, automated deployments)
Storage (Shared SCSI, iSCSI, SAN, DAS, NAS, replication)
Microsoft (SQL Server, Exchange, Active Directory, Terminal Services, general infrastructure)
Citrix (Winframe – Xenapp; Web Interface, Secure Gateways)

Resources and Tools used:

Nagios	GroundWork OpenSource Community Edition 6.1	http://sourceforge.net/projects/gwmos/files/installable (BIN) and Vmware appliance versions available.
SCP	Veeam FastSCP	http://www.veeam.com/vmware-esxi-fastscp.html
Check comma nds	Various shell and perl check commands	Links supplied within document

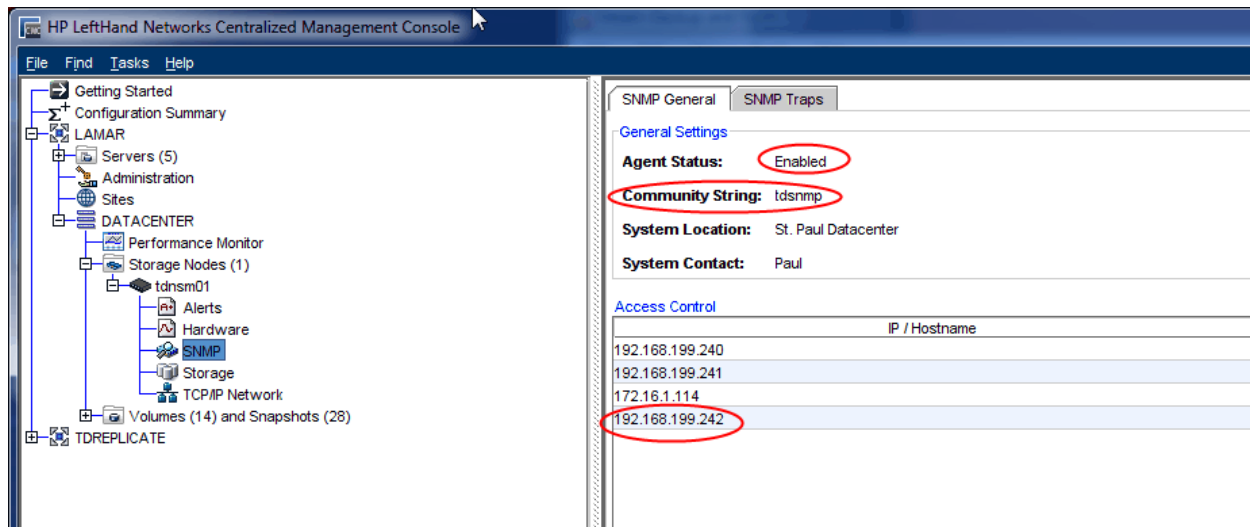
Allow SNMP Queries to your P4xxx storage nodes:

For any storage nodes you wish to monitor you need to enable SNMP, and set the community string:



Log into the HP LeftHand Network Centralized Management Console and verify the following:

- ★ The SNMP Agent Status is Enabled
- ★ The IP Address for your groundwork server is listed in the Access Control
- ★ You have defined a Community String
- ★ Verify connectivity between the Nagios Server and the storage node(s) (can you ping?)

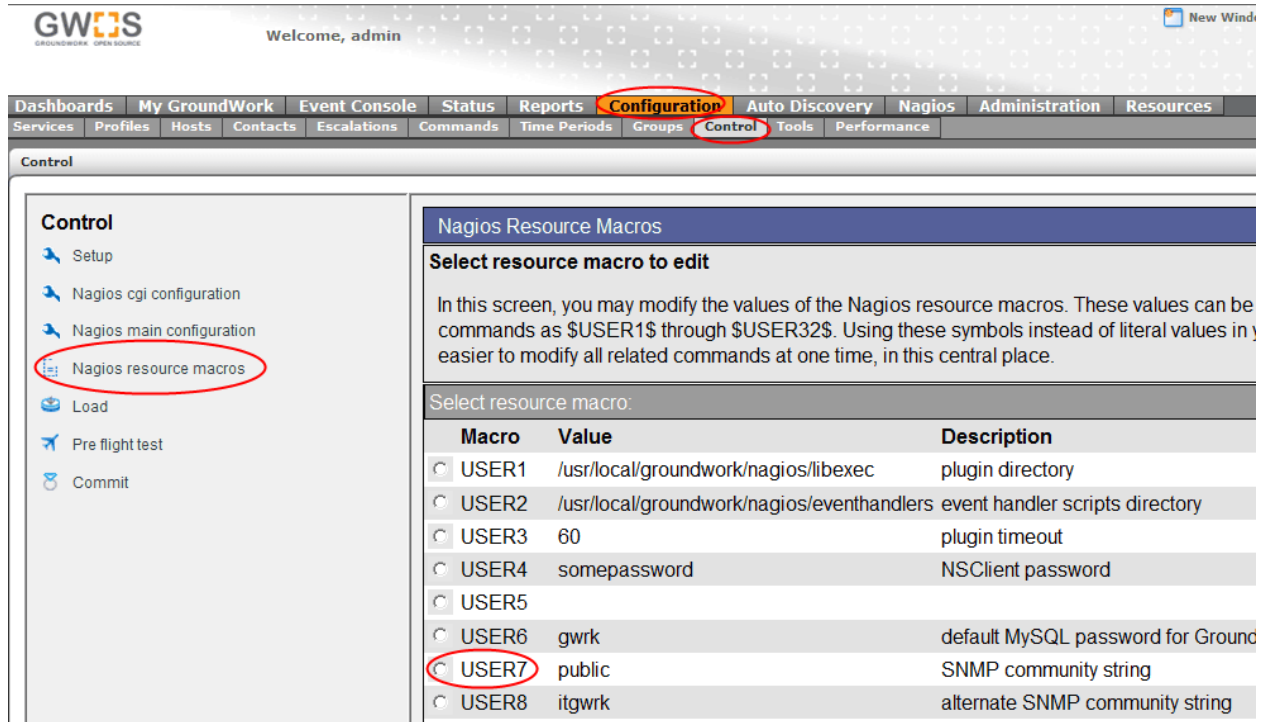


The screenshot shows the HP LeftHand Networks Centralized Management Console interface. The left sidebar displays a tree view with categories like LAMAR, DATACENTER, and TDRPLICATE. The main panel shows the 'SNMP General' configuration page. Under 'General Settings', 'Agent Status' is set to 'Enabled' and 'Community String' is 'tdsnmp', both circled in red. Under 'Access Control', a table lists IP addresses: 192.168.199.240, 192.168.199.241, 172.16.1.114, and 192.168.199.242, with the last one circled in red.

Configure SNMP community string in groundwork

Log into your groundwork Server by browsing to <http://yourgroundworkserver>
Login as admin, Password: admin

Click Configuration → then Control → then Nagios resource macros:



Control

- Setup
- Nagios cgi configuration
- Nagios main configuration
- Nagios resource macros**
- Load
- Pre flight test
- Commit

Nagios Resource Macros

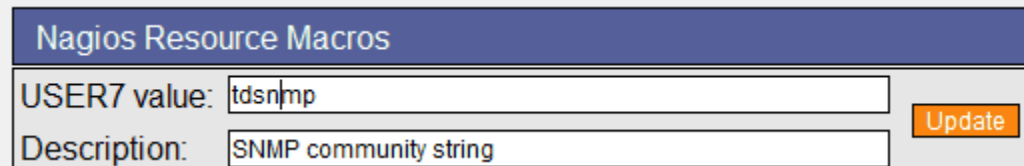
Select resource macro to edit

In this screen, you may modify the values of the Nagios resource macros. These values can be commands as \$USER1\$ through \$USER32\$. Using these symbols instead of literal values in your commands is easier to modify all related commands at one time, in this central place.

Select resource macro:

Macro	Value	Description
<input type="radio"/> USER1	/usr/local/groundwork/nagios/libexec	plugin directory
<input type="radio"/> USER2	/usr/local/groundwork/nagios/eventhandlers	event handler scripts directory
<input type="radio"/> USER3	60	plugin timeout
<input type="radio"/> USER4	somepassword	NSClient password
<input type="radio"/> USER5		
<input type="radio"/> USER6	gwrk	default MySQL password for Groundwork
<input checked="" type="radio"/> USER7	public	SNMP community string
<input type="radio"/> USER8	itgwrk	alternate SNMP community string

Click the radio button by USER7:



Nagios Resource Macros

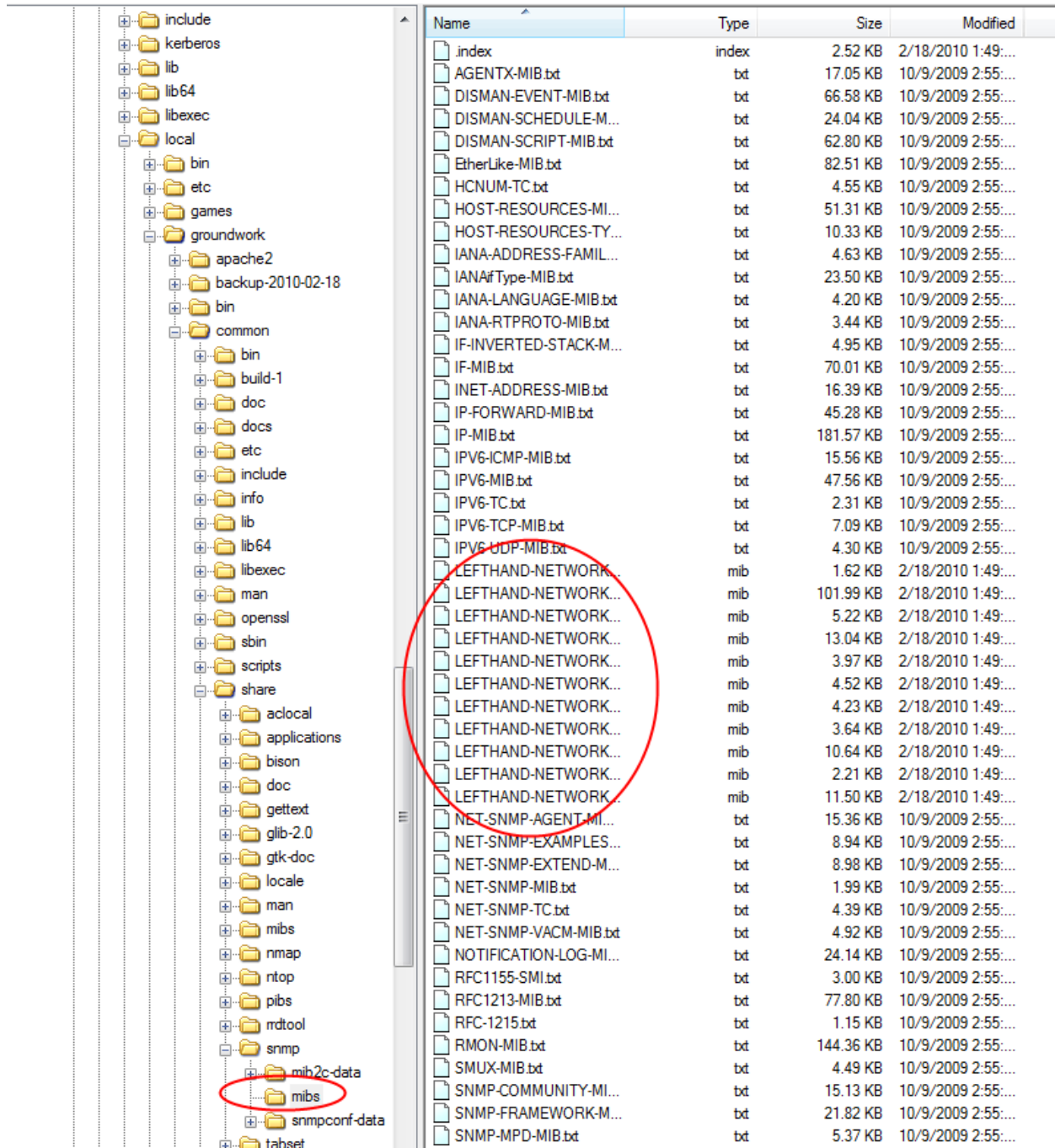
USER7 value:

Description:

Enter the value for your community string (this will need to match in the Lefthand Console) click

Copy MIB files to your groundwork server using an SCP client. (Veeam or Win SCP work well)
 To obtain the MIB files for HP Lefthand, perform a custom installation of the CMC and select ALL. The MIB files will reside here: C:\Program Files (x86)\LeftHand Networks\UI\mibs

Copy all the LEFTHAND-NETWORKS-* files into /usr/local/groundwork/common/share/snmp/mibs
 Use this same method to place any other device specific MIB files onto your groundwork server:



Name	Type	Size	Modified
index	index	2.52 KB	2/18/2010 1:49:...
AGENTX-MIB.txt	txt	17.05 KB	10/9/2009 2:55:...
DISMAN-EVENT-MIB.txt	txt	66.58 KB	10/9/2009 2:55:...
DISMAN-SCHEDULE-M...	txt	24.04 KB	10/9/2009 2:55:...
DISMAN-SCRIPT-MIB.txt	txt	62.80 KB	10/9/2009 2:55:...
EtherLike-MIB.txt	txt	82.51 KB	10/9/2009 2:55:...
HENUM-TC.txt	txt	4.55 KB	10/9/2009 2:55:...
HOST-RESOURCES-MI...	txt	51.31 KB	10/9/2009 2:55:...
HOST-RESOURCES-TY...	txt	10.33 KB	10/9/2009 2:55:...
IANA-ADDRESS-FAMIL...	txt	4.63 KB	10/9/2009 2:55:...
IANAfType-MIB.txt	txt	23.50 KB	10/9/2009 2:55:...
IANA-LANGUAGE-MIB.txt	txt	4.20 KB	10/9/2009 2:55:...
IANA-RTPROTO-MIB.txt	txt	3.44 KB	10/9/2009 2:55:...
IF-INVERTED-STACK-M...	txt	4.95 KB	10/9/2009 2:55:...
IF-MIB.txt	txt	70.01 KB	10/9/2009 2:55:...
INET-ADDRESS-MIB.txt	txt	16.39 KB	10/9/2009 2:55:...
IP-FORWARD-MIB.txt	txt	45.28 KB	10/9/2009 2:55:...
IP-MIB.txt	txt	181.57 KB	10/9/2009 2:55:...
IPV6-ICMP-MIB.txt	txt	15.56 KB	10/9/2009 2:55:...
IPV6-MIB.txt	txt	47.56 KB	10/9/2009 2:55:...
IPV6-TC.txt	txt	2.31 KB	10/9/2009 2:55:...
IPV6-TCP-MIB.txt	txt	7.09 KB	10/9/2009 2:55:...
IPV6-UDP-MIB.txt	txt	4.30 KB	10/9/2009 2:55:...
LEFTHAND-NETWORK...	mib	1.62 KB	2/18/2010 1:49:...
LEFTHAND-NETWORK...	mib	101.99 KB	2/18/2010 1:49:...
LEFTHAND-NETWORK...	mib	5.22 KB	2/18/2010 1:49:...
LEFTHAND-NETWORK...	mib	13.04 KB	2/18/2010 1:49:...
LEFTHAND-NETWORK...	mib	3.97 KB	2/18/2010 1:49:...
LEFTHAND-NETWORK...	mib	4.52 KB	2/18/2010 1:49:...
LEFTHAND-NETWORK...	mib	4.23 KB	2/18/2010 1:49:...
LEFTHAND-NETWORK...	mib	3.64 KB	2/18/2010 1:49:...
LEFTHAND-NETWORK...	mib	10.64 KB	2/18/2010 1:49:...
LEFTHAND-NETWORK...	mib	2.21 KB	2/18/2010 1:49:...
LEFTHAND-NETWORK...	mib	11.50 KB	2/18/2010 1:49:...
NET-SNMP-AGENT-MI...	txt	15.36 KB	10/9/2009 2:55:...
NET-SNMP-EXAMPLES...	txt	8.94 KB	10/9/2009 2:55:...
NET-SNMP-EXTEND-M...	txt	8.98 KB	10/9/2009 2:55:...
NET-SNMP-MIB.txt	txt	1.99 KB	10/9/2009 2:55:...
NET-SNMP-TC.txt	txt	4.39 KB	10/9/2009 2:55:...
NET-SNMP-VACM-MIB.txt	txt	4.92 KB	10/9/2009 2:55:...
NOTIFICATION-LOG-MI...	txt	24.14 KB	10/9/2009 2:55:...
RFC1155-SMI.txt	txt	3.00 KB	10/9/2009 2:55:...
RFC1213-MIB.txt	txt	77.80 KB	10/9/2009 2:55:...
RFC-1215.txt	txt	1.15 KB	10/9/2009 2:55:...
RMON-MIB.txt	txt	144.36 KB	10/9/2009 2:55:...
SMUX-MIB.txt	txt	4.49 KB	10/9/2009 2:55:...
SNMP-COMMUNITY-MI...	txt	15.13 KB	10/9/2009 2:55:...
SNMP-FRAMEWORK-M...	txt	21.82 KB	10/9/2009 2:55:...
SNMP-MPD-MIB.txt	txt	5.37 KB	10/9/2009 2:55:...

Test SNMP Queries:

To verify you have done all the above steps correctly do the following:

Configuration → Commands → Copy → Check_alive

Command Wizard	
Copy:	check_alive
Command name:	<input type="text" value="check_nsm_raid"/>
Type:	? <input type="text" value="check"/>
Command line:	? <input type="text" value="\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -o LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusModuleRaidStatus.\$ARG1\$ -R ok"/>
Usage:	check_nsm_raid!ARG1
Test:	<div style="display: flex; justify-content: space-between;"> <div>Host: <input type="text" value="10.0.5.6"/></div> </div> <div style="display: flex; justify-content: space-between;"> <div>Arguments: <input type="text" value="1"/></div> </div> <div>Service description: <input type="text"/></div> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <pre> /usr/local/groundwork/nagios/libexec/check_snmp -H 10.0.5.6 -C tdsnmp -o LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusModuleRaidStatus.1 -R ok SNMP OK - "ok" Command returned exit status 0 </pre> </div> <div style="margin-top: 5px;"> <input type="button" value="Test"/> </div>
<input type="button" value="Cancel"/> <input type="button" value="Add"/>	

Command name:	check_nsm_raid
Command line:	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -o LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusModuleRaidStatus.\$ARG1\$ -R ok
Host:	<ip address of your storage node>
Arguments:	1 (the only valid instance for this particular check)

Click You should see SNMP OK – “ok” |

If successful, click If not go back and check SNMP, network connectivity, community string, and the MIB files to verify.

To better understand how this works let's dissect the commandline:

Commandline:	<code>\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -o LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusModuleRaidStatus.\$ARG1\$ -R ok</code>
\$USER1\$	This is a nagios variable for the path to the executable. It is usually <code>/usr/local/groundwork/nagios/libexec</code>
check_snmp	The check command executable or script to run
-H \$HOSTADDRESS\$	Destination to send the query. This plugs in the "Host" argument supplied
-C \$USER7\$	The SNMP Community string, supplied by the Nagios variable \$USER7\$
-o <mibobject>.\$ARG1\$	This is the SNMP object we wish to query. In this case it says to use the CLUSTERING MIB. <code>clusModuleRaidStatus</code> indicates the specific value to query, and \$ARG1\$ is the instance.
-R ok	This tells the command that "ok" is the normal expected result. Anything else will result in the command returning an error status.

Now use the "Copy Command" method to create check commands for the other health and performance metrics for the Lefthand SAN. Be sure to click **Add** after each one.:

CLUSTER Performance Metrics	
check_cluster_module	<code>\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -P 2c -o LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusModuleStorageStatus.\$ARG1\$</code>
check_cluster_readios	<code>\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -P 2c -o LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusClusterStatsIoRead.\$ARG1\$ -w 999999999999999</code>
check_cluster_readkbs	<code>\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -P 2c -o LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusClusterStatsKbytesRead.\$ARG1\$ -w 999999999999999</code>
check_cluster_readlatency	<code>\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -P 2c -o LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusClusterStatsIoLatencyRead.\$ARG1\$ -w 999999999999999</code>
check_cluster_readqueue	<code>\$USER1\$/check_snmpx \$HOSTADDRESS\$ \$USER7\$ LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusClusterStatsQDepthRead.1 \$ARG1\$ \$ARG2\$ ReadQueue</code>
check_cluster_writeios	<code>\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -P 2c -o LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusClusterStatsIoWrite.\$ARG1\$ -w 999999999999999</code>
check_cluster_writekbs	<code>\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -P 2c -o LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusClusterStatsKbytesWrite.\$ARG1\$ -w 999999999999999</code>
check_cluster_writelatency	<code>\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -P 2c -o LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusClusterStatsIoLatencyWrite.\$ARG1\$ -w 999999999999999</code>
check_cluster_writequeue	<code>\$USER1\$/check_snmpx \$HOSTADDRESS\$ \$USER7\$ LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusClusterStatsQDepthWrite.1 \$ARG1\$ \$ARG2\$ WriteQueue</code>

Module Performance Metrics:	<p>Note: This section has been modified. With the 8.5 release of SAN/iQ HP has deprecated the NSM-CLUSTERING Module statistics. These are NOW in the LEFTHAND-NETWORKS-NSM-STORAGE-MIB::storageRaidStats</p> <p>Also note, these storageRaidStats don't appear to give meaningful data for legacy NSM modules</p>
check_nsm_queuedepth	\$USER1\$/check_snmpx \$HOSTADDRESS\$ \$USER7\$ LEFTHAND-NETWORKS-NSM-STORAGE-MIB::storageRaidStatsQDepthTotal.0 \$ARG1\$ \$ARG2\$ "QueueDepth"
check_nsm_readios	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -P 2c -o LEFTHAND-NETWORKS-NSM-STORAGE-MIB::storageRaidStatsIOsRead.\$ARG1\$ -w 9999999999999999
check_nsm_readkbs	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -P 2c -o LEFTHAND-NETWORKS-NSM-STORAGE-MIB::storageRaidStatsKbytesRead.\$ARG1\$ -w 9999999999999999
check_nsm_readlatency	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -P 2c -o LEFTHAND-NETWORKS-NSM-STORAGE-MIB::storageRaidStatsIOLatencyRead.\$ARG1\$ -w 9999999999999999
check_nsm_writeios	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -P 2c -o LEFTHAND-NETWORKS-NSM-STORAGE-MIB::storageRaidStatsIOsRead.\$ARG1\$ -w 9999999999999999
check_nsm_writekbs	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -P 2c -o LEFTHAND-NETWORKS-NSM-STORAGE-MIB::storageRaidStatsKbytesWrite.\$ARG1\$ -w 9999999999999999
check_nsm_writelatency	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -P 2c -o LEFTHAND-NETWORKS-NSM-STORAGE-MIB::storageRaidStatsIOLatencyWrite.\$ARG1\$ -w 9999999999999999
Module Health Metrics	
check_nsm_batterycache	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -o LEFTHAND-NETWORKS-NSM-INFO-MIB::infoCacheBatteryStatus.1 -R normal
check_nsm_drivebay	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -o LEFTHAND-NETWORKS-NSM-STORAGE-MIB::storageDeviceStatus.\$ARG1\$ -R Active
check_nsm_fanstatus	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -o LEFTHAND-NETWORKS-NSM-INFO-MIB::infoFanStatus.\$ARG1\$ -R normal
check_nsm_manager	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -o LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusManagerStatus.\$ARG1\$ -R 1
check_nsm_powersupply	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -o LEFTHAND-NETWORKS-NSM-INFO-MIB::infoPowerSupplyStatus.\$ARG1\$ -R Normal
check_nsm_raid	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -o LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusModuleRaidStatus.\$ARG1\$ -R ok
check_nsm_storage	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -o LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusModuleStorageStatus.\$ARG1\$ -R 1
check_nsm_temp	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -o "LEFTHAND-NETWORKS-NSM-INFO-MIB::infoMotherboardTemperature.0" -w \$ARG1\$ -c \$ARG2\$ -l "Mainboard Temp" -C \$USER7\$ -u C



```
#!/bin/sh
#

results=$(/usr/local/groundwork/nagios/libexec/check_snmp -P 2c -H $1
-C $2 -o $3 -w$4 -c$5)
section1=$(echo "$results" | cut -d"|" -f1)
perfnm=$(echo "$results" |cut -d"=" -f2)

#echo "sec1=$section1"
#echo "First results are [$results]"

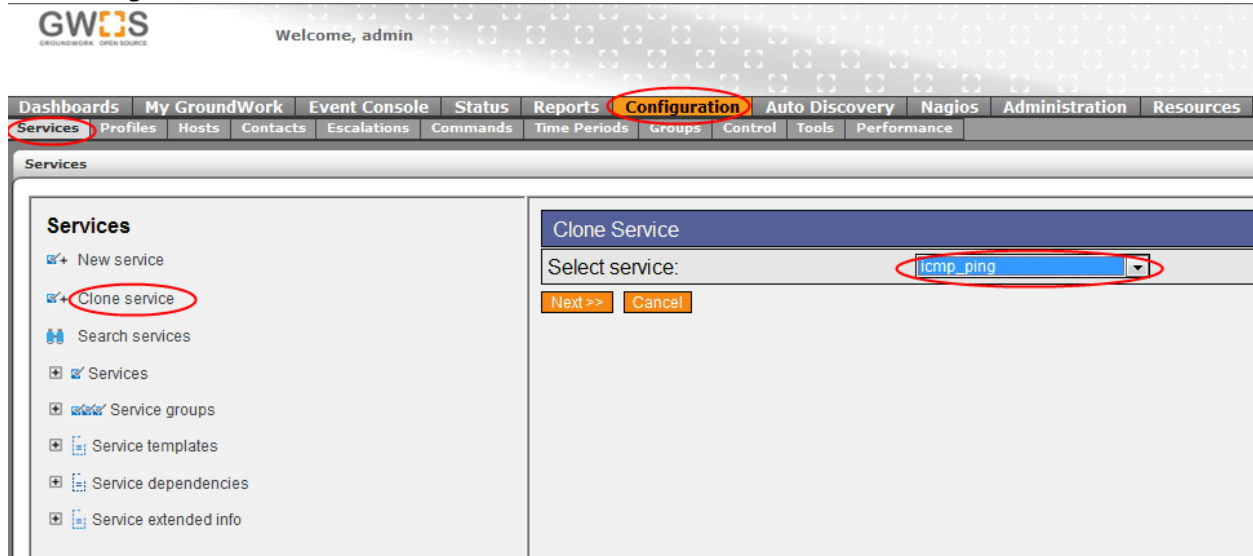
results=$(echo "$perfnm" | sed 's/^[ \t]*//;s/[ \t]*$//')
results=$(echo "$section1 | $6=$results;$4;$5;")

    echo "$results"
```

Save that file, and use `chmod +x check_snmp` to ensure it is executable.

Now we need to create Services to monitor Network Storage Modules (NSM) and Virtual Storage Appliances (VSA).

Click Configuration → Services → Clone Service



Select icmp_ping to clone from, click **Next >>**

Name the Service nsm_batterycache.

Select the Service Check Tab, and change the check command to the appropriate check_command. Also paste the proper usage into the Command Line, enter an NSM module into the HOST entry to test. Click **Test** to verify you have the correct syntax:

Manage Service	
Service Detail	Service Check
Service name: nsm_batterycache	
Service Check	
If you are satisfied with the check as inherited from the template, do nothing on this page. Otherwise uncheck the inherit checkbox and make the necessary changes. Use the test button to check the argument values, but bear in mind that the check command is run under the web servers account, so there may be issues with certain checks.	
Service template:	generic-service
<input type="checkbox"/> Inherit check from template	
Check command:	check_nsm_batterycache
Command definition:	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -o LEFTHAND-NETWORKS-NSM-INFO-MIB::infoCacheBatteryStatus.1 -R normal
Usage:	check_nsm_batterycache
Command line:	check_nsm_batterycache
Test:	<div style="border: 1px solid gray; padding: 5px;"> Host: 10.0.5.5 <pre> /usr/local/groundwork/nagios/libexec/check_snmp -H 10.0.5.5 -C tdsnmp -o LEFTHAND-NETWORKS-NSM-INFO-MIB::infoCacheBatteryStatus.1 -R normal SNMP OK - "normal" Command returned exit status 0 </pre> </div>
<input type="button" value="Test"/> <input type="button" value="Save"/>	

If the test results look normal then click

Do the same for the remaining NSM Health checks.

There is a slight difference for some of them. For any checks that have an instance (Power supply, disk drive bay etc, note the ARGUMENTS in the next example:

Manage Service	
Service Detail	Service Check
Service name: nsm_drivebay	
Service Check	
If you are satisfied with the check as inherited from the template, do nothing on this page. Otherwise uncheck the inherit checkbox and changes. Use the test button to check the argument values, but bear in mind that the check command is run under the web servers acc issues with certain checks.	
Service template: generic-service	
<input type="checkbox"/> Inherit check from template	
Check command:	check_nsm_drivebay
Command definition:	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -o LEFTHAND-NETWORK MIB::storageDeviceStatus.\$ARG1\$ -R Active
Usage:	check_nsm_drivebay!ARG1
Command line:	? check_nsm_drivebay!2
Test:	Host: 10.0.5.5
<pre> /usr/local/groundwork/nagios/libexec/check_snmp -H 10.0.5.5 -C tdsnmp -o LEFTHAND-NETWORKS-NSM-STORAGE-MIB::storageDeviceStatus.2 -R Active </pre>	
<div style="border: 1px solid black; padding: 5px;"> Test SNMP OK - "Active" Command returned exit status 0 </div>	

Note in the Usage field the ARG1. Arguments can be tested. Separate arguments with exclamation points '!'. In this example the \$ARG1\$ may be an integer representing the drive bay number. Valid numbers will depend on which model Storage model you have. This also works for VSAs, the drive bay represents the virtual disk.

Next we configure the services for NSM and Cluster performance statistics:
There are only a few slight differences from the services we created in the last steps.

Just like before, we Click Configuration → Services → Clone Service

Clone Service

Select service: icmp_ping_alive

Next >>
Cancel

However, this time select icmp_ping_alive to clone from, click Next >>

Name the Service lhc_readios.

There is one small difference. In the Service Detail tab you will notice that the Extended info template is set to "number_graph". This will be important later when we begin creating historical graphs.

Select the Service Check Tab, and change the check command check_cluster_readios. Also paste the proper usage into the Command Line, enter the IP address for a valid SAN/iQ cluster into the HOST entry to test. Click the Test Button:

Manage Service	
Service Detail	Service Check
Service name: lhc_readios	
Service Check	
If you are satisfied with the check as inherited from the template, do nothing on this page. Otherwise uncheck the inherit checkbox and make the necessary changes. Use the test button to check the argument values, but bear in mind that the check command is run under the web servers account, so there may be issues with certain checks.	
Service template: generic-service	
<input type="checkbox"/> Inherit check from template	
Check command:	check_cluster_readios
Command definition:	\$USER1\$/check_snmp -H \$HOSTADDRESS\$ -C \$USER7\$ -P 2c -o LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusClusterStatsIOsRead.\$ARG1\$ -w 999999999999999
Usage:	check_cluster_readios!ARG1
Command line:	check_cluster_readios!1
Test:	Host: 10.0.5.5
	<pre>/usr/local/groundwork/nagios/libexec/check_snmp -H 10.0.5.5 -C tdsnmp -P 2c -o LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusClusterStatsIOsRead.1 -w 999999999999999</pre>
<input type="button" value="Test"/>	<pre>SNMP OK - 495506286 LEFTHAND-NETWORKS-NSM-CLUSTERING-MIB::clusClusterStatsIOsRead.1=495506286c</pre> <p>Command returned exit status 0</p>
<input type="button" value="Save"/>	

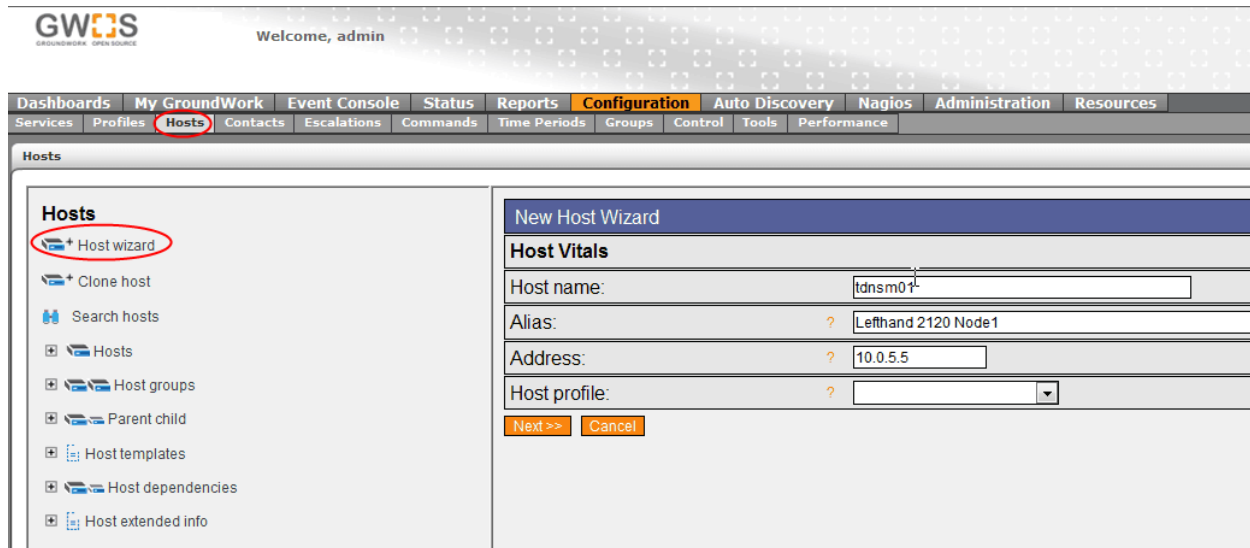
Notice the results are 495506286 operations. Not a particularly useful number at first glance. That is because this SNMP counter returns a TOTAL count of operations. In order to glean useful information we need to take readings at set intervals, determine the difference (delta), divide by the number of seconds in the delta, graph the results, and that gives you operations per seconds (IOPs). We will get the basic service checks working now, and configure graphing in part 3 of this series.

Click

Repeat the above steps, and create services for all the(cluster and module) performance counters. Use the following service names (and YES, the exact naming convention is very important. Stay with me and you will understand once we begin creating graphs!):

Cluster Services	Module services
lhc_readq	nsm_readios
lhc_readios	nsm_readkbs
lhc_readkbs	nsm_latency_rd
lhc_latency_rd	nsm_writeios
lhc_writeios	nsm_writekbs
lhc_writekbs	nsm_latency_wr
lhc_latency_wr	nsm_queue
lhc_writeq	

Now we are ready to Create our first Storage Host and start performing some monitoring. Click Configuration → Hosts → Host wizard



Enter one of your HP LeftHand Storage Nodes details in the wizard.

Click **Next >>**

New Host Wizard

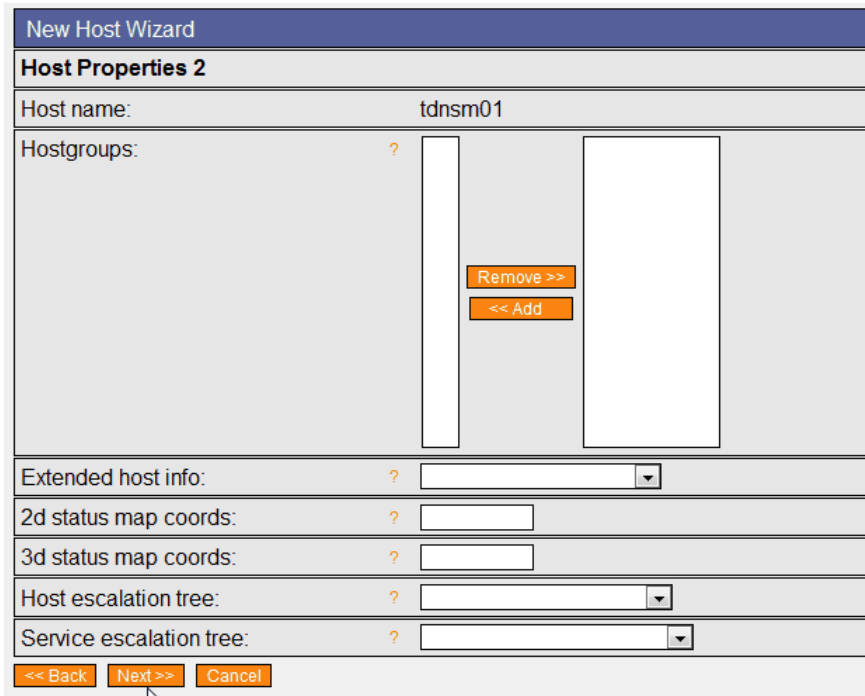
Host Properties 1

Host name:

Host template: ?

Parents: ?

Select "Generic-host" as the template and click



New Host Wizard

Host Properties 2

Host name:

Hostgroups:

Extended host info:

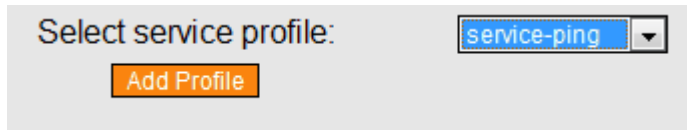
2d status map coords:

3d status map coords:

Host escalation tree:

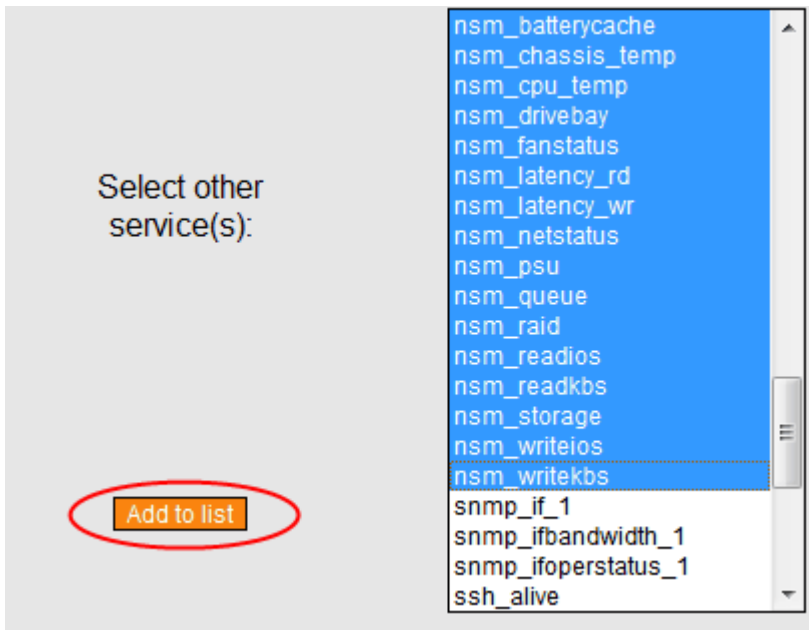
Service escalation tree:

If you've created Hostgroups you can place the host in the group, but we'll create those later and move the host (it's quite easy). Leave the rest of these defaults, and click



Select service profile:

Select service-ping profile and click Add Profile



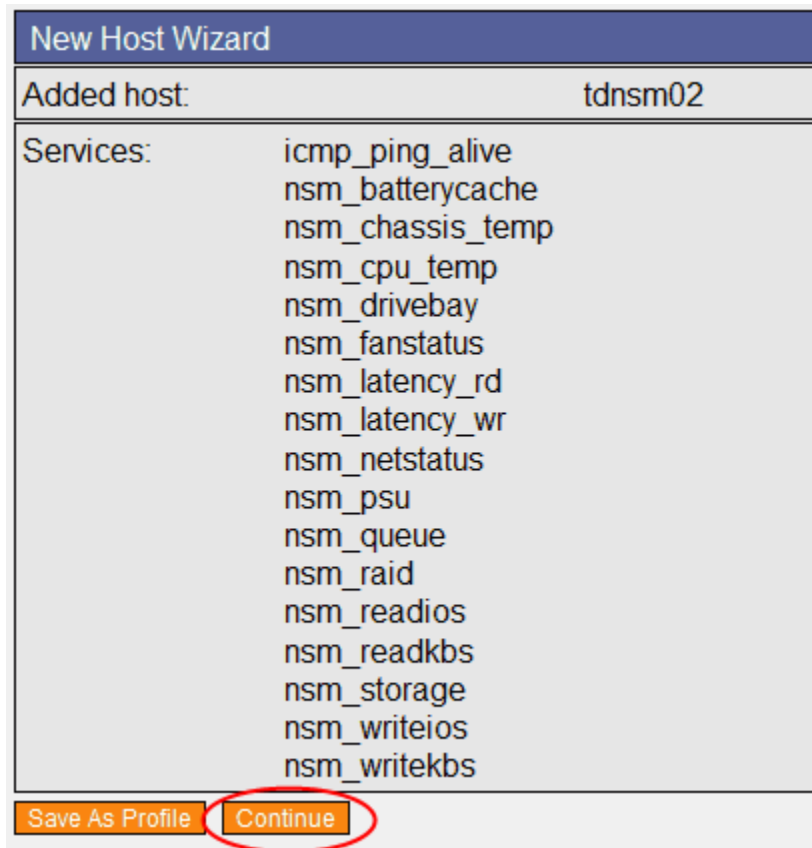
Select other service(s):

- nsm_batterycache
- nsm_chassis_temp
- nsm_cpu_temp
- nsm_drivebay
- nsm_fanstatus
- nsm_latency_rd
- nsm_latency_wr
- nsm_netstatus
- nsm_psu
- nsm_queue
- nsm_raid
- nsm_readios
- nsm_readkbs
- nsm_storage
- nsm_writeios
- nsm_writekbs
- snmp_if_1
- snmp_ifbandwidth_1
- snmp_ifoperstatus_1
- ssh_alive

Select all the lhnsm_services, and click "Add to list"

Review the Services added to the new

host and click **Continue**



New Host Wizard	
Added host:	tdnsm02
Services:	icmp_ping_alive nsm_batterycache nsm_chassis_temp nsm_cpu_temp nsm_drivebay nsm_fanstatus nsm_latency_rd nsm_latency_wr nsm_netstatus nsm_psu nsm_queue nsm_raid nsm_readios nsm_readkbs nsm_storage nsm_writeios nsm_writekbs
Save As Profile Continue	

Now Create a Hostgroup for our storage nodes to live in:

Hostgroup Properties	
Hostgroup name:	Storage
Alias:	? SAN and Storage Resources
Members:	? <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="border: 1px solid gray; padding: 5px;">tdnsm01</div> <div style="border: 1px solid gray; padding: 5px;">localhost</div> </div> <div style="margin-top: 5px; text-align: center;"> <input type="button" value="Remove >>"/> <input type="button" value="<< Add"/> </div>
Contact Groups:	? <div style="border: 1px solid gray; padding: 5px;">nagios admin</div>
Host escalation tree:	? <input type="text"/>
Service escalation tree:	? <input type="text"/>
<input type="button" value="Add"/> <input type="button" value="Cancel"/>	

Configuration → Hosts → Host Groups → New
 Select your newly created Host and
 to the Members list.

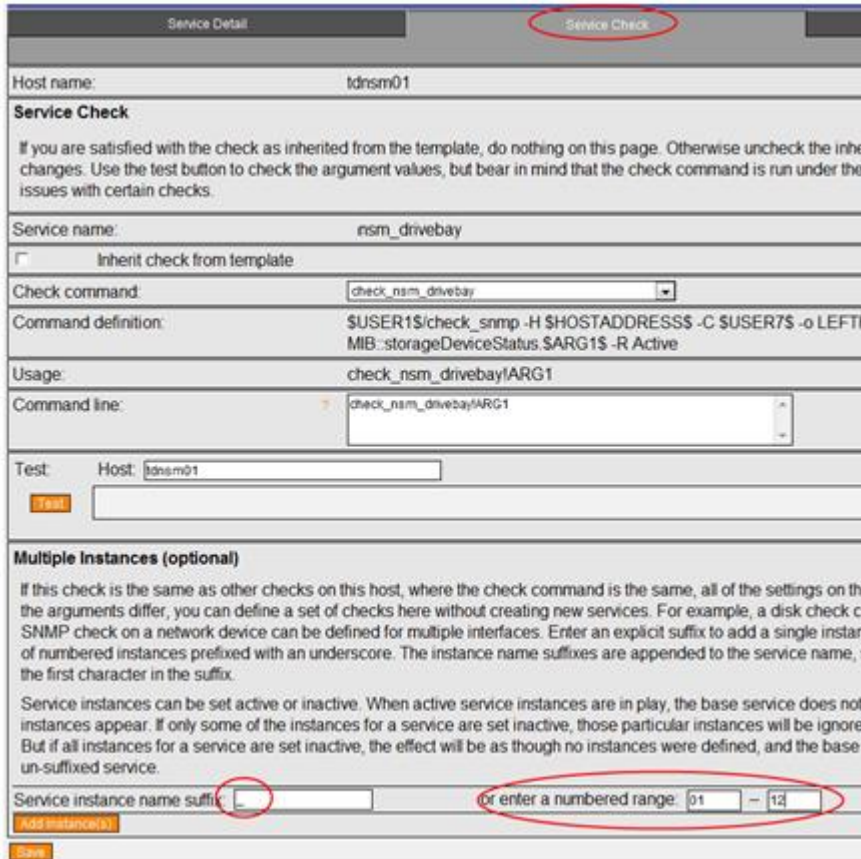
Click

Hosts

- Host wizard
- Clone host
- Search hosts
- Hosts
 - Storage
 - tdnsm01
 - Detail
 - icmp_ping_alive
 - nsm_batterycache
 - nsm_chassis_temp
 - nsm_cpu_temp
 - nsm_drivebay**
 - nsm_fanstatus
 - nsm_latency_rd
 - nsm_latency_wr

Now let's add the instances for some of the service checks for our SAN:

Configuration → Hosts → Storage → "Your SAN"
 → nsm_drivebay



On the Right Click the Service Check Tab and scroll down to "Multiple Instances"

Use an underscore for the instance name suffix, put a range for the number of drives. In this example a P4500 G1. It has 12 drives. Click **Add Instance(s)**

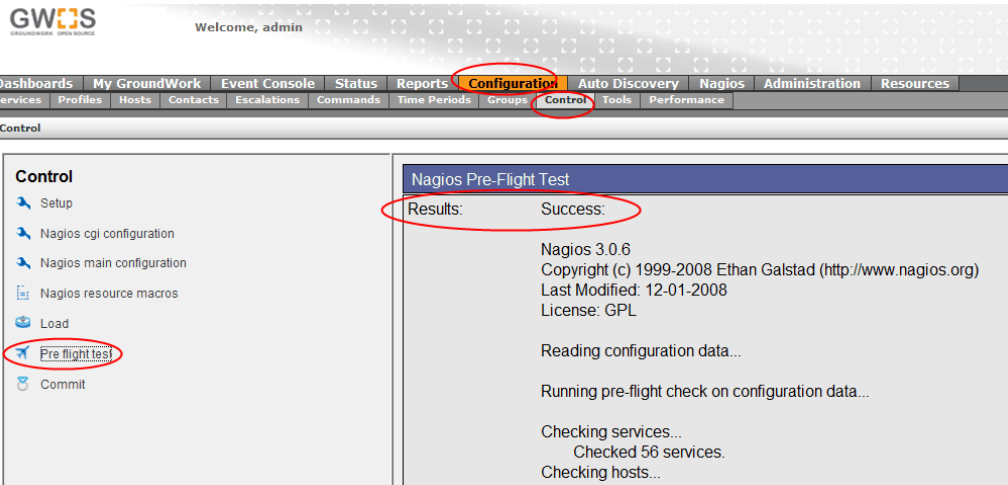
Instance Name Suffix	Status	Arguments
<input type="checkbox"/> _01	<input checked="" type="checkbox"/> Active	1
<input type="checkbox"/> _02	<input checked="" type="checkbox"/> Active	2
<input type="checkbox"/> _03	<input checked="" type="checkbox"/> Active	3
<input type="checkbox"/> _04	<input checked="" type="checkbox"/> Active	4
<input type="checkbox"/> _05	<input checked="" type="checkbox"/> Active	5
<input type="checkbox"/> _06	<input checked="" type="checkbox"/> Active	6
<input type="checkbox"/> _07	<input checked="" type="checkbox"/> Active	7
<input type="checkbox"/> _08	<input checked="" type="checkbox"/> Active	8
<input type="checkbox"/> _09	<input checked="" type="checkbox"/> Active	9
<input type="checkbox"/> _10	<input checked="" type="checkbox"/> Active	10
<input type="checkbox"/> _11	<input checked="" type="checkbox"/> Active	11
<input type="checkbox"/> _12	<input checked="" type="checkbox"/> Active	12

Now Modify the Instance names and Arguments to reflect as above. I like change 1,2,3 to 01,02,03 so they alphabetize in the right order.

When finished click **Save**

Do the same for fanstatus (in my case there were 4 instances)
Also for Powersupply (should be 2 instances)

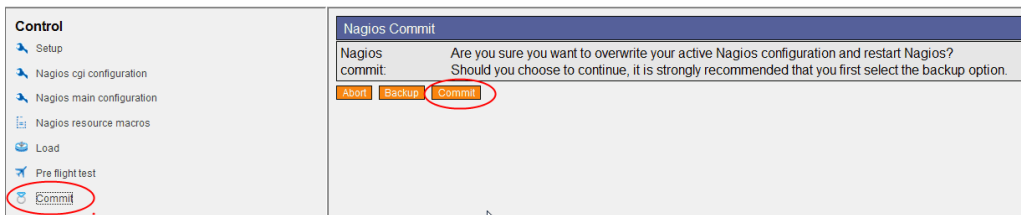
Remember to click **Save** after each change.



Now it's time to save changes, compile, and restart Nagios to begin monitoring!

Click Configuration → Control → Pre flight test

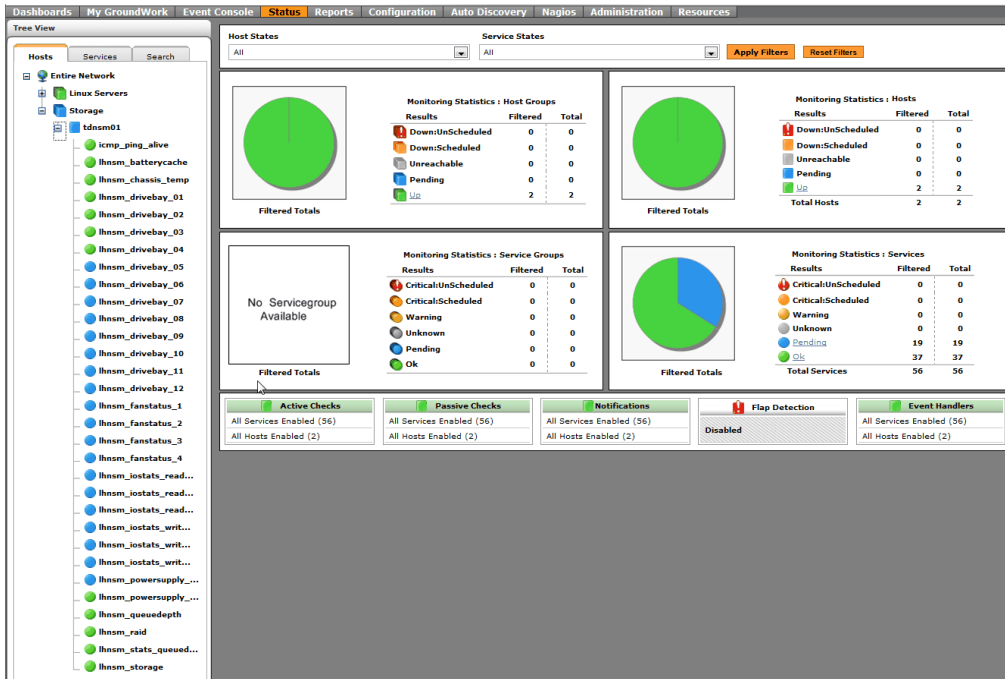
The pre Flight test makes sure none of your configuration has syntax errors or improper characters.



If you get Success, then click Commit to write changes to the Nagios database and restart services.

Once you have completed the Commit it is time to check your Status and wait for the checks to come in!

Click 



You will notice Blue indicates the service is still pending a check (wait a few moments and it should turn green). Green indicates the service is in an "Up" State. Yellow would indicate warning, Red Critical, and Grey indicates it was unable to get data.

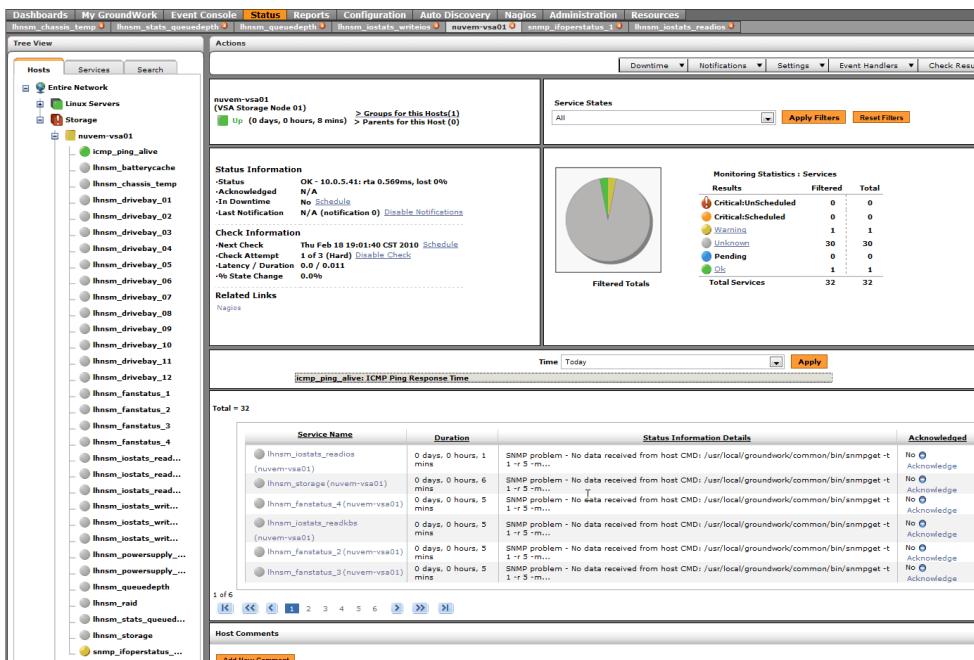
Clone Host

Host name:	nuvem-vs-a01
Alias:	VSA Storage Node 01
Address:	10.0.5.41
Host to clone:	tdnsm01

Clone Host
Cancel

Once you are satisfied that you have configured the service checks and instances the way you like, you can then use the clone host wizard to duplicate your efforts for additional storage modules (hosts) to make configuration easy!

Configuration → Hosts → Clone Host. Enter the details for your new host click Clone Host, and then Preflight Test and Commit. Then check the Status to see your results:



The screenshot shows the Nagios Groundwork interface. On the left is a tree view of the network topology. The main area displays the status of the host 'nuvem-vs-a01' (VSA Storage Node 01), which is 'Up'. It includes sections for Status Information, Check Information, and a table of service states. The service states table shows several 'SNMP problem' alerts for various services like 'snmp_ifoperstatus_1' through 'snmp_ifoperstatus_4'.

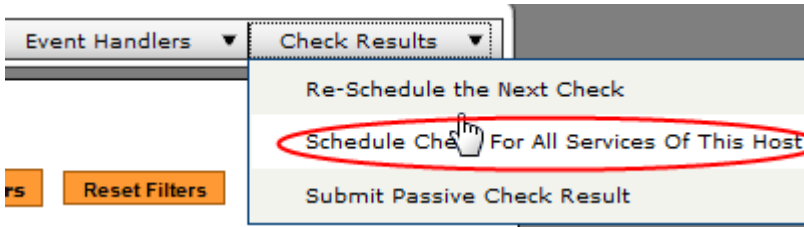
Service Name	Duration	Status Information Details	Acknowledged
lhnsm_justats_readios (nuvem-vs-a01)	0 days, 0 hours, 1 mins	SNMP problem - No data received from host CMD: /usr/local/groundwork/common/bin/snmpget-t 1-r 5 -m...	No <input type="radio"/> Acknowledge <input type="radio"/>
lhnsm_storage (nuvem-vs-a01)	0 days, 0 hours, 6 mins	SNMP problem - No data received from host CMD: /usr/local/groundwork/common/bin/snmpget-t 1-r 5 -m...	No <input type="radio"/> Acknowledge <input type="radio"/>
lhnsm_fanstatus_4 (nuvem-vs-a01)	0 days, 0 hours, 5 mins	SNMP problem - No data received from host CMD: /usr/local/groundwork/common/bin/snmpget-t 1-r 5 -m...	No <input type="radio"/> Acknowledge <input type="radio"/>
lhnsm_justats_readkbe (nuvem-vs-a01)	0 days, 0 hours, 5 mins	SNMP problem - No data received from host CMD: /usr/local/groundwork/common/bin/snmpget-t 1-r 5 -m...	No <input type="radio"/> Acknowledge <input type="radio"/>
lhnsm_fanstatus_2 (nuvem-vs-a01)	0 days, 0 hours, 5 mins	SNMP problem - No data received from host CMD: /usr/local/groundwork/common/bin/snmpget-t 1-r 5 -m...	No <input type="radio"/> Acknowledge <input type="radio"/>
lhnsm_fanstatus_3 (nuvem-vs-a01)	0 days, 0 hours, 5 mins	SNMP problem - No data received from host CMD: /usr/local/groundwork/common/bin/snmpget-t 1-r 5 -m...	No <input type="radio"/> Acknowledge <input type="radio"/>

So why are all my checks (except for ping) coming back grey?

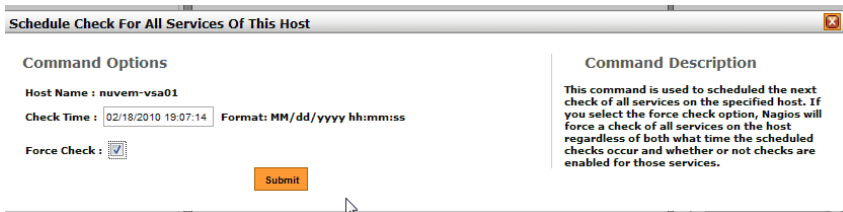
Status Information Details

SNMP problem - No data received from host CMD: /usr/local/groundwork/common/bin/snmpget-t 1-r 5 -m...

Look closer at the Status Details:



We are not receiving data from the host. In this case it is a simple fix. We forgot to add the nagios monitoring server IP to the SNMP access list on the HP LeftHand CMC. After fixing the CMC go back to groundwork. In the Status window click on the host. Then Select the Check Results dropdown.



Check the Force Check and then Submit

The default interval for service checks is 10 minutes. If you want a more immediate refresh the method above will request a recheck.

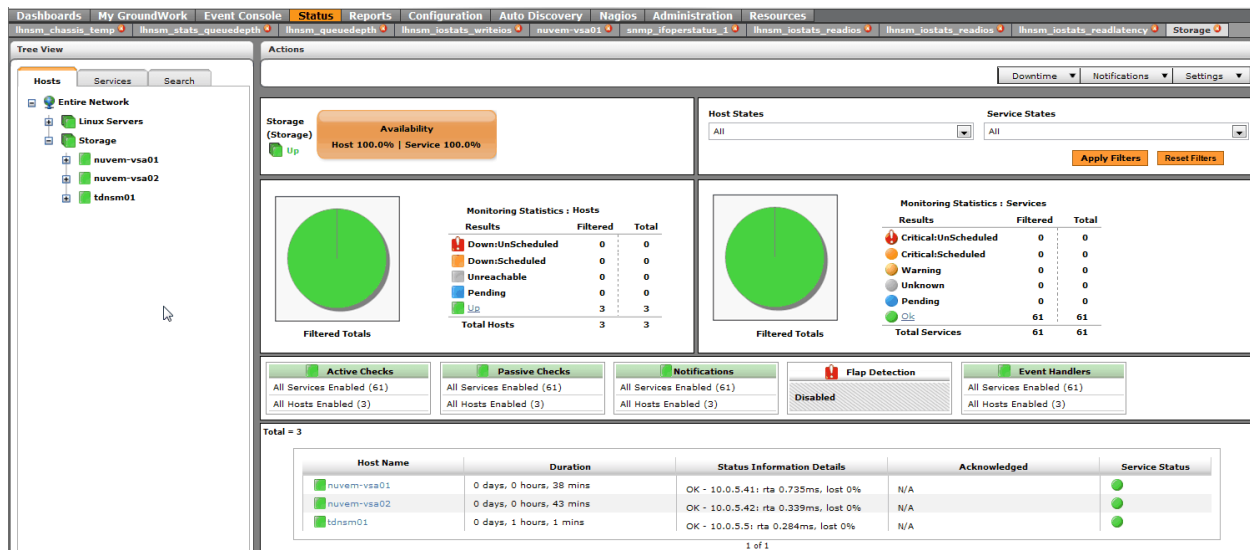
Instance Name Suffix	Status	Arguments
<input checked="" type="checkbox"/> _11	<input checked="" type="checkbox"/> Active	/11
<input type="checkbox"/> _01	<input checked="" type="checkbox"/> Active	/1
<input type="checkbox"/> _02	<input checked="" type="checkbox"/> Active	/2
<input type="checkbox"/> _03	<input checked="" type="checkbox"/> Active	/3
<input checked="" type="checkbox"/> _04	<input checked="" type="checkbox"/> Active	/4
<input checked="" type="checkbox"/> _05	<input checked="" type="checkbox"/> Active	/5
<input checked="" type="checkbox"/> _06	<input checked="" type="checkbox"/> Active	/6
<input checked="" type="checkbox"/> _07	<input checked="" type="checkbox"/> Active	/7
<input checked="" type="checkbox"/> _08	<input checked="" type="checkbox"/> Active	/8
<input checked="" type="checkbox"/> _09	<input checked="" type="checkbox"/> Active	/9
<input checked="" type="checkbox"/> _10	<input checked="" type="checkbox"/> Active	/10
<input checked="" type="checkbox"/> _12	<input checked="" type="checkbox"/> Active	/12

Remove Instance(s) Check All Uncheck All Save

To remove the extra drivebay instances, click `lhnsm_drivebay`, select the Services Check tab:

Select the offending instances, click **Remove Instance(s)** and then **Save**.

Perform a Preflight Test and **Commit**. Then check the Status to see your results again:



The screenshot shows the Nagios Status page with the following monitoring statistics:

Monitoring Statistics : Hosts		
Results	Filtered	Total
Down:UnScheduled	0	0
Down:Scheduled	0	0
Unreachable	0	0
Pending	0	0
Up	3	3
Total Hosts	3	3

Monitoring Statistics : Services		
Results	Filtered	Total
Critical:UnScheduled	0	0
Critical:Scheduled	0	0
Warning	0	0
Unknown	0	0
Pending	0	0
OK	61	61
Total Services	61	61

Host Name	Duration	Status Information Details	Acknowledged	Service Status
nuvem-vsa01	0 days, 0 hours, 38 mins	OK - 10.0.5.41: rta 0.735ms, lost 0%	N/A	OK
nuvem-vsa02	0 days, 0 hours, 43 mins	OK - 10.0.5.42: rta 0.339ms, lost 0%	N/A	OK
tdnsm01	0 days, 1 hours, 1 mins	OK - 10.0.5.5: rta 0.284ms, lost 0%	N/A	OK

Green means Go!



Groundwork monitoring for HP Lefthand P4000 SANs Author: Paul Drangeid | <http://www.tdonline.com>

In Upcoming parts we will cover these additional topics:

Creating Graphs based on collected Data

Create Service Checks for Cluster Level resources

Configuring Notification for Warning and Critical Thresholds

Tracking Volume performance statistics and usage (snapshots etc)

Tracking total cluster usage

Updates and additions to this document series will be posted here:

<http://www.tdonline.com/training/lefthand/>