



Purpose

This document describes how to use the SNMP Walk Wizard, it briefly explains SNMP and how to reference a MIB file or OID. SNMP is the acronym for Simple Network Management Protocol. An SNMP Walk is when the Nagios XI server scans a device to see what SNMP objects are available for monitoring.

Target Audience

This document is intended for use by Nagios Administrators that want to monitor SNMP devices using an SNMP Walk to discover it's available objects.

SNMP Walk Explained

An SNMP Walk refers to an operating system program that queries a device to see what SNMP objects are available for monitoring.

If you perform an SNMP Walk on a Linux Operating system you will receive 3500+ results, which is probably more than what you need. So how exactly do you know what is available on your device to be monitored, without seeing 3500+ results? Before that can be answered, a brief SNMP explanation is required (*without getting too involved*):

- SNMP is based on Object Identifiers (OIDs),
 - This is an unambiguous persistent name like 1.3.6.1.4.1.343
 - Explained clearly on Wikipedia: https://en.wikipedia.org/wiki/Object_identifier
 - Numbers like that are not easy to identify what they are for
- Management Information Base (MIB)
 - A MIB is a database that correlates OIDs to an understandable format
 - A manufacturer of a device like a router or UPS can provide you with a MIB file that explains what SNMP OIDs are available on that device

Your Nagios XI server has the SNMP modules installed on it and comes with the standard MIB files that are bundled with the SNMP modules. These MIB files are a collection of the most common generic objects that are implemented in devices running SNMP.

Going back to the question posed earlier, how exactly do you know what is available on your device to be monitored, without seeing 3500+ results? The manufacturer of your device will normally make available a MIB file that is specific for that device. The manufacturers MIB file provides detailed information on the SNMP objects that this device allows you to query.

For this documentation to be easily understood, we are going to use one of the MIB files that comes with the Nagios XI server. By using this MIB file you will be able to reproduce what this documentation is demonstrating and then you will be able to understand a MIB file for your specific device.

Managing MIB Files

Nagios XI has a dedicated section for managing MIB files. Navigate to **Admin > System Extensions > Manage MIBs**.

The screenshot shows the Nagios XI web interface. The top navigation bar includes 'Home', 'Views', 'Dashboards', 'Reports', 'Configure', 'Tools', 'Help', and 'Admin' (circled). The left sidebar lists various system management options, with 'Manage MIBs' circled. The main content area is titled 'Manage MIBs' and contains the following elements:

- A checkbox labeled 'Check this box if this server uses the **SNMP Trap Interface**'.
- An 'Upload a MIB' section with a 'Browse...' button, a 'Process traps' checkbox, and an 'Upload MIB' button.
- A row of action buttons: 'View File Permissions', 'Process All Traps', 'Undo All Trap Processing', and 'View All Associated Traps'.
- A table listing installed MIB files:

MIB	First Uploaded	Status	Date Processed	# Assoc Traps	Actions
AGENTX-MIB	2019-09-27 08:20:47	Uploaded	N/A	0	
BRIDGE-MIB	2019-09-27 08:20:47	Uploaded	N/A	0	

You can use the **Browse** and **Upload MIB** buttons to upload your own MIBs. Understanding how to read a MIB file can help you get the most out of the SNMP Walk wizard, however it's not required knowledge at this

point. The [Understanding MIB Files And Objects](#) section in this documentation does explain how to read a MIB file which may be of some help.

SNMP Walk Wizard

In Nagios XI navigate to **Configure > Configuration Wizards** and select the **SNMP Walk** wizard. In the following screenshot you can see how the search field allows you to quickly find a wizard.

The screenshot shows the Nagios XI interface. The top navigation bar includes Home, Views, Dashboards, Reports, **Configure**, Tools, Help, and Admin. The left sidebar has a 'Configure' section with 'Configuration Wizards' selected. The main content area is titled 'Configuration Wizards - Select a Wizard' and features a search bar with 'SNMP Walk' entered. A list of wizards is displayed, with 'SNMP Walk' highlighted. The description for the selected wizard is 'Scan an SNMP-enabled device for elements to monitor.'

On Step 1 you will be asked to supply the **address** of the device you will run the SNMP Walk against as well as the port.

You need to select the appropriate **SNMP Version**, this screenshot shows SNMP v2c settings.

Nagios XI has some limitations on the characters allowed in the SNMP Community field, please refer to this KB article for more information:

[Nagios XI - Special Characters](#)

The screenshot shows the 'Configuration Wizard: SNMP Walk - Step 1' interface. It is divided into two sections: 'SNMP Information' and 'SNMP Authentication'.
 Under 'SNMP Information':
 - Device Address: 10.25.13.15 (The IP address or fully qualified DNS name of the server or device you'd like to monitor.)
 - Device Port: 161 (The port on which the SNMP device is listening.)
 Under 'SNMP Authentication':
 - SNMP Version: 2c (The SNMP protocol version used to communicate with the device.)
 - SNMP Community: Str0ngC0mmunity (The SNMP community string used to query the device.)

This screenshot shows SNMP v3 settings.

Nagios XI has some limitations on the characters allowed in the Password fields, please refer to this KB article for more information: [Nagios XI - Special Characters](#)

The device being used in this documentation is a CentOS 7 server that is accepting SNMP requests. This is purely to make this documentation reproducible for you to test. For detailed instructions on how to configure CentOS 7 to accept SNMP requests please refer to the following documentation: [Monitoring Linux Using SNMP](#)

The final settings available are the **SNMP Scan Settings**. These are optional settings however to demonstrate the capabilities of the wizard we'll choose some options.

The **MIBs** list allows you to limit the results of your scan to one or more MIB files. In this example I have chosen the `HOST-RESOURCES-MIB` file.

We are also going to further limit the results by only selecting objects under the `host.hrSystem` MIB tree, more information on this can be located in the [Understanding MIB Files And Objects](#) section of this documentation. Click **Next** to progress to step 2.

SNMP Authentication

SNMP Version:

The SNMP protocol version used to communicate with the device.

Security Level:

Username:

Authentication Password:

Authentication Protocol:

Privacy Password:

Privacy Protocol:

SNMP Scan Settings

Specify some specifics to narrow down the SNMP scan results.

MIBs: [Add another MIB](#)

Select MIBs whose OIDs you want to see. By default, if no MIBs selected, the scan will show all OIDs for all MIBs.

SNMP Advanced Scan Settings

Specify advanced settings for the SNMP scan. Adjusting these settings is **optional**.

OID:

The top-level OID to use for scanning. If empty, by default, it will scan "private" which should work for most MIBs.

Timeout:

The maximum number of seconds to wait for the SNMP scan to complete.

Max Results:

The maximum number of results to process from the SNMP scan.

[◀ Back](#)

[Next ▶](#)

When you proceed to Step 2, the wizard will perform the SNMP Walk against the device based on the settings you provided on Step 1.

Make sure the **Host Name** field is has a value that easily identifies this device.



Configuration Wizard: SNMP Walk - Step 2

Device Details

Device Address: 10.25.13.15



Host Name: 10.25.13.15
The name you would like to have associated with this server or device.

The results of the SNMP Walk will be displayed in a table with various fields. The following screenshots show two different objects selected to be monitored.

SNMP Services

Select the OIDs you'd like to monitor via SNMP.

Currently showing OIDs related to the following MIBs: **HOST-RESOURCES-MIB**

Select	MIB	OID	Type	Current Value	
<input checked="" type="checkbox"/>	HOST-RESOURCES-MIB	hrSystemUptime.0	Timeticks	(489056) 1:21:30.56	
	Display Name	Data Label ?	Data Units ?	Match Type	Thresholds ?
	System Uptime			Numeric	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"></div> <div style="margin-right: 10px;">860000</div> <div style="margin-right: 10px;"></div> <div>860000</div> </div>

In the screenshot above, the `hrSystemUptime.0` OID has been selected to be monitored.

- The checkbox in the left column is how you select this item to be monitored
- The **Display Name** field has been populated with **System Uptime**, this is how the service will be named
- `hrSystemUptime.0` is a measurement of timeticks, $8600000 = 1$ day in timeticks.
- This service is being created so that it will go into a critical state when the device has been operating for less than one day, hence it has less than `8600000` timeticks. To do this:
 - Match Type = **Numeric**
 - Warning and Critical Range = `8600000:0`

More information on warning and critical thresholds can be found on the Nagios Plugin Development Guidelines page:

<https://nagios-plugins.org/doc/guidelines.html#THRESHOLDFORMAT>

Here is another example that demonstrates checking a string.

SNMP Services

Select the OIDs you'd like to monitor via SNMP.

Currently showing OIDs related to the following MIBs: **HOST-RESOURCES-MIB**

Select	MIB	OID	Type	Current Value
<input checked="" type="checkbox"/>	HOST-RESOURCES-MIB	<input type="text" value="hrSystemInitialLoadParameters.0"/>	STRING	"BOOT_IMAGE=/vmlinuz-3.10.0-693.2.2.el7.x86_64 root=/dev/mapper/centos-root ro rd.lvm.lv=centos/swap vconsole.font=latacyrheb-su"
Display Name	Data Label	Data Units	Match Type	Thresholds
<input type="text" value="Boot Image"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="String"/>	<input type="text" value="-3.10.0-693.2.2.el7.x86_64"/>

In the screenshot above, the `hrSystemInitialLoadParameters.0` OID has been selected to be monitored.

- The purpose of this example is to demonstrate how you can check a string to ensure it is set to the correct value. You might have strict change controls in place and want to make sure a specific Linux boot image has been used to boot the operating system.
 - Match Type = **String**
 - String To Match = `vmlinuz-3.10.0-693.2.2.el7.x86_64`

With these options, if the boot image changes the service will go into a critical state.

Once you've finished selecting all the items you wish to monitor click **Next** and then complete the wizard by choosing the required options in Step 3 - Step 5.

To finish up, click on **Finish** in the final step of the wizard. This will create the new hosts and services and begin monitoring.

Once the wizard applies the configuration, click the **View status details for <your device>** link to see the new host and services that were created.

Host	Service	Status	Duration	Attempt	Last Check	Status Information
10.25.13.15	Boot Image	Ok	N/A	1/5	2019-10-09 11:22:16	SNMP OK - "BOOT_IMAGE=/vmlinuz-3.10.0-693.2.2.el7.x86_64 root=/dev/mapper/centos-root ro rd.lvm.lv=centos/swap vconsole.font=latarcyrheb-su"
	System Uptime	Ok	N/A	1/5	2019-10-09 11:22:18	SNMP OK - 539882398


Here are those same services after the SNMP device was rebooted after the latest updates were installed:

Host	Service	Status	Duration	Attempt	Last Check	Status Information
10.25.13.15	Boot Image	Critical	5s	1/5	2019-10-09 11:29:03	SNMP CRITICAL - "**BOOT_IMAGE=/vmlinuz-3.10.0-957.27.2.el7.x86_64 root=/dev/mapper/centos-root ro rd.lvm.lv=centos/swap vconsole.font=latarcyrheb-s**"
	System Uptime	Critical	4m 15s	4/5	2019-10-09 11:27:57	CRITICAL - Plugin timed out while executing system call

This demonstrates how the thresholds defined when running the wizard can generate alerts.

This completes configuring Nagios XI to monitor a device using the SNMP Walk wizard.

Understanding MIB Files And Objects

In this documentation we used the `HOST-RESOURCES-MIB` MIB file to limit the SNMP walk. From the [Manage MIBs Page](#) you can locate this file in the list and then click the **Download**  icon. You will be prompted to download the file, once downloaded open the file in a text editor like Notepad.

The contents of the MIB file will be explained shortly, but first a screenshot from the SNMP Walk wizard to understand what the next topic will be about.

SNMP Advanced Scan Settings

Specify advanced settings for the SNMP scan. Adjusting these settings is **optional**.

OID:

The top-level OID to use for scanning. If empty, by default, it will scan "private" which should work for most MIBs.

On Step 1 of the wizard there is a field labeled **OID** and is not populated by default. When this field is empty the wizard will scan for all private OIDs on the device however this may yield more results than necessary. In the example above you can see the value `host.hrSystem` has been used to define where the scan will begin in the MIB tree.

Understanding what value to populate in this field is where the MIB file comes into play. When you look at the MIB file, any line that contains "OBJECT IDENTIFIER ::= " will start with a label that identifies a hierarchical level in the MIB tree. Here are some examples:

```
host          OBJECT IDENTIFIER ::= { mib-2 25 }
hrSystem      OBJECT IDENTIFIER ::= { host 1 }
hrStorage     OBJECT IDENTIFIER ::= { host 2 }
```

Generally, but not always, the objects in the file are hierarchical as the file continues. In the curly brackets to the right is an identification as to which object this one resides under. You can see that `hrSystem` resides under the `host` object, the same as how the `host` object resides under the `mib-2` object.

In the wizard, the object can be referenced different ways, such as:

```
hrSystem
host.hrSystem
mib-2.host.hrSystem
host
mib-2.host
```


When the SNMP Walk is performed, the MIB files on your Nagios XI server are searched for the requested object. When it finds that object it will then execute the SNMP Walk. As you can imagine, using an object like `host` may exist in different MIB files and you might not get the desired results. Whereas `mib-2.host` is more specific and likely to query the correct objects.

When looking at the MIB file you will have noticed that it's not that easy to read, for example:

```
hrSystemUptime OBJECT-TYPE
    SYNTAX      TimeTicks
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The amount of time since this host was last
        initialized. Note that this is different from
        sysUpTime in the SNMPv2-MIB [RFC1907] because
        sysUpTime is the uptime of the network management
        portion of the system."
 ::= { hrSystem 1 }
```

If you want to get a list of all the objects in a MIB file you can execute a command to do this. All of the MIB files are located in the `/usr/share/snmp/mibs` directory.

Establish a terminal session to your Nagios XI server and execute the following command:

```
snmptranslate -Ts -m /usr/share/snmp/mibs/HOST-RESOURCES-MIB.txt
```

Here is an extract from that output:

```
.iso.org.dod.internet.mgmt.mib-2.host
.iso.org.dod.internet.mgmt.mib-2.host.hrSystem
```

```
.iso.org.dod.internet.mgmt.mib-2.host.hrSystem.hrSystemUptime  
.iso.org.dod.internet.mgmt.mib-2.host.hrSystem.hrSystemDate
```

An OID can also be specified in the wizard, you can get a list of all OIDs by executing the following command:

```
snmptranslate -Tz -m /usr/share/snmp/mibs/HOST-RESOURCES-MIB.txt
```

Here is an extract from that output:

```
"host"                "1.3.6.1.2.1.25"  
"hrSystem"           "1.3.6.1.2.1.25.1"  
"hrSystemUptime"    "1.3.6.1.2.1.25.1.1"  
"hrSystemDate"      "1.3.6.1.2.1.25.1.2"
```

This completes the section on understanding MIB files and objects.

Finishing Up

This completes the documentation on using the SNMP Walk wizard in Nagios XI.

If you have additional questions or other support related questions, please visit us at our Nagios Support Forums:

<https://support.nagios.com/forum>

The Nagios Support Knowledgebase is also a great support resource:

<https://support.nagios.com/kb>