Purpose

This document describes how to configure Nagios XI to monitor Apache Cassandra distributed database implementations in order to ensure that data, as well as the hardware housing it, is operating properly.

Target Audience

This document is intended for use by Nagios XI Administrators who wish to configure Nagios XI to monitor Apache Cassandra distributed databases.

What is Apache Cassandra?

Apache Cassandra is an open source distributed database management system designed to handle large amounts of data across many commodity servers, providing high availability with no single point of failure. Cassandra offers robust support for clusters spanning multiple data centers, with asynchronous master-less replication allowing low latency operations for all clients.

Prerequisite

The monitoring plugin used in this documentation will be executed on the Cassandra server. This means that the NRPE agent will need to be installed on your Cassandra server(s). This documentation assumes that you have installed NRPE as per the following documentation:

Installing The XI Linux Agent

Editing Files

In steps of this documentation you will be required to edit files. This documentation will use the vi text editor. When using the vi editor:

- To make changes press `i` on the keyboard first to enter insert mode

- Press `Esc` to exit insert mode

- When you have finished, save the changes in vi by typing `:wq` and press Enter

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Cassandra Monitoring Plugin

This document uses the plugin **Check Cassandra Status and Heap Memory**.

Memory Heap and Other Metrics Retrievable Through JMX:

- https://exchange.nagios.org/directory/Plugins/Java-Applications-and-Servers/Check-Cassandra-status-and-heap-memory-utilization/details

- The plugin checks to see that the node is UP, if it is DOWN it will return a CRITICAL status

- The plugin checks the memory heap utilization, a WARNING status at 85% and CRITICAL at 95%

This plugin requires the `nodetool` utility, which is usually installed on your Cassandra server. To make sure it exists, execute the following command on your Cassandra server:


```
nodetool status
```


You should receive output like the following:


```
Datacenter: dc1
===============
Status=Up/Down
|/ State=Normal/Leaving/Joining/Moving
    Address       Load        Tokens    Owns (effective)    Host ID                                  Rack
UN  10.25.7.31  269.32 KB    256        64.9%               5da540c1-d97f-43b9-aaf5-2a823e009eae   rack1
UN  10.25.7.33  264.23 KB    256        71.5%               0fef2f3f-aef2-4b93-80ae-60fd6c30ca66   rack1
UN  10.25.7.32  268.69 KB    256        63.6%               43de786f-dfe8-4c6e-8239-6b2ef111a755   rack1
```

Download The Plugin And Test

The first step is to download and test the plugin. Establish a terminal session to your Cassandra server and execute the following commands:

```
cd /usr/local/nagios/libexec
```

The next command is all one line, it's too long for the document so it wraps onto two lines. It's important that the "double quotes" are used and the -O is a capital "oh":

```
wget "https://exchange.nagios.org/components/com_mtree/attachment.php?
link_id=3819&cf_id=24" -O cassandra.pl
```

Now execute these commands to correctly set permissions:

```
chmod +x cassandra.pl
chown nagios:nagios cassandra.pl
```

Now test that the plugin works, to do so execute the following command:

```
./cassandra.pl
```

You should see output similar to:

```
CASSANDRA OK -  | heap_mem=8.01
```

If you receive output similar to the following:

```
CASSANDRA CRITICAL -  cannot run /usr/share/cassandra/bin/nodetool;
```

It just means the plugin is pointing to the wrong location for the `nodetool` program. To fix the problem, execute this command to locate nodetool:

```
find / -name nodetool
```

Which should output something like:

```
/usr/bin/nodetool
```

You will need to edit the `cassandra.pl` file and change this line (line 53):

```
my $nodetool_path        = '/usr/share/cassandra/bin/nodetool';
```

In this example, the line would be changed to:

```
my $nodetool_path        = '/usr/bin/nodetool';
```

Once you've done that, execute `cassandra.pl` and you should see output similar to:

```
CASSANDRA OK -   | heap_mem=8.01
```

Great, the plugin works. As explained earlier, the plugin has default thresholds for the heap memory usage. If you wanted to try other values, the following arguments can be used:

```
./cassandra.pl --heap_w 5 --heap_c 95
```

In this example it outputs the following:

```
CASSANDRA WARNING - WARNING: 8% heap used; | heap_mem=8.05
```

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The warning threshold I used on the example was not at all realistic, it was just used to demonstrate how the plugin thresholds can be defined.

Configure NRPE

In order for Nagios XI to execute this plugin, you need to define a command for this plugin in the `nrpe.cfg` on the Cassandra server. Edit the `/usr/local/nagios/etc/nrpe.cfg` file by executing the following command:

```
vi /usr/local/nagios/etc/nrpe.cfg
```

Add the following line to the end of the file:

```
command[cassandra]=/usr/local/nagios/libexec/cassandra.pl $ARG1$
```

After saving these changes, restart the `xinetd` service on the Cassandra Server (or the nrpe service if you compiled from source) by running the following command.

```
service xinetd restart
```

Now to test the check from the XI server. Establish a terminal session to your Nagios XI server and execute the following command, making sure to replace *<cassandra_server_ip>* with the IP address of your Cassandra server:

```
/usr/local/nagios/libexec/check_nrpe -H <cassandra_server_ip> -c cassandra
```

You should see output similar to:

```
CASSANDRA OK -  | heap_mem=7.21
```

If you receive that output then everything is working. If you wanted to pass your own thresholds then the command to execute would be as follows:
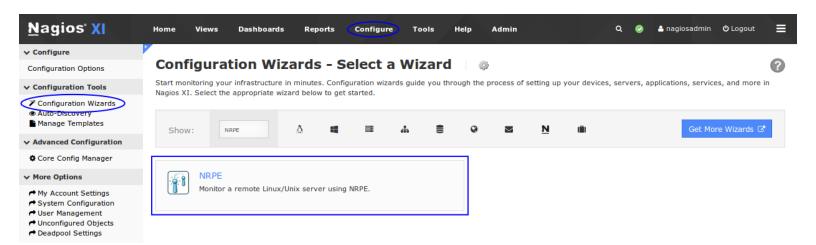
```
/usr/local/nagios/libexec/check_nrpe -H 10.25.7.31 -c cassandra -a '--heap_w 5 --heap_c 95'
```

Now that NRPE has been configured correctly on your Cassandra server the next step is to create the monitoring configuration in Nagios XI.

Create Nagios Monitoring Objects

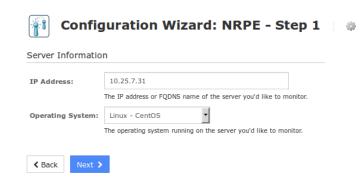In this example you will use the NRPE Configuration Wizard which will create the host and service objects. Navigate via the top menu bar to **Configure** > **Run a configuring wizard** and select the **NRPE** wizard. In the following screenshot you can see how the search field allows you to quickly find a wizard.

On Step 1 you will be asked to supply the **address** of the Cassandra server.

You will also have to select the **Operating System**, in this case it is CentOS.

Click Next to progress to step 2.

On step 2 you will configure all of the options for monitoring.

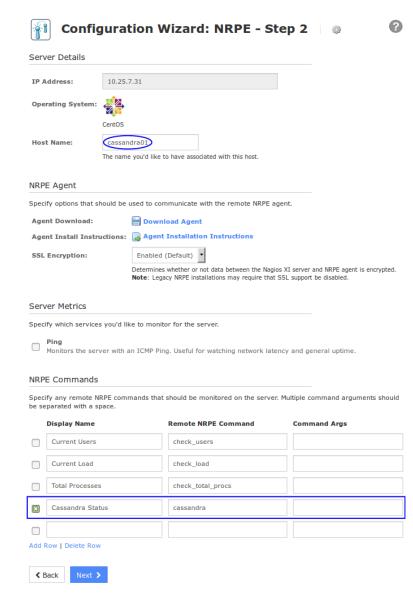To start off with make sure a valid Host Name has been entered.

The NRPE Agent section can be ignored because you have already installed it.

The NRPE wizard allows you to specify which NRPE commands should be executed and monitored and what display name (service description) should be associated with each command.

In the screenshot to the right you can see the command has been defined for the `cassandra` check.

If you wanted to supply your own thresholds, you would type them in the Command Args field, for example:

```
--heap_w 5 --heap_c 95
```
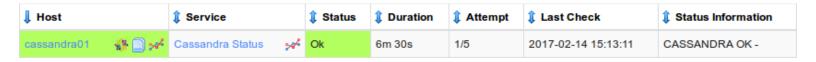
Click Next and then complete the wizard by choosing the required options in Step 3 - Step 5.

To finish up, click on **Finish** in the final step of the wizard.

This will create the new hosts and service and begin monitoring.

Configuration Wizard: NRPE - Step 2

Server Details

IP Address: 10.25.7.31

Operating System: CentOS

Host Name: cassandra01
The name you'd like to have associated with this host.

NRPE Agent

Specify options that should be used to communicate with the remote NRPE agent.

Agent Download: Download Agent
Agent Install Instructions: Agent Installation Instructions
SSL Encryption: Enabled (Default)
Determines whether or not data between the Nagios XI server and NRPE agent is encrypted. **Note:** Legacy NRPE installations may require that SSL support be disabled.

Server Metrics

Specify which services you'd like to monitor for the server.

☐ Ping
Monitors the server with an ICMP Ping. Useful for watching network latency and general uptime.

NRPE Commands

Specify any remote NRPE commands that should be monitored on the server. Multiple command arguments should be separated with a space.

	Display Name	Remote NRPE Command	Command Args
☐	Current Users	check_users	
☐	Current Load	check_load	
☐	Total Processes	check_total_procs	
☒	Cassandra Status	cassandra	
☐			

Add Row | Delete Row

‹ Back | Next ›

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

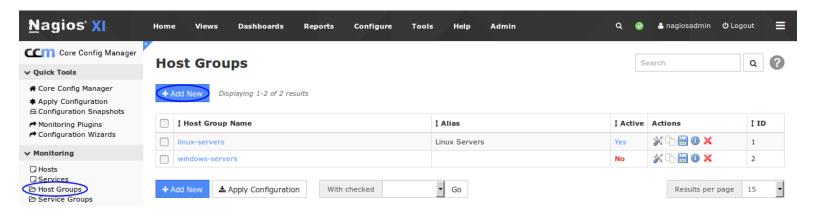| ↓ Host	↕ Service	↕ Status	↕ Duration	↕ Attempt	↕ Last Check	↕ Status Information
cassandra01	Cassandra Status	Ok	6m 30s	1/5	2017-02-14 15:13:11	CASSANDRA OK -

You are now monitoring your Cassandra server, it's as simple as that.

Advanced Nagios Monitoring Configuration

Apache Cassandra is a distributed database, it's likely that you are going to have more than just one Cassandra server that you want to monitor. Instead of repeating those steps for each Cassandra server, you can use a Nagios advanced configuration technique by assigning a service to a host group (instead of to a specific host). By using this technique, all of the hosts that are in this host group will receive the same services ... but there is only one service definition which in turns reduces your configuration complexity / overhead.

In this example I will add another two Cassandra servers using this method, but before we add the servers, I'll create the host group first. Navigate via the top menu bar to **Configure** > **Core Config Manager** and then **Monitoring** > **Host Groups**.

Host Group Management

Click the **+Add New** button.

Host Group Name *

Cassandra Servers

A **Host Group Name** and **Description** is required.

Description *

All Cassandra Servers

Notes

Don't add any members to the group, this will be done via the host object.

Notes URL

Action URL

Click **Save** to create the host group.

☒ Active ⓘ

Assign Memberships

Manage Hosts   0

Manage Host Groups   0

Save   Cancel

The next step is to add the existing host as a member of the new group. Navigate to **Monitoring** > **Hosts**.

Click the **Modify** icon for the existing host.

How To Monitor Apache Cassandra Distributed Databases

Click the **Manage Host Groups** button.

Add the **Cassandra Servers** host group to the Assigned list.

Click **Close** and then **Save**.

The next step is to change the existing service to use the new host group. Navigate to **Monitoring > Services**.

Click the **Modify** icon for the existing service.

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How To Monitor Apache Cassandra Distributed Databases

Click the **Manage Hosts** button.

Remove the existing host **cassandra01** from the Assigned list.

Click **Close**.
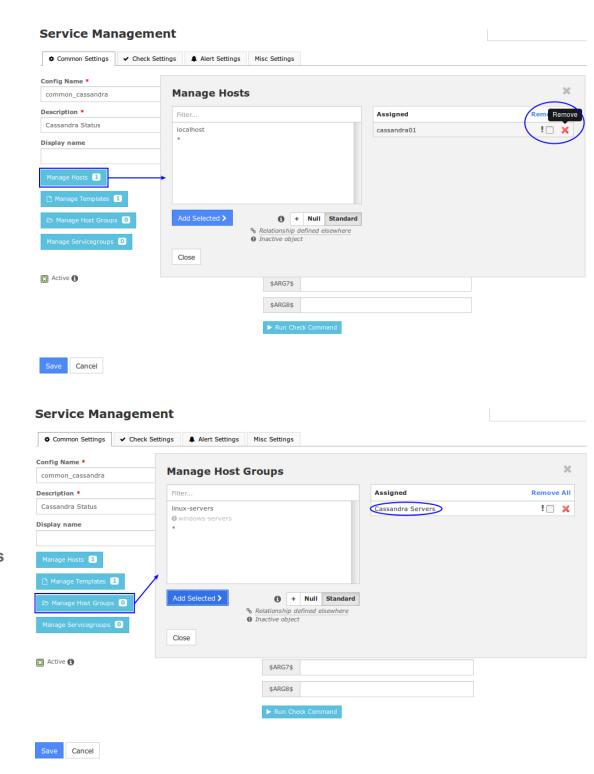
Click the **Manage Host Groups** button.

Add the **Cassandra Servers** host group to the **Assigned** list.

Click **Close**.

Finally, change the Config Name to something generic, because this service is no longer "tied" to the cassandra01 server.

Click **Save** and **Apply Configuration**.

At this point, technically all that has been done is to change the service from being assigned to a host, it is now assigned to a host group. In the next step, you'll add the remaining hosts and they will receive the new **Cassandra Status** service.

To add the remaining hosts, the **Bulk Host Cloning and Import** wizard will be used to clone the existing host. Navigate via the top menu bar to **Configure** > **Run a configuring wizard** and select the **Bulk Host Cloning and Import** wizard. In the following screenshot you can see how the search field allows you to quickly find a wizard.

On **Step 1** you are required to select the host that you wish to use as the template that you will clone. The screenshot on the following page shows the host **cassandra01** has been selected. Click Next to continue.

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Configuration Wizard: Bulk Host Cloning and Import - Step 1

This wizard allows you to clone existing hosts quicky and easily. It supports import of new hosts in bulk.
New host information is specified in CSV format and each newly imported host is given the same services as an existing host that is being monitored. This is useful if you setup one host as a template and want to setup several other hosts using the same template.

Template Host Information

Host Name: cassandra01

Select an existing host that should be cloned and used as the template for new hosts.

[< Back] [Next >]

In **Step 2**, the host you selected to use as the template is shown at the top. All of the available services from the template host are listed under the **Select Template Services** section. In this example the only service listed is **Cassandra Status** and you can see that it says *"Inherited - Can not be cloned using the wizard"*. This is exactly what we want, the new hosts will inherit this service when the wizard is completed.

Under the **Import / Cloning Data** section, the drop down lists are the Nagios XI host object directives. These need to be mapped to each field of the CSV data that is provided in the **Data** text area.
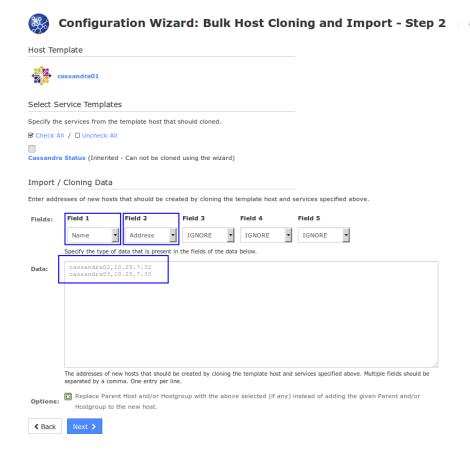
The data provided is the remaining Cassandra hosts I am adding.

Looking at the screenshot to the right you can see:

    Field 1 = Address

    Field 2 = Name

Click Next to continue.

Configuration Wizard: Bulk Host Cloning and Import - Step 2

Host Template

cassandra01

Select Service Templates

Specify the services from the template host that should cloned.

☑ Check All / ☐ Uncheck All

☐ **Cassandra Status** (Inherited - Can not be cloned using the wizard)

Import / Cloning Data

Enter addresses of new hosts that should be created by cloning the template host and services specified above.

Fields:	Field 1	Field 2	Field 3	Field 4	Field 5
	Name	Address	IGNORE	IGNORE	IGNORE

Specify the type of data that is present in the fields of the data below.

Data:
```
cassandra02,10.25.7.32
cassandra03,10.25.7.33
```

The addresses of new hosts that should be created by cloning the template host and services specified above. Multiple fields should be separated by a comma. One entry per line.

Options: ☒ Replace Parent Host and/or Hostgroup with the above selected (if any) instead of adding the given Parent and/or Hostgroup to the new host.

[< Back] [Next >]

The remaining wizard steps have no settings, any options that are normally available in for these steps in Configuration Wizards will be inherited from the template host you selected. You can click **Finish** on any of the steps or click Next on each step and click **Apply** on the final step.

Wait for the configuration wizard to create the new monitoring configs. The following screenshot shows the newly monitored hosts and services based on the data provided on step 2 (as well as the original host).

Host	Service	Status	Duration	Attempt	Last Check	Status Information
cassandra01	Cassandra Status	Ok	1h 44m 54s	1/5	2017-02-14 16:48:11	CASSANDRA OK -
cassandra02	Cassandra Status	Ok	3m 19s	1/5	2017-02-14 16:49:46	CASSANDRA OK -
cassandra03	Cassandra Status	Critical	3m 15s	4/5	2017-02-14 16:52:43	CASSANDRA CRITICAL - WARNING: Cassandra node is DOWN

You can see that one of the Cassandra nodes is down, the plugin is doing it's job!

From the steps you were just shown, you can see how services can be applied to multiple hosts using host groups. This can be a time saver when creating monitoring configurations for identical type devices (like nodes in a cluster).

Finishing Up

This completes the documentation on how to monitor Apache Cassandra distributed databases 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