## Purpose

This document describes how to generating audio alerts in Nagios XI. The solution is based on using a Raspberry Pi to output the audio alert via HDMI or 3.5mm headphone jack.

If you are generating audio alerts in Nagios XI 2024, see <u>Audio Alerts Nagios XI 2024</u>.

## Overview

An audio alert from Nagios is just another type of notification. Instead of receiving an email informing you of a problem, an audio alert would be heard without needing to look at the computer. So, what exactly is an audio alert?

- This solution generates the audio using a program called Flite, it is a text to speech synthesis engine.
- In real time the Pi will generate the audio and output it to the via HDMI or 3.5mm headphone jack.
- This means you can customize the alert to say whatever you want, for example:
  - The host server01 is currently down.
  - The service disk usage C: for the host server01 is currently in a warning state, the last output was C:\ total: 99.51 Gb used: 25.89 Gb (26%) free 73.62 Gb (74%)

A Raspberry Pi is used in this solution because:

- It is a cheap device that is commonly used to display Nagios health on a TV or screen in NOC.
- It has HDMI and or 3.5mm headphone jack audio output.
- The audio alerts are not physically tied to the Nagios XI Server.
  - Commands are sent to the Pi using an SSH connection.
  - This allows you to easily scale up this solution to multiple Pi's in different rooms/locations.
- It provides an easy to implement solution.

This solution is not limited to a Raspberry Pi, as you follow the documentation you will see that it can be implemented on any Linux Distribution.

## Requirements

To be able to implement this solution the following requirements must be met:

- Raspberry Pi (3 Model B used in this example).
- A TV/Screen with built in speakers to play audio or external speakers that can connect to the 3.5mm headphone jack.

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- Raspbian Stretch Desktop (Lite also works if you want an audio only solution without a display).
- A static IP address on the Pi as the Nagios Server will be sending commands to it to play the audio.
- An active internet connection as several components will need to be installed.

Once you have met all of those requirements you will be able to proceed with the steps in this document.

## Enable SSH / Create Nagios User

The first step is to enable the SSH service and create a nagios user. SSH is how Nagios will send the commands to play the audio. It will also provide the ability to monitor the Pi itself using the SSH Proxy configuration wizard in Nagios XI.

On your Pi Desktop, open a terminal session. Execute this command to become the root user:

sudo su

Enable the SSH service so it starts on boot and start the service by executing these commands:

systemctl enable ssh.service
systemctl start ssh.service

Now create the nagios user along with adding the user account to the audio group so it has permission to output the audio. You will need to provide a password for the nagios user. Execute these commands:

useradd -m nagios usermod -a -G audio nagios passwd nagios

Once it is completed you need to configure the SSH keys between the Nagios XI server and the Pi (this allows passwordless authentication). Establish a terminal session to your **Nagios XI** server as the root user. Execute this command to become the nagios user on the Nagios XI server:

su nagios

Execute this command to create an SSH key:

ssh-keygen





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Press **ENTER** (accepting defaults) when prompted for a filename and passphrase. Public and private SSH keys will be generated and saved in the following directory:

```
/home/nagios/.ssh
```

In the following commands replace xxx.xxx.xxx with the IP address of your Pi. This command will copy the SSH key to the Pi:

ssh-copy-id -i ~/.ssh/id\_rsa.pub nagios@xxx.xxx.xxx

You will be prompted to add the host to the list of new hosts, you need to type yes to proceed and then you will need to type the password for the nagios user (the nagios user you created on the Pi).

Now to verify that you can login to the Pi without supplying a password. Continuing with the terminal session on the Nagios XI server execute the following command:

ssh nagios@xxx.xxx.xxx.xxx

If the SSH keys are configured properly you should be able to login to the Pi machine without supplying credentials. Simply type **exit** to close the SSH session.

Also test the check\_by\_ssh plugin, run the following command:

/usr/local/nagios/libexec/check\_by\_ssh -H xxx.xxx.xxx.xxx -C uptime

If things are setup properly, you should get output from the "uptime" command on the remote server that looks similar to the following:

12:01:42 up 35 min, 1 user, load average: 0.00, 0.01, 0.05

If your output is similar then you are ready to proceed to the next step.

## **Install Flite**

Next is to install the Flite application and test that the audio works.

Return to your Pi Desktop terminal session and execute the following command:

apt-get install -y flite

Once this has been installed you can test it straight away.

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Make sure your speakers are turned on and execute the following command:

flite -t "testing 1 2 3"

If you heard that come through your speakers, then everything is working correctly. If it did not, double check your display or external speakers have the volume turned up and execute the command again. If you still do not hear the audio, then please continue to the <u>Troubleshooting</u> section.

There are several voices available in Flite, personally I like the "slt" voice, for example:

```
flite -t "testing 1 2 3" -voice slt
```

In the remainder of this documentation, I am going to use this voice.

## **Test Flite From Nagios XI**

Now you can test from the Nagios XI server to see if everything is configured correctly. In your terminal session on your Nagios XI server execute the following commands (replace xxx.xxx.xxx with the IP address of your Pi):

```
cd /usr/local/nagios/libexec/
./check_by_ssh -H xxx.xxx.xxx -C '/usr/bin/flite -t "testing 1 2 3" -voice slt'
```

You should hear the audio and receive output similar to:

```
OK - check_by_ssh: Remote command '/usr/bin/flite -t "testing 1 2 3" -voice slt' returned status 0
```

If you heard the audio, then you are ready to proceed to the next step. If you do not hear the audio, then please continue to the <u>Troubleshooting</u> section.

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## **Configure Nagios XI**

The way Nagios XI will decide if it needs to generate an audio alert is exactly the same way it decides if it needs to send an email alert. A Nagios XI user account will be created and used to send notifications to, this is how you will be able to selectively define what hosts and services will generate audio alerts. The next step will create the user and define the host and service notification commands that will be triggered when a notification is sent.

Login to your Nagios XI server and navigate to Admin > Users > Manage Users.

<u>N</u> agios' <u>XI</u>	Home	Views	Dashboards Report	s Configure	Tools Help	Admin		Q 🥥 🔺 na	agiosadmin 🖒 Logo	out 🔳
✓ System Information	P									
System Status	Mar	nage Use	ers							0
Audit Log Check For Updates	A 4	dd New User	R Add users from LDA	P/AD 🛛 😼 Email	All Users				Search	٩
↓ Users	Showin	g 1-1 of 1 total r	records							
Anage Users		👃 Username	1 Name	🄱 Email	Phone Number	Auth Level	Auth Type	Last Login	Actions	
Notification Management		nagiosadmin	Nagios Administrator	root@localhost		Admin	Local	2017-11-30 17:25:1	6 🥜 💩 💿 🗸	3 ×

Click the Add New User button and populate the fields as required.

The check boxes highlighted in the screenshot are the most important ones that need to be enabled.

Add New User			
General Settings		Security Settings	
Username:	audioalerts	Authorization Level: 😡	User
Password:	•••••	Can see all objects: 😧	
Repeat Password:		Can (re)configure hosts and services: 0	
Force Password Change at Next Login:		Can see/control monitoring engine:	
Email User Account Information:		Can access advanced features: 🚱	
Name:	Audio Alerts	Has read-only access:	
Email Address:	alerts@domain.local	Has API access:	
Create as Monitoring Contact:			
Enable Notifications:			
Account Enabled:	<ul> <li>Image: A start of the start of</li></ul>		

Click the Add User button to create the new user.

Now you need to create commands for the notifications, navigate to **Configure > Core Config Manager**.

In the left pane expand **Commands** and click **>\_ Commands**.

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### Click the + Add New button.

<u>N</u> agios XI	Hom	e Views Da	shboards	Reports	Configure
Core Config Manager	-				
A Quick Tools	Co	ommands			
∧ Monitoring	G	Add New Displayi	na 1-15 of 128	results	
∧ Alerting				1.	
∧ Templates		Command Name	1 Com	mand Line	
✓ Commands		check-host-alive	\$USER	1\$/check_icn	np -H \$HOSTAD
>_ Commands		check-host-alive-htt	tp \$USER	1\$/check_htt	p -H \$HOSTADD
Advanced		check-host-alive-tft	p tftp \$H	OSTNAME\$ 6	9
A Tools		check bpi	/usr/bit	n/php sUSER	1\$/check_bpi.p
A CCM Admin		check_dhcp	\$USER	1\$/check_dh	cp \$ARG1\$

Populate the **Command Name** field with audio\_host\_notification\_handler. **The Command Line** field is shown on the following page. Make sure the **Command Type** is defined as "*misc command*".

Command Name *
audio_host_notification_handler
Example: check_example
Command Line *
\$USER1\$/check_by_ssh -H \$CONTACTPAGER\$ -C '/usr/bin/flite -t "\$NOTIFICATIONTYPE\$ \$NOTIFICATIONTYPE\$ \$NOTIFICATION
Example: \$USER1\$/check_example -H \$HOSTADDRESS\$ -P \$ARG1\$ \$ARG2\$
Command Type:
misc command 🔻
Active 🚯

Click the Save button once you populated the fields.

You will need to repeat the same steps to create the audio\_service\_notification\_handler command. The full details of both commands are shown below. The commands are one extensive line, they are wrapped over several lines due to their size.

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### **Command Name:**

audio\_host\_notification\_handler

#### Command Line:

```
$USER1$/check_by_ssh -H $CONTACTPAGER$ -C '/usr/bin/flite -t
"$NOTIFICATIONTYPE$ $NOTIFICATIONTYPE$ $NOTIFICATIONTYPE$ the host
$HOSTNAME$ has a $HOSTSTATE$ state" -voice slt'
```

### Command Name:

audio\_service\_notification\_handler

### Command Line:

```
$USER1$/check_by_ssh -H $CONTACTPAGER$ -C '/usr/bin/flite -t
"$NOTIFICATIONTYPE$ $NOTIFICATIONTYPE$ $NOTIFICATIONTYPE$ the service
$SERVICEDESC$ on host $HOSTNAME$ has a $SERVICESTATE$ state" -voice slt'
```

These commands are how Nagios XI dynamically generates the audio alert. It is able to pull values like \$HOSTNAME\$ and \$SERVICEDESC\$ to provide alerts specific to the object the alert is for.

You can see that \$NOTIFICATIONTYPE\$ has been used three times at the beginning of each message, there are two reasons for this:

- To give you a moment to realize you need to listen to the audio alert that is going to be announced.
- Depending on the HDMI / audio equipment being used the beginning of the message can be cut off, this can do with the audio equipment "waking up". Having \$NOTIFICATIONTYPE\$ three times ensures you don't miss the essential information.

You will also notice the command uses -H \$CONTACTPAGER\$ for the Pi address. In the next step you will configure the audioalerts contact object with the IP address of the of the Pi. By doing it this way you can easily use multiple Pi's to send audio alerts to, it allows the solution to scale easily.

Here is a screenshot of both commands that have been created:

[ Command Name	[ Command Line	1 Active	Actions	1 ID
audio_host_notification_handler	<pre>\$USER1\$/check_by_ssh -H \$CONTACTPAGER\$ -C '/usr/bin/flite -t "\$NOTIFICATIONTYPE\$ \$NOTIFICATIONTYPE\$ \$NOTIFICATIONTYPE\$ the host \$HOSTNAME\$ has a \$HOSTSTATE\$ state" -voice slt'</pre>	Yes	* D 🗎 🛛 🗙	128
audio_service_notification_handler	<pre>\$USER1\$/check_by_ssh -H \$CONTACTPAGER\$ -C '/usr/bin/flite -t "\$NOTIFICATIONTYPE\$ \$NOTIFICATIONTYPE\$ the service \$SERVICEDESC\$ on host \$HOSTNAME\$ has a \$SERVICESTATE\$ state" -voice slt'</pre>	Yes	* 🗅 🚍 🛛 🗙	129

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Now that the commands have been created, they need to be assigned to the contact. In the left pane expand **Alerting** and click **Contacts**.

<u>N</u> agios' XI	Home Views Dashboards Reports	Configure Tools Help Admin	۹ 😔	🛓 nagiosadmin	එ Logout 🛛 🗮
Core Config Manager	Contacts		S	earch	۹ 🕜
<ul> <li>∧ Monitoring</li> <li>✓ Alerting</li> </ul>	+ Add New Displaying 1-2 of 2 results				
Contacts	I Contact Name	I Alias	[ Active	Actions	1 ID
© Time Periods	audioalerts	Audio Alerts	Yes	× D 🗃 🛛 🗙	2
Host Escalations Service Escalations	naglosadmin	Nagios Administrator	Yes	× 10 🔚 🛛 🗙	1
∧ Templates					
A Commands	+ Add New Apply Configuration With	checked Go		Results per p	age 15 💌

On the **Common Settings** tab you will need to provide the IP address of the Pi in the Pager Number field.

Common Settings	Alert Settings	Misc Settings
Contact Name •		
audioalerts		
Description		
Audio Alerts		
Email Address		
alerts@domain.local		
Pager Number		

#### Click the Alert Settings tab.

There are two buttons here:

- 1. Manage Host Notification Commands
- 2. Manage Service Notification Commands

Click the Manage Host Notification Commands button, this will bring up the Manage window.

. com	non Set	tings	Alert Set	tings Misc Settings								_
Host Notif	lication	s Enable	ed			Service No	otifications	Enabled				
On Off	Skip	Null				On off	Skip Nu	t.				
Host Notif	fication	s Timep	eriod			Service No	otifications	Timeper	boi			
audioaler	ts_notifi	cation_ti	mes		-	audioaler	ts_notificat	on_times				
Host Notif	lication	options				Service No	otification	options				
Down U	nreacha	ble Up	Flapping	Scheduled Downtime	None	Warning	Unknown	Critical	Flapping	Scheduled Downtime	Ok	
						None						
Manage f	Host Not	ification	Commands	0		None Manage	Service Not	ification C	ommands	٥		
Manage I Retain sta	Host Not	ification ormation	Commands n			None Manage :	Service Not	fication C	ommands	D		
Manage i Retain sta On Off	Host Not Itus Info Skip	ification ormation Null	Commands n			None Manage : Can Subm	Service Not	flication C nds	ommands	0		
Manage I Retain sta On Off Retain noi	Host Not Skip n-statu	ification ormation Null s inform	Commands n nation			None Manage : Can Subm On Off	Service Not hit Comman Skip Nu	ification C nds	ommands	0		

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In the **Manage** window you need to select the

audio\_host\_notification\_handler command in the left pane and then click the **Add Selected** button, so it appears in the right hand pane.

This is for HOST notifications, hence why you added the audio\_host\_xxx command only.

Click the Close button.

Click the **Manage Service Notification Commands** button, this will bring up the **Manage** window.

In the Manage window you need to select the

audio\_service\_notification\_handler command in the left pane and then click the **Add Selected** button, so it appears in the right hand pane.

This is for SERVICE notifications, hence why you added the audio\_service\_xxx command only.

Click the Close button.

Click the **Save** button, this completes the changes required for the Contact object.

Once you've made your selections click the **Apply Configuration** button to push these changes into the running monitoring configuration.



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## **Assign Contact To Objects And Test**

At this point all that is remaining is to assign the *audioalerts* contact to the Nagios Host and Service objects that you want to receive audio alerts for. This example is going to use the **Current Users** service for the **localhost** object. The thresholds will be adjusted so the service can be put into a warning state, and you will be able to hear the audio alert.

In the left pane expand Monitoring and click Services. Click the Current Users service object to edit it.

Service Mar	nagement			
Common Settings	✓ Check Settings	Alert Settings	Misc Settings	
Config Name *			Check com	mand
localhost			check_loc	al_users
Description *			Command	view
Current Users			\$USER1\$	/check_users -w \$ARG1\$ -c \$ARG2\$
Display name				
			\$ARG1\$	
Manage Hosts 1			\$ARG2\$	50

Change the \$ARG1\$ field to 1, this will cause it to go into a warning state when more than 1 user is logged in.

Click the Alert Settings tab and then click the Manage Contacts button.

Service Mana	agement		
Common Settings	✓ Check Settings	Alert Settings	Misc Settings
🛓 Manage Contacts 🚺	Manage Conta	ct Groups 0	
Notification period *			
xi_timeperiod_24x7			-

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In the **Manage Contacts** window you need to select the audioalerts contact in the left pane and then click the **Add Selected** button, so it appears in the right hand pane.

Filter			Assigned	Remove Al
nagiosadmin			audioalerts	×
			a and a second a se	
Add Selected >	+ Null	Standard		
6				

Click the **Close** button and then the **Save** button.

Once you've made your selections click **the Apply Configuration** button to push these changes into the running monitoring configuration.

Now you are ready to generate an audio alert. Navigate to **Home > Service Detail** and click the **Current Users** service.

<u>N</u> agios' XI	Home View	s Dashboard:	•	Reports	Configure		Tools	Help	Admin			۹	•	nagiosad	Imin	<b>ሮ</b> Logo	ut
∧ Quick View	P																
✓ Details	Service	Status			*			_		*							6
Service Detail	All services					los	t Status	Summary			Serv	ice Sta	tus Sur	mary			
Host Detail						Up	Down	Unreachable	Pending		Ok	Warning	Unkno	wn Cri	tical	Pendin	9
Hostgroup Summary Hostgroup Overview						1	0	0	0		12	0	0		0	0	
Hostgroup Grid						Unh	andled	Problems	AII		Un	handled	P	oblems		AII	
Servicegroup Summary Servicegroup Overview	Search	Q					0	0	I			0		0		12	
Servicegroup Grid					1.	ast U	pdated: 201	7-12-01 09:02:3	8		Last U	pdated: 201	7-12-01 09	02:38			
BPI	Showing 1-12 of	12 total records										Page 1	of 1	15 Pe	er Pag	je 🔹	Go
∧ Graphs	👃 Host	Service		🕽 Status	Duration		🏮 Attem	pt 🤱 Last Ch	eck	🔱 Status Ir	forma	tion					
∧ Maps	localhost 🗋 🛹	Current Load	24	Ok	23d 22h 16m	30s	1/4	2017-12-0	1 09:01:30	OK - load a	verage	: 0.17, 0.11	1,0.09				
Incident Management		Current Users	246	Ok	23d 22h 16m	5s	1/4	2017-12-0	1 09:01:55	USERS OK	- 1 use	ers current	ly logged i	n			





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Last Check:

Next Check:

2017-12-01 09:14:30

2017-12-01 09:19:30

The service will be in an OK state. Earlier on the thresholds were changed so that this service will enter a WARNING state when more than 1 user is logged onto the Nagios XI server. To force it into a WARNING state all you need to do is establish 2 SSH sessions to your Nagios XI server (you should already have one open).

Once you have the 2 SSH sessions open click the Force an immediate check link under Ouick Actions.

The service should go into a WARNING state; however, a notification will not be sent yet as it is in SOFT state. It must be in a WARNING state 4 times before it is in a HARD state

#### Force an immediate check 3 more times to force the notification to be sent

Once it goes into a hard state you will hear the audio notification.

If you close one of the SSH sessions and then force another check you will hear the recovery audio notification.

# **Current Users**

Service Status Detail



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You can also verify that the notification was generated by clicking the cell phone icon above the **Overview** tab.

You can see in the screenshot above how a notification was sent to the *audioalerts* contact for the WARNING and OK states.



Date / Time	Host	Service	Reason	Escalated	State	Contact	Dispatcher	Information
2017-12-01 12:07:30	localhost	Current Users	Service Recovery	No	ок	nagiosadmin	Nagios XI	USERS OK - 1 users currently logged in
2017-12-01 12:07:30	localhost	Current Users	Service Recovery	No	ок	audioalerts	Custom: audio_service_notification_handler	USERS OK - 1 users currently logged in
2017-12-01 12:04:53	localhost	Current Users	Service Problem	No	WARNING	nagiosadmin	Nagios XI	USERS WARNING - 2 users currently logged in
2017-12-01 12:04:53	localhost	Current Users	Service Problem	No	WARNING	audioalerts	Custom: audio_service_notification_handler	USERS WARNING - 2 users currently logged in

This completes all the steps required to implement audio alerts in Nagios XI using a Raspberry Pi.

## Considerations

This documentation has provided you with a solution for generating audio alerts with Nagios XI however it has only scratched the surface of what is possible.

### **Multiple Pi's**

- Simply create more Nagios XI users and define the IP address in the Pager field of contact.
- Assign the different contact accounts to the relevant host and service objects, different teams in different rooms can receive audio alerts that only they need to hear.

### **Selective Alerts**

- You can change the time period assigned to a contact so that audio alerts are only generated when you want them to.
- The types of alerts for a contact can be defined on the contact object, only receive DOWN, WARNING and CRITICAL events if that is what you require.

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### **Descriptive Alerts**

• Any of the Nagios Macros can be used to define the audio alert messages, they can be found from this <u>Macro</u> page.

### **Extensive Notification Handler**

- Currently the audio\_host\_notification\_handler and audio\_service\_notification\_handler are oriented towards host/service problem/recovery notifications.
- Other types of alerts will also be sent to these contacts, like:
  - flapping start/stop
  - o custom notifications
  - o acknowledgments
  - o however, they might not have all the required text content
- You can define exactly what text string is sent to the Flite program however you will need to write a wrapper script that performs the logic behind all of that.
- If you look at some of the other commands like the xi\_host\_notification\_handler you can see that it sends all the valid macros to the handle\_nagioscore\_notification.php script, it is this script that performs all the logic and then actually sends the notification.

### Speech Synthesis Markup Language (SSML)

 Flite supports reading text that is in SSML format, this allows you to customize the audio output.

## Monitor The Pi

You should start monitoring the Pi from Nagios XI, it has been configured ready to run the SSH Proxy configuration wizard against it. This is found at the <u>Monitoring Hosts Using SSH</u> Documentation.

You will need to have some plugins installed for monitoring. This KB article shows you how to install <u>Nagios Plugins</u>.

The check library has a list of unusual ways to monitor a device, this will help you with the SSH Proxy configuration wizard. This is located in <u>Nagios Knowledgebase</u>.

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## Troubleshooting

If you are not receiving audio then there are several troubleshooting steps you can follow from this page.

Audio output to HDMI or 3.5mm headphone jack is automatic however you can override this. If you execute this command, you can get a list of the devices on the Pi:

/usr/bin/amixer controls

The output will be something like:

```
numid=3,iface=MIXER,name='PCM Playback Route'
numid=2,iface=MIXER,name='PCM Playback Switch'
numid=1,iface=MIXER,name='PCM Playback Volume'
numid=5,iface=PCM,name='IEC958 Playback Con Mask'
numid=4,iface=PCM,name='IEC958 Playback Default'
```

The *numid=3,iface=MIXER,name='PCM Playback Route'* device is what is used to output the audio. You can change the preferred output with the following command:

amixer cset numid=3 2

Where *0=auto*, *1=headphones*, *2=hdmi*. In that command above you can see that the output was defined as number 2 which is the HDMI. After making the change you can do a test to see if it is working:

flite -t "testing 1 2 3" -voice slt

It has been observed that if the display is turned off when the Pi boots up the HDMI audio may not work, a reboot with the display turned on is the resolution to the problem.

## **Finishing Up**

This completes the documentation on how to generate audio alerts from Nagios XI. If you have additional questions or other support-related questions, please visit us at our Nagios Support Forum, Nagios Knowledge Base, or Nagios Library:

Visit Nagios Support Forum

Visit Nagios Knowledge Base

Visit Nagios Library

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