

Network Monitoring and Management

Cacti Additional Exercises:

- **Plugin Architecture**
- **Settings Plugin**
 - o **Email to Request Tracker**
- **Installing and Configuring the thold Plugin**
- **CDEFs (Control DEFinitions)**

Notes:

- Commands preceded with "\$" imply that you should execute the command as a general user - not as *root*.
- Commands preceded with "#" imply that you should be working as the *root* user.
- Commands with more specific command lines (e.g. "RTR-GW>" or "mysql>") imply that you are executing commands on remote equipment, or within another program.
- If a command line ends with "\ " this indicates that the command continues on the next line and you should treat this as a single line.
- These exercises are tested against Ubuntu server version 9.10.

Exercises

Exercise 0

Log in to your PC or open a terminal window as the sysadm user.

Exercise 1

Install the Cacti Plugin Architecture (Cacti PA)

This assumes that you have already installed and configured Cacti on your system. You must do this first. You can find the Cacti Plugin Architecture here:

<http://cactiusers.org/>

With additional installation information here:

<http://cactiusers.org/wiki/PluginArchitectureInstall>

The major issue with installing the Cacti Plugin Architecture is that it is a patch made directly to the Cacti code. This means that you cannot simply download the latest version of the PA and expect it to work. You must download the version that matches *exactly* the version of Cacti you are running. In addition, you should patch your Cacti installation immediately after installation and initial configuration *before* adding hosts and graphs to your installation.

As May 2010 using Ubuntu Server 9.10 the Cacti version installed by “apt-get” is 0.8.7.d, or one version behind the current Cacti version of 0.8.7.e. To download the correct PA patch for Cacti version 0.8.7.d do:

```
$ cd /usr/local/src
$ sudo mkdir cacti-pa
$ cd cacti-pa
$ sudo wget http://mirror.cactiusers.org/downloads/plugins/cacti-plugin-0.8.7d-PA-v2.4.zip
$ sudo unzip cacti-plugin-0.8.7d-PA-v2.4.zip
```

This particular zip file unzips contents directly in to the directory where you are located. It does not make a new directory (proper behavior).

Next, to update Cacti with the supplied patch do the following. We do a “dry run” first for testing purposes:

```
$ cd /usr/share/cacti/site
$ patch -p1 -N --dry-run < /usr/local/src/cacti-pa/cacti-plugin-0.8.7d-PA-v2.4.diff
```

If you see any error messages and you have not updated your Cacti installation, then you can copy over the files that failed from /usr/local/src/cacti-pa/files-0.8.7d to /usr/share/cacti/site and place them in the appropriate locations.

If you see error message and you have already updated Cacti, then you must decide whether you wish to re-install Cacti from scratch before applying the Cacti Plugin Architecture patch.

Assuming no errors were reported, then execute the “patch” command without the “—dry-run” option:

```
$ patch -p1 -N < /usr/local/src/cacti-pa/cacti-plugin-0.8.7d-PA-v2.4.diff
```

Please note: As Cacti is installed in Ubuntu several Cacti files have been updated by the Ubuntu package team. You will most likely encounter some error messages when attempting to patch Cacti. In the case of Cacti version 0.8.7.d in Ubuntu the following files were not patched:

- /usr/share/cacti/site/include/global_constants.php
- /usr/share/cacti/site/include/global.php
- /usr/share/cacti/site/lib/html.php

To resolve this issue, after you have issued the patch command you must do:

```
$ sudo cp /usr/local/src/cacti-pa/files-0.8.7d/include/global_constants.php /usr/share/cacti/site/include/.
$ sudo cp /usr/local/src/cacti-pa/files-0.8.7d/include/global.php /usr/share/cacti/site/include/.
$ sudo cp /usr/local/src/cacti-pa/files-0.8.7d/lib/html.php /usr/share/cacti/site/lib/.
```

As you can see patching a packaged version of Cacti can be a bit tricky. Another option would be to download Cacti from source and install this on your server.

Your next step in the installation process is to update the file /usr/share/cacti/site/include/global.php.

```
$ cd /usr/share/cacti/site
$ vi include/global.php
```

Near the top of this file you will see:

```
/* Default database settings*/  
...  
$database_username = "cactiuser";  
$database_password = "cactiuser";
```

Edit this lines and change them to:

```
/* Default database settings*/  
...  
$database_username = "root";  
$database_password = "PASSWORD USED IN CLASS";
```

Next find the entry that reads:

```
$config['url_path'] = '/';
```

And change this to read:

```
$config['url_path'] = '/cacti/';
```

Save the file and quit. Now we need to fix two small bugs in the this particular patch file under Ubuntu:

```
$ cd /usr/share/cacti/site/lib  
$ sudo ln -s /usr/share/php/adodb/ adodb  
$ cd /usr/share/cacti/site  
$ ln -s /var/lib/cacti/rra/ rra
```

Now we need to import a patch to the Cacti MySQL database:

```
$ cd /usr/local/src/cacti-pa  
$ mysql -uroot -p cacti < pa.sql
```

When prompted for the “root” password for MySQL enter in the password you used while installing Cacti.

Finally restart MySQL and Apache to make sure that the changes take effect.

```
$ sudo /etc/init.d/mysql restart  
$ sudo /etc/init.d/apache restart
```

And, that’s it. The Cacti Plugin Architecture is now installed. If you go to your running Cacti instance and log in you won’t notice any changes:

<http://localhost/cacti/>

In the next exercise we’ll install a Cacti Plugin.

Exercise 2

Install the Cacti Settings Plugin

The Cacti Settings Plugin will give us additional settings that we can set from within the Cacti web interface. Including the ability to tell Cacti where to send alert emails.

To install this plugin do the following:

```
$ cd /usr/local/src
$ sudo wget http://cactiusers.org/downloads/settings.tar.gz
$ sudo tar xvf settings.tar.gz
$ cd /usr/share/cacti/site/plugins
$ sudo mkdir settings
$ cd settings
$ sudo cp -r /usr/local/src/settings/* .
$ cd /usr/share/cacti/site/include/
```

Now we must update our Cacti configuration to tell it to look for a Settings plugin.

```
$ sudo vi global.php
```

Inside this configuration file, as you proceed down a few lines, you will find a line that looks like this:

```
$plugins = array();
```

Directly after this, you may see an example line like this

```
// $plugins[] = 'thold';
```

Below these lines add the following line:

```
$plugins[] = 'settings';
```

Now save and exit from the file.

That's it. You are done.

If you log in to Cacti as the “admin” user and click on the “Settings” link on the left side of the page you will now see an extra tab in your available settings called “Mail / DNS” – Click on this tab and view the newly available options.

At this point we are going to configure Cacti to send email to the sysadmin@localhost account. This way we can test that email is working before we attempt to configure email to go to our Request Tracker ticket queue at net@localhost.

On the next page fill in the items circled in yellow (Test Email, From Email Address, From Name) and then click on the “Send a Test Email” item circled in red.

console

graphs

Console -> Cacti Settings

Logged in as admin (Logout)

Create

New Graphs

Management

Graph Management

Graph Trees

Data Sources

Devices

Collection Methods

Data Queries

Data Input Methods

Templates

Graph Templates

Host Templates

Data Templates

Import/Export

Import Templates

Export Templates

Configuration

Settings

Utilities

System Utilities

User Management

Logout User

General

Paths

Poller

Graph Export

Visual

Authentication

Mail / DNS

Cacti Settings (Mail / DNS)

Send a Test Email

Test Email

This is a email account used for sending a test message to ensure everything is working properly.

tldadmin@localhost

Mail Services

Which mail service to use in order to send mail

PHP Mail() Function

From Email Address

This is the email address that the email will appear from.

cacti@localhost

From Name

This is the actual name that the email will appear from.

Cacti System Monitor

Word Wrap

This is how many characters will be allowed before a line in the email is automatically word wrapped. (0 = Disabled)

120

Sendmail Options

Sendmail Path

This is the path to sendmail on your server. (Only used if Sendmail is selected as the Mail Service)

/usr/sbin/sendmail

[OK: FILE FOUND]

SMTP Options

SMTP Hostname

This is the hostname/IP of the SMTP Server you will send the email to.

localhost

SMTP Port

This is the port on the SMTP Server that SMTP uses.

25

SMTP Username

This is the username to authenticate with when sending via SMTP. (Leave blank if you do not require authentication.)

SMTP Password

This is the password to authenticate with when sending via SMTP. (Leave blank if you do not require authentication.)

DNS Options

Primary DNS IP Address

Enter the primary DNS IP Address to utilize for reverse lookups.

Secondary DNS IP Address

Enter the secondary DNS IP Address to utilize for reverse lookups.

DNS Timeout

Please enter the DNS timeout in milliseconds. Cacti uses a PHP based DNS resolver.

500

Settings

Test Email: sysadmin@localhost
From Email Address: cacti@localhost
From Name: Cacti Systems Monitor

One you press “Send a Test Email” you should see a popup window like this:

Checking Configuration...
 Creating Message Text...

This is a test message generated from Cacti. This message was sent to test the configuration of your Mail Settings.

 Your email settings are currently set as follows

Method: PHP's Mailer Class

Sending Message...

Success!

You can verify that your sysadmin account received the email by viewing your mail:

```
$ mutt
```

Be sure to do this as the sysadmin user on your machine.

Once you are sure that email is working, then go back to your Cacti web interface, click on Settings, then click the “Mail / DNS” tab and change the “Test Email” field from:

```
sysadmin@localhost  
to  
net@localhost
```

If you press the “Send a Test Email” link on the upper right of the page this should send an email to the Net queue in your Request Tracker instance. You can do this, then log in on RT:

<http://localhost/rt/>

as your “sysadmin” account. You should see an initial ticket with the subject of “Cacti Test Message” in the main page of RT. Cacti will now generate tickets for any hosts that it detects as being down. You can update how Cacti detects down hosts by clicking on the “Settings” tab, then “Poller” – The last two sections of this screen allow you to configure Cacti host down settings:

Host Availability Settings	
Downed Host Detection The method Cacti will use to determine if a host is available for polling. <i>NOTE: It is recommended that, at a minimum, SNMP always be selected.</i>	SNMP
Ping Type The type of ping packet to send. <i>NOTE: ICMP requires that the Cacti Service ID have root privileges in Unix.</i>	UDP Ping
Ping Port When choosing either TCP or UDP Ping, which port should be checked for availability of the host prior to polling.	23
Ping Timeout Value The timeout value to use for host ICMP and UDP pinging. This host SNMP timeout value applies for SNMP pings.	400
Ping Retry Count The number of times Cacti will attempt to ping a host before failing.	1
Host Up/Down Settings	
Failure Count The number of polling intervals a host must be down before logging an error and reporting host as down.	2
Recovery Count The number of polling intervals a host must remain up before returning host to an up status and issuing a notice.	3

Most installations that use Cacti with a ticketing system install the thold (threshold) plugin (next exercise). This plugin requires that the settings plugin be installed first in order to work.

Exercise 3

Installing and Configuring the thold Plugin

There are many plugins available for Cacti. A number of them are available here:

<http://cactiusers.org/>

and here:

<http://docs.cacti.net/plugins>

and, if you want a plugin that lets you view Nagios from within Cacti go here:

<http://trac2.assembla.com/npc/>

One of the most widely used plugins for Cacti is thold. This plugin allows you to define detailed thresholds for hosts and services. One of the critical implications of this is that you can, then, generate a ticket when a threshold is reached. The thold plugin allows you to define thresholds in almost any conceivable way you might need.

To install the thold plugin do the following:

```
$ cd /usr/share/cacti/site/plugins
$ sudo mkdir thold
$ cd thold
$ sudo wget http://cactiusers.org/downloads/thold.zip
$ unzip thold.zip
```

Now we must edit our /usr/share/cacti/site/include/global.php file to indicate that the plugin has been installed:

```
$ sudo vi /usr/share/cacti/site/include/global.php
```

Find the lines that look like this:

```
$plugins = array();
//$plugins[] = 'thold';
$plugins[] = 'settings';
```

And, remove the comment from “//\$plugins[] = ‘thold’;” so that this section looks like this:

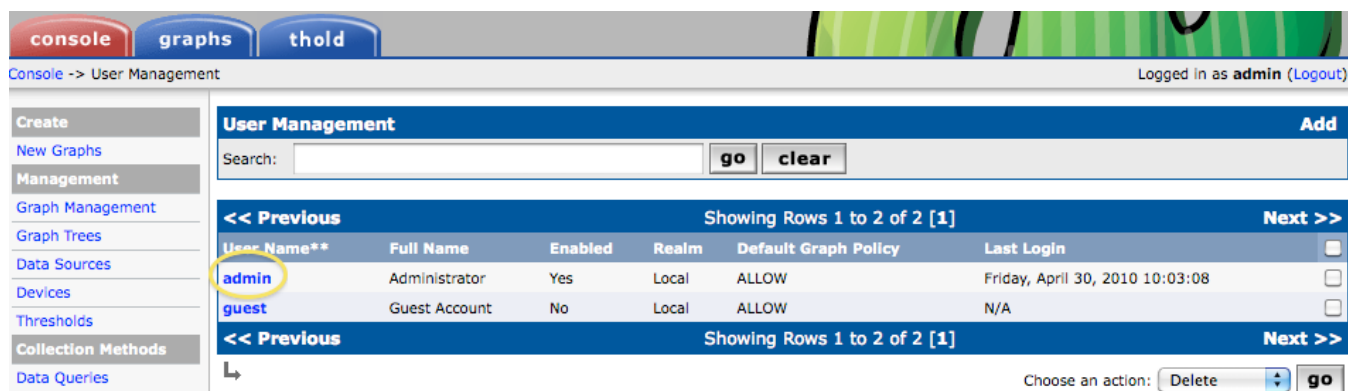
```
$plugins = array();
$plugins[] = 'thold';
$plugins[] = 'settings';
```

Now save and exit from the file. The plugin has been installed, but you must now log in to Cacti as the “admin” user and take some additional steps to activate the plugin.

Go to <http://localhost/cacti/> and log in as “admin”.

On the main log in page click on the “User Management” option on the lower right.

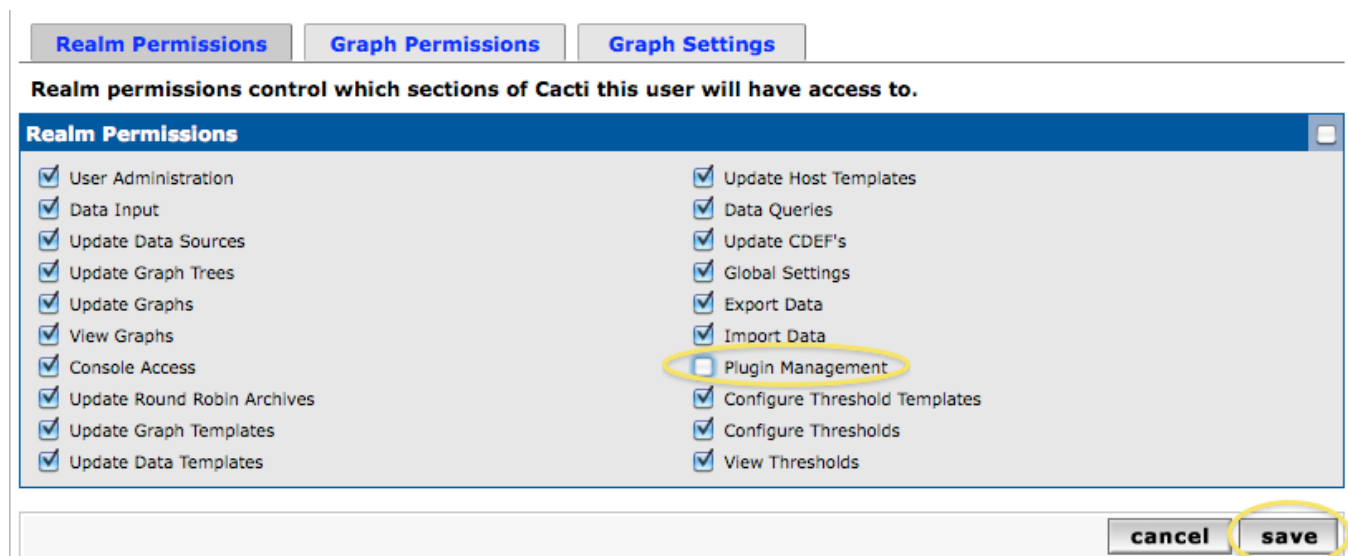
You should see something like this:



The screenshot shows the Cacti User Management interface. At the top, there are tabs for 'console', 'graphs', and 'thold'. Below the tabs, the breadcrumb 'Console -> User Management' is visible, along with the user 'Logged in as admin (Logout)'. On the left, a sidebar contains links for 'Create', 'New Graphs', 'Management', 'Graph Management', 'Graph Trees', 'Data Sources', 'Devices', 'Thresholds', 'Collection Methods', and 'Data Queries'. The main area is titled 'User Management' and includes a search bar with 'go' and 'clear' buttons. Below the search bar, a table lists users. The 'admin' user is highlighted with a yellow circle. The table has columns for 'User Name**', 'Full Name', 'Enabled', 'Realm', 'Default Graph Policy', and 'Last Login'. At the bottom right, there is a 'Choose an action:' dropdown menu with 'Delete' selected and a 'go' button.

User Name**	Full Name	Enabled	Realm	Default Graph Policy	Last Login
admin	Administrator	Yes	Local	ALLOW	Friday, April 30, 2010 10:03:08
guest	Guest Account	No	Local	ALLOW	N/A

Click on the “Admin” entry and you should see this at the bottom of the screen:

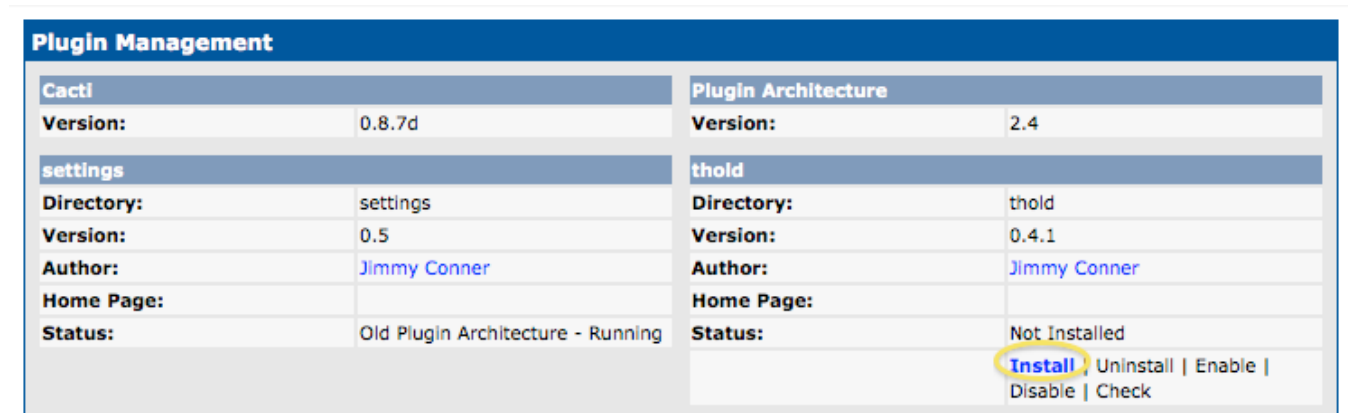


The screenshot shows the Cacti Realm Permissions interface. At the top, there are tabs for 'Realm Permissions', 'Graph Permissions', and 'Graph Settings'. Below the tabs, the text 'Realm permissions control which sections of Cacti this user will have access to.' is displayed. The main area is titled 'Realm Permissions' and contains a list of permissions. The 'Plugin Management' option is checked and highlighted with a yellow circle. At the bottom right, there are 'cancel' and 'save' buttons, with the 'save' button highlighted with a yellow circle.

Permission	Checked
User Administration	☒
Data Input	☒
Update Data Sources	☒
Update Graph Trees	☒
Update Graphs	☒
View Graphs	☒
Console Access	☒
Update Round Robin Archives	☒
Update Graph Templates	☒
Update Data Templates	☒
Update Host Templates	☒
Data Queries	☒
Update CDEF's	☒
Global Settings	☒
Export Data	☒
Import Data	☒
Plugin Management	☒
Configure Threshold Templates	☒
Configure Thresholds	☒
View Thresholds	☒

Check the “Plugin Management” option and press “Save”

On the left-hand side of the screen you will now see a new option appear called “Plugin Management” under the Configuration section. Click on this and you should see the following:



The screenshot shows the Cacti Plugin Management interface. It is divided into two main sections: 'Cacti' and 'Plugin Architecture'. The 'Cacti' section shows the version '0.8.7d' and a 'settings' section with fields for 'Directory', 'Version', 'Author', 'Home Page', and 'Status'. The 'Plugin Architecture' section shows the version '2.4' and a 'thold' section with fields for 'Directory', 'Version', 'Author', 'Home Page', and 'Status'. The 'Status' field for the 'thold' plugin is 'Not Installed', and the 'Install' button is highlighted with a yellow circle.

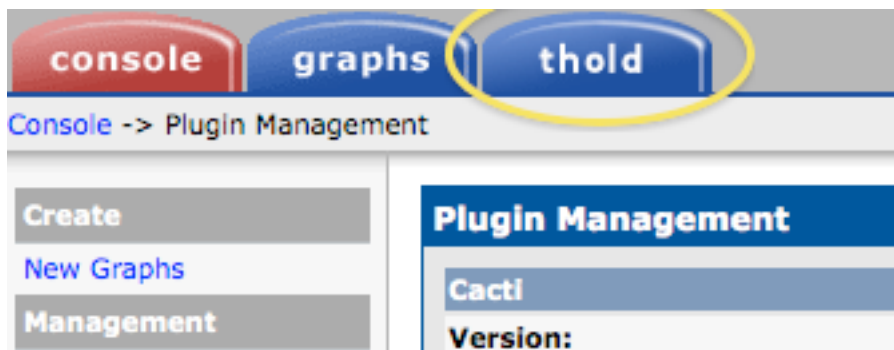
Cacti	Plugin Architecture
Version: 0.8.7d	Version: 2.4
settings	thold
Directory: settings	Directory: thold
Version: 0.5	Version: 0.4.1
Author: Jimmy Conner	Author: Jimmy Conner
Home Page:	Home Page:
Status: Old Plugin Architecture - Running	Status: Not Installed
	Install Uninstall Enable Disable Check

To complete the thold installation click the “Install” option as circled (image previous page).

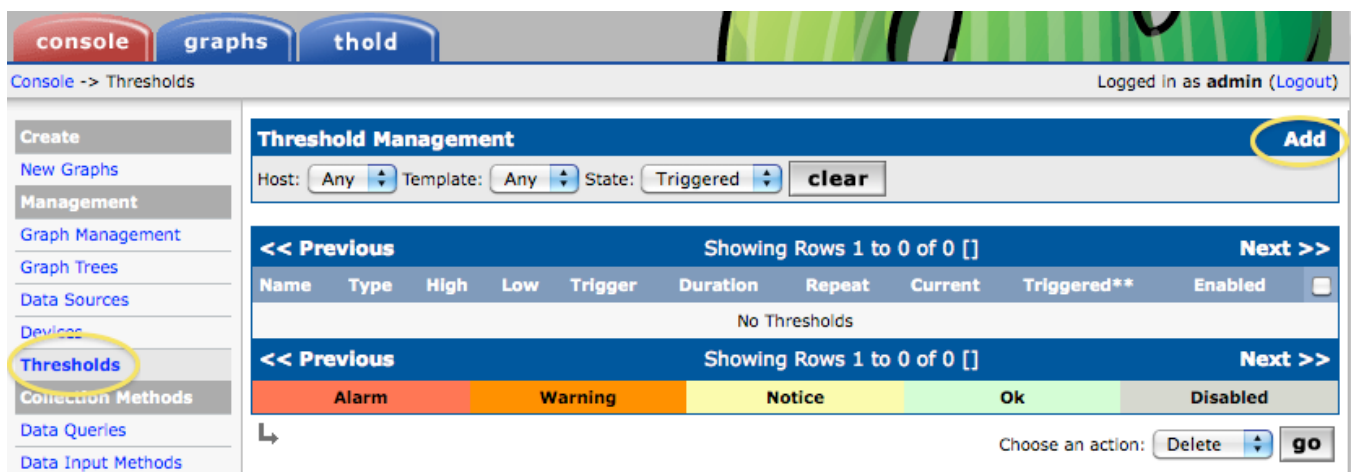
And, finally, you’ll see this and you must click the “Enable” option for the thold plugin to start working:

Plugin Management			
Cacti		Plugin Architecture	
Version:	0.8.7d	Version:	2.4
Thresholds		settings	
Directory:	thold	Directory:	settings
Version:	0.4.1	Version:	0.5
Author:	Jimmy Conner	Author:	Jimmy Conner
Home Page:	http://cactiusers.org	Home Page:	
Status:	Installed	Status:	Old Plugin Architecture - Running
		Install Uninstall Enable	
		Disable Check	

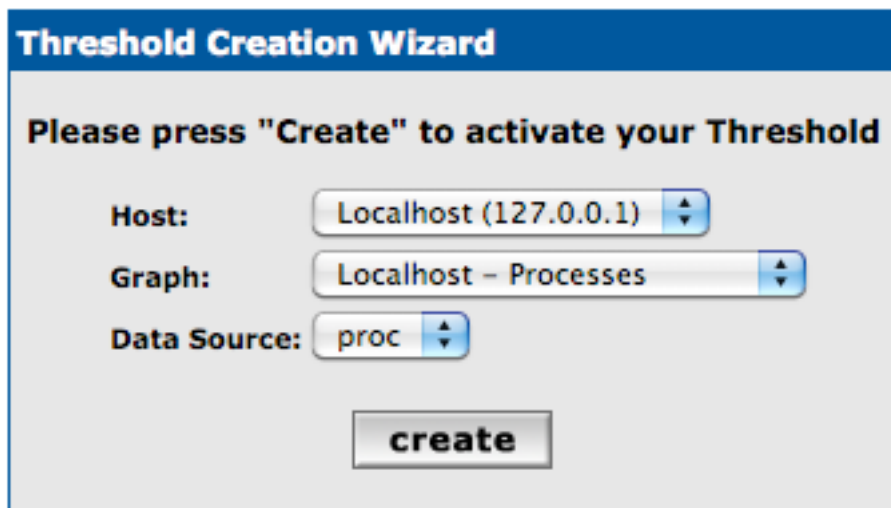
After this you will see a new tab called “thold” appear in your Cacti web interface:



Now we are ready to define a new threshold so that we can generate tickets in Request Tracker if, or when, the threshold is met. You can come up with most any threshold imaginable. As we’d like to generate a ticket let’s create a threshold that we know will be met. First, click on the “Thresholds” menu choice on the left of your screen just under the “Management” category:

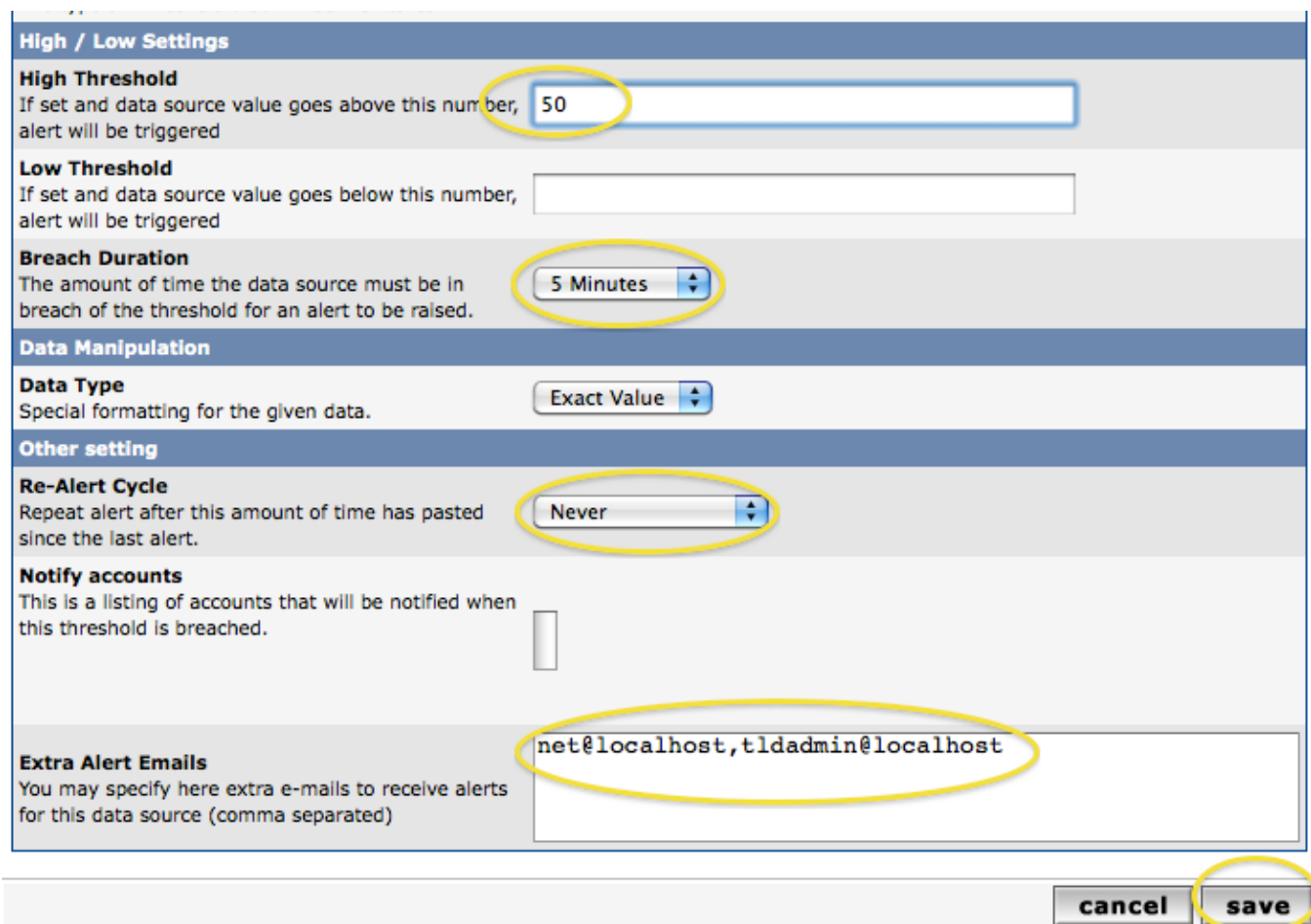


Click on the “Add” option at the upper-right of the screen. You will see the Threshold Creation Wizard. In the drop-down menu for “Host” choose “Localhost (127.0.0.1)”. Under “Graph” choose “Localhost – Processes.” Finally, when “Data Source” appears select “proc.”



The image shows a 'Threshold Creation Wizard' dialog box. It has a blue header bar with the title 'Threshold Creation Wizard'. Below the header, it says 'Please press "Create" to activate your Threshold'. There are three dropdown menus: 'Host' set to 'Localhost (127.0.0.1)', 'Graph' set to 'Localhost – Processes', and 'Data Source' set to 'proc'. At the bottom is a 'create' button.

Now press “create” and you will see a full page of options appear. Near the bottom of the page are the ones that we will update to create our threshold:



The image shows a configuration page for a threshold. It has several sections: 'High / Low Settings', 'Data Manipulation', and 'Other setting'. In the 'High / Low Settings' section, the 'High Threshold' is set to 50, 'Breach Duration' is set to 5 Minutes, and 'Re-Alert Cycle' is set to Never. In the 'Data Manipulation' section, 'Data Type' is set to Exact Value. In the 'Other setting' section, 'Extra Alert Emails' is set to net@localhost,tldadmin@localhost. The 'cancel' and 'save' buttons are at the bottom right.

What we are saying here is that if we see more than 50 processes running on our localhost machine for more than 5 minutes, then we will send an email to net@localhost and to sysadmin@localhost. Note that under the “Re-Alert Cycle” we have chosen “Never” to avoid creating a new ticket every 5 minutes.

Be sure you fill in the fields as shown in the screen capture on the previous page. In reality this is a contrived threshold as most Linux boxes will easily run with over 50 processes. We simply want to show you how to create a threshold and to have it trigger.

Note that once you press “save” you will not see anything for a few minutes. But, after 5 to 10 minutes if you click on the “thold” tab in your Cacti web pages you will see something like this:

Threshold Status

Template: All Status: Triggered Rows: 30 Search: go clear

Actions	Name**	ID	Type	High	Low	Current	Enabled
	Localhost - Processes [proc]	1	High/Low	50		98	Enabled

Showing Rows 1 to 1 of 1 [1]

Time: 0 seconds, User: 0 seconds, System: 0 seconds, Swaps: 0 swaps, Pages: 0 pages

If you check email for your sysadmin account or if you look at the Request Tracker pages logged in as “sysadmin” (go to <http://localhost/rt/>) you should see a new ticket created that looks something like this:

10 newest unowned tickets

#	Subject	Queue	Status	Created
11	Localhost - Processes [proc] went above threshold of 50 with 102	net	new	26 min ago

Take

Now you are ready to review what hosts and services you are monitoring. If you see items that you wish to be notified about, then you can create thresholds for them and send an email notice to an account or to a ticket queue of your creation.

Exercise 4

Cacti CDEFs (Control DEFinitions)

A CDEF Function is the function or equation used to determine what point to plot on the graph. Cacti allows us to change how data is plotted by creating our own function definition, then applying these to graph templates.

The actual process of creating a CDEF function would require many pages of text and images. Instead, we suggest you watch this tutorial:

<http://gregsowell.com/?p=280>

The main idea to understand is that you can adjust or create calculations on any data collected or being graphed by Cacti.