Network Management &
Monitoring

Network and Server Statistics Using Cacti

Introduction

Network Monitoring Tools

- Availability
- Reliability
- Performance

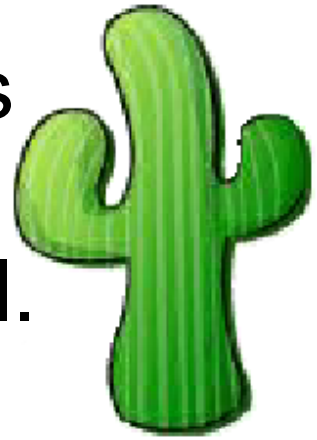
Cacti monitors the performance and usage of devices.

Introduction

- A tool to monitor, store and present network and system/server statistics
- Designed around RRDTool with a special emphasis on the graphical interface
- Almost all of Cacti's functionality can be configured via the Web.
- You can find Cacti here:
  http://www.cacti.net/

Introduction

Cacti: Uses RRDtool, PHP and stores data in MySQL. It supports the use of SNMP and graphics with RRDtool.



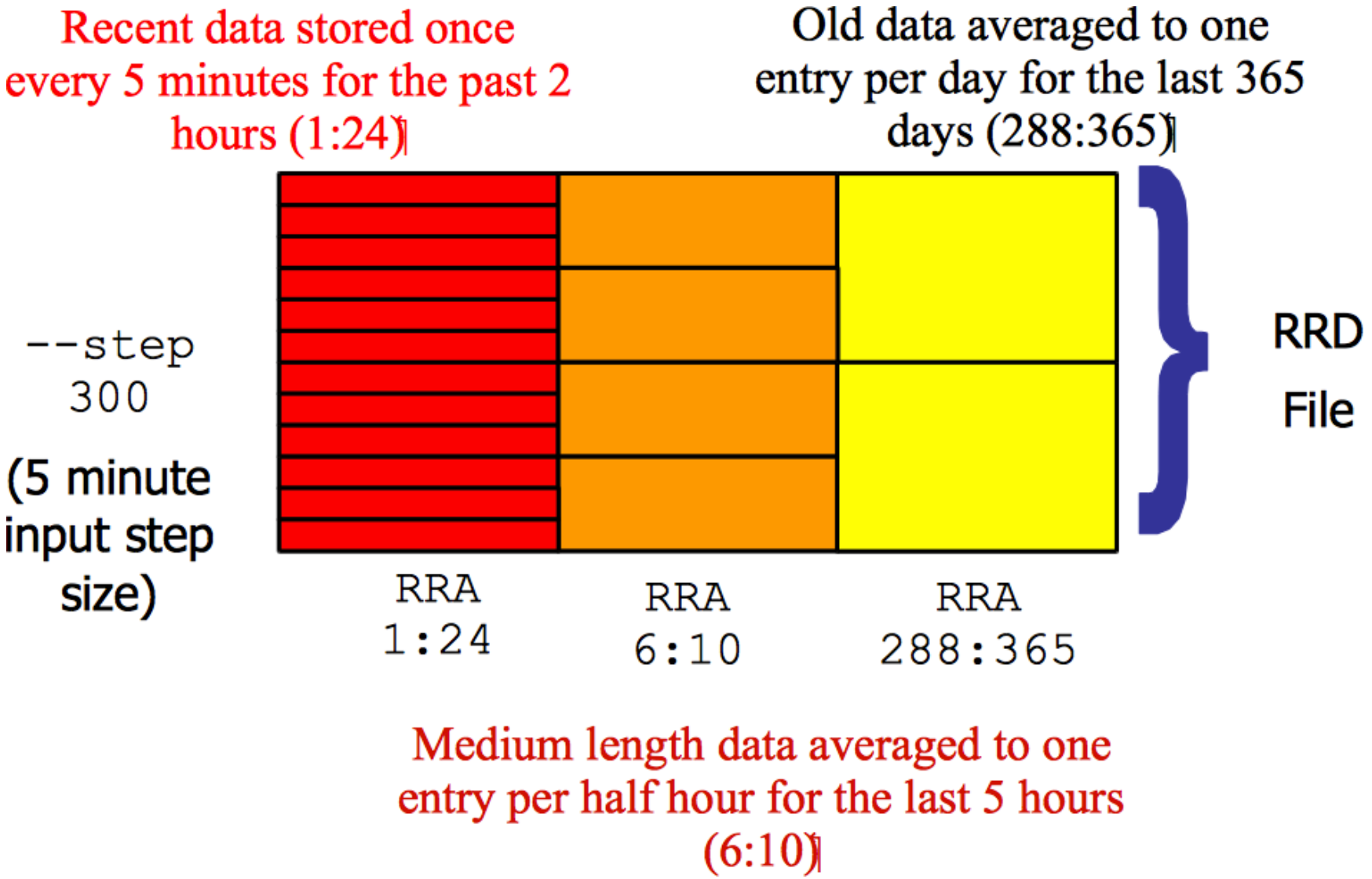
"Cacti is a complete frontend to RRDTool, it stores all of the necessary information to create graphs and populate them with data in a MySQL database. The frontend is completely PHP driven. Along with being able to maintain Graphs, Data Sources, and Round Robin Archives in a database, cacti handles the data gathering. There is also SNMP support for those used to creating traffic graphs with MRTG."

General RRDtool

- Round Robin Database for time series data storage
- Command line based
- From the author of MRTG
- Made to be faster and more flexible
- Includes CGI and Graphing tools, plus APIs
- Solves the Historical Trends and Simple Interface problems as well as storage issues

Find RRDtool here: http://oss.oetiker.ch/rrdtool/

RRDtool Database Format



General Description

1. Cacti is written as a group of PHP scripts.
2. The key script is “poller.php”, which runs every 5 minutes (by default). It resides in /usr/share/cacti/site.
3. To work poller.php needs to be in /etc/cron.d/cacti like this:

```
MAILTO=root
*/5 * * * * www-data php /usr/share/cacti/site/poller.php >/dev/null 2>/var/log/cacti/poller-error.log
```

4. Cacti uses RRDtool to create graphs for each device and data that is collected about that device. You can adjust all of this from within the Cacti web interface.
5. The RRD files are located in /var/lib/cacti/rra when cacti is installed from packages.

Advantages

You can measure Availability, Load, Errors and more all with history.

- Cacti can display your router and switch interfaces and their traffic, including all error traffic as well.
- Cacti can measure drive capacity, CPU load (network h/w and servers) and much more. It can react to conditions and send notifications based on specified ranges.

Graphics

- Allows you to use all the functionality of rrdgraph to define graphics and automate how they are displayed.
- Allows you to organize information in hierarchical tree structures.

Data Sources

- Permits you to utilize all the functions of rrdcreate and rrdupdate including defining several sources of information for each RRD file.

Advantages cont.

Data Collection

- Supports SNMP including the use of *php-snmp* or *net-snmp*
- Data sources can be updated via SNMP or by defining scripts to capture required data.
- An optional component, *cactid*, implements SNMP routines in C with multi-threading. Critical for very large installations.

Templates

- You can create templates to reutilize graphics definitions, data and device sources

Cacti Plugin Architecture

- Extends Cacti functionality. Many, many plugins are available. Part of the default Cacti installation in Ubuntu version 12 and above.

User Management

- You can manage users locally or via LDAP and you can assign granular levels of authorization by user or groups of users.

Disadvantages

- Configuration of Interfaces via the web interface is tedious – use provided command-line scripts instead.
- Upgrading versions can be difficult if installed from Source.

Advice:

For continuous use or large installations it is likely that you will be using scripts and tools to automate the configuration of Cacti.

Steps to add and monitor devices

PART II

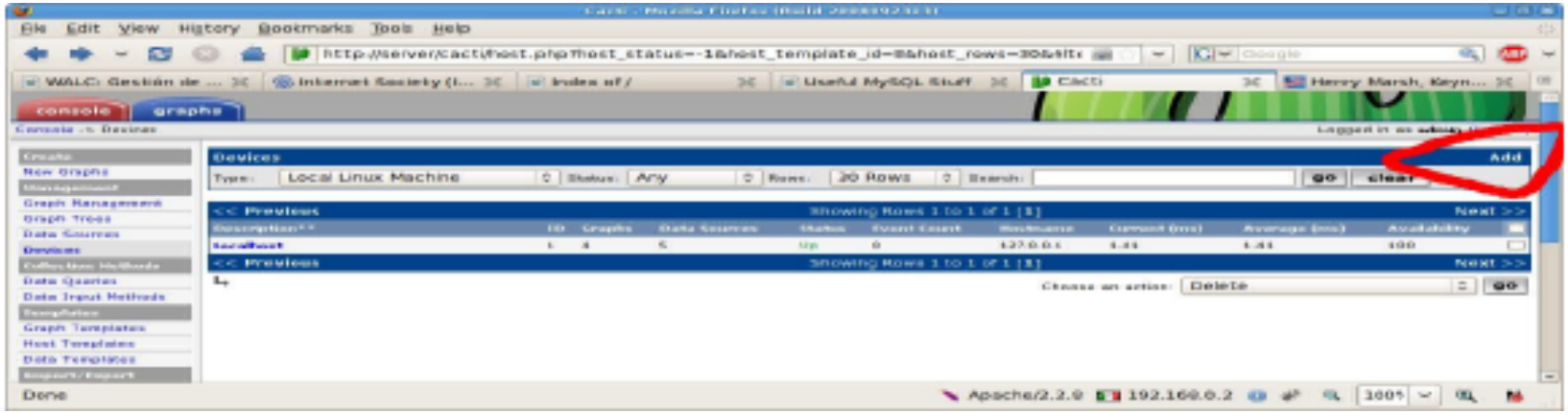
Before we install Cacti we demonstrate how to use the interface to add and monitor some devices…

Adding a Device via Web Interface

Management -> Devices -> Add

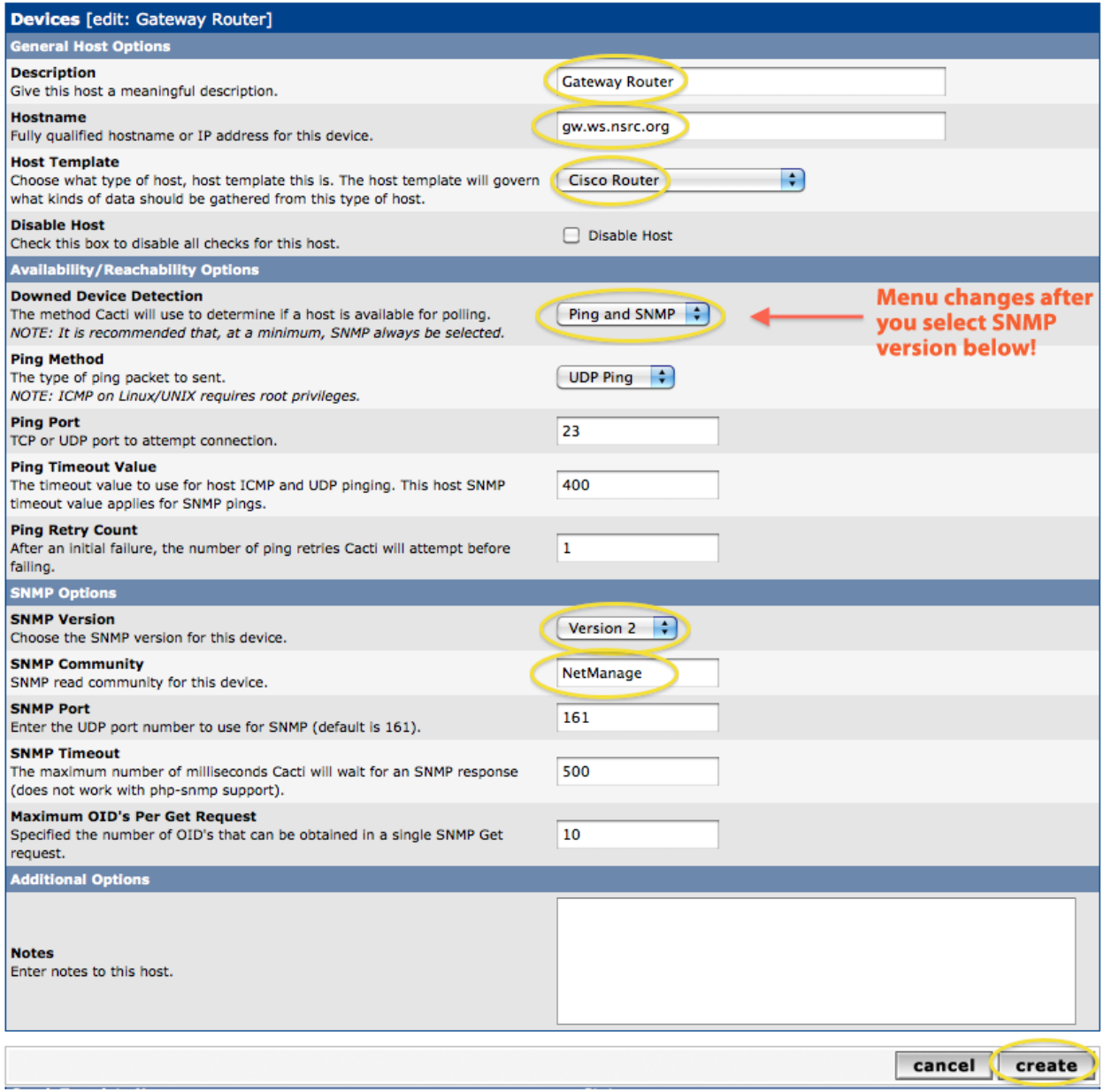
Specify device attributes

- We'll add an entry for our gateway router, gw.ws.nsrc.org*



*Actual device name may be different.

Add Devices: 2



Add Devices: 3

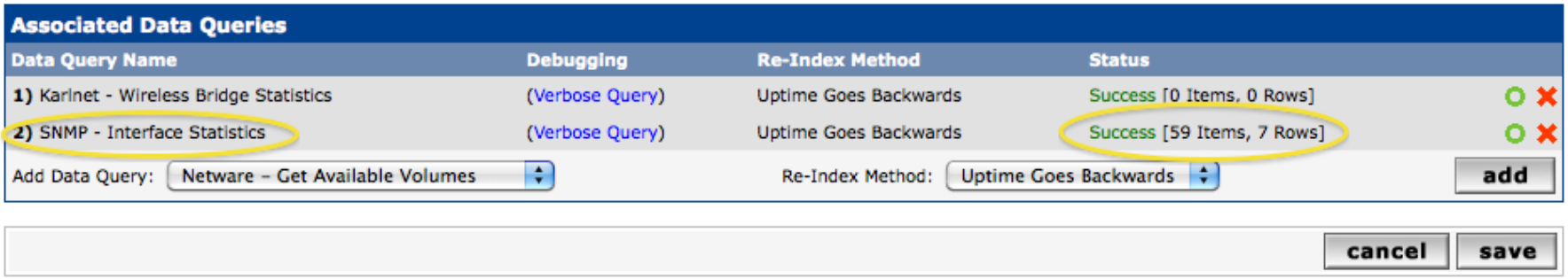
- Host Template: *ucd/net SNMP Host* is recommended for servers to include disk definitions.
- Choose SNMP version 2 for this workshop.
- For “Downed Device Detection” we recommend either using *Ping and SNMP*, or just *Ping*.
- Use “NetManage” for the “SNMP Community” string.

SNMP access is a security issue:

  - Version 2 is not encrypted
  - Watch out for globally readable “public” communities
  - Be careful about who can access r/w communities.
  - Replace “xxxxxxx” with your local public r/o string

Add Devices: 4

For a router you may see *a lot* of potential network interfaces that are detected by SNMP.



Your decision is to create graphs for all of these are not. Generally the answer is, "Yes" – Why?

Create Graphics

- Chose the “Create graphs for this host”
- Under Graph Templates generally check the top box that chooses *all* the available graphs to be displayed.
- Press Create.
- You can change the default colors, but the predefined definitions generally work well.

Create Graphics: 2

Save Successful.

Gateway Router (gw.ws.nsrc.org)

SNMP Information

```
System:Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version
www.cisco.com/techsupport Copyright (c) 1986-2006 by Cisco Systems,
Inc. Compiled Tue 28-Feb-06 21:03 by alnguyen
Uptime: 24881862 (2 days, 21 hours, 6 minutes)
Hostname: sanog17-2.learn.ac.lk
Location:
Contact:
```

Ping Results

```
UDP Ping Success (1.19 ms)
```

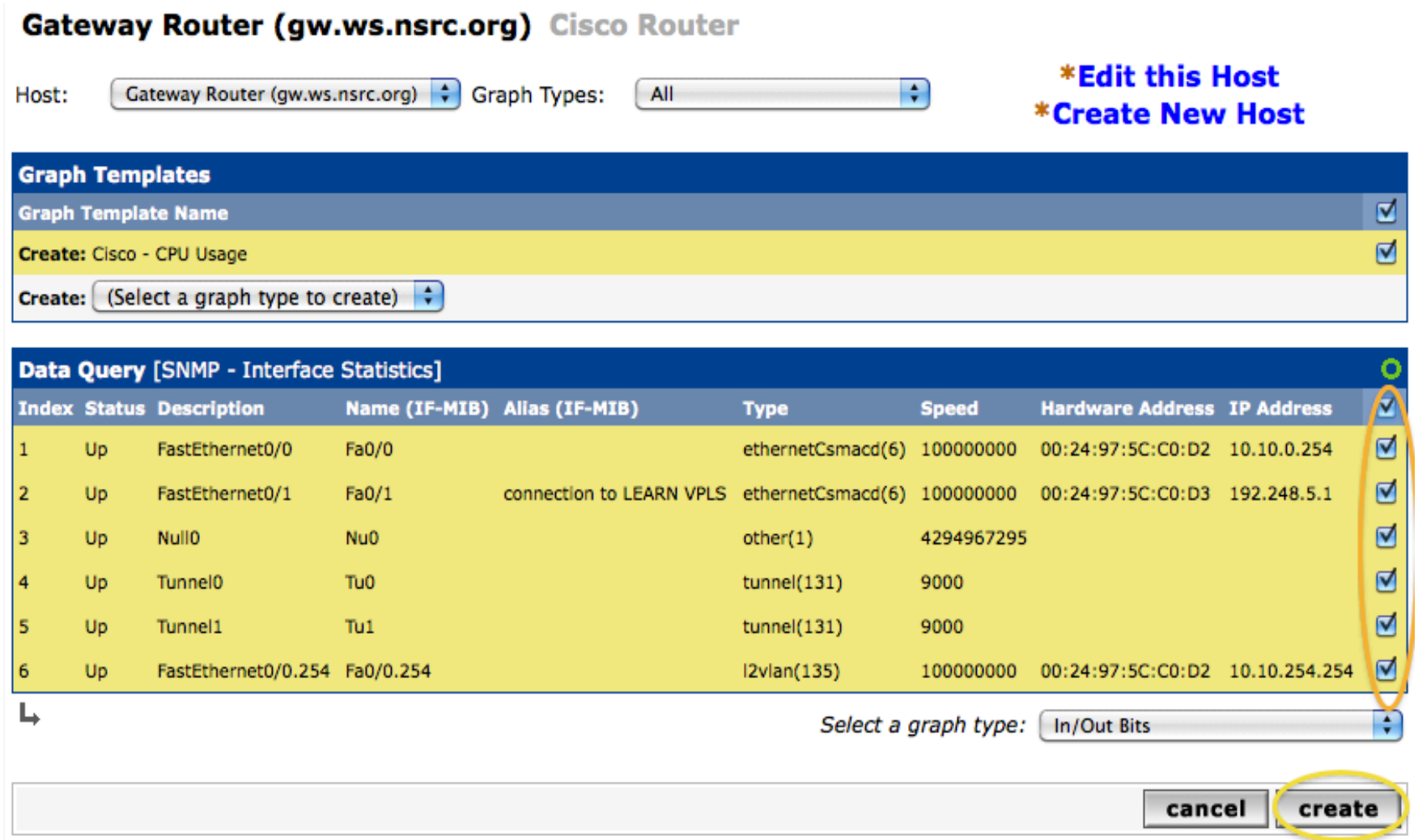
*Create Graphs for this Host
*Data Source List
*Graph List

Devices [edit: Gateway Router]

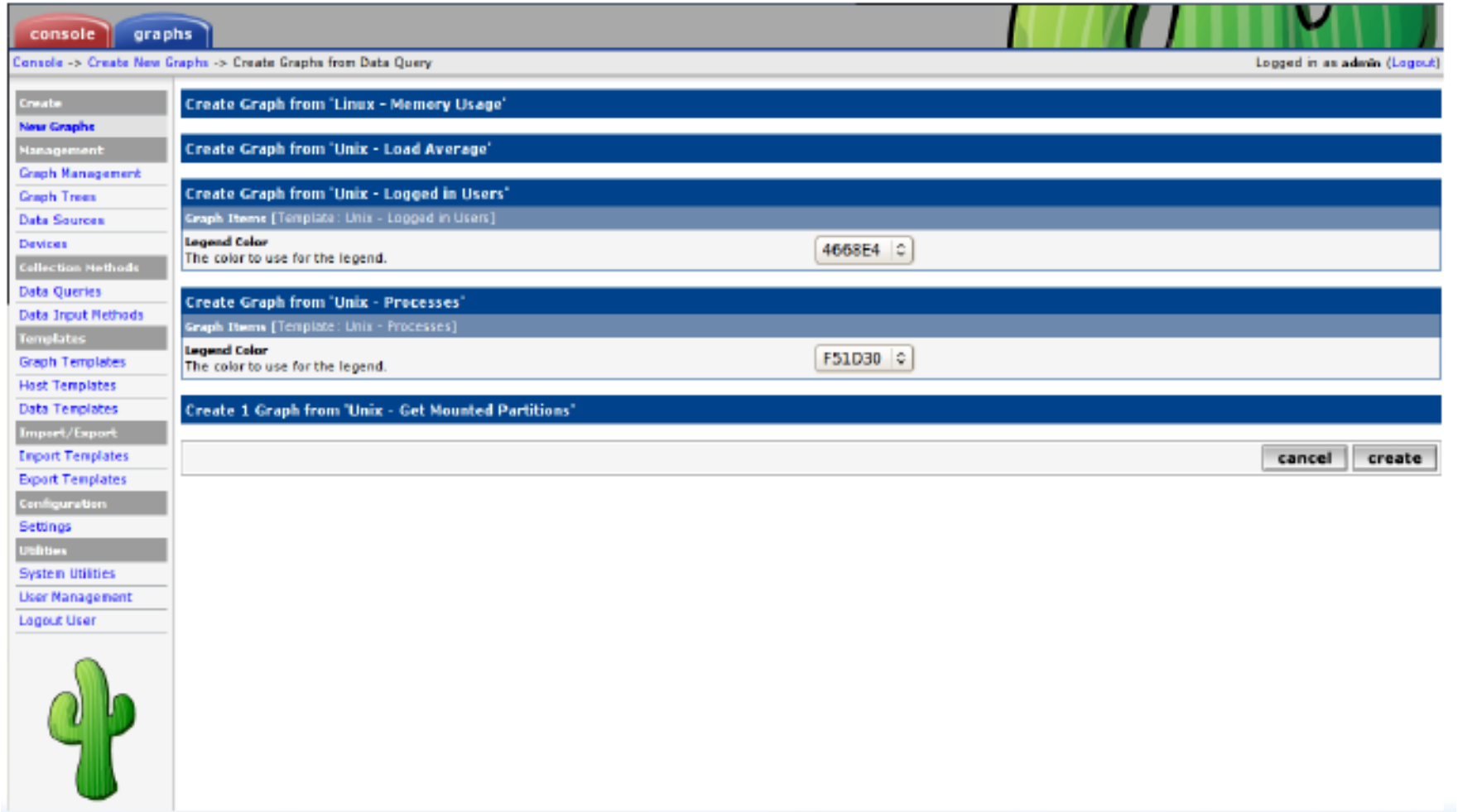
General Host Options

Description Give this host a meaningful description.	Gateway Router
Hostname Fully qualified hostname or IP address for this device.	gw.ws.nsrc.org
Host Template Choose what type of host, host template this is. The host template will govern what kinds of data should be gathered from this type of host.	Cisco Router

Create Graphics: 3



Create Graphics: 4



You'll see this screen later when you are creating graphics for hosts vs. routers

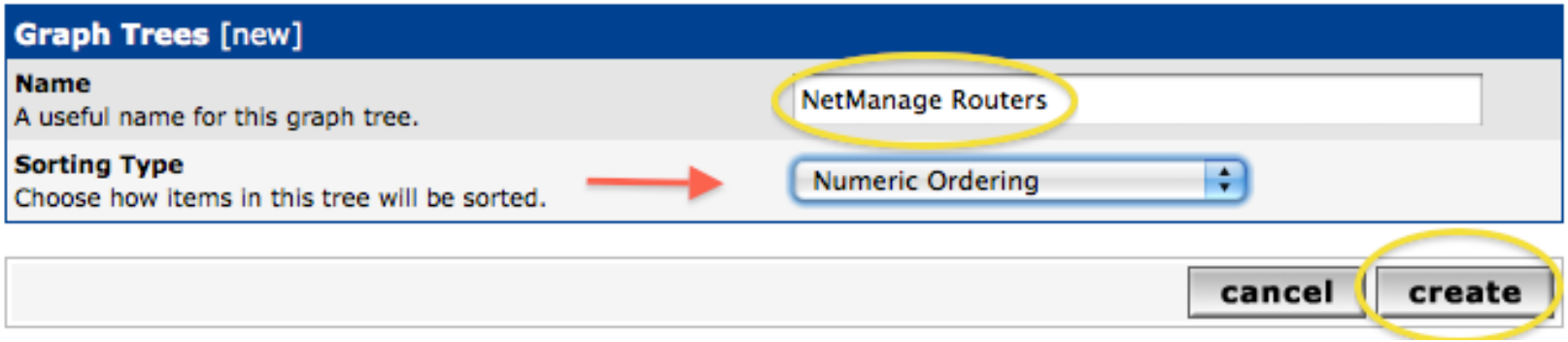
View the Graphics

- Place the new device in its proper location in your tree hierarchy.
- Building your display hierarchy is your decision. It might make sense to try drawing this out on paper first.
  - Under Management → Graph Trees select the Default Tree hierarchy (or, create one of your own).

Graphics Tree

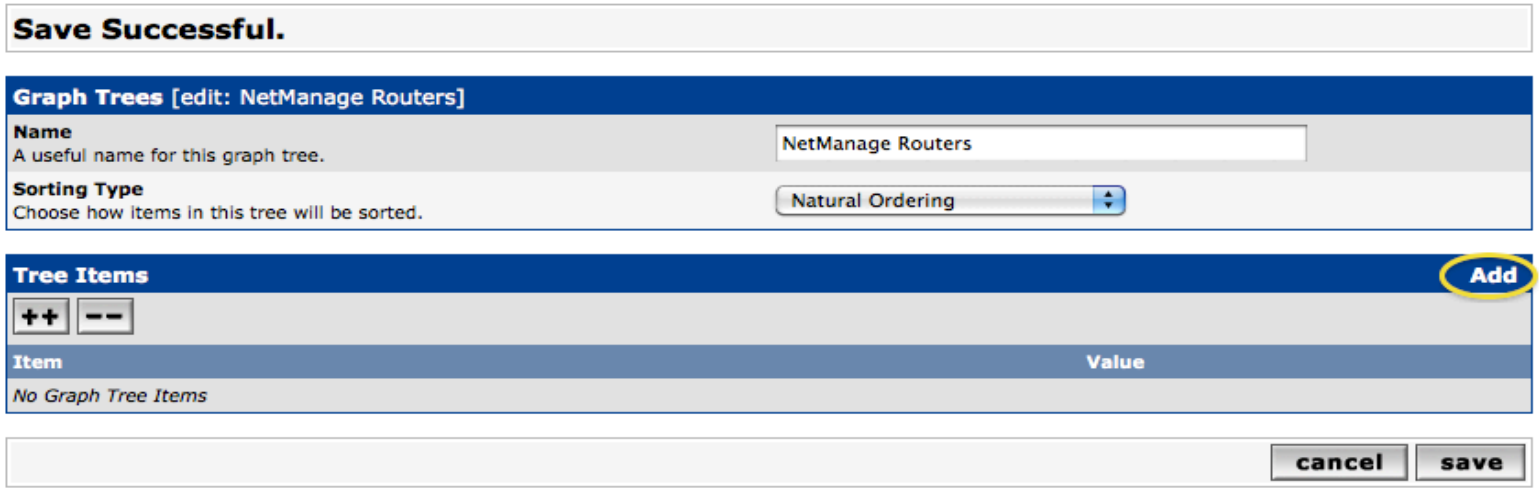
First, press “Add” if you want a new graphing tree:

Second, name your tree, choose the sorting order (the author likes Natural Sorting and press “create”:

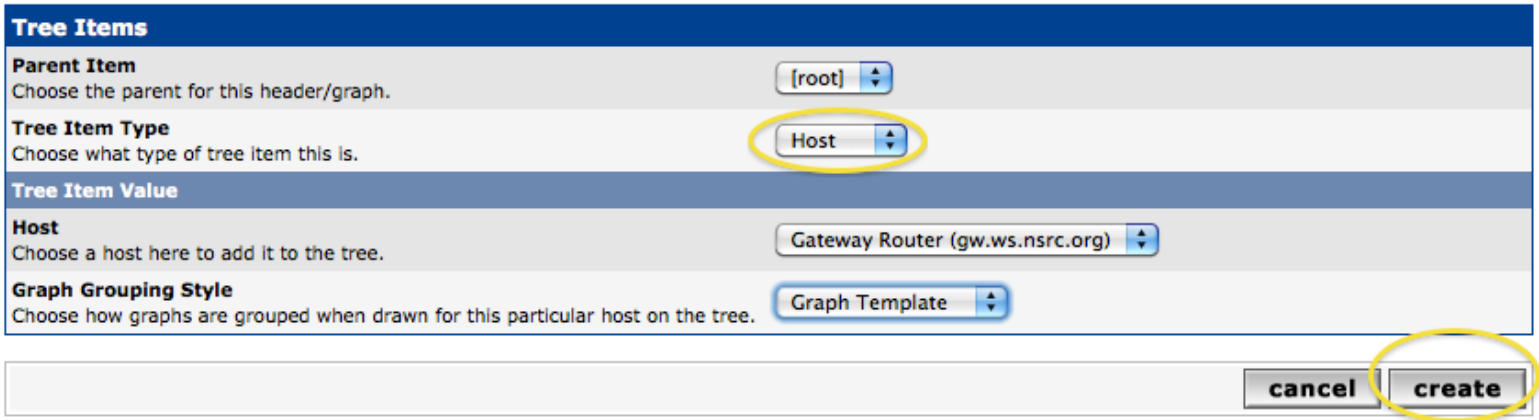


Graphics Tree

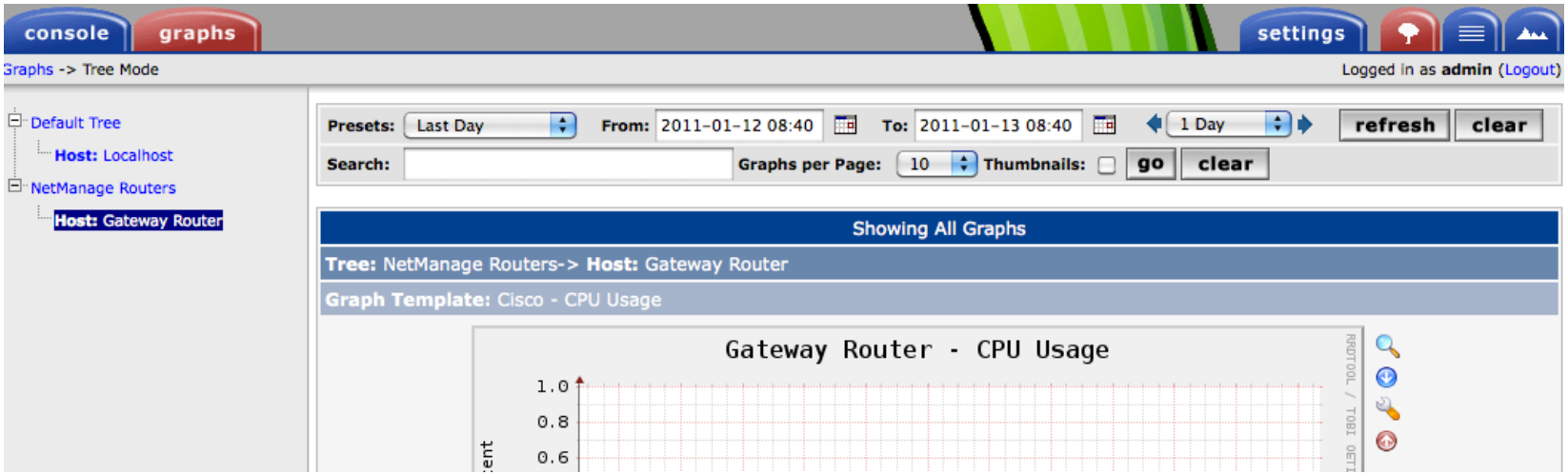
Third, add devices to your new tree:



Once you click “Add” you can add “Headers” (separators), graphs or hosts. Now we'll add Hosts to our newly created graph tree:

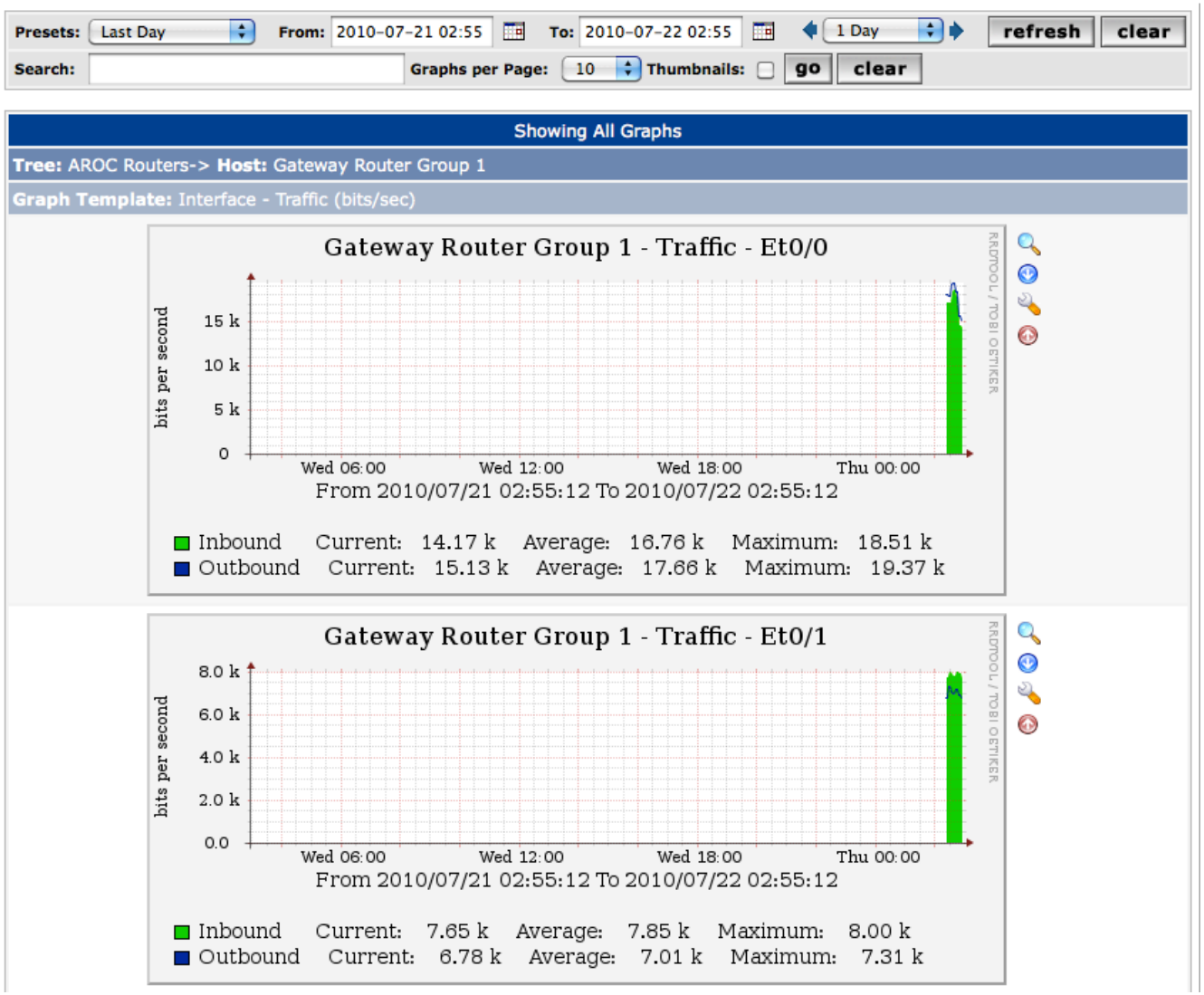


Graphics Tree with 2 Devices

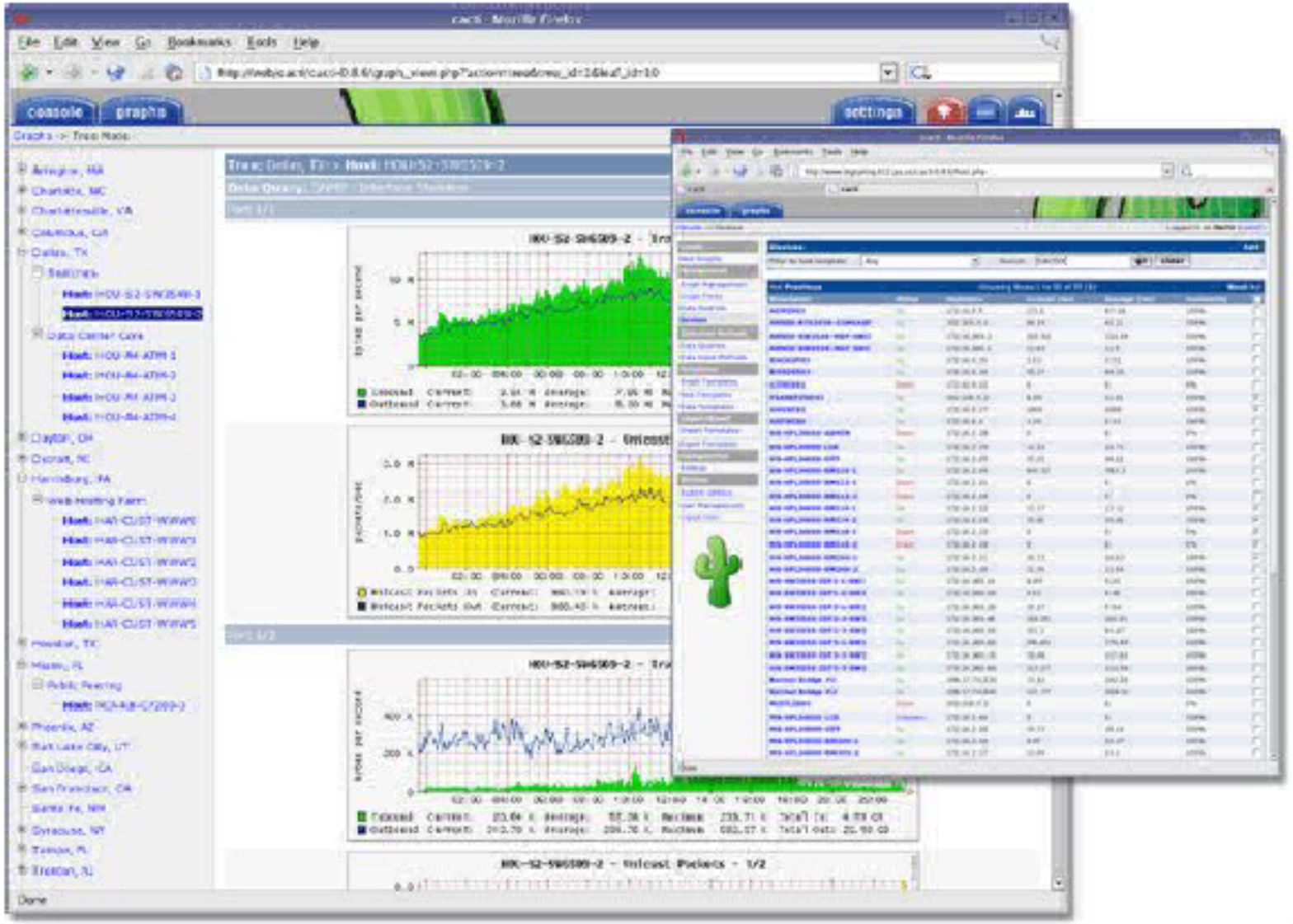


- Our graphics tree *just* after the first two devices were added.
- So far, graphics are empty – the first data can take up to 5 minutes to display.
- Cacti graphs are stored on disk and updated using RRDTool via the poller.php script, which, by default, is run every five minutes using `cron`.

Initial Graphs



Over time you'll see tendencies



Next Steps

- There are a number of popular Cacti plugins, such as:
  - Settings
  - thold
  - PHP Weathermap
- A good place to start is http://cactiusers.net/ and Google.
- To send email to RT from Cacti via rt-mailgate you can use the Cacti “settings” plugin:
  http://docs.cacti.net/plugin:settings
- Automate device and graph creation using available command-line scripts in `/usr/share/cacti/cli`, such as:
  - `add_devices.php`
  - `add_graphs.php`
  - `add_tree.php`

Conclusions

- Cacti is very flexible due to its use of templates.
- Once you understand the concepts behind RRDTool, then how Cacti works should be (more or less) intuitive.
- The visualization hierarchy of devices helps to organize and locate new devices quickly.
- It is not easy to do a rediscover of devices.
- To add lots of devices requires automation. Software such as Netdot, Netdisco, IPPlan, TIPP can help – as well as local scripts that update the Cacti back-end MySQL database directly.

References

- Cacti Web Site:
  http://www.cacti.net/
- Plugin Documentation
  http://docs.cacti.net/plugins
- Cacti Discussion Group:
  http://forums.cacti.net/
- Cacti Users – Plugin Architecture Home
  http://cactiusers.org/

PART III

Cacti Installation and Configuration

Exercises

Your Mission...

- Install Cacti
- Create device entry for your local router
- Create device entries for your local servers
- Create graphs for each item
- Place PCs, Routers, Switches in a tree hierarchy of your design.
- Add additional devices using the command line scripts.

Use the Network Diagram on the class wiki as a reference.

Cacti Installation General

- Available in RPM form and packages for Gentoo, Red Hat, Fedora, SuSE, FreeBSD, etc.
- It is necessary to install *cactid* separately if you wish to use this for larger installations. This is the *cacti-spine* package in Ubuntu.

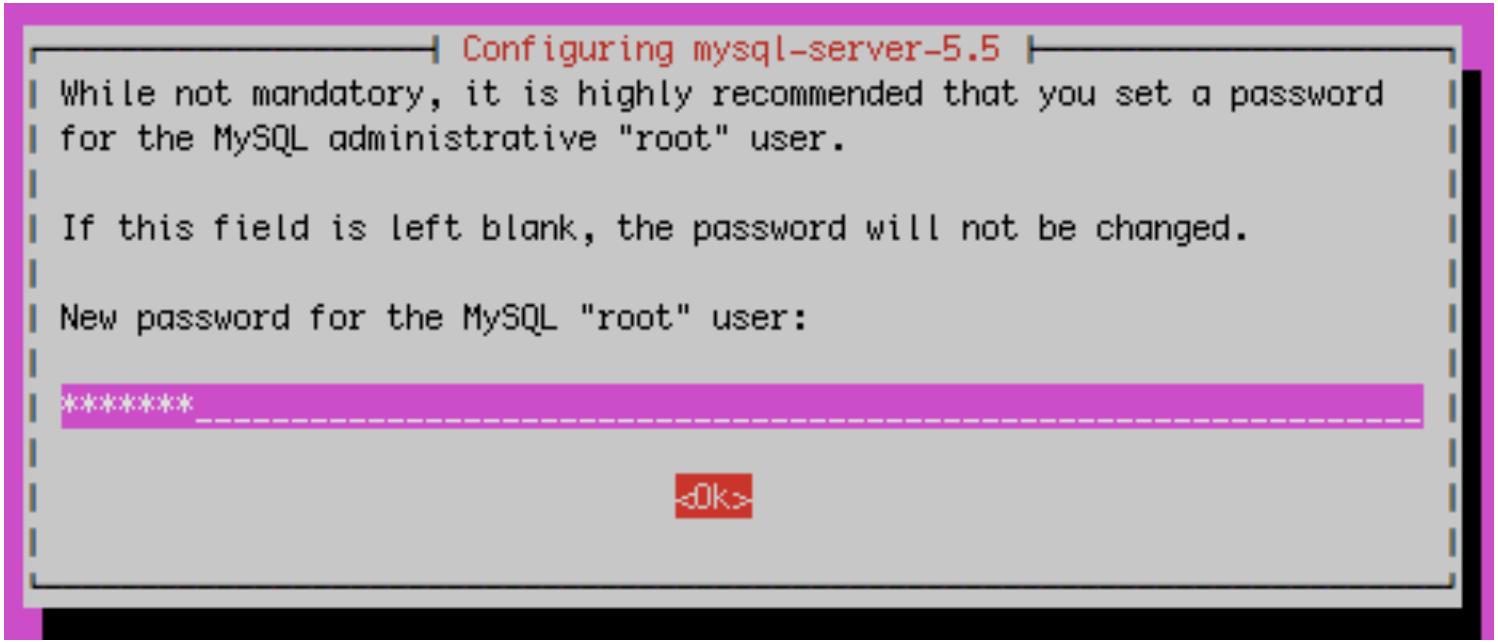
Installation: Ubuntu Server 12.04

In Ubuntu Cacti 0.8.8a with the Plugin Architecture is not yet part of the main distribution. We need a few extra steps to install Cacti 0.8.8a at this time:

```
# apt-get install python-software-properties
    After this operation, 22.0 MB of additional disk space will be used.
    Do you want to continue [Y/n]? Y
# add-apt-repository ppa:micahg/ppa
    You are about to add the following PPA to your system:
     These are packages that I wanted backported to the current stable release.
     More info: https://launchpad.net/~micahg/+archive/ppa
    Press [ENTER] to continue or ctrl-c to cancel adding it
      (Press <ENTER> at this point)
# apt-get update
# apt-get install cacti
    0 upgraded, 62 newly installed, 0 to remove and 0 not upgraded.
    Need to get 55.4 MB of archives.
    After this operation, 175 MB of additional disk space will be used.
    Do you want to continue [Y/n]? Y
```

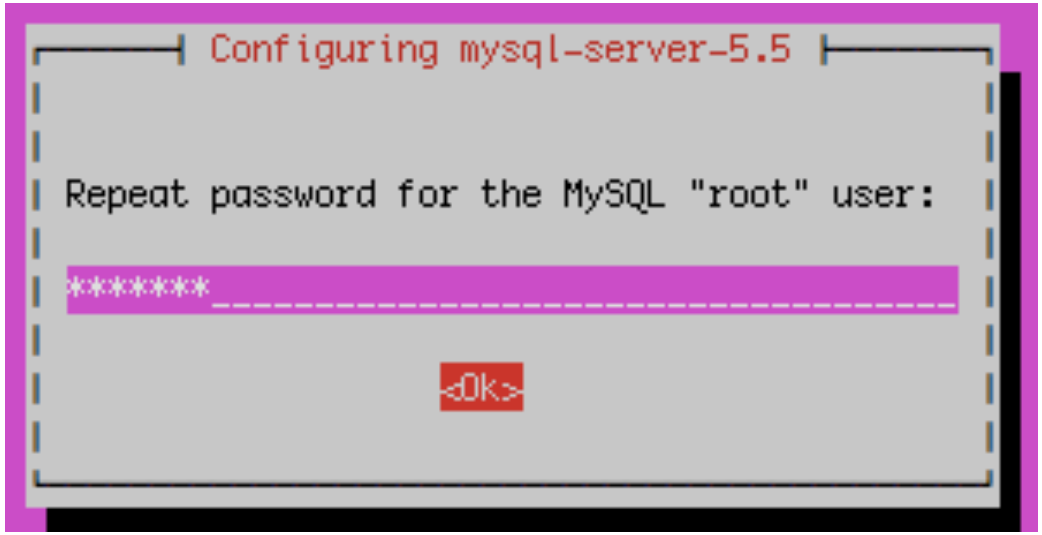
Installation: 2

We may have already done this for you. If so, you can use these slides for informational purposes. Skip to the Cacti *Web* installation steps to continue…



Use the workshop root password given in class.
Please do not use a different password.

Installation: 3

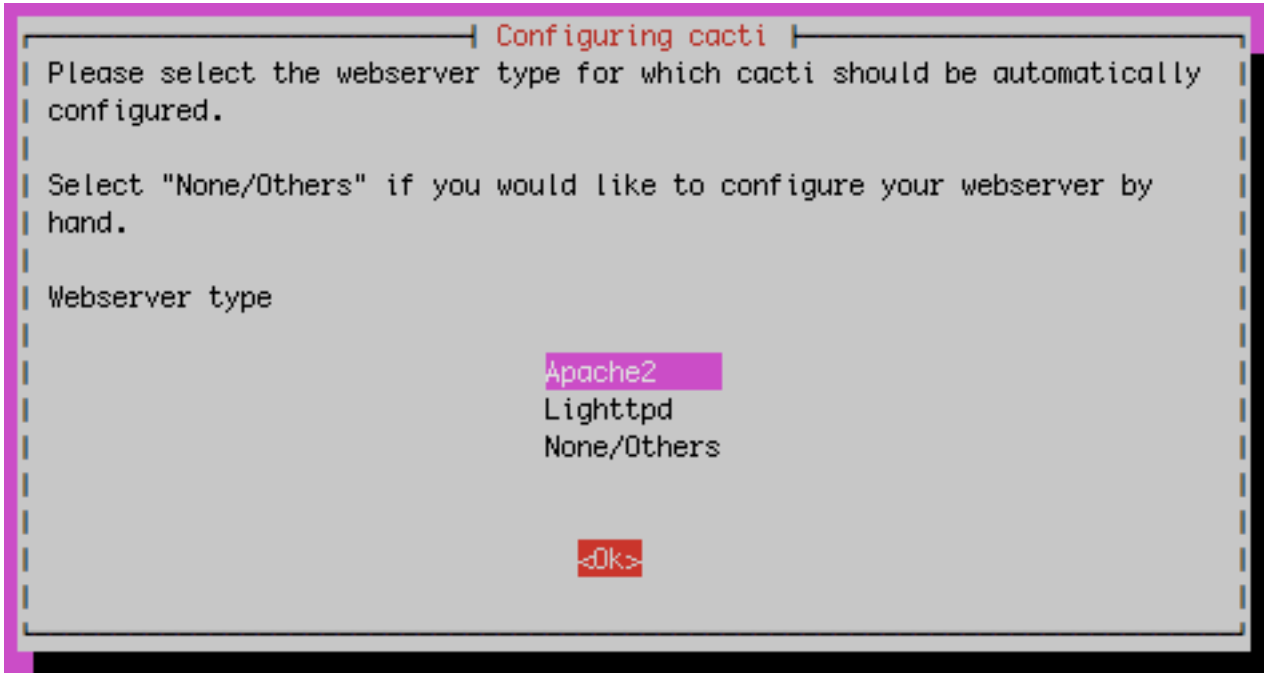


Again, use the workshop root password

Installation: 4

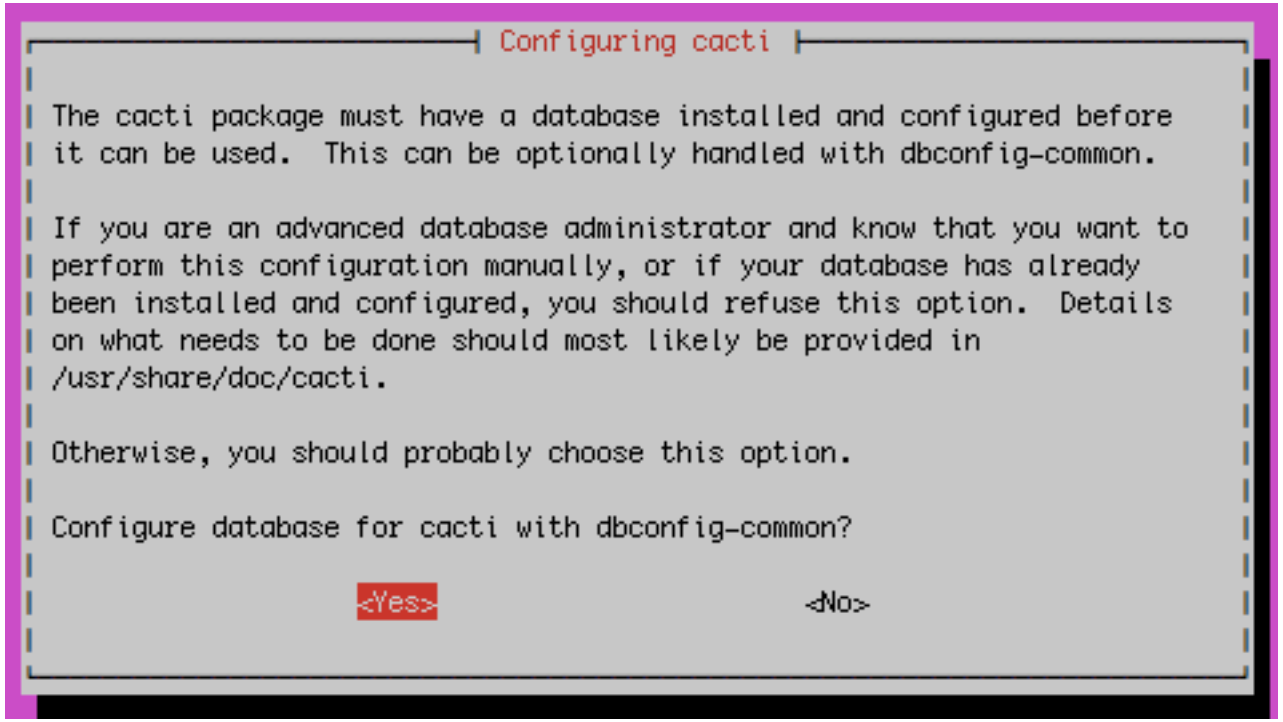
Informational message only. Not an issue. Press OK to continue.

Installation: 5



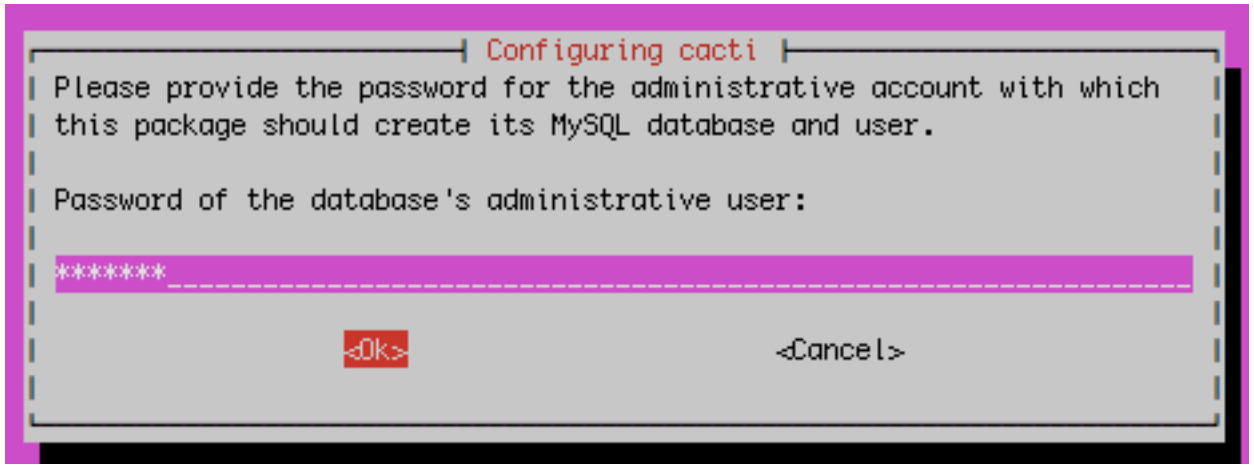
We are using Apache2. Be sure this is chosen then highlight <Ok> and press <ENTER> to continue.

Installation: 6



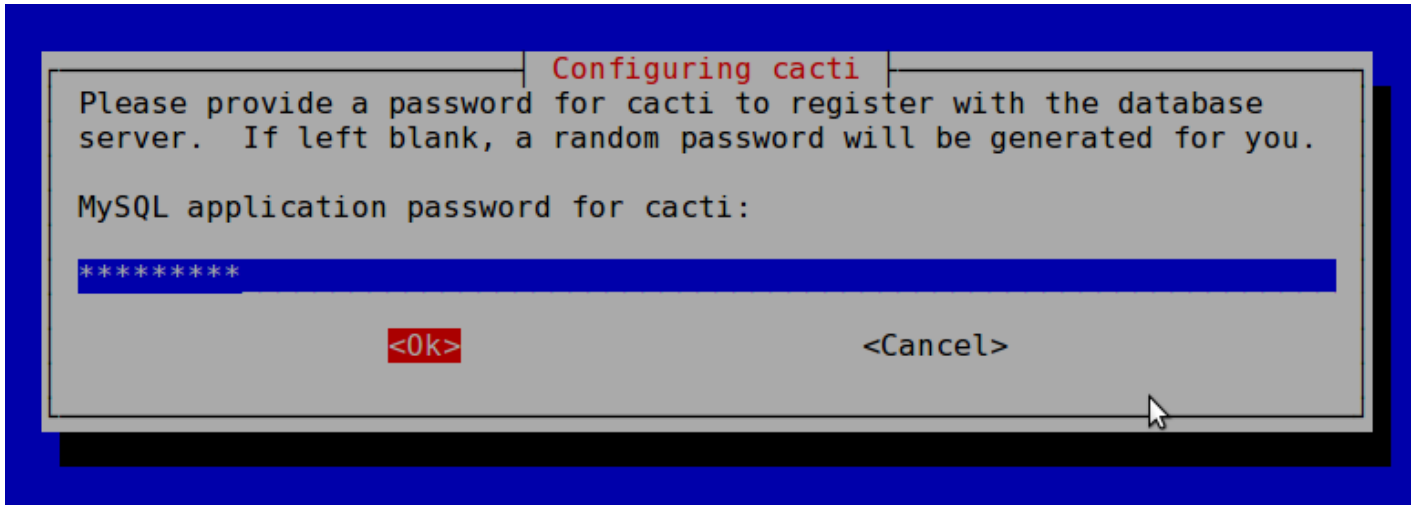
Choose <Yes> and press <ENTER> to continue.

Installation: 7



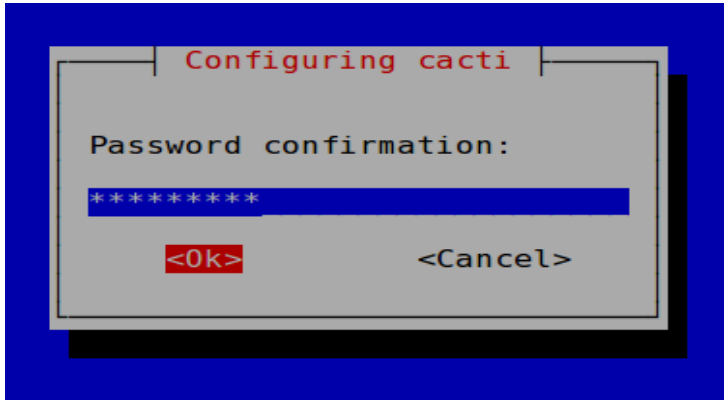
Use the workshop **root password** you provided earlier.

Installation: 8



Use any password you wish.
This is ***not*** the workshop root password.

Installation: 9



Repeat the password you just entered in the previous screen.

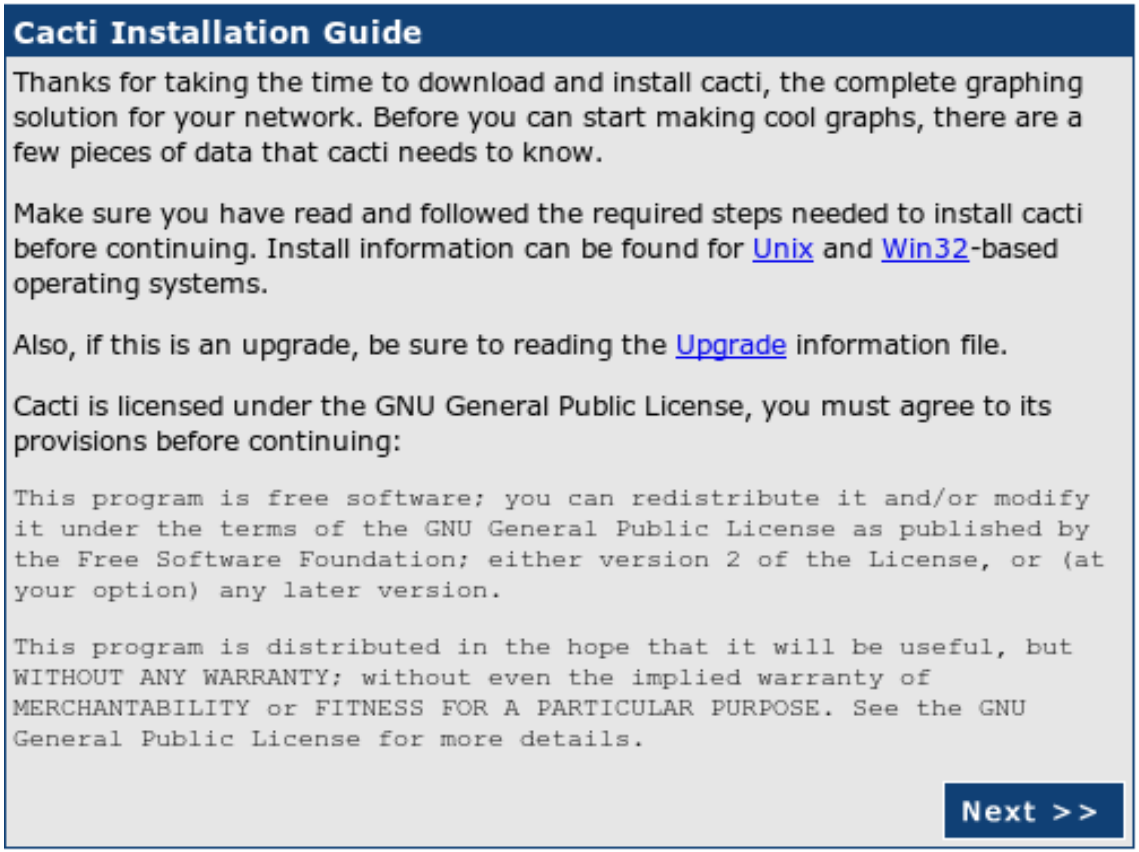
Cacti: Installation - Web

Now use a web browser and open the following address:

http://pcN.ws.nsrc.org/cacti

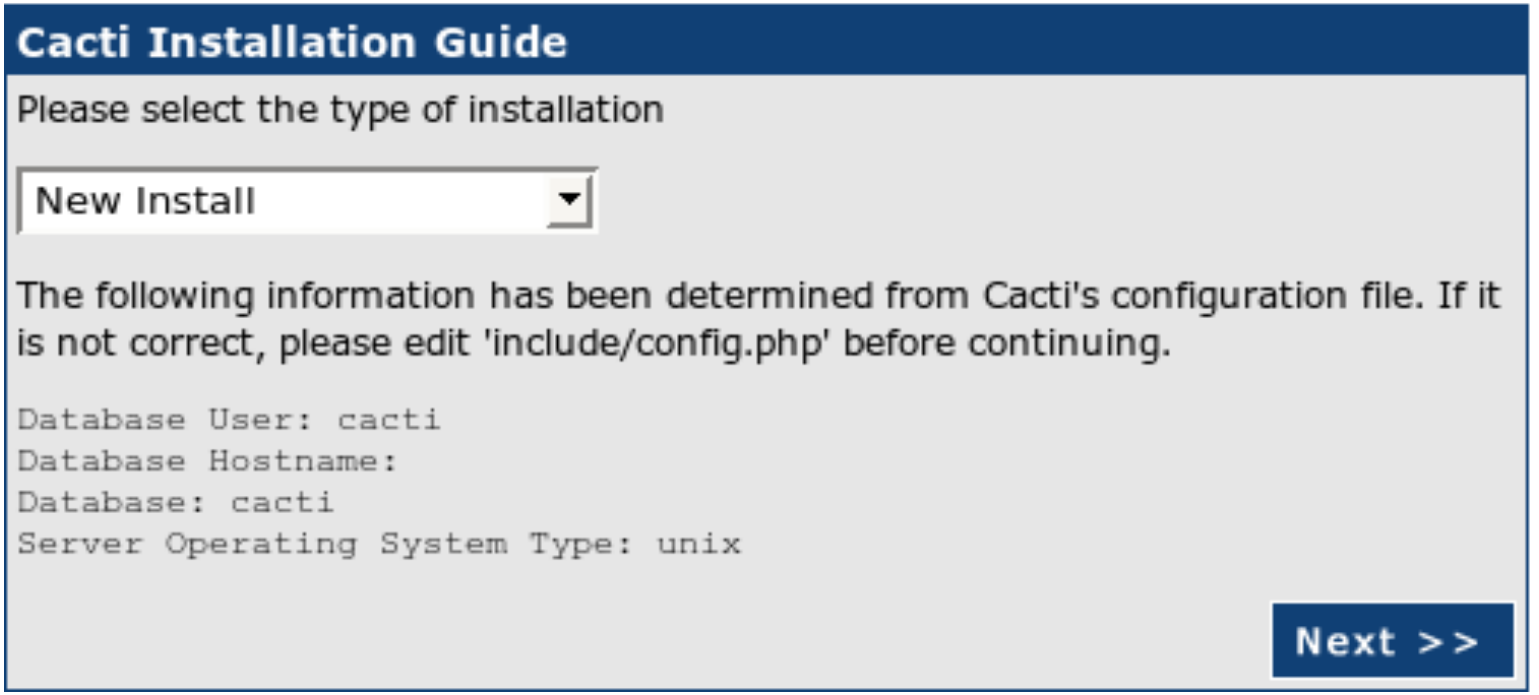
You will see the following...

Cacti: Installation - Web



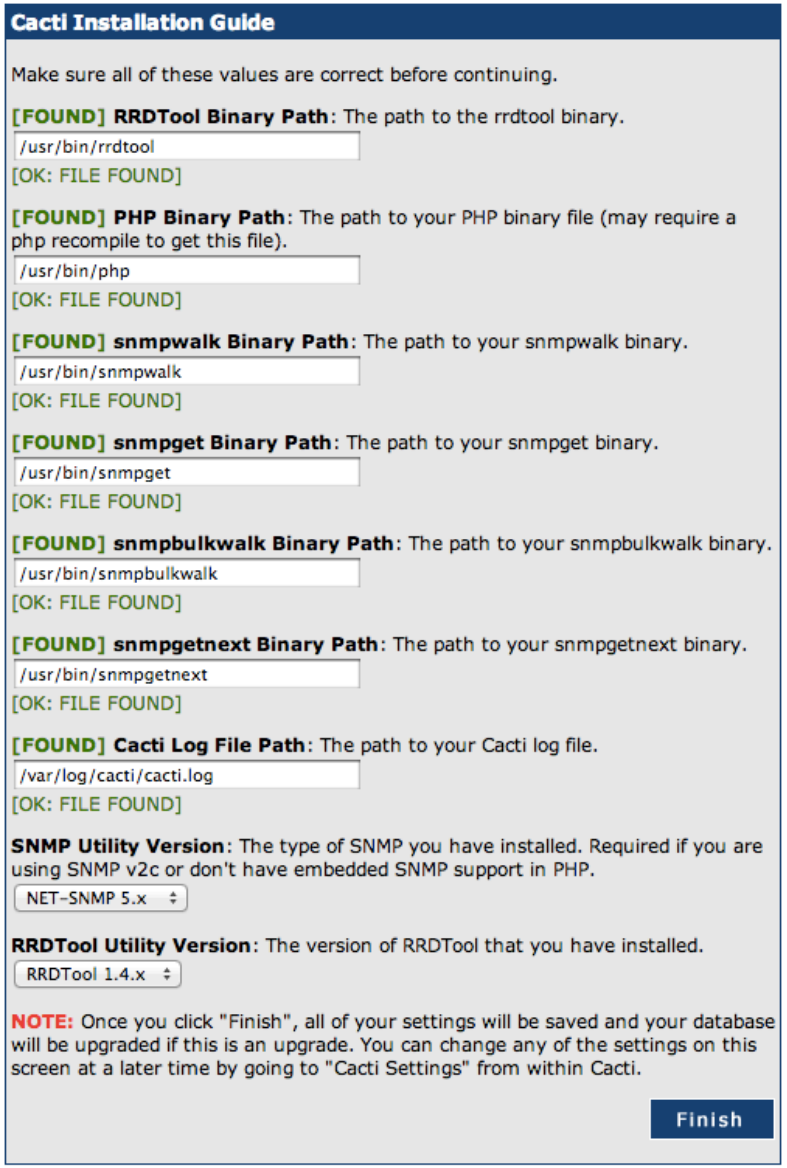
Press “Next >>”

Cacti: Installation - Web



Choose “New Install” and press “Next >>” again.

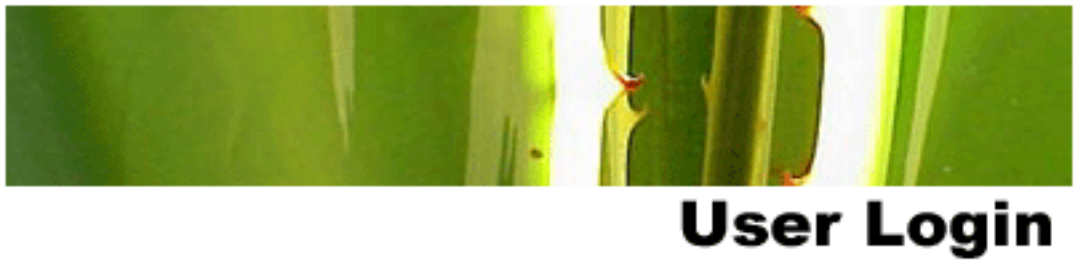
Cacti: Installation - Web



Your screen should look like this. If it does not ask your instructor for help.

Press “Finish”

Cacti: First Time Login



First time login use:

User Name: *admin*
Password: *admin*

Cacti: Change Default Password

User Login

*** Forced Password Change ***

Please enter a new password for cacti:

Password: ********

Confirm: ********

Save

Now you must change the *admin* password.

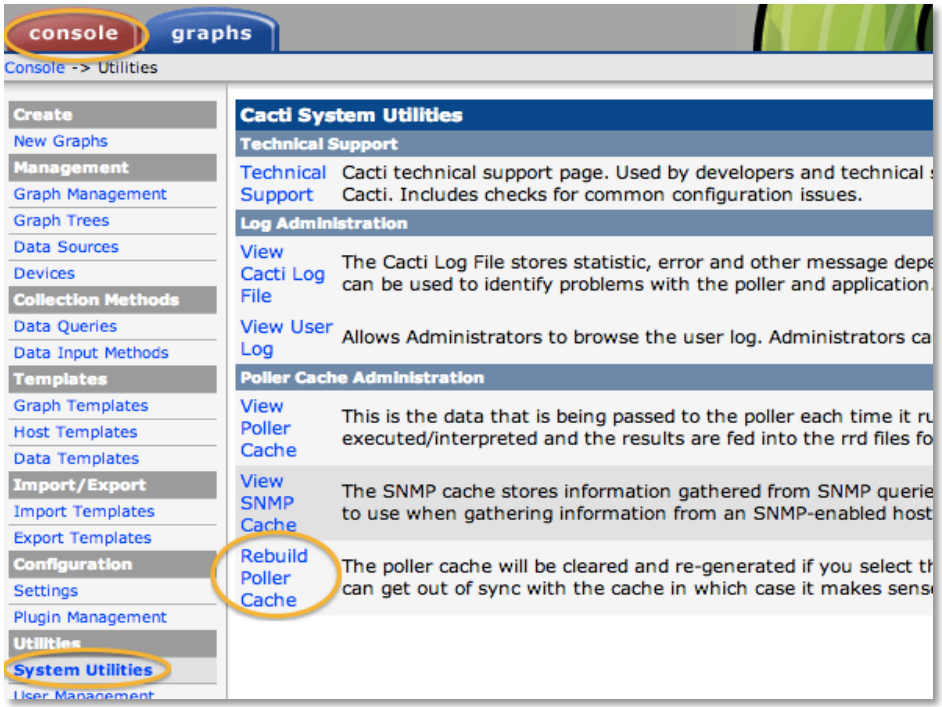
Please ***use the workshop password*** provided in class.

Cacti: Fix Localhost Graphs

There is a minor bug with Cacti version 0.8.8a. In order to start generating the default graphs for the Localhost entry (preconfigured at install) you need to do the following:

1. After logging in click on the ”console” tab.
2. Click on ”System Utilities” bottom left of the screen.
3. Click on ”Rebuild Poller Cache”

That’s it. Now if you click on the ”graphs” tab you will see graphs for your localhost appear within 5 minutes.



Cacti: Final Installation Steps

Back at your system prompt you need to enter in a few final commands to clean up our software repositories and fix a minor bug in the current Cacti 0.8.8.a package:

```
# add-apt-repository -r ppa:micahg/ppa
     You are about to remove the following PPA from your system:
      These are packages that I wanted backported to the current stable release.
      More info: https://launchpad.net/~micahg/+archive/ppa
     Press [ENTER] to continue or ctrl-c to cancel removing it
       (Press <ENTER> at this point)
```

Next you need to create some logical links to support the Cacti Plugin Architecture properly:

```
# ln -s /usr/share/cacti/site/include /usr/local/share/cacti/include
# ln -s /usr/share/cacti/site/lib /usr/local/share/cacti/lib
```

You are now done installing Cacti version 0.8.8a.

PART IV

Additional Cacti Exercises

Available as part of the workshop agenda page on your classroom wiki.