

Network and Server Statistics using Cacti

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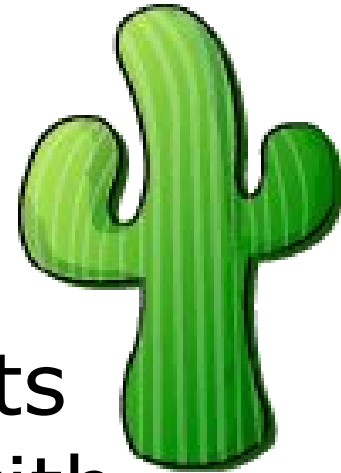
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Introduction

- 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.

Introduction Cont.



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

"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."

Advantages

- Graphics
 - Allows the use of all the functions of rrdgraph to define graphics and to automate some of them
 - Allows you to organize information in hierarchical trees.
- Date sources
 - Allows you to use all the rrdcreate and rrdupdate functions, including defining multiple data sources for RRD files
- Data collection
 - Data sources can be updated via SNMP or by defining scripts
 - SNMP support included using php-snmp or net-snmp
 - An optional component, *cactid*, implements SNMP routines in C with multi-threading for increased efficiency. This can be critical if you have lots of devices.
- Templates
 - You can create templates to reuse graphics definitions, data sources and devices.
- User management
 - You can manage authentication (locally or via LDAP) having distinct levels of authorization for users (if you so wish).

Installation

- Available in RPMs and packages for Gentoo, Debian, etc.
- It's necessary to install *cactid* separately if you wish to use it for faster SNMP calls.
- Starting in Ubuntu 8.10 the cacti package install is complete. Prior to 8.10 additional steps were required after doing:

```
– apt-get install cacti
```

Configuration

- Cacti uses MySQL to store configurations. In older Ubuntu versions it was necessary to manually create the cacti MySQL database and set the permissions:

```
# mysqladmin --user=root create cacti
# mysql cacti < cacti.sql
# mysql --user=root mysql

mysql> GRANT ALL ON cacti.* TO cactiuser@localhost IDENTIFIED BY 'cacti_pass';
mysql> flush privileges;
```

- It was, also, sometimes necessary to manually specify the cacti connection parameters in `/etc/cacti/db.php`:

```
$database_type = "mysql";
$database_default = "cacti";
$database_hostname = "localhost";
$database_username = "cactiuser";
$database_password = "cacti_pass";
$database_port = "3306";
```

Configuration

- Make sure that there is a cron job that has been configured as well – Likely in `/etc/cron.d/cacti`.
- This will be something like:

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

- This is not necessary with the Debian package in Ubuntu 8.10.

cactid

```
# tar xvzf cacti-cactid-0.8.6.tar.gz
# cd cactid-0.8.6
# ./configure
# make
# make install
```

```
# vi /usr/local/cactid/bin/cactid.conf
DB_Host      localhost
DB_Database  cacti
DB_User      cactiuser
DB_Pass      cacti_pass
DB_Port      3306
```

In the web interface:

- Go to **Configuration -> Settings -> Paths -> Cactid Poller File Path** and specify the location of cactid
- Go to **Poller** and in **Poller Type**, select **cactid**

cacti: Installation

Now, use your web browser and open:

`http://localhost/cacti`

You'll see the following...

cacti: Installation

Cacti Installation Guide

Thanks for taking the time to download and install cacti, the complete graphing solution for your network. Before you can start making cool graphs, there are a few pieces of data that cacti needs to know.

Make sure you have read and followed the required steps needed to install cacti before continuing. Install information can be found for [Unix](#) and [Win32](#)-based operating systems.

Also, if this is an upgrade, be sure to reading the [Upgrade](#) information file.

Cacti is licensed under the GNU General Public License, you must agree to its provisions before continuing:

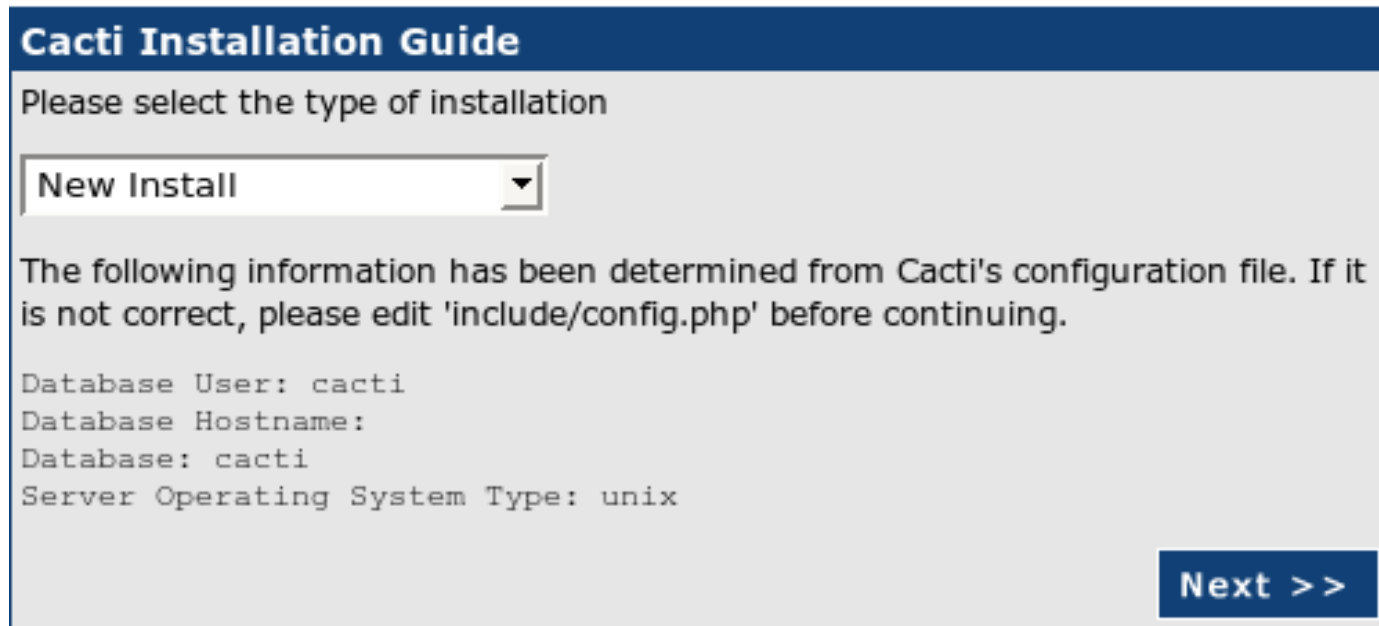
```
This program is free software; you can redistribute it and/or modify
it under the terms of the GNU General Public License as published by
the Free Software Foundation; either version 2 of the License, or (at
your option) any later version.
```

```
This program is distributed in the hope that it will be useful, but
WITHOUT ANY WARRANTY; without even the implied warranty of
MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU
General Public License for more details.
```

Next >>

Press “Next >>”

cacti: Instalación



Cacti Installation Guide

Please select the type of installation

The following information has been determined from Cacti's configuration file. If it is not correct, please edit 'include/config.php' before continuing.

Database User: cacti
Database Hostname:
Database: cacti
Server Operating System Type: unix

[Next >>](#)

Choose "New Install" and press "Next >>" again.

cacti: Instalación

Cacti Installation Guide

Make sure all of these values are correct before continuing.

[FOUND] RRDTool Binary Path: The path to the rrdtool binary.

[FOUND] PHP Binary Path: The path to your PHP binary file (may require a php recompile to get this file).

[FOUND] snmpwalk Binary Path: The path to your snmpwalk binary.

[FOUND] snmpget Binary Path: The path to your snmpget binary.

[FOUND] snmpbulkwalk Binary Path: The path to your snmpbulkwalk binary.

[FOUND] snmpgetnext Binary Path: The path to your snmpgetnext binary.

[FOUND] Cacti Log File Path: The path to your Cacti log file.

SNMP Utility Version: The type of SNMP you have installed. Required if you are using SNMP v2c or don't have embedded SNMP support in PHP.

RRDTool Utility Version: The version of RRDTool that you have installed.

NOTE: Once you click "Finish", all of your settings will be saved and your database will be upgraded if this is an upgrade. You can change any of the settings on this screen at a later time by going to "Cacti Settings" from within Cacti.

Should screen should look like this. If not, ask for help from your instructor.

Press "Finish"

cacti: First Login



User Login

Please enter your Cacti user name and password below:

User Name:

Password:

Login

Log in the first time using:

User Name: *admin*

Password: *admin*

cacti: Password Change



User Login

***** Forced Password Change *****

Please enter a new password for cacti:

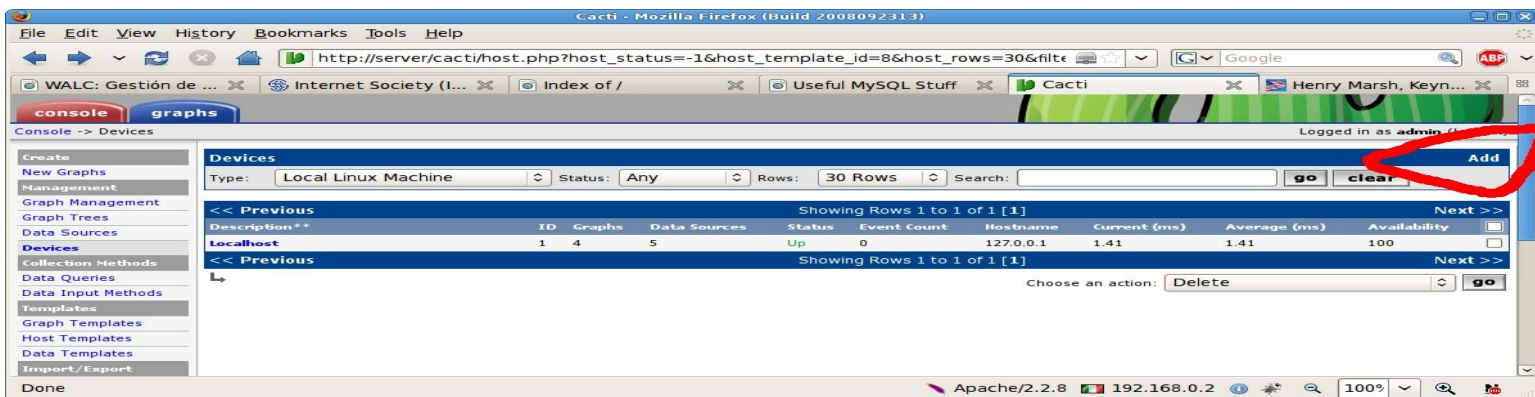
Password:

Confirm:

Now you must change the admin password. Please *use the workshop password* when you do this.

Add Devices

- **Management -> Devices -> Add**
- Specify device attributes
 - Select a device template and this will automatically provide you with several device templates as well as ask for information about the device.
 - You can add additional templates when/if you wish.




Add devices

console graphs

Console -> Devices -> (Edit) 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



Devices [new]

Description
Give this host a meaningful description.

Hostname
Fully qualified hostname or IP address for this device.

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.

Notes
Enter notes to this host.

Disable Host
Check this box to disable all checks for this host. Disable Host

Availability/Reachability Options

Downed Device Detection
The method Cacti will use to determine if a host is available for polling.
NOTE: It is recommended that, at a minimum, SNMP always be selected.

Ping Method
The type of ping packet to sent.
NOTE: ICMP on Linux/UNIX requires root privileges.

Ping Port
TCP or UDP port to attempt connection.

Ping Timeout Value
The timeout value to use for host ICMP and UDP pinging. This host SNMP timeout value applies for SNMP pings.

Ping Retry Count
The number of times Cacti will attempt to ping a host before failing.

SNMP Options

SNMP Version
Choose the SNMP version for this device.

SNMP Community
SNMP read community for this device.

SNMP Port
Enter the UDP port number to use for SNMP (default is 161).

SNMP Timeout
The maximum number of milliseconds Cacti will wait for an SNMP response (does not work with php-snmp support).

Maximum OID's Per Get Request
Specified the number of OID's that can be obtained in a single SNMP Get request.
NOTE: This feature only works when using Spine

Add Devices

Be sure you choose SNMP Version 2 for class.

You can, of course, use SNMP Version 3 in your own environment.

Create graphics

- Go to the “Create graphs for this host” choice.
- Choose the graph templates and date queries you want, then press “Create”.
- You can change the default color schemes for the graphs if you wish, but the predefined ones seem pretty reasonable.

Create graphics: Step 1

console graphs

Console -> Create New Graphs Logged in as **admin** (Logout)

pc1 (pc1.mgmt.conference.apricot.net) Local Linux Machine

Host: Graph Types:


[*Edit this Host](#)
[*Create New Host](#)

Graph Templates

Graph Template Name	
Create: Linux - Memory Usage	<input checked="" type="checkbox"/>
Create: Unix - Load Average	<input checked="" type="checkbox"/>
Create: Unix - Logged in Users	<input checked="" type="checkbox"/>
Create: Unix - Processes	<input checked="" type="checkbox"/>
Create: <input type="text" value="(Select a graph type to create)"/>	

Data Query [Unix - Get Mounted Partitions]

Device Name	Mount Point	
/dev/sda1	/	<input checked="" type="checkbox"/>



Create graphics: Step 2

console graphs

Console -> Create New Graphs -> Create Graphs from Data Query 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



Create Graph from 'Linux - Memory Usage'

Create Graph from 'Unix - Load Average'

Create Graph from 'Unix - Logged in Users'

Graph Items [Template: Unix - Logged in Users]

Legend Color
The color to use for the legend.

Create Graph from 'Unix - Processes'

Graph Items [Template: Unix - Processes]

Legend Color
The color to use for the legend.

Create 1 Graph from 'Unix - Get Mounted Partitions'

See the Graphics

- Place the new device on the tree hierarchy that corresponds to where it belongs.
- This is up to you, but, perhaps, draw this out on a sheet of paper first.
 - In Management -> Graph Trees select the default graph tree (or create your own)

Graph Trees

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

Graph Trees		Add
Name		
Default Tree		x

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

Graph Trees [new]	
Name A useful name for this graph tree.	<input type="text" value="Network Management PCs"/>
Sorting Type Choose how items in this tree will be sorted.	<input type="text" value="Natural Ordering"/>
<input type="button" value="cancel"/> <input type="button" value="create"/>	

Graph Trees

Third, add devices to your new tree:

Graph Trees [edit: Network Management PCs]

Name
A useful name for this graph tree.

Sorting Type
Choose how items in this tree will be sorted.

Tree Items Add

++ --

Item	Value
No Graph Tree Items	

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

Tree Items

Parent Item
Choose the parent for this header/graph.

Tree Item Type
Choose what type of tree item this is.

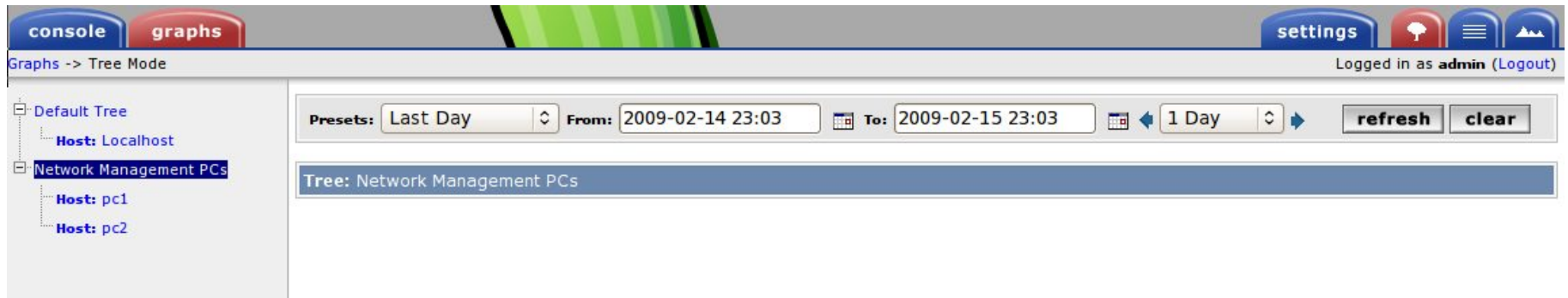
Tree Item Value

Host
Choose a host here to add it to the tree.

Graph Grouping Style
Choose how graphs are grouped when drawn for this particular host on the tree.

Graph Tree with 2 Devices

Our graph tree after our first two devices have been added. No graphs are displayed yet. This can take up to 5 minutes (remember the Cacti cron job?):



The screenshot shows the Cacti web interface in 'Tree Mode'. The top navigation bar includes 'console' and 'graphs' tabs, and a 'settings' button. The user is logged in as 'admin'. The left sidebar shows a tree structure with 'Default Tree' containing 'Host: Localhost' and 'Network Management PCs' containing 'Host: pc1' and 'Host: pc2'. The main content area displays a date range from '2009-02-14 23:03' to '2009-02-15 23:03' with a '1 Day' interval, and buttons for 'refresh' and 'clear'. Below this, a blue bar indicates the selected tree: 'Tree: Network Management PCs'.

Next a much larger example with graphs being displayed ==>

An Example...

The screenshot displays a network monitoring application interface. On the left, a tree view shows a hierarchy of devices, with 'Houston, TX' selected. The main area contains three graphs and a table:

- Graph 1: Inbound Traffic** (Title: HOU-S2-SW209-2 - Inbound)
 - Y-axis: Bytes per second (0 to 80 K)
 - X-axis: Time (02:00 to 12:00)
 - Legend: Inbound Current (green area), Inbound Average (green line)
 - Stats: Current: 3.64 K, Average: 7.05 K
- Graph 2: Outbound Traffic** (Title: HOU-S2-SW209-2 - Outbound)
 - Y-axis: Bytes per second (0 to 2.0 K)
 - X-axis: Time (02:00 to 12:00)
 - Legend: Outbound Current (yellow area), Outbound Average (yellow line)
 - Stats: Current: 3.68 K, Average: 8.30 K
- Graph 3: Packets** (Title: HOU-S2-SW209-2 - Packets)
 - Y-axis: Bytes per second (0 to 800 K)
 - X-axis: Time (02:00 to 20:00)
 - Legend: Packets In (green area), Packets Out (blue area)
 - Stats: Current: 25.64 K, Average: 57.36 K, Packets In: 236.71 K, Total In: 4 M 91 KB, Packets Out: 212.79 K, Average: 209.70 K, Packets Out: 682.07 K, Total Out: 25-98 KB
- Table: Connections**

Destination	State	Current	Max	Min	Current	Max	Min
192.168.1.1	Open	172.16.1.1	172.16.1.1	0	0	0	0%
192.168.1.2	Open	172.16.1.2	172.16.1.2	0	0	0	0%
192.168.1.3	Open	172.16.1.3	172.16.1.3	0	0	0	0%
192.168.1.4	Open	172.16.1.4	172.16.1.4	0	0	0	0%
192.168.1.5	Open	172.16.1.5	172.16.1.5	0	0	0	0%
192.168.1.6	Open	172.16.1.6	172.16.1.6	0	0	0	0%
192.168.1.7	Open	172.16.1.7	172.16.1.7	0	0	0	0%
192.168.1.8	Open	172.16.1.8	172.16.1.8	0	0	0	0%
192.168.1.9	Open	172.16.1.9	172.16.1.9	0	0	0	0%
192.168.1.10	Open	172.16.1.10	172.16.1.10	0	0	0	0%
192.168.1.11	Open	172.16.1.11	172.16.1.11	0	0	0	0%
192.168.1.12	Open	172.16.1.12	172.16.1.12	0	0	0	0%
192.168.1.13	Open	172.16.1.13	172.16.1.13	0	0	0	0%
192.168.1.14	Open	172.16.1.14	172.16.1.14	0	0	0	0%
192.168.1.15	Open	172.16.1.15	172.16.1.15	0	0	0	0%
192.168.1.16	Open	172.16.1.16	172.16.1.16	0	0	0	0%
192.168.1.17	Open	172.16.1.17	172.16.1.17	0	0	0	0%
192.168.1.18	Open	172.16.1.18	172.16.1.18	0	0	0	0%
192.168.1.19	Open	172.16.1.19	172.16.1.19	0	0	0	0%
192.168.1.20	Open	172.16.1.20	172.16.1.20	0	0	0	0%
192.168.1.21	Open	172.16.1.21	172.16.1.21	0	0	0	0%
192.168.1.22	Open	172.16.1.22	172.16.1.22	0	0	0	0%
192.168.1.23	Open	172.16.1.23	172.16.1.23	0	0	0	0%
192.168.1.24	Open	172.16.1.24	172.16.1.24	0	0	0	0%
192.168.1.25	Open	172.16.1.25	172.16.1.25	0	0	0	0%
192.168.1.26	Open	172.16.1.26	172.16.1.26	0	0	0	0%
192.168.1.27	Open	172.16.1.27	172.16.1.27	0	0	0	0%
192.168.1.28	Open	172.16.1.28	172.16.1.28	0	0	0	0%
192.168.1.29	Open	172.16.1.29	172.16.1.29	0	0	0	0%
192.168.1.30	Open	172.16.1.30	172.16.1.30	0	0	0	0%
192.168.1.31	Open	172.16.1.31	172.16.1.31	0	0	0	0%
192.168.1.32	Open	172.16.1.32	172.16.1.32	0	0	0	0%
192.168.1.33	Open	172.16.1.33	172.16.1.33	0	0	0	0%
192.168.1.34	Open	172.16.1.34	172.16.1.34	0	0	0	0%
192.168.1.35	Open	172.16.1.35	172.16.1.35	0	0	0	0%
192.168.1.36	Open	172.16.1.36	172.16.1.36	0	0	0	0%
192.168.1.37	Open	172.16.1.37	172.16.1.37	0	0	0	0%
192.168.1.38	Open	172.16.1.38	172.16.1.38	0	0	0	0%
192.168.1.39	Open	172.16.1.39	172.16.1.39	0	0	0	0%
192.168.1.40	Open	172.16.1.40	172.16.1.40	0	0	0	0%
192.168.1.41	Open	172.16.1.41	172.16.1.41	0	0	0	0%
192.168.1.42	Open	172.16.1.42	172.16.1.42	0	0	0	0%
192.168.1.43	Open	172.16.1.43	172.16.1.43	0	0	0	0%
192.168.1.44	Open	172.16.1.44	172.16.1.44	0	0	0	0%
192.168.1.45	Open	172.16.1.45	172.16.1.45	0	0	0	0%
192.168.1.46	Open	172.16.1.46	172.16.1.46	0	0	0	0%
192.168.1.47	Open	172.16.1.47	172.16.1.47	0	0	0	0%
192.168.1.48	Open	172.16.1.48	172.16.1.48	0	0	0	0%
192.168.1.49	Open	172.16.1.49	172.16.1.49	0	0	0	0%
192.168.1.50	Open	172.16.1.50	172.16.1.50	0	0	0	0%

To Complete in Class

- Attempt to configure each device in the classroom, including pcs, routers, switches and the classroom NOC as well.
- Use SNMP settings to take advantage of the information you can gather on each device.
- Note that you can choose “Cisco Router” as a device template, and “Generic SNMP-enabled Host” as well.

Workshop Network

Our workshop consists of two routers and three switches and the various pcs attached to each switch.

Refer to our network diagram for the details:

<http://noc/trac/netmanage/wiki/network>

Machine Names

Row 1

pc1

...

pc8

sw1

net1-gw

Row 2

pc9

...

pc15

sw2

net2-gw

- Use “`dig -x IP`” to see the name of each device. Use names instead of IPs in Cacti (and Smokeping, nagios, etc)
- Our domain is `mgmt.conference.apricot.net`.

Device Templates

- Go to Templates -> Host Templates
- Select one of the templates and then “Duplicate”
- Edit the new template and add the graphs and data queries you want to use.
- Create new devices using the new template. Very simple.

Graphing Templates

- You can modify already existing templates.
- Go to Templates → Graph Templates
- Choose the desired template
- Modify any of the attributes that you wish.
- Once you save changes to an existing template, then these will be reflected in the graphs of all devices that use the updated template.

Installing additional templates

- You can install templates and scripts from third parties for specific statistics, such as:
 - MySQL: <http://www.faemalia.net/mysqlUtils/>

Conclusiones

- Cacti is very flexible due to the idea of templates.
- Once you understand the concepts behind RRDTool, then using Cacti should be intuitive.
- The hierarchical visualization of devices helps to organize and find devices very quickly.
- There are no (or very little) available statistics about the performance of *cactid* (anyone want to collect some?)
- It's not easy to do rediscovery of devices.
- To add lots of devices requires lots of time and effort. Tools like Netdot and Netdisco can help – or, home-grown MySQL scripts.

Referencias

- Cacti web site. <http://www.cacti.net>
- Forums. <http://forums.cacti.net/>