



Nagios®

Introduction

- A key measurement tool for actively monitoring availability of devices and services.
- Possible the most used open source network monitoring software.
- Has a web interface.
 - Uses CGIs written in C for faster response and scalability.
- Can support up to thousands of devices and services.

Installation

In Debian/Ubuntu:

- `# apt-get install nagios3`
- Files are installed here:
 - `/etc/nagios3`
 - `/etc/nagios3/conf.d`
 - `/etc/nagios-plugins/conf`
 - `/usr/share/nagios3/htdocs/images/logos`
 - `/usr/sbin/nagios3`
 - `/usr/sbin/nagios3stats`
- Access Nagios via the web here:
<http://192.168.10X.30/nagios3/>

Nagios: Tactical Overview

Nagios

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- Service Detail
- Host Detail
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- Hostgroup Grid
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- Service Problems
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- Network Outages

Show Host:

- Comments
- Downtime
- Process Info
- Performance Info
- Scheduling Queue

Reporting

- Trends
- Availability
- Alert Histogram
- Alert History
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Configuration

- View Config

Tactical Monitoring Overview

Last Updated: Thu Sep 3 15:37:09 CDT 2009
Updated every 90 seconds
Nagios® 3.0.2 - www.nagios.org
Logged in as guest

Monitoring Performance

Service Check Execution Time: 0.01 / 4.07 / 0.115 sec
Service Check Latency: 0.02 / 0.25 / 0.117 sec
Host Check Execution Time: 0.01 / 0.13 / 0.018 sec
Host Check Latency: 0.01 / 0.28 / 0.137 sec
Active Host / Service Checks: 41 / 46
Passive Host / Service Checks: 0 / 0

Network Outages

0 Outages

Network Health

Host Health:
Service Health:

Hosts

0 Down0 Unreachable41 Up0 Pending

Services

0 Critical0 Warning0 Unknown46 Ok0 Pending

Monitoring Features

Flap Detection	Notifications	Event Handlers	Active Checks	Passive Checks
Enabled All Services Enabled No Services Flapping All Hosts Enabled No Hosts Flapping	Enabled All Services Enabled All Hosts Enabled	Enabled All Services Enabled All Hosts Enabled	Enabled All Services Enabled All Hosts Enabled	Enabled All Services Enabled All Hosts Enabled

Nagios: Service Detail

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Service Problems

- Unhandled

Host Problems

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Current Network Status

Last Updated: Thu Sep 3 14:46:07 CDT 2009
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[View History For all hosts](#)
[View Notifications For All Hosts](#)
[View Host Status Detail For All Hosts](#)

Host Status Totals

Up	Down	Unreachable	Pending
41	0	0	0
All Problems		All Types	
0		41	

Service Status Totals

Ok	Warning	Unknown	Critical	Pending
46	0	0	0	0
All Problems		All Types		
0		46		

Service Status Details For All Hosts

Host ↑↓	Service ↑↓	Status ↑↓	Last Check ↑↓	Duration ↑↓	Attempt ↑↓	Status Information
DNS-ROOT	SSH	OK	2009-09-03 14:43:51	43d 0h 55m 19s	1/4	SSH OK - OpenSSH_5.1p1 Debian-3ubuntu1 (protocol 2.0)
ISP-DNS	SSH	OK	2009-09-03 14:41:21	16d 3h 57m 24s	1/4	SSH OK - OpenSSH_5.1p1 Debian-3ubuntu1 (protocol 2.0)
ISP-RTR	SSH	OK	2009-09-03 14:43:57	43d 5h 35m 13s	1/4	SSH OK - Cisco-1.25 (protocol 2.0)
NOC-TLD1	SSH	OK	2009-09-03 14:41:27	1d 0h 1m 59s	1/4	SSH OK - OpenSSH_5.1p1 Debian-3ubuntu1 (protocol 2.0)
NOC-TLD2	SSH	OK	2009-09-03 14:44:04	1d 22h 44m 22s	1/4	SSH OK - OpenSSH_5.1p1 Debian-3ubuntu1 (protocol 2.0)
NOC-TLD3	SSH	OK	2009-09-03 14:41:34	1d 22h 40m 58s	1/4	SSH OK - OpenSSH_5.1p1 Debian-3ubuntu1 (protocol 2.0)
NOC-TLD4	SSH	OK	2009-09-03 14:44:10	1d 22h 44m 16s	1/4	SSH OK - OpenSSH_5.1p1 Debian-3ubuntu1 (protocol 2.0)
NOC-TLD5	SSH	OK	2009-09-03 14:41:40	1d 22h 41m 46s	1/4	SSH OK - OpenSSH_5.1p1 Debian-3ubuntu1 (protocol 2.0)
NOC-TLD6	SSH	OK	2009-09-03 14:44:17	1d 22h 44m 9s	1/4	SSH OK - OpenSSH_5.1p1 Debian-3ubuntu1 (protocol 2.0)
NOC-TLD7	SSH	OK	2009-09-03 14:41:47	1d 22h 41m 39s	1/4	SSH OK - OpenSSH_5.1p1 Debian-3ubuntu1 (protocol 2.0)
NOC-TLD8	SSH	OK	2009-09-03 14:44:23	1d 22h 44m 3s	1/4	SSH OK - OpenSSH_5.1p1 Debian-3ubuntu1 (protocol 2.0)
NS1-TLD1	SSH	OK	2009-09-03 14:41:53	1d 0h 1m 33s	1/4	SSH OK - OpenSSH_5.1p1 Debian-3ubuntu1 (protocol 2.0)
NS1-TLD2	SSH	OK	2009-09-03 14:44:30	1d 22h 43m 56s	1/4	SSH OK - OpenSSH_5.1p1 Debian-3ubuntu1 (protocol 2.0)
NS1-TLD3	SSH	OK	2009-09-03 14:42:00	1d 22h 41m 26s	1/4	SSH OK - OpenSSH_5.1p1 Debian-3ubuntu1 (protocol 2.0)
NS1-TLD4	SSH	OK	2009-09-03 14:44:36	1d 22h 43m 50s	1/4	SSH OK - OpenSSH_5.1p1 Debian-3ubuntu1 (protocol 2.0)
NS1-TLD5	SSH	OK	2009-09-03 14:42:06	1d 22h 41m 20s	1/4	SSH OK - OpenSSH_5.1p1 Debian-3ubuntu1 (protocol 2.0)
NS1-TLD6	SSH	OK	2009-09-03 14:41:43	1d 22h 43m 13s	1/4	SSH OK - OpenSSH_5.1p1 Debian-3ubuntu1 (protocol 2.0)

Nagios: Host Detail

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Current Network Status

Last Updated: Thu Sep 3 14:55:18 CDT 2009
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[View Service Status Detail For All Host Groups](#)
[View Status Overview For All Host Groups](#)
[View Status Summary For All Host Groups](#)
[View Status Grid For All Host Groups](#)

Host Status Totals

Up	Down	Unreachable	Pending
41	0	0	0

All Problems	All Types
0	41

Service Status Totals

Ok	Warning	Unknown	Critical	Pending
46	0	0	0	0

All Problems	All Types
0	46

Host Status Details For All Host Groups

Host ↑↓	Status ↑↓	Last Check ↑↓	Duration ↑↓	Status Information
DNS-ROOT	UP	2009-09-03 14:51:41	43d 1h 7m 0s	PING OK - Packet loss = 0%, RTA = 0.33 ms
ISP-DNS	UP	2009-09-03 14:51:41	16d 4h 11m 25s	PING OK - Packet loss = 0%, RTA = 0.29 ms
ISP-RTR	UP	2009-09-03 14:51:51	43d 5h 47m 40s	PING OK - Packet loss = 0%, RTA = 1.24 ms
NOG-TLD1	UP	2009-09-03 14:52:01	1d 0h 10m 56s	PING OK - Packet loss = 0%, RTA = 4.02 ms
NOG-TLD2	UP	2009-09-03 14:52:01	1d 22h 53m 46s	PING OK - Packet loss = 0%, RTA = 2.23 ms
NOG-TLD3	UP	2009-09-03 14:52:11	1d 22h 53m 36s	PING OK - Packet loss = 0%, RTA = 2.62 ms
NOG-TLD4	UP	2009-09-03 14:52:21	1d 22h 53m 36s	PING OK - Packet loss = 0%, RTA = 1.09 ms
NOG-TLD5	UP	2009-09-03 14:52:31	1d 22h 54m 6s	PING OK - Packet loss = 0%, RTA = 5.20 ms
NOG-TLD6	UP	2009-09-03 14:52:31	1d 22h 53m 56s	PING OK - Packet loss = 0%, RTA = 10.49 ms
NOG-TLD7	UP	2009-09-03 14:52:41	1d 22h 53m 56s	PING OK - Packet loss = 0%, RTA = 1.05 ms
NOG-TLD8	UP	2009-09-03 14:52:51	1d 22h 53m 56s	PING OK - Packet loss = 0%, RTA = 1.00 ms
NS1-TLD1	UP	2009-09-03 14:53:01	1d 0h 10m 26s	PING OK - Packet loss = 0%, RTA = 10.19 ms
NS1-TLD2	UP	2009-09-03 14:53:01	1d 22h 53m 56s	PING OK - Packet loss = 0%, RTA = 5.06 ms
NS1-TLD3	UP	2009-09-03 14:53:11	1d 22h 53m 36s	PING OK - Packet loss = 0%, RTA = 1.03 ms
NS1-TLD4	UP	2009-09-03 14:53:21	1d 22h 53m 36s	PING OK - Packet loss = 0%, RTA = 1.15 ms
NS1-TLD5	UP	2009-09-03 14:53:21	1d 22h 54m 6s	PING OK - Packet loss = 0%, RTA = 1.12 ms
NS1-TLD6	UP	2009-09-03 14:53:31	1d 22h 53m 36s	PING OK - Packet loss = 0%, RTA = 1.06 ms
NS1-TLD7	UP	2009-09-03 14:53:41	1d 22h 53m 46s	PING OK - Packet loss = 0%, RTA = 1.11 ms
NS1-TLD8	UP	2009-09-03 14:53:51	1d 22h 53m 36s	PING OK - Packet loss = 0%, RTA = 1.18 ms
TLD1-RTR	UP	2009-09-03 14:53:51	1d 22h 54m 6s	PING OK - Packet loss = 0%, RTA = 2.22 ms
TLD2-RTR	UP	2009-09-03 14:54:01	1d 22h 53m 46s	PING OK - Packet loss = 0%, RTA = 2.38 ms

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[View Service Status Detail For All Host Groups](#)
[View Host Status Detail For All Host Groups](#)
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Host Status Totals













Up	Down	Unreachable	Pending
41	0	0	0
All Problems		All Types	
0		41	

Service Status Totals













Ok	Warning	Unknown	Critical	Pending
46	0	0	0	0
All Problems		All Types		
0		46		

Service Overview For All Host Groups













TRTI TLD1 Servers, Virtual Machines, Routers (TLD1)

Host	Status	Services	Actions
NOC-TLD1	UP	1 OK	  
NS1-TLD1	UP	1 OK	  
TLD1-RTR	UP	1 OK	  
TRTI-TLD1	UP	1 OK	  













TRTI TLD2 Servers, Virtual Machines, Routers (TLD2)

Host	Status	Services	Actions
NOC-TLD2	UP	1 OK	  
NS1-TLD2	UP	1 OK	  
TLD2-RTR	UP	1 OK	  
TRTI-TLD2	UP	1 OK	  













TRTI TLD3 Servers, Virtual Machines, Routers (TLD3)

Host	Status	Services	Actions
NOC-TLD3	UP	1 OK	  
NS1-TLD3	UP	1 OK	  
TLD3-RTR	UP	1 OK	  
TRTI-TLD3	UP	1 OK	  













TRTI TLD4 Servers, Virtual Machines, Routers (TLD4)

Host	Status	Services	Actions
NOC-TLD4	UP	1 OK	  
NS1-TLD4	UP	1 OK	  
TLD4-RTR	UP	1 OK	  
TRTI-TLD4	UP	1 OK	  




TRTI TLD5 Servers, Virtual Machines, Routers (TLD5)

Host	Status	Services	Actions
NOC-TLD5	UP	1 OK	  
NS1-TLD5	UP	1 OK	  
TLD5-RTR	UP	1 OK	  
TRTI-TLD5	UP	1 OK	  

TRTI TLD6 Servers, Virtual Machines, Routers (TLD6)

Host	Status	Services	Actions
NOC-TLD6	UP	1 OK	  
NS1-TLD6	UP	1 OK	  
TLD6-RTR	UP	1 OK	  
TRTI-TLD6	UP	1 OK	  







TRTI TLD7 Servers, Virtual Machines, Routers (TLD7)

Host	Status	Services	Actions
NOC-TLD7	UP	1 OK	  
NS1-TLD7	UP	1 OK	  

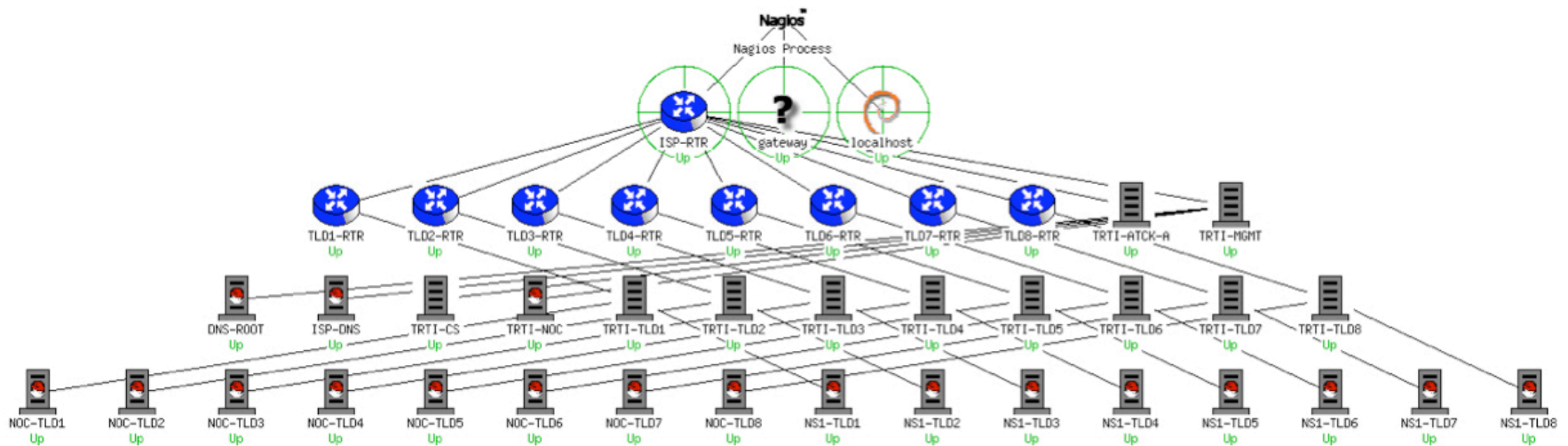
TRTI TLD8 Servers, Virtual Machines, Routers (TLD8)

Host	Status	Services	Actions
NOC-TLD8	UP	1 OK	  
NS1-TLD8	UP	1 OK	  

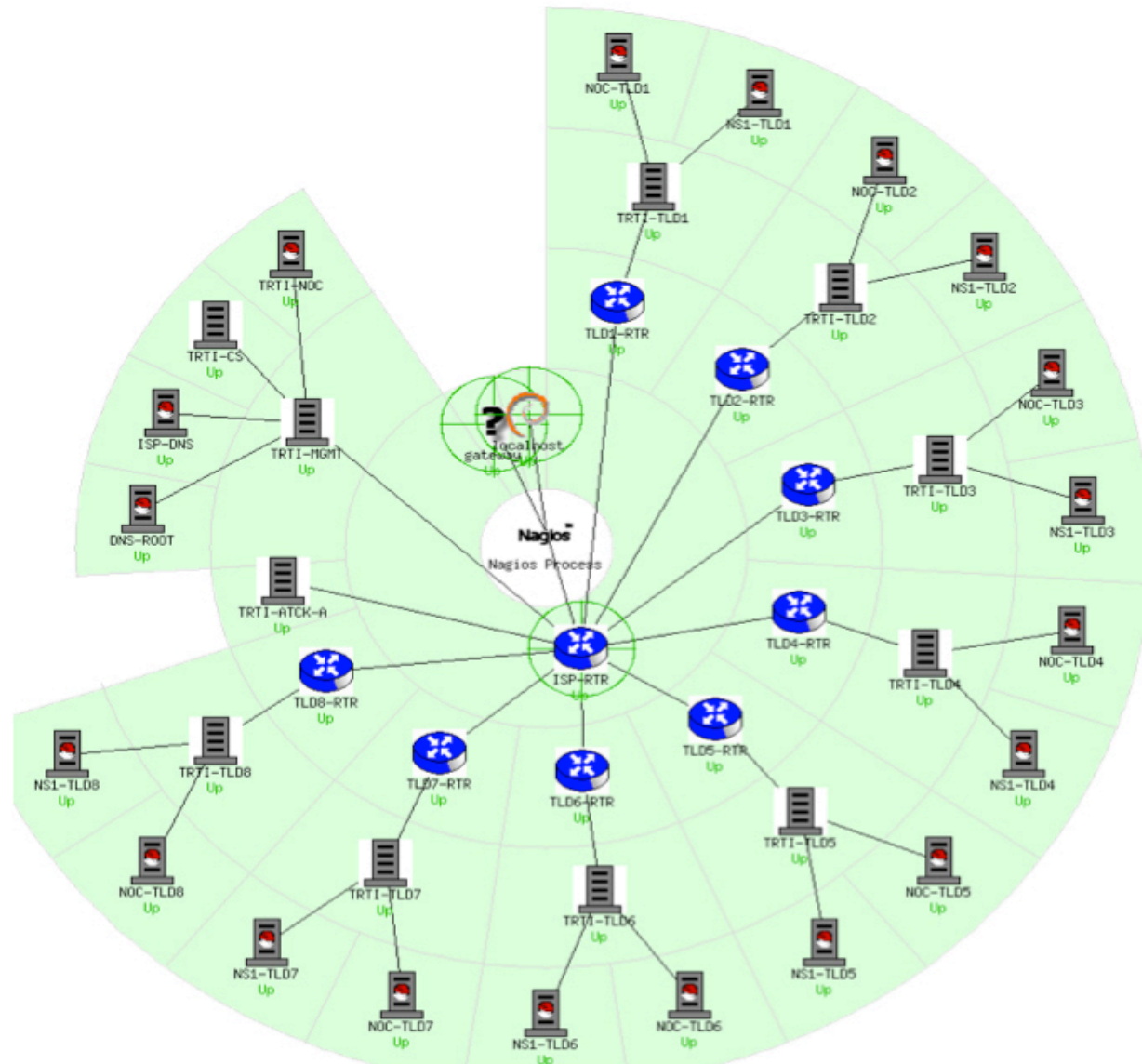
TRTI Management Virtual Machines (VM-mgmt)

Host	Status	Services	Actions
DNS-ROOT	UP	1 OK	  
ISP-DNS	UP	1 OK	  

Nagios: Status Map: Collapsed Tree



100



Features

- Verification of availability is delegated to plugins:
 - The product's architecture is simple enough that writing new plugins is fairly easy in the language of your choice.
 - There are many, many plugins available.
- Nagios uses parallel checking and forking.
 - Version 3 of Nagions does this better.

Features cont.

- Has intelligent checking capabilities. Attempts to distribute the server load of running Nagios (for larger sites) and the load placed on devices being checked.
- Configuration is done in simple, plain text files, but that can contain much detail and are based on templates.
- Nagios reads it's configuration from an entire directory. You decide how to define individual files.

Yet More Features...

- Utilizes topology to determine dependencies.
 - Nagios differentiates between what is down vs. what is not available. This way it avoids running unnecessary checks.
- Nagios allows you to define how you send notifications based on combinations of:
 - Contacts and lists of contacts
 - Devices and groups of devices
 - Services and groups of services
 - Defined hours by persons or groups.
 - The state of a service.

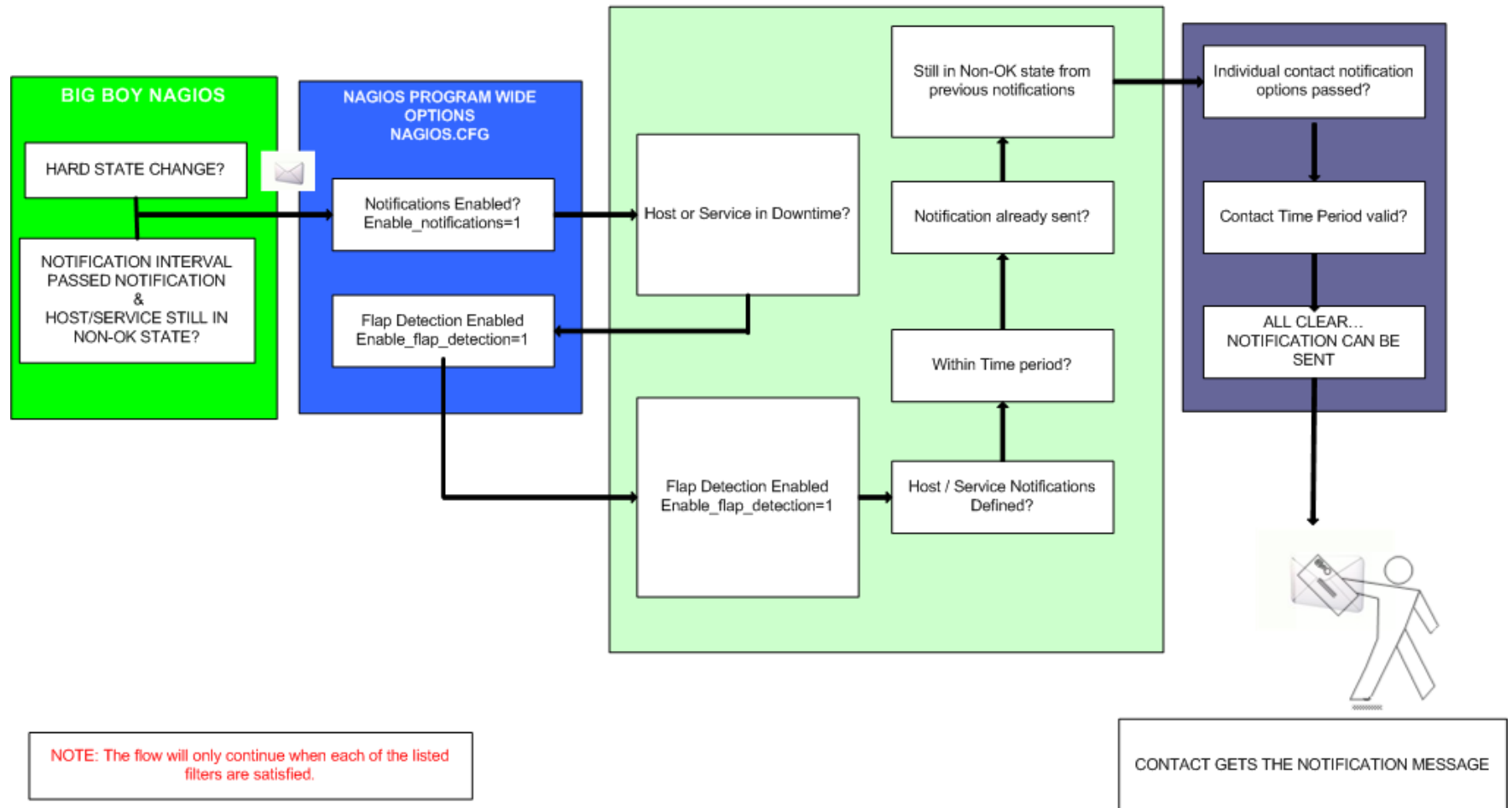
And, even more...

Service state:

When configuring a service you have the following notification options:

- **d: DOWN:** The service is down (not available)
- **u: UNREACHABLE:** When the host is not visible
- **r: RECOVERY:** (OK) Host is coming back up
- **f: FLAPPING:** When a host first starts or stops or its state is undetermined.
- **n: NONE:** Don't send any notifications

NAGIOS - NOTIFICATION FLOW DIAGRAM



Features, features, features

- Allows you to acknowledge an event.
 - A user can add comments via the GUI
- You can define maintenance periods
 - By device or a group of devices
- Maintains availability statistics.
- Can detect *flapping* and suppress additional notifications.
- Allows for multiple notification methods such as:
 - e-mail, pager, SMS, winpopup, audio, etc...
- Allows you to define notification levels. Critical feature.

How Checks Work

- A node, host or device consists of one or more service checks (PING, HTTP, MYSQL, SSH, etc)
- Periodically Nagios checks each service for each node and determines if state has changed. State changes are:
 - CRITICAL
 - WARNING
 - UNKNOWN
- For each state change you can assign:
 - Notification options (as mentioned before)
 - Event handlers

How Checks Work

- Parameters
 - Normal checking interval
 - Re-check interval
 - Maximum number of checks.
 - Period for each check
- Node checks only happen when on services respond (assuming you've configured this).
 - A node can be:
 - DOWN
 - UNREACHABLE

How Checks Work

- In this manner it can take some time before a host change's its state to “down” as Nagios first does a service check and then a node check.
- By default Nagios does a node check 3 times before it will change the nodes state to down.
- You can, of course, change all this.

The Concept of “Parents”

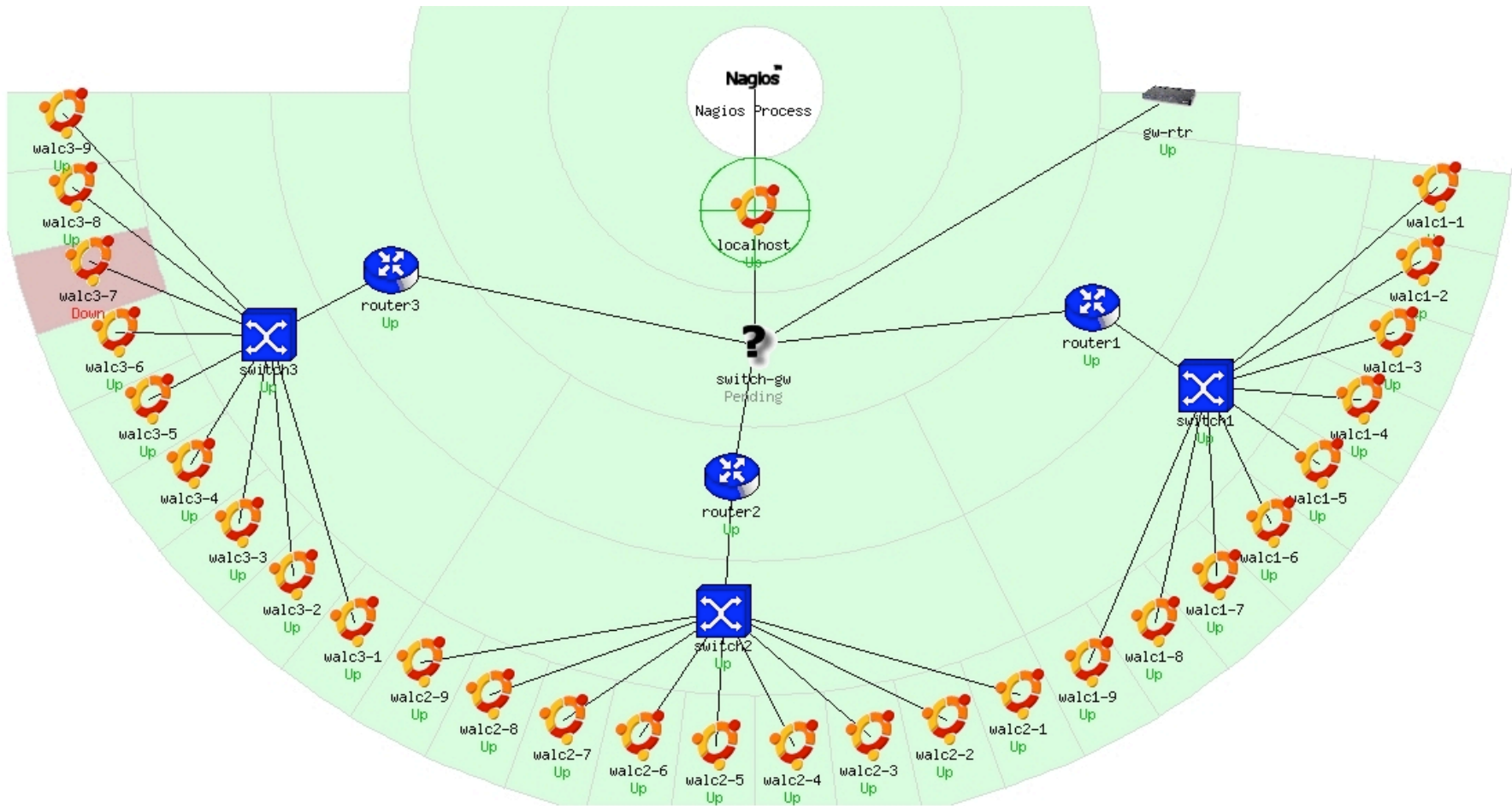
- Nodes can have parents.
 - For example, the parent of a PC connected to a switch would be the switch.
 - This allows us to specify the network dependencies that exist between machines, switches, routers, etc.
 - This avoids having Nagios send alarms when a parent does not respond.
 - A node can have multiple parents.



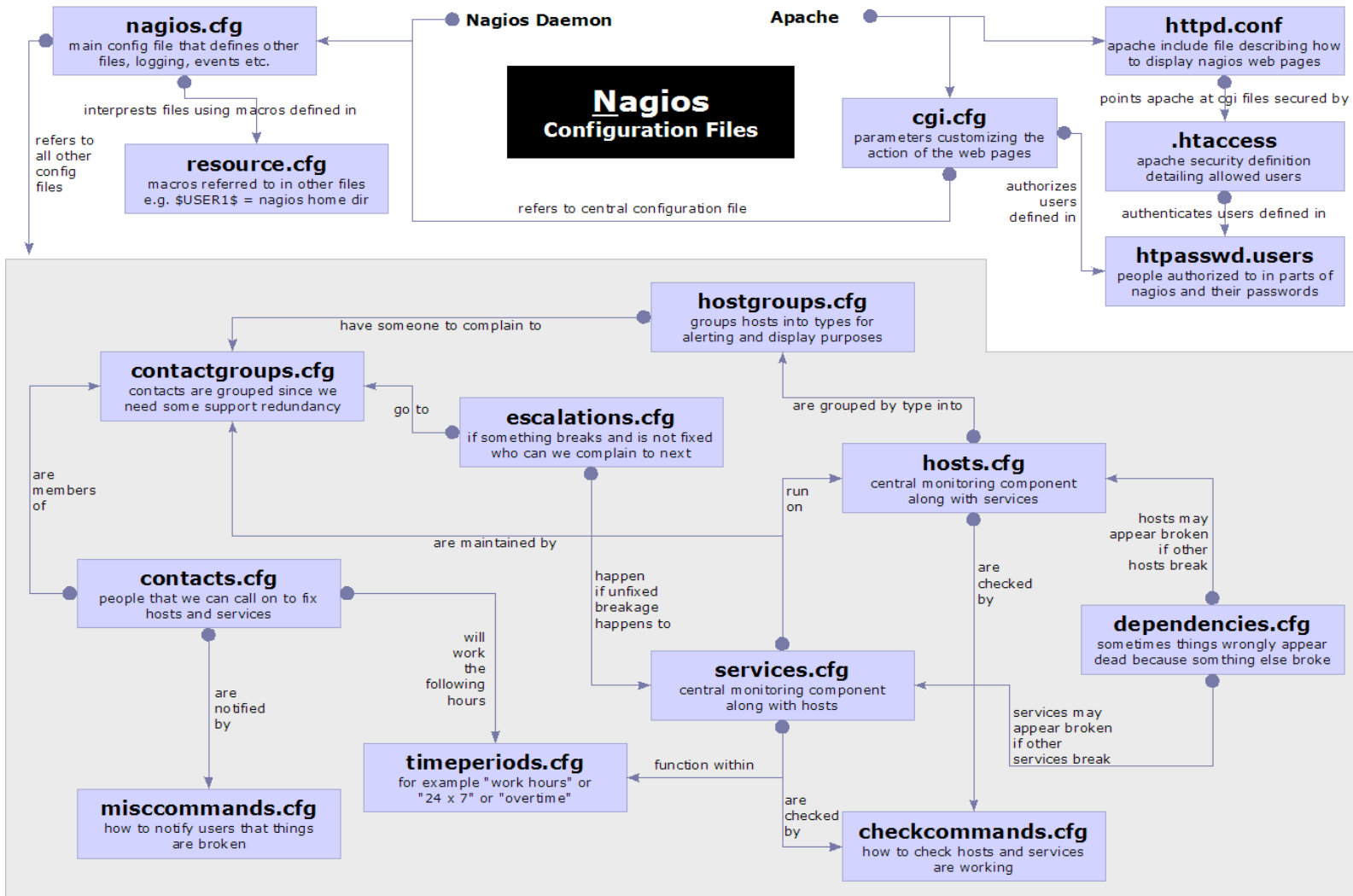
The Idea of Network Viewpoint

- Where you locate your Nagios server will determine your point of view of the network.
- Nagios allows for parallel Nagios boxes that run at other locations on a network.
- Often it makes sense to place your Nagios server nearer the border of your network vs. in the core.

Network Viewpoint



Nagios Configuration Files



Configuration Files

- Located in /etc/nagios3/
- Important files include:
 - `cgi.cfg` Controls the web interface and security options.
 - `commands.cfg` The commands that Nagios uses for notifications.
 - `nagios.cfg` Main configuration file.
 - `conf.d/*` All other configuration goes here!

Configuration Files

Under conf.d/* (*sample only*)

- `contacts_nagios3.cfg` users and groups
- `generic-host_nagios2.cfg` default host template
- `generic-service_nagios2.cfg` default service template
- `hostgroups_nagios2.cfg` groups of nodes
- `services_nagios2.cfg` what services to check
- `timeperiods_nagios2.cfg` when to check and who to notify

Configuration Files

Under conf.d some other possible config files:

- [host-gateway.cfg](#) Default route definition
- [extinfo.cfg](#) Additional node information
- [servicegroups.cfg](#) Groups of nodes and services
- [localhost.cfg](#) Define the Nagios server itself
- [pcs.cfg](#) Sample definition of PCs (hosts)
- [switches.cfg](#) Definitions of switches (hosts)
- [routers.cfg](#) Definitions of routers (hosts)

Plugin Configuration

- The Nagios package in Ubuntu comes with a bunch of pre-installed plugins:
- apt.cfg breeze.cfg dhcp.cfg disk-smb.cfg
disk.cfg dns.cfg dummy.cfg flexlm.cfg
fping.cfg ftp.cfg games.cfg hppjd.cfg
http.cfg ifstatus.cfg ldap.cfg load.cfg
mail.cfg mrtg.cfg mysql.cfg netware.cfg
news.cfg nt.cfg ntp.cfg pgsql.cfg ping.cfg
procs.cfg radius.cfg real.cfg rpc-nfs.cfg
snmp.cfg ssh.cfg tcp_udp.cfg telnet.cfg
users.cfg vsz.cfg

Main Configuration Details

- Global settings
- File: `/etc/nagios3/nagios.cfg`
 - Says where other configuration files are.
 - General Nagios behavior:
 - For large installations you should tune the installation via this file.
 - See: *Tunning Nagios for Maximum Performance*
http://nagios.sourceforge.net/docs/2_0/tuning.html

CGI Configuration

- File: `/etc/nagios3/cgi.cfg`
 - You can change the CGI directory if you wish
 - Authentication and authorization for Nagios use.
 - Activate authentication via Apache's `.htpasswd` mechanism, or using RADIUS or LDAP.
 - Users can be assigned rights via the following variables:
 - `authorized_for_system_information`
 - `authorized_for_configuration_information`
 - `authorized_for_system_commands`
 - `authorized_for_all_services`
 - `authorized_for_all_hosts`
 - `authorized_for_all_service_commands`
 - `authorized_for_all_host_commands`

Time Periods

- This defines the base periods that control checks, notifications, etc.
 - Defaults: 24 x 7
 - Could adjust as needed, such as work week only.
 - Could adjust a new time period for “outside of regular hours”, etc.

```
# '24x7'
define timeperiod{
    timeperiod_name 24x7
    alias            24 Hours A Day, 7 Days A Week
    sunday           00:00-24:00
    monday           00:00-24:00
    tuesday          00:00-24:00
    wednesday        00:00-24:00
    thursday         00:00-24:00
    friday           00:00-24:00
    saturday         00:00-24:00
}
```

Configuring Service/Host Checks

- Define how you are going to test a service.

```
# 'check-host-alive' command definition
define command{
    command_name    check-host-alive
    command_line    $USER1$/check_ping -H $HOSTADDRESS$ -w 2000.0,60% -c
5000.0,100% -p 1 -t 5
}
```

Located in /etc/nagios-plugins/config, then adjust in /etc/nagios3/
conf.d/services_nagios2.cfg

Notification Commands

Allows you to utilize any command you wish. You can this for generating tickets in RT.

```
# 'notify-by-email' command definition
define command{
    command_name      notify-by-email
    command_line       /usr/bin/printf "%b" "Service: $SERVICEDESC$\nHost:
$HOSTNAME$\nIn: $HOSTALIAS$\nAddress: $HOSTADDRESS$\nState: $SERVICESTATE$
\nInfo: $SERVICEOUTPUT$\nDate: $SHORTDATETIME$" | /bin/mail -s
'$NOTIFICATIONTYPE$: $HOSTNAME$/$SERVICEDESC$ is $SERVICESTATE$'
$CONTACTEMAIL$
}
```

From: nagios@nms.localdomain
To: grupo-redes@localdomain
Subject: Host DOWN alert for switch1!
Date: Thu, 29 Jun 2006 15:13:30 -0700

Host: switch1
In: Core_Switches
State: DOWN
Address: 111.222.333.444
Date/Time: 06-29-2006 15:13:30
Info: CRITICAL - Plugin timed out after 6 seconds

Nodes and Services Configuration

- Based on templates
 - This saves lots of time avoiding repetition
 - Similar to Object Oriented programming
- Create default templates with default parameters for a:
 - generic node
 - generic service
 - generic contact

Generic Node Configuration

```
define host{
    name                generic-host
    notifications_enabled 1
    event_handler_enabled 1
    flap_detection_enabled 1
    process_perf_data    1
    retain_status_information 1
    retain_nonstatus_information 1
    check_command        check-host-alive
    max_check_attempts   5
    notification_interval 60
    notification_period   24x7
    notification_options  d,r
    contact_groups        nobody
    register              0
}
```

Individual Node Configuration

```
define host{
    use                generic-host
    host_name          switch1
    alias              Core_switches
    address             192.168.1.2
    parents            router1
    contact_groups      switch_group
}
```

Generic Service Configuration

```
define service{
    name                                generic-service
    active_checks_enabled                1
    passive_checks_enabled              1
    parallelize_check                   1
    obsess_over_service                 1
    check_freshness                     0
    notifications_enabled               1
    event_handler_enabled               1
    flap_detection_enabled              1
    process_perf_data                  1
    retain_status_information            1
    retain_nonstatus_information        1
    is_volatile                         0
    check_period                        24x7
    max_check_attempts                 5
    normal_check_interval               5
    retry_check_interval                1
    notification_interval               60
    notification_period                 24x7
    notification_options                c,r
    register                           0
}
```

Individual Service Configuration

```
define service{
    host_name          switch1
    use                 generic-service
    service_description PING
    check_command       check-host-alive
    max_check_attempts 5
    normal_check_interval 5
    notification_options c,r,f
    contact_groups      switch-group
}
```


Beeper/SMS Messages

- It's important to integrate Nagios with something available outside of work
 - Problems occur after hours... (unfair, but true)
- A critical item to remember: an SMS or message system should be independent from your network.
 - You can utilize a modem and a telephone line
 - Packages like sendpage, qpage or gnokii can help.

Some References

- <http://www.nagios.org>: Nagios web site
- <http://sourceforge.net/projects/nagiosplug>: Nagios plugins site
- *Nagios. System and Network Monitoring* by Wolfgang Barth. Good book on Nagios
- <http://www.nagiosexchange.org>: Unofficial Nagios plugin site
- <http://www.debianhelp.co.uk/nagios.htm>: A Debian tutorial on Nagios
- <http://www.nagios.com/>: Commercial Nagios support