Grid Infrastructure Monitoring System Based on Nagios

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SRCE

HPDC 2007, Workshop on Grid Monitoring

Overview

- ❖ Motivation
- ❖ Nagios framework
- ❖ Nagios-based grid monitoring
  - ◆ Architecture
  - ◆ Grid extensions
  - ◆ Statistics
  - ◆ Demo
- ❖ Contributions to WLCG Grid Service Monitoring WG
- ❖ Future work
- ❖ Conclusions

Motivation

❖ **Provide site admin-centric monitoring**

  ◆ simplify grid resources operations

❖ **Enable better resource availability**

  ◆ issue notifications as soon as problem appears

❖ **Achieve complex sensor's dependencies**

  ◆ enables problem isolation

  ◆ only relevant notifications are issued

❖ **Visualization & management interface**

  ◆ grid resources status

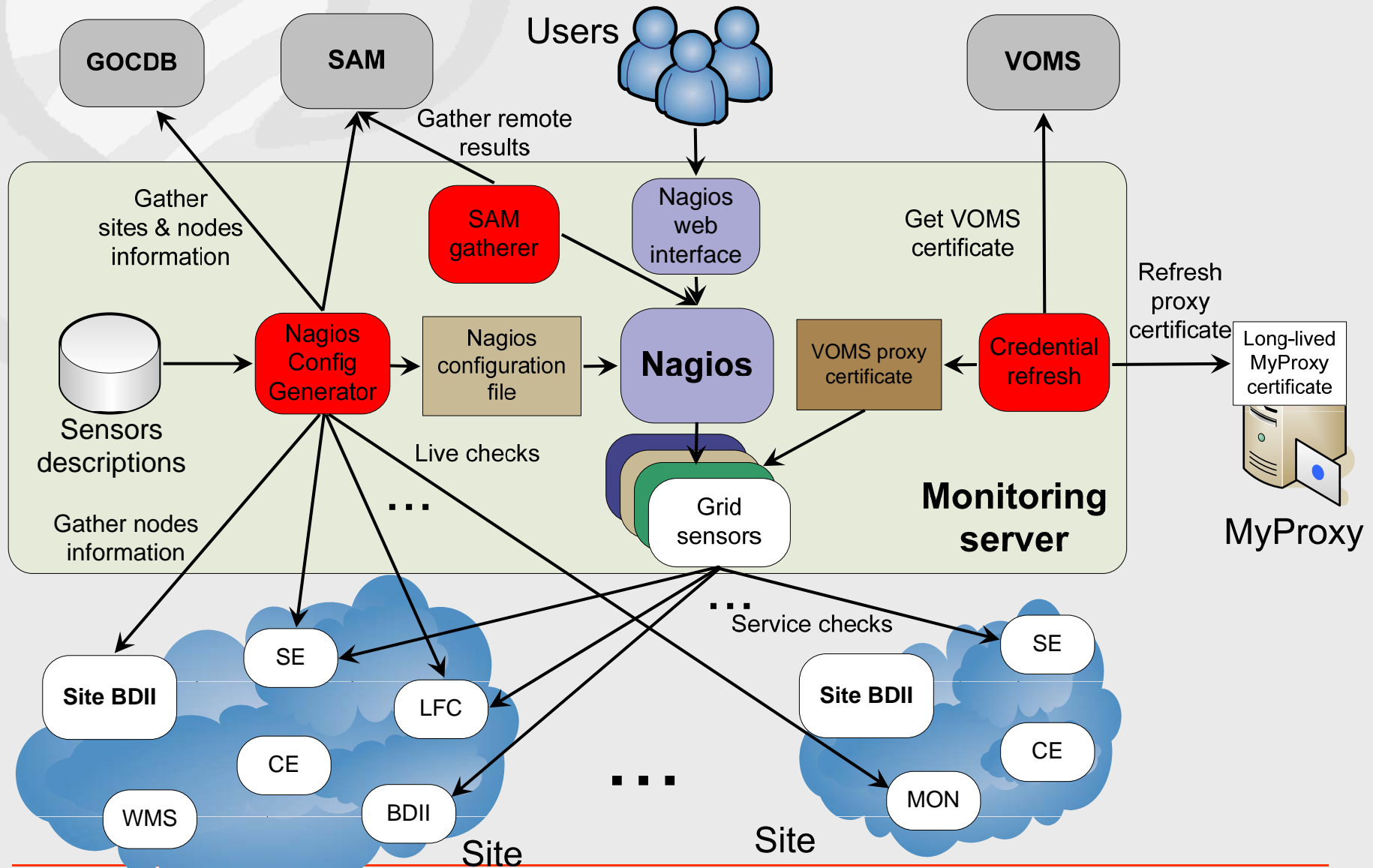❖ **Report generation**

  ◆ availability, problem history

Nagios Framework

❖ Open source monitoring framework

  ◆ widely used & actively developed

❖ Host and service problems detection and recovery

❖ Provides wide set of basic sensors

  ◆ easy to develop custom sensors

❖ Centralized vs. distributed deployment

❖ High configurability

  ◆ service dependencies, fine-grained notification options

❖ Web interface

  ◆ status view, administration

Nagios-based Grid Monitoring

❖ Monitoring CRO-GRID Infrastructure (2004-2006)

  ◆ Globus Toolkit Pre-WS & WS, UNICORE, other services

  ◆ active recovery of services

  ◆ still in production within CRO NGI

❖ Monitoring EGEE resources in Central Europe (CE)

  ◆ core services since mid 2006

  ◆ all CE sites for 1st line support since September 2006

  ◆ centralized deployment - single server @ SRCE

  ◆ **http://nagios.ce-egee.org**

Architecture

GOCDB

SAM

Users

VOMS

Gather remote results

Gather sites & nodes information

SAM gatherer

Nagios web interface

Get VOMS certificate

Refresh proxy certificate

Sensors descriptions

Nagios Config Generator

Nagios configuration file

Nagios

VOMS proxy certificate

Credential refresh

Long-lived MyProxy certificate

Live checks

Gather nodes information

Grid sensors

Monitoring server

MyProxy

...

...

Service checks

SE

Site BDII

LFC

SE

CE

Site BDII

CE

WMS

BDII

...

MON

Site

Site

srce

Grid Extensions

- ❖ Grid sensors
  - ◆ Security facilities & services
    - CA distribution, Certificate lifetime, MyProxy, VOMS, VOMS Admin
  - ◆ Monitoring & information services
    - R-GMA, BDII, MDS, GridICE
  - ◆ Job management services
    - Globus Gatekeeper, RB, WMS, WMProxy, Job matching
  - ◆ File management services
   - GridFTP, SRM, DPNS, LFC

Grid Extensions

- ❖ Sensor hierarchy
- ❖ Automatic recovery
  - ◆ both local and remote services
  - ◆ security handled with sudo
- ❖ Certificate based authentication for the web interface
- ❖ NCG, SAM gatherer, Credential mgmt.

Statistics

❖ EGEE implementation statistics

 ◆ 69 hosts

 ◆ 570 services actively monitored

 ◆ 1029 services results imported from SAM

❖ Nagios server statistics (last month)
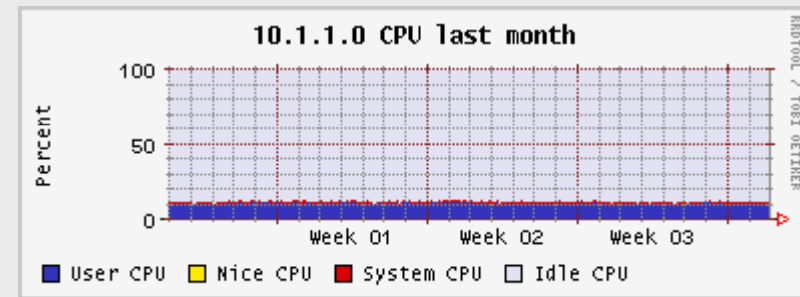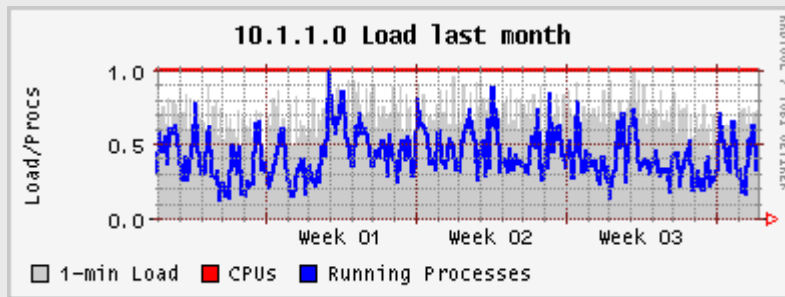
Demo

EGEE implementation web interface

Google

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- Service Group
  - Summary
  - Grid
- Status Map
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- Comments
- Downtime

Reporting

- Trends
- Availability
- Alerts
  - Histogram
  - History
  - Summary
- Notifications
- Event Log

Configuration

Tactical Monitoring Overview

Last Updated: Tue Jan 23 16:15:21 CET 2007
Updated every 90 seconds
Nagios® - www.nagios.org
Logged in as /C=HR/O=edu/OU=srce/CN=Emir Imamagic

Network Outages

0 Outages

Hosts

4 Down	0 Unreachable	61 Up	0 Pending
1 Unhandled Problems 3 Scheduled			

Services

28 Critical	1 Warning	1 Unknown	450 Ok	0 Pending
6 Unhandled Problems 17 on Problem Hosts 6 Acknowledged	1 Unhandled Problems	1 Unhandled Problems		

Monitoring Features

Flap Detection	Notifications	Event Handlers	Active Checks	Passive Checks
Disabled N/A	Enabled 43 Services Disabled 4 Hosts Disabled	Enabled All Services Enabled All Hosts Enabled	Enabled All Services Enabled All Hosts Enabled	Enabled All Services Enabled All Hosts Enabled

Monitoring Performance

Service Check Execution Time:	0.02 / 2066.35 / 44.042 sec
Service Check Latency:	0.00 / 3.21 / 0.150 sec
Host Check Execution Time:	0.01 / 10.01 / 0.671 sec
Host Check Latency:	0.00 / 0.00 / 0.000 sec
# Active Host / Service Checks:	65 / 480
# Passive Host / Service Checks:	0 / 0

Network Health

Host Health:
Service Health:

Find: se1-egee.sr   Match case

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Current Network Status

Last Updated: Tue Jan 23 13:55:09 CET 2007
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View History For This Host
View Notifications For This Host
View Service Status Detail For All Hosts

Host Status Totals

Up	Down	Unreachable	Pending
1	0	0	0

All Problems	All Types
0	1

Service Status Totals

Ok	Warning	Unknown	Critical	Pending
12	0	0	0	0

All Problems	All Types
0	12

Service Status Details For Host 'se1-egee.srce.hr'

Host ▲▼	Service ▲▼	Status ▲▼	Last Check ▲▼	Duration ▲▼	Attempt ▲▼	Status Information
se1-egee.srce.hr	CA distribution	OK	01-23-2007 12:36:56	10d 12h 55m 20s	1/3	CA DIST OK: Official IGTF version is 1.11. Valid distribution version found. All CA certificates versions are valid.
	Certificate lifetime	OK	01-23-2007 12:36:56	76d 20h 27m 59s	1/3	CERT OK: Certificate will expire in 55 days (Mar 20 08:02:00 2007 GMT).
	DPNS	OK	01-23-2007 13:36:56	6d 5h 46m 25s	1/4	DPNS OK: Listing content of /dpm succeeded. Directory contains domain srce.hr subdirectory.
	DPNS ping	OK	01-23-2007 13:51:56	36d 21h 42m 44s	1/4	TCP OK - 0.433 second response time on port 5010
	Globus GridFTP	OK	01-23-2007 13:51:56	6d 6h 31m 24s	1/4	FTP OK - 0.013 second response time on port 2811 [220 se1-egee.srce.hr DPM GridFTP Server 1.12 GSSAPI type Globus/GSI wu-2.6.2 (gcc32dbg, 1069715860-42) ready.]
	Globus GridFTP transfer	OK	01-23-2007 13:36:56	153d 4h 23m 18s	1/4	GridFTP OK: Transfer from local to remote computer succeeded. Transfer from remote to local computer succeeded. Received file is valid. File successfully removed from remote computer.
	Globus MDS GRIS	OK	01-23-2007 13:51:56	36d 21h 39m 6s	1/4	LDAP OK - 0.152 seconds response time
	GridICE MDS	OK	01-23-2007 13:51:56	36d 21h 42m 44s	1/4	LDAP OK - 0.706 seconds response time
	MyProxy	OK	01-23-2007 13:51:56	6d 6h 31m 23s	1/4	MYPROXY_INIT SUCCESS: proxy created. MYPROXY_INFO SUCCESS: proxy info retrieved. MYPROXY_DESTROY SUCCESS: proxy was destroyed.
	R-GMA Tomcat	OK	01-23-2007 13:51:56	6d 6h 31m 23s	1/4	HTTPS OK: HTTP/1.1 200 OK - 0.154 seconds response time
	SRMv1 ping	OK	01-23-2007 13:51:56	36d 21h 39m 7s	1/4	SRM ping successful.
	SRMv1 transfer	OK	01-23-2007 13:36:56	61d 14h 45m 28s	1/4	Transfer from local to remote computer succeeded. Transfer from remote to local computer succeeded. Received file is valid. File successfully removed from remote computer.

12 Matching Service Entries Displayed

Find: se1-egee.sr   Match case

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Service Information

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View Information For This Host
View Status Detail For This Host
View Alert History For This Service
View Trends For This Service
View Alert Histogram For This Service
View Availability Report For This Service
View Notifications For This Service

Service

WMS

On Host

CYFRONET-LCG2 WMS

(wms1.cyf-kr.edu.pl)

Member of

wms

149.156.9.27

Service State Information

Current Status:	OK
Status Information:	GLITE-SUBMIT SUCCESS: job https://wms1.cyf-kr.edu.pl:9000/20o7YUZirst-iNmSnv5LZA submitted. GLITE-STATUS SUCCESS: Done (Success). GLITE-OUTPUT SUCCESS: job output retrieved. SUCESS: Output contains string "TESTING".
Performance Data:	
Current Attempt:	1/4
State Type:	HARD
Last Check Type:	ACTIVE
Last Check Time:	01-23-2007 12:58:04
Status Data Age:	0d 0h 58m 49s
Next Scheduled Active Check:	01-23-2007 13:58:04
Latency:	0.075 seconds
Check Duration:	438.309 seconds
Last State Change:	01-23-2007 11:58:04
Current State Duration:	0d 1h 58m 49s
Last Service Notification:	N/A
Current Notification Number:	0
Is This Service Flapping?	N/A
Percent State Change:	N/A
In Scheduled Downtime?	NO
Last Update:	01-23-2007 13:56:48
Active Checks:	ENABLED
Passive Checks:	ENABLED
Obsessing:	ENABLED
Notifications:	ENABLED
Event Handler:	ENABLED
Flap Detection:	ENABLED

Service Commands

- Disable active checks of this service
- Re-schedule the next check of this service
- Submit passive check result for this service
- Stop accepting passive checks for this service
- Stop obsessing over this service
- Disable notifications for this service
- Schedule downtime for this service
- Disable event handler for this service
- Disable flap detection for this service

Find: se1-egee.sr   Match case

https://cs-egee.srce.hr/nagios/

Google

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Service Availability Report

Last Updated: Tue Jan 23 14:01:04 CET 2007
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View Availability Report For This Host
View Availability Report For All Services
View Trends For This Service
View Alert Histogram For This Service
View Alert History This Service
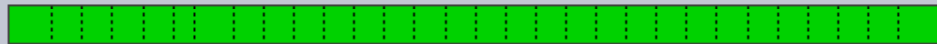View Notifications For This Service

Service 'MyProxy' On Host 'se1-egee.srce.hr'

12-23-2006 14:01:04 to 01-23-2007 14:01:04
Duration: 31d 0h 0m 0s

First assumed service state:

Unspecified

Report period:

Last 31 Days

Backtracked archives:

4

Update

[Availability report completed in 0 min 0 sec]

Service State Breakdowns:

State	Type / Reason	Time	% Total Time	% Known Time
OK	Unscheduled	30d 20h 0m 0s	99.462%	99.462%
	Scheduled	0d 3h 52m 33s	0.521%	0.521%
	Total	30d 23h 52m 33s	99.983%	99.983%
WARNING	Unscheduled	0d 0h 0m 0s	0.000%	0.000%
	Scheduled	0d 0h 0m 0s	0.000%	0.000%
	Total	0d 0h 0m 0s	0.000%	0.000%
UNKNOWN	Unscheduled	0d 0h 0m 0s	0.000%	0.000%
	Scheduled	0d 0h 0m 0s	0.000%	0.000%
	Total	0d 0h 0m 0s	0.000%	0.000%
CRITICAL	Unscheduled	0d 0h 0m 0s	0.000%	0.000%
	Scheduled	0d 0h 7m 27s	0.017%	0.017%
	Total	**0d 0h 7m 27s**	**0.017%**	**0.017%**
Undetermined	Nagios Not Running	0d 0h 0m 0s	0.000%	
	Insufficient Data	0d 0h 0m 0s	0.000%	
	Total	0d 0h 0m 0s	0.000%	
All	Total	31d 0h 0m 0s	100.000%	100.000%

Service Log Entries:
[View full log entries]

Find: se1-egee.sr   Match case

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All Host and Service Scheduled Downtime

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[Host Downtime | Service Downtime]

Scheduled Host Downtime

Schedule host downtime

Host Name	Entry Time	Author	Comment	Start Time	End Time	Type	Duration	Downtime ID	Trigger ID	Actions
eszakigrid66.inf.elte.hu	01-23-2007 19:54:53	Emir Imamagic	3499#Security incident on site, shutdown to investigate	01-10-2007 13:05:22	01-31-2007 12:00:00	Fixed	20d 22h 54m 38s	261	N/A	
eszakigrid68.inf.elte.hu	01-23-2007 19:54:53	Emir Imamagic	3499#Security incident on site, shutdown to investigate	01-10-2007 13:05:22	01-31-2007 12:00:00	Fixed	20d 22h 54m 38s	262	N/A	
eszakigrid69.inf.elte.hu	01-23-2007 19:54:53	Emir Imamagic	3499#Security incident on site, shutdown to investigate	01-10-2007 13:05:22	01-31-2007 12:00:00	Fixed	20d 22h 54m 38s	263	N/A	
test-lcgCE.uibk.ac.at	01-23-2007 19:54:53	Emir Imamagic	3544#nodes for the certification testbed	01-17-2007 15:10:00	02-16-2007 08:00:00	Fixed	29d 16h 50m 0s	255	N/A	
test-SE.uibk.ac.at	01-23-2007 19:54:53	Emir Imamagic	3544#nodes for the certification testbed	01-17-2007 15:10:00	02-16-2007 08:00:00	Fixed	29d 16h 50m 0s	256	N/A	
lite.iit.bme.hu	01-23-2007 19:54:53	Emir Imamagic	3567#cooling problem	01-22-2007 09:15:00	01-25-2007 18:00:00	Fixed	3d 8h 45m 0s	264	N/A	
se.hpc.iit.bme.hu	01-23-2007 19:54:53	Emir Imamagic	3567#cooling problem	01-22-2007 09:15:00	01-25-2007 18:00:00	Fixed	3d 8h 45m 0s	265	N/A	
skurut17.cesnet.cz	01-23-2007 19:54:53	Emir Imamagic	3585#Prolongued security downtime	01-23-2007 19:30:00	01-24-2007 19:30:00	Fixed	1d 0h 0m 0s	257	N/A	
skurut18.cesnet.cz	01-23-2007 19:54:53	Emir Imamagic	3585#Prolongued security downtime	01-23-2007 19:30:00	01-24-2007 19:30:00	Fixed	1d 0h 0m 0s	258	N/A	
skurut3.cesnet.cz	01-23-2007 19:54:53	Emir Imamagic	3585#Prolongued security downtime	01-23-2007 19:30:00	01-24-2007 19:30:00	Fixed	1d 0h 0m 0s	259	N/A	
se1.egee.man.poznan.pl	01-23-2007 19:54:53	Emir Imamagic	3577#Reboot needed due to instalation of new storage space	01-24-2007 10:00:00	01-24-2007 10:30:00	Fixed	0d 0h 30m 0s	260	N/A	

Scheduled Service Downtime

Schedule service downtime

Host Name	Service	Entry Time	Author	Comment	Start Time	End Time	Type	Duration	Downtime ID	Trigger ID	Actions

Find:

Google

EGEE CE nodes
EGEE DPM SE nodes
EGEE LFC nodes

○ Include
● Exclude

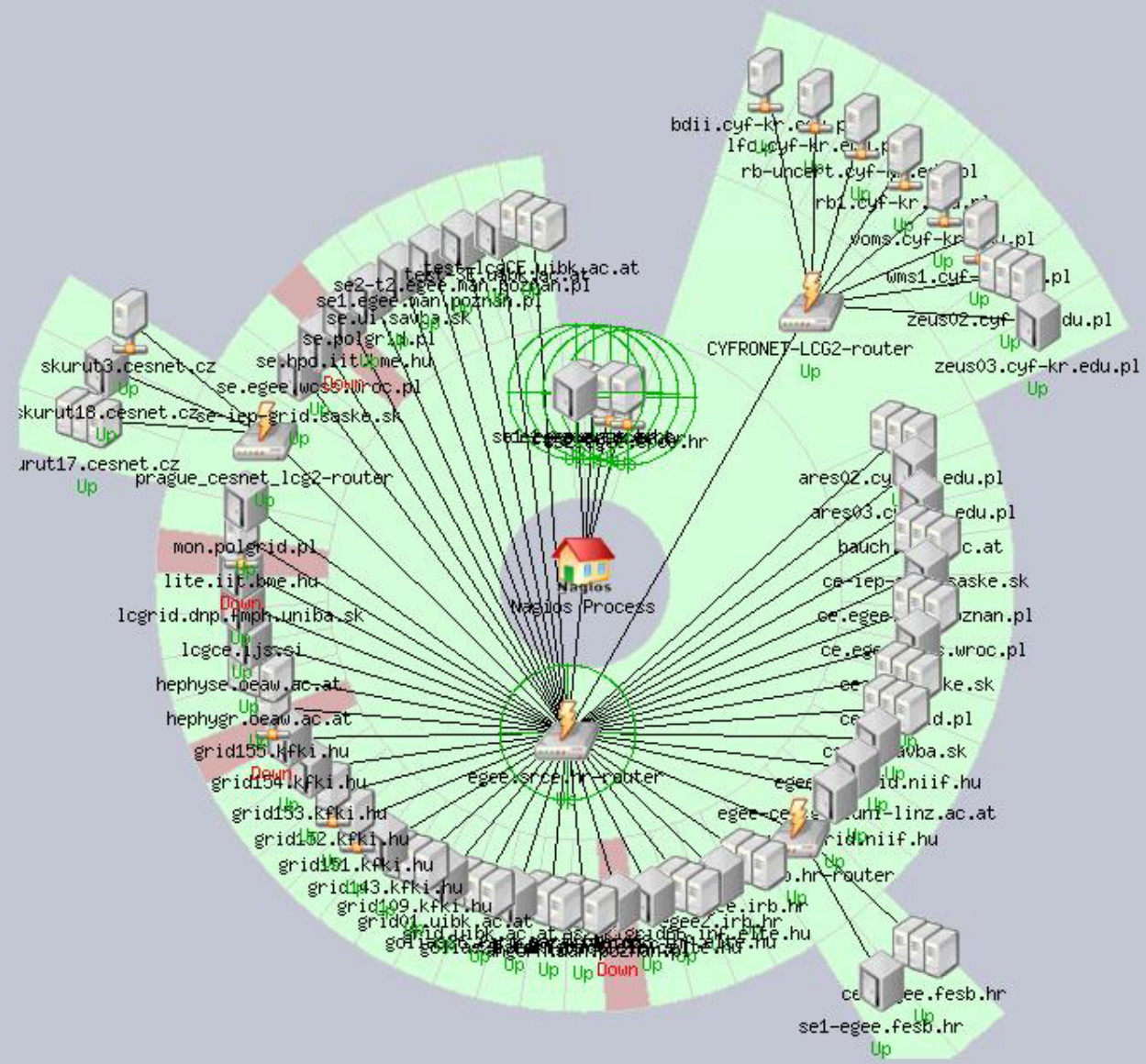Suppress popups:

Update

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Imamagic

View Status Detail For All Hosts
View Status Overview For All Hosts

bdii.cyf-kr.edu.pl
lfc.cyf-kr.edu.pl
rb-uncert.cyf-kr.edu.pl
rb1.cyf-kr.edu.pl
voms.cyf-kr.edu.pl
wms1.cyf-kr.edu.pl
zeus02.cyf-kr.edu.pl
CYFRONET-LCG2-router
Up
zeus03.cyf-kr.edu.pl
Up

testlcgCE.uibk.ac.at
se2-t2.egee.man.poznan.pl
se1.egee.man.poznan.pl
se.ui.savba.sk
se.polgrid.pl
se.hpd.iit.dme.hu
se.egee.wcss.wroc.pl
se-iep-grid.saske.sk
skurut3.cesnet.cz
skurut18.cesnet.cz
skurut17.cesnet.cz
prague_cesnet_lcg2-router
Up

ares02.cyf.edu.pl
ares03.cyf.edu.pl
bauch.ac.at
ce-iep-grid.saske.sk
ce.egee.man.poznan.pl
ce.egee.wcss.wroc.pl
ce.saske.sk
ce.polgrid.pl
ce.ui.savba.sk

Nagios
Nagios Process

mon.polgrid.pl
lite.iit.bme.hu
Down
lcgrid.dnp.fmph.uniba.sk
Up
lcgce.ijs.si
Up
hephyse.oeaw.ac.at
Up
hephygr.oeaw.ac.at

grid155.kfki.hu
Down
grid154.kfki.hu
grid153.kfki.hu
grid152.kfki.hu
grid151.kfki.hu
grid143.kfki.hu
grid109.kfki.hu
grid01.uibk.ac.at

egee.srce.hr-router

egee.grid.niif.hu
egee-ce.grid.uni-linz.ac.at
grid.niif.hu
No
.hr-router
ce.irb.hr
egee2.irb.hr
bme.hu
Up Up Up Down Up

ce.egee.fesb.hr
Up
se1-egee.fesb.hr
Up

Contributions to WLCG Grid Service Monitoring WG

❖ All sensors rewritten to be compliant with Probe specification

❖ Developed interface to Nagios data compliant with Data exchange format

❖ Nagios-based prototype

  ◆ several grid extensions used (NCG, credential management, SAM gatherer)

Future Work

❖ Utilizing our extensions on site level

❖ Distributing monitoring deployment

◆ hierarchy of Nagios servers

❖ Migration of credential management to robot certificates

❖ Further sensor development

❖ Service check execution optimization

◆ active vs. passive checks

Conclusions

- ❖ Nagios
  - ◆ highly configurable monitoring framework with notifications, service dependencies, …
  - ◆ simple, programming language-agnostic sensor API
- ❖ Grid extensions
  - ◆ integration with existing infrastructure (user certificates, VOMS, GOCDB, SAM)
  - ◆ sensors for key grid services
- ❖ Nagios @ grid
  - ◆ enables sites' better availability
  - ◆ admins get only relevant notifications

Thank You!

Questions?