Grid Site Monitoring tools developed and used at SCL

SEE-GRID-SCI
SEE-GRID eInfrastructure for regional eScience

www.see-grid-sci.eu

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V. Slavnić, B. Acković, D. Vudragović, A. Balaž, A. Belić, M.Savić*
SCL, Institute of Physics Belgrade, Serbia
*Faculty of Electrical Engineering, University of Banja Luka

Overview

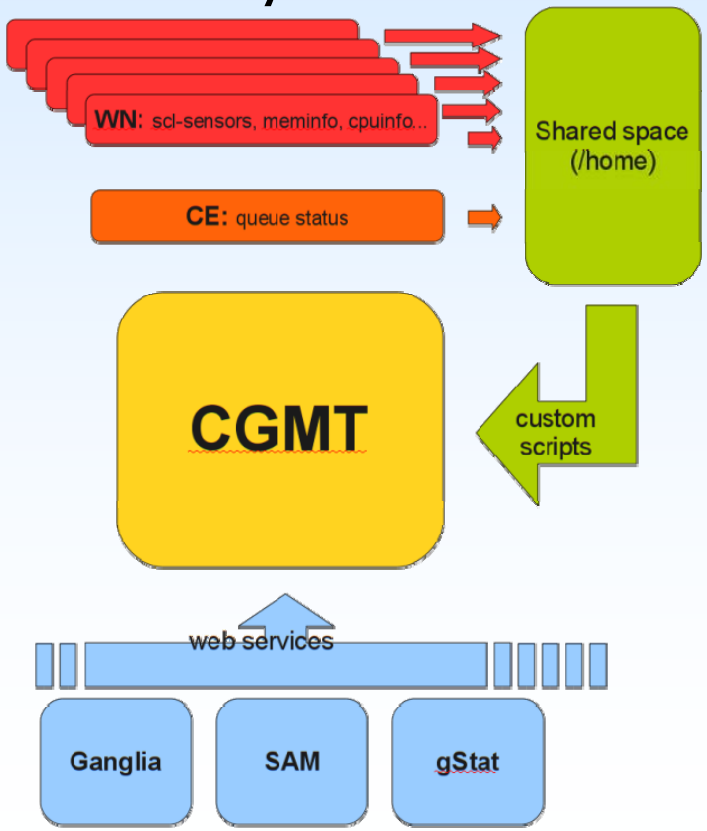
- Introduction
- Grid site monitoring tools
  - CGMT
  - WMSMON
  - WatG browser
  - Pakiti
  - Ganglia
  - SAM
  - BBmSAM
  - GStat
- Conclusions

Introduction

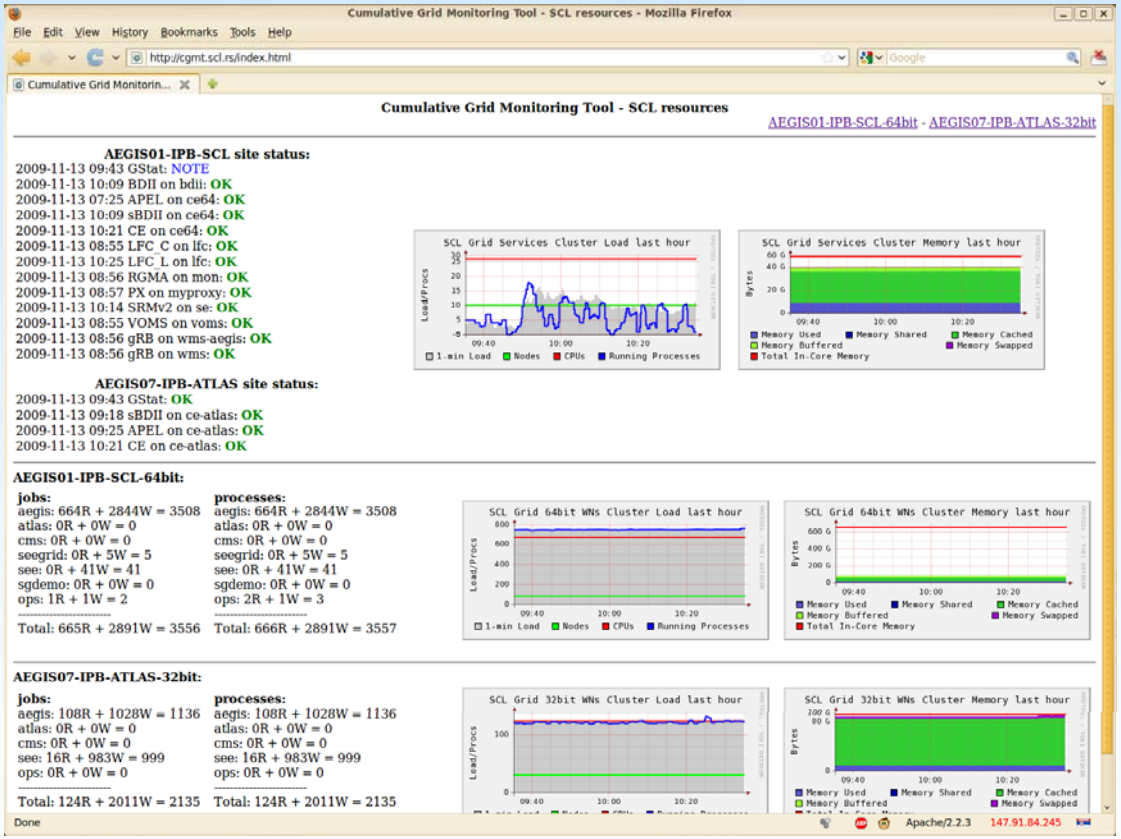
- Grid site is a complex system
- Different subsystems and its parameters:
  - Basic hardware layer
    - temperature, voltage, fan speed
  - Operating system (OS) layer
    - CPU load, disk and memory usage
  - Grid middleware software stack layer
    - number of jobs, available CPU and storage resources, test results
  - Additional network and cooling subsystems
- Grid site administrators have to monitor and supervise each of these important attributes
- SCL use several monitoring tools – some of them developed by SCL for its specific needs

Cumulative Grid Monitoring Tool – CGMT (1/4)

- Set of scripts accompanied by the simple web interfaces
- Provide Grid site monitoring and integrated presentation of the results provided by various monitoring tools

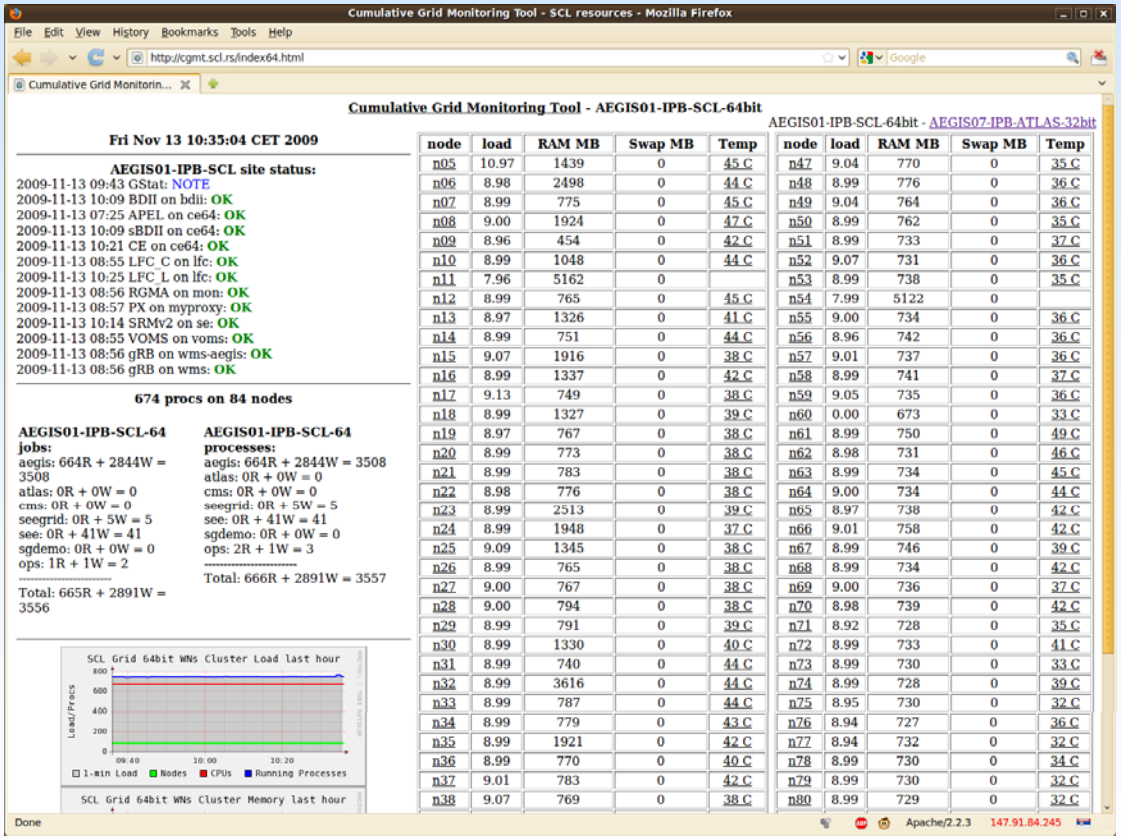


Cumulative Grid Monitoring Tool – CGMT (2/4)



Main web page of CGMT tool

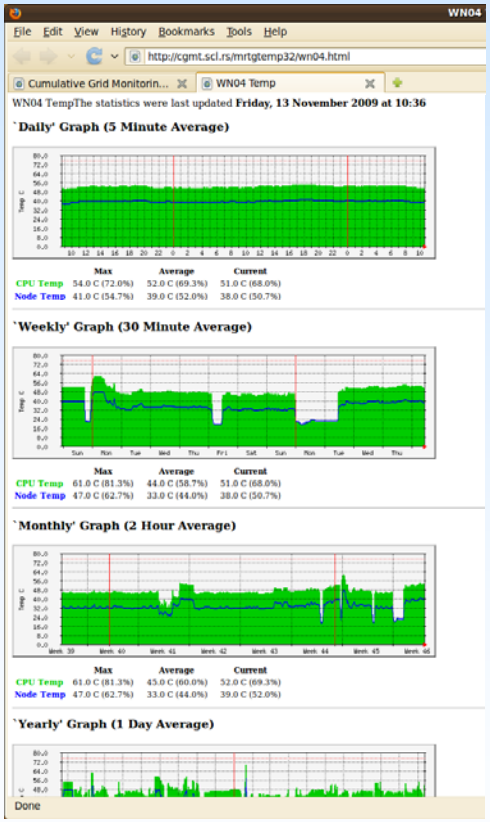
Cumulative Grid Monitoring Tool – CGMT (3/4)



node	load	RAM MB	Swap MB	Temp	node	load	RAM MB	Swap MB	Temp
n05	10.97	1439	0	45 C	n47	9.04	770	0	35 C
n06	8.98	2498	0	44 C	n48	8.99	776	0	36 C
n07	8.99	775	0	45 C	n49	9.04	764	0	36 C
n08	9.00	1924	0	47 C	n50	8.99	762	0	35 C
n09	8.96	454	0	42 C	n51	8.99	733	0	37 C
n10	8.99	1048	0	44 C	n52	9.07	731	0	36 C
n11	7.96	5162	0		n53	8.99	738	0	35 C
n12	8.99	765	0	45 C	n54	7.99	5122	0	
n13	8.97	1326	0	41 C	n55	9.00	734	0	36 C
n14	8.99	751	0	44 C	n56	8.96	742	0	36 C
n15	9.07	1916	0	38 C	n57	9.01	737	0	36 C
n16	8.99	1337	0	42 C	n58	8.99	741	0	37 C
n17	9.13	749	0	38 C	n59	9.05	735	0	36 C
n18	8.99	1327	0	39 C	n60	0.00	673	0	33 C
n19	8.97	767	0	38 C	n61	8.99	750	0	49 C
n20	8.99	773	0	38 C	n62	8.98	731	0	46 C
n21	8.99	783	0	38 C	n63	8.99	734	0	45 C
n22	8.98	776	0	38 C	n64	9.00	734	0	44 C
n23	8.99	2513	0	39 C	n65	8.97	738	0	42 C
n24	8.99	1948	0	37 C	n66	9.01	758	0	42 C
n25	9.09	1345	0	38 C	n67	8.99	746	0	39 C
n26	8.99	765	0	38 C	n68	8.99	734	0	42 C
n27	9.00	767	0	38 C	n69	9.00	736	0	37 C
n28	9.00	794	0	38 C	n70	8.98	739	0	42 C
n29	8.99	791	0	39 C	n71	8.92	728	0	35 C
n30	8.99	1330	0	40 C	n72	8.99	733	0	41 C
n31	8.99	740	0	44 C	n73	8.99	730	0	33 C
n32	8.99	3616	0	44 C	n74	8.99	728	0	39 C
n33	8.99	787	0	44 C	n75	8.95	730	0	32 C
n34	8.99	779	0	43 C	n76	8.94	727	0	36 C
n35	8.99	1921	0	42 C	n77	8.94	732	0	32 C
n36	8.99	770	0	40 C	n78	8.99	730	0	34 C
n37	9.01	783	0	42 C	n79	8.99	730	0	32 C
n38	9.07	769	0	38 C	n80	8.99	729	0	32 C

- CGMT cluster page

Cumulative Grid Monitoring Tool – CGMT (4/4)



- Node info page

Node temperature page

WMSMON (1/3)

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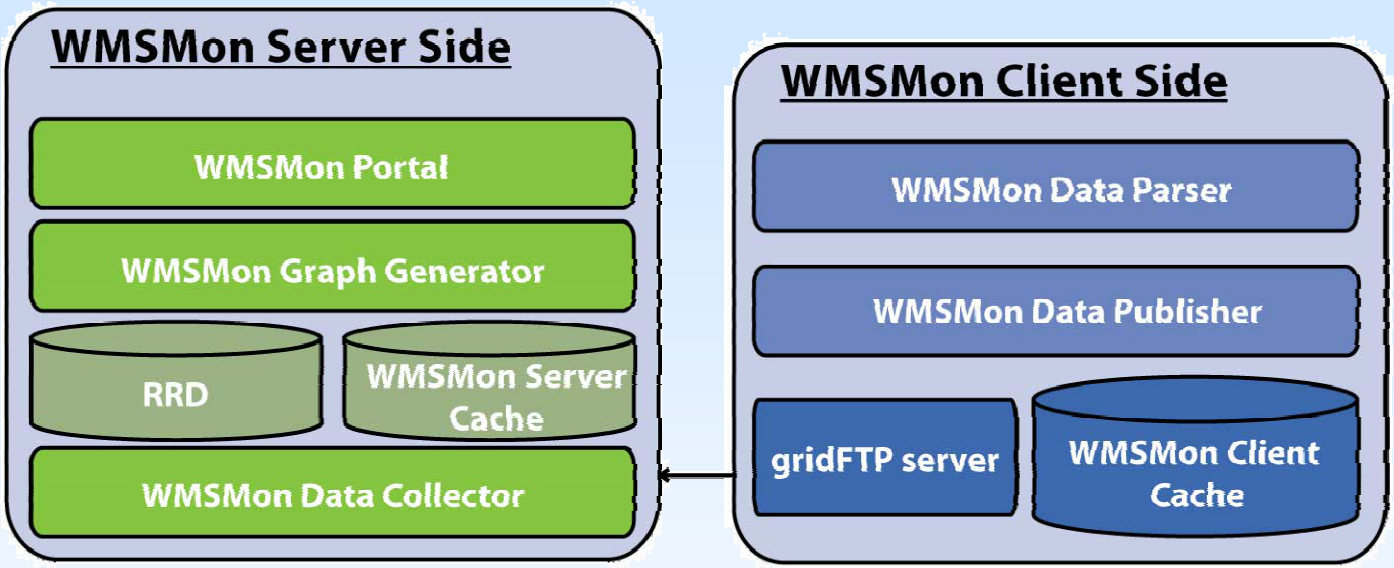
- Workload Management System (WMS) is one of the key Grid services of the gLite middleware software stack
- WMSMON provides a site independent, centralized, uniform monitoring of gLite WMS services
- Properties of WMS that can be monitored:
  - Load averages
  - Job queues properties
  - File system properties
  - Log file properties
  - Availability/responsiveness of gLite services/daemons

WMSMON (2/3)



WMSMON architecture

- WMSMON web portal presents information from different WMS sources in a unified way
- Data is shown in simplified way with the emphasis on WMS services identified not to work properly
- Pages with detailed information and graphs for each monitored WMS service

WMSMON (3/3)

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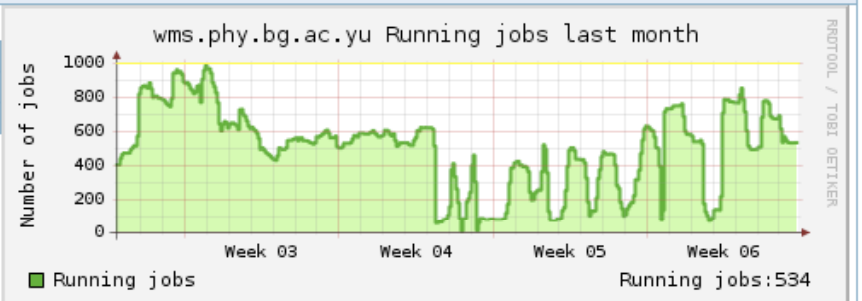
wmsmon

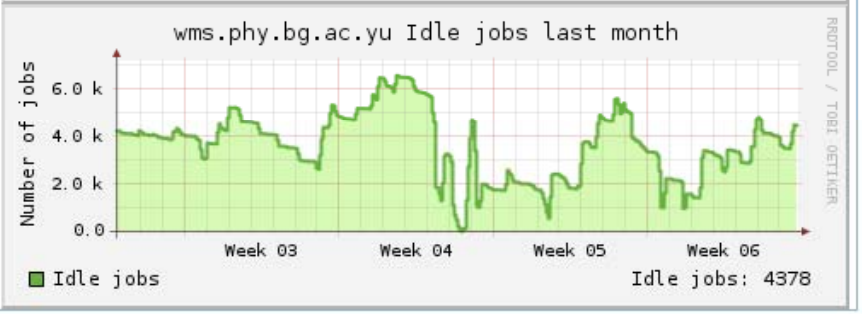
wmsmon

WMS Hostname	Timestamp	Load	Jobs	File system	Log files	gLite daemons
wms.phy.bg.ac.yu	Sun, 08 Feb 2009 20:25:01 +0100					
wms-aegis.phy.bg.ac.yu	Sun, 08 Feb 2009 20:25:01 +0100					
c16.grid.etfbl.net	Sun, 08 Feb 2009 20:30:01 +0100					

Jobs

Property	Value
Number of Running Jobs	534
Number of Idle Jobs	4378





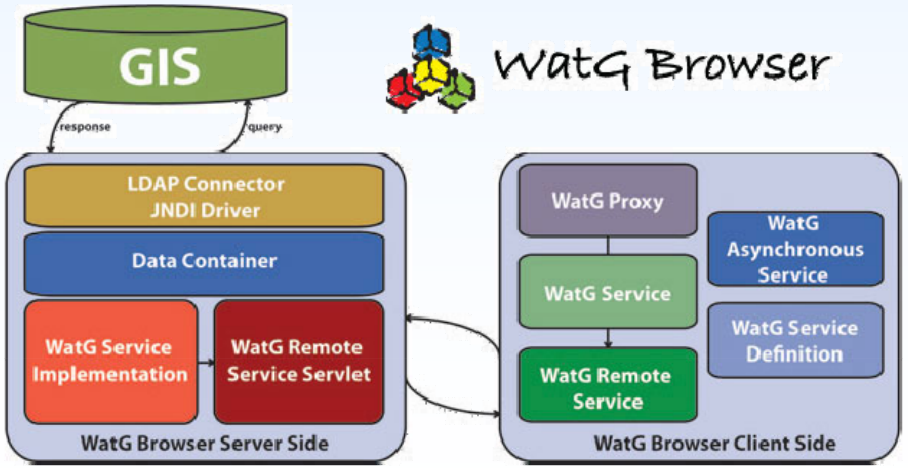
- WMSMON web portal

WatG (1/3)

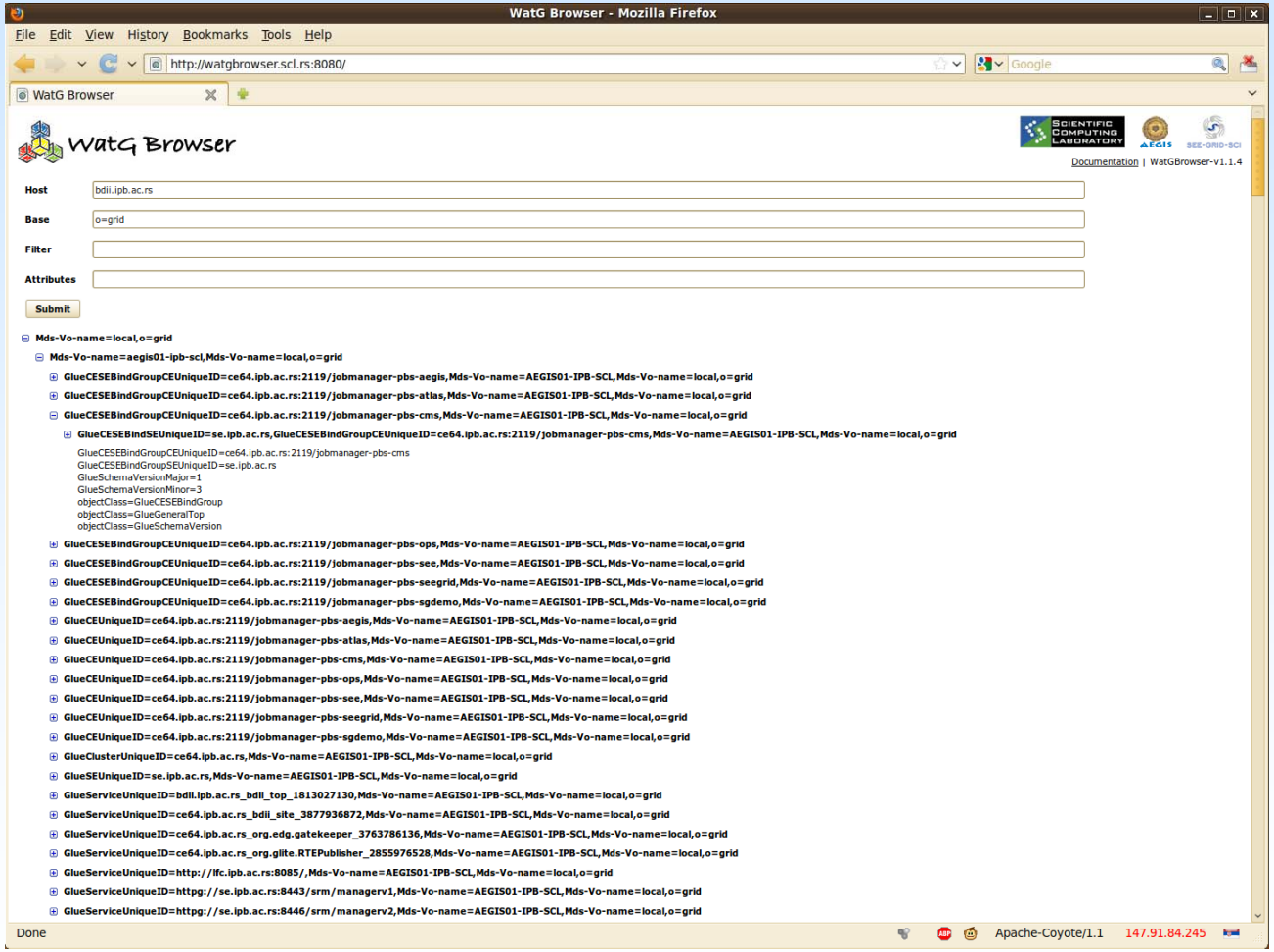
- WatG Browser (What is at the Grid Browser) is a web-based Grid Information System (GIS) visualization application
- Provides detailed overview of the status and availability of various Grid resources in a given gLite-based e-Infrastructure
- Information sources:
  - Local resource information system (GRIS)
  - Grid site information system (site BDII)
  - Top-level information system (top-level BDII)
- Allows quick and easy navigation through entries and objects of the LDAP tree retrieved by the specified query

WatG (2/3)

- Supports partial refreshes and desynchronization of a web page
- Developed with Google Web Toolkit (GWT) open source Java software development framework
- Operational tool in the framework of the SEE-GRID project
- Will be integrated into GStat EGEE tool



WatG (3/3)

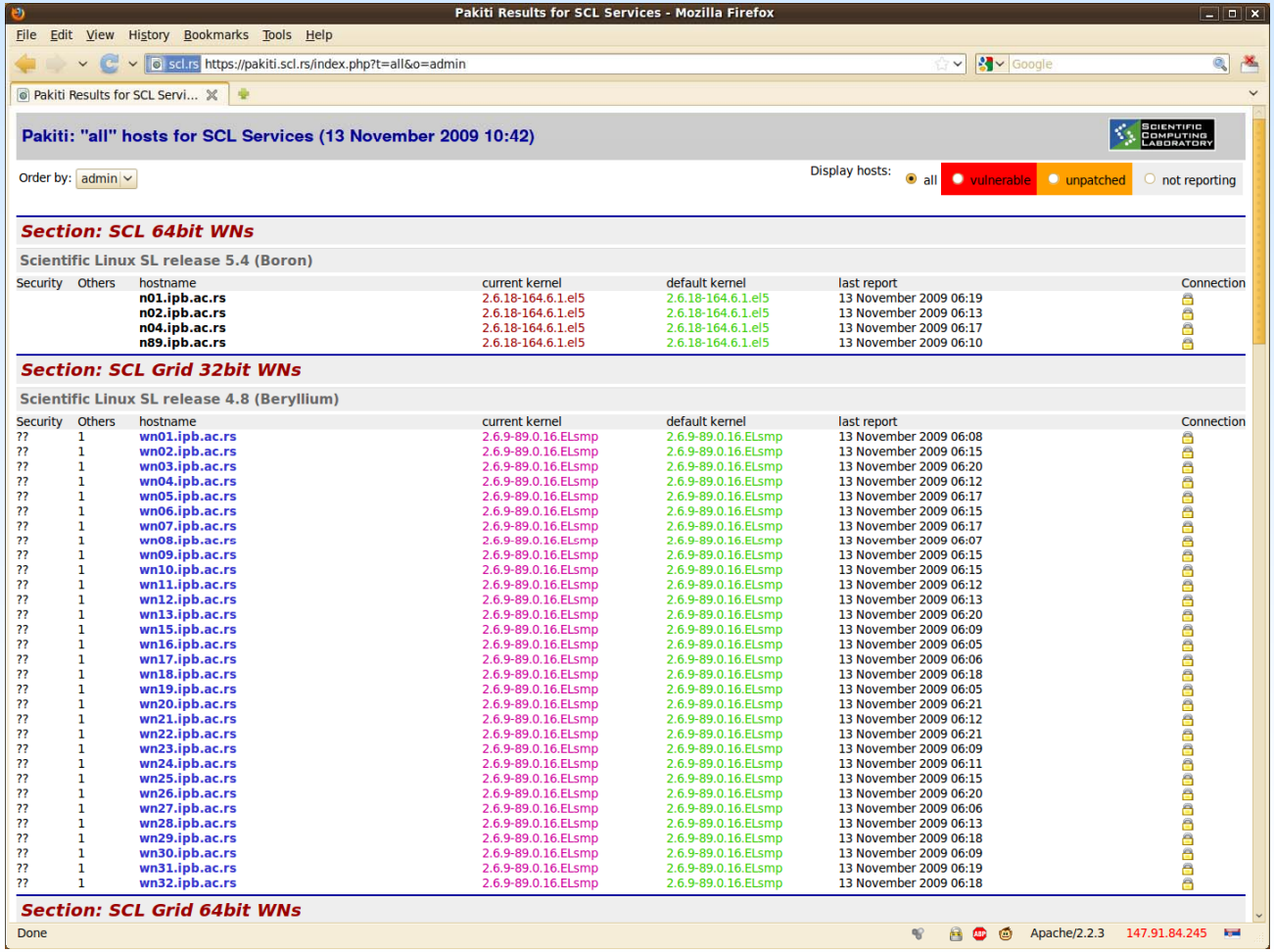


- WatG front end

Pakiti (1/2)

- Provides a monitoring and notification mechanism for checking the patching status of installed packages on an RPM-based Linux system
- Client/server model
- Exchanging information using HTTP(S)
- Through a cron job Pakiti on client checks if new patches are available and report them to the relevant Pakiti Server(s)
- Helps the system administrator keeping multiples machines up-to-date

Pakiti (2/2)

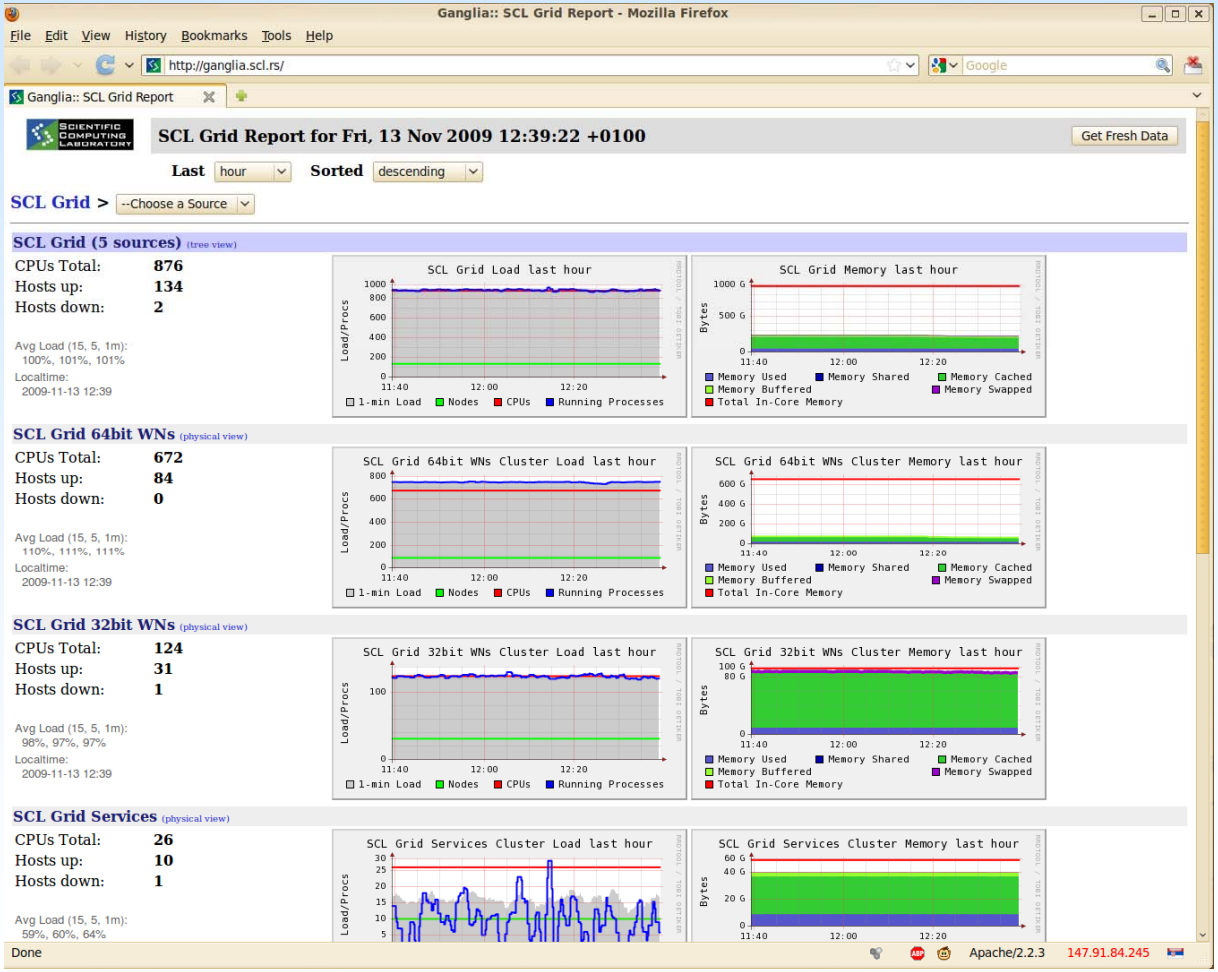


- SCL Pakiti main web page

Ganglia (1/2)

- Scalable distributed monitoring system for high-performance computing systems (clusters and Grids)
- Currently in use on thousands of clusters around the world
- Gives fast and reliable overview of the status of site nodes
- Client-server based system
  - gmond daemon working on each monitored node collecting various data about OS
  - gmetad daemon on server side collects gmond outputs and publishes them on the web interface
- Easy to add new custom monitored parameters data into gmond daemon on ganglia clients

Ganglia (2/2)

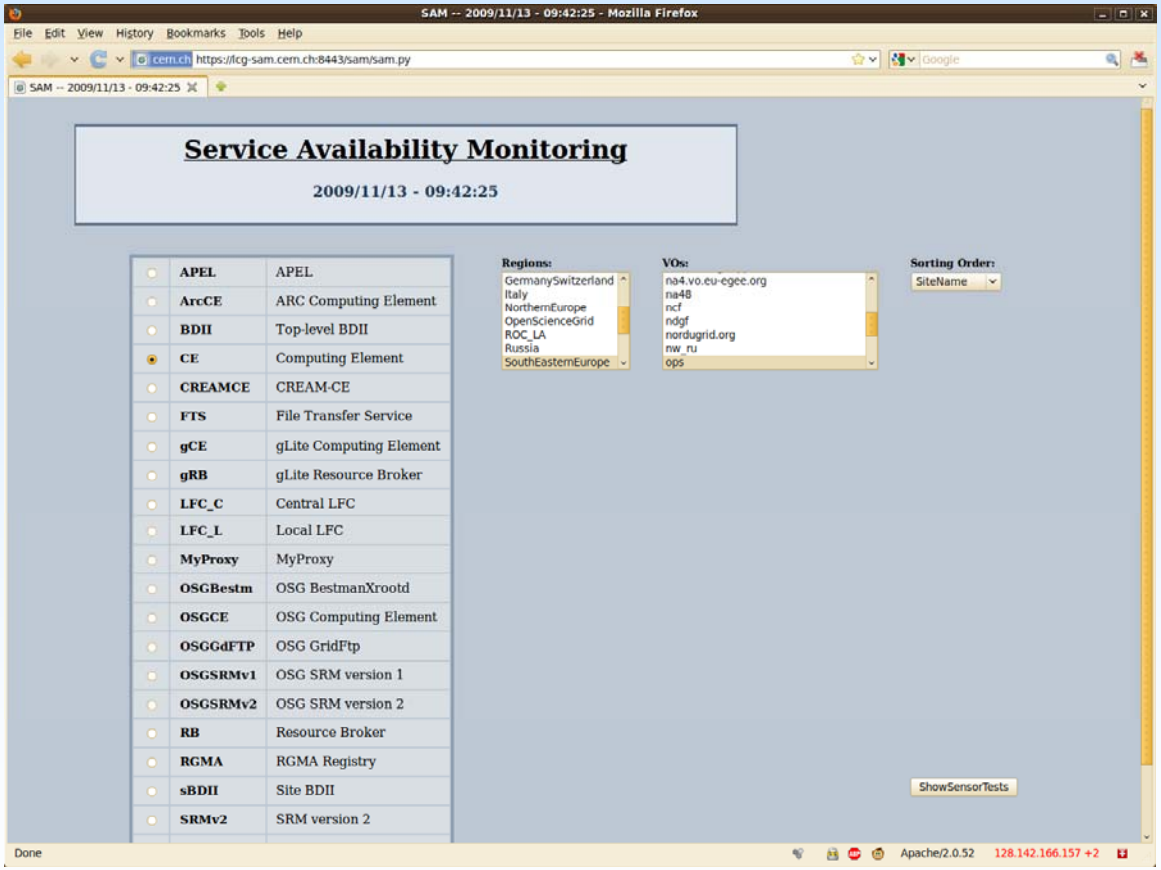


SCL Ganglia main page

SAM (1/3)

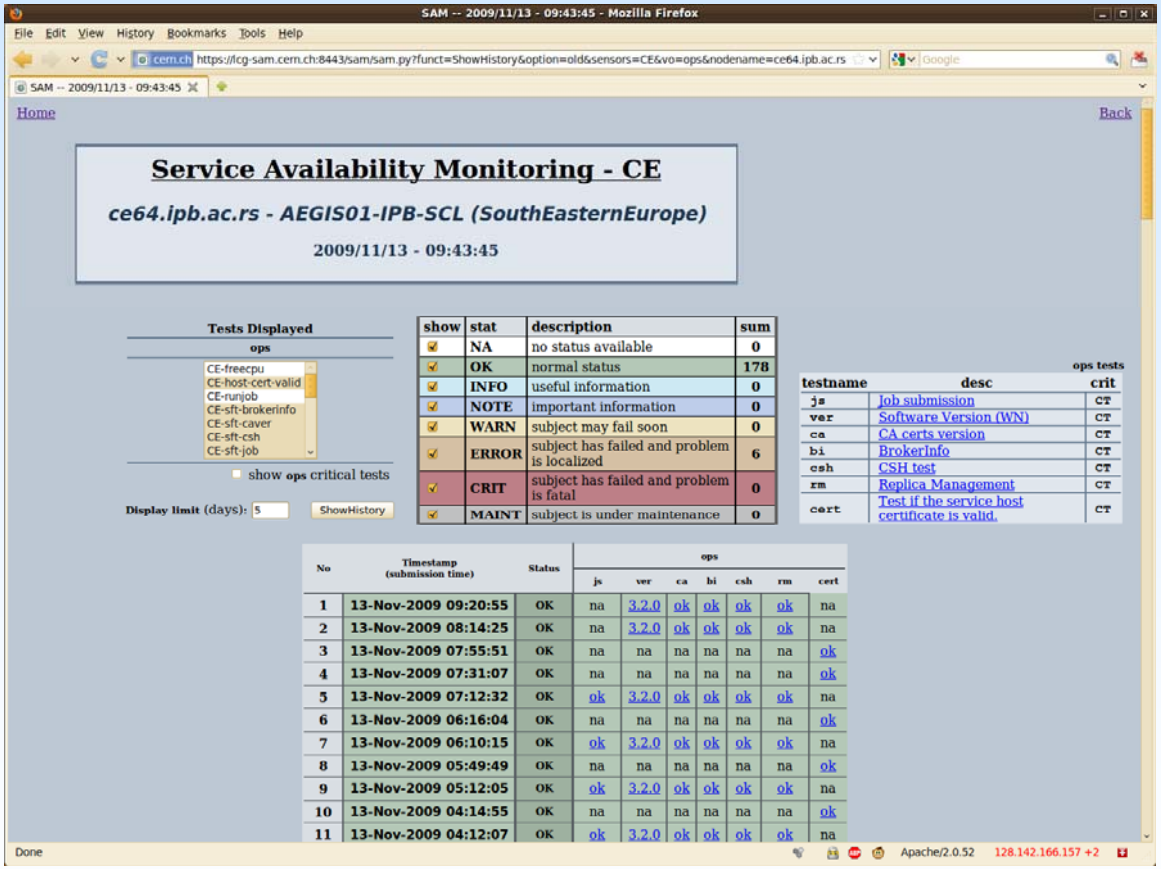
- Service Availability Monitoring
- Framework used in EGEE for the monitoring of production Grid sites
- It consists of:
  - Set of probes submitted at regular intervals
  - Database that stores test results
- Valid certificate is needed to access web portal
- In addition, access can be granted for specific IP address

SAM (2/3)



SAM main page

SAM (3/3)



SAM results web page

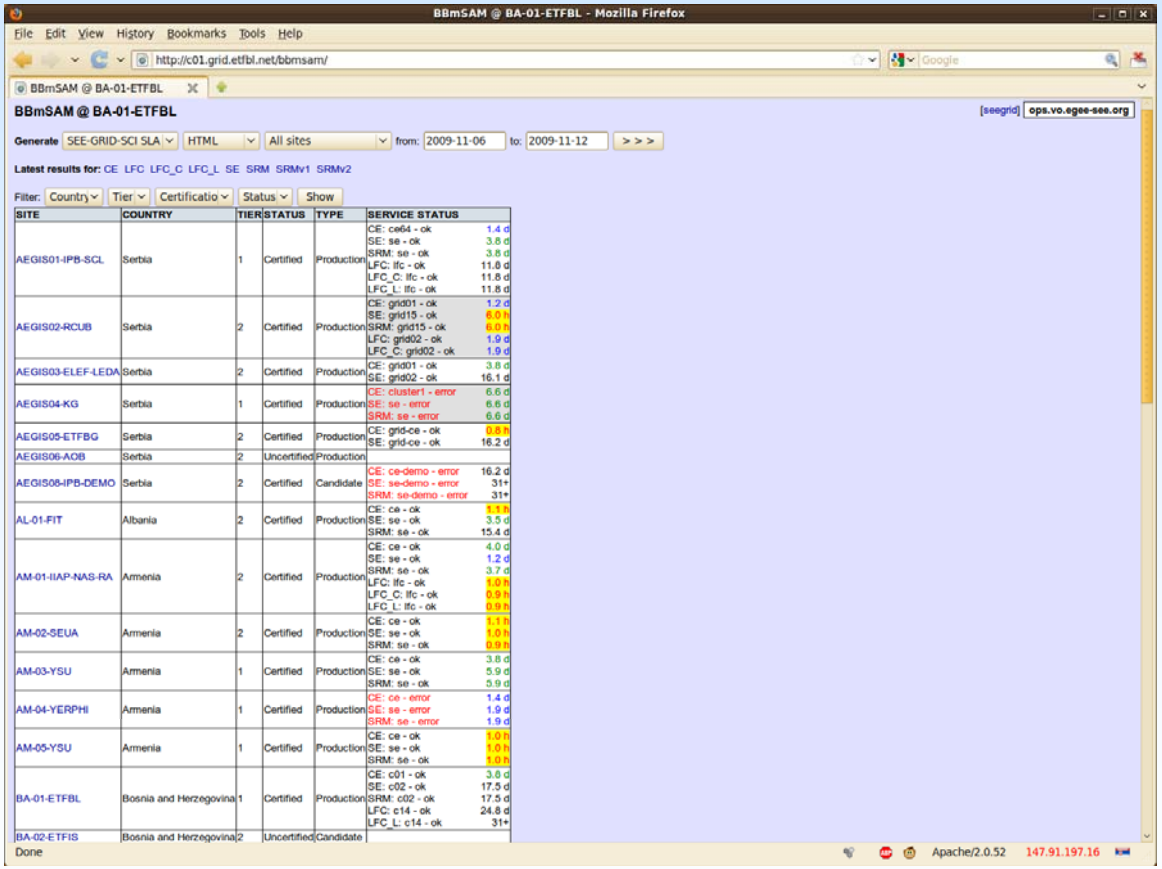
BBmSAM (1/4)

- SEE-GRID alternative to the EGEE SAM framework
- Web application implemented in PHP relying on MySQL database
- Main features of BBmSAM are:
  - Use of unaltered client and sensor components of EGEE SAM system
  - Synchronization with central HGSM service
  - Use of free and open source technologies
  - Enabling more efficient access by mobile and small screen devices
- Main components of BBmSAM are:
  - Database server
  - Synchronization service
  - BBmSam web services
  - BBmobileSAM
  - BBmSAM portal

BBmSAM (2/4)

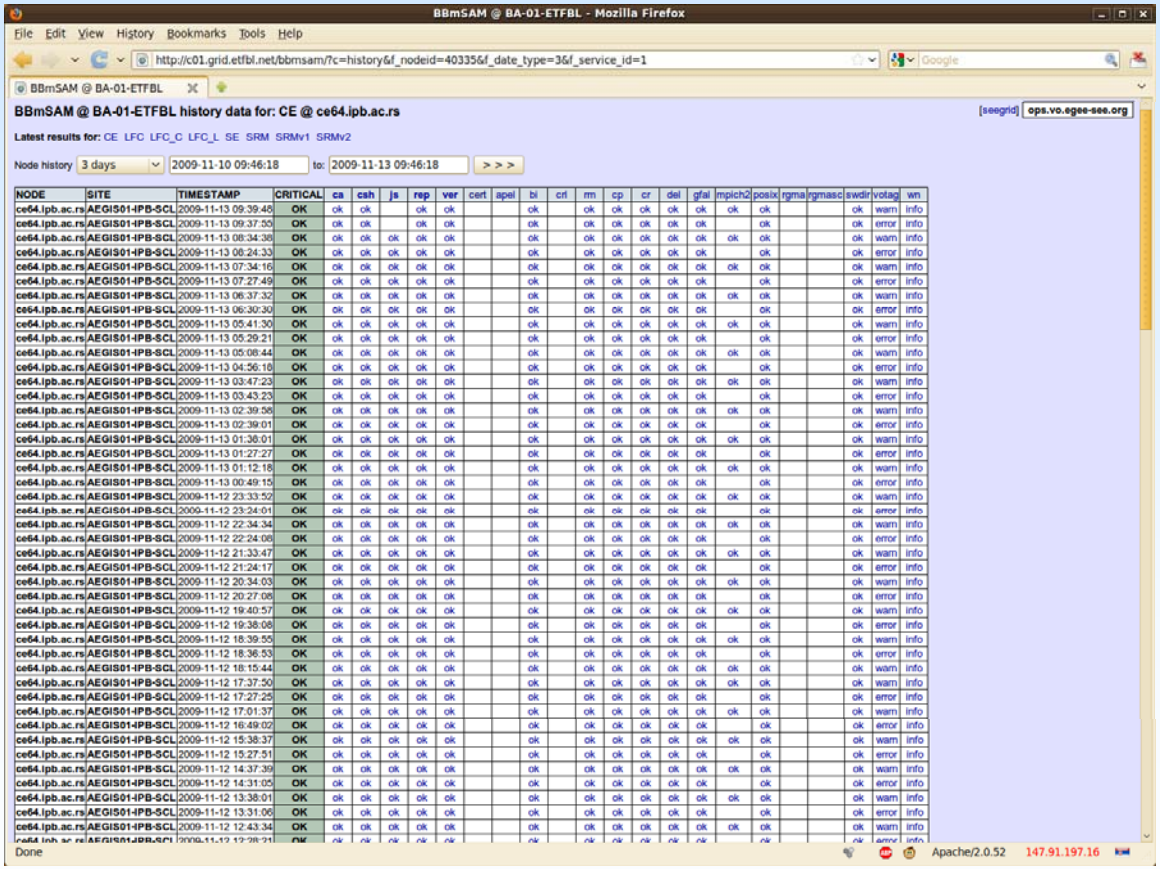
- BBmSAM system performs:
  - Periodical synchronization of local HGSM database with central HGSM database performed each 10 minutes
  - Regular SAM test submission performed each 3 hours for interactive tests (job based) and each hour for non-interactive tests
  - Publishing of interactive test data each 20 minutes
  - Calculating hourly uptime/availability each hour (for SEE-GRID-2 compatible SLA)
  - Calculating service instance uptime (for continuous time SLA calculations in SEE-GRID-SCI)
  - Generating information for end-users of portal on demand basis

BBmSAM (3/4)



BBmSAM front web page

BBmSAM (4/4)



BBmSAM test results page

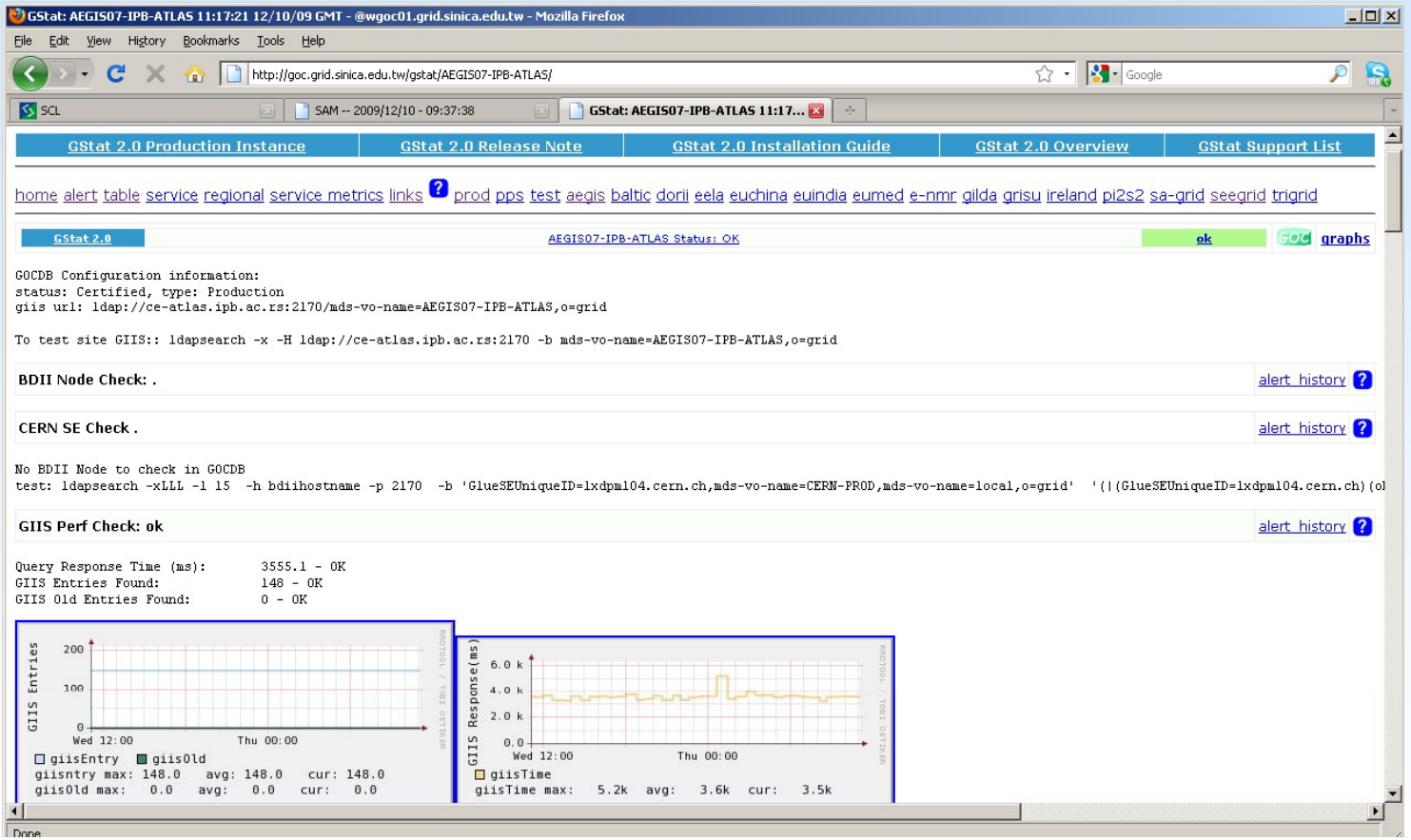
GStat (1/3)

- Application designed to monitor EGEE/LCG compatible Information Systems
- Its purpose is to detect faults, verify the validity and display useful data from the Information System
- Relies on queries to site GIISes/BDIIs and not to any submitted job
- GStat covers the following areas:
  - Site and service information
  - Usage information
  - Information integrity
- Depends on the data found in the GOCDB
- GStat runs on a single server

GStat (2/3)

Gstat main page

GStat (3/3)



Gstat site page

Conclusions

- Presented tools are used for overseeing two large Grid sites at SCL
- Considered vital for Grid operations
- Provide essential information about Grid sites' and services' health to site administrators and end-users
- Tools developed at SCL are provided to all interested site administrators through SCL's SVN and RPM repository