

perfSONAR-PS Update

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WLCG PS Deployment TF Co-chair

GDB Meeting

CERN

February 12th, 2014

Vision for perfSONAR-PS in WLCG

❄ Goals:

- ❄ Find and isolate “network” problems; alerting in a timely way
- ❄ Characterize network use (base-lining)
- ❄ Provide a source of network metrics for higher level services
- ❄ **First step:** get monitoring in place to create a baseline of the current situation between sites (see details later)
- ❄ **Next:** continuing measurements to track the network, alerting on problems as they develop
- ❄ Choice of a standard “tool/framework”: **perfSONAR**
 - ❄ We wanted to benefit from the R&E community consensus
- ❄ **perfSONAR’s purpose is to aid in network diagnosis** by allowing users to characterize and isolate problems. **It provides measurements of network performance metrics over time** as well as “on-demand” tests.

Plans for WLCG Operations

- ❄ WLCG (Worldwide LHC Computing Grid) operations task-force for perfSONAR:
 - ❑ Encouraging all sites to deploy and register two instances
 - ❑ All sites to use the “mesh” configuration
 - ❑ One set of test parameters to be used everywhere
 - ❑ Detailed instructions at <https://twiki.cern.ch/twiki/bin/view/LCG/PerfsonarDeployment>
- ❄ **Simone presented at CHEP 2013 bringing perfSONAR-PS to an international audience**
- ❄ The current dashboard is a central source for network information. We also need to make sure we are gathering the right metrics and making them easily accessible
 - ❑ We need to encourage discussion about the types of metrics our frameworks and applications would like concerning the network

Summary: Where Are We?

- ❄ Newest release **3.3.2** of perfSONAR-PS released February 3, 2014. Improvements in security, minor bugfixes, improvements
- ❄ Modular Dashboard project now “orphaned”. Code still in GitHub <https://github.com/PerfModDash/PerfModDash>
- ❄ New prototype replacement of Modular Dashboard under evaluation (Uses OMD <http://omdistro.org/start> and MaDDash)
- ❄ Tickets issued for perfSONAR-PS issues (see below)
- ❄ About 85% of WLCG sites have perfSONAR-PS (at some level)
 - ❑ 15% are problematic and may need intervention from the experiments
- ❄ Of the 85% with perfSONAR-PS we have some issues to resolve for a significant fraction:
 - ❑ Firewalls are blocking services
 - ❑ Sites are not using the mesh-configuration
 - ❑ Versions are too old or not fully configured
 - ❑ Nodes are down/crashed

Old Modular Dashboard (Orphaned)

← → ↻ <https://perfsonar.racf.bnl.gov:8443/exda/?page=25&cloudName=LHCONE> 🔍 ☆ ☰

RACF
Grid Group

Main Page

All Clouds

Individual Clouds:

- USATLAS
- USCMS
- IT
- LHCOPN
- LHCONE
- CA-ATLAS
- UK
- LHC-FR

Inter Cloud Tests:

- AGLT2-IT
- FR-US
- ATLAS-UK

Primitive Services

perfSonar Sites

List of Hosts

List of Matrices

List of Alarms

List of Clouds

List of Sites

List of Schedulers

Probes

Manage Users

Define or Edit Alarms

RACF dashboard

perfSONAR dashboard (old)

RACF dashboard (test)

perfSONAR dashboard (old, test)

Dashboard documentation

The Production Instance of perfSONAR Dashboard

Status as of: Mon Dec 10 10:02:47 EST 2012

Cloud LHCONE

Sites of LHCONE cloud

BNL	AGLT2	INFN Napoli	SARA	ASGC	PIC
KIT	TRIUMF	Toronto	Prague	Tokyo	LRZ-LMU
GRIF-LAL	DESY-HH	MWT2(UC)	GRIF/LPNHE		

LHCONE Throughput Matrix

	---	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
0:BNL (lhcmon.bnl.gov)	---	1.81	2.08	0.08	0.00	0.34	0.05	0.00	0.10	0.14	0.02	0.14	0.04	0.00	0.47	0.14	0.31	0.18	
1:AGLT2 (psmsu02.agit2.org)	1.05	---	3.93	0.30	0.46	0.30	0.05	0.00	0.09	0.10	0.02	0.01	0.28	0.00	0.00	0.10	0.30	0.22	
2:AGLT2 (psum02.agit2.org)	0.18	0.30	---	0.07	0.04	0.05	0.00	0.00	0.09	0.11	0.00	0.00	0.20	0.00	0.00	0.05	0.40	0.20	
3:ASGC (lhc-bandwidth.twgrid.org)	0.01	0.01	0.01	---	0.10	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4:CERN	0.00	0.01	0.01	0.01	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

LHCONE Latency

0:BNL (lhcperfmon.bnl.gov)	
1:AGLT2 (psmsu01.agit2.org)	
2:AGLT2 (psum01.agit2.org)	
3:ASGC (lhc-latency.twgrid.org)	

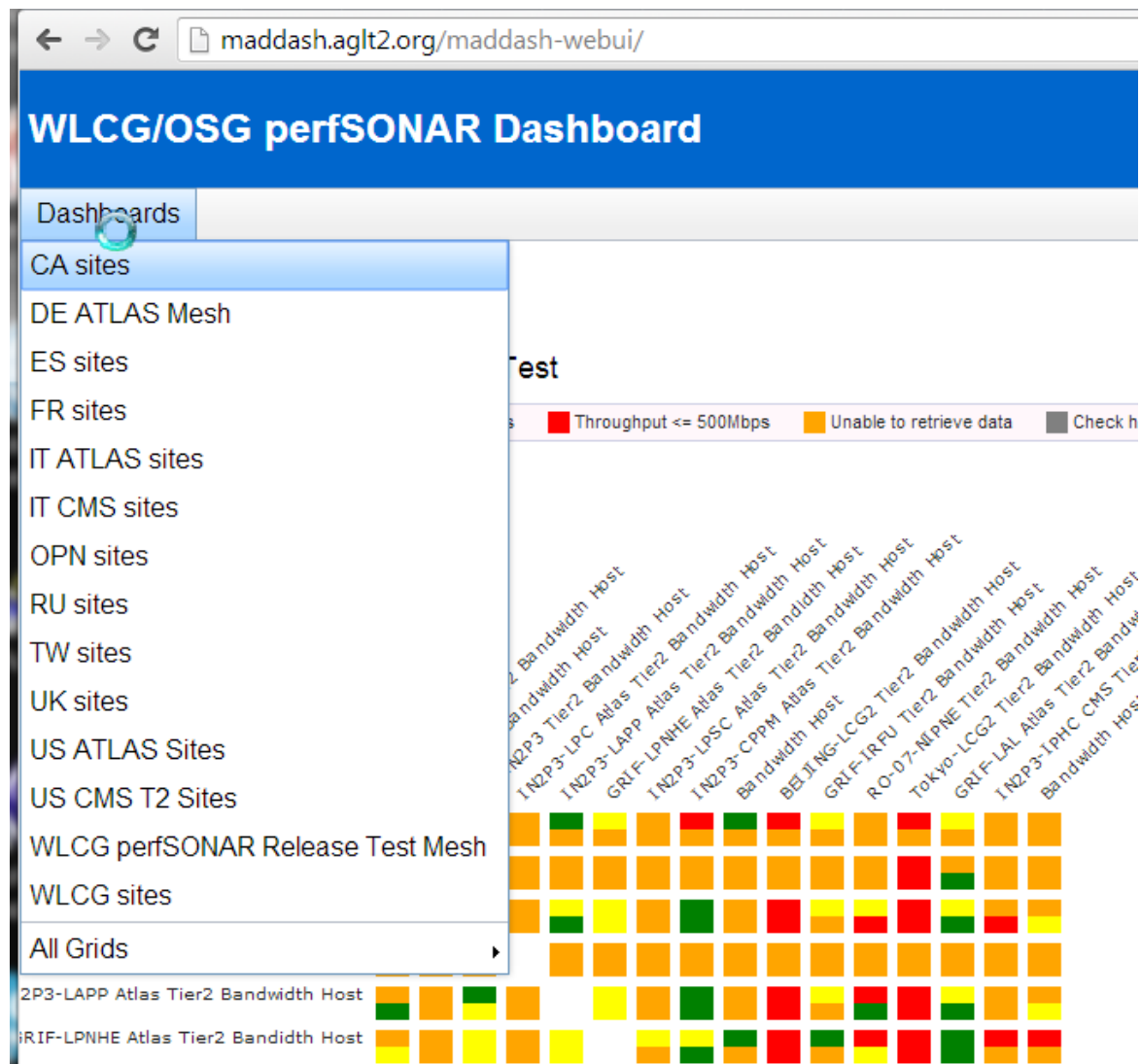
<https://github.com/PerfModDash/PerfModDash>

Modular Dashboard Replacement

MaDDash (Monitoring and Debugging Dashboard) is a perfSONAR-PS project developed and maintained by ESnet.

It is **easy to install**, provides drill-down capability and will be supported for the foreseeable future. (Install details at <https://twiki.cern.ch/twiki/bin/view/LCG/MadDashWLCG>)

It doesn't provide any primitive service monitoring nor the ability to create/edit meshes via the GUI.



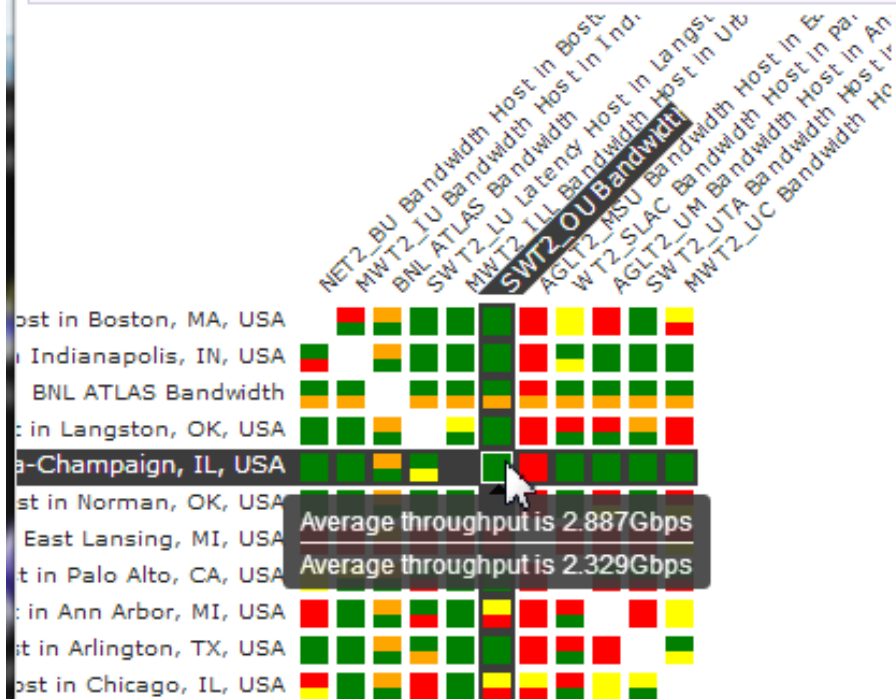
Example Throughput Mesh

WLCG/OSG perfSONAR Dashboard

Dashboards

US ATLAS Sites - US ATLAS Cloud BWCTL Mesh Test

■ Throughput ≥ 900 Mbps ■ Throughput < 900 Mbps ■ Throughput ≤ 500 Mbps ■ Unable to retrieve data ■ Check has not yet run



Colors denote defined ranges of throughput (using default from ESnet for now)

Hovering provides results from both Measurement Archives(MAs) involved in the test

Clicking allows you to drill down

MaDDash Drill-down to Graphs

WLCG/OSG perfSONAR Dashboard

Dashboards

ps2.ochep.ou.edu to mwt2-ps02.campuscluster.illinois.edu (Throughput Reverse)

Status: **OK** Last Checked: February 11, 2014 18:47:56 PM Eastern Standard Time Next Check: February 12, 2014 02:47:56 AM Eastern Standard Time

Summary History Check Details

Current Results

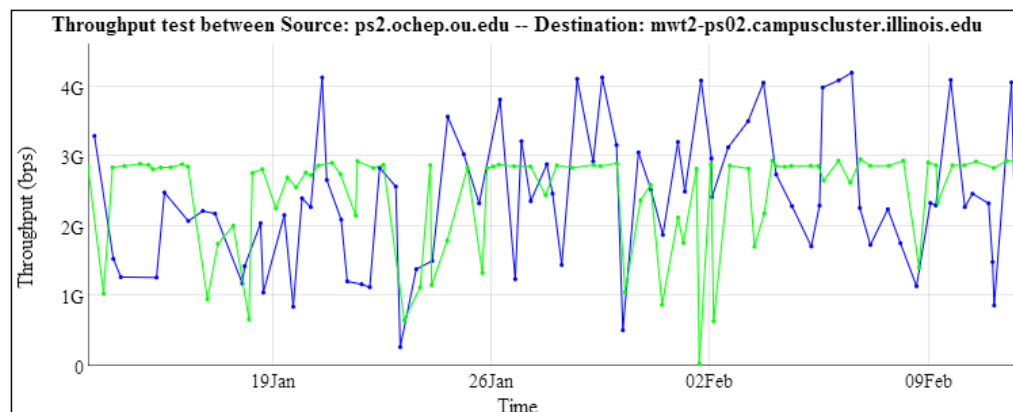
Current Status: **OK**
Result of last check: **OK**
Message For Current Status: Average throughput is 2.887Gbps

Statistics

Graph

perfSONAR BWCTL Graph

perfSONAR



Graph Key

■ Src-Dst throughput
■ Dst-Src throughput

OMD Description and Capabilities

- ❄ OMD (Open Monitoring Distribution) was selected to complement MaDDash and replicate the service testing component present in the Modular Dashboard.
 - ❑ OMD bundles Nagios/Icinga/Shinken with various tools in a single RPM. Easy to deploy and configure; provides nice features.
- ❄ For those familiar with Nagios there is a low barrier to use.
- ❄ The Check_MK (rule-based configuration) is a very powerful component we can leverage.
- ❄ Installation via yum by : 'yum install omd-1.10' (once repo setup)
- ❄ Currently prototype for WLCG evaluation is running at:
<https://maddash.aglt2.org/WLCGperfSONAR/omd>

WLCG OMD Check_MK Mainpage

← → ↺ https://maddash.aglt2.org/WLCGperfSONAR/check_mk/

Check_MK

1.2.2p3

Main Overview

Tactical Overview

Hosts	Problems	Unhandled
184	5	5
Services	Problems	Unhandled
1843	506	506

Quicksearch

Views

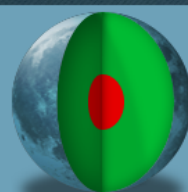
- Dashboards
 - Main Overview
- Hosts
 - All hosts
 - All hosts (Mini)
 - All hosts (tiled)
 - Host search
- Hostgroups
 - Hostgroups
 - Hostgroups (Grid)
 - Hostgroups (Summary)
- Services
 - Servicegroups
 - Servicegroups (Grid)
 - Servicegroups (Summary)
 - Services by group
- Business Intelligence
- Problems
- Addons
- Other

EDIT

WATO - Configuration

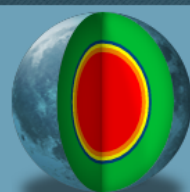
- Main Menu
- Hosts & Folders
- Host Tags
- Global Settings
- Host & Service Parameters
- Host Groups
- Service Groups

Host Statistics


















Up	179
Down	5
Unreachable	0
In Downtime	0
Total	184

Service Statistics


















OK	1291
In Downtime	0
On Down host	46
Warning	55
Unknown	79
Critical	372
Total	1843




Host Problems (unhandled)

state	Host	Icons
DOWN	perfsonar01-iep-grid.saske.sk	  
DOWN	perfsonar02-iep-grid.saske.sk	  
DOWN	perfsonar2.ihep.ac.cn	  
DOWN	ps-bandwidth.clumeq.mcgill.ca	  
DOWN	sonar2.itim-cj.ro	  

Service Problems (unhandled)

State	Host	Service	Icons	Status detail
CRIT	ccperfsonar2-lhcopn.in2p3.fr	One-Way Ping Service OWAMP		CRITICAL - Socket tim 10 seconds
CRIT	lcg-sonar01.hep.ucl.ac.uk	PS-Homepage		CRITICAL - Socket tim 45 seconds
CRIT	hep-sonar.ecm.ub.es	Traceroute Measurement Archive		CRITICAL - Socket tim 10 seconds
CRIT	lphne-psl.in2p3.fr	Traceroute Measurement Archive		No route to host
CRIT	netmon02.grid.hep.ph.ic.ac.uk	PingER Measurement Archive and Regular Tester		No route to host
CRIT	netmon00.grid.hep.ph.ic.ac.uk	PS-Homepage		CRITICAL - Socket tim 45 seconds
CRIT	ps01.ncg.ingrid.pt	perfSONAR-BUOY Measurement Archive		Connection refused
CRIT	ps02.ncg.ingrid.pt	PS-Homepage		CRITICAL - Socket tim 45 seconds
CRIT	psonar1.lal.in2p3.fr	PS-Homepage		CRITICAL - Socket tim 45 seconds
CRIT	ccperfsonar2.in2p3.fr	PingER Measurement Archive and Regular Tester		CRITICAL - Socket tim 10 seconds
CRIT	gridpp-ps-lat.ecdf.ed.ac.uk	PS-Homepage		No route to host
CRIT	netmon02.grid.hep.ph.ic.ac.uk	Traceroute Measurement Archive		No route to host
CRIT	perfsonar1.ihep.ufl.edu	perfSONAR-BUOY Measurement Archive		Connection refused
CRIT	perfsonar01.ftuam.es	PingER Measurement Archive and Regular Tester		Connection refused
CRIT	perfsonar01.datagrid cea.fr	PS-Homepage		No route to host

Events of recent 4 hours

	Time	Host	
	9 min	uct2-net1.mwt2.org	PingER Measur Archive Tester
	9 min	iut2-net1.iu.edu	PingER Measur Archive Tester
	9 min	hcc-ps01.unl.edu	PingER Measur Archive Tester
	9 min	psonar2.fnal.gov	PingER Measur Archive Tester
	9 min	lutps.lunet.edu	PingER Measur Archive Tester
	9 min	perfsonar-owamp.accre.vanderbilt.edu	PingER Measur Archive Tester
	9 min	perfsonar01.hep.wisc.edu	PingER Measur Archive Tester
	10 min	ps2-echas.cu.edu	Bandwi

Grouping By Hosts

Check_MK rules were used to setup host groups

Easy to track Regional/VO cloud status this way

Can also organize by perfSONAR node type

The “Name” column is a link you can use to drill-down to host lists

← → ↻ https://maddash.aglt2.org/WLCGperfSONAR/check_mk/

Check_MK 1.2.2p3

Hostgroups (Summary)

3 30s Edit View

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Quicksearch


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Name	Alias	Up	Dw	Un	Pd	O	W	C	U	P
Bandwidth	Bandwidth perfSONAR-PS Toolkit nodes	84	2	0	0	576	26	113	37	0
CA	CA perfSONAR-PS Toolkit nodes	9	1	0	0	67	2	19	2	0
DE	DE perfSONAR-PS Toolkit nodes	12	2	0	0	76	2	40	4	0
ES	perfSONAR-PS Toolkit nodes from ES	19	0	0	0	90	4	58	20	0
FR	perfSONAR-PS Toolkit nodes from FR	28	2	0	0	155	6	91	18	0
ITATLAS	ITATLAS perfSONAR-PS Toolkit nodes	6	0	0	0	37	6	11	0	0
ITCMS	ITCMS perfSONAR-PS Toolkit nodes	6	0	0	0	42	4	4	4	0
LHCOPN	LHCOPN perfSONAR-PS Toolkit nodes	24	0	0	0	168	4	62	14	0
Latency	Latency perfSONAR-PS Toolkit nodes	94	3	0	0	676	29	294	48	0
RU	perfSONAR-PS Toolkit nodes from RU	6	0	0	0	38	4	8	0	0
TW	TW perfSONAR-PS Toolkit nodes	2	0	0	0	15	2	1	0	0
UK	UK perfSONAR-PS Toolkit nodes	28	0	0	0	178	5	63	14	0
USATLAS	USATLAS perfSONAR-PS Toolkit nodes	19	0	0	0	297	10	14	4	0
USCMS	USCMS perfSONAR-PS Toolkit nodes	20	0	0	0	132	6	37	5	0
WLCG	WLCG perfSONAR-PS Toolkit nodes	177	5	0	0	1285	54	403	85	0

Grouping By Service

← → ↻ https://maddash.aglt2.org/WLCGperfSONAR/check_mk/

Check  1.2.2p3

Servicegroups (Summary)

   3 30s  Edit View

Tactical Overview x

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Quicksearch x

Views x

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Name	Alias	O	W	C	U	P
Bandwidth	Bandwidth Test Controller	80	0	6	0	0
NDT	Network Diagnostic Tester	146	0	32	0	0
NPAD	Network Path and Application Diagnosis	103	0	75	0	0
OWAMP	One-Way Ping Service OWAMP	86	0	11	0	0
PS-Admins	PS Toolkit Administrator Configured, cached and checked every hour	132	0	10	41	0
PS-Homepage	PS-Homepage access checked every 6 hours	148	3	32	0	0
PS-LatLong	PS Toolkit Latitude/Longitude Configured, cached and checked every hour	83	0	100	0	0
PS-Version	PS Toolkit Version, cached and checked every hour	60	47	36	40	0
PingER	PingER Measurement Archive	64	0	33	0	0
TracerouteMA	Traceroute Measurement Archive	66	0	31	0	0
WLCG-Mesh-Updates	Check for WLCG mesh updates	0	0	1	0	0
perfSONAR-BUOY-MA	perfSONAR-BUOY Measurement Archive	145	0	38	0	0

We can also group by service type, allowing us to quickly check service status by grouping. Name column is clickable. **Note we check needed PS services but don't yet have a good check of sites mesh-configuration (use dashboard for now)**

Example of Detailed Host Monitoring

← → ↻ https://maddash.aglt2.org/WLCGperfSONAR/check_mk/ ☆ ⚙

Check MK 1.2.2p3

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- Host Groups
- Service Groups
- Users & Contacts
- Roles & Permissions
- Contact Groups
- Time Periods

Mathias Kettner

Services of Host maddash.aglt2.org 44 rows omdadmin (admin) 02:18

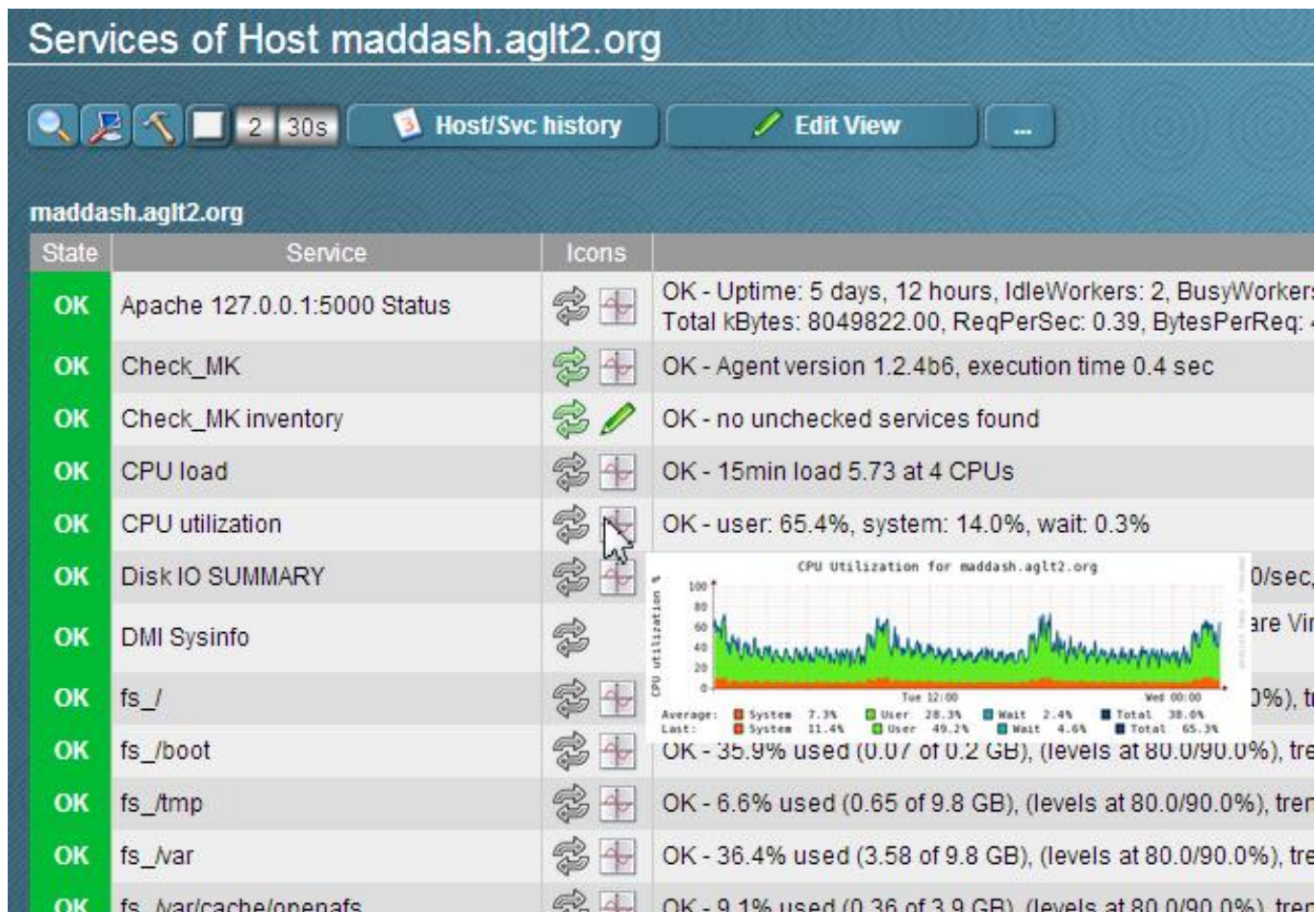
Host/Svc history Edit View

maddash.aglt2.org

State	Service	Icons	Status detail	Age	Checked	Perf-O-Meter
OK	Apache 127.0.0.1:5000 Status	🔄	OK - Uptime: 5 days, 12 hours, IdleWorkers: 2, BusyWorkers: 1, OpenSlots: 125, TotalSlots: 128, TotalAccesses: 188014, CPUload: 0.09, TotalKBytes: 8049822.00, ReqPerSec: 0.39, BytesPerReq: 43842.60, BytesPerSec: 17232.60, States: (Waiting: 2, SendingReply: 1)	2014-01-29 12:09:41	13 sec	
OK	Check_MK	🔄	OK - Agent version 1.2.4b6, execution time 0.4 sec	2014-01-29 12:09:39	13 sec	0.4s
OK	Check_MK inventory	🔄	OK - no unchecked services found	2014-02-08 10:54:51	2 min	
OK	CPU load	🔄	OK - 15min load 5.73 at 4 CPUs	2014-02-08 10:22:32	13 sec	6.8
OK	CPU utilization	🔄	OK - user: 65.4%, system: 14.0%, wait: 0.3%	2014-01-29 12:09:41	13 sec	79%
OK	Disk IO SUMMARY	🔄	OK - 1.41MB/sec read, 655.33kB/sec write, IOs: 124.70/sec, Latency: 1.61ms	2014-01-29 12:13:39	13 sec	1.41M/s 0.64M/s
OK	DMI Sysinfo	🔄	OK - Manufacturer: VMware, Inc., Product-Name: VMware Virtual Platform, Version: None, S/N: VMware-42 09 a9 d8 7a 11 9c 4b-ca 90 4a 80	2014-01-29 12:09:41	13 sec	
OK	fs_/_	🔄	OK - 15.4% used (5.67 of 36.8 GB), (levels at 80.0/90.0%), trend: +19.07MB / 24 hours	2014-01-29 12:09:41	13 sec	15%
OK	fs_/boot	🔄	OK - 35.9% used (0.07 of 0.2 GB), (levels at 80.0/90.0%), trend: 0.00B / 24 hours	2014-01-29 12:09:41	13 sec	35%
OK	fs_/tmp	🔄	OK - 6.6% used (0.65 of 9.8 GB), (levels at 80.0/90.0%), trend: +186.24kB / 24 hours	2014-01-29 12:09:41	13 sec	6%
OK	fs_/var	🔄	OK - 36.4% used (3.58 of 9.8 GB), (levels at 80.0/90.0%), trend: -16.09MB / 24 hours	2014-01-29 12:09:41	13 sec	36%
OK	fs_/var/cache/openafs	🔄	OK - 9.1% used (0.36 of 3.9 GB), (levels at 80.0/90.0%), trend: 0.00B / 24 hours	2014-01-29 12:09:41	13 sec	9%
OK	Interface 2	🔄	OK - [em1] (up) 1GBit/s, in: 10.85kB/s(0.0%), out: 3.25kB/s(0.0%)	2014-01-29 12:09:41	13 sec	0.0% 0.0%
OK	Interface 3	🔄	OK - [em2] (up) 1GBit/s, in: 148.16kB/s(0.1%), out: 33.86kB/s(0.0%)	2014-01-29 12:09:41	13 sec	0.1% 0.0%
OK	Kernel Context Switches	🔄	OK - 1795/s in last 60 secs	2014-01-29 12:10:39	13 sec	1794.8/s
OK	Kernel Major Page Faults	🔄	OK - 7/s in last 60 secs	2014-01-29 12:10:39	13 sec	7.5/s
OK	Kernel Process Creations	🔄	OK - 74/s in last 60 secs	2014-01-29 12:10:39	13 sec	74.1/s
OK	LOG /var/log/boot.log	🔄	OK - no error messages	2014-01-29 12:19:39	13 sec	
OK	LOG /var/log/dmesg	🔄	OK - no error messages	2014-01-29 12:19:39	13 sec	
OK	LOG /var/log/maddash/maddash-server.log	🔄	OK - no error messages	2014-01-29 12:19:39	13 sec	
OK	LOG /var/log/maddash/maddash-server.netlogger.log	🔄	OK - no error messages	2014-01-29 12:19:39	13 sec	
OK	LOG /var/log/messages	🔄	OK - no error messages	2014-01-29 12:09:41	13 sec	
OK	LOG /var/log/personar/config_daemon.log	🔄	OK - no error messages	2014-01-29 12:19:39	13 sec	
OK	LOG /var/log/secure	🔄	OK - no error messages	2014-01-29 12:19:39	13 sec	
OK	Memory used	🔄	OK - 1.78 GB used (1.33 GB RAM + 0.45 GB SWAP, this is 63.3% of 2.81 GB RAM)	2014-01-29 12:09:41	13 sec	63%
OK	Mount options of /	🔄	OK - mount options exactly as expected	2014-01-29 12:09:41	13 sec	

Individual hosts can be monitored in detail by installing check_mk-agents
See <https://twiki.cern.ch/twiki/bin/view/LCG/WLCGperfSONARMonitoring>

Feature: Graphs Automatically Created

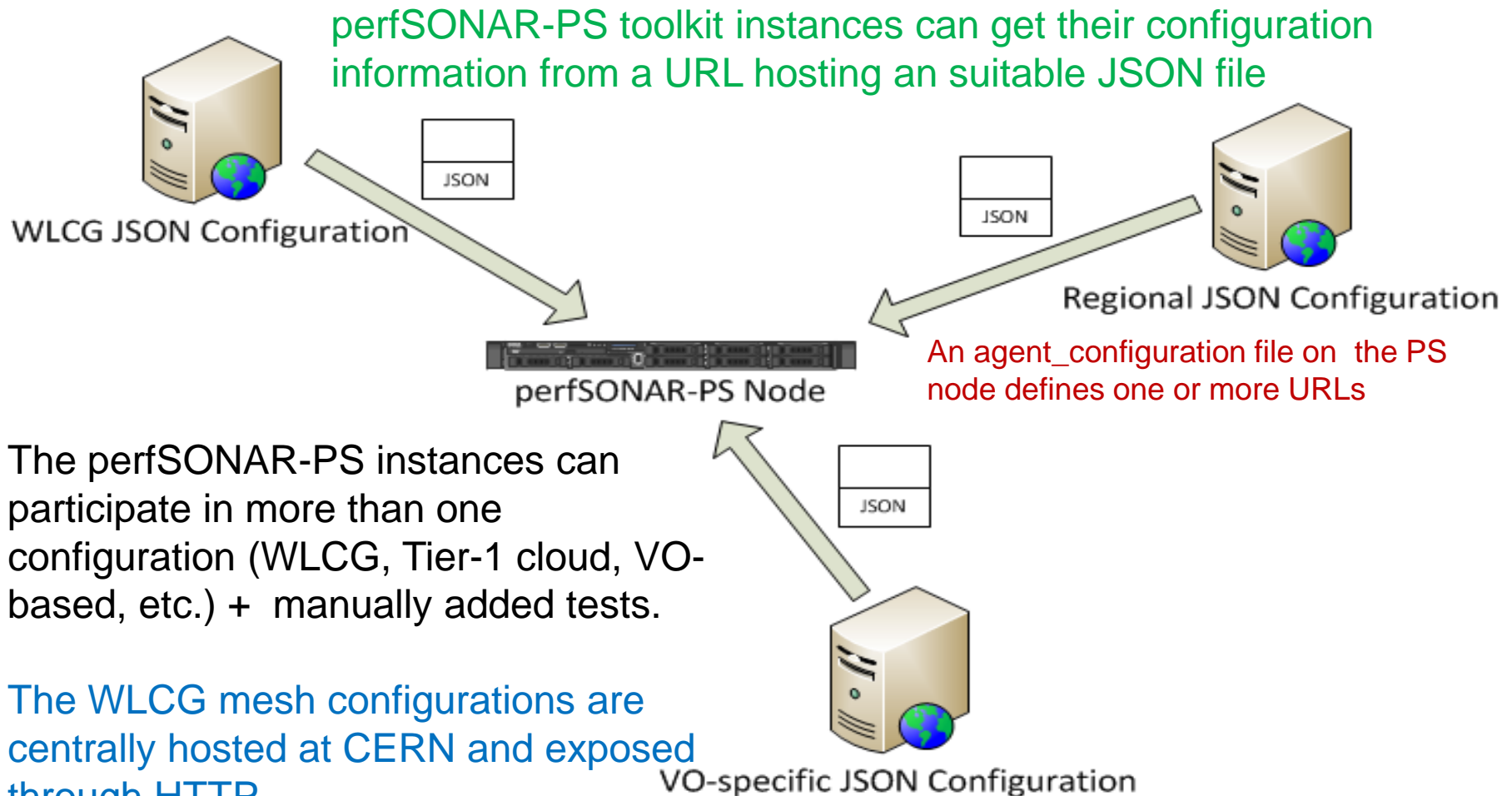


Graphs are created automatically where checks provide performance data. Hovering over the “graph” icon shows a thumbnail. Clicking takes you to a page with larger graphs sequenced by timescale (RRD).

Mesh-Config Comments and Status

- ❄ One of the lessons learned from LHC use of perfSONAR-PS was that setting up and maintaining scheduled tests for the perfSONAR-PS toolkit instances was a challenge.
- ❄ As sites changed, joined or left, every other site needed to update their configuration to change, add or remove tests.
 - ❑ Labor intensive, slow to get all updates in place and gets worse as we increase the size of the deployments!
- ❄ Aaron Brown/Internet2 provided a solution: the “mesh” configuration which allows sites to track a central configuration and update themselves when it changes:
http://www.usatlas.bnl.gov/twiki/bin/view/Projects/PerfSONAR_PS_Mesh
- ❄ **perfSONAR-PS 3.3.x has all functionality for the mesh built-in**
- ❄ **We plan to automate the generation of the required WLCG meshes using OIM/GOCDB registration + some “metadata”**

perfSONAR-PS Mesh Example



The perfSONAR-PS instances can participate in more than one configuration (WLCG, Tier-1 cloud, VO-based, etc.) + manually added tests.

The WLCG mesh configurations are centrally hosted at CERN and exposed through HTTP

<https://grid-deployment.web.cern.ch/grid-deployment/wlcg-ops/perfsonar/conf/central/>

WLCG Deployment Details

- ❄ **Sites are organized in regions**
 - ❑ Based on geographical locations and experiments computing models
 - ❑ All sites are expected to deploy a bandwidth host and a latency host
- ❄ **Regular testing is setup using a set of centralized (“mesh”) configurations**
 - ❑ Bandwidth tests: 30 seconds tests
 - ⌘ every 6 hours intra-region, 12 hours for T2-T1 inter-region, 1 week elsewhere
 - ❑ Latency tests; 10 Hz of packets to each WLCG site
 - ❑ Traceroute tests between all WLCG sites each hour
 - ❑ Ping(ER) tests between all site every 20 minutes

Using perfSONAR-PS Metrics

- ❄ **Throughput:** Notice problems and debug network, also help differentiate server problems from path problems
- ❄ **Latency:** Notice route changes, asymmetric routes
 - ❑ Watch for excessive Packet Loss
- ❄ On-demand tests and NPAD/NDT diagnostics via web
- ❄ **Optionally:** Install additional perfSONAR nodes inside local network, and/or at periphery
 - ❑ Characterize local performance and internal packet loss
 - ❑ Separate WAN performance from internal performance
- ❄ Daily Dashboard check of own site, and important peers

Debugging Network Problems

- ❄ Using perfSONAR-PS we (the VOs) identify network problems by observing degradation in regular metrics for a particular “path”
 - ❑ Packet-loss appearance in Latency tests
 - ❑ Significant and persistent decrease in bandwidth
 - ❑ Currently requires a “human” to trigger.
- ❄ Next check for correlation with other metric changes between sites at either end and other sites (is the problem likely at one of the ends or in the middle?)
- ❄ Correlate with paths and traceroute information. Something changed in the routing? Known issue in the path?
- ❄ **In general NOT as easy to do all this as we would like even with the current perfSONAR-PS toolkit**

Network Monitoring Challenges

- ❄ Getting hardware/software platform installed at **all** WLCG sites
- ❄ **Dashboard development:** Need **additional effort** to produce something suitable quickly and ensure it meets our needs...
- ❄ Managing site and test configurations
 - ❑ Testing and improving “centralized” (VO-based?) configurations
 - ❑ Verifying the right level of scheduled tests for a site, e.g., Tier-2s test to other same-cloud Tier-2s (and Tier-1)?
 - ❑ Address 10G vs 1G tests that give misleading results
- ❄ Improve path monitoring (traceroute) access within the tool
- ❄ **Alerting:** A high-priority need but complicated:
 - ❑ Alert who? Network issues could arise in any part of end-to-end path
 - ❑ Alert when? Defining criteria for alert threshold. Primitive services are easier. Network test results more complicated to decide
- ❄ Integration with VO infrastructures and applications (ongoing)

Improving perfSONAR-PS Deployments

- ❄ Based upon the issues we have encountered we setup a Wiki to gather best practices and solutions to issues we have identified:
<http://www.usatlas.bnl.gov/twiki/bin/view/Projects/LHCperfSONAR>
- ❄ This page is shared with the perfSONAR-PS developers and we expect “fixes” will be incorporated into future releases (current list already addressed in **v3.3.2**)
- ❄ Improving resiliency (set-it-and-forget-it) a high priority. Instances should self-maintain and the infrastructure should be able to alert when services fail (OMD tests)
- ❄ Disentangling problems with the measurement infrastructure versus problems with the measurements...
- ❄ PS Roadmap at <https://code.google.com/p/perfsonar-ps/wiki/RoadMap>

My perfSONAR-PS Wishlist

- ❄ **Continued reliability/resiliency improvements**
 - ❑ Must be “set-it-and-forget-it” to meet the needs of the bulk of our users
- ❄ **Topology/path diagnosis support**
 - ❑ Traceroute sensitive to ECMP (“Paris” traceroute)
 - ❑ Tools/gui to:
 - ⌘ visualize route
 - ⌘ show router port usage
 - ⌘ show drops/errors
 - ⌘ Identify perfSONAR-PS instances along the path
 - ❑ Path comparison/correlation tools using metrics coupled + traceroutes (identify “bad” paths via multiple measurements)
- ❄ **Alerting and alarming**
 - ❑ Support for configuring notification to alert users to network problems
 - ⌘ NAGIOS support exists but not well matched to multidomain issues
 - ❑ Alarms targeted at most likely problem domain
- ❄ **Handle NIC speed mismatches**
 - ❑ 10GE testing to 1GE “overruns” and provides misleading information
- ❄ **Support for additional tests (Iperf variants, new tools, etc)**

Future Use of Network Metrics

- ❄ Once we have a source of network metrics being acquired we need to understand how best to incorporate those metrics into our facility operations.
- ❄ Some possibilities:
 - ❑ Characterizing paths with “costs” to better optimize decisions in workflow and data management (underway in ANSE)
 - ❑ Noting when paths change and providing appropriate notification
 - ❑ Optimizing data-access or data-distribution based upon a better understanding of the network between sites
 - ❑ Identifying structural bottlenecks in need of remediation
 - ❑ Aiding network problem diagnosis and speeding repairs
 - ❑ In general, incorporating knowledge of the network into our processes
- ❄ **We will require testing and iteration to better understand when and where the network metrics are useful.**

WLCG perfSONAR Considerations

- ❄ Getting a WLCG network service with suitable data-store in production in OSG is a high priority
 - ❑ OSG has offered to host a “Network Service” for WLCG
 - ❑ Need to exercise the API and start testing use of metrics
- ❄ We will need to plan for IPv6 monitoring. As sites move to using IPv6 we have to be ready to test the potentially different paths and performance
 - ❑ Duncan Rand has done some nice work in this direction already.
- ❄ The test definitions and resulting metrics will need to be evaluated for their effectiveness
 - ❑ Are tests providing useful information?
 - ❑ Are the test parameters optimized for our use-cases?
 - ❑ What are the appropriate OK, WARN and CRIT levels?
 - ❑ Do we need to add new tests/metrics?

Closing Remarks

- ❄ perfSONAR dashboard is critical for “visibility” into networks. We can’t manage/fix/respond-to problems if we can’t “see” them.
- ❄ Our assumption is that perfSONAR (and the perfSONAR-PS toolkit) is the de-facto standard way to get network metrics and will be supported long-term
 - ❑ Especially critical that R&E networks agree on its use and continue to improve and develop the reference implementation. This is the case
- ❄ Having perfSONAR-PS fully deployed should give us some interesting options for better management and use of our networks
- ❄ Need to get some “network service” operating in OSG for WLCG.

Discussion/Questions

Questions or Comments?

Relevant URLs

- ❄ WLCG perfSONAR-PS deployment URL:
<http://twiki.cern.ch/twiki/bin/view/LCG/PerfsonarDeployment>
- ❄ perfSONAR-PS site <http://psps.perfsonar.net/>
- ❄ perfSONAR-PS Install/configuration guide:
<http://code.google.com/p/perfsonar-ps/wiki/pSPerformanceToolkit33>
- ❄ MaDDash Dashboard: <http://maddash.aglt2.org/maddash-webui>
- ❄ Tools, tips and maintenance:
<http://www.usatlas.bnl.gov/twiki/bin/view/Projects/LHCperfSONAR>
- ❄ OSG networking pages
<https://www.opensciencegrid.org/bin/view/Documentation/NetworkingInOSG>
- ❄ OMD prototype for WLCG perfSONAR-PS Monitoring:
<https://maddash.aglt2.org/WLCGperfSONAR/>