perfSONAR MDM - perfSONAR PS Comparison

perfSONAR MDM Product Document

Date issued: 15 March 2012
Document code: GN3-12-182
Dissemination Level: R (Restricted to the GÉANT Service Area)

Authors: Domenico Vicinanza (DANTE)

Document Revision History

Version	Date	Description of change	Person
0.1	01-03-2012	First draft issued	Domenico Vicinanza

Table of Contents

Erreur ! Utilisez l'onglet Accueil pour appliquer Title au texte que vous souhaitez faire apparaître ici.
Document Code: GN3-12-182

iii

1 Introduction

This document aims at providing an honest comparison between perfSONAR MDM and perfSONAR PS, highlighting similarities and differences.

perfSONAR is an infrastructure for network performance monitoring, making it easier to solve end-to-end performance problems on paths crossing several networks. Monitoring data is collated from all those domains where the perfSONAR service is deployed, in order to visualise network characteristics, present the information in a standardised format and enable troubleshooting of related issues.

perfSONAR MDM and perfSONAR PS are respectively the GÉANT and the I2/ESnet implementation of the perfSONAR monitoring concept and infrastructure. They both use the perfSONAR protocol (specified by OGF NM-WG) to exchange data, they both share the same overall design goals which include flexibility, extensibility, openness, and decentralization.

Even if they are sharing a common view, the actual software development, the product life cycles, the interaction with the users, the actual implementation and deployment are different. The differences are mainly due to the fact that perfSONAR MDM is designed to provide a service, with an official support and a federated deployment, centrally monitored and coordinated, while perfSONAR PS is intended to be a collection of monitoring and troubleshooting tools to be downloaded when needed.

In the past years perfSONAR MDM and perfSONAR PS followed two different development paths and they are currently different in terms of positioning, support models and, occasionally, measurement strategies. However, since March 2010, they both committed to be operationally interoperable.

1.1 Infrastructure commonalities

perfSONAR MDM and perfSONAR PS share the global architecture design which is based on the following principles:

- A modular system that allows the division of the architecture into multiple components that can be developed by individuals. The measurement modules are called Measurement Points (MPs) and Measurement Archives (MAs), the first ones performing – or collecting – measurements, the second ones storing the measurements, making them available upon request. In addition there are ancillary

Erreur ! Utilisez l'onglet Accueil pour appliquer Title au texte que vous souhaitez faire apparaître ici.
Document Code: GN3-12-182

4

modules like the Lookup Services (LS), providing a catalogue of services available and the Authentication Service (AS), providing the Authentication and Authorisation functions

- A dynamic system that allows components and Measurement Points, to some extent, to be added or removed during the system operation.

- A self-configuring system that allows components and Measurement Points to autonomously announce their existence and capabilities.

- A decentralized system that allows each administrative authority to tune the system capabilities in accordance with locally-specified policies and procedures.

- A scalable system that can a) incorporate multiple networks and overlay virtual communities, b) handle varying numbers of users and servers, and c) handle varying information volumes as well as differing types of monitoring data and tools.

- A secure system that cannot be exploited for uses other than performance monitoring, which is not particularly vulnerable to attack.

- A safe system that does not overly congest the networks it is trying to monitor.

- A fault-tolerant system that fails gracefully in the presence of module failures.

- A self-diagnosing system that provides clear and timely exception messages in the case of failure.

1.2 Design and implementation differences

1.2.1 Positioning

perfSONAR MDM and perfSONAR PS have quite different market positioning: the first one aims to provide a multidomain monitoring service, with official support and a formal user panel; the second aims at providing an open collection of tools to perform monitoring services.

As mentioned in the respective websites:

"*perfSONAR MDM (Multi-Domain-Monitoring) is the multi-domain monitoring service for the GÉANT Service Area (GSA). It enables NREN NOCs and PERTs to collaborate in providing seamless network performance, working together to identify, prevent and solve performance issues for network users.*"
(from perfsonar.geant.net website)

Erreur ! Utilisez l'onglet Accueil pour appliquer Title au texte que vous souhaitez faire apparaître ici.
Document Code: GN3-12-182

5

"*perfSONAR-PS is an open source development effort to create a colletion of easy-to-use and easy-to-install perfSONAR network performance monitoring services and tools.*"
(from psp.perfsonar.net website)

1.2.2 User base

perfSONAR MDM users are primarily NOC and PERT engineers who need access to network measurement data from multiple network domains. perfSONAR MDM functionalities are designed with the help of network engineers working in the GÉANT and NREN NOCs. The requirement gathering process is facilitated by the creation of a perfSONAR MDM user panel which includes representative members of the NRENs community (to participate just send an email to perfsonar-user-panel@geant.net) and members of the development, deployment and product management teams.

perfSONAR PS users are university campuses and research projects who are liaising with I2 or ESnet for support. There is no declared user drive and there is no user panel.

1.2.3 Support

perfSONAR MDM is part of the GEANT portfolio and it is then officially supported. The support function is operated by the Multi-Domain Service Desk, a brand new GÉANT service providing a single point of contact to NREN NOCs requiring assistance with multi-domain services and tools. The pilot phase for this service commenced on the 30th January 2012. The NREN deployment is supported by a dedicated team (part of GÉANT SA2 Task3) lead by a software deployment coordinator.

perfSONAR PS is community supported through two mailing lists, one for users (perfsonar-user@internet2.edu) and one for developers (perfsonar-dev@internet2.edu). There is no official user support, however the two mailing lists are quite active.

1.2.4 Media and training

Since March 2011, perfSONAR MDM has a comprehensive website (http://perfsonar.geant.net) with news, reports from users, FAQs, resources (which include links to user guides, training material, software download pages and user interface). It finally contains sections about why use perfSONAR MDM, how perfSONAR MDM works and who benefits from it.

It has a twitter account (managed by the perfSONAR MDM product manager in agreement with GÉANT Public Relations team) giving regular updates about software developments, latest news and pictures and screenshots. The GÉANT twitter and facebook accounts are reporting perfSONAR MDM news (including the NREN deployments) as well. @perfSONARMDM tweets are followed by the major EU and US NRENs, Grid projects and research labs.

Erreur ! Utilisez l'onglet Accueil pour appliquer Title au texte que vous souhaitez faire apparaître ici.
Document Code: GN3-12-182

6

perfSONAR MDM had self-paced training since 2008 (with new revised versions published regularly), publicly available on the GÉANT website:

- User interface: http://cbt.geant.net/repository/gn3/perfsonarui/perfsonarui.htm

- Global overview: http://cbt.geant2.net/repository/gn3/perfsonar_online_overview/player.html

New training material, in particular short videos, will be prepared during GÉANT Y4.

GÉANT NA2 (Public Relations) works in collaboration with perfSONAR MDM team to publish web stories and press releases about perfSONAR MDM in the GÉANT Service Area:

- Hands-on training at the perfSONAR MDM workshop:
  http://www.geant.net/Media_Centre/News/Pages/perfSONARworkshop.aspx

- New release of perfSONAR MDM makes multi-domain monitoring faster than ever:
  http://www.geant.net/Media_Centre/News/Pages/NewreleaseofperfSONARMDMallowsmulti-domainmonitoringinminutes.aspx

- perfSONAR MDM helps support intercontinental dance performance:
  http://www.geant.net/Media_Centre/News/Pages/perfSONARMDMsupportsdanceperformance.aspx

- perfSONAR MDM expands interoperable monitoring to United States:
  http://www.geant.net/Media_Centre/News/Pages/perfSONARextendsinto.aspx

- perfSONAR MDM extended with new interface and more detailed monitoring:
  http://www.geant.net/Media_Centre/News/Pages/perfSONAR.aspx

Some of this news is covered by national and international technical magazines, as:

http://www.scientific-computing.com/news/news_story.php?news_id=485

Training activities for NRENS are starting to be organised starting from 2012. The first event will be held in Berlin, from 20-22 March, as a hands-on training with the participation of 13 NRENs.

perfSONAR PS website is hosted at I2 (http://psps.perfsonar.net/toolkit/) and news and updates about it appear in both ESnet (http://www.es.net/RandD/performance-perfsonar/) and I2 (http://psps.perfsonar.net/) websites. The media coverage comprises webnews, as:

- PerfSONAR Helps Accelerate Big Science Collaborations: http://www.es.net/news-and-publications/esnet-news/perfsonar-helps-accelerate-big-science-collaborations/

and use cases available as PDF leaflets:

- http://www.internet2.edu/pubs/200904-CS-PERF.pdf

Erreur ! Utilisez l'onglet Accueil pour appliquer Title au texte que vous souhaitez faire apparaître ici.
Document Code: GN3-12-182

7

- http://www.internet2.edu/performance/200904-CS-UL.pdf

- http://www.internet2.edu/pubs/CS-NDT-BroadbandCensus.pdf

No formal training activities are currently organised. However the perfSONAR PS team at I2 organises regular community meeting (in the US), to foster collaboration among users, share experiences.

1.2.5   One-Way Delay, Jitter and Packet Loss measurement

The main difference between the perfSONAR MDM and PS implementations are related to the One-Way Delay, Jitter and Packet Loss measurements.

perfSONAR MDM is based on HADES (Hades Active Delay Evaluation System) an active, extremely light-weight monitoring system developed by WiN-Labor at RRZE (Regional Computing Centre Erlangen), to provide QoS measurements in DFN's G-WiN infrastructure based on the metrics developed by the IETF IPPM WG. HADES is currently used to monitor the DFN's backbone, and more than 50 perfSONAR MDM measurement points based on HADES have been deployed in numerous GEANT and EU NRENs Points of Prescence (PoPs). HADES is one of the most strong and mature perfSONAR MDM components.

perfSONAR PS is based on OWAMP, a command line client application and a policy daemon used to determine one way latencies between hosts. It is an implementation of the OWAMP protocol as defined by http://www.rfc-editor.org/rfc/rfc4656.txt

Both OWAMP and HADES satisfy the same design principles:

- Full IPv6 support. No options needed.

- Configurable send schedule and packet sizes as requested by the client.

- Resource protection as defined by the policy controls implemented in a configuration file

- Port range specification for packet receivers for firewall friendliness.

1.2.6   Available bandwidth measurement

The available bandwidth measurements for both perfSONAR MDM and perfSONAR PS are performed using BWCTL. The only difference is that perfSONAR MDM implements a complete measurement points around it, called BWCTL MP, enabling detailed logging (who requested what bandwidth measurement when) and on-demand testing capabilities from the user interface. This has the great advantage of giving the possibility to authorised users to run on-demand tests even on a mobile device, like a smartphone, at any time.

Erreur ! Utilisez l'onglet Accueil pour appliquer Title au texte que vous souhaitez faire apparaître ici.
Document Code: GN3-12-182

8

1.2.7   Ownership and commitments

perfSONAR MDM is part of the GÉANT portfolio, it is then "owned" by the member NRENs. This naturally means that its development, its features, its implementation has to meet specific design requirements coming from the NREN community. The side effect is that its development is sometimes slowed down by the need of meeting sometimes quite different requirements (i.e. security, privacy, monitoring methodologies, packaging) coming from different NRENs.

perfSONAR PS is developed by I2 and ESnet as a toolkit and there is no commitment to fulfil campus or research centre requirements. This has the advantage of streamline the development process creating a more agile development framework.

2   perfSONAR MDM and perfSONAR PS features comparison table

perfSONAR MDM	perfSONAR PS
Officially supported, federated service. Support is coming from the GÉANT Multi-Domain Service Desk (MDSD). It is open from 08:00 to 17:00 UK time, Monday to Friday. The MDSD is the single point of contact for NRENs who require information or assistance with respect to the multi-domain services. A request raised with the MDSD (telephone or email) will be recorded and resolved and if necessary escalated to Subject Matter Experts and Software Developers.	Community supported, with quite active users replying pretty soon to the help requests. However no formal structure or no official commitment to provide a support function (this is in line with the design principles)

Erreur ! Utilisez l'onglet Accueil pour appliquer Title au texte que vous souhaitez faire apparaître ici.
Document Code: GN3-12-182

9

perfSONAR MDM	perfSONAR PS
Dedicated deployment team, assisting the NREN deploying perfSONAR MDM through dedicated meeting, phone calls, videoconferences, guiding the engineers through all the needed steps to install and configure perfSONAR	No deployment team (being a toolkit)
The user interface was originally a java-based, stand-alone user interface not particularly user friendly. The current interface is a web-based comprehensive visualisation tools designed in collaboration with the users, able to display all the metrics requested by the users from the same URL. In February 2012, the new web user interface has been professionally reviewed by a web usability expert, to make sure it was meeting commercial-grade usability requirements	Basic visualisation tools, web-based. Different metrics are available through different webpages.
User-driven with a formal user panel	No user panel
Designed to meet NRENs requirement (and enable a seamless multi-domain monitoring service across the NRENs)	Designed to optimise the troubleshooting process between final users (campuses and research projects) and network providers (I2/ESnet)
Set of metrics agreed with the users, to meet the NOC and PERT engineers requirements	Set of metrics decided by the perfSONAR PS team to support the troubleshooting process
Development life-cycle based on Agile, aiming at releasing every 3-month	No specific development model adopted.
perfSONAR MDM is distributed as RPM and (shortly) DEB packages. A survey has been carried out asking whether the GEANT perfSONAR team should provide live distributions (as perfSONAR PS) and the reply has been negative. Live distributions are perceived to be less secure and less manageable in the long term, even if they have the attractive advantage to be ready to be used.	perfSONAR PS toolkit is distributed as iso images (Live DVD installation). This has clearly reduces the time-to-market and enables any interested user to deploy a perfSONAR measurement point is a short time with little effort. The draw-back is that a live DVD distribution is sometimes less suitable for stable, long-term deployment and it is harder to make it compatible with local security policies

Erreur ! Utilisez l'onglet Accueil pour appliquer Title au texte que vous souhaitez faire apparaître ici.
Document Code: GN3-12-182

10

perfSONAR MDM	perfSONAR PS
Some NRENs, like RedIRIS, have developed their own live distribution version of perfSONAR MDM for local use	
Documentation in compact PDF documents available together with the packages, tested and formatted using the GEANT template: https://forge.geant.net/forge/display/perfsonar/Downloads	Documentation available as a web page only with nice screenshots: http://code.google.com/p/perfsonar-ps/wiki/pSPerformanceToolkit321
No community meeting organised by GÉANT	Regular community meeting, organised by Internet2 to bring the users together
The lookup service (LS) component which was available, suffered scalability issues. Its development it is currently progressing really well, thanks to a dedicated experienced developer working on it and a close collaboration with I2 and ESnet focussing on the interoperability of the service.	A lookup service (LS) component is available, even if it is suffering scalability issue
Authentication and Authorisation is currently being implemented thanks to a full-time developer hired in September 2012	No Authentication and Authorisation available. There is then no implemented service (a part from firewalling services) and no plan to develop one to provide AA functionalities. This is in line with the fact that perfSONAR PS is designed as a troubleshooting toolkit.
perfSONAR MDM does not currently have any last mile diagnostic tools, since NREN/GEANT NOC engineers never asked such troubleshooting functionalities. The perfSONAR MDM development team will be ready to implement such functionalities if required by the NREN community to support their campus users.	perfSONAR PS contains some last mile diagnostic tools, NDT and NPAD, focussing on solving end-host issues
One-Way delay measurements based on HADES	One-Way delay measurements based on OWAMP
On-demand bandwidth measurement from perfSONAR MDM web user interface running on any web browser, including mobile devices	No on-demand bandwidth measurement from perfSONAR PS from the user interface.

Erreur ! Utilisez l'onglet Accueil pour appliquer Title au texte que vous souhaitez faire apparaître ici.
Document Code: GN3-12-182

11

3 Conclusions

perfSONAR MDM and perfSONAR PS share the same monitoring approach, delivers the same metrics (even if sometimes using different methodologies, like HADES and OWAMP) and they committed to be interoperable.

The main difference is that perfSONAR MDM is designed to provide a multi-domain monitoring service for the GÉANT Service Area, it is strongly user driven and has a comprehensive visualisation tool; perfSONAR PS is designed as an open toolkit, conceived to be installed quickly to immediately provide troubleshooting capabilities and mainly based on command line.

perfSONAR PS is community supported (with a really active and supportive mailing list). perfSONAR MDM is supported by the GÉANT MultiDomain Service Desk. The process of installation and deployment is assisted by a special team which liaises with each NREN to make sure that the deployment is carried out meeting their expectation and taking into account their resources and their specific, unique needs.

perfSONAR MDM is part of the GÉANT portfolio, it is then "own" by the EU NRENs. This means that all the participating R&E network representatives have the right of communicating their requirements, raise priorities and discuss needs within the perfSONAR MDM User Panel.

perfSONAR MDM is the only one of the two which has security (Authentication and Authorisation) in the development plan. perfSONAR PS users did not ask for any particular security mechanism, while EU NRENs raised some serious security and privacy complaint which will be implemented by the perfSONAR MDM development team.

perfSONAR PS is the only one which has a community forum which meets regularly to discuss issues and share experiences.

The operational interoperability is a commitment of both PS and MDM and it aims at building a global transatlantic multi-domain monitoring infrastructure. The interoperability is currently implemented for the measurement points (i.e. the measurement requests are recognised and the metrics provided). Some work needs to be done on the visualisation tools, to access data archives and homogenise the results.

Erreur ! Utilisez l'onglet Accueil pour appliquer Title au texte que vous souhaitez faire apparaître ici.
Document Code: GN3-12-182

12

Glossary

AA   Authentication and authorization: this is a security method for ensuring the appropriate users are allowed to use a system and that they are given differing levels of access depending upon their credentials.

BWCTL   Bandwidth Test Controller: a tool, developed by Internet2, that wraps Iperf to establish bandwidth; unlike Iperf, this tool does not need to be started concurrently on both ends of the test, nor does it require the user to be given an account on the remote machine.

PERT   Performance Enhancement Response Team

SOAP   Simple Object Access Protocol

XML   eXtensible Markup Language

Erreur ! Utilisez l'onglet Accueil pour appliquer Title au texte que vous souhaitez faire apparaître ici.
Document Code: GN3-12-182

13