

perfSONAR: A SERVICE ORIENTED ARCHITECTURE FOR MULTI-DOMAIN NETWORK MONITORING

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TERENA NRENs and Grids Workshop, Amsterdam, 15 Sep 2010

The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement no 238875 (GÉANT)

Performance Measurement Goals



- Increase network awareness
 - Promote realistic expectations of network amongst users
- Reduce diagnostic costs
 - Performance problems noticed early
 - Performance problems addressed efficiently
 - Network engineers can see & act outside their domains
- Transform application design
 - Applications designed with networks in mind



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Four Aspects to perfSONAR

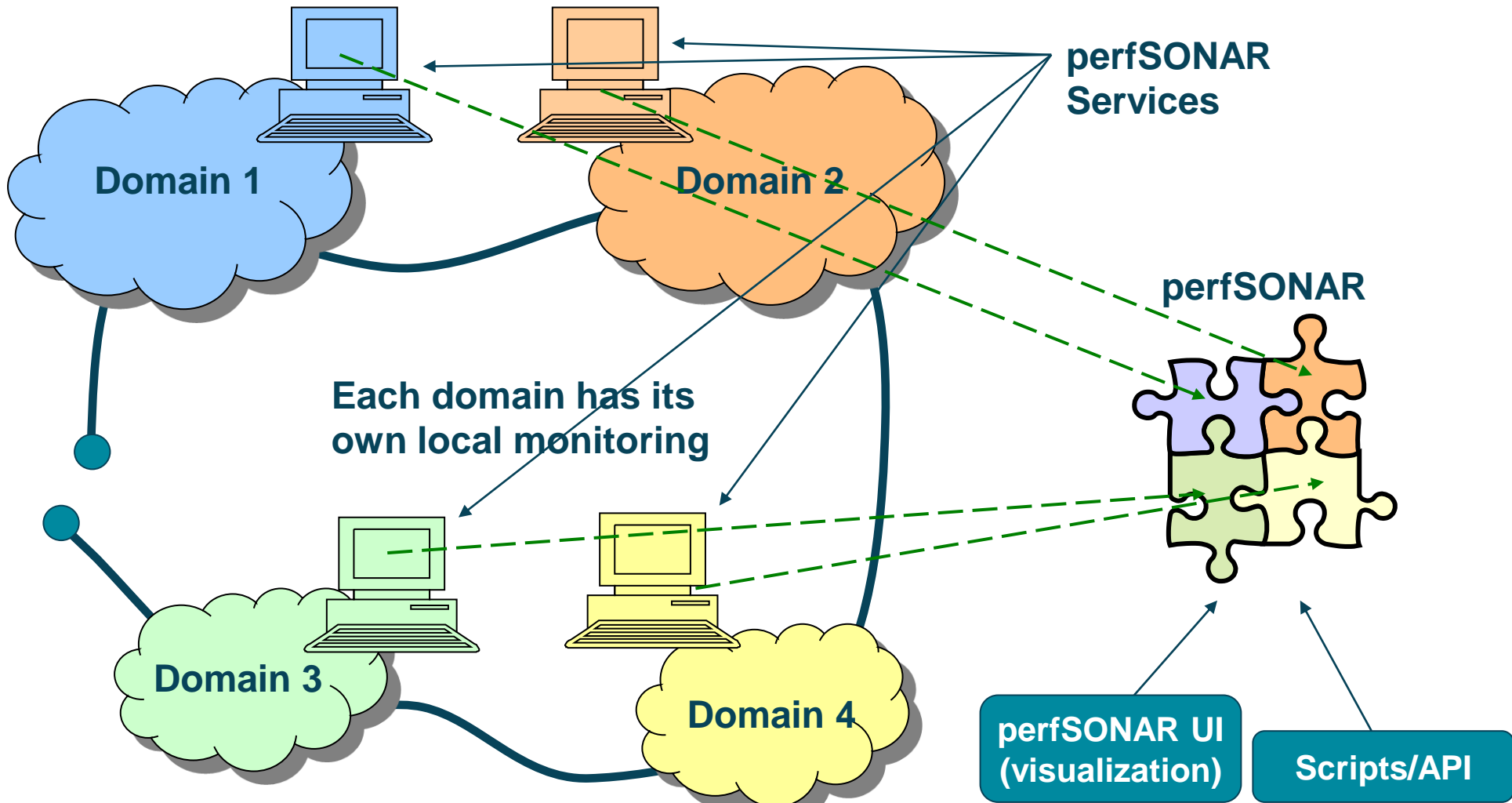


- Architecture and protocols
 - Define web services based on roles
 - Define their communication syntax and semantics
 - *Protocols based on the Open Grid Forum (OGF) Network Measurement Working Group (NM-WG) schemas*
 - Allow anyone to develop web service implementations
- A set of interoperable software implementations.
 - Java, Perl, Python etc.
- A collaboration by many organisations
- A deployed measurement infrastructure



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perfSONAR as unifying layer across domains



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connect • communicate • collaborate

perfSONAR Use Cases



- Come from international community of European and American research networks
- Help to systematize requirements coming from other communities
- Shift focus from adding features to perfSONAR products to delivering perfSONAR products to communities as a service
- Help to better integrate perfSONAR components development
- The perfSONAR infrastructure supports use cases in terms of delivered functionality



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Network Performance and Diagnostic Use Case



- Service: Enables users at the edge of the network to identify performance capabilities and leverage the people and tools necessary to improve their end-to-end experience
- Users: performance engineers at NRENs, national and regional backbones
- Functionalities
 - Link availability (L2, L3)
 - Available bandwidth (historical/on-demand, UDP/TCP)
 - One-way delay, one-way delay variation
 - Traceroute
 - Ping
- Measurement Points
 - Discoverable
 - Available and accessible
 - Intra-domain, inter-domain and multi-domain paths
 - Integrated into workflows

- Service: Makes it easy for large experiments/projects to monitor their paths of interest, and be able to identify the attributes of those end-to-end multidomain paths
- Users: NOC engineers and key people responsible for a large experiments data movement (e.g: Virtual Organizations)
- Functionalities
 - Path uptime
 - Router interface utilization, drops, and errors
 - Achievable bandwidth (end-to-end and network-to-network)
 - Packet loss / reordering / one-way delay variation (end-to-end and network-to-network)
- Data visualization tools to easily combine all data

Dynamic Circuit Monitoring Use Case



- Service: Enables the automatic creation and monitoring of multi-domain dynamic circuits within the set of participating networks
- Users: NOC engineers, power users such as project virtual NOCs
- Functionalities
 - Notifications (flexibly configurable, triggered by changes in state)
 - Cover current and historic state
 - Cover administrative and operational states
- Measurement Points
 - Must be reliable
 - Configuration must be automated
 - Must scale to static and dynamic circuits
 - Information model must support reporting about any potential performance metric for the following
 - *Full circuit*
 - *Each segment*
 - *Each link or interface*

Web Portal for End Users Use Case



- How am I doing?
- Is it even possible to do this?
 - If yes
 - *Is this better/worse than others?*
 - *If worse, what's then?*
 - *Educate*
 - *Ask for help*



- perfSONAR MDM Basic
 - Software (perfSONAR components) and support (Service Desk)
 - Effective federated model for NRENs and regional networks
 - *Domains deploy necessary components using their own infrastructure and resources*
- perfSONAR MDM Managed
 - Infrastructure (measurement servers), software (perfSONAR components), support and maintenance (Service Desk)
 - Effective solution for private networks
 - *Implemented for LHCOPN*
- perfSONAR MDM Passive
 - Dedicated infrastructure for passive network monitoring (dedicated optical cards), software and support

- Web services
 - Measurement Archives (MA)
 - *RRD MA, SQL MA, HADES MA*
 - Lookup Service
 - Auth/Autz
- Measurement Point services (MP)
 - BWCTL MP, SSH/Telnet MP, E2EMon MP
- Visualization
 - Different ways of using infrastructure and presenting data

Available In Production



- perfSONAR MDM 3.2 release
 - Bundle of perfSONAR MDM installers comprising Java and Perl web services as well as administrator's documentation
 - DEB, RPM installation packages
 - Originated in GÉANT
- Visualization tools
- Coming soon: perfSONAR MDM 3.3 release
 - Better performance and stability
 - DVD installation



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