

Network Performance Monitoring for the Grid

ABSTRACT – All Hands 2005

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Network performance monitoring has traditionally been important to the operation of networks of any significant size as an aid to fault detection and for determining expected performance.

The need for such monitoring is enhanced in the Grid computing arena. Without it:

- Grid middleware and applications cannot optimise their performance by adapting to changing network conditions.
- networks cannot be debugged for efficiency, an essential step in supporting data intensive applications because simple over-provisioning is not sufficient.
- the Grid cannot be “self healing”, or apply the SLAs associated with the “utility computing” model.

To address some of these issues, a UK e-Science Grid network performance monitoring project began in June 2002. After establishing a network monitoring infrastructure for UK e-Science with associated human visualisation the project moved into a second phase, consolidating that infrastructure and adding machine (Web Services) access to the collected performance data. Web Services access is provided for:

- Grid middleware and applications
- Network diagnostic tools for use by NOCs and GOCs
- Network authorities wishing to share performance data across multiple administrative domains for the purpose of true end-to-end performance monitoring – a holy grail in this problem space

At this year’s event we will present an update, focused on the international Grid network monitoring work which the UK has contributed to, and in some cases lead, in the last year:

- The Network Measurements-Working Group (NM-WG) of GGF, co-chaired by Daresbury, is defining XML schemas for communicating with network monitoring systems via Web Services technology. In suggesting a standard by which software can request and share data, it is hoped that true end-to-end performance monitoring and testing will become possible, spanning both administrative and geographical boundaries.

The group’s version 1 (V1) schemas are nearing completion, and we will provide a summary of implementation trials. These include EGEE JRA4 and Internet2 work recently demonstrated at GGF13, the combination of which highlighted the ability to obtain historic data from backbone and end-to-end monitoring infrastructures, and request on-demand tests – a significant step.

While the V1 schemas have been very useful in obtaining involvement from network operators such as Internet2 and DANTE, the group is now developing V2 schemas. And while V1 could be considered as a monolithic “one size fits all” solution, V2 consists of a base or framework schema, defining a structure from which schemas for each particular tool and/or performance characteristic can be produced. This has the advantage that each can be specifically tailored. Our talk will outline this and other advantages, including the separation of variable information from that which is relatively constant, and the inclusion of ‘message types’.

- JRA4 is the EGEE group responsible for development of network services. Building on the work of NM-WG they are producing network performance “intermediary” software. Their mediator will provide a single interface from which Grid applications, EGEE middleware and GOC/NOCs can request network performance data. Requests will be forwarded to relevant underlying monitoring infrastructures, whether they are operated by a pan-European operator such as DANTE or a local NREN, hiding this complexity from the requestor. It is hoped that the software will develop to liaise with different administrative domains over the running of on-demand and scheduled tests, again making a powerful abstraction for the client.

A prototype was successfully demonstrated at GGF13, where it obtained performance data from backbone (DANTE's perfmnit) and end-to-end (EDG WP7) monitoring infrastructures. This symbolises a significant step towards multi-domain monitoring.

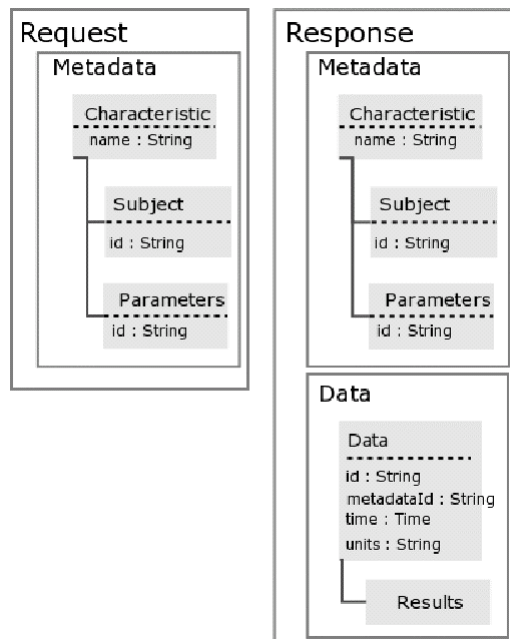


Figure 1: NM-WG V2 base schemas

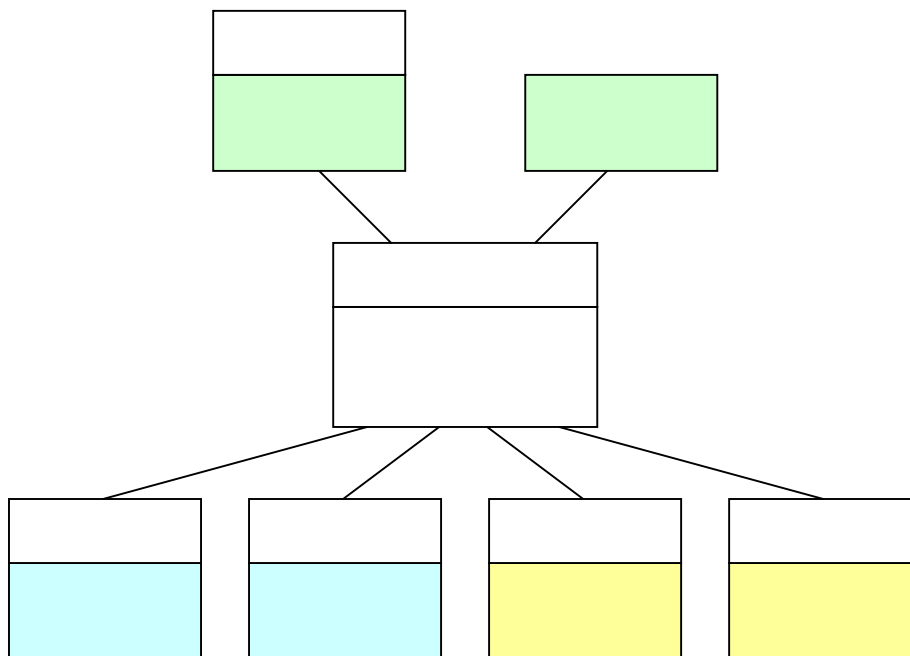


Figure 2: EGEE JRA4 NPM Mediator

In addition we will also describe UK specific developments, including changes to the monitoring infrastructure and development of a new human interface targeted at the UK GOSC.

It is hoped that demonstrations of pertinent UK, European and US work will be possible to reinforce our content.