

# Grid Monitoring

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## Overview

- SLAC IEPM since 1995
- WAN Backbones typically perform very well
- Monitoring for PPDG
  - Requires finer grained monitoring
  - End-to-end is required
  - Provide statistics on network performance
  - Conduct analysis on trends for resource allocation
  - Contribute real data to a PPDG Monitoring system

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SLAC has been monitoring WAN performance since 1995. The wide-area networks such as ESnet and Internet2 typically perform very well but grid science requires very high end-to-end performance to achieve the goals. Monitoring is essential.

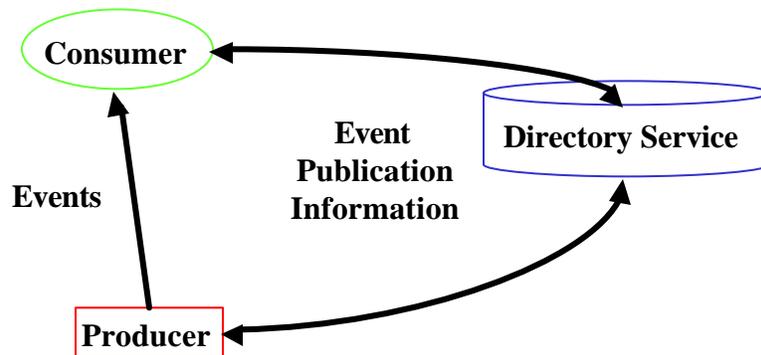
## Global Grid Forum (GGF)

- Several relevant WGs
  - Performance Working Group/Area
  - Network Working Group
  - Grid Information Services
- Grid Monitoring Architecture (GMA)
  - GWD-Perf-16-1
- GMA implementation at SLAC

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The obvious place to start with a grid related issue is the global grid forum. There are several working groups, but the one of most interest is the performance Working Group (to become the performance area in the re-structured GGF). The grid Monitoring Architecture is being developed here and the work at SLAC is an attempt to deploy it.

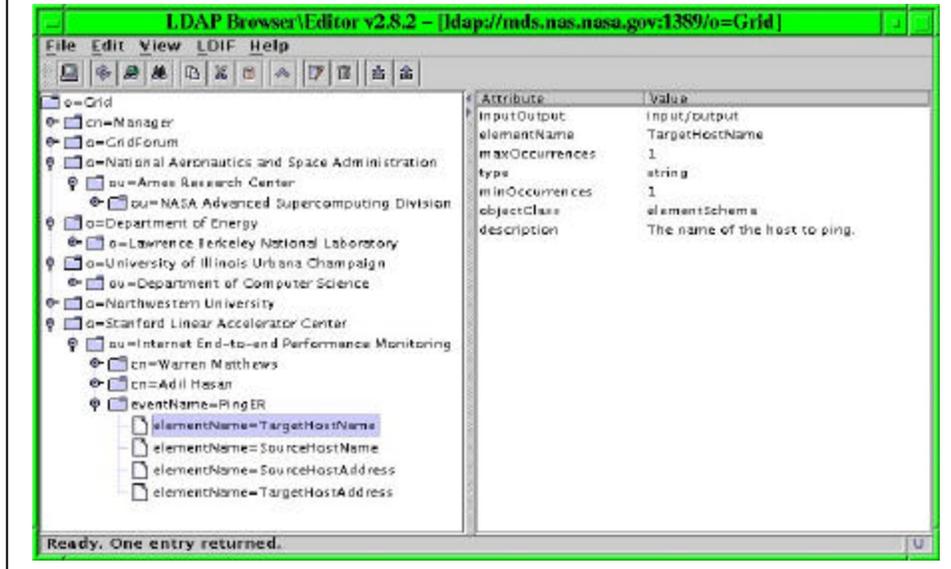
# GMA Terminology



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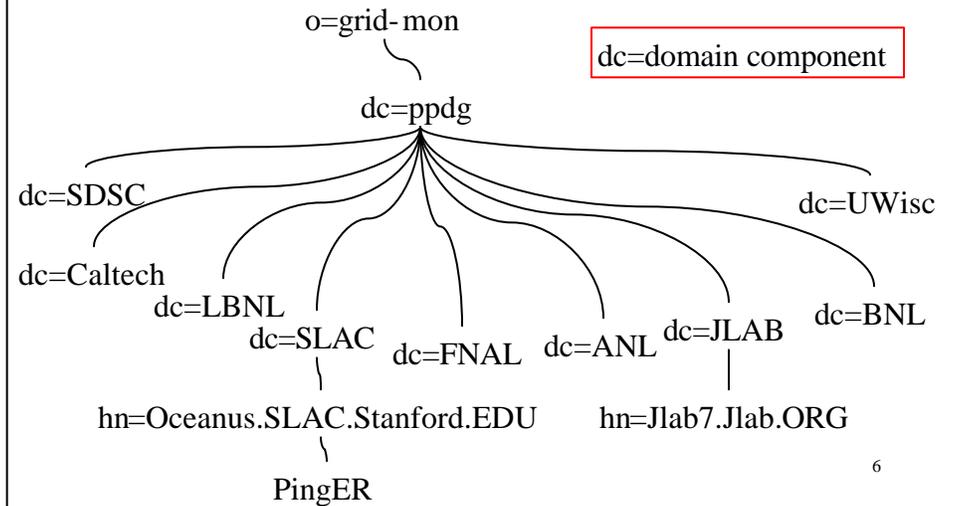
The concept of producers and consumers is common in all monitoring projects. The addition here is consumers use the directory service to look up producers, just as you would use a phonebook. Consumers obtain the data directly from the producer.

# Directory Service - LDAP



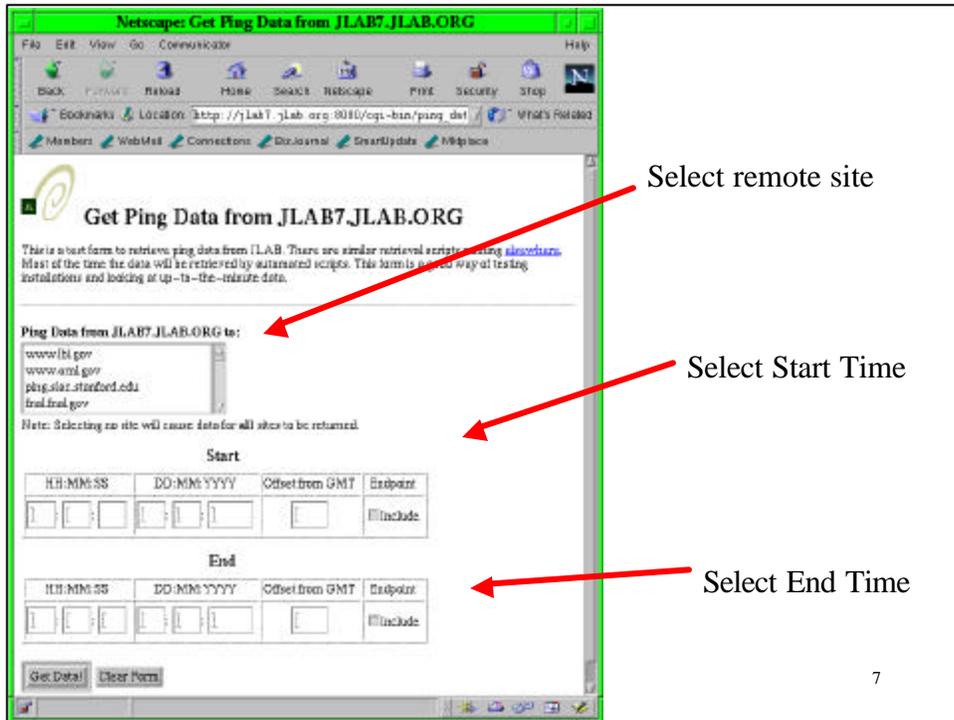
This is a screenshot of the test GMA Directory Service at NASA, maintained by Warren Smith. Note some SLAC details have been registered. Imagine a PPDG Directory Service for PPDG GOC.

# Producers



Imagine “from site” is the key. So assuming structure based on sites, nodes and measurements.

Easily imagine a myriad of other measurements. Surveyor data (one-way delay), traceroute, bottleneck bandwidth (pathchar), optimum window size (iperf). Also router cpu utilization, host memory usage, last throughput achieved with bbcp etc etc etc.



PingER data from almost all PPDG sites is available from a local webpage for near-real time analysis. The URL of these sites is indicated in the directory service. Result is in a known format. Data can be mined by a script using a query string.

## Production Data

- PingER data has been put into LDAP
  - required platform for making resource decisions
- LDAP optimized for reading
  - Too dynamic, overwhelm server
- FNAL (archive site) implementing MySQL
  - Not near real-time
- Historic data required for alarm system
- Common interface is useful

Wide-spread assumption seems to be LDAP will be used by resource brokers. Hence put PingER data in, however not convinced it is or should be required. LDAP has problems, perhaps LDAP front end would be more usable. Some sort of historic data must also be available and it would probably be more user friendly to have the same interface for all enquiries.

## Network Monitors

	PingER	AMP	Surveyor	RIPE	NIMI	Trace
<b>SLAC</b>	Yes	Yes	Yes	Yes	Yes	Yes
<b>LBNL</b>	Yes				Yes	Yes
<b>UWisc</b>	Yes	Yes	Yes			Yes
<b>FNAL</b>	Yes	Yes	Yes		Yes	Yes
<b>ANL</b>	Yes		Yes			Yes
<b>BNL</b>	Yes		Yes			
<b>JLAB</b>	Yes					Yes
<b>Caltech</b>	Yes					
<b>SDSC</b>		Yes				

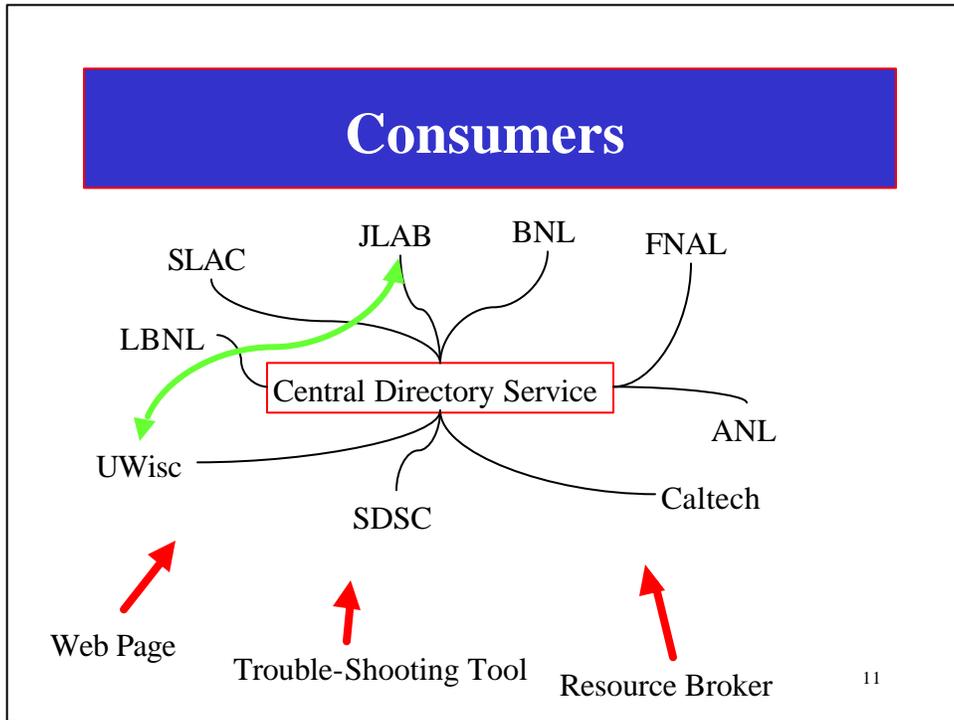
The deployment of numerous projects should be leveraged. PingER is available but not sufficient for the grid. AMP less available but also probably insufficient. Concerns over support for Surveyor. RIPE not widely deployed but easy to get data directly. NIMI is our hope but difficult to contribute.

## GIMI

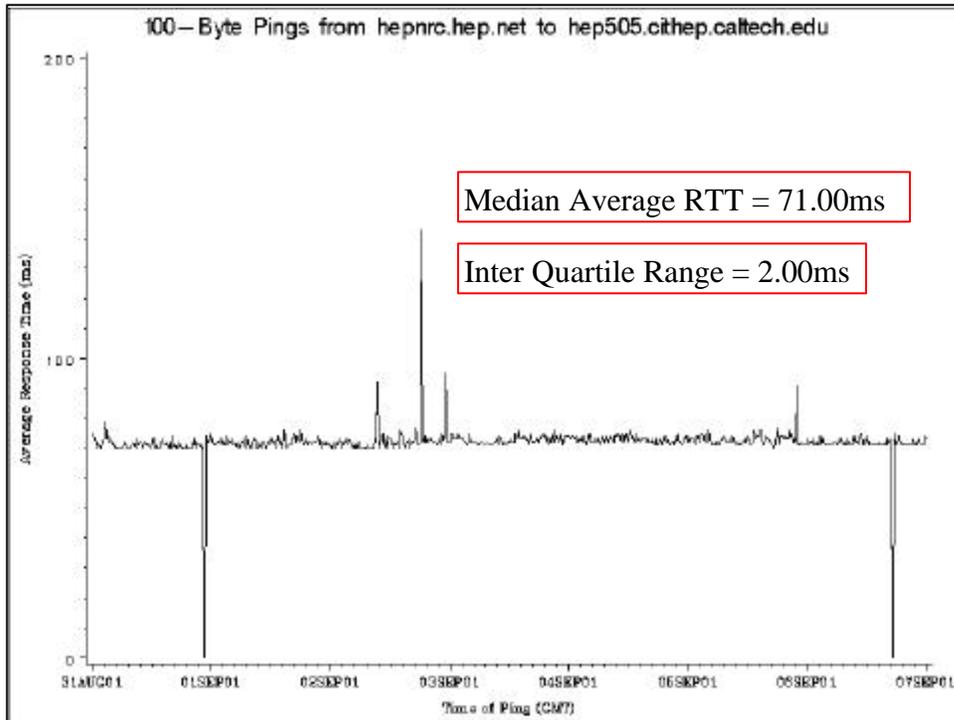
- **Global Internet Measurement Infrastructure**
- Platform for many measurements
- Not tied to one-groups set of measurements
- Similar feel to GMA
- Possibly access to otherwise restricted data (eg SNMP) due to stringent access-control

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We've been plugging NIMI (nka GIMI). See AIME proposal to SciDAC.



PPDG sites are also the consumers. Imagine a trend graphs for resource allocation and a trouble shooting tool for the GOC. Complete E2E details are essential. In the future Resource Brokering will be required. Consumers obtain data directly from producers.



For example PingER results could be displayed. Would be easy to code an email alarm system a la RIPE-TT.

## Tools

- Traceroute
  - Router details
- Pathchar
  - Bottleneck bandwidth
- Iperf (Enable)
- Chirp (INCITE)
  - characterize network service

## Other Work

- Euro-Grid
  - Globus/MDS
  - Standards
- IETF/IPPM
  - Performance metrics
  - New implementations
- GGF/Network WG

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Also data tag and tera data facility

## Further Work

- Production Monitoring
- Directory Service
- More Data
- Analysis Tools
- Integrate with Resource Brokering

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Not entirely accurate to call it production, but the gaps will be filled in to provide real data and advertise that data in a directory service.

## Future Work

- Network Weather Service
- Servers and/or integrate into GIMI
- Host monitoring should be registered
- Unknown timescale
- Unfunded
  - Looking for volunteer effort

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Once the initial deployment is operational, there is much more to be done.

## Conclusions

- Finer-grained monitoring is essential
- Required service for the Grids
- Can the I2 HENP group help ?

**Any Questions ?**