Toward a Measurement Infrastructure.

Warren Matthews (SLAC)
Presented at the e2e Workshop
The workshop web page says we will focus on:

- **Measurement Data Collection**
  - Tools, Methods, Attributes, Schema
- **Data Repositories**
  - Storage, Access, Management
- **Data Analysis**
  - Network Capabilities, Problem ID/Location

This is a workshop in progress.
Tools: PingER

- Ping End-to-end Reporting
- 10x100 Byte pkts, 10x1000 Byte pkts
- Started in 1995
- Currently 36 monitoring sites in 14 countries
- Long term trends and short term glitches
- Continues to prove useful
  - Project with ICTP/eJDS on Digital Divide

Transatlantic link was 2Mbps in 1995. Now Multiple OC12.

Vacation

Traffic on ESnet doubles every year
Tools: IEPM-BW/MAGGIE

• Currently 10 monitoring sites
  – North America, Europe and Asia
• 1-6 target sites each (40 at SLAC)
• Iperf, bbftp, bbcp, gridftp, udpmon
  – Network and applications
• Tools from DoE/MICS funded SCIDAC
• Measurement Infrastructure
Data Analysis

- Web Page based tables and graphs
  - Trends
  - Post mortems
  - Network Research
- Problem detection (later),
- Resource brokers
  - talk with the Computing/Storage Elements
Access: Publishing

- Web Page
- MDS (Globus)
- Web Services
  - Work with GGF NMWG and GLUE
- PMP communication
  - UCL
  - Database
Problem Identification: Net Rat

• Typical Scenario
  – User complains file transfer is slow
  – Net admin runs ping, traceroute, iperf test

• Proactive
  – Problem: What do we mean by throughput?
    How do we know there was a performance hit?
  – Our approach is diurnal changes
Iperf TCP throughput from SLAC to Caltech by hour of day
from 11 Oct - 8 Nov '02
Alarms

• Too much to keep track of
• Rather not wait for complaints
• Automated Alarms
• Rolling average à la RIPE-TT
  – May not be the best approach
Iperf Measurements between SLAC and JLAB on Mondays 7-8pm
Iperf measurements between SLAC and JLAB in November and December 2002.
Limitations

• Could be over an hour before alarm is generated
• More frequent measurements impact the network and measurements overlap
• Low impact tools allow finer grained measurement
  – Use NWS multi-variate method
  – Use SCIDAC ABwE (PingER, OWAMP) tool
Easier to See with CDFs

64K NWS Transfers

16M HTTP Transfers

This slide taken from Rich Wolski’s talk at GGF5
Infer Performance

IPERF

ABwE
• However concern is generated
  – Compare to baseline
  – Look for changes in traceroute
  – Compare tools
  – Compare common routes
  – Cross reference other alarms
Throughput achieved with Iperf and Route taken between SLAC and Internet2 in November 2002.
Toward a Monitoring Infrastructure

• Evolving
  – Certainly the need
    • DOE Science Community
    • Grid
    • Troubleshooting / E2Epi
  – Many of the ingredients
    • Many monitoring projects
    • PIPES
Summary / To-Do

- “It is widely believed that a ubiquitous monitoring infrastructure is required”.
  - So join in
- Communication
  - Define and implement
- Problem identification
Links

- IEPM Home Page
- eJDS
- GGF NMWG
- Rich Wolski’s talk at GGF5
- SCIDAC
- INCITE
• SLAC team led by Les Cottrell
• Warren Matthews
• Connie Logg
• Jiri Navratil
• Jerrod Williams
• Fabrizio Coccelletti (INFN)
• Frank Nagy, Maxim Grigoriev (FNAL)
• And all the local administrators/supporters.
• Funding by DoE MICS / SCIDAC