Monitoring and Accelerating GridFTP

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XSP - eXtensible Session Protocol

• Session layer (Layer 5 in the OSI model)
• Implemented as a Globus XIO driver
  – Loadable with –dcstack and –fsstack
• Use cases:
  – Monitoring with NetLogger, Calipers and Periscope
  – Dynamic network provisioning
  – WAN Acceleration with Phoebus
Monitoring

- NetLogger monitors read and write system calls, and Calipers summarizes these in situ
- The XSP collector daemon collates and forwards to Periscope
  - Periscope is a perfSONAR front end and cache
- BLiPP:
  Basic
  Lightweight
  Periscope
  Probes
TCP throughput

Time series of throughput for representative TCP experiments: (a) 1 stream memory-to-disk with 100ms latency, (b) 1 stream memory-to-memory with no latency, (c) 1 stream disk-to-disk with no latency, (d) 4 streams memory-to-disk with 100ms latency and 1% loss added at 60 seconds.
UDT throughput

Time series of throughput for representative UDT experiments: (a) 4 streams memory-to-disk with 100ms latency, (b) 4 streams memory-to-disk with 100ms latency and 1% loss added at 60 seconds, (c) 4 streams disk-to-disk with 100ms latency, (d) 4 streams memory-to-memory with 100ms latency.
Wait, what?

Bottleneck = network

.01% loss event

Bottleneck = disk write
Half as many read()s. Others return zero, not counted.

Less work being done

Variance
Topology-aware Monitoring
XSP and Dynamic Circuits

- All things old are new again – circuits
  - Still packets over traffic engineered paths
- ESnet OSCARS, Internet2 ION and OS$^3$E/NDDI
  - NDDI is based on OpenFlow, an emerging protocol to allow fine-grained control of network devices
- SC11 Demo: monitor and react
DYNES

- DYNES is an NSF MRI that is distributing storage and OSCARS IDCs for ION to various sites — Internet2, Caltech, Vanderbilt, U. Michigan

- Initially using FDT from Caltech, but we are deploying the circuit capable GridFTP with XSP
GridFTP+XSP using the Phoebus WAN Accelerator System

- Phoebus is an open source WAN accelerator funded by the DOE and now the NSF
- Phoebus uses XSP to communicate via gateways that can tune, adapt and translate protocols
  - TCP tuning, UDT, RDMA over the WAN
Conclusion

• Quite a few topics focused on the performance of GridFTP
• Flexible and scalable monitoring for troubleshooting
• Adapt performance using emerging network technologies and protocols
• Questions?