AGLT2 Site Report

Shawn McKee/University of Michigan

Bob Ball, Chip Brock, Philippe Laurens, Mike Nila

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Site Summary

- The ATLAS Great Lake Tier-2 (AGLT2) is a distributed LHC Tier-2 for ATLAS spanning between UM/Ann Arbor and MSU/East Lansing. Roughly 50% of storage and compute at each site
  - 9408 logical cores
  - MCORE slots 950 (dynamic) + 10 (static)
  - Additional 720 Tier-3 job slots usable by Tier-2
  - Average 10.21 HS06/slot
  - **6.85 Petabytes** of storage
  - Total of **96.1 kHS06**
  - Tier-2 services virtualized in VMware 5.5 (soon upgrading to 6.5)
- 2x40 Gb inter-site connectivity, UM has 100G to WAN, MSU has 10G to WAN, lots of 10Gb internal ports and 20 x 40Gb ports, 32x100G/40G or 64x50G/25G ports
- High capacity storage systems have 2 x 50Gb bonded links
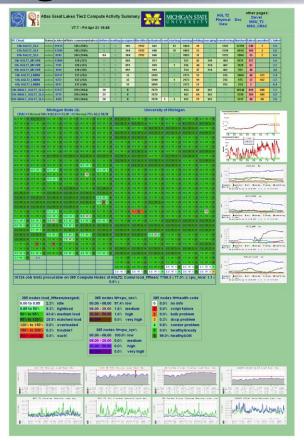- 40Gb link between Tier-2 and Tier-3 physical locations

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AGLT2 Monitoring

AGLT2 has a number of monitoring components in use
As shown before we have:

- Customized "summary" page   ------->
- **OMD** (**O**pen **M**onitoring **D**istribution) at both UM/MSU
- Ganglia
- Central syslog'ing via ELK: Elasticsearch, Logstash, Kibana
- SRMwatch to track dCache SRM status
- GLPI to track tickets (with FusionInventory)

We find this set of tools indispensable for proactively finding problems and diagnosing issues.

Personnel Reorganization

- Over the last year we have lost two tier-2 cluster administrators, one at UM and one at MSU
- For the near-term, we are not planning on hiring a replacement
  - We have been very successful in getting good undergraduates to work on an hourly basis for us.
  - MSU added Mike Nila (Engineering-tech) 20% time
  - Looking to augment our current two undergraduate hourly students with 1-2 more to maintain "institutional" knowledge as students move on.

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Hardware Additions

- Last summer we had a one-time infusion of NSF funds
  - AGLT2 received $398K additional funds for hardware
- We negotiated good pricing with Dell and purchased:
  - 55 R630s; 2xE2640v4 processors, 128GB ram, 2x800 SSDs
  - 4 Storage nodes (R730xd+MD3460+MD3060e; 120x8TB)
  - 2 MD3060e shelves (each 60x8TB disk)
  - All with 5-year warranties
- Total **addition** was **24 kHS06**, 4.8 PB(raw) / **3.84 PB(r6)**
  - All equipment was added and has been operational in 2017
- We also spent remaining funds from last 5-year grant in January
  - 18 R630 nodes, 4 N2048, 1 N4032F
  - **Added 7.8 kHS06**

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Software Updates Since Last Mtg

- Tier-2 VMs rebuilt to use SL7 (old SL5)

- dCache updated to 3.0.11 and Postgresql 9.5

- HTCondor now running version 8.4.11

- OSG CE updated to 3.3.21

- Various switch firmware updates applied

- Monitoring updates: OMD/check_mk to 1.2.8p18, ELK stack upgraded, custom monitoring upgraded.

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Lustre at AGLT2

- We have updated our Lustre storage, using new hardware and incorporating old servers

- The new Lustre server and storage shelves were racked in the Tier-2 center last year
  - Lustre version 2.7.0 was installed and new file system created (Using ZFS)
  - Old files from /lustre/umt3 were copied to the new system
  - Old Lustre servers were then recycled to increase total storage in new file system
  - New Lustre file system is (re)mounted at the old location, /lustre/umt3

- Current AGLT2 lustre size is now 1.1 PB (retired some *old* storage)
  - We continue to have challenges with older hardware and this combination of Lustre (2.7) + ZFS (0.6.4.2)

- **Next up:** go to **Lustre 2.10+ZFS** v0.7 <u>when ready</u>

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Possible Relocation at UM

- I reported last year that AGLT2 may need to move to a new physical location at the University of Michigan
- **Reminder:** After exploring our requirements the University had the architects involved with the building renovation work around our Tier-2 center space.
- **Update:** Our college just purchased new batteries for the two APC Symmetra 80kW systems in that room.
  - We were also informed that the room will not be altered. All good news. Hopefully we are set for at least the next 5 years.

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Future Plans

- Participating in **SC17** (simple infrastructure for 100G+)
  - Likely will demo use of **OSiRIS** object stores as part of the **ATLAS** distributed event service
- Working on integration of **OVS** (Open vSwitch) on production storage and Software Defined Networking (OpenFlow). We are experimenting with SDN in our Tier-2 and as part of LHCONE point-to-point testbed.
- Working on IPv6 dual-stack for all nodes in our Tier-2
  - Have IPv6 address block for AGLT2 (spans UM/MSU)
  - Our perfSONAR nodes are all dual-stacked and working fine.
  - **Dual-stacking our dCache system is our next step. Planned for sometime in the next month or two.**

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Summary

- Tier-2 services and tools are evolving. Site continues to expand and operations are smooth.

- Monitoring stabilized, update procedures working well

- FUTURE: IPv6 for storage, SDN, SC17

Questions ?