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HEPiX, GSI-Darmstadt
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BNL RACF Site Report

RHIC/ATLAS Computing Facility Overview

- Located at the Brookhaven National Laboratory on Long Island, New York
- Provide scientific and general computing needs for the RHIC experiments (STAR, PHENIX)
  - RHIC currently in the midst of Run 11
- US Tier-1 center for ATLAS
- Support for other local research efforts (Daya Bay, LBNE, LSST, EIC, ATLAS Tier-3)
- Currently 34 FTEs (2 openings)

This presentation will focus on updates since the Cornell meeting...

Facility Infrastructure

- In late 2010, reached the 920 KW limit of UPS-backed power in old facilities.
- Excess capacity only available in CDCE (30% of 1 MW in use)
  - Add'l PDU and CRAC units being installed for new ATLAS procurement (June)
  - Ongoing migration of all ATLAS servers and switches to CDCE
- Long overdue upgrade of power/temp monitoring system commenced in March for deployment in early Fall
  - Integrated monitoring to include new areas (CDCE, Sigma7) along with BCF
  - Automated action can be taken in a localized manner

Network

- Major ATLAS network reconfig in January - better utilization of inter-switch links (also, all new inter-switch links are 100 GbE ready)
- Practically all ATLAS systems now line rate connected (1/10 GbE); investigating ramifications of 10 GbE compute nodes
- Eliminated legacy Cisco 6500 ATLAS switches; ongoing retirement for RHIC (down to one by end of '11)
- Considering IPv6 introduction for selected web services and ssh gateways (end FY2012)

Processor Farm Hardware

- Currently, ~16K cores on ~1900 systems
- ATLAS procurement: 142 Dell R410 (dual-Westmere, 12 core), 2.67 Gz, 48 GB, 4x1 TB (expect delivery in June)
  - Tests indicate Westmere uses 37% less power per core (HEP SPEC performance gain is nonlinear)
- RHIC procurement expected in Summer. Smaller procurements for other programs have been placed over past six months

Update On Hardware Issues

- Dell has replaced ~90% of heat sinks to resolve overheating CPU issues reported on in October
- RACF staff finally traced disk failure issue to anomalously high cooling fan vibration
  - Problem reproducible with specialized (HEP SPEC + Bonnie) stress test - problem tracked the fans
  - Dell has replaced the identified problematic fans
  - High fan RPM resulting from temperature/heat sink problems might have caused premature wear of bearings
- Actions to mitigate
  - Rack doors removed to improve airflow
  - Changed BIOS setting from "Maximum Performance" to "Active Power Control," lowering average fan speed by 20%
  - Add'l BIOS changes (e.g. no turbo boost) reduce power consumption by 15% with only 3% loss in performance.
  - Changes being applied incrementally since April as unobtrusively as possible

Processor Farm Software

- Transition of ATLAS to group quotas in Condor 7.4.2 fairly smooth (PHENIX transitioning soon)
  - Some scheduling priority issues when allowing spillover beyond fixed group quota (production losing resources to analysis) - applied temporary workaround, expect resolution in 7.6?
- Major rewrite of RHIC Central Reconstruction Software (CRS) underway
  - Address long-term PHENIX/STAR requests for asynchronous import/ export of files, enhanced job scheduling, feature-rich CLI, redesigned HPSS staging interface, redesigned error handling, upgraded reporting/ notification, etc.
  - First stage prototype was available for testing in March
- KSplice Uptrack for centralized rebootless kernel updates
  - Recently deployed on all ATLAS farm nodes and used to patch a kernel (kswapd) bug that was crashing hosts (patch provided in < 2 days)
  - Deployment on RHIC nodes in progress

Distributed Storage

- ATLAS dCache upgrade to 1.9.5-23 in January
  - PNFS: Postgres 9; upgraded fiber-attached storage to increase iops (now 22 drives)
  - SRM: Postgres 9; internal SSD RAID array
  - Added 19 Nexsan Satabeasts for add'l 1.8 PB (9.5 PB total)
  - Retired ~20 remaining 16 TB Thumpers
  - Implemented ATLAS federated XRootd interface
- PHENIX dCache scratch pool hardware upgraded (~70 TB) and write pools reconfigured; Chimera upgrade planning in progress

Distributed Storage

- STAR XRootd upgraded in October (vers. 20100315-1007)
  - New installation and management system; expect eventual migration to Puppet
  - R/W and other functionality to be added
- ATLAS Tier-3 XRootd storage service expanded with procurement of 8 Dell R710's
  - System currently deployed for local use, managed with Puppet
  - Using EPEL repo for XRootd/Proof (for now)
  - Federation and security implementation underway

Mass Storage

- Added 20 LTO-5 tape drives (10 ATLAS, 10 RHIC)
  - Staying with LTO-4 media for now (ongoing migration off of LTO-3)
- Resolved major read/write incompatibility problem between HP and IBM LTO4 tape drives by replacing all ten HP drives with IBM
- Upgrading ATLAS HPSS disk cache and network to increase throughput (8 GB/s peak, 4 GB/s sustained aggregate I/O)
- One Atlas SL8500 library expanded to full 5 module size (10500 slots)
- Major HPSS upgrade to 7.3.2 planned for August (7.1.1 EOL)
  - Migrating core IBM Power/AIX servers to RHEL servers
  - ACSLS (library control) platform migration from IBM Power/AIX to Solaris x86
  - DB2 storage upgrade
- Looking at T10KC technology, but waiting for more experience in the field

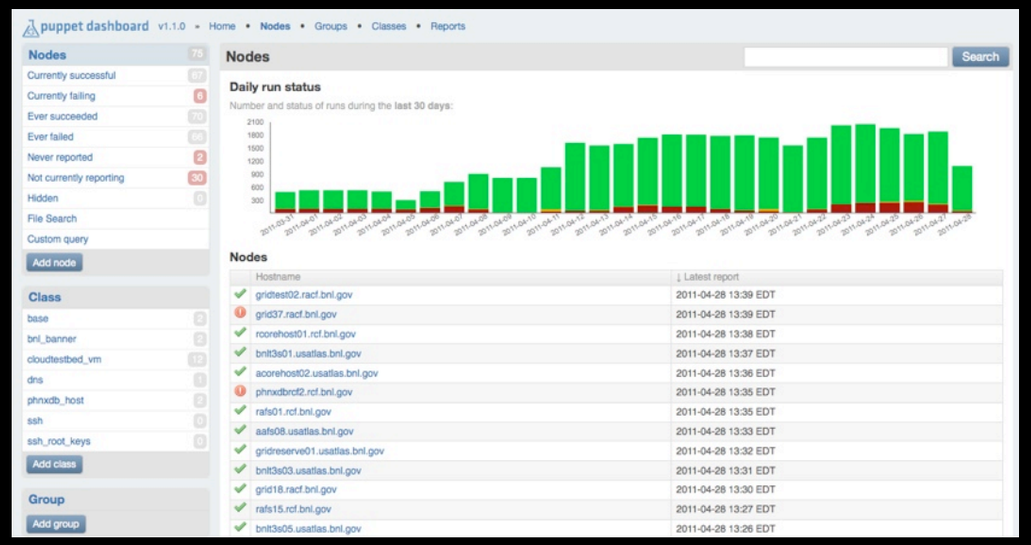
Other Services

- BlueArc NFS
  - Initial deployment of BlueArc FC disk is being replaced after 4 years, to be replaced by SAS with LSI rs12 turbo controllers (25% faster than rc12, up to 96 disks)
  - Arranging for pre-beta test of BlueArc NFS 4.1 in next few months - would like to stress test with 4.1 client on the 142 new ATLAS farm servers
- Grid/Web services
  - Preliminary work on moving from WebAuth web SSO to Shibboleth web SSO for all authenticated pages
  - Involved in ATLAS federated identity pilot project
  - Established 32-node ATLAS/OSG grid testbed to investigate cloud platform technologies

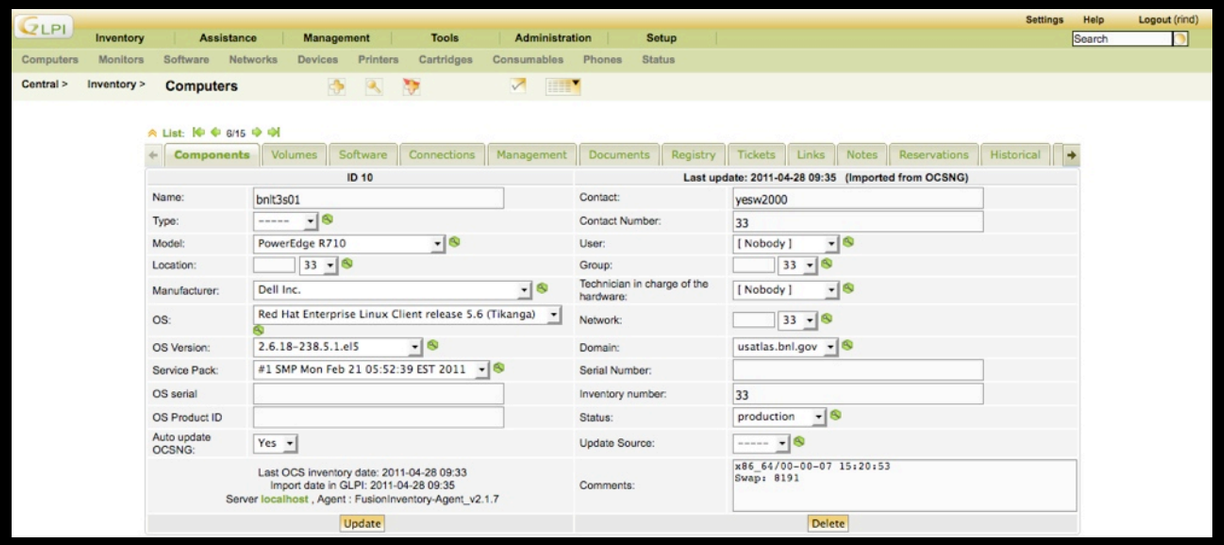
Configuration Management

- In final testing stage and initial production deployment of a new Puppet-based configuration management model
  - Cobbler for base system provisioning and post-install bootstrap of puppet configuration
  - Git for distributed admin access to puppet manifest catalog and historical change management
    - Automatic sync from git to puppet with web-based approval system for production environment
  - GLPI or puppet-dashboard for asset management - used to define puppet node classes & parameters
- Basic modules & classes complete - currently deployed on ~70 hosts, with more added each week, mostly on new system builds

Puppet Dashboard



GLPI



Thanks...and I hope to see you at CHEP 2012! (If not before)

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