Linux Farms at the RCF

Thomas A. Yanuklis

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Overview

- Linux Farms provides the majority of CPU power in RCF
- Mass processing of raw data from RHIC experiments
- Software for submission of jobs to Linux nodes
- Software for monitoring performance and availability of services in Linux Farms
- Access restrictions to Linux Farms to minimize unauthorized use

System Hardware

- Mostly rack-mounted, 2-U (3.5-in in height) nodes due to space restrictions
- 338 Intel-based nodes (dual and quads), ranging from Pentium Pro 200 MHz to Pentium-III 800 MHz
- Approximately 18,176 SpecInt95 in the Linux Farm
- Nodes have 256-1024 MB of RAM and 5-120 GB of local disk
- Nodes allocated to each experiment
- Nodes further sub-divided into reconstruction (CRS) and analysis (CAS) nodes

System Software

- Operating System
  - Currently using Red Hat Linux 6.1 (2.2.18 kernel)
  - Security and other system customizations to standard Red Hat Linux 6.1
  - OS upgradeable over the network or initiated via bootable floppy
  - Master Linux image kept in a separate machine
- Services
  - Access to user software and data via AFS and NFS servers
  - Interactive access to CAS nodes via secure protocol

Control Software

- CRS
  - Designed and maintained by RCF staff
  - Flexible and well-instrumented tools for submitting, monitoring and controlling reconstruction jobs
  - Interface with HPSS for access to STK silos
  - Jobs submitted on batch server node are relayed to batch master node, which interfaces with HPSS and the CRS nodes
  - HPSS and NFS checks to minimize job losses
  - CRS nodes very stable due to load management

Control Software (Continued)

- CAS
  - User jobs submitted via LSF or interactively
  - LSF queues separated by experiment and by priority
  - LSF has easy-to-use GUI's
  - Cost of LSF licenses is an issue
  - Decrease of system stability due to concurrent batch and interactive access to CAS nodes

Monitoring Software

- 24-hour on-call staff for critical systems during collider operation
- System monitoring via Web interfaces and automatic paging systems
- Monitoring of system availability and critical services (NFS, NIS, SSH, LSF)
- User access to monitoring information on the Web
- Data stored on disk and backed-up nightly
- Cluster management software collects vital hardware statistics
- Remote system management

Security

- RCF periodically the target of hacker attacks
- Users access CAS nodes via gateway machines through the SSH protocol[a]
- Majority of systems closed to external access
- Firewall placed around RCF to further minimize unauthorized access

[a] The RCF is currently in the process of moving to OpenSSH, we were previously using F-Secure.

Summary

- Smooth upgrading of OS in Spring 00
- Linux Farm ready for RHIC turn-on in Summer 00
- Most CTS tickets to Linux Farms resolved within a few hours
- System stability increasing with increasing staff and experience with running large Linux Farm
- Linux Farm ready for Year 2 of RHIC operations

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- No annoying animated paperclip[a]

[a] See http://www.userfriendly.org