EPICS at the Advanced Light Source

November 2002

Alan K Biocca

ALS Controls Group Leader

ALS Overview

- Advanced Light Source
- 3rd Generation Synchrotron
- UV & Hard X-Rays
- 1.9 GEV 400 mA
- 3 Superconducting Bend Magnets
- (www.als.lbl.gov)

See the ALS

- Visit Berkeley, CA, or
- Go to the Movies - The Hulk
  - Summer 2003
  - Gammasphere grafted into ALS

Non-EPICS Control System

- 500 Homemade Control Computers
  - 80186, 4x16 Bit Analog I/O, Binary I/O, etc
- Homebrew Optical Serial Data Network
- Multibus I Data Concentrator Memory
- 3 Multibus II Data Routers
- 12 Console PCs running Win2K
- 3 Sun Solaris Consoles

EPICS Controls

- 17 VME IOCs
- 19 Compact PCI IOCs
  - IP I/O Card – 16 Bit Analog I/O
  - Rear Card Trim DAC 16 Bits offset 10x
- HP GPIB to Ethernet
- Devicenet to Sbend Power Supplies

Servers

- Network Appliance 300G (GigE)
- Raidzone 900G
- 6 Sun Netra T-1
- 3 PC NT Servers
- Misc Sparc 5 Gateways (per sector)
- New Linux Gateway (first)

Network

- Router - Cisco 8540 40Gbit
  - Plus redundant HSRP backup – 100Mb paths
- 1G links to all switches & LBNL Core
- Switches - Cisco 35xx (~20)
- Separate subnets for
  - Controls, Servers, Development, Offices,
  - Fast Feedback,
  - Each Sector (User nets)

Network Security

- Have a Security Policy
- Well Managed Hosts
- Secure Protocols – SSH, etc
- Strong Filtering in Router
- LBNL Monitoring ‘Bro’
- Awareness – training, notification
- Scanning for weaknesses
- Avoid Insecure SW & Protocols – IIS, telnet, etc

Controls Core Upgrade

- Retire Difficult to Maintain Systems
  - Multibus & Serial Data Systems
- Building ILC to Network (EPICS) Adapters
- Building new Knob Panels
  - Serial Interface, Atmel AVR based
- Replace Some Control Room Apps
  - That depend on Multibus Systems
  - Made library to access data for the rest

EPICS Clients at ALS

- Matlab
- Delphi/Kylix
- Labview
- StripTool
- Alarm Handler
- Java Apps
- DM; MEDM, etc
- ALS Archiver
- Python
- Simple Channel Access
- Activex
- RUDS Gateway

RUDS
(Remote UDP Data Service)

- Gateway
  - for Simple Native mode
  - And short-life clients (eg Web scripts)
  - Long Range Access, Improved Security
- Simple UDP Protocol (readonly)
  - Server: C
  - Clients: Native Perl, C, Native Labview
- Future Clients: PHP, Python, Java

Fast Feedback System

- 12 Compact PCI PowerPC crates
- Read Beam Position around the Ring
- Distribute to all crates, Compute corrections
- Send to 50 Corrector Power Supplies (trim DACs)
- 1khz Update rate - on (private switched) Network
- 13,000 hz Multicast Packet rate
- Significantly Less than 0.1% late/missed Cycles

What's Next?

- Windows XP??
- More Linux
- More Python
- More PHP (less Perl)
- More Kylix
- Move to Channel Archiver
- Config db to MySQL

Controls Group Opening

- Physics & Operations Support
- James McDonald Leaving
- Posting out in the next week or two
- Contact AKBiocca@LBL.gov