ATCA, HPI, AIS - open specifications for HA applications

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Outline

- New CS and ATCA as platform of choice
- Service Availability Forum (SAF)
- Hardware Platform Interface (HPI)
- Application Interface Specification (AIS)

ILC Control System requirements

- Overall Control system availability goals of 99% -99.9%
 - For a system of a ~1200 "shelves" it translates to 99.999% availability for each "shelf"
- Serviceability and manageability
 - 30 km long underground tunnel
- Standardization
 - For simplified development and Quality Assurance
- Modularity Both Hardware and Software
- And many other including redundancy, high speed serial links...

ATCA as a platform for ILC control system

- Advanced Telecom Computing Architecture (ATCA) embodies most of the required features
- Designed to provide 99.999% availability
- Modularity
 - separate back-pane and front
 - HOT SWAP
- Redundancy Power supply, cooling, serial back-pane
- Extensive manageability
- And more

Service Availability Forum

• Objectives:

- Develop and publish high service availability and management software interface specifications
- Promote and facilitate their adoption by the industry
- Members Leading telecom industry companies
- Primary specifications:
 - HPI Hardware Platform Interface for hardware resource monitoring and management, similar to IPMI
 - AIS Application Interface Specification for software monitoring and management

SAF Specifications

- Represent current "best-practices" of Telecom Industry in building HA applications
 - And this may be applicable for accelerator control systems as well
- C and Java API
- Provide a framework and guidelines for development of HA applications

Basic architecture



Basic Architecture

Hardware



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Technology and Instrumentation in Particle Physics, Tsukuba

HPI - Hardware Platform Interface

- Inventory & configuration what components are in the system HW, serial numbers, location
- Control Hot Swap, Power up/down, reset, firmware upgrade, watchdogs...
- Monitoring temperature, voltage, fan speed, LED...
- Portable Abstract, support various factors/ architectures

HPI - Reasons to use

- Hides platform specific or proprietary features from application
- Eliminates proprietary application interface allows fast porting to other platforms
- Remote control via HPI-SNMP



HPI usage example - Redundant EPICS IOC

- ATCA shelf with two CPU blades
- Running two Redundant EPICS IOC
- HPI is used to monitor the health of each blade
- This information is used to make decision on failover



HPI usage example - Redundant EPICS IOC

- HPI is Platform independent
- Instead of ATCA we can use "conventional" server PC
- OpenHPI has /dev/sysfs mappings on Linux



AIS - Application Interface Specification

- AIS is a set of open standard interface specifications
- AIS defines an API for middleware between the applications and the operating system
- It is divided into the areas:
 - Availability Management Framework
 - Cluster Membership Service
 - Log Service
 - Event Service
 - Lock Service
 - Checkpoint Service
 - Message Service
 - Information management Model



Further topics

- AIS benefits and reasons to use
- AIS implementations ?
 - OpenSAF, OpenAIS, OpenClovis
- Examples of AIS usage
 - "cold" standby redundant IOC Claude Sanders APS
 - EPICS caGW proposal Claude Sanders APS
 - My experience ?

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Conclusion

- ATCA is being actively adopted by accelerator people, new boards being developed, Physics ATCA initiative
- As for the software HPI & AIS offer extensive base for hardware and software management. And a framework and guidelines for development of HA applications
- HPI & AIS Possible areas of usage in accelerator controls
 - IOCs
 - Nameservers
 - Gateways
 - Embedded CPUs (FPGA)

Open questions