Management Tools for Distributed Control System in KSTAR

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WEMMU006

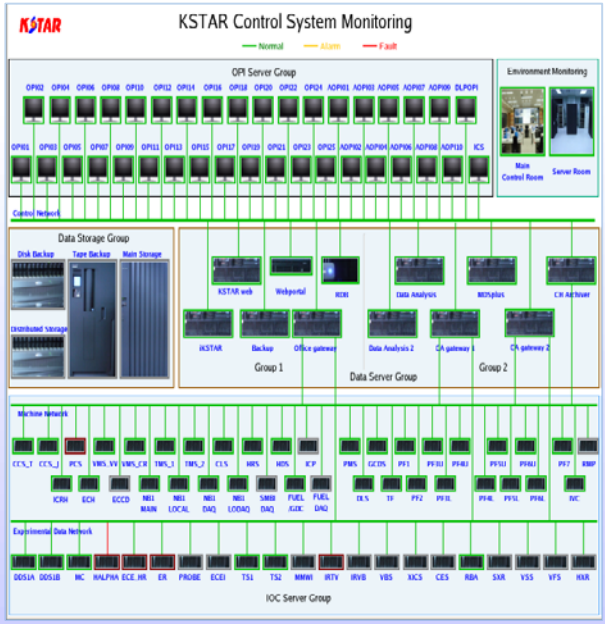
- KSTAR is the latest working a nuclear fusion device of superconducting tokamak

Project Goal

- Overview
  - ✓Control System Monitoring
    - ❖ Supervising All IT Infrastructure Resources in the KSTAR Environment
  - ✓Software Version Control (source code and software deploy)
    - ❖ Deploying Binary File Under Distributed Environment (Execution files or Object files)
  - ✓Virtualization for Flexible IT Infrastructure
    - ❖ Green IT (No power, No place and No CO2 for IT)
    - ❖ Increases the cost effectiveness of IT resources (Freely assign/remove resources)

Solution Outline

- Control System Monitoring
  - ✓Developed Several Modules:
    - Network Status: Using Internet Control Message Protocol
    - Storage/Switch: Using Simple Network Management Protocol
    - Two Widgets: BlinkLine, CABlinkLabel for User Interface
    - Environment Monitoring: Using NI's Compact Field Point
    - sysMonLib with EPICS Lib in All IOC Servers and IT Servers
      - Itself Monitoring Resources in Each Server
        (CPU, Memory, Used Network Packet, and so on)



- Version Control System using Subversion
  - ✓Changed CVS to Subversion
  - ✓Supports for Binary File Format (for Deploying the Developed Software)
- Virtualization for KSTAR IT Infrastructure
  - ✓Using VMWare (ESX / ESXi)
  - ✓Can use ESXi Hypervisor for free (Not support vMotion and Fault Tolerant)
  - ✓Commercially ESX Hypervisor

Conclusion

- Results achieved
  - ✓CSM -> Could Supervise All IT Infrastructure Resources in KSTAR Environment
    - Server Resources (CPU, Memory, Network Packet(In-bound, Out-bound), …)
    - Network Soundness (ICMP, SNMP)
    - Environment (Thermo-hydrostat, Rack Temperature, Water Leak for HPC)
    - Storage System (SNMP-MIB), Simple Message Service(SMS)
  - ✓Subversion for Version Control System
    - Deploying Software to the All IT Servers according to Version
    - Minimized Human Errors due to Wrong Software Management
  - ✓Virtualization for Flexible IT Infrastructure using ESX / ESXi Hypervisor
    - Virtualized OPI servers for remote experiment participants (10 remote OPI servers)
    - Virtualized servers for software testing simulating real distributed environment
    - Virtualized development servers (4s) and Virtualized EPICS gateway servers
- Future Plans (What's the Next)
  - ✓ Clustering Server System or Fault Tolerant System (for Non-Interruptible Data Service)
  - ✓ Load Balancing for Data Service
  - ✓ Virtualization for Data Service