EPICS as Standard for Controls and Monitoring Systems across Physics Division Halls

Tyler Lemon
Detector Support Group
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EPICS in Jefferson Lab Physics Division

- **EPICS** is a collection of software tools and applications that make up a distributed control system

- **Control Systems Studio (CSS)** is most common GUI onsite

- **WEDM** and **WebOPI** used for off-site remote monitoring

- **EPICS ALH** (ALarm Handler) and **CSS BEAST** (Best Ever Alarm System Toolkit) used for alarm handling

- **PLC-to-EPICS communication** performed using Ethernet/IP drivers on an IOC or KEPserver (OPC server with IOC shell)
Security

• **Separate subnets** established by Computer Center isolate Hall networks

• **Two-factor login** through gateway required to get to any Hall subnet from CUE or external network

• **Authentication** required for web browser monitors
  – Web browser monitoring is read-only

• **Limit** users’ and host computers’ access to GUIs

• **Make** PVs or GUIs read-only

• **Require confirmation** for critical controls before writing to PVs
  – Magnet dump
  – Resets
Hall B

• **GUIs:** CSS
  – clascss environment for opening individual sessions for each user

• **Web Monitoring:** WebOPI
  – hallbopi.jlab.org

• **Alarm Handler:** CSS BEAST

• **PLC-EPICS interface:** Ethernet/IP driver on IOC

• **System Maintainer:** Nathan Baltzell
Hall D

• **GUIs:** CSS
  - CSS environment set up to open CSS workspaces that have a menu option for all systems

• **Web Monitor:** WEDM

• **Alarm Handler:** CSS BEAST

• **PLC-EPICS interface:** Ethernet/IP driver on IOC

• **System Maintainer:** Hovanes Egiyan
Hall C Proposal

- **GUIs:** CSS, Tcl/Tk, HMI
  - CSS screens are used for detector HV controls
  - DSG is converting PLC HMI screens to CSS screens
  - Tcl/Tk still used by some users as swap to CSS is ongoing
  - HMIs used for all magnet controls

- **Web Monitor:** WEDM

- **Alarm Handler:** EPICS ALH

- **PLC-EPICS interface:** KEPServer

- **Proposed System Maintainer:** Peter Bonneau
  - **Advisor:** Steve Wood
Hall A Proposal

• **GUI**: CSS

• **Web Monitor**: WEDM or WebOPI
  – Investigate latest that allows CSS screens to be directly used

• **Alarm Handler**: CSS BEAST

• **Proposed System Maintainer**: Peter Bonneau
  – **Advisor**: Steve Wood
Conclusion

- **Goal** is to standardize EPICS across Physics Division
- **Security concerns** addressed by limiting full access to specific host computers and users
- **DSG** is developing Hall A SoLID PLC code with HMIs and CSS and EPICS in parallel

**DSG Staff:** Mary Ann Antonioli, Aaron Brown, Peter Bonneau, Pablo Campero, Brian Eng, and Tyler Lemon

**Peter Bonneau** proposed system maintainer for Hall A and Hall C
Backup

• **IOC Server**
  – Will run EPICS base and support software
  – OS: Red Hat Enterprise Linux 7 (RHEL7)

• **KEPServer**
  – Currently used by Hall C for PLC-to-EPICS communication
  – PLC tags are read by KEPServer (an OPC server) and then published to EPICS through an IOC Shell