First EPICS/CSS Based Instrument Control and Acquisition System at ORNL

NEUTRON SCIENCES

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Abstract

The neutron imaging prototype beam line Cold-Guide 1D (CG-1D) at the Oak Ridge National Laboratory High Flux Isotope Reactor (HFIR) is used for many different applications necessitating a flexible and stable instrument control system. Instrument scientists expect a robust data acquisition system. They need a clear and concise user interface that allows them to both configure an experiment and to monitor an ongoing experiment run. Idle time between acquiring consecutive images must be minimized. To achieve these goals, we implemented a system based upon EPICS, a newly developed Control System Studio (CSS) scan system, and CSS operator interface "Best OPI, Yet" (BOY).

HFIR CG-1D Beam Line

Synopsis

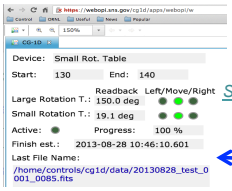
- The HFIR CG-1D beam line has been converted to EPICS, CSS, and the new Scan System.
- First users of the new platform successfully performed CT scans in January 2013.
- The new system is very stable. Total downtime this year was about 2 days of production time.
- Control system of existing SNS beam line "Engineering Materials Diffractometer" (VULCAN) is now being converted.
- The new beam line Ultrasmall-Angle Neutron Scattering (USANS) will be converted.

CG-1D Control System

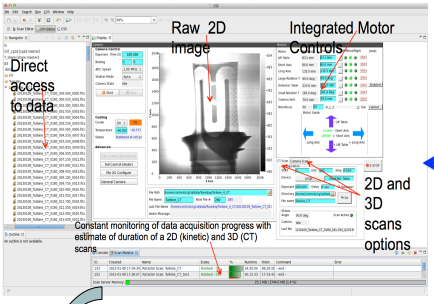
The goal of the new system is to allow beam line users to monitor, control and automate the experiment.

- The experiment data, typically consisting of numerous image files taken by a camera, is written to an NFS-mounted server.
- The system is divided into two layers. The User interface, which is implemented by CSS BOY, lives in the open network. The rest of the system sits behind a firewall.
- The user interface communicates with the second layer via EPICS Channel Access (CA), secure shell (ssh), and an http server.
- All the Input/Output controllers (IOCs) run in the beam line private network. Only read-access is available outside the beam line, such as WebOPI, but there is limited, controlled write access from the lab network through ssh for configuration and maintenance.
- Communications between the IOCs, which handle the hardware devices, are done through Channel Access. There is a beam line Linux server that supports data storage for the IOCs, Scan Server, and beamline-local data.

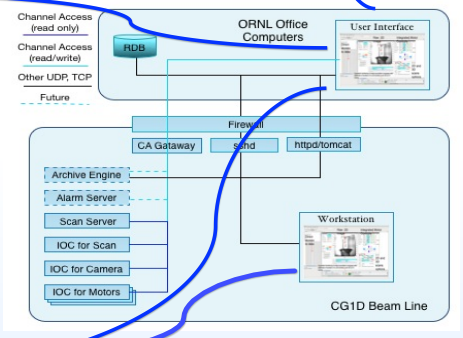
Web OPI



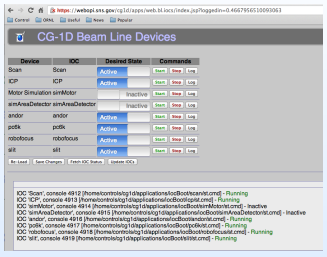
THCOAAB03 *Bringing Control System User Interfaces to the Web*
Talk on Thursday, Xihui Chen



CG-1D Control System



IOC Handling Web Interface

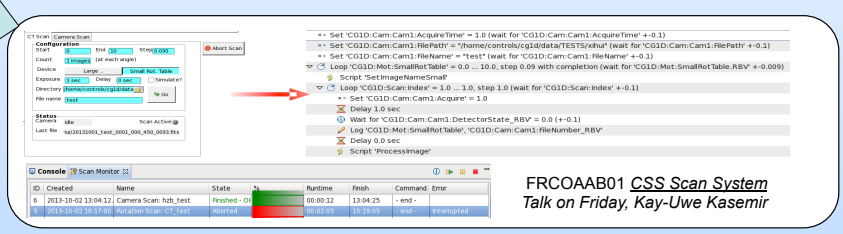


Hardware:

- Detector: Andor Camera with EPICS Area Detector support
- Sample positioning system: Parker 6K8 motor controller with EPICS PC6K/Motor support
- Camera focus: RoboFocus with StreamDevice/asyn
- Slits: Galil DMC-4080 with EPICS Galil/Motor support

CG-1D Experiment Example

- User submit a sequence of experiments then monitor the progress, pause, resume, or abort their execution.
- The scan system provides automated experiment control with robust features of error checking, time-out handling, and read back verification during the scan process.



FRCOAAB01 *CSS Scan System*
Talk on Friday, Kay-Uwe Kasemir

*SNS is managed by UT-Battelle, LLC, under contract DE-AC05-00OR22725 for the U.S. Department of Energy