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Migrating to an EPICS-based Instrument Control System at the ISIS Spallation Neutron Source

Introduction

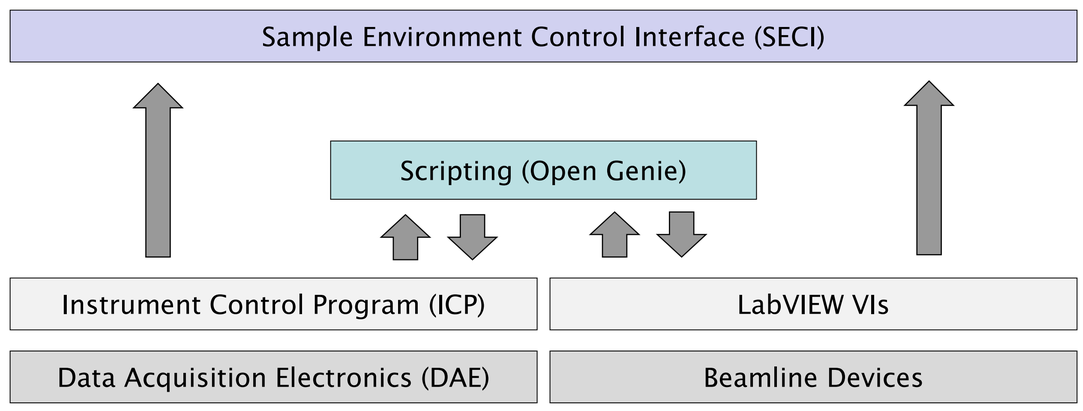
The beamline instruments at the ISIS spallation neutron source have been running successfully for many years using an in-house developed control system. The advent of new instruments and the desire for ever more complex experiments led to a project being created to determine how best to meet these challenges.

It was decided that migrating to an EPICS-based system would offer many advantages in terms of flexibility, software reuse and the potential for collaboration.

The challenge was for a small development team (<8 people) to develop a new system whilst maintaining the existing system and minimising disruption.

The Existing Control System

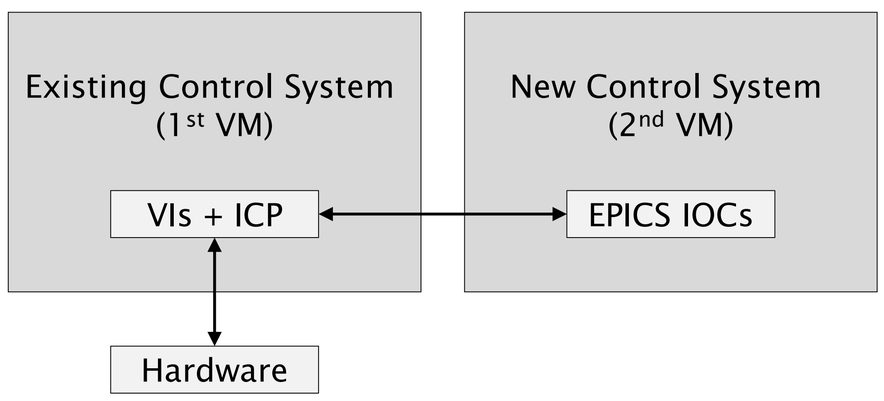
- Runs on a Windows 7 x64 VM
- Device drivers written in LabVIEW
- SECI is the main GUI, but is also a data logger and configuration manager
- The ICP is responsible for controlling neutron data collection and producing the final data file
- DCOM used for communication between components



Issues: strong coupling between components; lack of defined boundaries between layers; multiple responsibilities; and, a lack of opportunities for collaboration with other facilities

The Parallel System

- New control system runs in a separate Windows VM
- IOCs run on the separate VM and “connect” to the VIs
- The existing control system required no modifications
- ProcServ is used to provide telnet access to IOCs
- In-house program for starting/stopping IOCs
- Python and PyEpics used for scripting
- PCASpy-based CA server used to retrieve PV names
- CS-Studio used for GUIs



Making IOCs from VIs

To be able to operate the two systems in parallel it was necessary to find a solution for integrating the LabVIEW VIs into the EPICS system without modifying them.

For this purpose, an EPICS Asyn driver was created that communicates with LabVIEW via DCOM.

This driver, called lvDCOM, allows IOCs to be created that can communicate with VIs both locally and remotely.

The lvDCOM driver is configured by an XML file which links the Asyn driver parameters to the front panel values of the VI. The initial XML configuration file and db record file are auto-generated.

The Future

The aim is to phase out the existing control system as the new system becomes more complete. For this to happen the following key tasks will need to be addressed:

- Replace LabVIEW VIs with pure EPICS IOCs where practical
- Produce a replacement GUI for SECI
- Identify and implement a system for logging “important” PVs
- Removal of the 2nd VM