Software review preparation

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This document summarizes the following areas:

1. Slow controls.
2. Common data format.
3. Source code repository.
4. Electronic logbook

Slow controls

During the 6 GeV era the halls have benefitted from a relationship with the Accelerator Controls Group (ACG) who have provided support for slow controls and monitoring through the EPICS system used to control and monitor the accelerator. We have discussed this relationship in the context of 12 GeV and have agreed that it will continue in the future. The exact scope of the support to be provided is still under discussion. The ACG typically completely maintain the beam-line components, such as magnets and BPMs, but not components of the targets and the detectors themselves. However, the ACG do provide support and guidance for the implementation of the detector and target control systems even though the bulk of the work is typically done by the hall or support group staff.

In the case of halls A through C many existing systems will be reused and new work for 12 GeV is seen as a perturbation to an existing system. In the case of hall-D, where many systems are being designed from scratch, control and monitoring through EPICS is a requirement and has a strong influence on the design. Hall-D intend to use hardware that pushes much of the intelligence closer to the hardware being monitored than has typically been the case with the other halls. An example is the use of smart network enabled devices where much of the work of monitoring and control is done by the device itself. In these cases the native communication protocols of the device performing the monitoring or control will be used and an interface to EPICS provided through a software IOC running on a Linux computer system. This is in contrast to most of the 6 GeV systems where the IOC is physically an embedded processor in VME and VME based electronics controls hardware directly at a low level.

As far as readiness is concerned the preexisting halls are in good shape as they already have working systems. Hall-D have a slow controls working group who meet every other week and are making good progress. Hall-D do need to better determine the scope of work and convert that into a plan that identifies who is doing the work, in particularly the hall/ACG boundary.

Data Formats

All of the halls will use the EVIO event format for raw data. EVIO is the native event format for CODA and was designed to meet the requirements of JLab experiments. EVIO was used in the 6 GeV program to store the raw data from halls A and C. EVIO was designed to meet the 6 GeV requirements of CLAS. For various reasons CLAS ultimately used the BOS/FPACK format for 6 GeV raw data. Since CLAS12 have chosen EVIO as their 12 GeV raw data format EVIO has been enhanced to add some of the useful functionality from BOS/FPACK.

The output of reconstruction or analysis typically contains more exotic data types than those found in raw data. Since EVIO was designed as a raw data format it is has not been ideally suited for storing reconstruction and analysis output. CLAS12 have proposed modifications to EVIO to allow it to be used for the output of reconstruction but are also considering HDF5 as a strong alternative. GLUEX are in the same situation regarding EVIO but are also considering HDDM (Hall-D Data Model). The output of hall-A analysis is the native file format of ROOT.

The choice of a data format for reconstructed data is tied closely to the physics being studied and the analysis methodology. All four halls have carefully considered data formats and choices have been made for valid reasons. In their presentations the halls should clearly make the argument for the format they are intending to use. The writing of all the raw data in the same EVIO format across all the halls goes a long way towards meeting the requirement of long term data archival.

Software repository

The halls have all been using software version control for some time for both online and offline software. Hall's B and D will use the Subversion (SVN) version control system. This is a mature system and has been in use at the lab for several years. The SVN software itself is available on all JLab machines that are used for scientific computing and is maintained by IT division. The software repositories managed by SVN are on the central file servers managed by IT division. This is the most stable and best protected random access file storage area that we have available. There is no clear advantage to combining the repositories for different halls and doing so would only increase problems associated with access control and repository management. Hall-C is currently using the old CVS version control system but is considering using the newer GIT system. This is a more modern and simpler alternative to SVN and seems well suited to their needs. Hall-A are also currently using CVS and seeking to migrate to a more modern system. They are monitoring Hall-C's progress with GIT and have the fallback solution of SVN. Halls B and D already have a significant investment in SVN and there seems little need or desire to change to GIT. There is little reason to force a single system on all four halls it is sufficient to note that there will likely only be two systems in use and to document the reasons.

Electronic logbook and equipment database

Of the four halls only hall-B has an electronic logbook that is satisfactory to their needs. Representatives from the halls met and discussed the situation along with some of their requirements. There were three options, the hall-B logbook, the accelerator logbook or a preexisting logbook system from outside the lab. There are neither resources, time nor desire to develop our own logbook system. We performed a survey of logbooks from outside the lab and rapidly reached the conclusion that taking any of these packages gave us the same starting point as using the accelerator or hall-B logbooks as the foundation for the new system. At this point the accelerator controls group (ACG) approached us to discuss possible areas for collaboration. They have been increasingly frustrated when trying to tie the three existing halls logbooks into their own system, for example to display information from all on the same page. They offered to modify the accelerator logbook to meet the requirements of all four halls. The halls agreed that if the ACG can meet the requirements promptly then they will adopt the new system. The flour halls met to discuss requirements which were then passed to the ACG who are working on design documentation.

During the discussion with the ACG we were introduced to the CEBAF elements database which would be an excellent system for storing information about equipment used in the halls. Hall-B already have a similar system that they developed themselves. The system developed by the ACG has a better design of database back-end than the hall-B system while the hall-B system ha as more user-friendly web based user interface. At this time hall-D have adopted the hall-B system. The ACG will continue to develop their system and hall-D have committed to reviewing the improved system with a view to adopting it in the future.