Data Acquisition Systems

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Overview

The growth of Intel PC's as hosts of DAQ systems continued in 1999. ISAC experimental setups are all different in nature requiring customization of the software components. MIDAS remains the main software package for acquisition and control. NOVA is supported for analysis as well as HBOOK/PAW. PHYSICA is also available for data manipulation.

MIDAS software

New hardware support has been added to the Midas software package in order to permit the use of state-of-the-art hardware modules. An EPICS to Midas interface has been written in order to guarantee proper communication between these two system especially for the ISAC hall where all the beam controls are performed by the EPICS package.

Continuous development and improvement of the Midas system include: a) integrated Alarm system based on events, task status, Database values state, b) Electronic logbook and runlog capability accessible from the Midas Run Control web page, c) PowerPC support for the VME modules d) Dual buffer capability for the VxWorks frontend code. Additional applications are now available such as a) Lazylogger: multiple background data logging facility including FTP transfer, b) Elog: Electronic log message writer, c) Odbhist: odb variable retriever from odb save-set.

NOVA

The NOVA Data analysis system has been integrated with the latest version of MIDAS (1.7), and has been installed on all data acquisition Linux PC's, as well as several analysis machines at TRIUMF and other labs. Several minor modifications to the system were implemented to better meet the needs of ISAC experimenters. NOVA is currently used by all except one ISAC experiments for both online data monitoring and offline analysis.

The next major version of NOVA (2.1) has been released and is in limited use for offline analysis. Major enhancements include the ability to transport dump files / analysis code seamlessly among different computer architectures, and support for the Bank structure (both YBOS and MIDAS) generated by the online acquisition system. User feedback will be evaluated before this version is released in an online environment.

ISAC systems

The latest ISAC experiments i.e. Life Time, LTNO, *beta*NMR have been setup using various components of the Midas DAQ package. Each experiment required customized software to fit the particular hardware configuration. This software development involved people with minimum knowledge of the Midas system. In a few sessions, each group were able to create/implement specific program tools in order to ease both the run control part as well as the off-line analysis of the data. In particular, LTNO "Slow Control" drivers were written for controlling and monitoring the LTNO target. In this case the development and the running code have been done on a Windows NT system.

Design of a video multiplexer system for the ISAC hall was done. Proof-of-principle software has been written as well as tests of video capture software. A simple monochrome video monitoring system for TRINAT and GPS was installed in the ISAC counting room.

μSR systems

Both M20 and M9B μSR setups were upgraded following the successful upgrade of M15 in 1998. All three μSR systems now have the same hardware: VME crate containing a CAMP slow control MVE162 CPU, a new Highland V680 TDC and a MVME2603 PowerPC CPU for fast histogramming. Communications between the two VME CPUs and the host computer is done via Ethernet. The scaler module remains in CAMAC. There are plans to change to a VME SIS 3803 16ch, 200 MHz module during 2000. The host machines remain Vax Worsktations. Further improvements to the software for the VME TDC and HM were also made.

A special setup was developed for experiment 777. In this case, the standard μSR scintillators were segmented to permit use of a more intense beam. To make use of the segmentation required a pipelined TDC. The DAQ in M20 was extensively modified for a test run last June. The VME TDC/HM system of the standard MUSR DAQ was replaced by a FASTBUS system, comprising a LRS1877 TDC, and a STR340 SFI (both in FASTBUS) with a VME MVME2305 PowerPC driving the system. Data from the LRS1877 was saved as histograms in the MVME2305 memory in the same format as for the standard MUSR system, so that it could be read out by the standard MUSR DAQ software on the VAX.

βNMR at ISAC

A DAQ system for the βNMR experiment running on ISAC was required that had similar functionality to that of the standard μSR system. Since the standard μSR system is based on obsolete hardware (and software) it was decided to use the standard TRIUMF DAQ system of MIDAS running under Linux. The standard MUSR front-end hardware for slow controls (comprising an MVME162 running CAMP) was used,

but the βNMR experiment required a VME SIS3801 Multichannel scaler accessed by a MVME2305 PowerPC, that processed the data into histograms. The histogram data had to be saved in a custom format for μSR, readable by the offline μSR data analysis programs. Therefore the μSR data archiving program was ported to Linux and required extensive modification to run with MIDAS. The CAMP software also had to be ported to Linux.

E614 Slow Controls

A slow controls / monitoring system, with a user interface based on Tcl/Tk, has been developed for Experiment 614. A single Tcl window (the Status Bar)presents the Global status of the complete experiment to the operator, with warning / error conditions being presented as different colors for buttons on the bar. A single mouse click provides access to a hierarchical system which allows the operator to pinpoint the exact cause of the alarm more precisely. In addition, easy access is provided to the history of any slow control variable monitored by the system.