Data Acquisition Systems

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Overview

The Triumf Data Acquisition System "MIDAS" is now deployed over 20 stations around the laboratory. These machines also provide significant offline analysis resources and disk storage.

Table I. Computer systems with MIDAS software managed by the DAQ group

Name	Location	Type
isdaq01	ISAC-LE, BNMR, Trinat	2xPII/450
isdaq02	ISAC-LE, GPS, LTNO	PIII/500
isdaq03	ISAC-HE, Tuda	2xPIII/550
isdaq04	ISAC-HE, Dragon	2xPIII/550
isdaq05	ISAC-LE, Osaka	PIII/1000-256
isdaq06	ISAC-HE	PIII/1000
isdaq08	ISAC-HE, 8Pi	2xPIII/1000
midtis01	Trinat DAQ	2xPIII/550
midtis02	Detector Facility	PPro/200
midtis03	LTNO platform DAQ	PII/350
midtis04	GPS DAQ	2xPIII/550
midtis05	Dragon floor DAQ	PII/350
midmes01	Detector Facility	PIII/500
midmes03	RMC DAQ	2xPIII/550
midmes04	Meson Hall tests	PII/350
midmes05	Detector Facility	PII/350
midmes06	8II Slow Control	PII/166
e614slow	TWIST Slow Control	PII/400
midtwist	Twist DAQ	2xPIII/1000
midm9b	M9B μSR DAQ	2xPIII/600
midm15	M15 μSR DAQ	2xPIII/600
midm20	M20 μSR DAQ	2xPIII/600
dasdevpc	DAQ devel & web server	PIV/1700

MIDAS software

The software development effort for Midas this year has been focused towards: a) support for newer hardware modules such as Hytech PCI/CAMAC, Wiener PCI/VME interfaces and other VME modules, b) improved user interface for experiment control through the web browser, c) Web documentation, d) driver portability across different Operating Systems.

The DAQ group has also contributed to the "12th IEEE Real Time Congress on Nuclear and Plasma Sciences", Valencia, June 2001, with a paper entitled: "Real Time control/monitoring & Data acquisition system for nuclear polarization experiments with implanted radioactive ions".

There was a significant effort on documentation as can be seen at

http://midas.triumf.ca/docmidas/index.html

NOVA software

Version 2.2 of the NOVA analysis system was released during 2001. Several experiments at TRIUMF (and elsewhere) are using NOVA both for real-time monitoring of their experiment and subsequent data analysis. An interface / data unpacker was developed for the DRAGON experiment, and the TRINAT analysis code was modified to allow them to upgrade to the newest version of the software.

ISAC systems

Support for new experimental zones has been provided in particular for TUDA where specific software code has been written to accommodate private event analyzer running on Solaris computers. DRAGON, TOJA and OSAKA are also other experiments where the DAQ group has been involved for setup and running support.

The 6 DAQ machines in the two counting rooms are organised in a NIS cluster to allow each group access to all CPUs, data disks and logging facilities transparently. We presently offer a CDrom RW drive, Exabyte 8500 drives and a DLT 4000 drive.

βNMR at ISAC

Further modifications and improvements were made to theβ NMR data acquisition system. In particular, problems with stepping the voltage of the Sodium Cell (via EPICS) were investigated and solved. Several new features required by experimenters were added. The process of changing between different experimental modes was simplified, and extensive documentation was written.

TWIST

The full TWIST DAQ with two frontend Fastbus crates was commissioned. A special MIDAS task called the Event Builder was developed to combine portion of events from each of the Fastbus crates. Sustained data rates of 2500 events/sec and 5 Mbytes/sec were obtained. Logging is done to a DLT8000 drive.

A completely functional implementation of the Slow Controls system for the TWIST experiment was completed during 2001. The system includes multiple front ends, interfacing several programmable Digital Voltmeters, a CAMAC Branch and a custom serial interface responsible for control and monitoring of the 260 PostAmplifier boards required for the experiment. High Voltage control and monitoring is carried out via CAMAC. In addition several parameters of the proton beam are provided by the TRIUMF Controls group via a CAMAC memory unit.

All slow controls data are maintained in the MIDAS online database (ODB), where they are imme-

diately available (via a Tcl interface) to the experimenter. Parameters are continually monitored and checked against user-selectable limits. When a parameter goes outside these limits, an alarm is immediately raised, informing the shift crew of the problem. The system worked well during engineering runs during 2001, and is being upgraded in preparation for Physics runs in 2002.

A preliminary version of a similar system was implemented for DRAGON, providing them with access to many of their beamline elements.

μSR systems

For μSR, work continued on the new Midas-based system. A prototype Midas frontend was written to replace the present front-end (running on a PowerPC under VxWorks). Our student returned, and incorporated support for a SIS3803 scaler into the new frontend, and added the histogram readout. He also modified the Tcl/Tk user interface.

Other experimental stations

In the Meson Hall, both the RMC and the CHAOS DAQ were in use during 2001 and required support from the DAQ group. JLAB HallD detector studies by the Regina group and aerogel tests by the Manitoba/CalTech GO group used the meson DAQ facilities.

Three DAQ stations are provided in the detector facility. They were used in turn for detector developments by the E949 group, the KOPIO group, the Dragon group, the TWIST group and the Hermes group.