Data Acquisition Systems

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Overview

In 2002, the DAQ group continued to support a wide array of experimental groups and tests stations. Peter Green who had been with the group for many years, retired at the end of June. He has been replaced by Konstantin Olchansky who had come to Triumf two years ago to work with the Twist group after several years at Brookhaven National Laboratory in DAQ, software analysis and Linux system management.

The Triumf Data Acquisition System "MIDAS" is currently deployed over 26 stations managed by the DAQ group around the laboratory. These machines also provide some 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, GP2, LTNO	PIII/500
isdaq03	ISAC-HE, Tuda	2xPIII/550
isdaq04	ISAC-HE, Dragon	2xPIII/550
isdaq05	ISAC-LE, Isac users	PIII/1000-256
isdaq06	ISAC-HE Isac users	PIII/1000
isdaq08	ISAC-LE, 8Π	2xPIII/1000
midtis01	Trinat DAQ	2xPIII/550
midtis02	Detector Facility	PPro/200
midtis03	LTNO platform DAQ	PII/350
midtis04	GP2 DAQ	2xPIII/550
midtis05	8Π cryo	PII/300
midtis06	Isac floor DAQ	AMD/XP/350
midmes01	Detector Facility	PIII/500
midmes02	Dragon	2xPIII/550
midmes03	RMC DAQ	2xPIII/550
midmes04	Detector Facility	PII/300
midmes05	Detector Facility	PPro/200
midmes06	8Π cryo backup	PII/166
daqtest	M11 users	PII/400
e614slow	TWIST Slow Control	PII/400
midtwist	Twist DAQ	2xPIII/1000
midm9b	M9B μSR DAQ	2xPIII/1000
midm15	M15 μSR DAQ	2xPIII/1000
midm20	M20 μSR DAQ	2xPIII/1000
dasdevpc	DAQ devel & web server	PIV/1700

MIDAS software

The MIDAS software continued to evolve and mature. Stefan Ritt, the main author of MIDAS software spent two weeks at Triumf in the early summer of 2002 to discuss and implement improvements of interest to the Triumf systems in collaboration with Pierre Amaudruz. Konstantin Olchansky joined the effort in July. The work on the MIDAS software during this year has been focused on the integration of an Event builder, current MIDAS tools optimization and web interface improvement integrated in a new release of MIDAS version 1.9.1

This new release addressed specifically the following tasks: mevb, logger, lazylogger, mhttpd, elog, history and upgraded error handling in the RPC portion of the code. Most of the software improvements have been suggested and tested by the TWIST experiment where MIDAS has been put to stringent use with data collection up to 8Mb/s and over a dozen slow control equipments.

The number of hardware devices supported by MIDAS keeps increasing. New MIDAS drivers for GPIB and USB devices were added as well as support for a SCSI Camac interface. The success of the USB driver has prompted a study to replace the connection of RS232 devices through old Emulex terminal servers by USB serial adapters.

Evaluation of other DAQ hardware such as PCI/VME interface, VME frontend modules: Flash ADC, AMT deadtimeless multihit TDC) and a new VME processor: a Pentium 4 by VMIC (***ref***) is in progress.

Study of the new MSCB slow control system developed by Stefan Ritt at PSI has been started in order to evaluate its possible implementation and use within Triumf for control and monitoring of experimental devices.

Information about MIDAS can be found at *http://midas.triumf.ca/docmidas/index.html*

Online analysis software

The DAQ group had been supporting two online analysis packages. The first one is called NOVA, developed and maintained by Peter Green. The second one is the MIDAS analyzer using the HBOOK/PAW/CERNLIB histogramming software suite.

With the retirement of Peter last June, the development of NOVA has stopped. Limited support for this package is expected to last until the end of 2003. With the development of HBOOK also being static, it was time for the DAQ group to embark on a new avenue. After consultation with the 8Π group, Stefan Ritt and Triumf computing services, it was decided to begin a development effort using ROOT which is a new C++ analysis framework supported at Cern and widely embraced by the high energy physics community as well as by GSI. The 8Π group put in a big effort to develop a GUI and macros for ROOT while Konstantin provided a MIDAS analyzer capable of producing ROOT histograms via shared memory and integrated MIDAS

RPCs into ROOT . In 2003, the effort will continue in collaboration with Stefan Ritt to provide a full interface to ROOT as well as a versatile GUI to satisfy the online analysis needs of former NOVA and HBOOK users.

DAQ systems

Pol and βNMR at ISAC

Further modifications and improvements were made to the βNMR data acquisition system. Support has been added for various scans of devices controlled by Epics (from the ISAC control system) and by CAMP systems (specific βNMR slow control systems). Extensive documentation accessible through any web browser is now available for this experiment.

A second DAQ called POL was installed on the second leg of the βNMR beamline. It supports a polarimeter for beam studies. The software had to be made versatile enough for use by βNMR users and other experimenters (Osaka) setting their experiment in that area. The experience gained in developing reliable scans of Epics devices was made available to other MIDAS experiments, specifically to the Osaka group.

μSR systems

The new Linux-based TD-μSR DAQ system was completed (including a graphical user interface written by Donald Arsenault). It has been installed on all three μSR beamlines and was successfully used during the fall beam periods.

A large part of a prototype linux-based system to replace I-μSR has been written and debugged.

TWIST

Development continued on the TWIST DAQ system. To boost the Data rate, the logging media was changed from a DLT8000 to a Super DLT III drive bringing the data rate to the level of 10 MBytes/s sustained while lowering the tape costs by a factor of 2.

As mentioned above, this demanding DAQ required a number of MIDAS improvement in all aspects of MIDAS. Much work was done mainly in the slow control category, In particular the implementation of M13 B1 and B2 magnet regulators and improvement of the USB camera readout for the TWIST alignment system (including modifications to the Linux ov511 driver). Three of the Fastbus TDCs had failed and required repairs. One had to be sent to an external company but Andrew Daviel was able to diagnose the problem FPGA in the other cases. Replacement of the chip was done in house by the electronic group.

The TWIST experimental group is now using exclusively Elog, the MIDAS electronic logbook facility instead of a paper logbook. Elog is accessible through any web interface making it possible for all members of the group, locally or externally based, to follow the progress of the experiment and make timely contributions.

Other experimental stations

The 8Π group switched from a VMS based DAQ to VME and MIDAS in the first half of the year with the help of the DAQ group. They also developed a ROOT online analysis package as mentioned above.

Half a dozen other requests for DAQ ranging from small test bench setups to real experiments have been handled. Support for external MIDAS users has been strong with more than 10 labs over the world requesting help on DAQ hardware selection and/or installation.