Feature upgrades and improvements in VME version of LAMPS DAQ Software

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Introduction

LAMPS [1] is a Data Acquisition software (DAQ) supporting varied controller type on CAMAC and VME platform. The thrust of recent software development has been centered on VME platform. This paper talks about recent improvements made in VME-LAMPS, as a result.

ROOT File Format support

ROOT [2] is a program, developed by CERN, for particle physics data analysis. LAMPS allows for list file to be written in multiple formats viz zls, candle etc. VME LAMPS, now, supports ROOT file format as well. Installation of ROOT libraries would be a per-requisite for using this feature. ROOT data format can be selected, while initializing the setup for acquisition. [Fig 1]

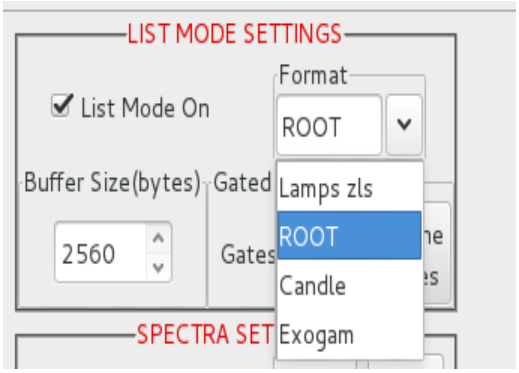

Fig. 1 Dropdown menu in LAMPS for ROOT file format selection

The saved ROOT file can be used with ROOT software for offline analysis. Also, offline analysis in LAMPS now supports importing a ROOT file. The two features will allow for inter-operability between ROOT and LAMPS.

Improved performance at high rates

It was noticed that at high data rates, the CAEN VME digitizer modules[3] were getting paralyzed and remained busy for extended period of time. Hence, either the system stopped counting during high count rates operation or the dead time was very high. In such cases, CAEN digitizer modules were not able to recover to normal working state within reasonable amount of time.

To bring the modules back to normal working condition, a data reset sequence is performed after putting them in offline mode. During data reset sequence, the clearing of the event counter and data reset operations are performed. The digitizer modules are, subsequently, put back in online mode. These operations are performed simultaneously for all modules in the CBLT through a multicast write. The performance of DAQ system, post the change, has shown a marked improvement at high trigger rates.

Support for CAEN V1718 Controller

V1718 is a VME to USB 2.0 Bridge, housed in a 1-unit wide VME 6U module. LAMPS now supports transparent inclusion of V1718 Controller. The logic is succinctly presented in Fig. 2.

Version Control for Source Code

In lieu of the various controller types supported by LAMPS, maintenance of LAMPS source code was becoming difficult. In light of this, the entire code base has been compartmentalized in private repositories and moved over to version control system. The public stable releases will happen, as usual, on lamps web page.

The switch over to version control will allow for non-linear development, documentation of code base evolution and effective communication among developers.

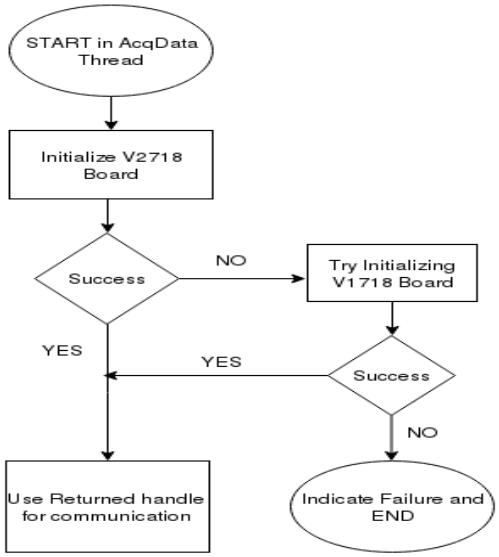

Fig. 2 Flowchart explaining the inclusion of V1718 Controller

Individual threshold configuration

LAMPS, hitherto, supported only global Lower level discriminator[LLD] thresholds on individual VME modules. Often, there is a need to fine tune the LLD threshold on a per channel basis. Setting up of individual threshold has been introduced for CAEN ADC, TDC, QDC and Mesytec MADC32 modules. Configuration window for setting LLD threshold has been shown in Fig 3.

Miscellaneous Changes

Mesytec MTDC-32, a high resolution time digitizer, integration is currently underway. Data readout from MTDC32 has been successful. Features like Window Start and Window Width have been implemented along with relevant GUI changes in LAMPS DAQ. Additional features are being added incrementally.

Integration of V785N ADC module – with LEMO connectors - has been completed. Required ADC type can be selected while initializing the setup.

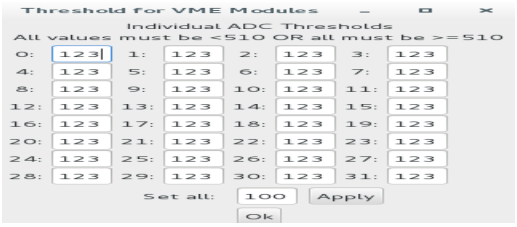

Fig. 3 Configuration window for LLD threshold

Custom analysis in C

LAMPS allows for analyzing the data set using FORTRAN code[user.f] to create user defined pseudo parameters. Custom code analysis is now possible in C as well. Users have been given a choice of choosing between them.

At compile time, both FORTRAN and C version of customizable code are compiled but function calls are made from relevant compiled file based on the option exercised.

Conclusion

The aforesaid improvements are expected to enhance software versatility in various use cases. Majority of these features are being alpha-tested and they are at advance stage of integration, post-which, the public release of software on lamps web page would occur.

References

[1] www.tifr.res.in/~pell/lamps.html
[2] https://root.cern.ch
[3] www.caen.it