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Implementations of streaming DAQ on actual detector systems

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Detector systems in modern nuclear and particle experiments must handle a large number of channels and high data rates.

In addition, the requirements for triggering systems have become more complex and faster decision making is required.

Streaming readout and software-based triggering on distributed computers is a natural solution to these problems due to recent technological advances.

Therefore, we develop a widely usable streaming data acquisition system based on FairMQ and the Redis key-value database.

The DAQ system is relatively simple and can be developed and operated by a few people.

It works with the cooperation of a large number of simple functional processes, and their connections are automatically set up based on port name, service name and their connection information in a database.

The DAQ system was applied to actual detector systems, the RCNP Grand RAIDEN spectrometer and the J-PARC E50 detector system beam test with streaming readout and online software trigger.

The two detector systems, consisting of plastic scintillation counters and drift chambers, were read out by an FPGA-based streaming readout TDC and distributed synchronized clock, where the charge information was obtained from the time-over-threshold.

The streaming readout DAQ worked well, including online triggering, on 12-core server PCs.

And also the software part of the DAQ was tried to read out a triggered DAQ system for a cylindrical drift chamber for the J-PARC COMET experiment.

This application worked well with sufficient performance.

This report explains the streaming capable DAQ system and its actual application, mainly from the software side.

Minioral

Yes

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No

Are you a student?

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