

DAQ status

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VME data transfer



- Fadc250 : 150 200 MB/s
- Fadc125 : 120 150 MB/s
- F1TDC : 160 180 MB/s

Main parameters:

- VME readout clock
 - Fa125: 40MHz, Fa250: 50 MHz
 - Maximum: 160MB/s and 200MB/s respectively
- DMA readout overhead
 - ~80 100 μs
- DMA buffer size
 - Currently 4 MB
 - FPGA board 16 MB



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DAQ Software



- <u>CODA 3.10</u> release has development updates that improve performance.
 - This release was tested using a 128KHz pulser and generated data from each ROC.
 - CODA can write to RAID disk up to about 1.7 GB/s split between 2 files.
 - We were able to run the full system with 4 DCs, 1 SEB and 1ER up to around ~2.3 GB/s writing 2 files to RAM disk.
- <u>cDAQ</u> performance was tested up to 2.5 3.0 GB/s and 100kHz trigger, using generated data traffic
 - Also performed tests with real physics trigger and high current ~500nA, 100kHz trigger, average data rate ~1.6 GB/s
 - \circ In the fall of 2019, several physics runs were taken with cDAQ
 - $\,\circ\,$ cDAQ has a different file format
 - $\,\circ\,$ Parser is ready and runs were successfully reconstructed for physics.

CODA development



- New CODA developments (not yet tested with the full system) include:
 - 1. A C based Event Recorder writing files using the EVIO C library (rather than JAVA).
 - 2. EMUs (including the DC, PEB, SEB and ER) now support writing compressed data both to a file as well as between EMU data links (EMUSockets).
 - This provides the opportunity to test a tradeoff between available processing power in the ER with reducing that needed to write the data to the disk.
- One requirement to move to the data compression support is that a new version of the EVIO package will be necessary (Version 6).
 - This makes significant changes to the Header structure of the EVIO files and care must be taken if code other than the standard EVIO libraries are used to read and decode the new files.
- These developments will be a part of a new release of CODA (3.11).
- The latest release will also standardize on a newer version of the JAVA runtime environment (jdk 11).
 - Java 11 includes a number of new features (pre-compiling and garbage collection) which we expect to provide performance enhancements to full system operation.
 - \circ $\,$ We hope to be able to test these new features this summer.

Conclusion



- CODA performance
 - Using writing into two files.
 - write speed ~1.7 GB/s to RAID disk and ~2.3 GB/s to RAM disk
 - Not yet tested with real beam.
- cDAQ tests:
 - Writing sped with generated data: ~2.6 3.0 GB/s to RAID disk
 - Tested with beam @500nA , 100 kHz trigger, data rate 1.3 2 GB/s
 - Decoding test with physics run under normal condition
 - ✓ Reconstructed normally
- New data management with a RAM disk.
- Expected KLF trigger rate:
 - \circ physics rate + background below ~ 700 Hz
 - o so, DAQ performance is about 2 order of magnitude higher



Backup



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