Data acquisition and online monitoring software for CBM test beams

J. Adamczewski-Musch, N. Kurz, S. Linev, P. Zumbruch

GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany

Abstract

The Compressed Baryonic Matter (CBM) experiment is intended to run at the FAIR facility that is currently being built at GSI in Darmstadt, Germany. CBM aims to extend the understanding of high-energy-density matter, in particular the conditions expected in heavy-ion collisions. In order to carry out these experiments, several test beam campaigns have been performed at different locations, such as SIS-100 (GSI), AGS (BNL), and SPS (CERN). These campaigns have led to various data sources, e.g., standard VME modules at the CBM test beam at SIS-100 (GSI) via FIBI boards, or via USB interface.

The data acquisition framework (DAQ) is able to collect events and store events with various trigger levels running on Linux PC’s. CBM DAQ is also implemented on the instrumental setup at SPS (CERN) which is based on standard VME modules. The CERN testbeam is a perfect testbed for several DAQ configurations. The CBM DAQ protocol has been integrated into the general CBM framework to store data in a multi-threaded approach. Simultaneous data from different systems can be collected on a single computer.

CBM online monitoring is based on the GSI DUM framework which cannot currently store VME data via sockets. This paper presents data from SPS CERN online data stream. A DAQ analysis framework has been implemented to process raw data in real-time. The paper discusses the implementation of components at the detector level and their integration into the detector system. The implemented DAQ will be integrated into the combined slow control DCS of all devices.

DABC Data acquisition software

DABC features

- Based on C++ and Linux
- Multi-threaded data-flow core
- Software objects and connections of a typical DABC node run in parallel on one or more processors
- Runtime configuration with XML files
- Implement data transport: TCP/IP, UDP/IP, InfiniBand, ...
- Supports set-up of high-speed building
- Interface to the GSI Multi Branch System framework MBS (VME-bus...)
- Implements DCM (optional DCM/EPICS) for system control access http://dabc.gsi.de

Online analysis with GO4 framework

GO4 (GSI Online Off-line Object Oriented) features

- C++ and ROOT based analysis framework
- Native support of Multi Branch System (MBS) data sources
- Online monitoring with interactive live display at DABC data sockets
- Offline analysis from file possible with same code (GUI or batch mode)
- Analysis performs subsequent data generations (“analysis steps”)
- Complete set of analysis tools for different detectors
- Common CBM DAQ code components reusable for different test set-ups
- Modular code development by participating subdetector experts

CBM experiment

SFP

electrons-proton neutral

- Prototype testing with beam is required!