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LHCb Online event processing and filtering

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The first level trigger of LHCb accepts 1 MHz of events per second. After preprocessing in custom FPGA-based boards these events are distributed to a large farm of PC-servers using a high-speed Gigabit Ethernet network. Synchronisation and event management is achieved by the Timing and Trigger system of LHCb. Due to the complex nature of the selection of B-events, which are the main interest of LHCb, a full event-readout is required. Event processing on the servers is parallelised on an event basis. The reduction factor is typically 1 / 500. The remaining events from all farm-nodes are forwarded to a formatting layer, where the raw data files are formed and temporarily stored. A small part of the events is also forwarded to a dedicated farm for calibration and monitoring. The files are subsequently shipped to the CERN Tier0 facility for permanent storage and from there to the various Tier1 sites for reconstruction. In parallel files are used by various monitoring and calibration processes running within the LHCb Online system. The entire dataflow is controlled and configured by means of a SCADA system and several databases. After an overview of the LHCb data acquisition and its design principles this paper will emphasize the LHCb event filter system, which is now implemented using the final hardware and will be ready for data-taking for the LHC startup. Control, configuration and security aspects will also be discussed.

Submitted on behalf of Collaboration (ex, BaBar, ATLAS)

LHCb Online

Primary author: Dr NEUFELD, Niko (CERN)

Presenter: Dr NEUFELD, Niko (CERN)

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