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A New Event Builder for CMS Run II

Tuesday, April 14, 2015 3:00 PM (15 minutes)

The data acquisition system (DAQ) of the CMS experiment at the CERN Large Hadron Collider (LHC) assembles events at a rate of 100 kHz, transporting event data at an aggregate throughput of 100 GB/s to the high-level trigger (HLT) farm. The DAQ system has been redesigned during the LHC shutdown in 2013/14. The new DAQ architecture is based on state-of-the-art network technologies for the event building. For the data concentration, 10/40 Gb/s Ethernet technologies are used together with a reduced TCP/IP protocol implemented in FPGA for a reliable transport between custom electronics and commercial computing hardware. A 56 Gb/s Infiniband FDR CLOS network has been chosen for the event builder with a throughput of 4 Tb/s. This paper will discuss the software design, protocols and optimizations for exploiting the hardware capabilities. We will present performance measurements from small-scale prototypes and from the full-scale production system.

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