

The DAQ Debugger for iFDAQ of the COMPASS Experiment

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Abstract : In general, state-of-the-art Data Acquisition Systems (DAQ) in high energy physics experiments must satisfy high requirements in terms of reliability, efficiency and data rate capability. This paper presents the development and deployment of a debugging tool named DAQ Debugger for the intelligent, FPGA-based Data Acquisition System (iFDAQ) of the COMPASS experiment at CERN. Utilizing a hardware event builder, the iFDAQ is designed to be able to readout data at the average maximum rate of 1.5 GB/s of the experiment. In complex softwares, such as the iFDAQ, having thousands of lines of code, the debugging process is absolutely essential to reveal all software issues. Unfortunately, conventional debugging of the iFDAQ is not possible during the real data taking. The DAQ Debugger is a tool for identifying a problem, isolating the source of the problem, and then either correcting the problem or determining a way to work around it. It provides the layer for an easy integration to any process and has no impact on the process performance. Based on handling of system signals, the DAQ Debugger represents an alternative to conventional debuggers provided by most integrated development environments. Whenever problem occurs, it generates reports containing all necessary information important for a deeper investigation and analysis. The DAQ Debugger was fully incorporated to all processes in the iFDAQ during the run 2016. It helped to reveal remaining software issues and improved significantly the stability of the system in comparison with the previous run. In the paper, we present the DAQ Debugger from several insights and discuss it in a detailed way.

Keywords : DAQ Debugger, data acquisition system, FPGA, system signals, Qt framework

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