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Run Control Software for the Upgrade of the ATLAS Muon to Central Trigger Processor Interface (MUCTPI)

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The Muon to Central Trigger Processor Interface (MUCTPI) of the ATLAS experiment at the Large Hadron Collider (LHC) at CERN is being upgraded for the next run of the LHC in order to use optical inputs and to provide full-precision information for muon candidates to the topological trigger processor (L1TOPO) of the Level-1 trigger system. The new MUCTPI is implemented as a single ATCA blade with high-end processing FPGAs which eliminate double counting of muon candidates in overlapping regions, send muon candidates to L1TOPO, and muon multiplicities to the Central Trigger Processor (CTP), as well as readout data to the data acquisition system of the experiment. A Xilinx Zynq System-on-Chip (SoC) with a programmable logic part and a processor part is used for the communication to the processing FPGAs and the run control system. The processor part, based on ARM processor cores, is running embedded Linux prepared using the framework of the Linux Foundation's Yocto project. The ATLAS run control software was ported to the processor part and a run control application was developed which receives, at configuration, all data necessary for the overlap handling and candidate counting of the processing FPGAs. During running, the application provides ample monitoring of the physics data and of the operation of the hardware.

Primary authors: KIRK, Julie Hart (STFC-Rutherford Appleton Laboratory (GB)); SPIWOKS, Ralf (CERN)

Presenter: SPIWOKS, Ralf (CERN)

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