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Using FPGA-based AMC Carrier Boards for FMC to Implement Intelligent Data Acquisition Applications in MTCA.4 Systems using OpenCL

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The MTCA.4 standard is widely used in developing advanced data acquisition and processing solutions in the big physics community. The number of applications implemented using commercial MTCA AMC cards using XILINX and IntelFPGA systems on chips is growing due to the flexibility and scalability of these reconfigurable hardware devices and their suitability to implement intelligent applications using artificial intelligence and machine learning techniques. Firstly, the contribution presents the design methodologies proposed by IntelFPGA and XILINX and the software/hardware setups needed for the development phase. Manufacturers are developing solutions that cover not only the hardware part but also the integration with advanced Linux platforms. Secondly, it develops how to interface FMC-based ADCs modules to the PL logic, how to process the data acquired using OpenCL, and how to interface with the EPICS software layer using the ITER Nominal Device Support framework. The contribution focuses on: the advantages and drawbacks of the hardware reference designs for SoC-based and PCIe designs; the methodologies proposed by manufacturers to implement the applications; how the reference designs have been applied to develop data acquisition and processing applications using two AMC from NAT Europe (one based on IntelFPGA Arria 10, and another one based on XILINX ZynqMP).

Minioral

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No

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