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The ReadoutCard userspace driver for the new ALICE O2 computing system

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The ALICE (A Large Ion Collider Experiment) experiment focuses on the study of the quark-gluon plasma as a product of heavy-ion collisions at the CERN LHC (Large Hadron Collider). During the Long Shutdown 2 of the LHC in 2019-2020, a major upgrade is underway in order to cope with a hundredfold input data rate increase with peaks of up to 3.4 TB/s. This upgrade includes the new Online-Offline computing system called O2.

The O2 readout chain runs on commodity Linux servers equipped with custom PCIe FPGA-based readout cards; the PCIe v3 x16, Intel Arria 10-based CRU (Common Readout Unit) and the PCIe v2 x8, Xilinx Vertex6-based CRORC (Common ReadOut Receiver Card). Access to the cards is provided through the O2 ReadoutCard userspace driver which handles synchronisation and communication for DMA transfers, provides BAR access, and facilitates card configuration and monitoring. The ReadoutCard driver is the lowest-level interface to the readout cards within O2 and is in use by all central systems and detector teams of the ALICE experiment.

This communication presents the architecture of the driver, and the suite of tools used for card configuration and monitoring. It also discusses its interaction with the tangent subsystems within the O2 framework.

Minioral

Yes

IEEE Member

No

Are you a student?

No

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