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Online processing in the ALICE DAQ - The Detector Algorithms

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ALICE (A Large Ion Collider Experiment) is the heavy-ion detector designed to study the physics of strongly interacting matter and the quark-gluon plasma at the CERN Large Hadron Collider (LHC). Some specific calibration tasks are performed regularly for each of the 18 ALICE sub-detectors in order to achieve most accurate physics measurements. These procedures involve events analysis in a wide range of experimental conditions, implicating various trigger types, data throughputs, electronics settings, and algorithms, both during short sub-detector standalone runs and long global physics runs.

A framework was designed to collect statistics and compute some of the calibration parameters directly online, using resources of the Data Acquisition System (DAQ), and benefiting from its inherent parallel architecture to process events. This system has been used at the experimental area for one year, and includes more than 30 calibration routines in production.

This paper describes the framework architecture and the synchronization mechanisms involved at the level of the Experiment Control System (ECS) of ALICE. The software libraries interfacing detector algorithms (DA) to the online data flow, configuration database, experiment logbook, and offline system are reviewed. The test protocols followed to integrate and validate each sub-detector component are also discussed, including the automatic build system and validation procedures used to ensure a smooth deployment.

The offline post-processing and archiving of the DA results is covered in a separate paper.

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