

Support for Online Calibration in the ALICE HLT Framework

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ALICE (A Large Heavy Ion Experiment) is one of the four major experiments at the Large Hadron Collider (LHC) at CERN. The High Level Trigger (HLT) is an online compute farm, which reconstructs events measured by the ALICE detector in real-time. The HLT uses a custom online data-transport framework to distribute the data and the workload among the compute nodes. ALICE employs subdetectors sensitive to environmental conditions such as pressure and temperature, e.g. the Time Projection Chamber (TPC). A precise reconstruction of particle trajectories requires the calibration of these detectors. Performing the calibration in real time in the HLT improves the online reconstructions and renders certain offline calibration steps obsolete, speeding up offline physics analysis. For LHC Run 3, starting in 2020 when data reduction will rely on reconstructed data, online calibration becomes a necessity. In order to run the calibration online, the HLT now supports the processing of tasks that typically run offline. These tasks run massively parallel on all HLT compute nodes, their output is gathered and merged periodically. The calibration results are both stored offline for later use and fed back into the HLT chain via a feedback loop in order to apply calibration information to the track reconstruction. Online calibration and feedback loop are subject to certain time constraints in order to provide up-to-date calibration information and they must not interfere with ALICE data taking. Our approach to run these tasks in asynchronous processes enables us to separate them from normal data taking in a way that makes it failure resilient. We performed a first test of online TPC drift time calibration under real conditions during the heavy-ion run in December 2015. We present an analysis and conclusions of this first test, new improvements and developments based on this, as well as our current scheme to commission this for production use.

Tertiary Keyword (Optional)

Reconstruction

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Distributed data handling

Primary Keyword (Mandatory)

DAQ

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