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O2: a new combined online and offline > computing for ALICE after 2018

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for the ALICE O2 Collaboration

ALICE (A Large Ion Collider Experiment) is a heavy-ion detector studying the physics of strongly interacting matter and the quark-gluon plasma at the CERN LHC (Large Hadron Collider).

After the second long shutdown of the LHC, the ALICE detector will be upgraded in order to make high precision measurements of rare probes at low p_T , which cannot be selected with a trigger, and therefore require a large sample of events recorded on tape. The online computing system will be entirely redesigned to address the major challenge of sampling the full 50 kHz Pb-Pb interaction rate increasing by a factor 100 the present limit. This upgrade will also include the continuous un-triggered read-out of two detectors (ITS and TPC) producing a sustained throughput of 1 TB/s.

This unprecedented data volume will be reduced by an entirely new strategy including the online calibration and reconstruction which will result in storing only the reconstruction results and discarding the raw data. This system, demonstrated in production on the TPC data since 2011, will have to be optimized for the online usage of reconstruction algorithms. It implies much tighter coupling between online and offline computing systems.

We present in this paper the R&D program put in place to address this huge challenge and the first results of this program.

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