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Commissioning CMS online reconstruction with GPUs

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Building on top of the multithreading functionality that was introduced in Run-2, the CMS software framework (CMSSW) has been extended in Run-3 to offload part of the physics reconstruction to NVIDIA GPUs. The first application of this new feature is the High Level Trigger (HLT): the new computing farm installed at the beginning of Run-3 is composed of 200 nodes, and for the first time each one is equipped with two AMD Milan CPUs and two NVIDIA T4 GPUs. In order to guarantee that the HLT can run on machines without any GPU accelerators - for example as part of the large scale Monte Carlo production running on the grid - the HLT reconstruction has been implemented both for NVIDIA GPUs and for traditional CPUs.

CMS has undertaken a comprehensive validation and commissioning activity to ensure the successful operations of the new HLT farm and the reproducibility of the physics results while using either of the two implementations: some have taken place offline, on dedicated Tier-2 centres equipped with NVIDIA GPUs; other activities ran online during the LHC commissioning period, after installing GPUs on few of the nodes from the Run-2 HLT farm. The final steps were the optimisation of the HLT configuration, after the installation of the new HLT farm.

This contribution will describe the steps taken to validate the GPU-based reconstruction and commission the new HLT farm, leading to the successful data taking activities after the LHC Run-3 start up.

Significance

References

Experiment context, if any

CMS Collaboration

Primary author: CMS COLLABORATION

Presenters: CMS COLLABORATION; HUWILER, Marc (University of Zurich (CH))

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