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The Introduction of Heterogeneous Computing Platforms into the ATLAS Trigger at CERN

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Abstract content
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The ATLAS detector at CERN is undergoing upgrades with a view to running at maximum design luminosity in 2022. The increase in luminosity implies either an increased data production rate, or decreased signal-to-noise ratio, or both concurrently. The luminosity increase therefore necessitates an upgrade of existing computing platforms, specifically in the ATLAS Trigger system. To address this problem, the GPU Demonstrator team at CERN is conducting research regarding the integration of Graphics Processing Units (GPU) into the ATLAS Trigger server farm. The ATLAS detector and its associated processing server farms, like the other detectors in the Large Hadron Collider (LHC), were conceived and implemented before general-purpose processing with GPU (GPGPU) was a viable option. As a result, the detector infrastructure (instrumentation, front-end hardware, software analysis packages) must be adapted, where possible, for parallelism in order to gain from the move into heterogeneous computing platforms. This paper describes some of the problems associated with this adaptation and their potential solutions.

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