



Contribution ID: 50

Type: **Poster presentation**

Preparing the Gaudi-Framework and the DIRAC-WMS for Multicore Job Submission

Monday, 14 October 2013 15:00 (45 minutes)

Due to the continuously increasing number of cores on modern CPUs, it is important to adapt HEP applications. This must be done at different levels: the software which must support parallelization and the scheduling has to differ between multicore and singlecore jobs. The LHCb software framework (GAUDI) provides a parallel prototype (GaudiMP), based on the multiprocessing approach. It allows a reduction of the overall memory footprint and a coordinated access to data via separated reader and writer processes. A comparison between the parallel prototype and multiple independent Gaudi jobs in respect to CPU-time and memory consumption will be shown. In the context of parallelization speedup is the most important metric, as it shows how software scales with the number of cores. It is influenced by many factors, due to software limitations like synchronization, but also due to hardware configurations, like frequency scaling. Those limitations and their dependencies will be discussed and the influence of hardware features will be evaluated, in order to forecast the spread in CPU-time. Furthermore, speedup must be predicted in order to find the limit beyond which the parallel prototype (GaudiMP) does not support further scaling. This number must be known as it indicates the point, where new technologies must be introduced into the software framework. In order to reach further improvements in the overall throughput, scheduling strategies for mixing parallel jobs can be applied. It allows overcoming limitations in the speedup of the parallel prototype. Those changes require modifications at the level of the workload management system (DIRAC). Results will be presented for the reconstruction, simulation and analysis software of the LHCb experiment.

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Session Classification: Poster presentations

Track Classification: Software Engineering, Parallelism & Multi-Core