

21st International Conference on Computing in High Energy and Nuclear Physics (CHEP2015)



Contribution ID: 165

Type: **oral presentation**

Running ATLAS workloads within massively parallel distributed applications using Athena Multi-Process framework (AthenaMP)

Tuesday, April 14, 2015 2:00 PM (15 minutes)

AthenaMP is a multi-process version of the ATLAS reconstruction and data analysis framework Athena. By leveraging Linux fork and copy-on-write, it allows the sharing of memory pages between event processors running on the same compute node with little to no change in the application code. Originally targeted to optimize the memory footprint of reconstruction jobs, AthenaMP has demonstrated that it can reduce the memory usage of certain configurations of ATLAS production jobs by a factor of 2. AthenaMP has also evolved to become the parallel event-processing core of the recently developed ATLAS infrastructure for fine-grained event processing (Event Service) which allows to run AthenaMP inside massively parallel distributed applications on hundreds of compute nodes simultaneously. We present the architecture of AthenaMP, various strategies implemented by AthenaMP for scheduling workload to worker processes (for example: Shared Event Queue and Shared Distributor of Event Tokens) and the usage of AthenaMP in the diversity of ATLAS event processing workloads on various computing resources: Grid, opportunistic resources and HPC.

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Session Classification: Track 2 Session

Track Classification: Track2: Offline software