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Geant4 simulation in a distributed computing environment

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The quantitative results of a study concerning Geant4 simulation in a distributed computing environment (local farm and LCG GRID) are presented. The architecture of the system, based on DIANE, is presented; it allows to configure a Geant4 application transparently for sequential execution (on a single PC), and for parallel execution on a local PC farm or on the GRID. Quantitative results concerning the efficiency of the system, overheads introduced by the DIANE system, latency for job execution and the optimisation of the job configuration (number of nodes and tasks) are presented. The quantitative results concern two typical experimental use cases studied in the project: 1) time-consuming simulations requiring "quasi-online" response of the order of a few minutes (e.g. studies required for detector design optimisation), and 2) high statistics, high-precision, computing-intensive simulations (e.g. simulation productions for physics studies). To our knowledge, this study represents the first quantitative evaluation of Geant4 simulation applications in real-life distributed computing environments, and comparison of simulation applications in a PC farm or on the GRID.

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