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Efficient job handling in the GRID: short deadline, interactivity, fault tolerance and parallelism

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The major GRID infastructures are designed mainly for batch-oriented computing with coarse-grained jobs and relatively high job turnaround time. However many practical applications in natural and physical sciences may be easily parallelized and run as a set of smaller tasks which require little or no synchronization and which may be scheduled in a more efficient way. The Distributed Analysis Environment Framework (DIANE), is a Master-Worker execution skeleton for applications, which complements the GRID middleware stack. Automatic failure recovery and task dispatching policies enable an easy customization of the behaviour of the framework in a dynamic and non-reliable computing environment. We demonstrate the experience of using the framework with several diverse real-life applications, including Monte Carlo Simulation, Physics Data Analysis and Biotechnology.

The interfacing of existing sequential applications from the point of view of non-expert user is made easy, also for legacy applications. We analyze the runtime efficiency and load balancing of the parallel tasks in various configurations and diverse computing environments: GRIDs (LCG, Crossgrid), batch farms and dedicated clusters. In practice, the usage of ther Master/Worker layer allows to dramatically reduce the job turnaround time, a scenario suitable for short deadline jobs and interactive data analysis.

Finally it is also possible to easily introduce more complex synchronization patterns, beyond trivial parallelism, such as arbitrary dependency graphs (including cycles, in contrast to DAGs) which may be suitable for bio-informatics applications.

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