A Hyper-heuristic for scheduling independent jobs in Computational Grids.

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Abstract

We will present the design and implementation of an hyper-heuristic for efficiently scheduling independent jobs in Computational Grids. An efficient scheduling of jobs to Grid resources depends on many parameters, among others, the characteristics of the Grid infrastructure as well as on job characteristics (such as computing capacity, consistency of computing, etc.). Existing ad hoc scheduling methods (batch and immediate mode) have shown their efficacy for certain types of Grids and job characteristics. However, they are not able to match the best Grid and job configuration while scheduling arriving jobs in the Grid system.

In this work we have designed and implemented a hyper-heuristic that uses a set of ad hoc (immediate and batch mode) scheduling methods to provide the best scheduling of jobs to Grid nodes according to the Grid and job characteristics. By examining the state and characteristics of the Grid, the hyper-heuristic is able to find the planning of jobs to Grid resources that minimizes both the makespan and flowtime of the system. The Hyper-heuristic has been tested and evaluated using a standard benchmark of instances as well as a prototype of a simulator.