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A DISCRETE PARTICLE SWARM OPTIMIZATION APPROACH FOR GRID JOB SCHEDULING

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Abstract. *Scheduling is one of the core steps to efficiently exploit the capabilities of emergent computational systems such as grid. Grid environment is a dynamic, heterogeneous and unpredictable one sharing different services among many different users. Because of heterogeneous and dynamic nature of grid, the methods used in traditional systems could not be applied to grid scheduling and therefore new methods should be looked for. This paper represents a discrete Particle Swarm Optimization (DPSO) approach for grid job scheduling. PSO is a population-based search algorithm based on the simulation of the social behavior of bird flocking and fish schooling. Particles fly in problem search space to find optimal or near-optimal solutions. In this paper, the scheduler aims at minimizing makespan and flowtime simultaneously in grid environment. Experimental studies illustrate that the proposed method is more efficient and surpasses those of reported meta-heuristic algorithms for this problem.*
Keywords: Grid computing, Scheduling, Makespan, Flowtime, Particle swarm optimization

1. **Introduction.** Grid computing has emerged as an important new field, distinguished from conventional distributed computing by its focus on large-scale resource sharing, innovative applications and in some cases, high-performance orientation [1]. Grid is composed of a set of virtual organizations (VOs). Each VO has its various resources and services, and on the basis of its policies provides access to them and hence grid resources and services are much different and heterogeneous, and are distributed in different geographically areas. At any moment, different resources are added to or removed from grid, and as a result, grid environment is highly dynamic.

Grid resources are registered within one or more Grid Information Services (GISs). The end users submit their requests to the Grid Resource Broker (GRB). Different requests demand different requirements and available resources have different capabilities. GRB discovers proper resources for executing these requests by querying in GIS and then schedules them on the discovered resources.