# Design and Implementation of a Parallel Ant System for Task Matching and Scheduling


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**ABSTRACT**

PC clusters have recently received much attention as cost-effective parallel platforms for scientific computations. A parallel program, which can be executed on a target cluster system, generally consists of a set of tasks (i.e. program segments). To effectively harness the computing power of the target cluster system, techniques for task matching and scheduling becomes vital important. In this dissertation, a parallel algorithm based on the Fast Ant System (FANT) is proposed. This algorithm, namely FANT-TMS, concentrates on properly allocating the tasks to the processing elements of the cluster system and sequencing the execution of the tasks. FANT-TMS is different from the previously proposed approaches in twofold. First, it employs an indirect representation scheme to represent a solution of the original problem. Second, it couples a local search procedure with a mechanism to improve the performance. FANT-TMS is evaluated through a comparison with the genetic algorithm (GA) based scheduling technique in terms of overall execution time of the parallel program. Simulation results show the efficiency and effectiveness of the proposed algorithm. With regarded to the performance of the proposed local search algorithm, these experimental results also demonstrate that significant improvement over existing methods (such as FASTEST and TASK) can be obtained.



Keywords : PC clusters ; Task matching and scheduling ; Ant system ; Local Search ; Genetic Algorithms


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