Efficient Scheduling of Task Graphs to Multiprocessors Using a Simulated Annealing Algorithm

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ABSTRACT

Given a parallel program modeled by a directed graph (DAG), the problem of scheduling the tasks of the program to multiprocessors has been proven to be NP-complete. For this reason, heuristics are usually used to tackle the scheduling problem. But the existing heuristic methods have many disadvantages, such as high time complexity, lack of scalability and no performance guarantee with respect to optimal solutions. To overcome or weaken these defects, in this paper, we employ a stochastic search technique in list scheduling and propose a simulated annealing algorithm for task scheduling (SATS). We also devise a novel topological sorting algorithm, stochastic topological sorting algorithm (STS), to generate an initial scheduling list. Our experiment results show that by setting control parameters properly, the proposed performs better than other heuristic algorithms, with affordable running time.