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HETEROGENEOUS MULTIPROCESSOR TASK SCHEDULING USING GENETIC AND SIMULATED ANNEALING ALGORITHMS AND THEIR HYBRIDIZATION

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ABSTRACT

In a heterogeneous multiprocessor system, a large program is decomposed into a set of tasks that have data dependencies. The most important problem, which is encountered in such systems, is task matching and scheduling. It consists of assigning tasks to processors, ordering task execution for each processor, and ordering interprocessor data transfers. The goal is to schedule all the tasks on the available processors so as to minimize the overall length of time required to execute the entire program without violating precedence constraints. This efficient scheduling reduces processing time and increases processor utilization, i.e. achieves high performance. This paper studies a previously developed problem-space genetic algorithm (PSGA)-based technique for task matching and scheduling on a heterogeneous multiprocessor system, and modifies it to mitigate its drawbacks. The modified algorithm is called MPSGA. Then, the paper presents a proposed Simulated Annealing (SA)-based task scheduling algorithm. Finally, it presents a proposed hybrid task scheduling algorithm that combines the proposed SA with MPSGA, which is called MPSGA_SA. Experiments have been conducted to evaluate the performance of the proposed scheduling techniques.

KEYWORDS: Heterogeneous Computing, Matching, Scheduling, Genetic Algorithms, Simulated Annealing