A fast predictive algorithm with idle reduction for heterogeneous system scheduling

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Abstract

We propose a distributed task scheduling algorithm called Predict and Arrange Task Scheduling (PATS) algorithm that achieves low time complexity with minimum scheduling length. The proposed algorithm constitutes two steps: level-based task scheduling by using earliest finish time candidate task list and idle slot reduction. In the first step, tasks are arranged in hierarchy to the one having expected slowest completion to be scheduled on the processing units one level at a time. In the second step, the idle time slots are minimized. To test the robustness of the algorithm unbiasedly, we conduct a two-part experiment. In the first part, the original set up of dependent task graphs with their corresponding weights are tested using comparative algorithms. In the second part, testing is performed on dependent task graphs being created from real world applications with randomly generated computation and communication weights. The results show that PATS algorithm yields greater average scheduling length ratio, running time, and efficiency than comparative algorithms.

Keywords: Task graph, Heterogeneous systems, Algorithm running time, Scheduling length