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Fair-IHEFT:A fairness-aware algorithm for multi-workflow scheduling in High Performance Computing Environment

Devising a multi-workflow scheduling algorithm is paramount to explore high performance from High Performance Computing Environment. In this article, we propose a new list scheduling algorithm taking fairness into consideration for assigning multi-workflow to heterogeneous processors. The proposed algorithm, a Fairness-aware Improved HEFT (Fair-IHEFT) algorithm is devised to schedule multiple workflows to optimality while minimizing the scheduling length by calculating task prioritization based on workflow structure. The experiments based on the workflows of four real-world applications show that the Fair-IHEFT algorithm significantly outperforms previous list scheduling algorithm in terms of makespan, fairness, makespan standard deviation, and frequency of best results. Additionally, job runtime is a crucial parameter for scheduling algorithms. To obtain accurate job runtime, we propose a job runtime prediction framework that can integrate a variety of machine learning algorithms to predict job runtime.

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