An Adaptive Space-Sharing Scheduling Algorithm for PC-Based Cluster

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Abstract: In recent years, PC-based cluster has become a mainstream branch in high performance computing (HPC) systems. Like other systems supporting HPC, one of the most important concerns in PC-based cluster is how to improve response time, throughput, and utilization. Therefore, scheduling can have a significant impact on performance characteristics of the system. This paper focuses on building an adaptive scheduling algorithm for Supernode II, a PC-based cluster built at HCMC University of Technology. Based on characteristics of the system and running jobs, the adaptive space-sharing scheme has many advantages compare to other solutions. The proposed scheduling algorithm for Supernode II is an improvement over other existing adaptive space-sharing solutions. The algorithm includes two main parts: a function to calculate number of processors allocated for jobs (partitioning-function) and rules to select jobs to be executed (job-selecting rules). The partitioning-function creates partitions for jobs adapting to the current system status and satisfying the requirement of jobs. In combination with the partitioning-function, job-selecting rules will help improving system utilization, reducing resource fragmentation, preventing indefinite postponement and getting a fair-share between jobs. Although the algorithm is specially built for Supernode II, we prove that it is suitable for other PC-based clusters with the similar characteristics.

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