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A scalable clustering-based task scheduler using DAG partitioning

Abstract: When scheduling a directed acyclic graph (DAG) of tasks with computational costs on computational platforms, a good trade-off between load balance and data locality is necessary. List-based scheduling techniques are commonly used greedy approaches for this problem. The downside of list-scheduling heuristics is that they are incapable of making short-term sacrifices for the global efficiency of the schedule. In this talk, I will describe new list-based scheduling heuristics based on clustering for homogeneous platforms, under the realistic duplex single-port communication model. An acyclic partitioner for DAGs is used for the clustering phase. The clustering enhances the data locality of the scheduler with a global view of the graph. Furthermore, since the partition is acyclic, we can schedule each part completely once its input tasks are ready to be executed. I will present an extensive experimental evaluation showing the trade-offs between the granularity of clustering and the parallelism, and how this affects the scheduling. Furthermore, I will compare our heuristics to the best state-of-the-art list-scheduling and clustering heuristics: we obtain more than three times better makespan in cases with many communications.