

A Communication-Ordered Task Graph Allocation Algorithm

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Abstract

The inherently asynchronous nature of the data flow computation model allows the exploitation of maximum parallelism in program execution. While this computational model holds great promise, several problems must be solved in order to achieve a high degree of program performance. The allocation and scheduling of programs on MIMD distributed memory parallel hardware, is necessary for the implementation of efficient parallel systems. Finding optimal solutions requires that maximum parallelism be achieved consistent with resource limits and minimizing communication costs, and has been proven to be in the class of NP-complete problems. This paper addresses the problem of static allocation of tasks to distributed memory MIMD systems where simultaneous computation and communication is a factor. This paper discusses similarities and differences between several recent heuristic allocation approaches and identifies common problems inherent in these approaches. This paper presents a new algorithm scheme and heuristics that resolves the identified problems and shows significant performance benefits.