Parallel Branch-and-Bound Methods for the Job Shop Scheduling

Job-shop scheduling (JSS) problems are among the more difficult to solve in the class of NP-complete problems. The only successful approach has been branch-and-bound based algorithms, but such algorithms depend heavily on good bound functions. Much work has been done to identify such functions for the JSS problem, but with limited success. Even with recent methods, it is still not possible to solve problems substantially larger than 10 machines and 10 jobs. In the current study, we focus on parallel methods for solving JSS problems. We implement two different parallel branch-and-bound algorithms for JSS on a 16-processor MEIKO computing surface with Intel i860 processors and perform extensive computational testing using classical publicly available benchmark problems. The parallel part of one of the implementations is based on a similar parallel code for quadratic assignment problems. Results are reported for different branching rules proposed in the literature.