

Optimal Deterministic and Stochastic Resource Allocation in a Distributed System

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In real life the duration time of project activities very often cannot be estimated correctly. Especially in research and development programs where the duration time of activities is very slightly known and the ex ante and ex post duration times are often different. [4],[6]

In the paper a new algorithm is introduced by which an optimal resource allocation with minimal total cost for any arbitrary project could be determined. This algorithm could hopefully be widely used in project management, resource planning and in the methodology of small-scale series production management [5],[6].

In this paper a distributed problem solving environment is also introduced that implements the above mentioned optimal resource allocation algorithm with a parallel branch and bound method. The system is built on the Jini technology [3]. It is a dynamic, service-oriented infrastructure that utilizes spare cycles of networked workstations in an efficient way and solves computation intensive problems more easily due to the parallelization.

In our system we use a parallel B&B that can significantly decrease the computation time or can achieve more accurate result in the same time. Moreover, the distribution of the task to different computation sites will result in lower resource (e.g. CPU, memory) consumption at each site, thus can make a problem solvable that was unsolvable on a single machine because of the resource limitations. At a certain class of applications (e.g. at the ones needing many synchronization and inter-process communication) the parallelization does not decrease, rather increase the execution time, but the benefit of resource sharing can be more important. The parallelization issues of the B&B algorithm were discussed in many papers [1],[2], the one that we use in our distributed problem solving environment is also the result of our research.

References

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