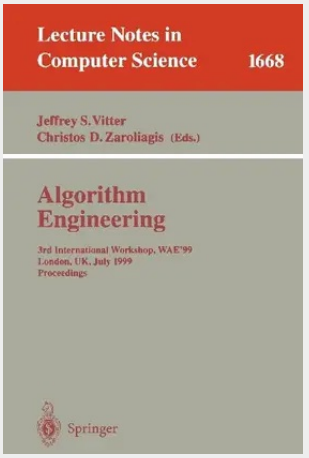
Vitter / Zaroliagis

Algorithm Engineering



This work considers practical parallel list-ranking algorithms. The model for which programs are written is a single-program multiple-data (SPMD) \bri- ingmodel". Thismodel isdesignated asa programmer'smodelfora ne-grained computation framework called Explicit Multi-Threading (XMT), which was - troduced in [VDBN98]; the XMT framework covers the spectrum from al- rithms through architecture to implementation; it is meant to provide a pl- form for faster single-task completion time by way of instruction-level par- lelism (ILP). The performance of XMT programs is evaluated as follow: the performance of a matching optimized XMT assembly code is measured within an XMT execution model. (We use in the current paper the so-called Spawn- MT programmingmodel - the easier to implement amongthe two programming modelspresented in[VDBN98]). The XMT approach deviatesfromthe standard PRAM approach by incorporating reduced synchrony and departing from the lock-step structure in its so-called asynchronous mode. Our envisioned platform uses an extension to a standard serial instruction set. This extension e ciently implements PRAM-style algorithms using explicit multi-threaded ILP, which allows considerably more n e-grained parallelism than the previously studied parallel computing implementation platforms/models. The list ranking problem was the rst problem considered as we examined and re ned many of the concepts in the XMT framework. The problem arises in parallel algorithmson lists, trees and graphs and is considered a fundamental problemin the theory of parallelalgorithms. Experimental results are presented.

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