

Foreword to the Special Issues

Current and future generation computer systems are aggressively pursuing additional opportunities for boosting performance via parallelism. Even though coarse grain systems are increasingly viewed as solutions for the slow down of the technology curve, attention should still be paid to the individual processor, or “building block,” to attain good overall performance. Facing the challenge of exploiting fine and medium grain parallelism, a simple “instruction set” may not be sufficient as a binding contract between architects and compiler writers.

The papers in these issues were selected from among the best submissions to *PACT '96*, the *Fourth International Conference on Parallel Architectures and Compilation Techniques*, and critically reviewed. Final versions of the papers, as they appear in print, are extended with novel material and further details which could not fit within the limited framework of a conference proceedings. As such, they contain valuable information not available elsewhere.

The topics of these seven papers span the spectrum from low level micro-architecture to dynamic (run-time) parallelization. Two papers focus on the branch prediction problem in micro-architecture. Chang *et al.* propose a method whereby the pattern history table update is turned off for easily predictable branches so as to reduce the pattern history table interference. Jourdan *et al.* describe and evaluate the design of a recovery mechanism for mispredicted-path execution.

Three papers discuss various aspects of multithreaded execution. Hendren *et al.* describe the compiler for EARTH-C, a simple parallel dialect of C. The compilation strategy includes a thread generation strategy based on list scheduling aimed at minimizing the number of threads and scheduling remote operation early. Newburn and Shen describe the PEDIGREE compiler which uses the program dependence graph to extract fine and coarse grain parallel execution threads from an assembly program. A thread migration mechanism, Nomadic Threads, is described and evaluated by Jenks and Gaudiot.

A run-time parallelization technique, called dynamic resolution, is described by Huelsbergen and evaluated in the context of destructive DAG manipulation. AG is an adaptive granularity communication mechanism that implements two separate protocols for small and large data transfers. It is described and evaluated by Park *et al.*

We sincerely hope these issues are of value to you. If the fields of parallel architectures and compilation are of interest to you, we suggest you follow the PACT series of conferences. You may find them to be informative and worthwhile. Additional information on *PACT '97* can be found at URL: <http://redhook.llnl.gov/isrc/projects/crg/pact97/index.html>

Our gratitude goes to the many reviewers who contributed from their time to read the papers and suggest improvements, on a very tight schedule. Also, we thank Alex Nicolau, who suggested the idea for this special issue. Last but not least, we offer our congratulations to the authors whose papers you are about to read. Their work has been rated as the best, and they should be proud of it.

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