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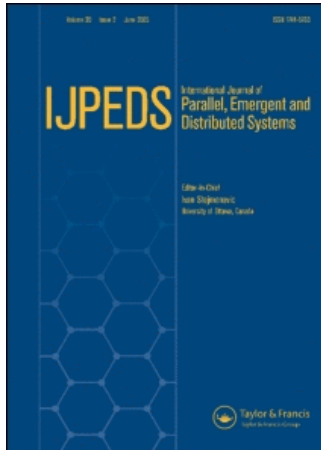
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Editorial

Special issue: Applied parallel computing

1. Introduction

Simulation problems are typically very compute intensive and, therefore, it is not surprising that numerical simulation algorithms constitute the bulk of the workload at the supercomputing centers worldwide. Many of these applications can only be performed on highly parallel systems and require the careful tuning and optimization to keep the runtimes as low as possible. However, the program parallelization on a multiprocessor is only one of several issues. With modern processors and deep hierarchical memory architectures, exploiting the instruction level parallelism of modern CPU architectures and techniques for improving the cache-performance have become increasingly important to maintaining a high efficiency. The performance tuning of complex simulation algorithms and exploiting advanced supercomputer architectures for demanding applications is, therefore, a very active research area.

This special issue collects six papers on the topic of applied parallel computing, as presented in preliminary form in a workshop on Parallel Applications held within the 18th Symposium on Simulation Techniques, September 12–14, 2005 at University of Erlangen-Nürnberg.

The papers in this special issue cover several topics of current high performance computing research. Haase, Liebmann, and Planck present a paper to address non-standard ordering strategies for iterative sparse matrix solvers, Göddecke, Strzodka, and Turek discuss a mixed precision iterative finite element solver as motivated by, e.g. the use of graphics cards for finite element calculations, and Blazy and Marquardt present their work on a parallel adaptive Navier–Stokes solver for computational fluid dynamics. The paper by Wenisch, van Treeck, Borrmann, Rank and Wenisch deals with computational steering, an issue that is also receiving increasing interest. Similarly, grid computing is currently considered as a hot topic and is discussed in the paper by Praxmarer and Kranzlmüller. The paper by Bergen, Wellein, Hülsemann, and Rüde finally deals with the parallelisation and performance tuning of a highly parallel multigrid finite element solver.

Ulrich Rüde and Frank Hülsemann