Mathematical Problems in Engineering

Special Issue on

Advances in High Performance Computing and Related Issues

CALL FOR PAPERS

Since computers have first appeared, their number of instructions per second approximately doubled every two years. Technology limits are nearly reached and it is not possible to increase the speed of the CPU any more even if the cost of energy growing exponentially is not an issue. Multicore and many-core paradigms solve this problem by introducing many cores instead of one resulting in paradigm shift from designing fastest single-core applications to parallelizing program execution. However, communication delays and energy consumption limit these paradigms as well.DataFlow paradigm naturally solves these problems by treating computer processing as factory production lines instead of one or many specialized workers. For special CPU-demanding and data-demanding applications, one can design data flow and program DataFlow computer accordingly.Until recently, DataFlow computer programmer would have to be a specialist in hardware. By noticing the advantage of pipelining execution of loops, industries have developed various tools that ease the process of transforming Von Neumann architecture applications into DataFlow applications.

However, programming DataFlow computer architectures comes with a cost, while it differs from programming control flow computer architectures, where programmer thinks only about executing instructions sequentially. In order to cope with data dependencies, redesigning algorithms is needed, requiring new mathematical models. As with other inventions, at the beginning, due to inertia, they are hard to accept, which is why redesigning algorithms is needed before many programmers change their programming preferences. As the percentage of DataFlow computers rises, it is to be expected that more and more algorithms will become available in open literature and later upgraded, as it is the case with related books, papers, and other materials.We invite authors to submit original research articles that seek to combine existing and new paradigms in order to achieve better execution performances, lower power consumption, and lower hardware costs. The software-based solutions are welcomed, as well.

Potential topics include, but are not limited to:

- Efficient handling of nondeterminism in dataflow architectures
- Overhead management in execution of an instruction cycle
- Dealing with applications with low degree of parallelism
- Security in SuperComputing and related issues
- Concepts and techniques that have been developed to both describe and implement the process of transforming programs written for Von Neumann architecture into alternative architectures
- Implementations of DataFlow applications and comparison of speed-up relative to control flow applications
- Architectures, simulators, system software, and applications tuned to new architectures

Authors can submit their manuscripts via the Manuscript Tracking System at http://mts.hindawi.com/submit/journals/mpe/adco/.

Lead Guest Editor
Veljko Milutinovic, University of Belgrade, Belgrade, Serbia
vm@etf.rs

Guest Editors
Borko Furht, Florida Atlantic University, Boca Raton, USA
bfurht@fau.edu

Zoran Obradovic, Center for Data Analytics and Biomedical Informatics, Philadelphia, USA
zoran.obradovic@temple.edu

Manuscript Due
Friday, 25 December 2015

First Round of Reviews
Friday, 18 March 2016

Publication Date
Friday, 13 May 2016