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IEEE SIGNAL PROCESSING MAGAZINE

Special Issue on Signal Processing on Platforms with Multiple Cores: Part 1 -- Overview and Methodology

Multi-core processors are now prevalent everywhere from desktops and graphics processors to laptops and embedded systems. Technology predictions indicate that this trend will continue and that there will be increasing numbers of cores (homogenous or heterogeneous) in future systems. It is clear that signal processing systems of tomorrow will be (and must be) implemented on platforms with multiple cores. This special issue is to address the principal technical trends and challenges of signal processing on systems with multiple/many cores.

While the challenges of designing multi-core systems in hardware are many, writing efficient parallel applications that utilize the computing capability of many processing cores may reveal to be even more challenging. Existing serial algorithms will need to be redesigned -- the best sequential algorithm is not necessarily the best parallel algorithm. Signal processing algorithm designers must understand the nuances of a multi-core computing engine. Only then can the tremendous computing power that such platforms provide be harnessed efficiently.

The intention of this special issue is to attract tutorial-style papers on (1) trends, fundamental driving forces, potential challenges of systems with multiple cores, and (2) software techniques and algorithmic modifications that are effective in performing signal processing on multiple cores. Possible topical areas include, but are not limited to, the following topics.

Scope of topics:

- Trends that will influence the future signal processing application design.
  - Survey of commercial processor trends
  - Survey of design and implementation of multi-core SoC/DSP/CPU/GPU architectures
  - Survey of programming support, e.g., languages and compilers
  - Survey of CAD support
- Design methodologies and examples of signal processing on multi-core systems.
  - Systematic methods to exploit multi-core architectures efficiently
  - Principles for design and optimization of algorithms for multi-core architectures
  - Emerging applications and usage models that are enabled by multi-core architectures
  - Design examples in important signal processing application areas, including multimedia, medical imaging, wireless communications, bio-medical signal processing, and genomics

Submission Procedure:

Prospective authors should submit white papers to the web submission system at http://www.ee.columbia.edu/spm/ according to the following timetable. The authors should first submit a white paper that summarizes the motivation, the significance of the topic, key takeaway messages, a brief history (important references if necessary), and an outline of the content. The white paper should be no more than 2 pages in the IEEE single-space double-column format.

Schedule (all deadlines are firm no exceptions)

White paper due:	December 15, 2008
Invitation notification:	January 15, 2008
Manuscript due:	March 22, 2009
Decision based on initial manuscript:	May 15, 2009
Revised manuscript due:	June 15, 2009
Acceptance notification:	July 7, 2009

Final manuscript due:	July 15, 2009
Publication date:	November, 2009

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