Scientific Programming

Special Issue on
Heterogeneous Systems for Scientific Computing: Architectures, Programming Models, and Applications

CALL FOR PAPERS

The need for higher performance and better energy efficiency in future exascale systems have given rise to heterogeneous computing platforms that integrate different types of computing elements, each optimized for a class of computations or a specific type of applications. Examples of such computing elements include multicores, Graphics Processing Units (GPUs), Field Programmable Gate Arrays (FPGAs), Digital Signal Processors (DSPs), and Application- Specific Integrated Circuits (ASICs). The heterogeneity poses several challenges: how to best integrate the computing elements, how to effectively and productively program the multiple interacting elements, and how to structure applications to better exploit the heterogeneous platforms.

This special issue of Scientific Programming aims to publish original, previously unpublished research results in the broad area of heterogeneous systems.

Potential topics include but are not limited to the following:

▶ Heterogeneous architectures for scientific computing, including novel architectures for integrating GPUs and FPGAs with multicore for performance and energy efficiency

▶ Application-specific architectures

▶ Customized architectures for scientific computing

▶ Programming models, paradigms, and tools for scientific and exascale computing

▶ Programming modes for heterogeneous systems

▶ Compilers, libraries, and runtime support for managing heterogeneity

▶ Domain specific languages in support of scientific computing/programming

▶ Virtualization of heterogeneous platforms in cloud and data center environments

▶ Novel applications and case studies that target heterogeneous platforms, drawn from domains such as machine learning, big data analytics, and scientific computing

▶ Workload characterization of scientific applications on heterogeneous platforms

▶ Performance modeling of algorithms and applications for heterogeneous systems

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