

MiniSymposium on Energy Aware Scientific Computing on Low Power and Heterogeneous Architectures

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Energy consumption is increasingly becoming one of the most relevant issue concerning the computing platforms for scientific applications and workloads. This has then required the use of energy-efficient processors, ranging from many-core architectures, like GP-GPU and Xeon-Phi, to Systems-on-Chip (SoCs). These processors feature a high performance-per-watt ratio, aimed on one side at energy efficiency, but requiring on the other side careful programming and optimization to provide high computing performance. Also off-the-shelf low-power Systems-on-Chip, originally designed for the embedded and mobile market, are becoming attractive for scientific and industrial applications given their increasing computing performance coupled with relatively low cost and low electrical power demand.

Scientific computing and mobile/embedded sectors, historically very isolated and confined to specific markets, are now experiencing a convergence under the driving forces of high computational power demands, power consumption limitations and cost effectiveness. The mini-symposium on “Energy Aware Scientific Computing on low power and heterogeneous architectures” provided a forum to discuss and share knowledge on developing, running and using computing systems based on low power, energy-efficient, and heterogeneous architectures. It originated from a collaboration between the COSA project (<http://www.cosa-project.it/>) funded by the Italian Institute for Nuclear Physics (INFN) and the ParCo2017 organizers. Seven contributions have been presented during a whole day (September, 13th) co-located with the ParCo2017 conference. Each presentation triggered active discussion among the attendees and presenters, allowing an interesting exchange of ideas and experiences on the mini-symposium topics.

The following contributions have been presented and six of them collected in the following pages:

- Multi-node advanced performance and power analysis with Paraver (F. Mantovani Invited speaker from the Barcelona Supercomputing Centre)
- Energy-efficiency evaluation of Intel KNL for HPC workloads (E. Calore University of Ferrara and Italian Institute for Nuclear Physics)
- Numerical relativity with many-core architectures (S. Bernuzzi - University of Parma and Italian Institute for Nuclear Physics)

- Large scale low power architectures computing system: status of ExaNeSt and EuroExa projects (P. Vicini - Italian Institute for Nuclear Physics)
- The brain on low power scalable architectures: efficient simulation of cortical slow waves and asynchronous states (A. Biagioni - Italian Institute for Nuclear Physics)
- The INFN COSA project experience on low power computing and storage (L. Morganti - Italian Institute for Nuclear Physics)

The mini-symposium program committee would like to thank all the speakers for the valuable contributions and the Parco2017 organizers for the having hosted this fruitful day of discussion on low power, energy aware and heterogeneous computing.