

Editorial for the special issue on Energy-aware high performance computing

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In 2010 we started the EnA-HPC conference series in order to bring researchers, vendors, and HPC center administrators together. Its purpose is to foster discussions regarding the status and future of energy awareness in high performance computing. Fields of interest cover all layers, from the lowest level of hardware technology, via operating system, compiler and application issues to facility technologies like air conditioning, sensor technology and heat reuse. After five successful conferences—2010 to 2012 in Hamburg and 2013/2014 in Dresden—EnA-HPC is taking a break in 2015. This special issue includes selected articles that have been submitted since the last event.

According to the U.S. Department of Energy 20 MW is a practical power limit for future Exaflop computers. A comprehensive effort at many levels is necessary to yield the overall energy reduction required to enable Exaflop computers that stay within this limit. Today's fastest supercomputer—Tianhe-2 (MilkyWay-2) installed at the National Super

Computer Center in Guangzhou—achieves a peak performance of 33.86 Petaflops in the Linpack benchmark using 3,120,000 cores. However, the required power input is about 17.8 MW. Thus, we are more than a factor of 25 away from our performance goal but today's technology already uses almost the entire acceptable power.

Energy efficiency has become an important aspect in HPC in recent years. This is for example reflected by the Green500 list that ranks HPC systems by their energy efficiency instead of their Linpack performance. Despite the continuous improvement in performance per watt, it is still a long way to go until Exaflop systems become feasible. This situation calls for an intensified research and more interdisciplinary collaboration in the field of Green IT. EnA-HPC will continue to further this development.

The organizers express their gratitude to all contributors to this journal. Their research efforts will render High Performance Computing economically and ecologically sustainable. We thank the program committee members as well as all reviewers for their efforts in selecting an attractive content for this journal.

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