Description

We will be ushering in an era with power and energy consumption as the primary concerns for scalable computing in the exascale era and beyond. To achieve viable high performance, revolutionary methods are required with a stronger integration among hardware features, system software and applications. Equally important are the capabilities for fine-grained spatial and temporal measurement and control to facilitate energy efficient computing across all layers. Current approaches for energy efficient computing rely heavily on power efficient hardware in isolation. However, it is pivotal for hardware to expose mechanisms for energy efficiency to optimize power and energy consumption for various workloads and to reduce data motion, a major component of energy use. At the same time, high fidelity measurement techniques, typically ignored in data-center level measurement, are of high importance for scalable and energy efficient inter-play in different layers of application, system software and hardware.

This workshop seeks to address important energy efficiency aspects in the HPC community that have not been previously addressed in the data center or cloud computing communities. Emphasis is given to the applications view related to significant energy efficiency improvements and to the required hardware/software stack that must include necessary power and performance measurement and analysis harnesses.

Current tools are often limited by hardware capabilities and their lack of information about the characteristics of a given workload/application. In the same manner, hardware techniques, like dynamic voltage frequency scaling, are often limited by their granularity (very coarse power management) or by their scope (a very limited system view). More rapid realization of energy savings will require significant increases in measurement resolution and optimization techniques. Moreover, the interplay between performance, power and reliability add another layer of complexity to this already difficult group of challenges.