

Sandia releases interface to help standardize supercomputer power and energy systems

November 12 2014



The High Performance Computing — Power Application Program Interface is intended to standardize and control power and energy features of high-performance computing systems.

To help moderate the energy needs of increasingly power-hungry supercomputers, researchers at Sandia National Laboratories have released an application programming interface (API) with the goal of standardizing measurement and control of power- and energy-relevant features for high-performance computing (HPC) systems.

The High Performance Computing—Power API specification, still open to [collaborators](#) for future development, is vendor-neutral in that it works on HPC products from any manufacturer, and has been vetted through reviews by other laboratories, universities and commercial collaborators.

"While the bulk of improvements in [energy efficiency](#) will no doubt come from hardware advances, software will play a critical role in maximizing the benefits of new hardware capabilities," said Sandia researcher Jim Laros, who leads the specification development effort.

The specification developed by Laros' team standardizes relevant measurement and control interfaces for a comprehensive range of HPC roles. These range from the hardware level to application interfaces. For example, standardizing how a work-load manager interfaces with the HPC system will enable such features as energy-aware scheduling. This can minimize power usage during the hours in which utility companies often charge higher rates.

"Because future architectures might not be able to operate all components at full capability for a variety of reasons, including temperature considerations or power delivery limitations," said Laros, "our specification defines standard interfaces to facilitate appropriate choices in allocating the available power budget among many, sometimes conflicting and often site-[specific](#), considerations.

"The specification we have developed provides multiple levels of abstractions to satisfy the requirements of multiple types of users or roles."

The Power API specification was developed after study by Sandia and the National Renewable Energy Laboratory (NREL). The work was based on almost a decade of research at Sandia, aided by numerous

industry and community relationships that developed over the same period.

A face-to-face review in July included representatives from Cray Inc., Adaptive Computing, Penguin Computing, AMD Inc., IBM, Intel Corp. and NREL, Laros said. Other university and laboratory collaborators, including the University of New Mexico, Oak Ridge and Los Alamos national laboratories and the Energy Efficient High Performance Computing working group, provided written feedback.

After the open release of version 1.0, an international audience conducted a review in Denver this fall.

"Feedback from both reviews as well as our continued collaborations with the HPC community will strengthen future releases of the specification," said Laros.

Provided by Sandia National Laboratories

Citation: Sandia releases interface to help standardize supercomputer power and energy systems (2014, November 12) retrieved 26 April 2024 from <https://phys.org/news/2014-11-sandia-interface-standardize-supercomputer-power.html>

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