EStar Award recognizes innovative supercomputer cooling

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An innovative, energy-saving approach to cooling Argonne's Blue Gene/P supercomputer was recognized with an Environmental Sustainability (EStar) award from the U.S. Department of Energy's (DOE) Office of Science.

EStar awards highlight environmental sustainability projects and programs that reduce environmental impacts, enhance site operations, reduce costs and demonstrate excellence in pollution prevention and sustainable environmental stewardship.

"Many people contributed to this success," said Pete Beckman, director of the Argonne Leadership Computing Facility (ALCF). "We have a very dedicated and talented team that works continually to reduce power consumption while supporting breakthrough science on our supercomputer. At Argonne, we believe green science is smart science."

The Argonne project was one of just five EStar awards given to the DOE's Office of Science laboratories. A total of 127 projects from across the country were nominated for the awards. Gregg Kulma, Argonne's Pollution Prevention/Waste Minimization Program Manager, submitted the nomination for the Blue Gene/P supercomputer project, along with five other Argonne projects with notable achievements in environmental sustainability.

"At Argonne, we are always looking for ways to be more energy efficient and environmentally friendly," said Kulma.

Much of the electricity needed to operate a supercomputer is used to cool the machinery. In colder weather Argonne saves as much as $25,000 per month in electricity costs by leveraging the Chicago area's climate to chill the water used to cool the supercomputer for free. That is in addition to the millions of dollars saved by the energy-efficient architecture of the Blue Gene/P, which uses about one-third as much electricity as a comparable supercomputer.

Other enhancements under development at the ALCF, which houses the supercomputer, include using smart power management functions to turn off chips and storage systems when they are not in use, as well as scheduling intensive compute jobs to run at night when the power grid has more capacity and temperatures are lower. Varying the demand of chilled water to match the needs of the machine allows the chillers to use less energy. This effort includes mapping the optimum chilled water temperature to the machine load to determine the "sweet spot" for energy-efficient cooling.

The ALCF is one of just two leadership computing facilities in the country that provide access to world-class supercomputing resources as well as dedicated teams of computational scientists and engineers to support research efforts across a wide spectrum of scientific disciplines. Major ALCF projects are selected through the Innovative and Novel Computational Impact on Theory and Experiment (INCITE) program.

The INCITE program seeks computationally intensive research projects that have the potential to make high-impact scientific advances through large allocations of computer time, resources and data storage. Researchers are currently generating complex simulations to accelerate discoveries in key areas such as climate change, alternative energy, biology and materials science.

Provided by Argonne National Laboratory