Argonne's Blue Gene/P gets more muscle to address most challenging scientific problems

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IBM and the U.S. Department of Energy's Argonne National Laboratory announced completion of a contract for a 445-teraflops Blue Gene/P system for the Argonne Leadership Computing Facility (ALCF). As the ALCF's second major acquisition, this enhancement increases the system capability by a factor of five to 556-teraflops. This additional capacity will accelerate the coming era of petascale computation in support of breakthrough science and engineering aimed at solving our nation's most challenging scientific problems.

"The IBM Blue Gene/P at Argonne is a critical piece of the DOE strategy for Leadership Computing. Not only is it part of a very productive partnership with the National Nuclear Security Administration , but it also provides the architectural diversity to ensure that a wide array of applications can take advantage of forefront computing capabilities" said Michael Strayer, associate director for Advanced Scientific Computing Research in the Office of Science. "The Blue Gene architecture is especially well suited for materials research and other simulations that require molecular dynamics."

"By the time this project is complete, Argonne will be home to one of our country's preeminent computing facilities," said Rick Stevens, associate laboratory director of Computing and Life Sciences at Argonne. "We look forward to housing this strategic facility and to the research advances and scientific progress it will generate."

Regarding pure computation power, the Blue Gene/P can carry out 445

million million calculations per second (445 teraflops = 445 followed by 12 zeroes). If all six billion people on Earth were participating in a science computation, they each would need to do 70,000 additions or multiplications per second to keep up with it. Moreover, the Blue Gene/P systems consume a fraction of the power per teraflop required by similar systems built around commodity microprocessors. This energy efficient solution reduces power demands and lowers operating costs.

"ALCF has been a valuable contributor in the development of Blue Gene/P," said Leo Suarez, head of deep computing at IBM. "The close working relationship that we enjoy will deliver a machine that will propel scientific discovery in the most profound way since Galileo's telescope."

IBM designed this extraordinary computer, and the ALCF is building a data storage system that can match it. The ALCF Blue Gene/P system pairs one of the world's fastest machines with advanced data management capabilities to meet the intense compute and data demands of petascale computing by leveraging the combined power of Argonne, IBM, Myricom and DataDirect Networks.

Established in 2006, the ALCF is Argonne's newest national user facility and is a key element of DOE's effort to provide leadership-class computing resources to the scientific community, making computationally intensive projects of the largest scale possible. ALCF operates this facility for DOE's Office of Science and also provides in-depth expertise and assistance in using petascale systems and optimizing scientific applications.

Most of ALCF's available computing time will be allocated by DOE's Innovative and Novel Computational Impact on Theory and Experiment (INCITE) program. This peer reviewed program seeks computationally intensive research projects from industry, academia, and research

organizations, which are poised to make high-impact scientific advances through the use of a large allocation of computer time and data storage.

"Researchers can employ this new computing resource to attack cutting-edge problems in science and engineering at unprecedented scale and speed," said Ray Bair, Argonne's ALCF director, "expanding the already diverse research Blue Gene/L has been supporting in areas like understanding the molecular basis of Parkinson's disease, designing more efficient jet engines, and manipulating light at the nanoscale."

Science and engineering computations will be able to use up to 163,840 processors at a time to explore how complex physical, chemical and biological systems behave.

This installation will also create new opportunities for the development of systems software for massively parallel computers. Beginning in 2008, IBM and Argonne will partner to support the Open Source development of Blue Gene software. The computing community will have access to the bulk of the Blue Gene systems software and can participate in its development.

"This access and involvement will speed the evolution of software for Blue Gene and provide the community with a platform for testing ideas applicable to future petaflops and exaflops systems," said Stevens.

Source: Argonne National Laboratory