

LANL, Sandia, Cray Set to Build Next-gen NNSA Supercomputer

National Nuclear Security Administration



WASHINGTON, DC — The National Nuclear Security Administration (NNSA) and Cray have entered into a contract agreement for a next-generation supercomputer, called Trinity, to advance the mission for the Stockpile Stewardship Program. Managed by NNSA, Trinity is a joint effort of the New Mexico Alliance for Computing at Extreme Scale (ACES) between Los Alamos and Sandia national laboratories as part of the NNSA Advanced Simulation and Computing (ASC) Program.

Trinity will be used by Los Alamos, Lawrence Livermore and Sandia national laboratories and will be housed at Los Alamos' Metropolis Computing Center. Trinity will be sized to run the largest and most demanding simulations of stockpile stewardship, assuring the safety, security, and effectiveness of the U.S. nuclear deterrent without the use of underground testing.

"Trinity will serve the needs of the men and women who play an important role in solving extremely complex calculations that underpin the success of our nation's Stockpile Stewardship Program," said Bob Meisner, NNSA ASC program director. "A very powerful mission-computing system, Trinity begins the transition to new exascale architectures. How well we make that transition has huge impacts on the future of stockpile stewardship."

Key drivers for Trinity include application performance improvements and larger memory for running more detailed weapons simulations. As part of the procurement, a Center of Excellence for Application Transition will be established to ensure success. A collaboration of the NNSA tri-labs, Cray, and Intel, the Center is essential for ensuring key ASC applications will successfully port to perform on the Trinity architecture.

"Supercomputing is a critical element of the NNSA's mission to maintain and enhance the safety, security, reliability and performance the U.S. nuclear weapons stockpile, and we are incredibly honored that a Cray supercomputer will play a vital role in this important work," said Peter Ungaro, president and CEO of Cray. "We have a long history with the Department of Energy, the NNSA and its associated laboratories, and we are pleased that the partnership we have developed over the years will continue with Trinity."

Scheduled for delivery starting in mid-2015, Trinity will have at least eight times greater applications performance than Cielo, the current NNSA supercomputer sited at Los Alamos. Trinity is the first Advanced Technology (AT) system for the ASC program and will implement the new computing strategy, which requires all AT systems to service NNSA mission workload while preparing the ASC applications for transition onto future advanced architectures. Given the pioneering nature of the new system, it is named after the first nuclear weapon test, the Trinity event in July 1945.

Trinity will introduce the "Burst Buffer" concept and "Advanced Power Management" as part of the platform. These technologies will be provided as part of a fully integrated system consisting of compute nodes, memory, high speed interconnect and parallel file system.

Trinity will use the processor technology from Intel. "Intel is honored to be providing the computational engine for Trinity and help NNSA deliver on their core mission of nuclear science, security, and safety," said Raj Hazra, Vice President, Data Center Group, General Manager, Technical Computing Group.

The Trinity technical specifications and the request for proposals were developed as part of a joint effort between ACES and the National Energy Research Scientific Computing Center (NERSC), managed by the DOE Office of Science.

"The needs of the mission drive the need for increased memory rather than computing speed alone," said Bill Archer, Los Alamos ASC program director. "Trinity will be a very fast machine, but the real key is having enough memory to solve extremely complex calculations for stockpile stewardship."

"We are excited by Trinity because it will provide the user community at the NNSA labs with an excellent capability for large-scale simulations through use of our existing code base," said Ken Alvin, Sandia's ASC Program deputy director. "It will also allow the ASC program to push our code base forward with next-generation platform technologies so that users can tackle even tougher simulation problems."

As part of NNSA's mission to assure the health of the U.S. nuclear deterrent, the ASC program continues to provide NNSA with leading-edge, high-end computing and simulation capabilities so that NNSA meets nuclear weapons assessment and certification requirements. Historically, NNSA's three national laboratories have been responsible for deploying leading-edge machines that have changed the supercomputing landscape, including Sequoia at Lawrence Livermore, Red Storm at Sandia, and Roadrunner at Los Alamos.

Established by Congress in 2000, NNSA is a semi-autonomous agency within the U.S. Department of Energy responsible for enhancing national security through the military application of nuclear science. NNSA maintains and enhances the safety, security, reliability and

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performance of the U.S. nuclear weapons stockpile without nuclear testing; works to reduce global danger from weapons of mass destruction; provides the U.S. Navy with safe and effective nuclear propulsion; and responds to nuclear and radiological emergencies in the U.S. and abroad.

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