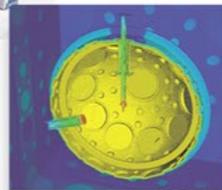


LLNL work entitled "Large-Scale Electronic Structure Simulation of the Heavy Metal Molybdenum." This quantum simulation of unprecedented scale and speed was run on BlueGene/L to help scientists understand the properties of materials under extreme conditions. This simulation won the 2006 Gordon Bell award.



ASCI Blue Pacific



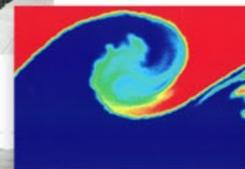
ASCI Blue Pacific was used to create the largest-ever 3D direct simulation of neutron transport. The colors represent flux values—with red highest and blue lowest—of fusion neutrons coming out of the Nova laser target chamber.



ASCI White



ASCI Purple

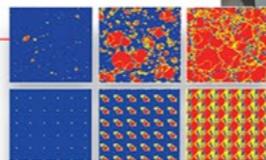


LLNL work entitled "First-of-a-Kind Simulation of a Kelvin-Helmholtz Instability in Molten Metals." Scientists were able to predict how a wave forms, atom by atom, using the computing power of BlueGene/L. This simulation won the 2007 Gordon Bell award.



BlueGene/L

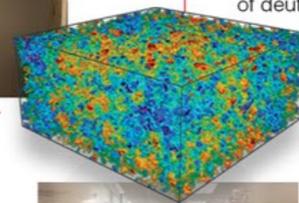
LLNL work entitled "Pioneering Materials Science Simulations." Scientists used BlueGene/L to identify the scale of simulation needed to understand how molten, metallic tantalum solidifies. This simulation won the 2005 Gordon Bell award.



A visualization of an early ASC Dawn simulation shows the electron potential in a 140-million-particle simulation of a 5-kilo-electron-volt plasma comprised of deuterium/tritium and 3.5-million-electron-volt alpha particles, being heated by an argon beam.



Sequoia Initial Delivery System (Dawn)



Sequoia



The HPC Innovation Center provides advanced computing solutions to help companies understand and manage the complex systems underlying twenty-first century technologies.



A Celebration of an Enduring Partnership





Advanced Simulation & Computing



Blue Pacific reasserted IBM's leadership in high performance computing (HPC), influenced the design and function of IBM's Global Parallel File System (GPFS), and allowed exploration of the mixed-hybrid symmetric multiprocessing (SMP) model. Blue Pacific served the program mission by enabling the first three-dimensional (3D) primary simulation and by allowing testing of massively parallel 3D codes.

ASCI
BLUE PACIFIC



Asci Purple
FIFTH GENERATION
ASCI PLATFORM



The Purple system realized the bold vision expressed a decade earlier—the routine production use of complex 3D integrated weapons codes for programmatically relevant simulations at scale. ASCI financial investment was critical to development of the Federation Interconnect; and ASCI technical involvement provided guidance to the design of the Power IH node, which remains IBM's flagship HPC product.



ASCI White cemented the "message passing interface (MPI) everywhere" model. White served program needs by enabling the first 3D full-device simulation and the first 3D assessment simulations.

ASCI
White

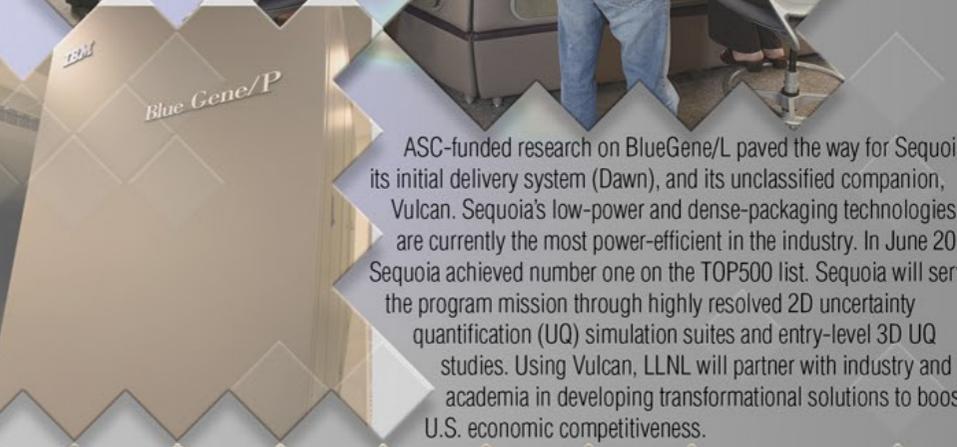
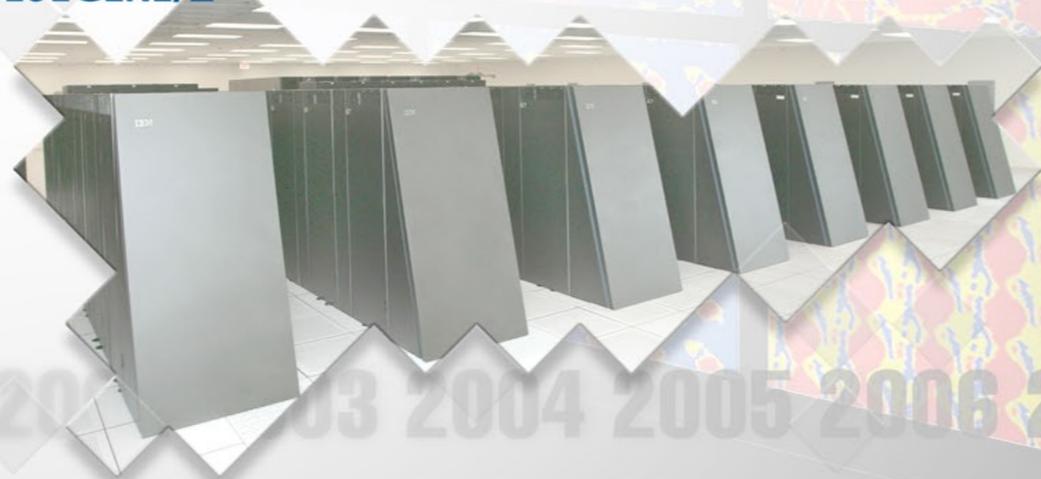


BLUEGENE/L

BlueGene/L exemplified revolutionary technology. It demonstrated the value of long-term research and development partnerships between laboratories and vendors. BlueGene/L achieved extreme peak performance with very low-power consumption by using a simple application-specific integrated circuit (ASIC) running at a low clock rate. BlueGene/L spent an amazing 3.5 years at number one on the TOP500 list. It was a key program tool used to resolve issues during plutonium aging assessments, and it enabled multi-scale model development.



Dawn
Sequoia Initial Delivery System



ASCI-funded research on BlueGene/L paved the way for Sequoia, its initial delivery system (Dawn), and its unclassified companion, Vulcan. Sequoia's low-power and dense-packaging technologies are currently the most power-efficient in the industry. In June 2012, Sequoia achieved number one on the TOP500 list. Sequoia will serve the program mission through highly resolved 2D uncertainty quantification (UQ) simulation suites and entry-level 3D UQ studies. Using Vulcan, LLNL will partner with industry and academia in developing transformational solutions to boost U.S. economic competitiveness.



1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012