

Computing Power for Scientific Discovery At Brookhaven National Laboratory

Purpose

To provide computational science capabilities through the use of powerful, state-of-the-art computers for science

Sponsor

- U.S. Department of Energy's Office of Science
- New York State grant for New York Blue

Features

- New York Blue -100 teraflop/s IBM Blue Gene/L supercomputer
- Two QCDOC computers
- Large Linux clusters

Website

www.bnl.gov/csc

With the huge amount of data involved in many experiments at Brookhaven National Laboratory, extremely powerful computers are needed to conduct research in many areas of science. Brookhaven has a vast amount of computing power available to help researchers solve data-intensive problems.



New York Blue, the world's fifth fastest supercomputer, is located at Brookhaven Lab.

research. Known as New York Blue, the supercomputer has an 18-rack configuration that links together 36,864 processors for a total of 100-teraflop/s performance, or 100 trillion calculations per second, about 10,000 times as fast as a personal computer.

Computational Science Center

The Brookhaven Computational Science Center (CSC) brings together researchers in biology, chemistry, physics and medicine with applied mathematicians and computer scientists to take advantage of the new opportunities for scientific discovery made possible by modern computers. To achieve research goals in these areas, the center has a close alliance with applied mathematicians and computer scientists at Stony Brook University and Columbia University.

A typical desktop computer contains one processor. At the CSC, computer clusters running the Linux operating system – typically containing 100 to 200 processors – are currently available for performing scientific calculations for Brookhaven researchers and their collaborators.

New York Blue

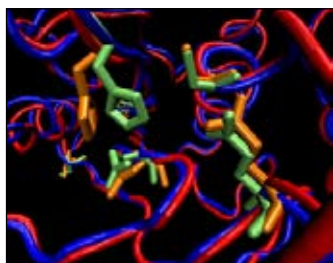
Supported by a \$26-million grant from New York State, Brookhaven Lab and Stony Brook University have acquired an IBM Blue Gene/L, the fifth fastest supercomputer in the world, and the second most powerful for open access

New York Blue is the centerpiece for the New York Center for Computational Sciences, which fosters research collaborations among research institutions, universities and companies throughout New York State. Brookhaven Lab will be among the academic and industrial users of the facility to perform research in a wide variety of sciences, including biology, medicine, materials science, nanoscience, renewable energy, finance and technology.

QCDOC Computers

The architecture for New York Blue was pioneered by a team from Columbia University, IBM, and the RIKEN BNL Research Center. The team designed two supercomputers at Brookhaven that are used for calculations in a basic physics theory called quantum chromodynamics. Known as QCDOC, for quantum chromodynamics on a chip, each of the computers contains more than 12,000 IBM processors. Each processor is connected by 24 wires to its neighbors – the equivalent of a 24-lane highway for data sharing.

Physicists use QCDOC computers for calculations in quantum chromodynamics 75 percent of the time, while researchers pursuing other scientific projects use them the remaining 25 percent of the time.



Computer simulation of the structure of adenovirus proteinase