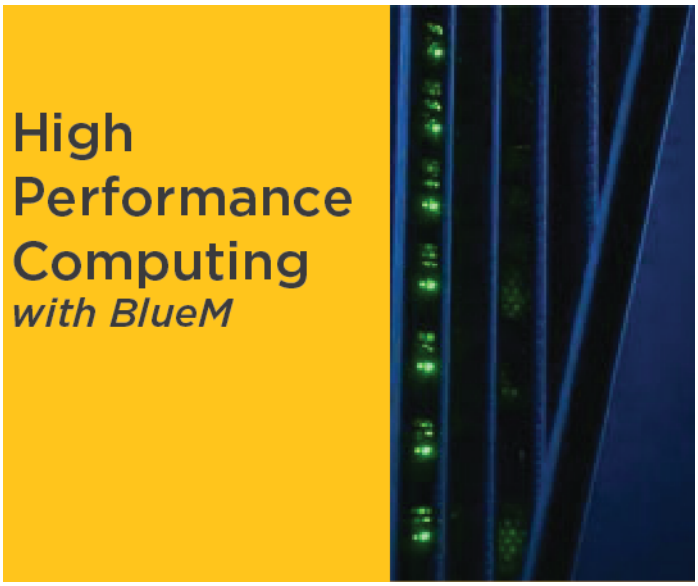


BlueM.Mines.Edu

Mines' Big Iron Supercomputer

154 Tflops 17.4Tbytes 10,496 Cores 85KW

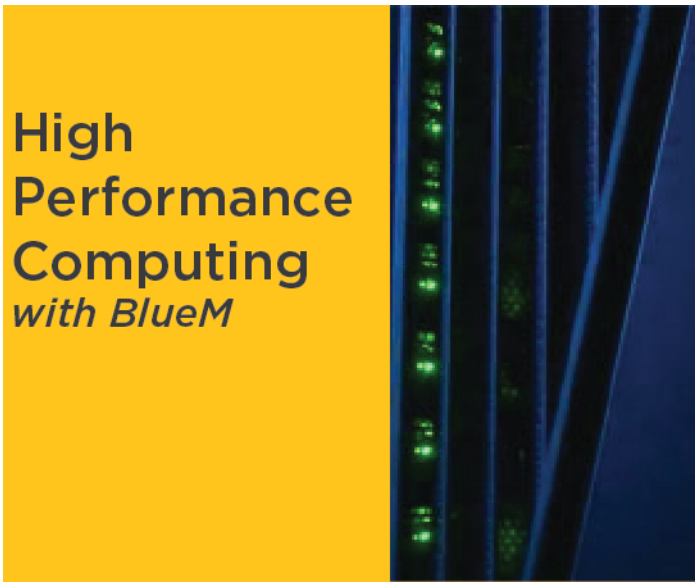
BlueM is Mines' newest HPC platform (in addition to the "Mio" cluster). It is a unique machine, composed of two distinct compute platforms or partitions that share a common file system. Both platforms, as well as the file system, were purchased from IBM as a package. The common file system shared between the partitions can hold 480 TB. It has efficient support for parallel operation (that is, multiple cores accessing it at the same time). The two compute platforms are optimized for different purposes.

The smaller compute platform, in terms of capability, is AuN ("Golden"). It is a traditional HPC platform using standard Intel processors. It contains 144 compute nodes connected by a high-speed network. Each node contains 16 Intel SandyBridge compute cores and 64 GB of memory for a total 2,304 cores and 9,216 GB of memory. AuN is rated at 50 Tflops. It is housed in two double-wide racks with 72 nodes in each rack. AuN is designed to run jobs that require more memory per core.

Mc2 ("Energy") is an IBM BlueGene. Mc2 is housed in a single large 4' x 4' rack, currently half full with room for expansion. The BlueGene computer is designed from the ground up as an HPC platform. It has a very-high-speed network connecting the nodes so applications can scale well. Each node has a processor dedicated to systems operations in addition to the 16 cores that are available for users. The processors on Mc2 are IBM "Power" processors. Mc2 has 512 compute nodes, each with 16 GB of memory for a total core count of 8,912 user cores and 8,912 GB of memory. Mc2 is rated at 104 Tflops. Mc2 is designed for jobs that can make use of a large number of cores.

The total power consumption of the system is about 85 kW with only 35 kW used by Mc2.

Mc2 is water cooled. AuN is currently running with rear door heat exchangers but could be run using air cooling only. BlueM is housed at the National Renewable Energy Laboratory in Golden, CO.



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Sample Projects

PI	Project Title
K. Smits	Sustainable Energy Pathways Collaborative: Pathways to Scalable, Efficient and Sustainable Soil Borehole Thermal Energy Storage Systems
Ganesh	• HPC algorithms for deterministic and stochastic scattering and absorption models • Simulation of Dynamics in Multiscale and Evolution Models
Dean	Diesel Reforming Technology with Hydrogen Peroxide as an Oxidant for Submarine Applications.
Hogue	• Advancing Hydrometeorological Predictions in Disturbed Mountain Watersheds: Integrating MODIS and Landsat products into the WRF-Hydro Framework • Fate of imported water in a semi-arid metropolis using a fully coupled hydrologic model4
D. Wu	Understanding Extractant Aggregation Through Molecular Dynamics Simulations
Sum	Investigations of Gas Hydrate Nucleation and Growth Using Molecular Simulations
Koh	Computational modeling of clathrate hydrates to study guest-guest and guest-host interactions
Maxwell	• Investigating Impacts of Landscape Scale Change in California: Response of Important Hydrologic Systems to Climate Change and Irrigation • Subsurface residence times of dissolved organic carbon in Mountain Pine Beetle infested mountain catchments • East River High Resolution Modeling
Eberhart	DFT-based materials, enzyme and explosives research
Z. Wu	Quantum Mechanical Simulations of Complex Nanostructures for Photovoltaic Applications
Lusk	• Carrier Collection and Transport in Thin Film Silicon with Tailored Nanocrystalline/Amorphous Structure • Non-Linear Up-Conversion Processes in Organic Molecular Systems • Nano-Photonic Control for Enhanced Upconversion • Phonon assisted transport and carrier relaxation in amorphous and nanocrystalline silicon materials • Electronic structure and reactivity study of substituted silsesquioxanes • Charge and Exciton Transport in Quantum Dot Solids
Maupin	• Bio Fuel Degradation • Ionic Liquid-Water-Enzyme Mixtures • Ionic Liquids and Metal Chlorides • Computational Investigations into Novel Polymer Membranes
Kappes	Combinatorial computational screening of organic flow battery electrolytes
Ciobanu	Structural polymorphs of lithium alumino-silicates
L. Carr	Entangled Many-Body Quantum Dynamics
Vyas	Rational Design of Superoxide Precursor
B. Wu	Large-Scale Graph Analytics

More Information

http://inside.mines.edu/HPC-BlueM
http://hpc.mines.edu
http://inside.mines.edu/HPC-MachineStat

Timothy H. Kaiser, Ph.D. (tkaiser@mines.edu)
Director of High Performance Computing

Mines
Information Technology

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