THE WOLFRAM SOLUTION FOR HIGH-PERFORMANCE COMPUTING

“The rich semantics of gridMathematica™ hide some of the complexities of programming distributed simulations on HPC clusters, giving simulation designers the freedom to more easily develop highly resolved models.”

—Diglio A. Simoni
Senior HPC Scientist
RTI International
High-performance computing requires getting the right answers to the most demanding technical problems. Speed is vital, but not sufficient—you must get the results you need, and they must be accurate.

Mathematica® provides all this and more, integrating important HPC technologies in a single seamless system so you do not have to choose between speed and accuracy. With many of these technologies applied in automated ways, Mathematica is the high-performance computing environment that lets you deliver quick, correct solutions.

KEY CAPABILITIES
- Automatically use local multicore or multi-CPU hardware, run on multiple CPUs locally or remotely, or use across grids with gridMathematica
- The most comprehensive and easy to use high-level interface to GPU programming and computation, with a framework for building and loading CUDA or OpenCL programs into the Mathematica kernel
- Built-in GPU-enhanced functions for areas such as linear algebra, image processing, financial simulation, and Fourier transforms and presentations
- CUDA and OpenCL programs scale to use all GPUs on the system, work over the network using remote kernels, or work over multiple machines using gridMathematica
- Integrate external dynamic libraries directly into Mathematica, enabling high-speed, memory-efficient execution
- Automatically convert Mathematica programs into standalone C code with code generation functions
- Just-in-time compilation automatically optimizes code for considerable net performance gains
- Core routines are optimized for specific hardware and use vendor-optimized libraries where beneficial
- The world’s largest web of algorithms, optimized for speed, memory use, and robustness

WAYS TO USE
- Simulate complex many-body physical systems with classical and quantum Monte Carlo methods
- Perform powerful image processing with built-in functions for filtering, morphology, and binary operations with the GPU
- Run large simulations to test models of the distribution and diffusion of air pollution
- Run GPU-optimized BLAST searches on large genomes
- Enhance financial and linear algebra calculations with CUDA or OpenCL computations
- Study protein dynamics on length and time scales otherwise not possible

Experience performance gains with automatic compilation, hardware-optimized routines, and memory-efficient dynamic libraries.

Increase computing power with local multicore or multi-CPU hardware, multiple remote CPUs, or full grids with gridMathematica.

WHAT EXPERTS ARE SAYING
“I was surprised how easy it was to make the change to parallel computing. The scope and complexity of the problems I can now comfortably explore has greatly increased. The fact that it is a superb all-in-one mathematics, computing, visualizing, documenting, and teaching environment is a delight and a great time saver.”
- Phil Gregory
Professor Emeritus
University of British Columbia

“I use Mathematica in my teaching and research. It provides a powerful tool to quickly access the information we need ... so we’re able to do ad hoc analysis quickly and easily.”
- Philip Zecher
Chief Risk Officer
EQA Partners

“Its many strong calculation features, high-level programming environment, open architecture, and web compliance made Mathematica an obvious choice.”
- Dr. Michael Feuer-Russ
Fraunhofer-Gesellschaft

WHO USES WOLFRAM TECHNOLOGY?
Some of the most important institutions in the industry, including:
- Advanced Micro Devices
- Intel Corp.
- Lockheed Martin
- Bloomberg Finance L.P.
- The Goldman Sachs Group, Inc.
- Merck & Co., Inc.
- Pfizer Inc.
- NASA
- Google
- Pixar Animation Studios