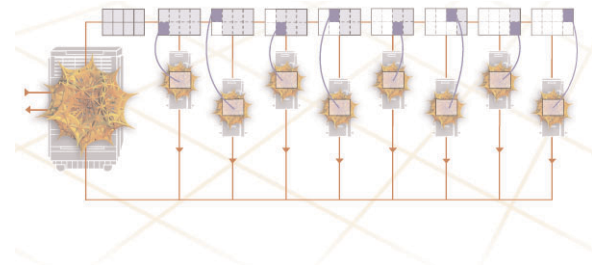


# grid**MATHEMATICA**<sup>™</sup>

TECHNICAL COMPUTING FOR THE GRID

*gridMathematica* combines the power of the world's leading technical computing environment with modern computing clusters and grids to solve the most demanding problems in mathematics, science, engineering, and finance. *gridMathematica* 1.1 incorporates easy-to-use parallel programming constructs and the advanced algorithms and record-breaking performance of *Mathematica*<sup>®</sup> 5, including optimized numerical libraries for use in high-speed linear algebra as well as additional 64-bit platform support. Typical uses of *gridMathematica* include bioinformatics applications, processing and analysis of large data sets, data mining, and large computations in physics, mathematics, and the life sciences.



## KEY BENEFITS

- Parallel codes can be developed and tested on desktop PC or workstation
- Support for multiprocessor machines as well as homogenous and heterogenous clusters
- Includes the world's largest collection of advanced algorithms
- Full support for all functions in *Mathematica* 5
- Record-breaking speed for numerical linear algebra
- Wide-ranging support for fast matrix operations
- High-performance optimization and linear programming functionality
- Extensive support for vector and array functions
- Optimized versions for 64-bit hardware

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## Parallel Computing Specific Features

Master/Slave parallelism  
Distributed memory  
Virtual shared memory  
Machine-independent implementation  
Source code for all high-level parallel commands  
Support for multiprocessor machines and clusters

High-performance *MathLink*<sup>®</sup> protocol communicates at the speed of the underlying network  
Scheduling of virtual processes or explicit distribution to available processors  
Synchronization, locking, and latency hiding  
Process queues and concurrency  
Parallel functional programming  
Failure recovery and automatic reassignment of stranded processes

## List of Parallel Computing Functions

### Startup/Shutdown

*Abandon*, *CloseSlave*, *CloseSlaves*, *ConnectSlave*, *LaunchSlave*, *LaunchSlaves*

### Concurrency

*DoneQ*, *Load*, *Queue*, *QueueRun*, *Wait*, *WaitOne*

### Low-Level Parallel Commands

*CloseSlaves*, *ExportEnvironment*, *FailureRecovery*, *Receive*, *ReceiveIfReady*, *RemoteEvaluate*, *ResetQueues*, *ResetSlaves*, *ReQueue*, *RecoveryMode*, *Send*

### High-Level Parallel Commands

*ParallelAnimate*, *ParallelContourPlot*, *ParallelDensityPlot*, *ParallelDot*, *ParallelEvaluate*, *ParallelInner*, *ParallelMap*, *ParallelParametricPlot3D*, *ParallelPlot3D*, *ParallelTable*

### System Variables

*InitCode*, *LoadFactor*, *mathkernel*, *NotReady*, *ProcessorID*, *QueueLength*, *Slaves*, *TraceLevel*, *winrsh*

### Shared Memory

*SharedDownValues*, *SharedVariables*, *VirtualShared*

## General Mathematica Features

Over 1900 built-in functions, including the world's largest collection of advanced algorithms for numeric and symbolic computation, discrete mathematics, statistics, data analysis, graphics, and general programming

Major new algorithms for solving equations and inequalities symbolically over complex numbers, reals, and integers

New-generation optimized numerical solvers for ordinary and partial differential equations

Record-breaking speed for numerical linear algebra

High-performance optimization and linear programming including interior point method

Wide-ranging support for domain specifications in symbolic computation

Wide-ranging support for fast sparse matrix operations

Full support for arbitrary and machine precision with automatic precision control

Multi-paradigm symbolic programming language with support for procedural, functional, list-based, object-oriented, and symbolic-programming constructs

Fully programmable 2D and 3D visualization with over 50 built-in plot types

Flexible import and export of over 40 data, image, and sparse matrix formats

High-level APIs to C/C++, Java, and scripting languages

Support for exact integers of arbitrary length, rationals, floating-point real and complex numbers, and arbitrary-precision real and complex numbers

## Technical Requirements

### Supported Platforms

*gridMathematica* is available for Windows, Mac OS X, Linux (x86, Alpha, Itanium, AMD64), Solaris, HP-UX, AIX, Compaq Tru64 Unix, and compatible systems.

### Supported Communication Protocols

TCP/IP, pipes

### Other Requirements

In order to launch *Mathematica* kernels on remote machines, an RSH/SSH client and/or server is needed. A daemon/server is needed only on the machine being connected to.

### Components

*Mathematica 5*, *Parallel Computing Toolkit*, *MathLM*, *MathLink*

For more information visit: [www.wolfram.com/gridmathematica](http://www.wolfram.com/gridmathematica)