

# Distributed Computational Software: The Benefits Are Multiplying

Microsoft® Windows® Compute Cluster Server 2003 and Wolfram Research's gridMathematica™ 2

## gridMATHEMATICA™ 2

### Customer Profile

Wolfram Research, Inc. is the maker of Mathematica - the science and technology tool of choice for computational software. Mathematica combines a numeric and symbolic computational engine, a graphics and visualization system, a programming language, and a documentation system to form a single, coherent and flexible scientific computing platform.

### The Challenge

The challenge was to make the powerful computational resources of Mathematica available in a flexible system configuration and enable Mathematica to distribute complex calculations across clusters, multiprocessor machines, or computing grids.

### Solution

Wolfram Research recently introduced gridMathematica 2, which delivers an optimized parallel Mathematica environment for modern multiprocessor machines, clusters, grids, and supercomputers.

gridMathematica 2 is an integrated software environment for developing and deploying parallel applications.

gridMathematica 2 is completely platform independent, so it can be used on dedicated multiprocessor machines as well as on homogeneous and heterogeneous clusters.

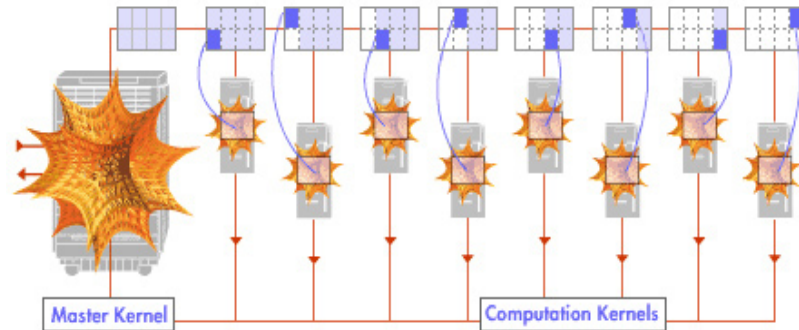
Combined with Microsoft Windows Compute Cluster Server 2003, gridMathematica 2 provides exceptionally high performance computing on a platform that is simple to deploy, easy to maintain and familiar to use.

### Benefits

- Low Cost
- All the functionality of Mathematica
- Simple to install
- Familiar computing environment
- Benefits of Windows maintenance
- Integrated Job Scheduler

### Overview

gridMathematica 2 is a parallel computing environment comprised of a collection of a kernels (or nodes). The master (or head) kernel handles all input, output, and scheduling functions, and delegates processes to a pool of computational kernels.



As such, gridMathematica 2 multiplies the 64-bit advantage of Mathematica across the entire cluster, providing rapid development and deployment with unparalleled computational performance. Since gridMathematica 2 introduces only a small number of new parallel computing constructs, users familiar with Mathematica can transition easily to gridMathematica without additional training.

### Windows Compute Cluster Server 2003

Windows Compute Cluster Server 2003 accelerates time-to-insight for customers solving complex computational problems by providing a high-performance computing platform that is simple to deploy, operate, and integrate with existing infrastructure and tools.

Windows Compute Cluster Server 2003 includes prescriptive setup procedures, a complete suite of management tools, and an integrated Job Scheduler. It works with Microsoft Active Directory® directory service, can be monitored with Microsoft Management Console (MMC) and Microsoft Operations Manager (MOM), and uses tools such as Microsoft Visual Studio® 2005, which supports parallel job development and debugging. Together, gridMathematica 2 and Windows Compute Cluster Server 2003 enable

deep computational processing on a highly scalable platform.

### The Combined Benefits

Windows Compute Cluster Server 2003, combined with gridMathematica 2 provides you with:

- **Depth:** gridMathematica 2 provides full access to the rich library of algorithms for numeric and symbolic computation provided by Mathematica.
- **Focus:** The details of parallelism in grid Mathematica are largely abstracted, allowing the developer to focus completely on solving the problem.
- **Scalability:** gridMathematica applications can be developed on a Windows XP laptop or desktop and be immediately deployed on Windows Compute Cluster Server 2003.
- **Access:** gridMathematica is able to read and write many data formats, including HDF5 and Microsoft Excel spreadsheets, and is able to access data from legacy applications through C/C++, Java, and .NET.

grid Mathematica and Windows Compute Cluster Server 2003 are a perfect fit for each other, providing a highly scalable and easily manageable rapid development and deployment environment alternative to traditional parallel programming languages on clusters.

# Microsoft Windows Compute Cluster Server 2003 and gridMathematica 2

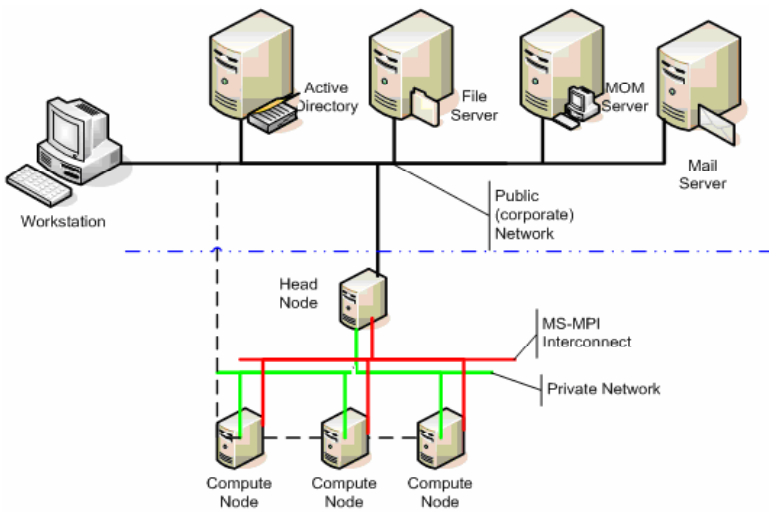
## Architecture

The Windows Compute Cluster Server 2003 head node:

- Controls and mediates all access to the cluster resources.
- Is the single point of management, deployment, and job scheduling for the compute cluster.

Windows Compute Cluster Server 2003 uses the existing corporate infrastructure and Active Directory for:

- Security
- Account management
- Operations management



## System Requirements:

CPU Requirement:	64-bit architecture computer Intel Pentium, or Xeon family with Intel Extended Memory 64 Technology (EM64T) processor architecture, or AMD Opteron family, AMD Athlon family, or compatible processor(s).
Minimum RAM:	512 MB
Maximum RAM:	32 GB
Multiprocessor Support :	Up to 4 processors
Disk Space for Setup:	4 GB
Disk Volumes:	Head node requires a minimum of two volumes (C:\ and D:\). For additional roles, additional partitions are recommended. Compute node requires a single volume. RAID 0/1/5 may be used, but is not required.
Network Interface Cards:	All nodes require at least one. Each node may require additional network interface cards as appropriate for the network topology, for public network access or in support of an MPI network.

## gridMathematica 2 Requirements:

gridMathematica 2 supports homogeneous and mixed operating system clusters. All that is required is a TCP/IP connection for communication between nodes.

Supported: Ethernet, Gigabit Ethernet, and Firewire (IEEE 1394)

Also supported: Myrinet, Infiniband, Quadtratics

## For More Information

For more information about Windows Compute Cluster Server 2003, please visit <http://www.microsoft.com/hpc>

For more information about Wolfram Research and gridMathematica 2, please visit <http://www.wolfram.com>.

To join the HPC Community, please visit <http://www.windowshpc.net>.

For information about purchasing Microsoft Windows Compute Cluster Server 2003, email [hpcinfo@microsoft.com](mailto:hpcinfo@microsoft.com)

©2006 Microsoft Corporation. All rights reserved. This data sheet is for informational purposes only. No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without the express written permission of Microsoft Corporation. MICROSOFT MAKES NO WARRANTIES, EXPRESS OR IMPLIED, IN THIS SUMMARY. Microsoft®, Windows®, Active Directory®, Visual Studio®, and the Windows logo are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. Other product and company names herein may be the trademarks of their respective owners.