



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 tool of choice for computational work at the frontiers of science, engineering and technology. *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 and multicore machines, or computing grids.

Solution

Wolfram Research recently introduced gridMathematica 2, which delivers an optimized parallel *Mathematica* environment for modern multiprocessor and multicore 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 and multicore machines, as well as on homogeneous and heterogeneous clusters.

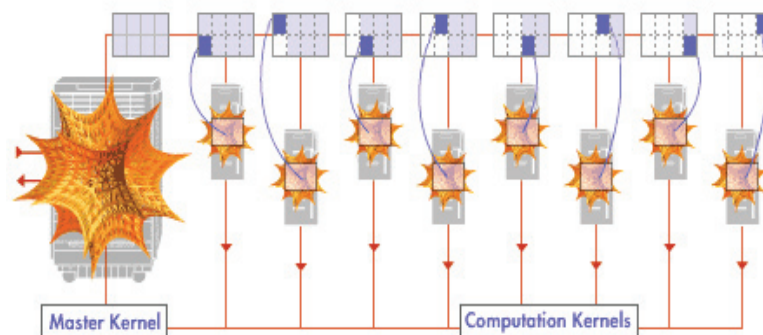
Combined with Microsoft® Windows® Compute Cluster Server 2003, gridMathematica 2 provides exceptionally high performance computing on a platform that is simple to deploy, easy to maintain and familiar to use.

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 *Mathematica* 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. The parallel environment of gridMathematica 2 will be immediately familiar to *Mathematica* users, providing parallel versions of the core *Mathematica* functionality.

Compute Cluster Server 2003

Microsoft Windows Compute Cluster Server (CCS) 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.

CCS 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 gridMathematica 2 are largely abstracted, allowing the developer to focus completely on creating solutions.
- **Scalability:** gridMathematica 2 applications can be developed on a Windows XP laptop or desktop and be immediately deployed on Windows Compute Cluster Server 2003.
- **Access:** gridMathematica 2 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.

gridMathematica 2 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®



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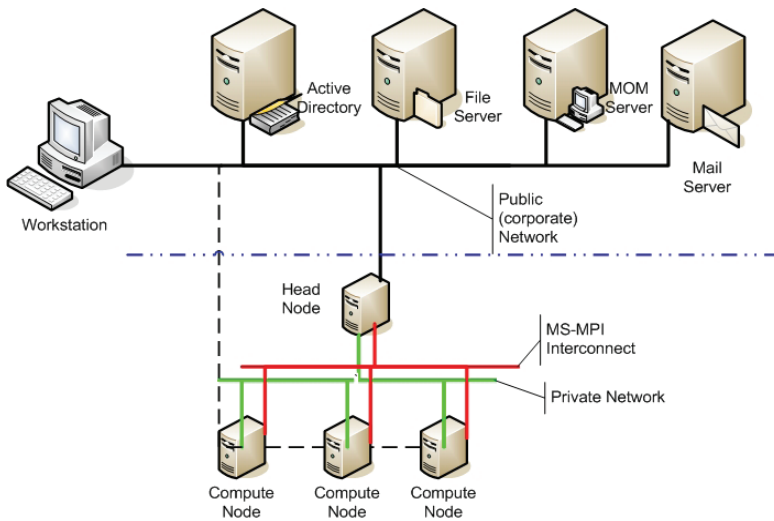
CCS Architecture

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



CCS 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.

grid $Mathematica$ 2 Requirements:

grid $Mathematica$ 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)
- Myrinet, Infiniband, Quadratics

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 grid $Mathematica$ 2, please visit <http://www.wolfram.com>.

For information about purchasing Microsoft Windows Compute Cluster Server 2003, please email hpcinfo@microsoft.com

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

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