

What is new in *Mathematica* 5.2?

- *Mathematica* 5.2 continues to lead the industry in speed, scope, and scalability by bringing 64-bit technology to all supported platforms—an industry first
- More than 4.3GB of memory (the 32-bit limit) can now be addressed, and high-precision or large numbers are processed in 64-digit rather than 32-digit chunks for faster computation.
- Numerical linear algebra multithreading capabilities

Why is Wolfram Research releasing *Mathematica* 5.2 only 6 months after 5.1?

- Well publicized releases of Windows and Macintosh 64-bit operating systems
- New availability of multi-core processors
- Natural wrap up for the 5.x cycle

■ List of Improvements

There are many new functions, toolkits, and performance improvements in *Mathematica 5.2*, including:

- All-platform support for 64-bit addressing
- Multicore support on major platforms
- Multithreaded numerical linear algebra
- 64-bit-enhanced arbitrary-precision numerics
- Vector-based performance enhancements
- Automatic installation selection
- Bundled notebook indexing for desktop search
- Support for ssh security for remote kernels
- vCard and RSS import
- New algorithms for symbolic differential equations
- Enhanced performance for linear Diophantine systems
- Enhanced quadratic quantifier elimination
- Singular-case support for high-level special functions
- Enhanced statistics charts
- *MathematicaMark*[™] 5.2 covering grids & clusters

And many more enhancements & innovations ...

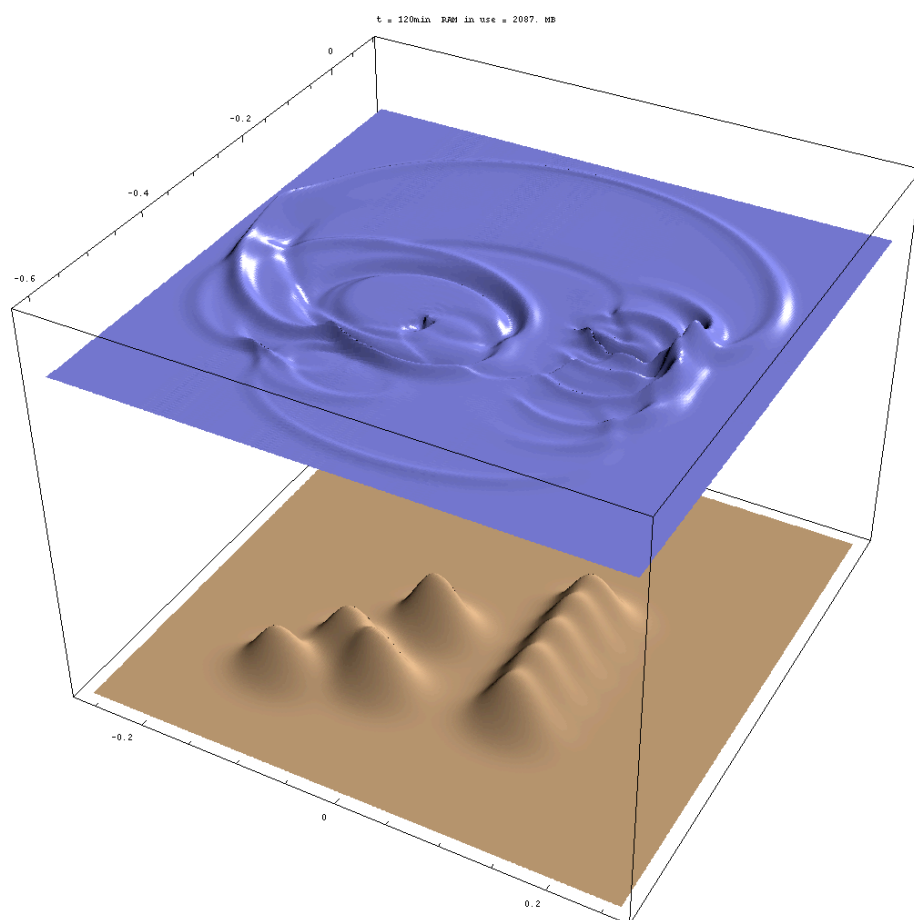
All-platform Support for 64-bit Addressing

- Across all major platforms, *Mathematica* now supports 64-bit memory addressing and 64-bit long number partitioning
- Industry firsts that reflect Wolfram Research's commitment to delivering rapid support for the latest computing technology.
- Not offered by **Maple, Matlab, or Mathcad** (Matlab has limited 64-bit support on Linux only)
- Access more than 4.3 GB of memory (exact number depends on platform: for example, 128GB RAM, 16 TB virtual memory on Windows XP 64-bit)

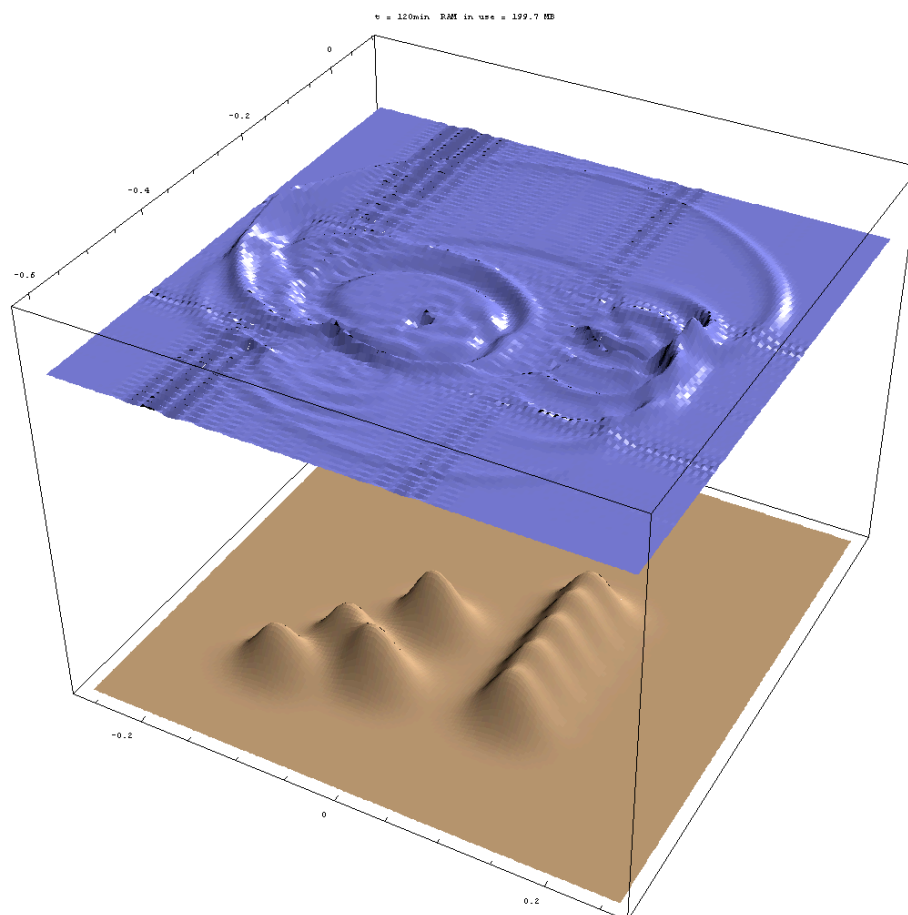
Why is This Important?

- 64-bit support lets *Mathematica* users solve much larger problems or solve problems with higher resolutions.

64-bit Grafik: t=120min RAM in use 2087MB



32-bit Grafik: t=120min RAM in use 199.7MB



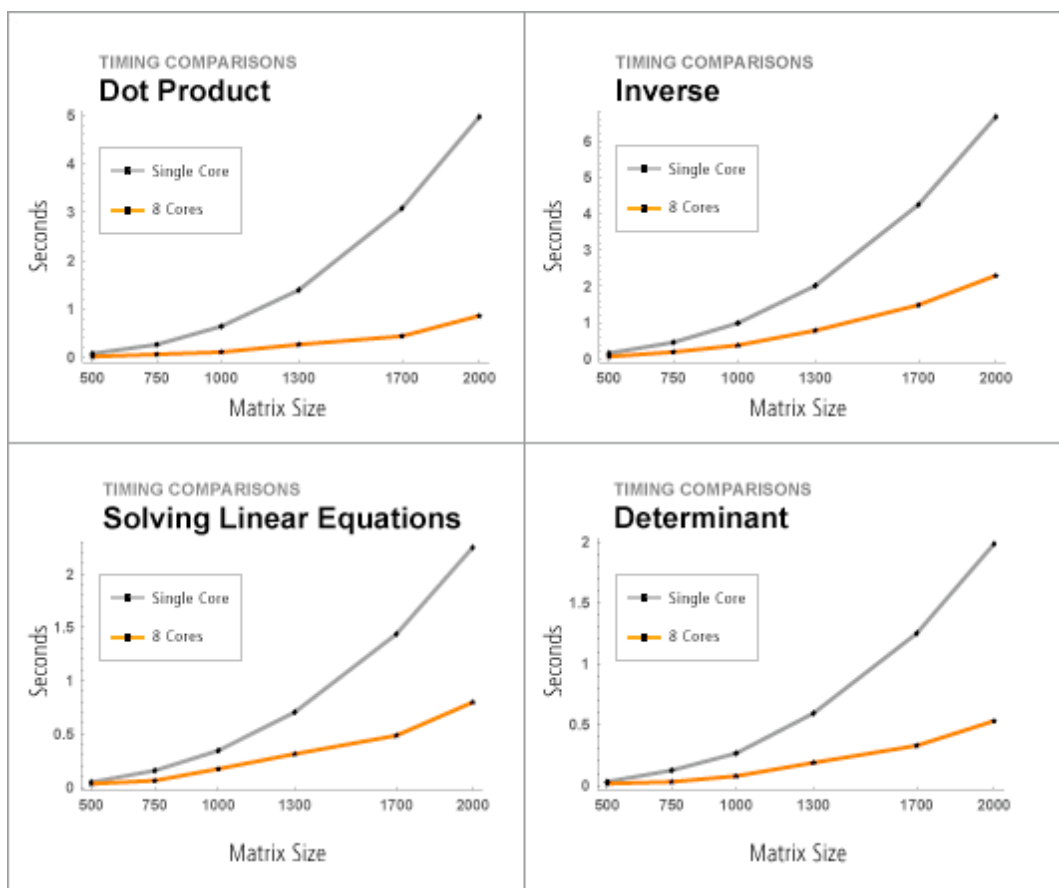
Which users can take advantage of 64-bit processing?

Taking advantage of the 64-bit features requires a very recent PC or Mac running the latest release of the respective operating systems. It is also available on any UNIX computer supported by *Mathematica* 5.2.

- Windows users must run Windows XP Professional x64 Edition (available for purchase and trial from Microsoft) on a Intel EM64T, AMD Opteron, or AMD Athlon 64
- Mac users must run Mac OS X 10.4 (available for purchase from Apple) or later on a G5
- Linux users must run a 64-bit capable version of Linux on an Intel EM64T, Intel Itanium, AMD Opteron, or AMD Athlon 64
- All UNIX versions fully support 64-bit addressing on all supported platforms

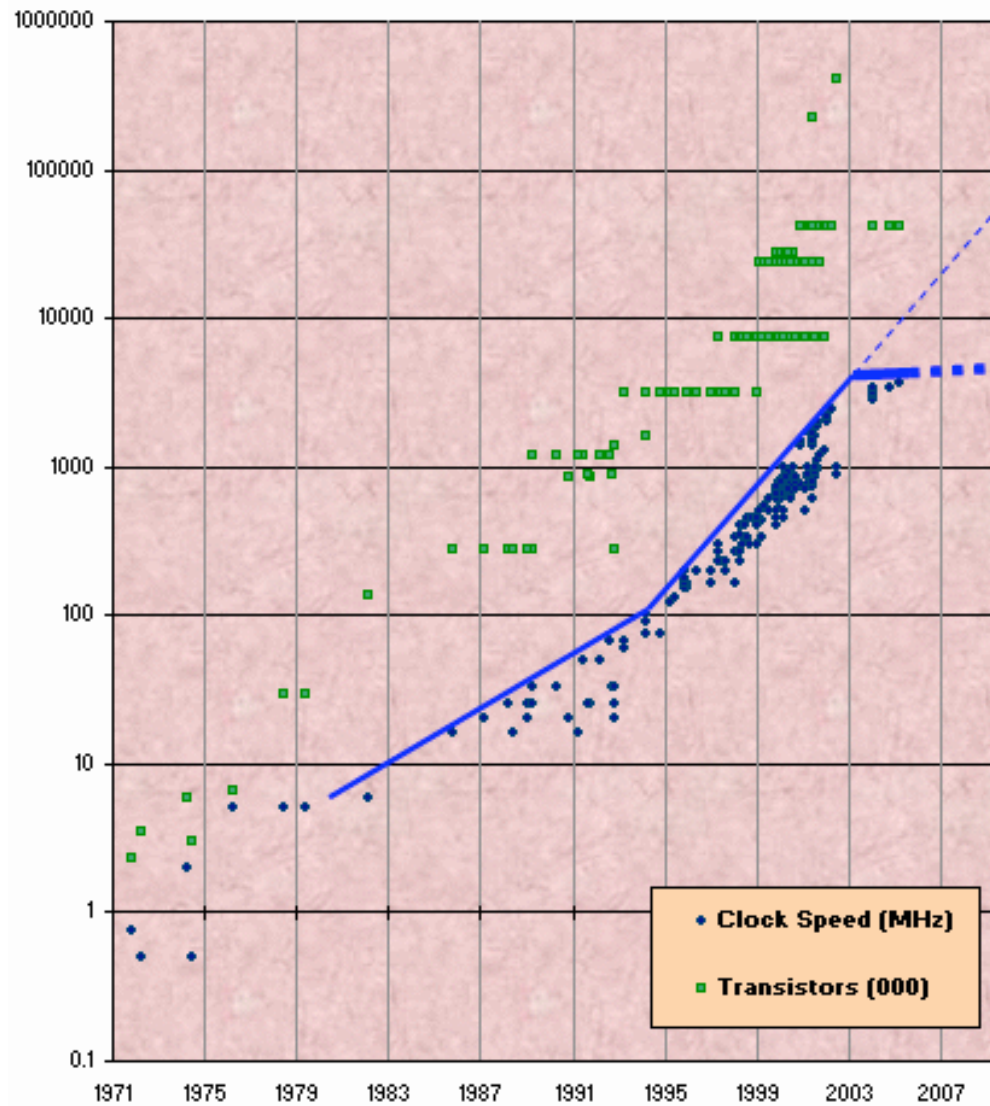
■ Multicore Support on Major Platforms

- All-platform support for threading of numerical linear algebra over multiple CPU or multicore computers.
- *Mathematica*'s notebook front-end is a separate process from its computational kernel, allowing them to run on separate cores or CPUs—giving a responsive interface even when the kernel core is under full load.
- *Mathematica* is the first technical software to take full advantage of multicore processors.



Why is This Important?

While Moore's Law (which states the number of transistors on a piece of silicon will double every 18 months) is still valid, CPU clock speed hit the so-called "heat wall" in late 2003. Since then, clock speed has only gone up marginally.



- By mid-2006 all mainstream systems will have multicore CPUs.
- The first systems are available now from AMD and Intel partners for under \$2000.

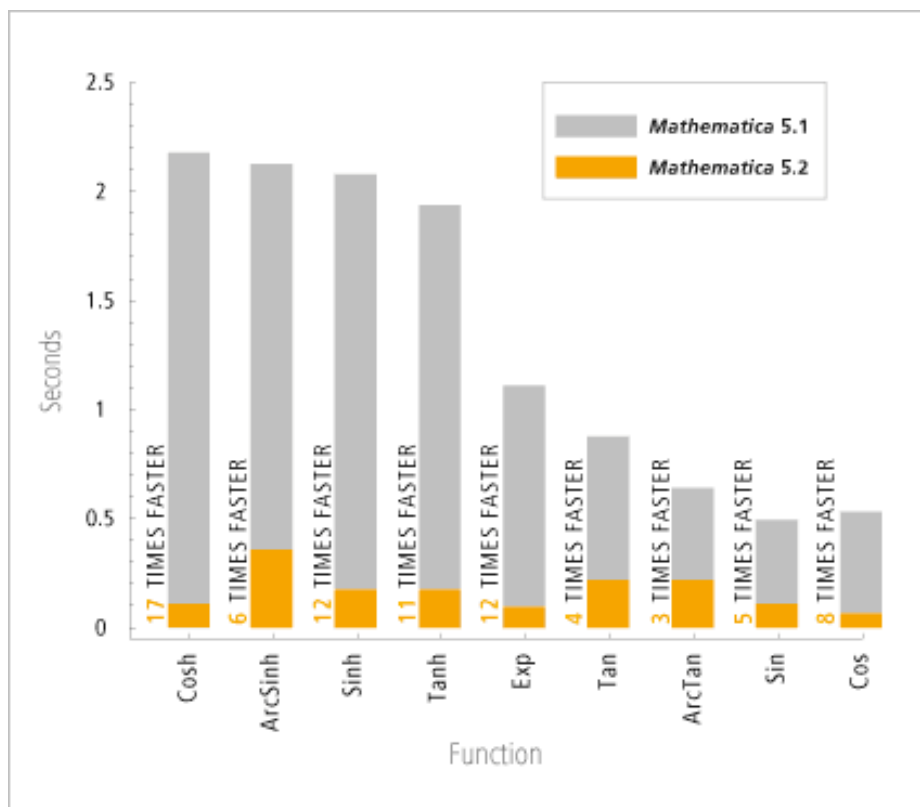
Which users can take advantage of multicore support?

To take advantage of the multicore/multiprocessor features, customers need to have a multicore or multiprocessor system.

■ Vector-based Performance Enhancements

Major speedups have been attained on key platforms when applying elementary functions to vectors, matrices, and arrays of floating point numbers.

Packed array technology—introduced in *Mathematica* 4—achieves this by utilizing vectorized math libraries optimized by CPU. On certain platforms these libraries use multicore technology.



Why is This Important?

Many computations in *Mathematica* require evaluating the same expressions thousands of times; examples include plotting, numerical integration, and solving of differential equations. Utilizing the vector units of modern processors like the Pentium 4 can speed up these computations significantly, improving performance throughout *Mathematica*.

■ Bundled Notebook Indexing for Desktop Search

The Wolfram Notebook Indexer has been included with *Mathematica* 5.2. After autoinitializing the correct plug-in for Google Desktop Search, Apple Spotlight, or the Windows Desktop, the Indexer parses notebook expressions so that *Mathematica* expressions, control language and arbitrary defined Unicode characters including Japanese, Chinese, and other 16-bit characters can be searched for.

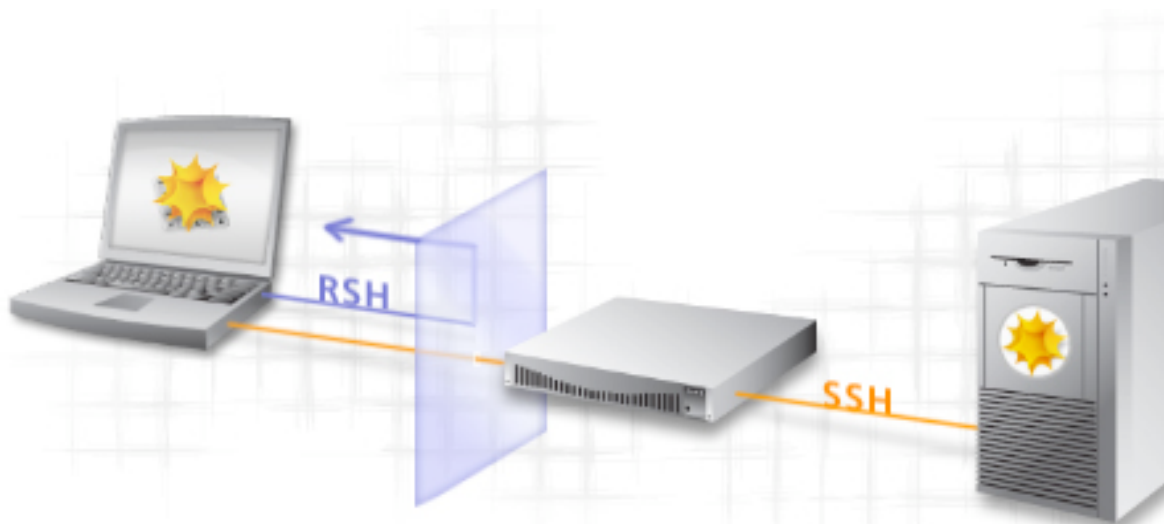
The Indexer supports extra features in certain indexers such as special category identifiers in Spotlight.

Why is This Important?

As Google explains on its site, “Desktop search is how our brains would work if we had photographic memories.” By making every notebook on your computer searchable, the Wolfram Notebook Indexer, together with the main desktop search utilities, puts your information easily within your reach and gives you additional options to find your *Mathematica*-based work quickly, even if you have thousands of notebooks and want to see, for example, only the ones that refer to “water table estimations.”

■ Support for SSH Security for Remote Kernels

Frontend and kernel communicate through a secure shell environment that is typical in many organizations, rather than just insecure connections such as remote shell.

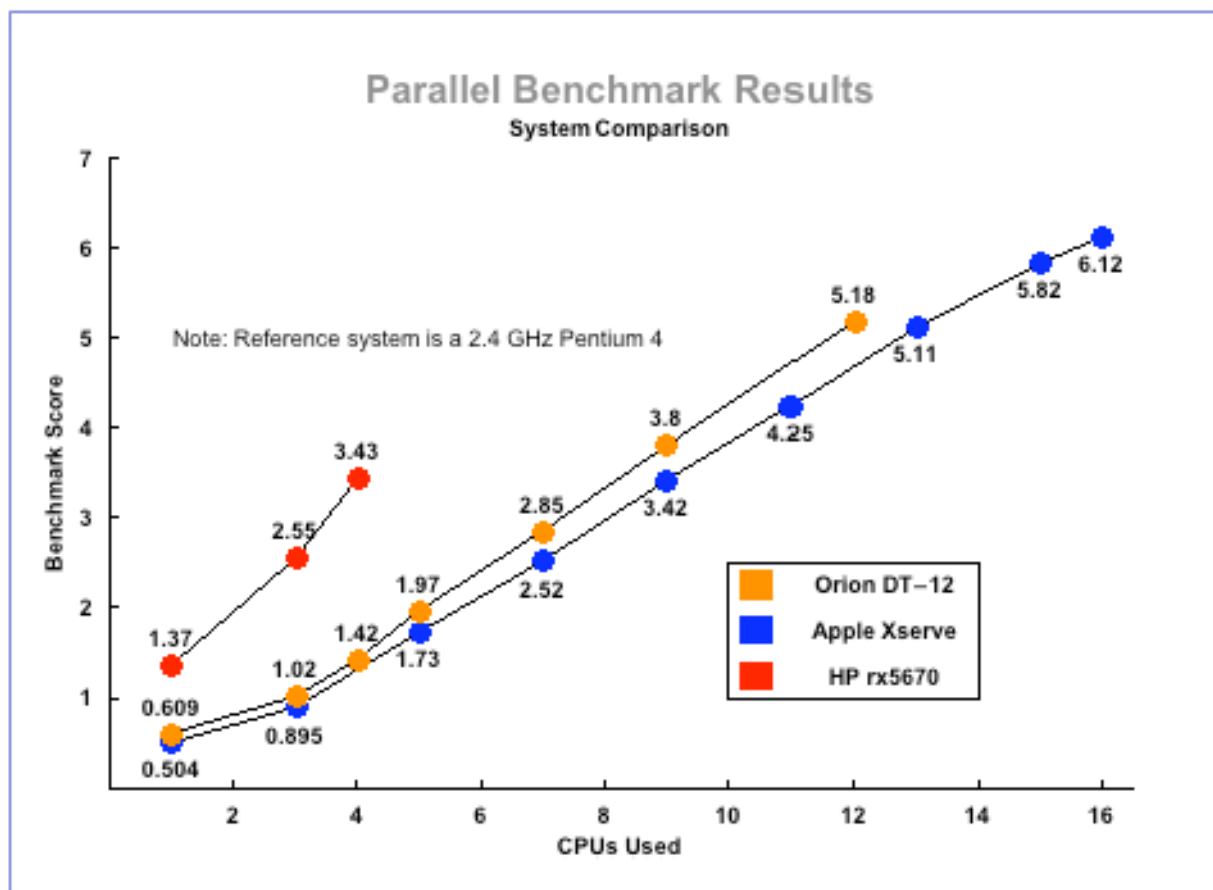


Why is This Important?

More and more of our customers are relying on the increasingly available clusters and grids to speed up their biggest computations using *gridMathematica* or *Parallel Computing Toolkit*. Increasing security concerns throughout IT departments have led many of them to rely on secure shell and other authentication and encryption technologies to secure their networks. Built-in ssh security in *Mathematica 5.2* makes this much easier.

■ MathematicaMark 5.2 Covering Grids & Clusters

MathematicaMark 5.2 provides scalability for *Mathematica* benchmark scores, allowing benchmarking of single-CPU systems as well as SMP machines, clusters, and grids.



Why is This Important?

- The performance that many users demand when using *Mathematica* press hardware to its limit.
- *MathematicaMark* creates quick benchmark reports that give existing and potential customers an accurate estimation of how well their computer performs and whether or not investing in different hardware would be advantageous.
- *MathematicaMark* is also of interest to computer manufacturers and reviewers because it tests and compares a wide range of capabilities,

■ Additional Computational Enhancements

Like any previous release, *Mathematica* 5.2 also includes numerous additions and enhancements to its mathematical capabilities, algorithm base, and other functionality.

- New algorithms for symbolic differential equations
- Enhanced performance for linear Diophantine systems
- Enhanced quadratic quantifier elimination
- Singular-case support for high-level special functions
- Enhanced statistics charts

Why is This Important?

As more methods have been added to *Mathematica*'s built-in functions, it allows our users to solve more and more problems—such as differential algebraic equations, piecewise equations, and first integrals of nonlinear PDEs—that cannot be solved in any other system.

These new methods are all fully integrated into *Mathematica*'s **automatic algorithm selection**, so users can take advantage of the functionality without having to learn new commands, or even being aware of it at all.

The Most Important Points to Communicate About *Mathematica* 5.2

Mathematica 5.2 is another step in the process of making *Mathematica* the best platform for high performance computing

- Universal 64-bit support means that there's effectively no memory barrier.
- Sparse and packed array technology introduced in *Mathematica* 4, 5.0 and 5.1 made computations highly memory efficient.
- Computational speedups since *Mathematica* 5 have improved some calculation times as much as 1000 fold. *Mathematica* 5.2 continues to outperform specialized numerical systems for many computations, while providing unmatched scope and scalability.
- Large speedups in import and export filters in *Mathematica* 5.1 removed final bottlenecks in the reading and writing of large data sets.
- Optional grid versions of *Mathematica* are available to distribute computations in parallel over multiple processors or computers.

In a sentence: *Mathematica* 5 introduced the computational power to analyze large amounts of data; 5.1 added the ability to read and write large binary data sets in near real time; and *Mathematica* 5.2 breaks the 4GB memory barrier on the desktop.

Mathematica 5.2 is optimized to take full advantage of the most modern processors and operating systems

Mathematica 5.2, together with the 64-bit and multicore CPUs from Intel, AMD, and Apple, and the recently released Windows XP Professional x64 Edition and Mac OS X 10.4 Tiger, brings 64-bit and multiprocessor/multicore support to mainstream desktop computers. It allows customers to solve much larger problems, solve problems with a higher resolutions, and lets them take full advantage of the most modern CPUs.

64-bit support means that customers can now execute computations that were impossible on Mac and PC with earlier versions. Even though the theoretical 32-bit limit is 4.3 Gigabytes, most systems, like Windows, limited a program to around 2.3GB. Over the last 4–5 years more and more *Mathematica* users have run into this limit as shown by technical support inquiries.

One important point to note is that although *Mathematica* supports 64-bit addressing, external libraries limit the size of any single *Mathematica* expression to about **4.2 billion elements**; for example, a single complex matrix cannot be larger than about 16GB. But *Mathematica* can perform operations on these variables that require many Gigabytes or Terabytes of memory.

This early support for 64-bit processing and multicore computers is unmatched by any other software

This support is unmatched by our direct competitors like Maple, Matlab, and Mathcad. The only one of our competitors offering any 64-bit support is Matlab, and their support is limited to the Linux operating system on AMD Opteron, or Intel EMT64 processors. But even their support is more limited than *Mathematica*'s on the same platforms. For reference, even the 64-bit version of Matlab can only have 2 billion elements per variable—and on anything but 64-bit Linux, that variable would fill up the entire memory space, so Matlab is unable to do any operations with variables of this size, except for 64-bit Linux on AMD or Intel EMT64 processors.

This unique capability of *Mathematica* makes it attractive as a technology demonstration for hardware and software vendors

Our close relations with hardware and operating system vendors has put *Mathematica* in the unique position of being the only commercial software available to fully utilize 64-bit computing. This has made *Mathematica* the demonstration software of choice at many prestigious events. For example, *Mathematica* 5.2 was recently featured in:

- Steve Jobs' keynote at the Apple WWDC
- The Microsoft keynote at WinHEC 2005
- The Intel venue at WinHEC 2005
- Both the Intel and AMD venues at Microsoft Tech·Ed 2005 in Orlando, Florida
- The Sun venue at the Design Automation Conference in Los Angeles, California
- The ClearSpeed Technology venue at the International Supercomputer Conference (ISC) in Heidelberg, Germany

Mathematica 5.2 will also be featured by Microsoft Japan after the release of the Japanese Edition.

Please feel free to approach hardware and operating system vendors in your territories.

***Mathematica* 5.2 is also a compelling upgrade for customers with older systems**

- *Mathematica* 5.2 improves core functionality with new algorithms for symbolic differential equations, enhanced performance for linear Diophantine systems, enhanced quadratic quantifier elimination, singular-case support for high-level special functions, and enhanced statistics charts.
- *Mathematica* 5.2 adds full text desktop searching in notebooks, letting customers find their *Mathematica*-based work quickly, even if they have thousands of notebooks and want to see, for example, only the ones that refer to "water table estimations".
- *Mathematica* 5.2 has many other enhancements, bug fixes, and minor tweaks (for example 75 performance and stability improvements for the `MeijerG` function alone).
- *Mathematica* 5.2 also adds support for Solaris 10 on x86-64.

Purchasing and Pricing

The list price for Mathematica is not changing for this release. Mathematica 5.2 is available at the same price as Mathematica 5.1 in all territories.

Trotz dieser enormen Leistungssteigerung sind die Preise unverändert konstant, seit 3 Jahren.

Siehe ADDITIVE eShop: <http://shop.additive-net.de/>

Mathematica V5.2, Windows, Preis Industrie: 3087,- EUR (inkl. MwSt., inkl 1 Jahr Update)

Mathematica V5.2, Windows, Preis Lehre: 1415,- EUR (inkl. MwSt.)

Mathematica V5.2 Student, Windows, Preise : 149,- EUR (inkl. MwSt.)

Mathematica V5.2 Student, Windows, Semestermiete : 35,- EUR (inkl. MwSt.)

Mathematica V5.2 Student, Windows, Jahresmiete : 55,- EUR (inkl. MwSt.)

Upgrade Policies

■ Upgrades from *Mathematica* 5.1

Upgrades from *Mathematica* 5.1 to *Mathematica* 5.2 will be available at 30% of the list price of *Mathematica* 5.2 (with appropriate rounding).

■ Upgrades from *Mathematica* 5.0

Upgrades from *Mathematica* 5.0 to *Mathematica* 5.2 will be available at a 20% surcharge over the upgrade price for *Mathematica* 5.1 users.

■ Upgrades from *Mathematica* 4.2

Upgrades from *Mathematica* 4.2 to *Mathematica* 5.2 will be available at a 40% surcharge over the upgrade price for *Mathematica* 5.1 users. See the Wolfram Research price list for your territory for details.

Marketing materials

What's new in 5.2 flyer

A printed two-page flyer listing new features of *Mathematica* 5.2 will be available for download at <http://www.wolfram.com/products/mathematica/>

Main *Mathematica* web site

www.wolfram.com/products/mathematica

What's new in 5.2

www.wolfram.com/products/mathematica/newin52

Revision history

www.wolfram.com/products/mathematica/history.html

Press information

media.wolfram.com

■ PR materials

The press kit for *Mathematica* 5.2 will be available at media.wolfram.com after the release of *Mathematica*. Wolfram Research, Inc., Wolfram Research Europe, and Wolfram Research Asia will be contacting press in all territories.

Press release

The *Mathematica* 5.2 press release will be available from www.wolfram.com/news/.

Reviewer's Guide, Screen shots and quotes

The *Mathematica* 5.2 reviewers guide will be available from media.wolfram.com.

Press Contact Information and Review Copies

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