

# webMathematica™ 2.3

## Reviewer's Guide

This guide provides key information for you to review webMathematica 2.3, an exciting technology from Wolfram Research. It will help you understand webMathematica 2.3's product design features, as well as its typical applications, technology, and fit within Wolfram Research's corporate strategy. Depending on your readers' interests, you may want to focus on ways end-users would benefit from webMathematica 2.3 or how webMathematica users would go about building a website.

## What is webMathematica?

webMathematica enables Mathematica® users and developers to add interactive calculations and visualization to any website using Mathematica as an engine. This simple concept incorporates a new generation of interactive functionality into websites.

The diagram below shows a view of a webMathematica site that can also be found online at [library.wolfram.com/explorations/webUnrisk](http://library.wolfram.com/explorations/webUnrisk).

The screenshot shows a web browser window displaying the 'webUNRISK' financial solutions website. The page features a 3D surface plot and a table of data. Several callout boxes point to specific features:

- Use templates to give your web site a consistent, professional appearance.** (Points to the website header and navigation bar)
- webMathematica custom tags integrate strongly with the standard Java web technologies Java Servlet and JavaServer Pages.** (Points to the 'RESULTS' button)
- Adjust your calculations interactively.** (Points to the 'RECALCULATE' button)
- Generate and display graphics and visualizations dynamically.** (Points to the 3D surface plot)
- Client technologies such as JavaScript and Java applets work seamlessly with webMathematica.** (Points to the 'CONTINUE TO NEXT STEP' button)
- Use familiar web interface elements such as buttons, drop-down lists, and text fields to control computations.** (Points to the 'RECALCULATE' button and the 'Adjust your data below' section)
- Select among multiple output formats.** (Points to the table of data)

Terminals	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
1	11840	11100	10300	10000	10000	10000	10000	10000	10000
2	13850	10240	10000	10100	10040	10010	10000	10000	10000
3	16210	10800	11600	10650	10160	10050	10020	10010	10010
4	18620	15720	12000	11000	10300	10150	10000	10010	10020
5	11470	10710	14000	11600	10000	10200	10140	10070	10040
7	16800	11570	16700	13200	11500	10700	10400	10260	10170
10	24000	17200	10000	16700	13100	11700	11000	10720	10500

Other applications of webMathematica include:

- Deploying problem-solving tools, calculators, and other functionality over the web
- Delivering specialized calculations to premium customers and/or within enterprise infrastructure
- Extending Mathematica applications to web-based education tools

- Serving pages that can be accessed from devices other than a computer (e.g., handheld electronics)
- Showcasing *Mathematica*-based work or hobbies in interactive web documents
- Publishing interactive courseware, textbooks, papers, and book supplements over the web
- Providing customized analysis and reports from corporate databases over the web (e.g., staff productivity, product inventory, competitive comparisons)
- Using information provided via web services to create interactive tools (e.g., weather data, stock quotes, map data)

More detailed descriptions and examples of these uses of web*Mathematica* can be found at [www.wolfram.com/webmathematica/uses](http://www.wolfram.com/webmathematica/uses).

### **How is web*Mathematica* different from *Mathematica*?**

*Mathematica* has long been the way technical people get their work done. Over two million users turn to *Mathematica* for computing, prototyping, programming, and communicating their results to others. *Mathematica* is used interactively or in batch mode for long computations and as a development tool for other *Mathematica* users.

web*Mathematica* is a technology for delivering specific *Mathematica* applications through a website so that end-users can access the application using a standard web browser. As an example, *Mathematica* is suitable for working on code that models some physical process—code that could then be placed into a web*Mathematica* site to enable people to run the model and use its results.

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## **Version 2.3 features**

web*Mathematica* 2.3 offers a number of new features and improvements.

### **Support for *Mathematica* 5.2**

web*Mathematica* 2.3 comes with *Mathematica* 5.2. The new version takes advantage of the latest web-development options and performance improvements in *Mathematica* 5.2, including support for 64-bit-enhanced arbitrary-precision numerics, multithreading support for numerical linear algebra, major vectorization speed-ups, and RSS and vCard import, as well as enhanced charts and visualizations.

### **Database connectivity**

*DatabaseLink* provides *Mathematica* with a powerful, ready-made solution for integrating *Mathematica* with any standard SQL database. Integrated with *Mathematica* 5.2, it provides a convenient bridge between SQL databases and web*Mathematica*. One particularly useful feature for web*Mathematica* is that *DatabaseLink* contains the HSQL Database Engine (HSQLDB), a lightweight database. This means that users who do not already have a database or want to experiment with using one do not have to set one up, instead they can use HSQLDB.

## **Client web services**

The *Web Services Package* allows *Mathematica* to call web services across the internet. Bundled with *Mathematica 5.2*, it provides a convenient way for *webMathematica* to use a web service. This is an important way to extend the functionality of a *webMathematica* website.

## **Authoring system**

*webMathematica Author* is an authoring system that aids in the creation and development of *webMathematica* material. A preview version is shipped with *webMathematica 2.3*.

## **Simpler installation**

*webMathematica 2.3* has a simple installation process that requires minimal configuration beyond the installation of the *webMathematica* web application.

## **Templating mechanism based on JavaServer Pages (JSP) custom tags**

HTML templating is done with JSP custom tags. This mechanism is easy to understand, allows the use of other JSP custom tag libraries, and facilitates the integration of *webMathematica* into other server applications.

## **MathML, SVG, and XML support**

Support for MathML and SVG is built into *webMathematica 2.3*, allowing users to describe equations and graphics in standard XML formats that can be read by browsers.

## **Support for catching message and print output**

Functions are provided for catching the output of any *Mathematica* `Message` or `Print` statements. This can be useful for debugging or developing material.

## **Support for HTTP file upload**

Functions are provided to support HTTP file upload, which allows users to submit data to a *webMathematica* web server.

## **Support for HTTP session variables**

Functions are provided for saving material in an HTTP session stored in the server. This can be useful for saving results from one computation to another.

## **HTML formatting functions**

Functions are provided for formatting results such as tables into HTML.

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## Suggestions for reviewing web $Mathematica$

There are different approaches to reviewing web $Mathematica$ . Depending on your readers' interests, you may want to focus on the ways end-users would benefit from a web $Mathematica$  website or how developers would use web $Mathematica$  technology to build a website.

A possible approach to familiarizing yourself with web $Mathematica$  for the purposes of reviewing it is as follows.

### Start by taking a look at the web $Mathematica$ website

Visit [www.wolfram.com/webmathematica](http://www.wolfram.com/webmathematica) for detailed information.

### Try some live examples at sites built with web $Mathematica$

Get an overview of how web $Mathematica$  can be used by experimenting with examples at [www.wolfram.com/webmathematica/examples](http://www.wolfram.com/webmathematica/examples) or any of our partner sites.

Information about select web $Mathematica$  users is included with your press kit. Other implementations by web $Mathematica$  users can be found at [www.wolfram.com/webmathematica/examples/others.html](http://www.wolfram.com/webmathematica/examples/others.html).

### Look at how the examples are written

If you would like to see what the code driving a web $Mathematica$  site looks like, click the document icon next to "View Code" in any of the examples at [library.wolfram.com/explorations](http://library.wolfram.com/explorations). The code is dynamically pulled out of the page and displayed using web $Mathematica$  technology.

### Take a look at the web $Mathematica$ User Guide

The entire documentation for our core products is available online at [documents.wolfram.com](http://documents.wolfram.com). This includes the web $Mathematica$  User Guide, the canonical source of information for web $Mathematica$ . The User Guide consists of about 200 pages.

### Contact us about installing your own server

One way to get a developer's view of web $Mathematica$  is to set up and run a web $Mathematica$  server. Please contact one of our public relations coordinators if you wish to do so. You can find their contact information at [media.wolfram.com/contact.html](http://media.wolfram.com/contact.html).

Keep in mind, though, that because web $Mathematica$  is a server product, it requires a more involved process to set up and operate than our desktop products, such as *Mathematica*, *Wolfram Publicon*<sup>®</sup>, or *Mathematica CalcCenter*<sup>®</sup>.

You should also be aware that making effective use of web $Mathematica$  requires a working knowledge of web server administration, HTML, and HTML forms.

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## What are web $Mathematica$ 's key advantages?

As stated on the product website, key technical advantages include the following.

### **Computational ability**

web $Mathematica$  sites can utilize any available  $Mathematica$  functions for web development. This allows developers to build technical computing web services—including numerical, symbolic, and graphical applications—of almost any magnitude to solve daily technical computing problems quickly and easily.  $Mathematica$  can also import and export over 40 data, sound, and image formats, enabling users to process data online.

### **Ease of use**

web $Mathematica$  delivers applications through a web interface. This means that in most cases the user interface consists of standard web GUI elements such as text fields, checkboxes, and drop-down lists. This enables most users to take advantage of these sites with little or no training. It also cuts training costs for companies, because employees no longer have to learn different software applications. In many cases, no  $Mathematica$  experience is required.

### **Server-based computation**

There is no software to buy, install, or maintain in order to use web $Mathematica$  sites. All end-users need is a web browser and, for some more advanced features like interactive 3D graphics, a Java Runtime Environment. This eliminates the necessity of buying and maintaining user software, leading to significant savings, and ensures that every end-user always has the most recent version. An additional advantage is that web $Mathematica$ -enhanced websites can be accessed from any computer or web-enabled device.

### **Full separation of server administration and content generation**

The server setup and content generation are completely separate so that system administrators and webmasters can set up the system once and then have others populate it. Content generators, be they engineers, writers, or instructors, do not have to understand or even have access to the underlying engine.

### **Standard server technology**

All web $Mathematica$  components are based on platform-independent standards such as HTML and Java to give web developers complete freedom to choose the hardware to run web $Mathematica$  and the software tools used to build web $Mathematica$  sites. This approach also gives organizations the flexibility to integrate web $Mathematica$  easily into existing IT structures, no matter what combination of hardware, operating system, web server, and servlet engine they use.

### **webMathematica kernel manager**

An important part of webMathematica is the kernel manager that calls *Mathematica* in a robust, efficient, and secure manner. The manager maintains a pool of one or more *Mathematica* kernels; by maintaining more than one kernel, it can process more than one request at a time. Each pool takes care of launching and initializing its kernels. When a request is received for a computation, a kernel process is removed to process the request and, upon completion, is returned to the pool. If any computation exceeds a preset amount of time, the kernel process is shut down and restarted. When the server is shut down, all the kernel processes are also shut down. These features maximize the performance and stability of the server.

### **Built-in universal database connectivity**

The new built-in *DatabaseLink* now provides an industrial-strength, ready-made solution for integrating webMathematica with any standard SQL database. This makes webMathematica the ideal web-based environment for providing analysis, computation, and reports to supplement the storage and searching capabilities of databases.

Using webMathematica for working with your database means:

- Applying the world's foremost high-level analysis system to your data over the web, from anywhere at any time
- Using *Mathematica's* high-speed data processing capabilities
- Choosing how to output results directly to the web, back to the database, or through another application
- Using the *Mathematica* language for encoding complex data manipulation, searching, or reporting—making programs many times shorter and faster to write
- Accessing *Mathematica's* unique tools for graphics and reporting
- Creating easy-to-use web interfaces for complex analysis

*DatabaseLink* is JDBC-based and works with all major databases, including Oracle and Microsoft Access. A lightweight database engine is also included, as are interactive point-and-click tools for making connections and querying data.

More information about *DatabaseLink* is available at [www.wolfram.com/solutions/databaselink/index.html](http://www.wolfram.com/solutions/databaselink/index.html).

Go to [www.wolfram.com/webmathematica/advantages](http://www.wolfram.com/webmathematica/advantages) for more information.

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## What is web $Mathematica$ used for?

### Business

Companies, financial institutions, and other commercial enterprises use web $Mathematica$  to build online calculators, problem solvers, as well as sophisticated data analysis and simulation tools. Whether over the web or a corporate intranet, web $Mathematica$  delivers the computational power of  $Mathematica$  to more people, without requiring them to learn extra software. With web $Mathematica$  *Professional*, businesses can develop free calculation services to attract traffic to their websites and offer enhanced tools for paying customers.

### Education

$Mathematica$  is currently used in many areas of education, especially mathematics, science, economics, and engineering. web $Mathematica$  extends the use of  $Mathematica$  to integrate web computation into the curriculum. Consistent with the general trend in education to develop web-based tools and offer distance education, instructors use web $Mathematica$  to encourage more interactive and hands-on learning.

### Publishing

web $Mathematica$  adds a new dimension to technical publishing on the web. Authors and publishers of textbooks and technical manuals use web $Mathematica$  to create live books and journals without having to incur printing and distribution costs. web $Mathematica$  also allows them to make their texts interactive by letting their readers solve and experiment with different problems.

### Research

Researchers all over the world use  $Mathematica$  to investigate their fields of specialization and develop techniques and algorithms for solving problems. web $Mathematica$  allows them to showcase their work through live interactive websites and immediately reach more people.

### Hobbies

Recreational scientists, artists, and other hobbyists use web $Mathematica$  to present their personal projects on the internet in a dynamic and professional way. *Premier Service* subscribers can use web $Mathematica$  *Amateur* free of charge for noncommercial applications.

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## web $Mathematica$ technology

web $Mathematica$  is based on a standard Java technology called “servlets.” Servlets are special Java programs that run on a web server machine. Typically they run in a separate program called a “servlet container” (or sometimes a “servlet engine”), which connects to the web server. Essentially all modern web servers support servlets natively or through a plug-in servlet container. These include Apache, Microsoft’s IIS, iPlanet, and so-called “application servers” (such as IBM WebSphere).

webMathematica technology enables a site to contain HTML pages that are enhanced by the addition of *Mathematica* commands. When a request is made for one of these pages, the *Mathematica* commands are evaluated and the computed result is placed in the page.

The following code calls *Mathematica's* Date function and returns the current date and time to the web browser. Note that this is standard HTML, except for the <msp:allocateKernel> tag, which is used once to allocate a *Mathematica* kernel, and the <msp:evaluate> tag, which is used to send commands to the kernel for evaluation.

```

<%@ page language="java" %>
<----|standard JSP headers
<%@ taglib uri="/webMathematica-taglib" prefix="msp" %> <----|

<html>      <-----standard html format
  <body>

    <p>The current date and time is:</p>

    <msp:allocateKernel> <--- allocates a Mathematica kernel

        <msp:evaluate> <---| Any Mathematica function inside
          Date[]      <---| this block is evaluated. The
        </msp:evaluate> <---| simplest way to create a new
          <---| webMathematica page is to
          <---| simply replace "Date[]" by
          <---| the function of your choice.

    </msp:allocateKernel>

  </body>
</html>

```

Here is a simple application that allows user interaction through HTML forms:

```

<%@ page language="java" %>
<----|standard JSP headers
<%@ taglib uri="/webMathematica-taglib" prefix="msp" %> <----|

<html>      <----|
<body>      <----|
<form action="Expand.jsp" method="post"> <----|
Enter a polynomial (e.g. x+y): <----| Standard html form
  <input type="text" name="expr" size="10"> <----|
Enter a positive integer (e.g. 4): <----|
  <input type="text" name="num" size="3"> <----|
  <input type="submit" value="Evaluate"> <----|
</form> <----|
<br> <----|

evaluation <----| Mathematica
<msp:allocatekernel> <----| with input from the
user. <----|
  <msp:evaluate> <----| This template could
be easily <----|
    <b>Expand[$$expr^$$num]</b> <----| modified to allow
simple <----|
  </msp:evaluate> <----| calculations with
any Mathematica <----|
</msp:allocatekernel> <----| function (e.g.
Integrate or Simplify).

```

```
</body>
</html>
```

You can find more information about the technology underlying *webMathematica*, including a step-by-step description of how *webMathematica* processes requests, at [www.wolfram.com/webmathematica/technology](http://www.wolfram.com/webmathematica/technology).

### **Inside story: The design of *webMathematica* technology**

*webMathematica* was designed to make it easy to embed *Mathematica* commands into HTML pages. An alternative design would have been to develop a library of commands, written in Java or C, that would interface over HTTP to a server. This would have been much more complicated to use. The simplicity of the interaction with HTML is a real strength of *webMathematica*.

Web technology has to strike a balance between client and server functionality. We decided to make *webMathematica* a server technology because the experience of *Mathematica* showed us the benefits of being able to draw on a broad range of functionality in technical computation. Any client that tried to provide all the useful functionality would become extremely large and would lose many of the benefits of web delivery.

*webMathematica* technology is founded on Java servlets, an extremely powerful standard web technology. We were very keen to use existing standards rather than develop our own server, which would have been necessary if we had based *webMathematica* on other web technology, such as CGI. Using standard technology means that standard tools and methodologies can be readily deployed. It also means that the technology is easily understood by web professionals.

### **Requirements**

The aim of *webMathematica* is to minimize the amount of extra knowledge required for developing a site. In practice, this means knowing something about HTML and *Mathematica*. Developers do not need any special knowledge of Java, nor do they need to know anything about JavaScript. *webMathematica* technology also aims to automate the management of the site to make running, maintenance, and configuration as convenient as possible. Administrators of *webMathematica* sites do not need any knowledge of Java beyond its installation.

The minimum technical components for *webMathematica* are:

- A servlet container supporting the Servlet Specification 2.2 (or higher) and JSP Specification 1.2 (or higher)
- A Java Development Kit (JDK) 1.4 (or higher); JDK 5.0 (or higher) is recommended

### **What is in the box**

#### *Constituent technology included in *webMathematica**

- *Mathematica* 5.2 with full documentation
- The *webMathematica* web application, a special configuration of files arranged to run inside a servlet container (includes *J/Link*<sup>™</sup>, *webMathematica* packages, and various Java class files)
- The *webMathematica* kernel manager, providing support for launching and shutting down *webMathematica* kernels and for configuring and monitoring the site as it operates

- LiveGraphics3D, a Java applet for displaying and manipulating three-dimensional graphics

***Documentation and examples included in webMathematica***

- webMathematica User Guide in notebook and PDF formats
- Getting Started Guide (installation card for Japanese version)
- Sample webMathematica pages
- Sample configuration files
- Sample applets
- Sample web pages
- Sample images
- Mathematica, C, and Java source code for all constituent technology except Mathematica 5.2 and LiveGraphics3D

***Certified configurations***

Please refer to the website for specific compatibility.

***Client software with tested compatibility:***

- Internet Explorer, Netscape Navigator, Mozilla, Safari, Omniweb
- HTML FORMs, JavaScript, plug-ins such as IBM techexplorer, applets, Active-X controls

***Server software with tested compatibility:***

- JSPs, Apache features, server-side Java, PHP

***Supported Java versions:***

- Minimum version: Java 1.4
- Recommended: Java 5.0 and above

***Servlet engines with tested compatibility:***

- Apache Tomcat, JRun, Sun ONE, Resin, BEZ WebLogic, JBoss, IBM WebSphere, Oracle 9i, ServletExec

***Web servers with tested compatibility:***

- Apache HTTP server, Microsoft IIS

***Supported server systems:***

- Any system supporting Mathematica 5.2 and Java 1.4 or higher

***Supported client systems:***

- Any system supporting HTTP access

## **Versions and licensing**

webMathematica comes in two major versions: webMathematica *Professional* and webMathematica *Amateur*.

webMathematica *Professional* is intended for the development of sophisticated intranet and internet sites. It offers commercial institutions convenient and easy-to-use web access to specialized computations for employees or premium customers.

web*Mathematica Amateur* is intended for those who wish to showcase their work over the web, providing an affordable way for hobbyists and researchers to build computational websites. It is subject to certain restrictions, the most important of which is that sites need to be freely accessible across the entire internet.

Complimentary copies of web*Mathematica Amateur* are available to schools and universities with most types of Wolfram Research site licenses.

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## How does web*Mathematica* fit into Wolfram Research's corporate strategy?

### **web*Mathematica* fills a major gap in the market**

Many web technologies, so powerful in various areas, are not well-suited to computation; it is simply not their main focus. web*Mathematica*, on the other hand, is ideal for scientific and technical computation and can provide this on the web. It also offers *Mathematica* developers, Value Added Resellers, and users a new way to distribute their work to a much larger audience.

### **web*Mathematica* forms part of the Wolfram Research range of products**

web*Mathematica* is part of Wolfram Research's plan to expand on its success with high-end technical solutions by providing compatible tools for all technical levels within an organization.

The suite of products includes:

- *Mathematica*—the high-level technical modeling and development environment
- *Mathematica CalcCenter*—the mid-level technical environment where professionals can perform their calculations
- web*Mathematica*—a tool for making technical solutions developed in *Mathematica* or *Mathematica CalcCenter* available to technical professionals or customers over the internet or corporate intranets
- *Mathematica Teacher's Edition*—a specially designed toolkit for math teachers to generate customized lessons, tailored assignments, and individualized quizzes with automatic answer keys
- *Wolfram Publicon*—a technical publishing environment for producing documents using the .nb notebook standard used by both *Mathematica CalcCenter* and *Mathematica*. *Publicon* is a cost-effective means for users without computational or modeling needs to use the .nb notebook as the technical document standard within an organization
- *MathReader*<sup>TM</sup>—a free tool for viewing, printing, and interacting with .nb notebook documents created by other Wolfram Research products. *MathReader* allows universal access to .nb documents within an organization without licensing costs

Versatile .nb notebook documents are compatible across all of these products. For example, a web-*Mathematica* site could return a .nb notebook to a client where it then could be used as a permanent document to record the results of a computation. The .nb document could be opened by *Mathematica*, *Mathematica CalcCenter*, or *Publicon*.

## **webMathematica builds infrastructure for communicating technical knowledge**

Stephen Wolfram's original vision was to build an integrated technical computing software system that would enable him and other users with technical computing needs to do everything in a single unified system.

"[In the mid to late 1980s] I needed to do lots of calculations and complicated experiments. I was analyzing how I spent my time—the majority of it was spent thinking what to do and cobbling together programs and tools that would enable me to do it. I realized it would be nice to have a unified, integrated system to do everything: graphics, algebraic calculations, documents, and so on. The main conceptual achievement was that symbolic processing could be the underlying foundation. Nature's complexity inspired the idea that computational systems could parallel intellectual activity."

Stephen Wolfram in *Scientific Computing World*, December 1996

With the advent of the internet, this vision has expanded to building a *Mathematica*-based infrastructure that will enable scientists, researchers, and other technical professionals to collaborate and distribute technical knowledge in a networked world. Starting with simple HTML export in *Mathematica* 3.0, Wolfram Research has been assembling the base technologies necessary to create the standards that will enable this infrastructure to be built. Expanding on those technologies, *Mathematica* 4.0, released in 1999, integrated MathML, an XML application for use and reuse of mathematical and scientific content on the web. Wolfram Research released *webMathematica*, in 2001, which gave us the ability to provide interactive computations and exploration over the web. The *Web Services Package* was developed in 2003, to integrate *Mathematica* and web services, letting a user call web services from *Mathematica* in a completely transparent way. Building on 5.2's dramatic speed, scope, and scalability improvements, and host of new capabilities, especially for working with large-scale, diverse types of data, *webMathematica* now provides the leading all-in-one solution for creating powerful interactive websites for research, business, and education.

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## **Wolfram Research: Committed to quality**

Wolfram Research design principles set *webMathematica* apart from other technical software—and give developers confidence. Most importantly, Wolfram Research brings the knowledge and technology developed during decades of building technical software to *webMathematica*. Some of the results of this experience follow.

### **Tested technology**

The underlying engine for *webMathematica* computations is *Mathematica*, one of the world's most thoroughly tested software products. Wolfram Research's software quality assurance program is one of the most sophisticated in the industry. Every week, throughout the development process, *Mathematica* is subjected to an extensive battery of manual and automated tests, including comparisons of nearly a half million computations (chosen from books of tables, bug reports, documented behavior, and other Wolfram Research generated tests) with known results. *Mathematica*'s ability to solve many problems in a variety of different ways (thereby allowing self-checking, automatic numerical precision control, and testing by the people who have used *Mathematica*) contributes further to its robustness. Because *Mathematica* is now viewed as a standard for reliability, many major companies specifically test their products against it.

## Testing methodology

*webMathematica* has benefited from the methods of the large Software Quality Assurance team at Wolfram Research. In over a decade of working with *Mathematica*, they have developed and fine-tuned automated testing tools and intelligent manual testing methodologies.

## Design quality

Wolfram Research also brings its vast experience in software engineering to *webMathematica*. Understanding the manner in which different pieces of technology interact, as well as how users interact with software, has driven careful interface design to make *webMathematica* as easy to use as possible for its target audience. One of the most critical decisions was to completely separate server setup and content generation, so system administrators and webmasters can set up the system once and then have others populate it. Any content generators (i.e., engineers, writers, or instructors) do not have to understand or even have access to the underlying engine.

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## About Wolfram Research

Wolfram Research is the world's leading developer of computational software for science and technology, offering organization-wide computing solutions. Led by *Mathematica*, its flagship product, the company's software is relied on today by several million enthusiastic users around the world and has been the recipient of many industry awards. Wolfram Research was founded in 1987 by Stephen Wolfram, who continues to lead the company today. The company is headquartered in the United States, with offices in Europe and Japan.

A full company background and history of Wolfram Research, including a history of *Mathematica* and information about corporate structure, grants and sponsorships, web resources, and other company contributions to research and education, is available at [www.wolfram.com/company](http://www.wolfram.com/company).

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