WebMathematics Interactive

2.1.6

the symbolic calculator for the today's student

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Why yet another math software?

Most computer algebra systems...

- are **non-free**
- have no full **internationalized** (localized) version
- have different and difficult **syntax**
  (even for teachers, not only for students!)
- start too slow (even on recent machines)
- have big **memory demand**
  (for parallelly run other software as well)
- react to user questions sometimes **slow**
  (depending on the running machine)

By contrast...

WMI2...

- is **free** and using **free modules** (Maxima, gnuplot, LaTeX, PostgreSQL, PHP, Apache, Linux)
- offers open standards for complete **localization**
- uses a common, **easy syntax** (which can be described in not more than 10 sentences)
- on broadband internet connection it starts always **very fast** (independently of the machine)
- has very **low memory** demand on client machines
- on broadband internet connection it reacts very fast

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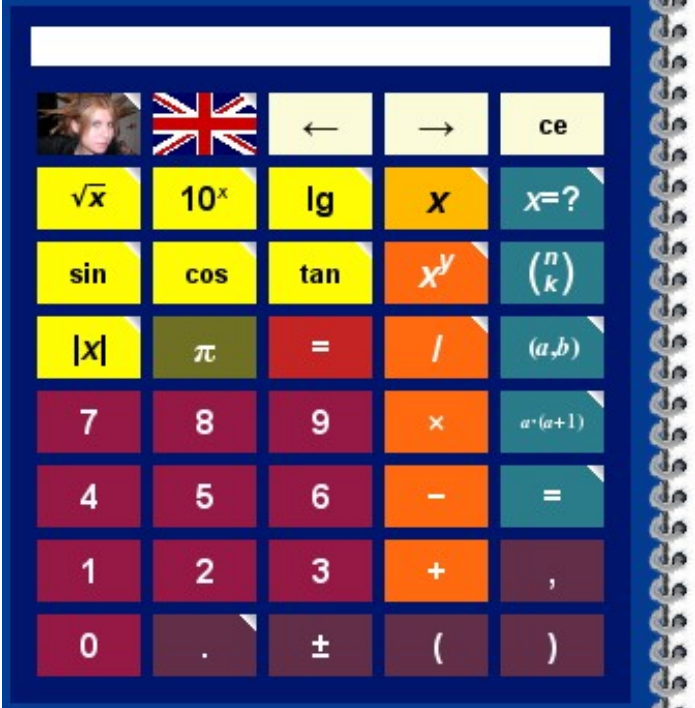

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Underlying software:

What is WMI2 exactly?

A graphical user interface for the *Maxima CAS* and the *gnuplot function plotter* (and other backends) and...

- focuses on **calculator-like functions** (>70 actions)
- saves calculations on a **worksheet**
- offers an **intuitive web interface** on-line 7/24
- has an automatic **formula syntax corrector** and converter
- defines 6 different **layouts** for different groups of students (school types and object categories)
- is available in **10 languages** (English, German, French*, Italian, Chinese**, Czech, Slovak, Serbian and Hungarian)

How does WMI2 work?

- The server software is installed on a **remote server** machine (or more machines, using load balancing)
- The user on the client side downloads a minimal **HTML/Javascript** code for interaction to the server
- All computations and formula generation are done on server side
- Only displaying formulas and graphs (both as images) are done by the **browser** on client side
- The server side is **caching** all queries (both questions and answers) to efficiently serve classroom usage

Do similar free projects already exist?

In general: no, but...

- **SAGE**: web based math worksheet editor
- **WxMaxima**: internationalized Maxima
- many web based and native application calculators
- **GeoGebra**: webstart (Java based)
- **MAW** (Mathematics Assistant on the Web)
- **jsMath**, **ASCIIMathML** (JavaScript formula editors)
- **DragMath** (Java formula editor)
- **Wolfram|Alpha** (knowledge base)

Who is behind WMI2?

- **University of Szeged, Bolyai Institute** (demand, testing, teacher experts)
- **Particio.com**, a for-profit company (development, web installations, management, support)
- Contributor students and colleagues

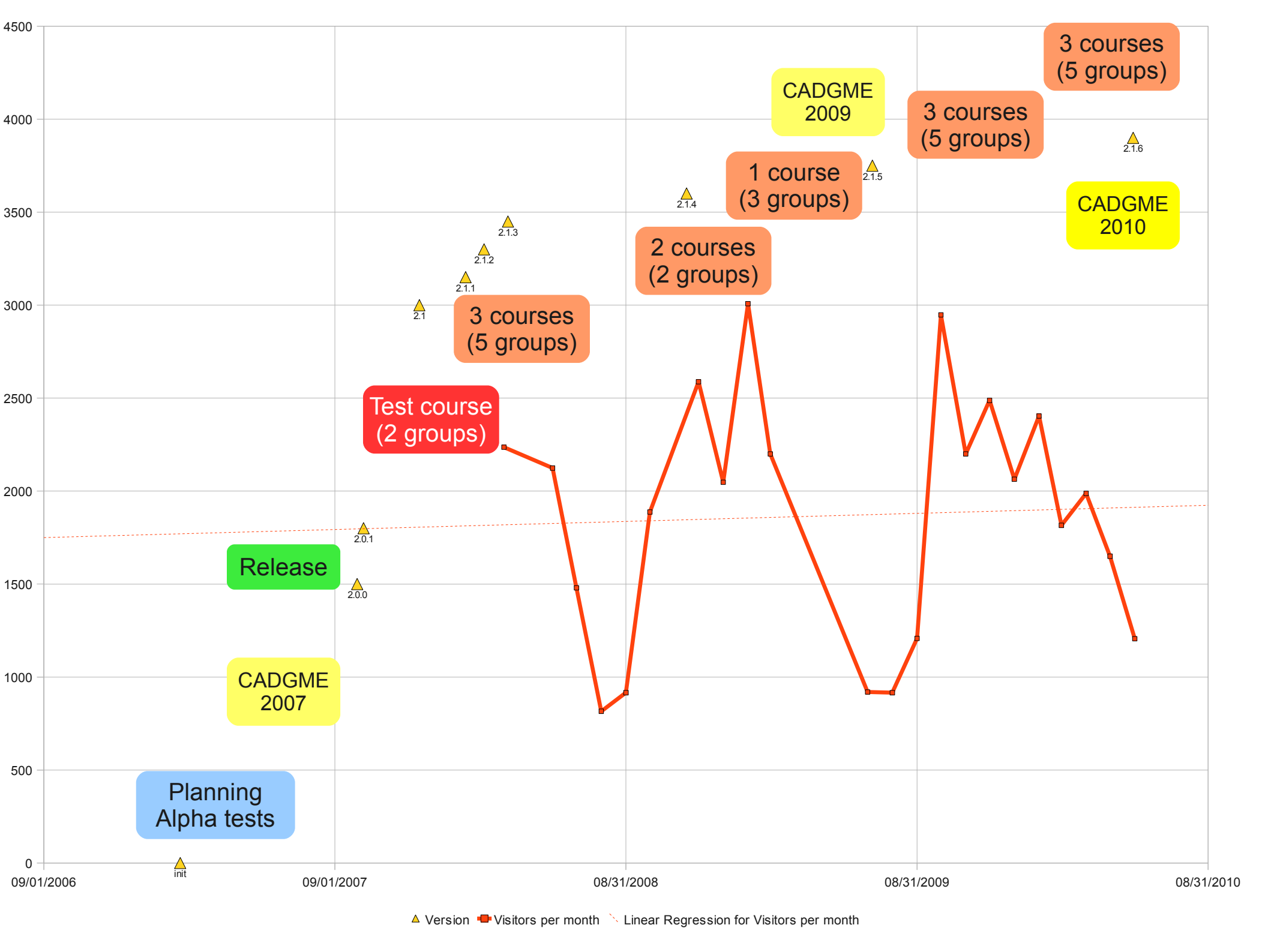
Who does WMI2 use?

- **University of Szeged, Hungary**: BSc/BA education
- **Brno University, Czech Republic**: Bsc education
- **University of Komárno, Slovakia**: Bsc education
- **Chang Gung University, Taiwan:** medical education (introductory mathematics)

WMI2 at Szeged

→ The WMI2 story

→ Development news


4500
4000
3500
3000
2500
2000
1500
1000
500
0
09/01/2006
09/01/2007
08/31/2008
08/31/2009
08/31/2010
init
2.0.0
2.0.1
2.1
2.1.1
2.1.2
2.1.3
2.1.4
2.1.5
2.1.6
Planning
Alpha tests
CADGME
2007
Release
Test course
(2 groups)
3 courses
(5 groups)
2 courses
(2 groups)
1 course
(3 groups)
CADGME
2009
3 courses
(5 groups)
CADGME
2010
3 courses
(5 groups)
Version
Visitors per month
Linear Regression for Visitors per month

Groups using WMI2 as a supplementary tool

	2007/8	2008/9	2009/10
Calculus	5		1
Elementary mathematics	1		1
Numerical methods	1	4	5
Software for teachers		1	2
Practical mathematics			1
Overall	*7*	*5*	*10*

WMI2 at Szeged

→ The WMI2 story

→ Development news

What's new in 2.1.6?

And why?

Didactics

Mathematical background to be explained

→ Wikipedia contributions

(detailed existing pages + new articles)

Visualizing complex functions

→ fast complex computation

(borrowed from WMI1/formconv + Ajax)

Parametric plots

→ fast parametric plots

(gnuplot + Ajax)

What's new in 2.1.6?

And why?

Intuitivity

Shortage of demo examples

→ Mediawiki site

→ API by allowing URL parameters

Ease of use

→ enhanced mouse accessibility for slow users

→ confirmation on user requested page closing

→ easy export to other systems (images, formulas)

What's new in 2.1.6?

And why?

Robustness

Sensitivity of sudden thrust of network load

→ Performance estimation + load balancing

→ Hardware issues to solve by software

(Ethernet technology, buggy network cards)

Fast start

→ co-operation with the fastest web browsers

(Google Chrome)

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Underlying software:

What's new in 2.1.6?

And why?

Maintenance

Standards compliance
→ W3C validation
→ support for new versions of the web browsers

Installation
→ detailed documentation for Debian Linux

Statistics
→ munin plugin
→ logrotate support

What are the plans?

Didactics

Detailed deduction

(Transparent) connection to exercise databases

What are the plans?

Intuitivity

Full English/localized documentation

Support for other languages

What are the plans?

Robustness

HTML5 support

Adding new cells to WMI2 grid (on demand)

Enhanced hardware (on demand)

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Underlying software:

What are the plans?

Maintenance

More automatism on creating statistics

Automatic database cleanup

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Acknowledgements

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