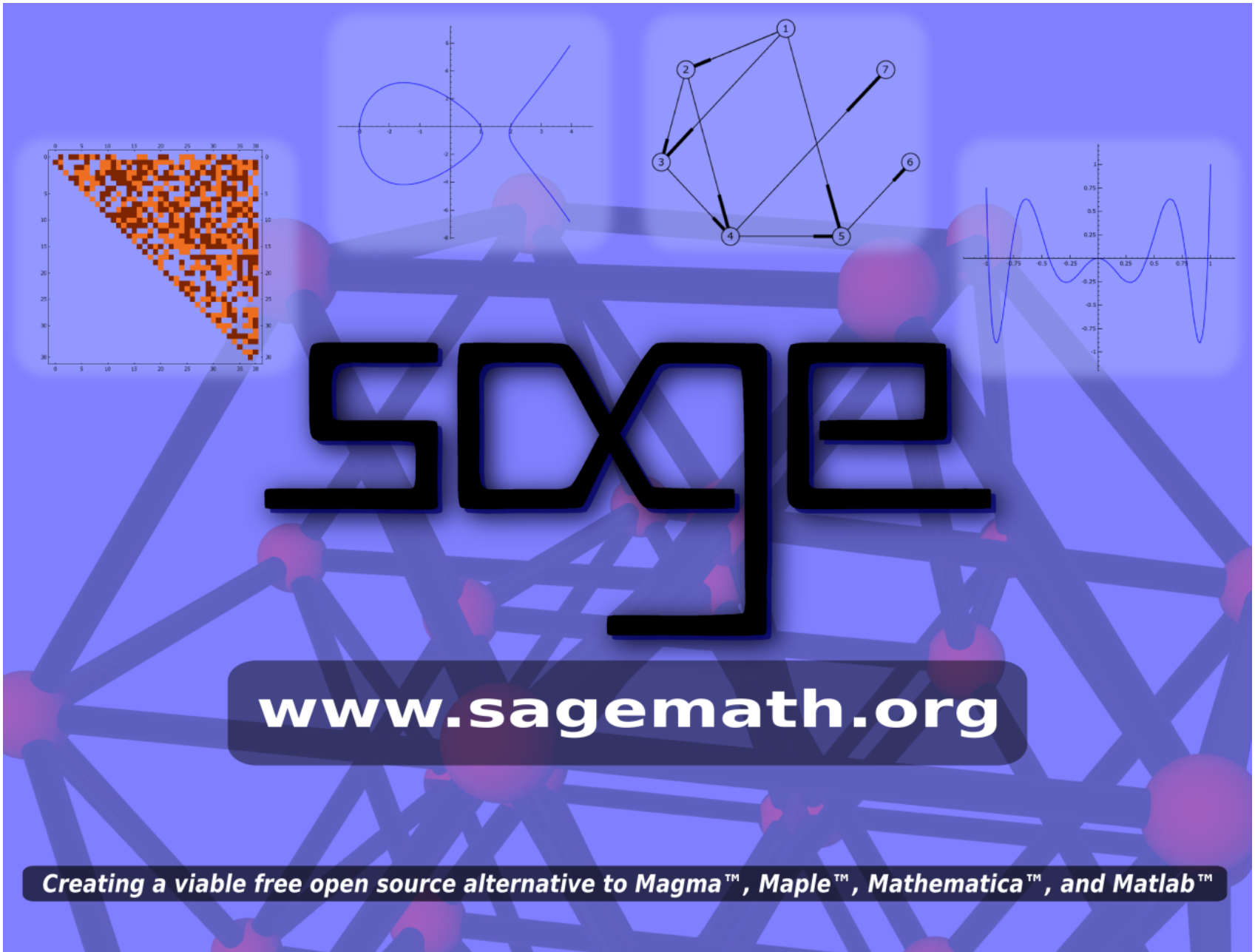

sage
www.sagemath.org
Creating a viable free open source alternative to Magma™, Maple™, Mathematica™, and Matlab™

# Outline

# History: Where did Sage Come From

| | |
|---|---|
| 1997–1999 | (**Berkeley**) **HECKE** – C++ (modular forms) |
| 1999–2005 | (**Berkeley**, **Harvard**) I wrote over 25,000 lines of **Magma** code. |
| | Ad hoc languages and closed source devel models of Magma, Mathematica, Matlab, and Maple are **old-fashioned and painful**. I must **see inside and change anything** in my software in order to be the best in the world at my research. |
| | **For me, Magma is a bad long-term investment**. |
| Feb 2005 | I released **SAGE-0.1** (over 3 years ago!) |
| Feb 2006 | **UCSD SAGE Days 1** workshop – SAGE 1.0. |
| October 2006 | **U Washington SAGE Days 2** workshop. |
| March 2007 | **UCLA SAGE Days 3** workshop. |
| May 2007 | Sage NSF grant– funds Clemenet Pernet. |
| June 2007 | **U Washington SAGE Days 4** workshop. |
| October 2007 | **Clay Math Institute SAGE Days 5** workshop. |
| November 2007 | **Heilbronn Institute SAGE Days 6** |
| Feb,Mar 2008 | **IPAM Sage Days 7**; **Austin Sage Days 8** |
| June 2008 | **Sage Devel Days 1** at UW. |

## Sage: Mission Statement

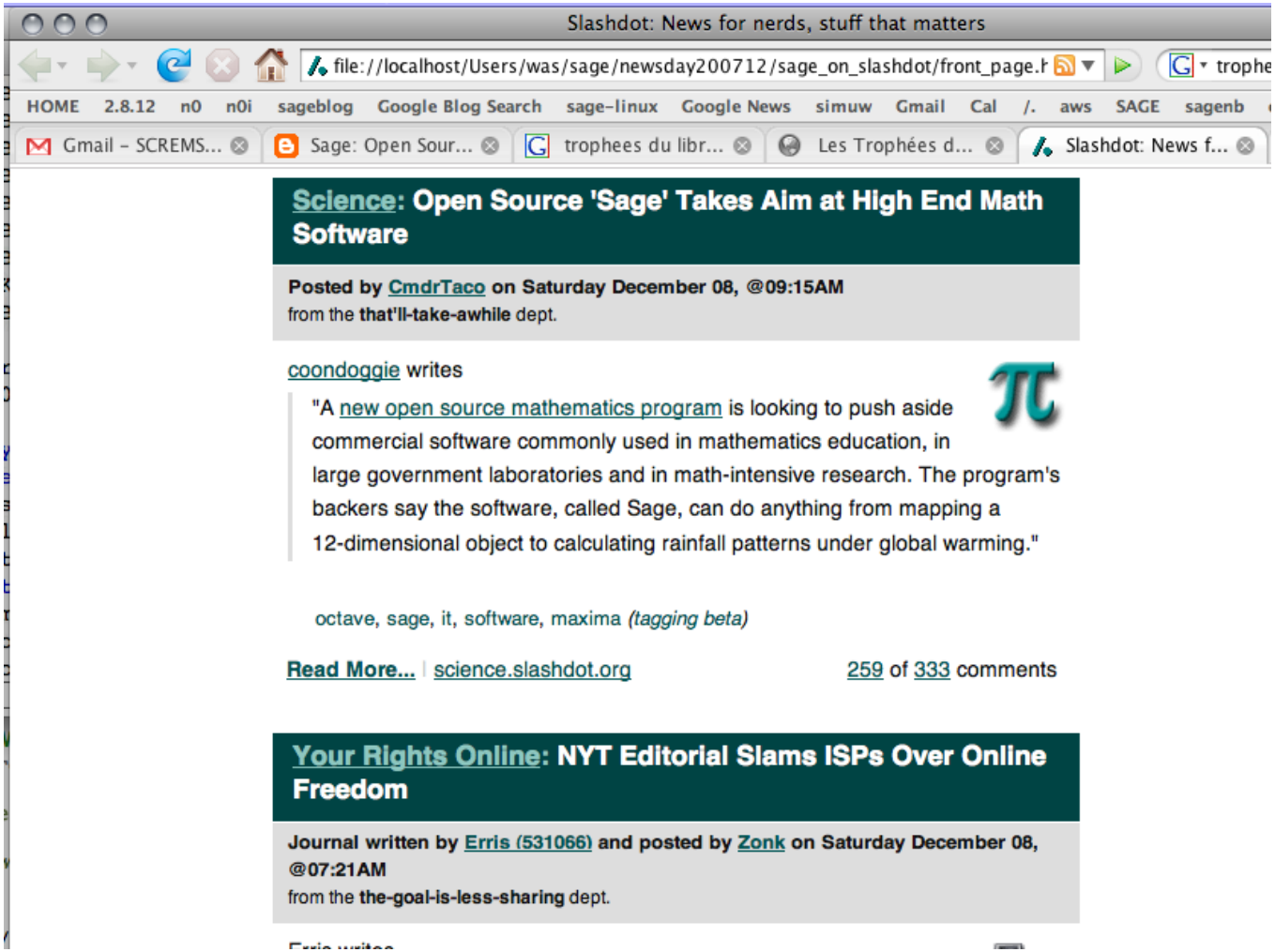
Provide a uniform open source high-quality **viable alternative** to **Magma, Mathematica, Maple** and **MATLAB**.

Do not reinvent the wheel but **reuse** as many **existing building blocks** as possible and make sure the result is **rigorously tested**, **easy to modify** by the end user and **very well documented**.

Also create a **helpful environment** and community (mailing lists, irc-channel, workshops, coding sprints).

**Teach courses**, write articles and books, so Sage is easy to learn.

# Nov 2007: Sage wins first place in Tropheés du Libre and gets slashdotted...




Tons of articles all over resulted, about 10,000 downloads in a weekend, etc...

# What is Sage?

Sage is a very large mathematics software package developed by a worldwide community of over 50 developers. Sage is:

1. a **distribution** of the best free, open-source mathematics software available (Sage 2.11 ships about 70 packages) that is easy to compile or install from binaries.

2. a **new library**, filling in gaps in functionality so Sage covers a wide range of algebraic, scientific, and statistical computing.

3. **interfaces** to almost all existing mathematics software packages (including Magma, PARI, Gap, Matlab, Mathematica, Maple, etc.) **The interfaces work now and can do almost anything; they are NOT OpenMath vaporware.**

# The Language of Sage

**Python** is a powerful modern interpreted programming language.

- "Python is fast enough for our site and allows us to **produce maintainable features in record times**, with a minimum of developers," said Cuong Do, Software Architect, **YouTube.com.**
- "Google has made no secret of the fact they use Python a lot for a number of internal projects. Even knowing that, once **I was an employee, I was amazed at how much Python code there actually is in the Google source code system**.", said Guido van Rossum, **Google**, creator of Python.
  well, I wouldn't advertise with Episode II ;-)
- "Python plays a key role in our production pipeline. Without it a project the size of **Star Wars: Episode II** would have been very difficult to pull off. From crowd rendering to batch processing to compositing, **Python binds all things together**," said Tommy Burnette, Senior Technical Director, **Industrial Light & Magic.**

**You will all learn Python during the next two weeks!**

# Python & Cython: The Main Languages of Sage

http://www.python.org and http://www.cython.org


**Python**

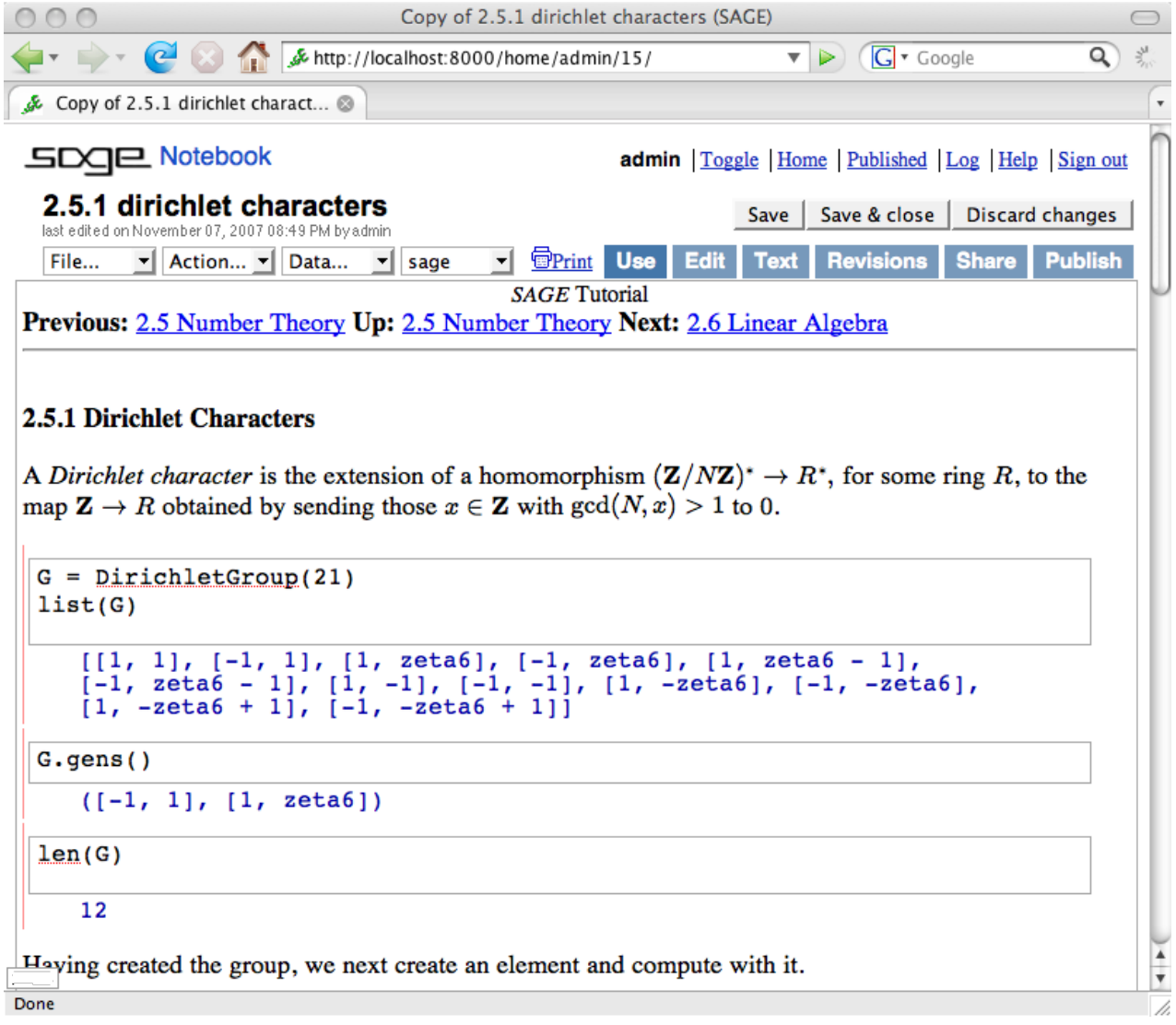
- A mainstream language with millions of users.
- **TIOBE declares Python as programming language of 2007!** "Python has been declared as programming language of 2007. It was a close finish, but in the end Python appeared to have the largest increase in ratings in one year time (2.04%). There is no clear reason why Python made this huge jump in 2007. Last month *Python surpassed Perl* for the first time in history, which is an indication that Python has become the "de facto" glue language at system level. It is especially beloved by system administrators and build managers. Chances are high that Python's star will rise further in 2008, thanks to the upcoming release of Python 3."

**Cython**: compiled Python – lead developer (Robert Bradshaw at UW)

- Growing and getting used in other projects...
- Cython is for some people definitely one of the main "killer features" of Sage over Magma.

# A Powerful Web-based Graphical User Interface

public notebooks available at `http://www.sagenb.org`




- graphical user interface
- plotting
- LaTeX typesetting
- remote access
- worksheet sharing
- interface to 3rd party systems, e.g. Magma

# Demo

# Getting Started With Sage

Web page: `http://sagemath.org`

1. Install Sage 2.11 on your computer ASAP.
2. The online documentation
3. Mailing lists
4. Sage seminar
5. Other UW students
6. Sage Days 8.5 in June (13-20).