



Viviane Pons

Maître de conférence, Université Paris-Sud Orsay
viviane.pons@lri.fr – @PyViv

SageMath

Introduction

SageMath is a free open source mathematics software

- ▶ Created in 2005 by William Stein.
- ▶ <http://www.sagemath.org/>
- ▶ Mission: *Creating a viable free open source alternative to Magma, Maple, Mathematica and Matlab.*

- ▶ the main language of Sage is **python** (but there are many other source languages: cython, C, C++, fortran)
- ▶ the source is distributed under the GPL licence.

One of the original purpose of Sage was to put together the many existent open source mathematics software programs: Atlas, GAP, GMP, Linbox, Maxima, MPFR, PARI/GP, NetworkX, NTL, Numpy/Scipy, Singular, Symmetrica,...

Sage is **all-inclusive**: it installs all those libraries and gives you a common python-based interface to work on them.

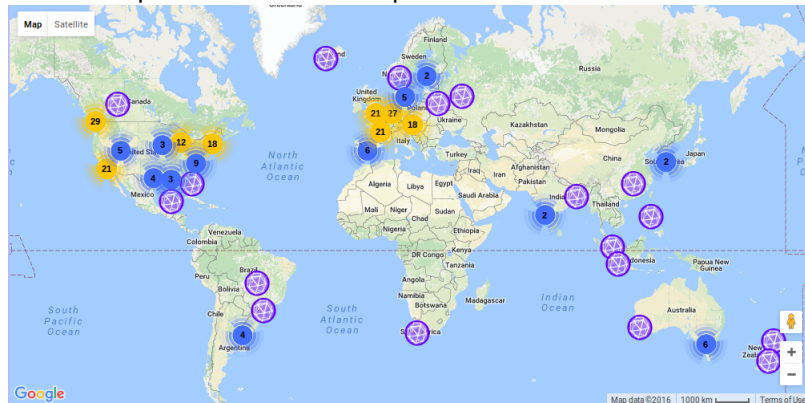
On top of it is the python / cython Sage library it-self.

Development model

- ▶ **Sage is developed by researchers for researchers:** the original philosophy is to develop what you *need* for your research and *share* it with the community.
- ▶ The first full-time Sage developer has been recruited last January at Paris-Sud university by the OpenDreamKit project.
- ▶ The code is maintained through a git repo with a system of tickets and peer-review for new contributions:
<http://trac.sagemath.org/>

The Sage community

268 developers in 182 different places.



Mailing lists, Sage days

Funding?

- ▶ Runs without permanent funding
- ▶ Benefit from local funding sources
- ▶ Since 2015: The **OpenDreamKit** project

OpenDreamKit 2015 – 2019

Open Digital Research Environment Toolkit for the Advancement of Mathematics

A project funded by the Horizon 2020 European Research Infrastructures Work Programme.

OpenDreamKit 2015 – 2019

Open Digital Research Environment Toolkit for the Advancement of Mathematics

A project funded by the Horizon 2020 European Research Infrastructures Work Programme.

- ▶ A budget of 7.6 millions run by 18 partner institutions in 7 countries

OpenDreamKit 2015 – 2019

Open Digital Research Environment Toolkit for the Advancement of Mathematics

A project funded by the Horizon 2020 European Research Infrastructures Work Programme.

- ▶ A budget of 7.6 millions run by 18 partner institutions in 7 countries
- ▶ Provides funding for many Open source mathematical software and projects: SageMath, GAP, PARI, Singular, Jupyter, LMFDB...

OpenDreamKit 2015 – 2019

Open Digital Research Environment Toolkit for the Advancement of Mathematics

A project funded by the Horizon 2020 European Research Infrastructures Work Programme.

- ▶ A budget of 7.6 millions run by 18 partner institutions in 7 countries
- ▶ Provides funding for many Open source mathematical software and projects: SageMath, GAP, PARI, Singular, Jupyter, LMFDB...
- ▶ Pays for full time developers, events, infrastructures

Aims

- ▶ Foster the ecosystem of open source software for pure mathematics and beyond
- ▶ Deliver a flexible Virtual Research Environment toolkit supporting collaborative work of soft, data, and knowledge

Main tasks

- ▶ Modularization and interfaces between systems
- ▶ Build, documentation, tests systems
- ▶ Portability, distribution, deployment
- ▶ High Performance
- ▶ Interactive collaborative computing environments
- ▶ Mathematical databases
- ▶ Research on social aspects of math soft development
- ▶ Community building and training

Follow us...

- ▶ <http://opendreamkit.org/>
- ▶ Twitter: @OpenDreamKit

Now, back to SageMath

What can I do with it?

Number theory, combinatorics, graph theory,...

Most things: *Calcul Mathématique avec Sage*

How can I use it?

- ▶ native install on Linux and Mac
- ▶ install through a virtual machine on Windows (new: native install on Windows)
- ▶ online on **CoCalc**

Cocalc

CoCalc is an online open-source **platform** where you can use Sage and more.