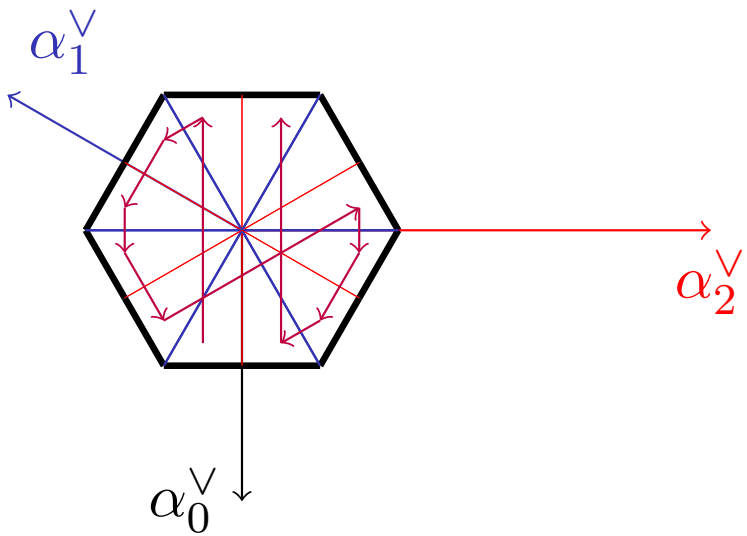
∗-Combinat: sharing combinatorics since 2000

Nicolas M. Thiéry

With slides from Franco Saliola, Florent Hivert, Dan Drake, William Stein, ...

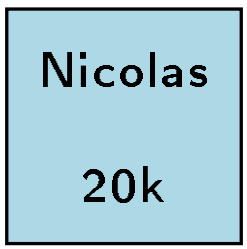
Laboratoire de Mathématiques d'Orsay, Université Paris Sud

Nikolaus Conference 2010, Aachen, 11/12/2010

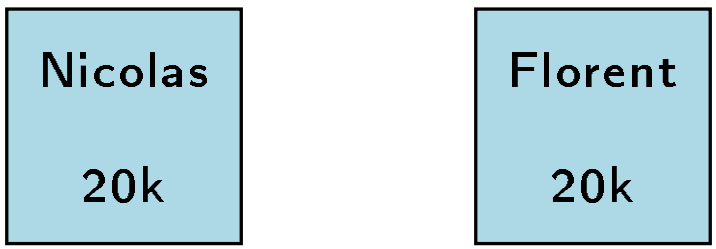


*-Combinat: it all started there

*-Combinat: 1



*-Combinat: 1+1 =



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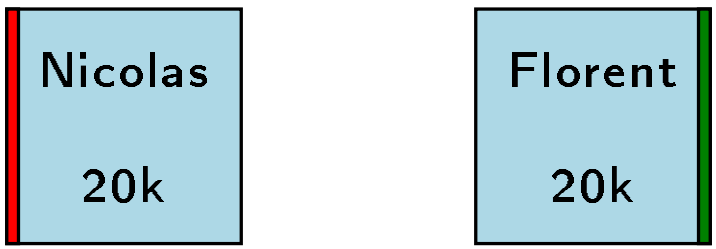

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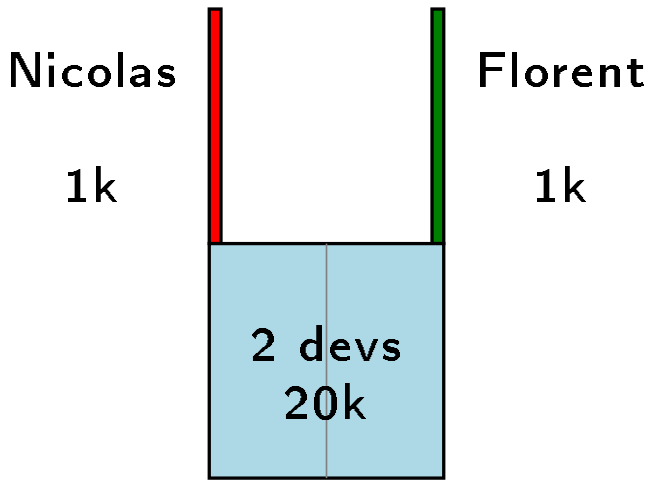

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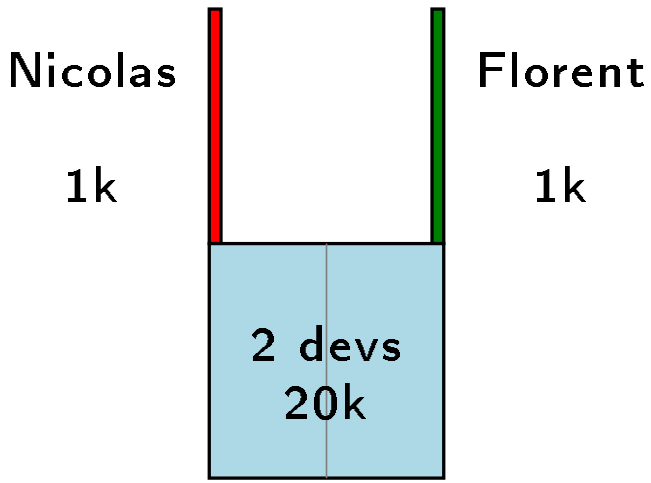

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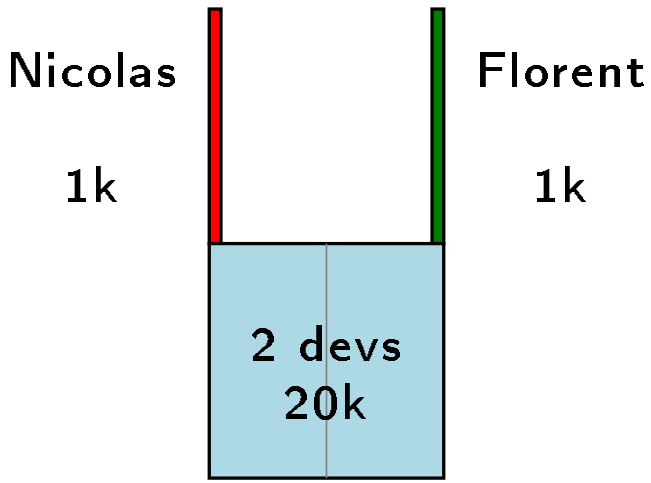

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- Opportunity for sharing and mutualisation

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- Based on a general purpose system

State of the art in 2000

Algebraic combinatorics packages

- Algolib: guess, combstruct, gfun, CS, ... (Projet Algo, INRIA)
- SF, coxeter/Weyl, poset (Stembridge)
- ACE, μ-EC (Marne-la-Vallée)
- Symmetrica (Bayreuth)
- Rate, ...

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Platforms

- Maple / Maxima / Mathematica
- GAP
- Magma
- Axiom / Aldor
- MuPAD

*-Combinat in a nutshell

`http://mupad-combinat.sf.net`
`http://combinat.sagemath.org`

Mission statement: *"To improve MuPAD/Sage as an extensible toolbox for computer exploration in combinatorics, and foster code sharing among researchers in this area"*

The ∗-Combinat Project

- *December 2000:* Birth of the project
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- *June 2008:* Migration to Sage
- *December 2010:* Nikolaus 2010!

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- MuPAD: 115k lines of MuPAD, 15k lines of C++, 32k lines of tests, 600 pages of doc
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And you ?

Sage's mission

"To create a viable high-quality and open-source alternative to Maple^{TM}, Mathematica^{TM}, Magma^{TM}, and MATLAB^{TM}

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and to foster a friendly community of users and developers"

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- Developed by a community of users, for users
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- "Build the car, don't reinvent the wheel"
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- Bazaar development model
- Active proselytism

A short history of Sage

- *2002:* Open Source Computer Algebra workshop in Lyon
- *1999-2005:* William Stein writes over 25,000 lines of Magma code for his research, and realizes that Magma was a bad long term investment since he couldn't see or modify the internals
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- *Feb. 2010:* Sage 4.4.2
  Sage Days 20, Luminy (France), 120 participants
- *Current version:* Sage-4.6.1
- 10000 users?
- *Funding* (postdoc, workshops, hardware): NSF, ANR, CNRS, Universities and Institutes, Google, Microsoft Research, ...

Sage is very young!

Sage has:

- bugs
- inconsistencies
- blank or undocumented areas

Sage lacks:

- native support under Windows (upcoming)
- (working) packages under Debian / Ubuntu / ...
- Proper modularization

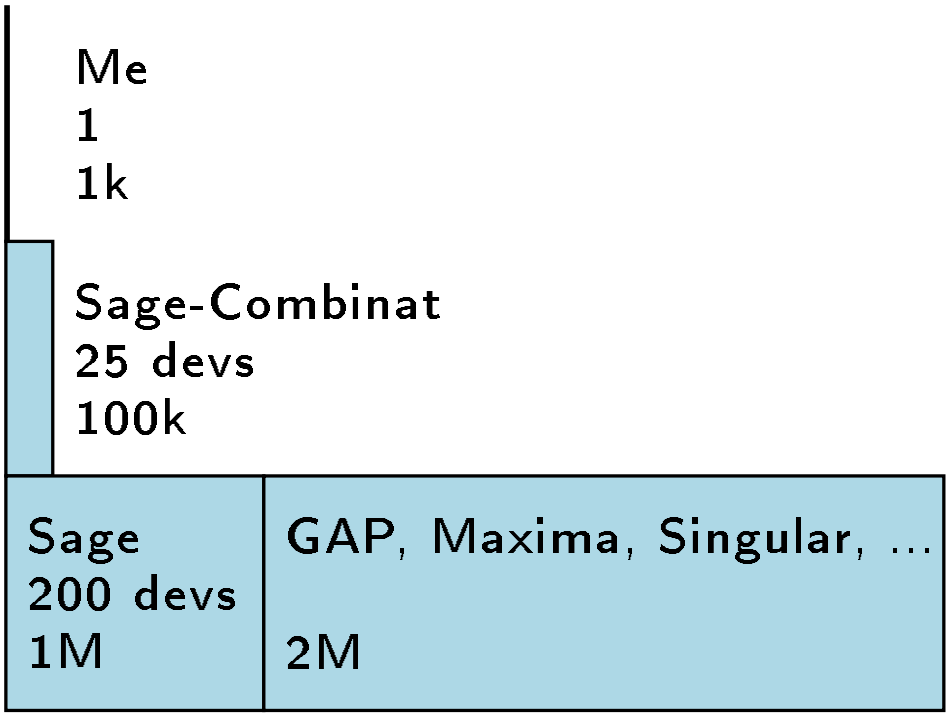
Sage's worldwide community

There currently are 184 contributors in 118 different places.

Sage Days in 2010

- Sage Days 19: Seattle, WA (January 2010)
- Sage Days 20: Marseille (February 2010)
- Sage Days 20.25: Montreal (March 2010)
- Sage Days 20.5: Fields Institute (May 2010)
- Sage Days 21: Seattle, WA (June 2010)
- Sage-Combinat/Chevie: France (June 2010)
- Sage Days 22: Berkeley, CA (July 2010)
- Sage Days 23: Leiden, Netherlands (July 2010)
- Sage Days 24: Linz, Austria (July 2010)
- Sage Days 25: Mumbai, India (August 2010)
- Sage Days 26: Kaiserslautern, Germany (August 2010)

Sage-Combinat demo!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Sage-Combinat
25 devs
100k
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200 devs
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GAP, Maxima, Singular, ...
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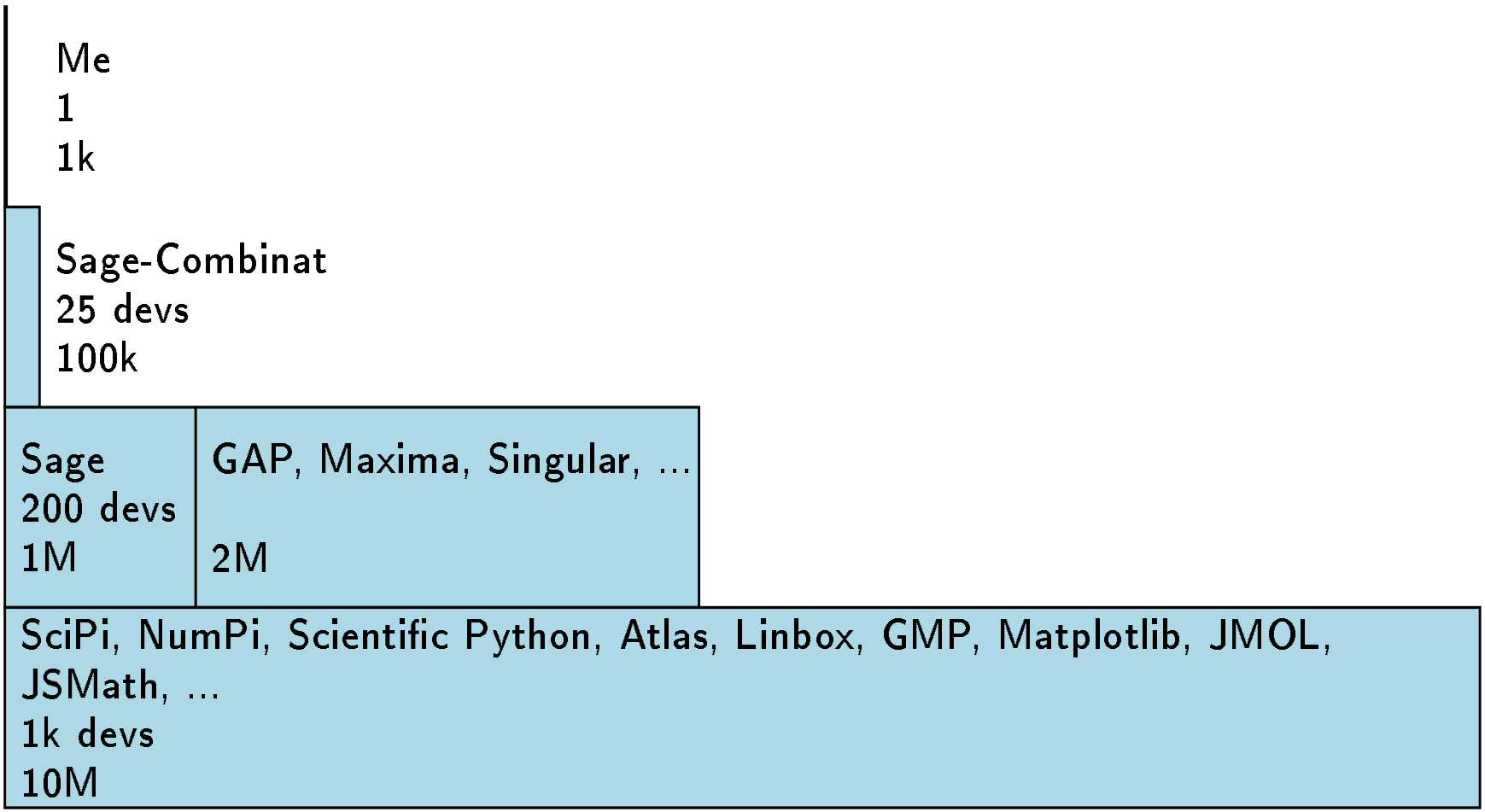
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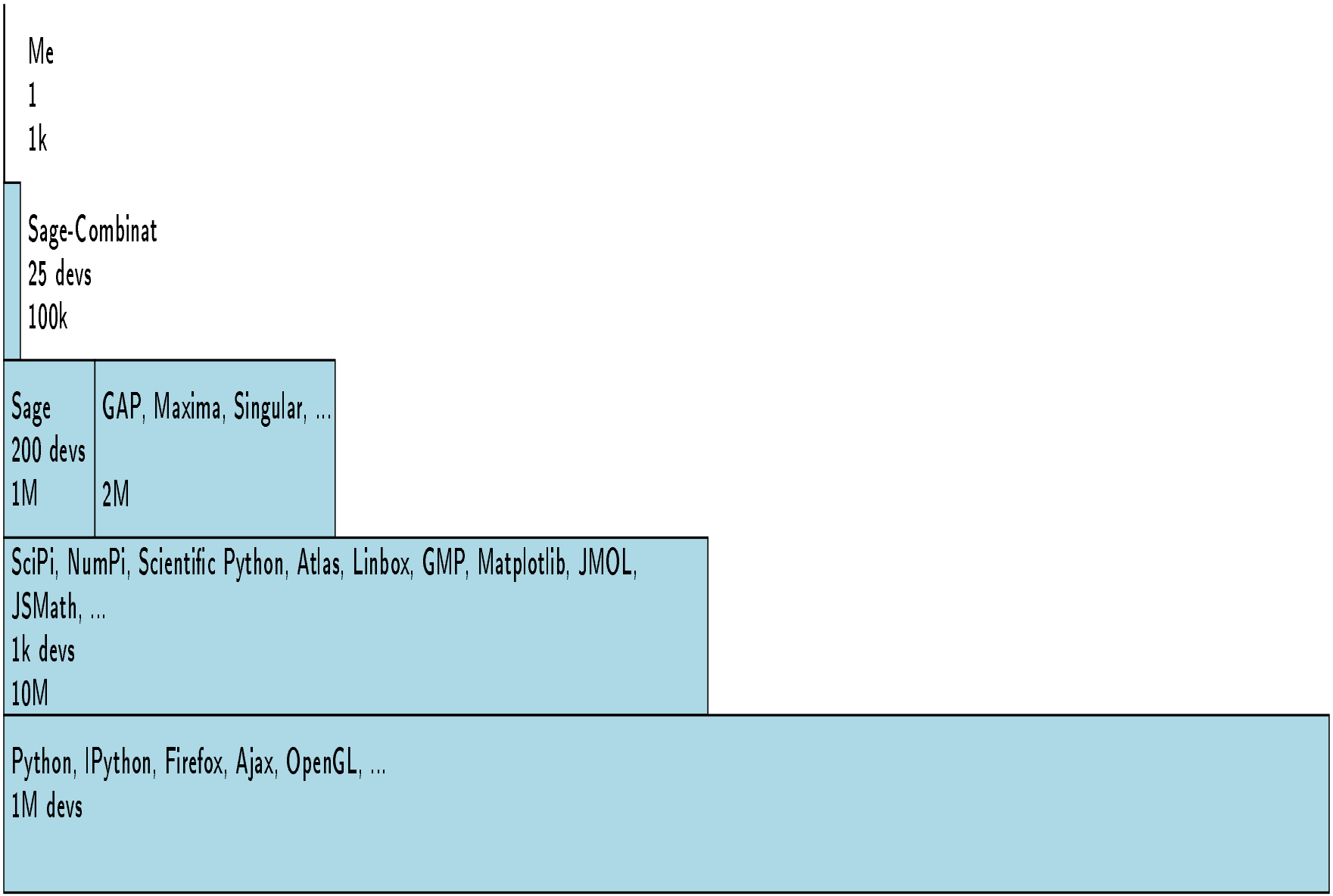
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Python, IPython, Firefox, Ajax, OpenGL, ...
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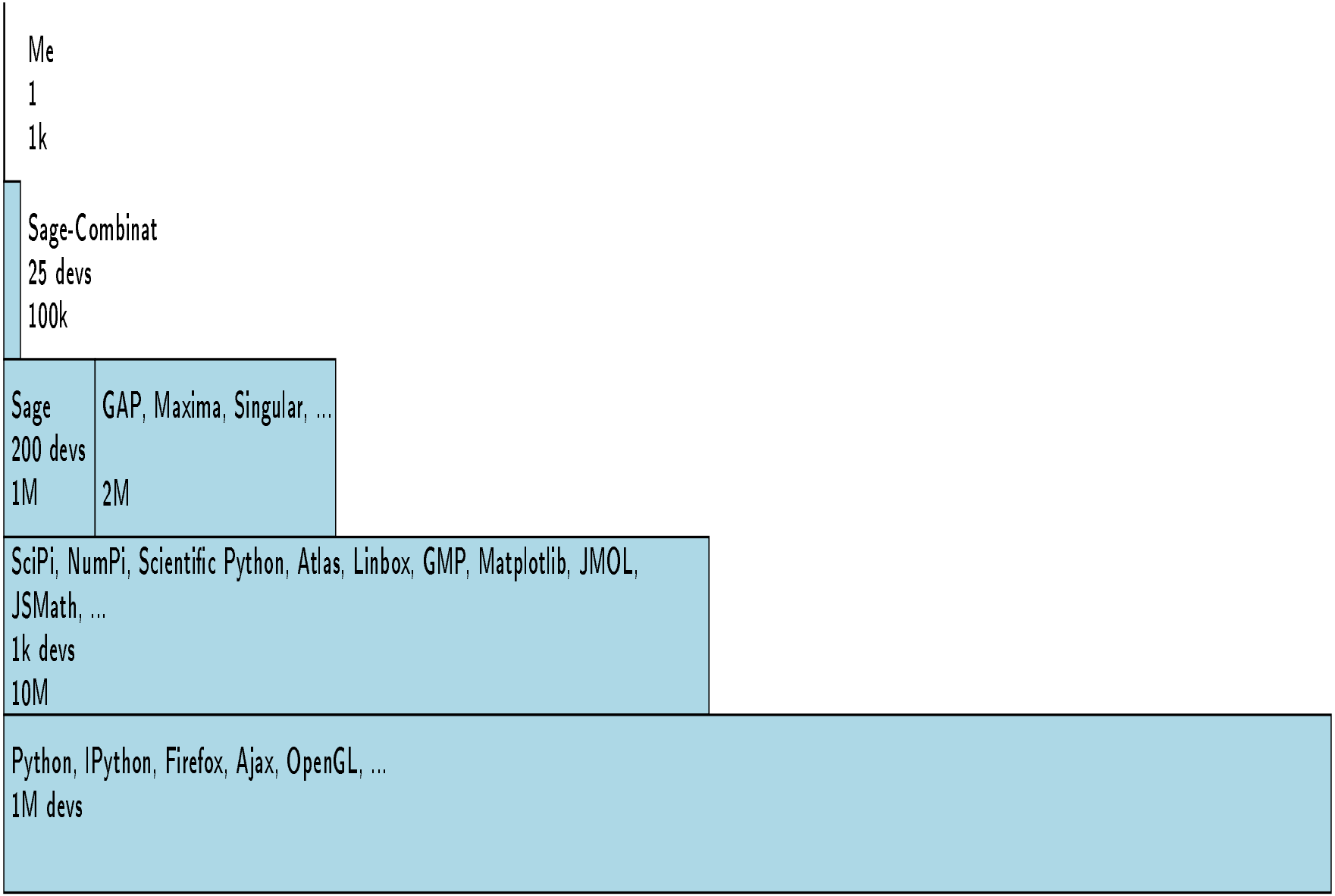
On the shoulders of a giant



Future of GAP and Sage?

How to foster collaboration?

- Sage strongly benefits from GAP. Does it pay back?
- Reduce frustration?
- Attribute proper credit?
- Avoid reinventing the wheel?
- What to port, what to interface?

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Some strategical differences:

- **Package** vs **integration**
- Focus on **algorithms** or on **models**

Packages vs constant integration

A collection of book vs Wikipedia

Packages promotes:

- Well defined interfaces
- Modularity
- Credit to the authors
- Simplicity of contribution

Constant integration

- Shared ownership
- Consistency
- Constant refactoring and upstreaming