

Past and future of deal.II

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Program today

We recently ran a 5-day “hackathon”: principal developers get together to hack/plan/fix/strategize.

We thought this is a good idea to also talk to the larger community:

- For you to hear about what is going on in deal.II
- For you to get to meet the principal developers
- For the principal developers to hear from users
- **To build personal connections**

My talk: Where does deal.II come from, where is it going?

The history of deal.II

In reality, deal.II is a garage project.

Nothing was planned.

The people who started it had not the first idea.

Originally:

- deal.II was a project for Ralf Hartmann, Guido Kanschat, and myself
- We wanted to have a flexible tool for numerical methods research
- We put it on a website “because we could” in 2000

The history of deal.II

In reality, deal.II is a garage project.

Nothing was planned.

The people who started it had not the first idea.

**But it works. And we figured a few things
out along the way.**

The history of deal.II

Truth 1: It's a vibrant project

The history of deal.II

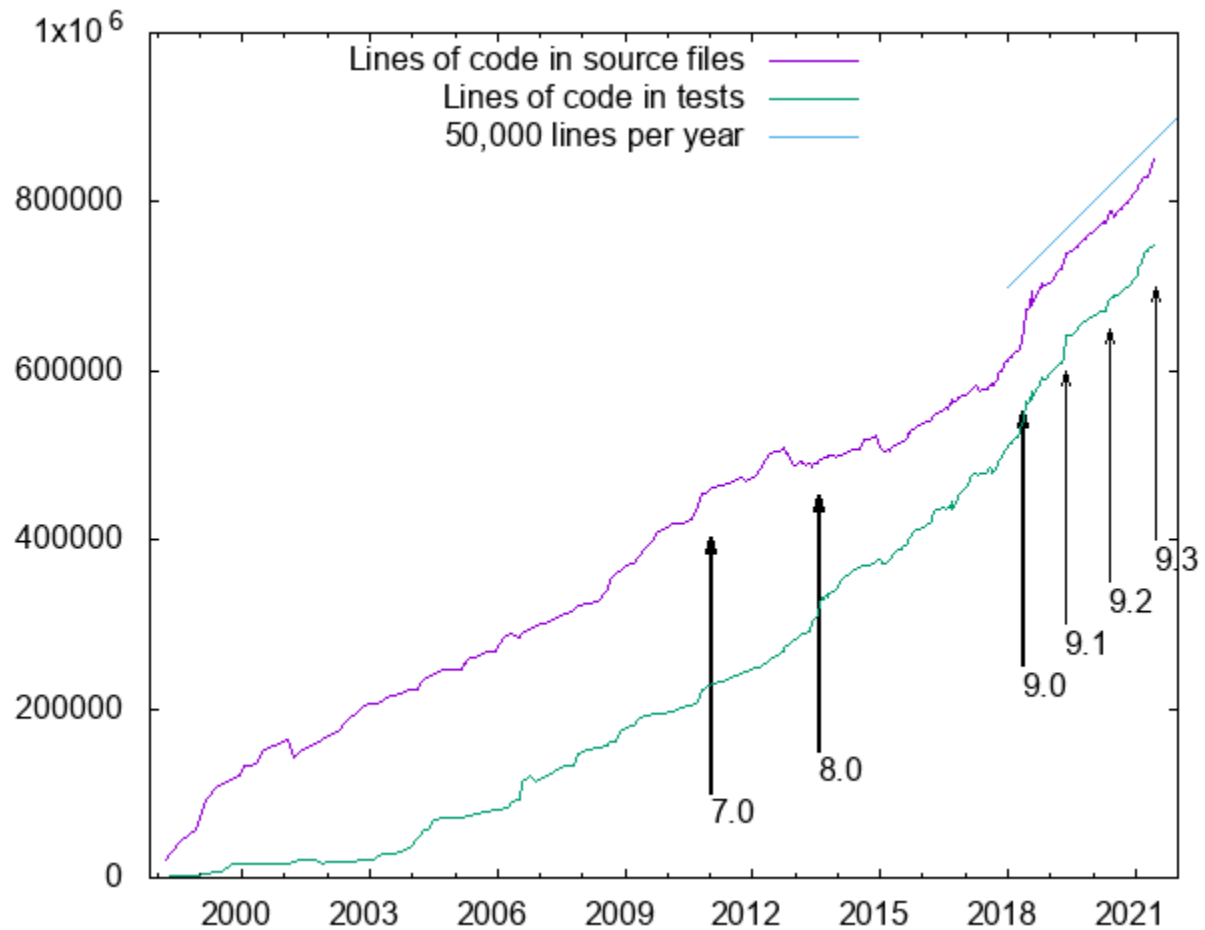
Truth 1: It's a vibrant project

We had eight *deal.II* user and developer workshop

- 2006 → 2010 → 2012 → 2013 → 2015 → 2018
→ 2019 → 2021
- # of people on the mailing list at these times:
80 → 260 → 365 → 219 → 540 → 993
→ 1096 → 1291
- # of contributors:
15 → 40 → 100 → 110 → 120 → 192
→ 215 → 297

The history of deal.II

Truth 1: It's a vibrant project



The history of deal.II

Truth 1: It's a vibrant project

There is a constant stream of new, major features.

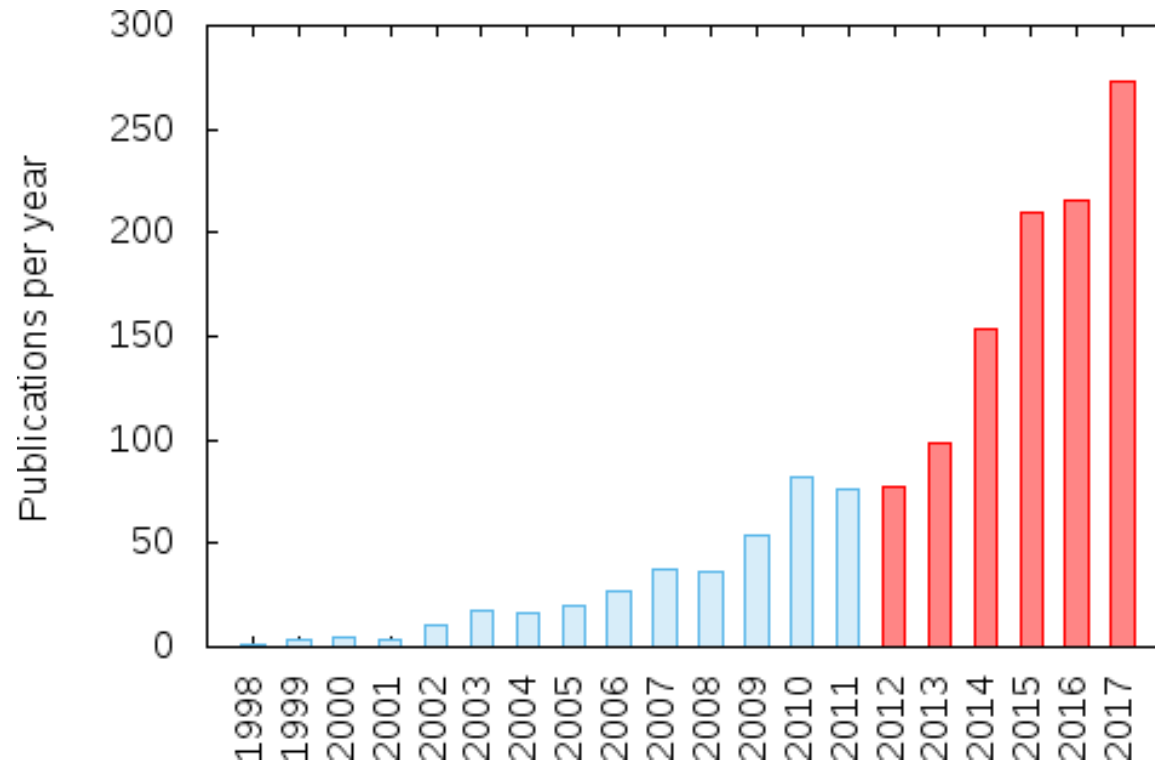
In the 9.3 release (in a couple of days):

- Experimental support for simplex meshes
- Better particle support
- Global coarsening multigrid
- More efficient point evaluations
- 9(!) new tutorial programs

More in the release paper soon!

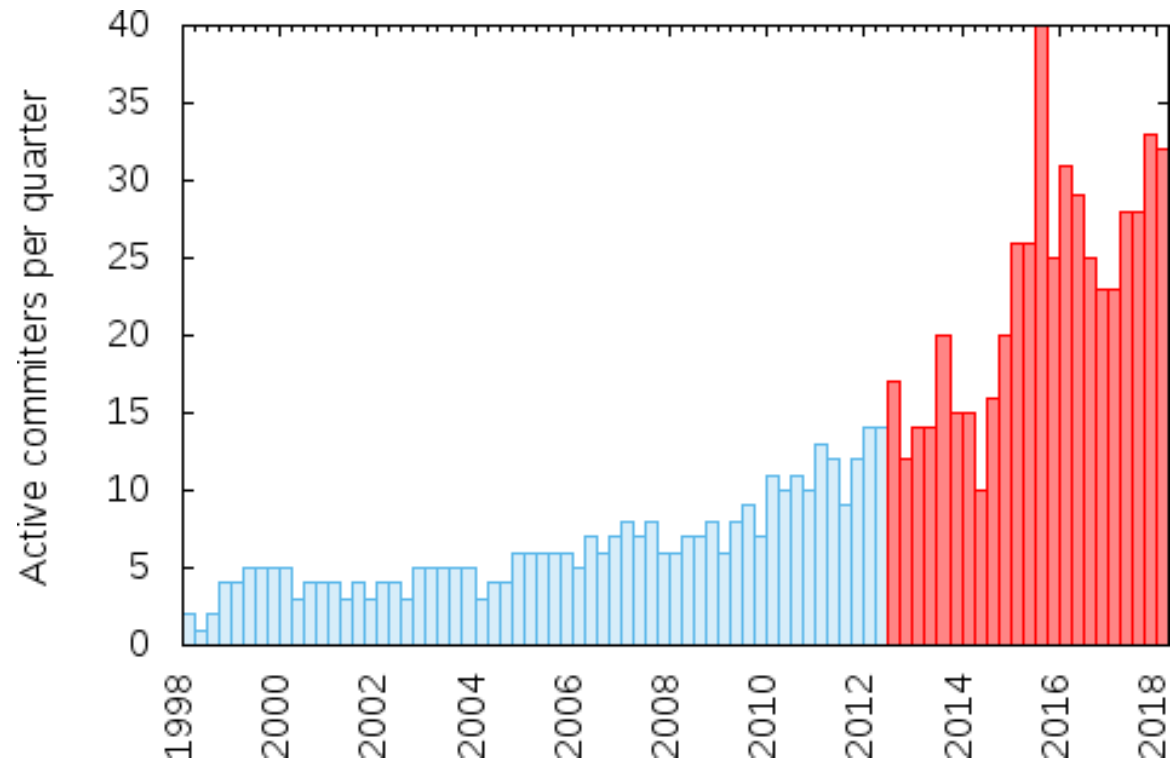
The history of deal.II

Truth 1: It's a vibrant project



The history of deal.II

Truth 1: It's a vibrant project



The history of deal.II

Truth 1: It's a vibrant project

For the 9.3 release:

- At least 65 people contributed code, documentation, fixes!
- The release paper will probably have 16 authors

- **This could be *you* next year!**

The history of deal.II

Truth 2: We've learned a few (technical) lessons.

- Managed continuous growth: 50,000 lines per month + tests
- Our code is modular:
 - users don't need to know internals of deal.II
 - developers don't need to know all of the library
- Reasonable documentation:
 - doxygen modules
 - tutorial programs
- We have a pretty good testsuite: 12,800+ tests run after each change
- **But:** Library has become a big piece of code – there is nobody any more who still knows everything

The history of deal.II

Truth 3: We've learned a few social lessons.

- We have attracted many more developers!
- We now have a significant group of dedicated and highly active developer/maintainers:
 - we have redundancy
 - we have diverse expertise
 - they all seem to benefit professionally from this work
- We seem to have developed good strategies for teaching

The history of deal.II

Truth 3: We've learned a few social lessons.

- We have attracted more Principal Developers:
 - Marc Fehling, Colorado State University (since 2021)
 - Peter Munch, Technical University of Munich (since 2020)
- Now a total of 12 Principal Developers
 - Meet them at <https://dealii.org/authors.html>

The history of deal.II

Truth 3: We've learned a few social lessons.

But there are also challenges:

- A lot more users
 - many more help requests than in the early years
 - but also more people who help with questions
 - searchable forum seems to help
- Nobody knows everything about everything any more
 - nobody can answer all questions
- Interfaces to many more external packages
 - much more complicated interactions
- A lot more actual and potential contributors
- Original developers have less time

deal.II as a “social project”

deal.II is a project with different “communities”:

- Library maintainers (“principal developers”)
- Other developers and contributors
- Users

With every collection of communities, there are problems that we need to work on.

deal.II as a “social project”

For example: Principal developers vs. other contributors

- How can we attract more contributors?
 - Are we encouraging enough in our attempts?
 - Can we make the “bar to entry” low enough?
 - Do we give adequate credit to contributors?
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- How do we ensure the long-term quality of deal.II?
 - Do even first time contributors have to write testcases?
 - How about documentation?
 - How can we enforce our coding styles?
 - Should we accept *every* contribution?

deal.II as a “social project”

For example: Developers vs. users

- How can we organize answering mails on the mailing list?
 - Can we organize it more equitably?
 - Can we ensure adequate response times?
 - Can we think of better ways of documenting stuff so that people can find them?
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- How can we entice users to become contributors?
 - How can we get users to work together on projects?
 - How can we ensure that people get credit for their work?

deal.II as a “social project”

Also: How do we ensure that future development is financially supported?

Rationale:

- Most researchers are funded for (i) teaching, (ii) work on specific projects, (iii) research as part of their regular job duties.
- They are evaluated based on “research output”

In order to spend time on deal.II, we need to make sure that deal.II is part of their funded projects.

Good news:

- A number of funding agencies do support our work
- Would love to hear back about funded projects that use deal.II

What I'm trying to say with all this

- deal.II is a cool and active project
- We want *you* to be part of this project
 - as a user
 - as a contributor
 - as a potential principal developer
 - as someone who answers questions on the forum