Benefits of open source development and open tools

Max Horn, August 31, 2011
Overview

■ My background

■ What does “open source” mean, anyway?

■ Why should you care?

■ How to be open and make the best out of it?

■ Tools, tools, tools
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Who am I

- Math PhD 2009, “Involutions of Kac-Moody groups”
- Currently working in computer algebra, esp. GAP
- Writing code for 20+ years, primarily for Mac and Unix
- Involved in open source since 1999
- Contributed (in small and big ways) to many open source projects, e.g. ScummVM, Fink, TeXShop, SDL, SourceForge.net, XMPP chat, …
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Example: ScummVM

- Project started in 2001, project (co-)lead 2002–2011
- About 40 active developers in 2011; over 200 all-time
- \( \sim 1.3 \text{M lines of code (mostly C++)} \)

- \( \sim 1.2 \text{M downloads in the past twelve months} \)
- Highly portable: Unix, OS X, Windows, phones, game consoles, ...
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What does “open source” mean, anyway?

- You probably already have an idea of what open source means . . .
- . . . but let’s make sure we are on the same page here!
- Wikipedia says:
  
  The term open source describes practices in production and development that promote access to the end product’s source materials. Some consider open source a philosophy, others consider it a pragmatic methodology.

- Applied to software, this leads to open source software; for example: Linux (kernel), OpenOffice, but also Sage, GAP, Singular, CoCoA, . . .
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Open source goes beyond software

- Most people associated “open source” with software alone . . .

- . . . but there is much more to it.

- E.g. open source hardware (OpenSPARC T1 processor, Arduino, . . .)
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  . . . and beverages! 😊
Publications = open source?

- Research publications (in math) are similar to open source:
  - The theorems in a paper are the **product**.
  - The proofs and lemmas are the **source**, and they are “shipped” along with the product.

- Being open allows the **community** to advance much quicker:
  - “Standing on the shoulders of giants”
  - Now imagine we would only ship the “product”, not the “source”!

- For individuals, this can be tempting, e.g. to hinder competition . . .

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We saw what is good about “open source publications”. For software, it is similar:

- Releasing your code allows others to learn from it
- ... and sometimes to improve on it
- ... and to build upon it.
- Again: “Standing on the shoulders of giants”
- Trust: No software is bug-free. No source = no idea of what is going on.
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- Linux - x86: kash_2.5.7.linux.tar.gz
- Mac OS X 10.3 - PPC: kash_2.5.6.macosx.tar.gz
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The dark side

- "But what if my code gets stolen?"
  - The possibility exists, no denying it . . .
  - . . . but not more so than for research ideas and papers.
  - Same countermeasures generally work well:
    - Legal protection via copyright (remember those licenses?);
    - peer review.
  - Example: ScummVM (GPL v2) illegally sold as part of software for
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- "But my code is so ugly, I don’t want to show it, and nobody will be
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  - "But my proof is so ugly, I don’t want to publish it."
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  - “But my proof is so ugly, I don’t want to publish it.”
  - Your code might not be as bad as you think.
  - Maybe you should improve it then, anyway?
  - Maybe others will help improving it if your tool is useful to them?
Users are a valuable resource
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- Algebraists
- Users

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Potential contributors and co-developers are users.
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Potential co-developers?
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Potential contributors?

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Beyond open source: Open development

- We saw the technical definition of open source...

- ...but for many, it means much more:
  - An open development process!
  - This means for example:
    - everybody can see the current code at all times, not just for releases;
    - discussions and planning is done in the open, everybody can chime in;
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- “The Cathedral and the Bazaar” an essay by Eric S. Raymond on software engineering methods.

- **The Cathedral model:** Top-down design; source code is available with each software release, but access to code developed between releases is restricted. (Past) examples: GNU Emacs, GCC, GAP, ...  

- **The Bazaar model:** Bottom-up design; code is developed over the Internet in view of the public. Examples: Linux, Sage, ScummVM, ...

- “Release early. Release often. And listen to your customers.”

- Linus’ Law: “Given enough eyeballs, all bugs are shallow.”

- Both approaches have pros and cons. The trick is to find the right mix!
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- What does “open source” mean, anyway?
- Why should you care?
- How to be open and make the best out of it?
- Tools, tools, tools
Making the best out of your version control system (VCS)

- Every non-trivial software project should use a VCS repository!
- Are you ??? 😊
- Helps with understanding the code and its past ("history mining")
- Helps tracking down regressions
- "Whom should I ask about this code?"
- What has changed since the last release?
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Avoid high entry barriers

- GAP is a really cool project, with a friendly and helpful community!
- But to an outsider, GAP development is opaque 😐
- GAP download page:
- Contrary to appearance, GAP is very much alive . . .
- . . . but if you are not already “inside”, there is no way of knowing that 😗
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- **Bug tracking:** Bugzilla, Trac, Redmine, ...; Lighthouse, Jira, ...

- **Wiki:** MediaWiki, Trac, Redmine, ...

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Test driven development; Extreme programming; Agile development; other software engineering ideas 〜 another talk 😊

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- The GAP team uses a Jenkins server for continuous integration.
- This way, regressions can be quickly noticed and resolved.

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A plea for using hosted collaboration tools

- If you are author of a small package (e.g. for GAP), please consider using a hosting provider (like github, SourceForge, etc.) for your project!

- If you host the project in your personal webspace, then ...

- ... whenever you move to a new job, your project has to move;

- ... if you loose time / interest, nobody else can update it.

- If you collect bug reports in your mailbox alone, they are lost if you leave the project \(\sim\) use a public bug tracker.

- Nowadays, you don’t have to be big (like GAP, Singular, etc.) with your own servers in order to have a a VCS, a public bug tracker, mailing lists, forums, a wiki, and more!
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- Nowadays, you don’t have to be big (like GAP, Singular, etc.) with your own servers in order to have a VCS, a public bug tracker, mailing lists, forums, a wiki, and more!
A plea for using hosted collaboration tools

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Some open source hosting platforms

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- GitHub (http://github.com)
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- Bitbucket (http://bitbucket.org)
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Live demo
Your tools are useless if nobody knows about them

- Once you have a version control system, a Wiki, a build server, etc., make sure that people find them!

- It is an annoying loss if new (potential and actual) developers do not know about all the available resources.

- Example: ScummVM collects this information on a set of web pages: http://wiki.scummvm.org/index.php/Project_Services
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SVM project services

Excerpt from http://wiki.scummvm.org/index.php/Project_Services

**BuildBot**
Main article: Buildbot
- [http://buildbot.scummvm.org/](http://buildbot.scummvm.org/)
  - Purpose: Provides automated build services for an increasing number of our supported platforms.
  - Primary Maintainer(s): Andre Heider (Dhewg) | John Willis (DJWillis)

**Git**
Main article: Git
- [https://github.com/scummvm/scummvm/](https://github.com/scummvm/scummvm/)
  - Purpose: Store the project's source code, keeping the development history and allowing collaborative work.
  - Primary Maintainer(s): Eugene Sanduleko (Sev)

**Doxygen Project Documentation**
Main article: Doxygen
- [http://doxygen.scummvm.org/](http://doxygen.scummvm.org/)
  - Purpose: This aims to provide current, automatically generated, documentation from our source code.
  - Primary Maintainer(s): Joost Peters (JoostP)

**Mailing list**
Main article: Mailing lists
- [https://lists.sourceforge.net/lists/admindb/scummvm-devel](https://lists.sourceforge.net/lists/admindb/scummvm-devel)
  - Purpose: Official developer mailing lists, for planning releases, and general discussions concerning development and project management.
  - Primary Maintainer(s): Eugene Sanduleko (Sev)
That’s it for today!

The End?
References

- ScummVM code size graph taken from Ohloh
- Arduino picture taken from Wikipedia
- Free Beer picture taken from Wikipedia
- The Cathedral and the Bazaar by Eric S. Raymond (see also Wikipedia)