

CS499 - OPEN SOURCE SOFTWARE DEVELOPMENT

Lecture #02: Basics about open source software

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The Four Freedoms

Freedom 0

"The freedom to run the program, for any purpose"

Freedom 1

"The freedom to study how the program works, and adapt it to your needs"

Freedom 2

"The freedom to redistribute copies so you can help your neighbor"

Freedom 3

"The freedom to improve the program, and release your improvements to the public, so that the whole community benefits"



Questions

- What is Open Source about?



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 - Price?



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Questions

- What is Open Source about?
 - Price?
 - License?
 - Social Movement?
 - Hobby?
 - Market trend?



WHO How
WHEN
WHERE
WHAT
WHY

Do you use Open Source?

More Questions

- Software vs. hardware: what's the difference?
 - Engineering vs. Software Engineering
 - Tool vs. Knowledge
 - Product vs. Service

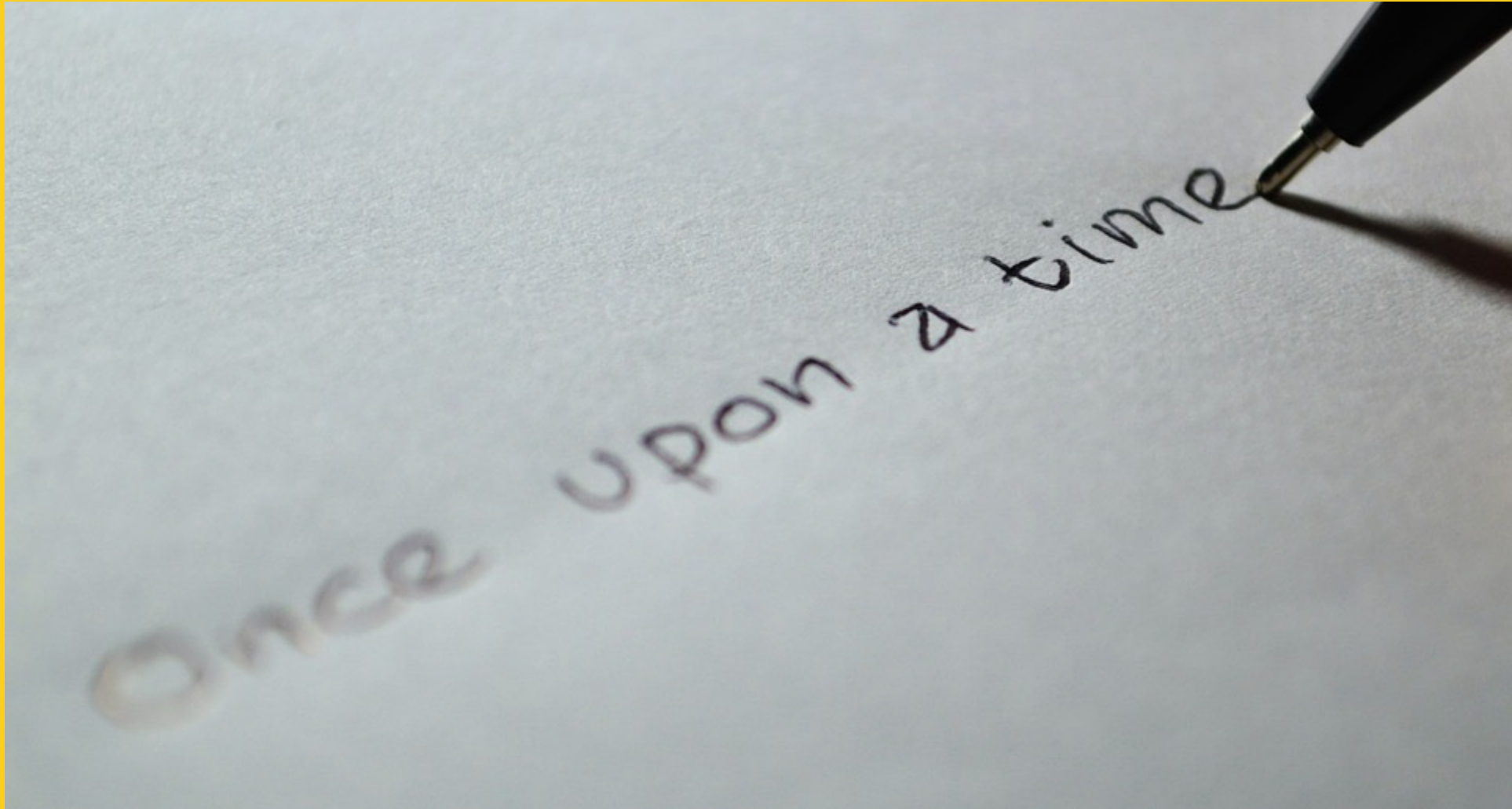


So...

- Open Source is about...
 - Freedom
 - License
 - Code as a way to share knowledge
 - Community!



A LITTLE BIT OF HISTORY



Pre-historic...

- Commercial settings:
 - software is usually part of a bigger solution (consulting, hardware, maintenance, etc.)
 - not a solution *per se*
- Academic settings:
 - Software is informally shared as a way to share knowledge
- Hobbyists
 - Hacking for fun
 - Garage programmers community

And the History...

- 1976 – Bill Gates’ “Open Letter to Hobbyists”
 - Copyright infringement + commercial power
 - *“Will quality software be written for the hobby market?”*
 - *“One thing you do do is prevent good software from being written.”*
- 1980 – Stallman problem with Xerox printer
 - Stallman refused access to the source code for the printer driver
- 1981 – IBM signs a deal with “Micro-Soft”
 - MS-DOS embedded in each and every IBM machine
- 1984 – Stallman launches GNU project
 - 1985 – Free Software Foundation (FSF) was formed to house funding for the GNU Project

And the History...

- 1991 – Linus Torvalds creates (or kicks off) Linux
 - Personal/informal project
 - Message to a newsgroup at Usenet
 - V 1.0.0 released in 1994 with 170+ KLoC
- 1995 – Internet Boom
 - Linux is distributed in large-scale
- 1997 – Eric Raymond writes “*The Cathedral and the Bazaar*”
 - Advantages of Open Source
 - Development in a decentralized way

And the History...

- 1998 – Netscape open-sourced
 - Fight with MS Explorer?
- 1998 – Eric Raymond, Linus Torvalds and others launch the Open Source Initiative (OSI)
 - Technical reasons to Open-source
 - Use of “Open Source” instead of “Free software”
- 1999 – Sourceforge is launched
- 2000 – OpenOffice is launched
- 2001 – IBM invests \$1 billion on Linux

And the History...

- 2003 – SCO sues IBM
- 2005 – Sun launches Solaris 10 as Open Source
- 2007 – Sun launches JDK under GPL
- GitHub launches in 2008
 - GitHub BOOM ~2010–2011 (2 million repos in 2011)
- ... MANY COMPANIES JOINING

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WHY???

Why Open Source?

- Incentive to collaboration → human relationship
- Technical education
- “Low-cost” access to “high-end” technology
- Decentralizes the “power” of the software
- Government → knowledge and transparency

Why Open Source?

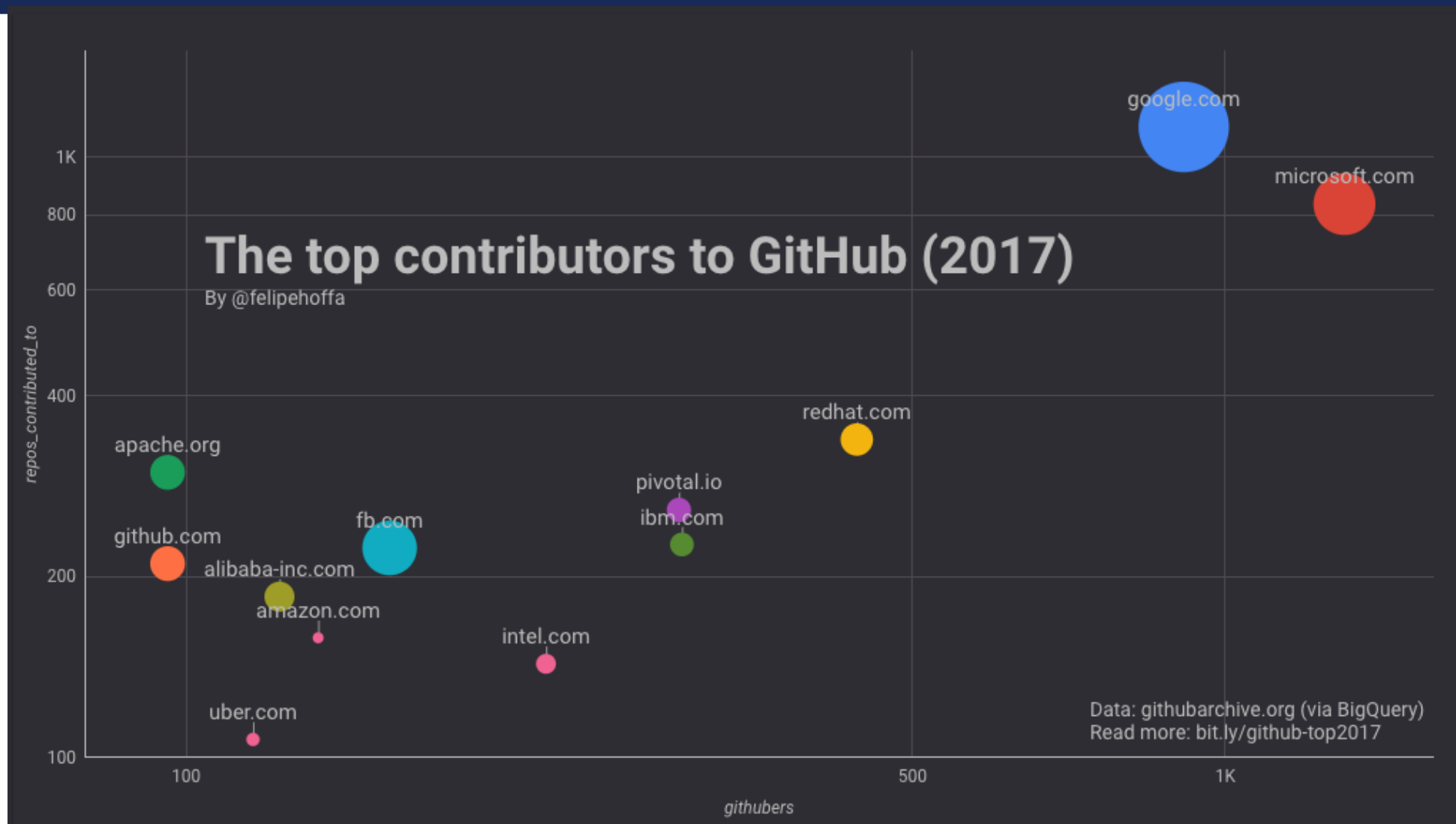
- Less duplicated code (and cost)
- Less bugs → More quality
 - *“Given enough eye-balls all bugs are shallow”*
- Customization and improvements
- Competition for support

“Problems”

- Quality assessment of the solutions
- Sustainability
- “Intellectual property”, trademarks, and patents
- Reputation (FUD)

FINAL FACTS

And... Open source leads the way



Why are companies joining OSS?



Branding/ Marketing

- Positioning in the communities
- Visibility
- Showcasing technological achievements
- Standardizing piece of technology



Attracting big talent

- Developers love
- Bypassing recruitment/ training steps
- Hiring tool

Reputation



Networking

- Access to big name companies
- Surrounded with peer company groups
- Getting hired



Building verifiable trust

- Showcasing expertise
- Build user fidelity



Fostering adoption

- Commercialize around their OSS project
- No vendor locking is attractive to users
- Get your technology adopted



Engineering need

- Where adopted technologies/ standards live
- Independence from licensing/ certification costs
- Build software more rapidly
- Neutrality and no locking policies



Business depends on OSS

- Keep dependency healthy
- Invest in security
- Guarantee of no company monopoly
- Governance and leadership
- Avoiding technical debt

Business Advantage



Closer channels

- Bigger reach to customers and users
- Readily R&D activity of the community
- No middleman



Coopetition

- Resource sharing
- Bigger market share
- Collaborate on the hard problem
- Better end product



Innovation

- Getting familiar with project interesting in the future
- Leveraging OSS ecosystem to guide business

Reciprocity



- Sustain the ecosystem
- Sharing experiences

Founder Ideology



Why are companies Open-sourcing?

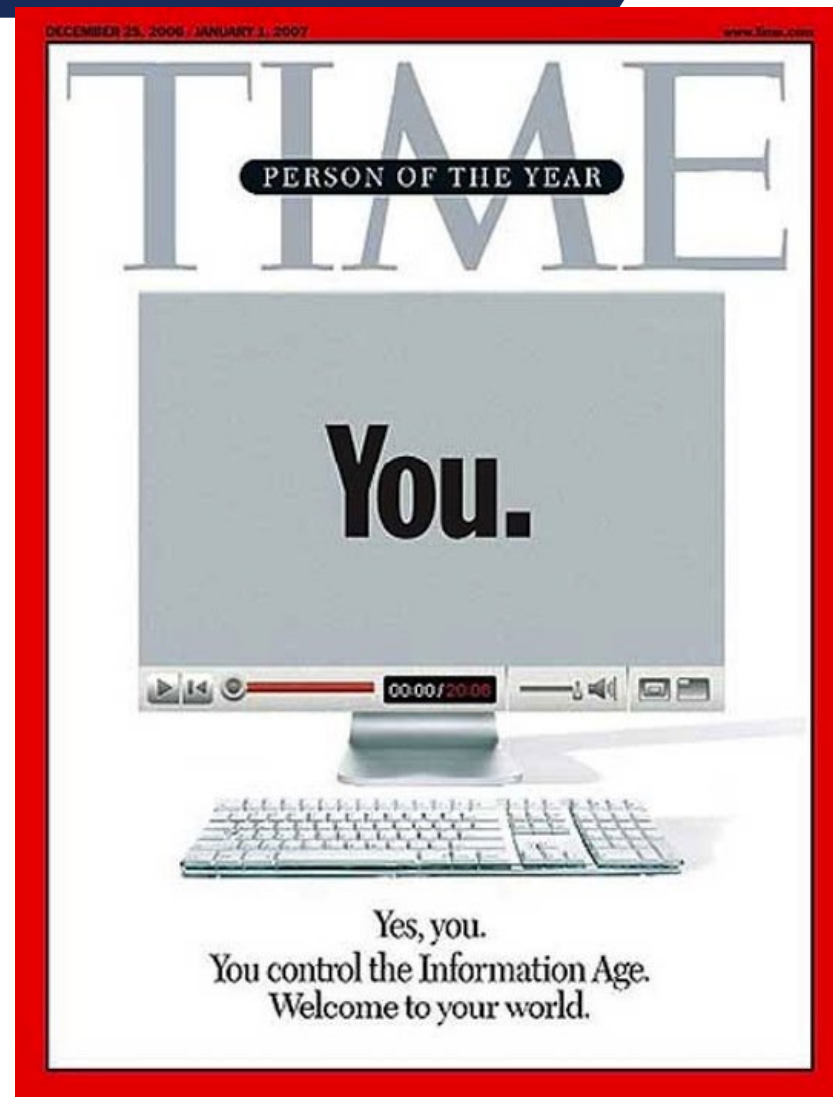
A close-up photograph of a white computer keyboard. A finger is pressing a blue key that has the words "Open Source" written on it in white, sans-serif font. The key is oriented diagonally. Other keys visible include a bracket/brace key to the left and a backslash/underscore key below it. The lighting is bright, casting soft shadows.

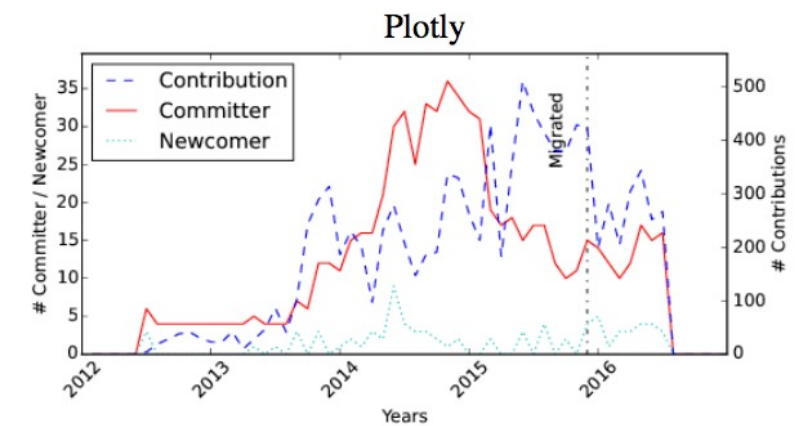
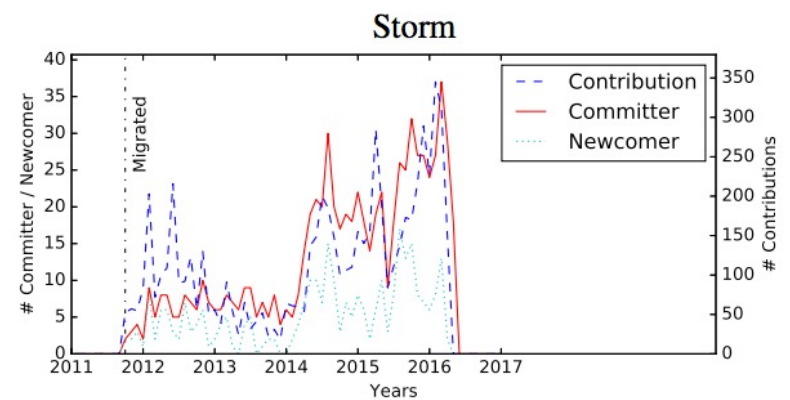
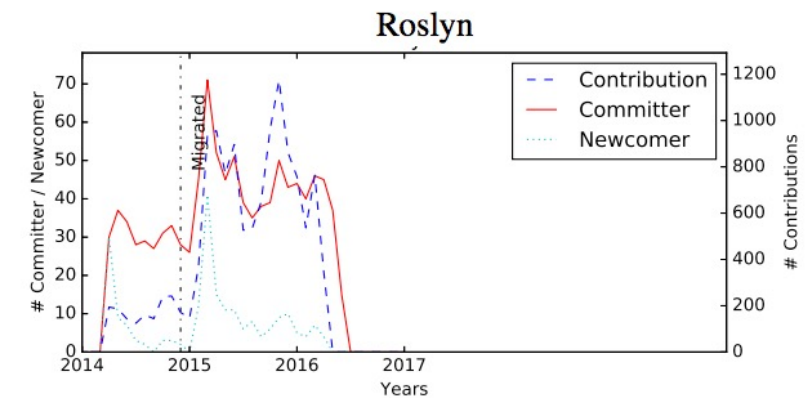
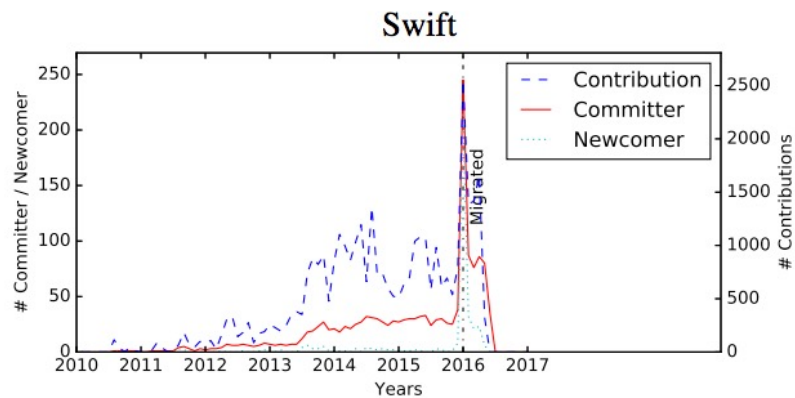
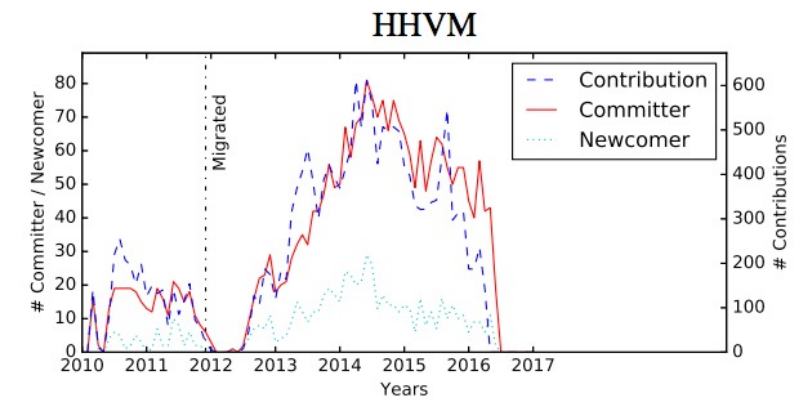
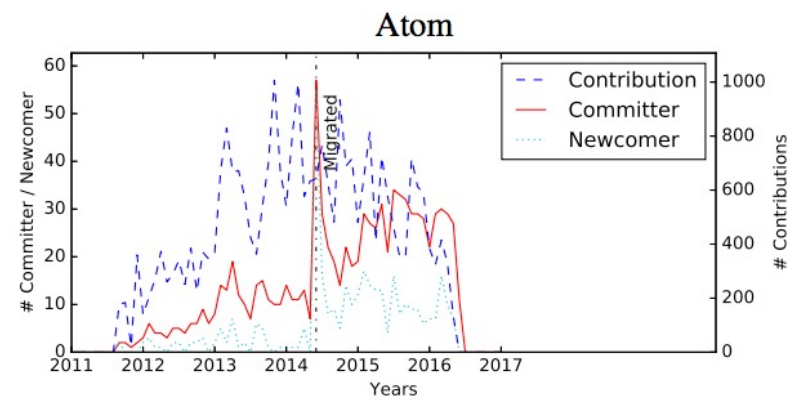
Open
Source

Leveraging the Crowd

“The World Wide Web became a tool for bringing together the small contributions of millions of people and making them matter”

Collaboration in large-scale





Pinto, Steinmacher, Dias and Gerosa, On the Challenges of Open-Sourcing Proprietary Software
Empirical Software Engineering, 2018

All About Community!

- OpenStack:
 - 1.7M lines of code
 - 19 programming languages
 - 17K community members
 - 5K+ code contributors
 - 38K e-mail messages
- Mozilla Firefox:
 - 13.5M lines of code
 - 37 programming languages
 - 4K+ contributors (1K+ in the last 12 months)
 - 4,231 years of effort (COCOMO model) - first commit in 2002
- Swift:
 - 445K lines of code
 - Over the past 12 months, 400+ developers



<https://www.openhub.net/p/openstack>

<https://opensource.com/business/14/6/openstack-numbers>

https://www.openhub.net/p/apple_swift