Software Engineering Theory and Practice

School of Computing	
Title	Software Engineering Theory and Practice
Module Coordinator	Steven Ossont
Email	steven.ossont@port.ac.uk
Code	M30819
Moodle	https://moodle.port.ac.uk/course/view.php?id=11429

U30819: Software Engineering Theory and Practice

Open Source Software Development

Open Source Basics

https://www.youtube.com/watch?v=Tyd0FO0tko8

OSS –The Software

- Free re-distribution of the software without licensing fees to the author
- Source code is made available with the software for no more than the cost of distribution
- Anyone can modify the software or derive other software from it
- Anyone modifying the software must redistribute the modified software under the same terms

> Steven Weber, The Political Economy of Open Source Software , BRIE Working Paper 140 https://brie.berkeley.edu/sites/default/files/wp140.pdf

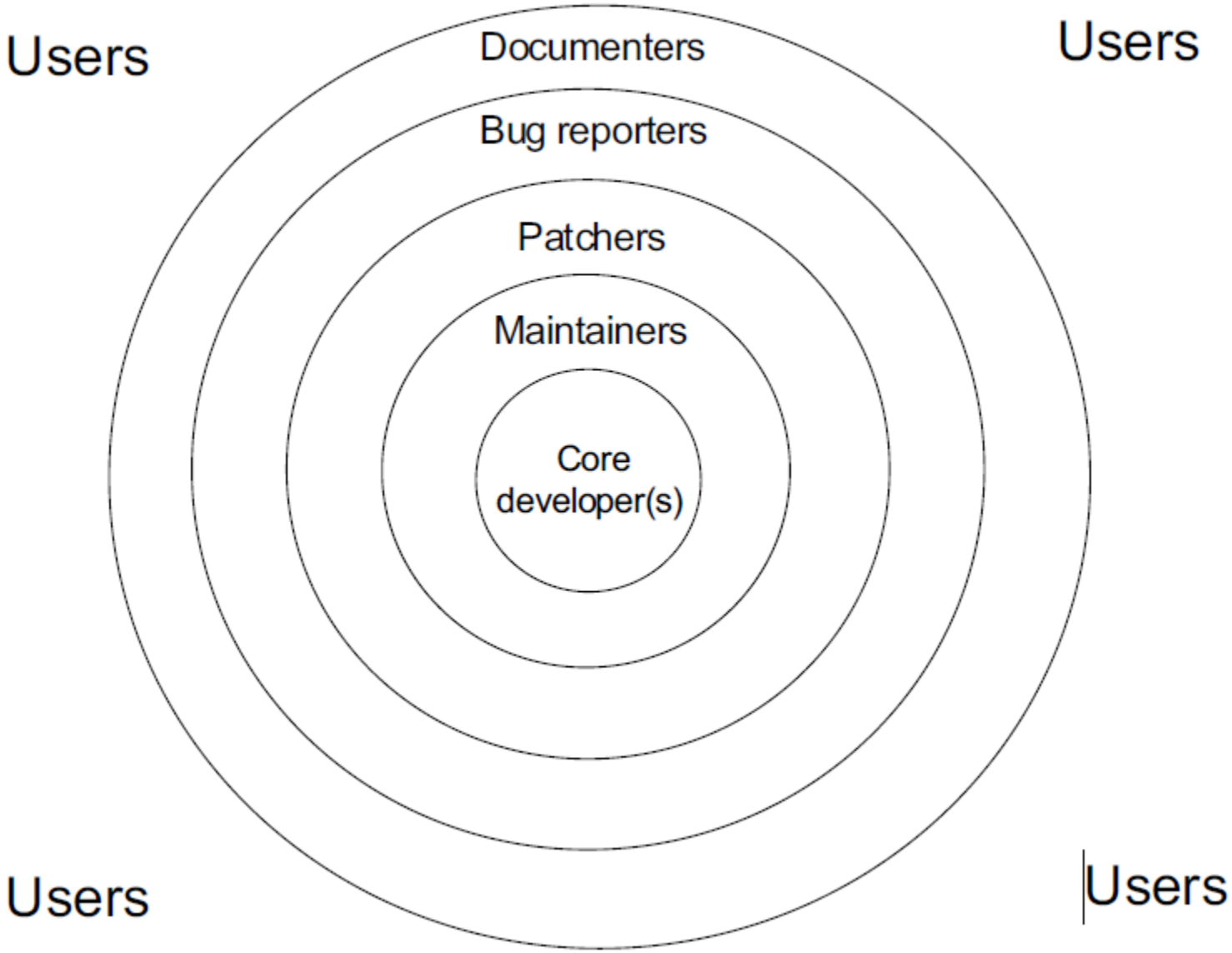
OSS –The Users

- Users are allowed to run the software for any purpose
- Users are able to study the software and modify it
- Users are able to modify the software and freely distribute their modifications
- Users are able to give copies of the software to others

Roles in Open Source Projects

- Providing feedback
- Helping new users
- Recommending the project to others
- Testing and reporting or fixing bugs
- Requesting new features
- Writing and updating software
- Creating artwork
- Writing and updating documentation
- Translating

OSS Development



What can we learn from the OS community?

Good programmers know what to write. Great ones know what to rewrite (and reuse).

While I don’t claim to be a great programmer, I try to imitate one. An important trait of the great ones is constructive laziness. They know that you get an A not for effort but for results, and that it’s almost always easier to start from a good partial solution than from nothing at all.

The Cathedral and the Bazaar, Eric Steven Raymond

What can we learn from the OS community?

Plan to throw one away; you will, anyhow.

You often don’t really understand the problem until after the first time you implement a solution. The second time, maybe you know enough to do it right. So if you want to get it right, be ready to start over at least once.

The Cathedral and the Bazaar, Eric Steven Raymond

What can we learn from the OS community?

When you lose interest in a program, your last duty to it is to hand it on to a competent successor.

The Cathedral and the Bazaar, Eric Steven Raymond

What can we learn from the OS community?

- *Treating your users as co-developers is your least-hassle route to rapid code improvement and effective debugging.*
- *Because source code is available, the users can be effective hackers. [...] your users will diagnose problems, suggest fixes, and help improve the code far more quickly than you could unaided.*

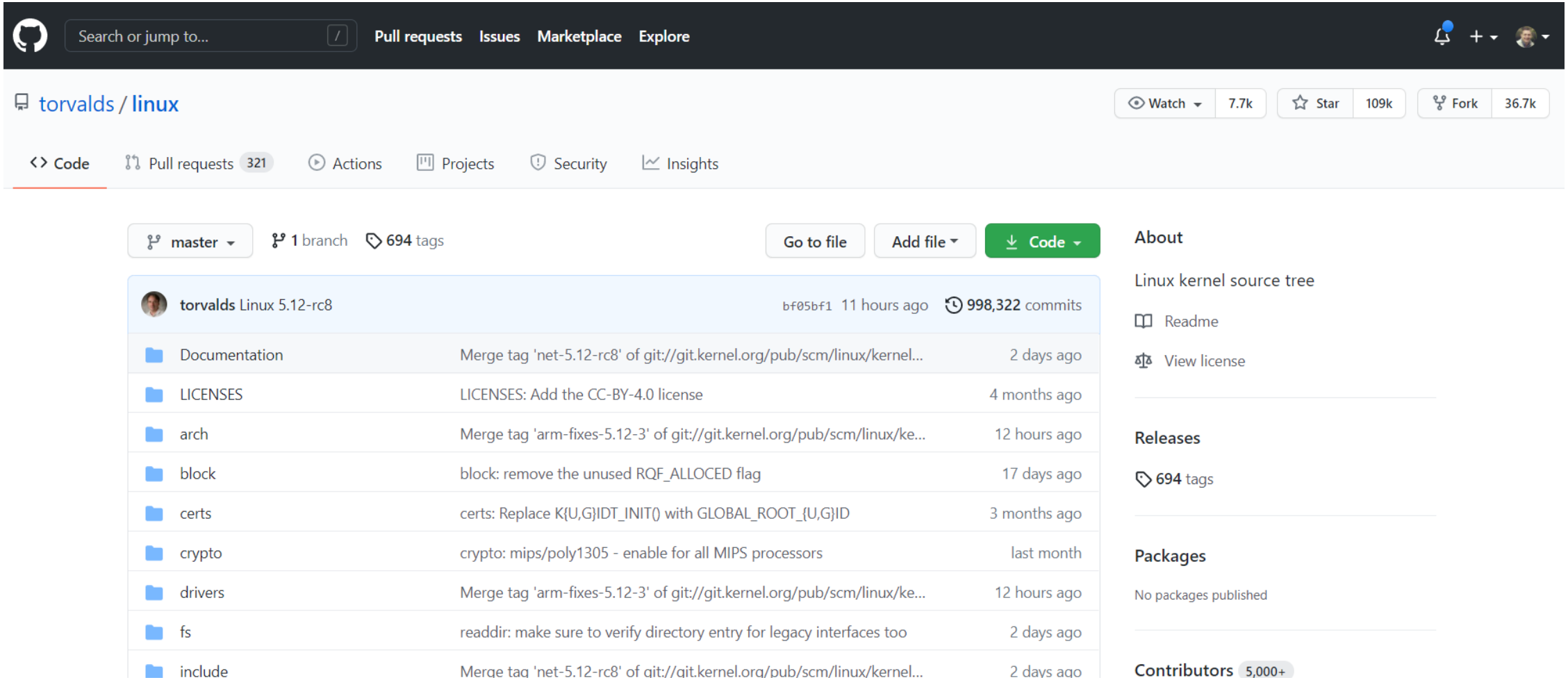
The Cathedral and the Bazaar, Eric Steven Raymond

What can we learn from the OS community?

Release early. Release often. And listen to your customers.

Linus's innovation wasn't so much in doing quick-turnaround releases incorporating lots of user feedback, but in scaling it up to a level of intensity that matched the complexity of what he was developing.

The Cathedral and the Bazaar, Eric Steven Raymond


Search or jump to...
Pull requests
Issues
Marketplace
Explore
torvalds / linux
Watch 7.7k
Star 109k
Fork 36.7k
Code
Pull requests 321
Actions
Projects
Security
Insights
master
1 branch
694 tags
Go to file
Add file
Code
torvalds Linux 5.12-rc8
bf05bf1 11 hours ago
998,322 commits
Documentation Merge tag 'net-5.12-rc8' of git://git.kernel.org/pub/scm/linux/kernel... 2 days ago
LICENSES LICENSES: Add the CC-BY-4.0 license 4 months ago
arch Merge tag 'arm-fixes-5.12-3' of git://git.kernel.org/pub/scm/linux/ke... 12 hours ago
block block: remove the unused RQF_ALLOCED flag 17 days ago
certs certs: Replace K{U,G}IDT_INIT() with GLOBAL_ROOT_{U,G}ID 3 months ago
crypto crypto: mips/poly1305 - enable for all MIPS processors last month
drivers Merge tag 'arm-fixes-5.12-3' of git://git.kernel.org/pub/scm/linux/ke... 12 hours ago
fs readdir: make sure to verify directory entry for legacy interfaces too 2 days ago
include Merge tag 'net-5.12-rc8' of git://git.kernel.org/pub/scm/linux/kernel... 2 days ago
About
Linux kernel source tree
Readme
View license
Releases
694 tags
Packages
No packages published
Contributors 5,000+

What can we learn from the OS community?

Given a large enough beta-tester and co- developer base, almost every problem will be characterized quickly and the fix obvious to someone.

Given enough eyeballs, all bugs are shallow. (Linus's Law)

What can we learn from the OS community?

Smart data structures and dumb code works a lot better than the other way around.

The next best thing to having good ideas is recognizing good ideas from your users. Sometimes the latter is better.

What can we learn from the OS community?

Perfection (in design) is achieved not when there is nothing more to add, but rather when there is nothing more to take away.

OSS Examples

- OS: Linux, FreeBSD, OpenBSD, NetBSD
- Internet: Apache, sendmail, Mozilla, Open SSL
- Programming tools: GCC, Make
- Database: Apache Cassandra
- Machine learning: TensorFlow
- Programming languages: Perl, Python, Ruby
- ... Kubernetes

> https://en.wikipedia.org/wiki/GNU_Project

OSS Scale - GitHub

- On June 4, 2018, Microsoft intent to acquire GitHub for **US$7.5 billion**
- 56 million users (Sep 2020)
- <5% of projects are *live* (a commit in the last year, more than 1 commit ever)
- ~140 Million projects
- Most likely to succeed:
  - Good marketing
  - Small enough for people joining them to make an impact

Open Source Licenses

- https://resources.whitesourcesoftware.com/blog-whitesource/open-source-licenses-comparison-guide
- https://en.wikipedia.org/wiki/Comparison_of_free_and_open-source_software_licences
- https://choosealicense.com/

Open Source Licenses

- These techniques are incorrect....
    i. Do not have a license.
    ii. Pick a random license.

You may be constrained.

- Apache requires Apache License 2.0
- Cloud Native Computing Foundation dictates Apache License 2.0 by default
- GNU recommends GNU GPLv3 for most programs
- NPM packages overwhelmingly use the MIT or the very similar ISC licenses
- OpenBSD prefers the ISC License
- Rust crates are overwhelmingly licensed under both MIT and Apache License 2.0
- WordPress plugins and themes must be GNU GPLv2 (or later)

GNU General Public Licence

- No limit to the number of copies you can make
- Distribute the software however you want
- Charge a fee to distribute the software
- Make whatever modifications to the software you want

https://www.smashingmagazine.com/2010/03/a-short-guide-to-open-source-and-similar-licenses/

MIT License

- You can use, copy, and modify the software however you want
- You can give the software away for free or sell it
- The only restriction is that it needs to be accompanied by the license agreement

https://www.smashingmagazine.com/2010/03/a-short-guide-to-open-source-and-similar-licenses/

Apache License

- Rights are perpetual – once granted, can be used forever
- Rights are worldwide – if granted in one country, granted in all countries
- Rights are granted for no fee
- Anyone can use the licensed software
- No one can take the rights away once they are granted

https://www.smashingmagazine.com/2010/03/a-short-guide-to-open-source-and-similar-licenses/

Participating in an OSS Community

- Prepare
- Play to your strengths – choose a role
- Estimate your time commitment
- Check your employment contract

> Intellectual property rights

Participating in an OSS Community

- Get to know your community
- Understand how the community communicates
- Understand how the community is governed
- Get to know the people
- Understand the communication channels

Participating in an OSS Community

- Engage
- Communicate what you are working on
- Acknowledge resources you use and their creators
- Plan an exit strategy
- Inform community members when you retire

OpenSSL (Heartbleed)

- Heartbleed was one of the worst internet flaws ever uncovered.
- Heartbleed bug will cost businesses tens of million of dollars ....
- OpenSSL donations averaging about $2,000 a year
- *The fact that the code change which caused the bug was done by an individual working at 23:00 on a New Year's Eve says a lot. The code simply wasn't reviewed enough and it went undetected for two years*.

https://www.bbc.co.uk/news/technology-27155946

Questions

- Google Summer of Code https://summerofcode.withgoogle.com
- https://github.com/sponsors/