

Open Source Overview and History

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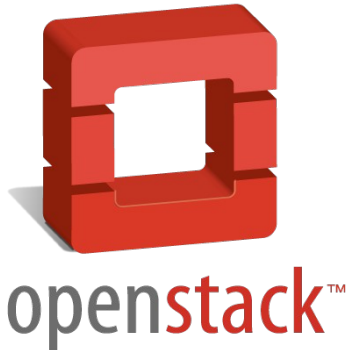
FLOSS B01

Free / Libre and Open Source Software

Examples of Open Source Software



debian



- **Legal definition**
 - Free software
 - Open source software
- **Process definition**

Free Software Definition

- Software is **free software** if the user receives
 - the necessary rights to use, study, modify, and distribute the software
 - free of charge and other restrictions
- Free (“... as in freedom, not free as in beer”)
 - is freedom of the software, not of people
 - Free software comes with obligations
- Free software is realized by way of free software licenses
 - Details on licensing and intellectual property later

Open Source Software (Legal Definition)

- Open source software is software whose license fulfills
 - these ten requirements <https://opensource.org/osd> [O10]; it must
 - not restrict redistribution
 - require inclusion of source code
 - allow modifications and derived works
 - preserve the integrity of the author's source code
 - not discriminate against persons or groups
 - not discriminate against fields of endeavor
 - not require additional license execution
 - not be specific to a product
 - not restrict other software distributed alongside
 - be technology neutral
 - and has been approved by the Open Source Initiative
- Open source was established partly in reaction to free software
 - Philosophical stance of free software created a rift with many practitioners
 - Focus is on the freedom of people, not the software
 - Ultimately, by and large compatible

“Open source is a **development method** for software that harnesses the power of **distributed peer review** and **transparency of process**. The promise of open source is **better quality, higher reliability, more flexibility, lower cost, and an end to predatory vendor lock-in.**” [O10]

The Cathedral and the Bazaar [R99]

- The Cathedral

- Carefully crafted work
 - Performed by small group
 - Evolves slowly
- Bugs and problems are tricky, require deep analysis
- Project is led by command and control approach
- No early releases nor beta

- The Bazaar

- Incremental work
 - Performed by large group
 - Evolves rapidly
- Linus' law: "Given enough eyeballs, all bugs are shallow"
- Project is lead by convincing people, nudging them on
- "Release early, release often"

The Apache Way [A10]

- Apache's **meritocracy** (“government by merit”)
 - grew out of the original http demon (httpd) i.e. the Apache web server
 - codified the values of collaboration in that initial then growing group
 - The httpd led to the creation of the Apache Software Foundation (ASF)
- The ASF's governance
 - Led to the creation of a “career ladder” i.e. multiple stages
 - Developers earn committer position by proving their merit over time
 - Developers can rise to the ranks of managing whole industry platforms
 - Focuses on “community over code” (ASF slogan)

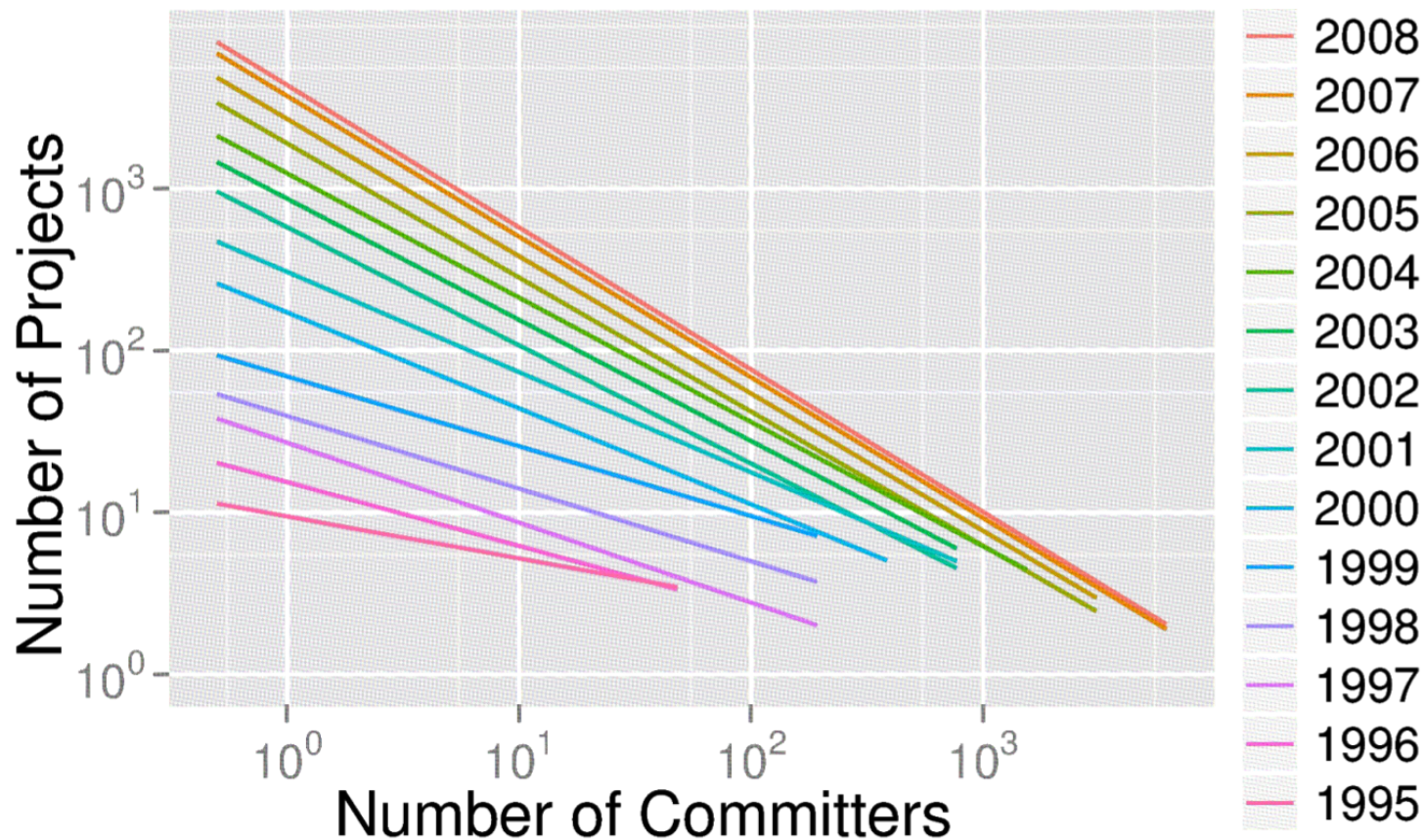
- **Open Collaboration**

- **Egalitarian**
 - Open for contribution
 - Everyone can contribute
- **Meritocratic**
 - Public discussion process
 - Decisions based on merit
- **Self-organizing**
 - People find their process
 - People find their project

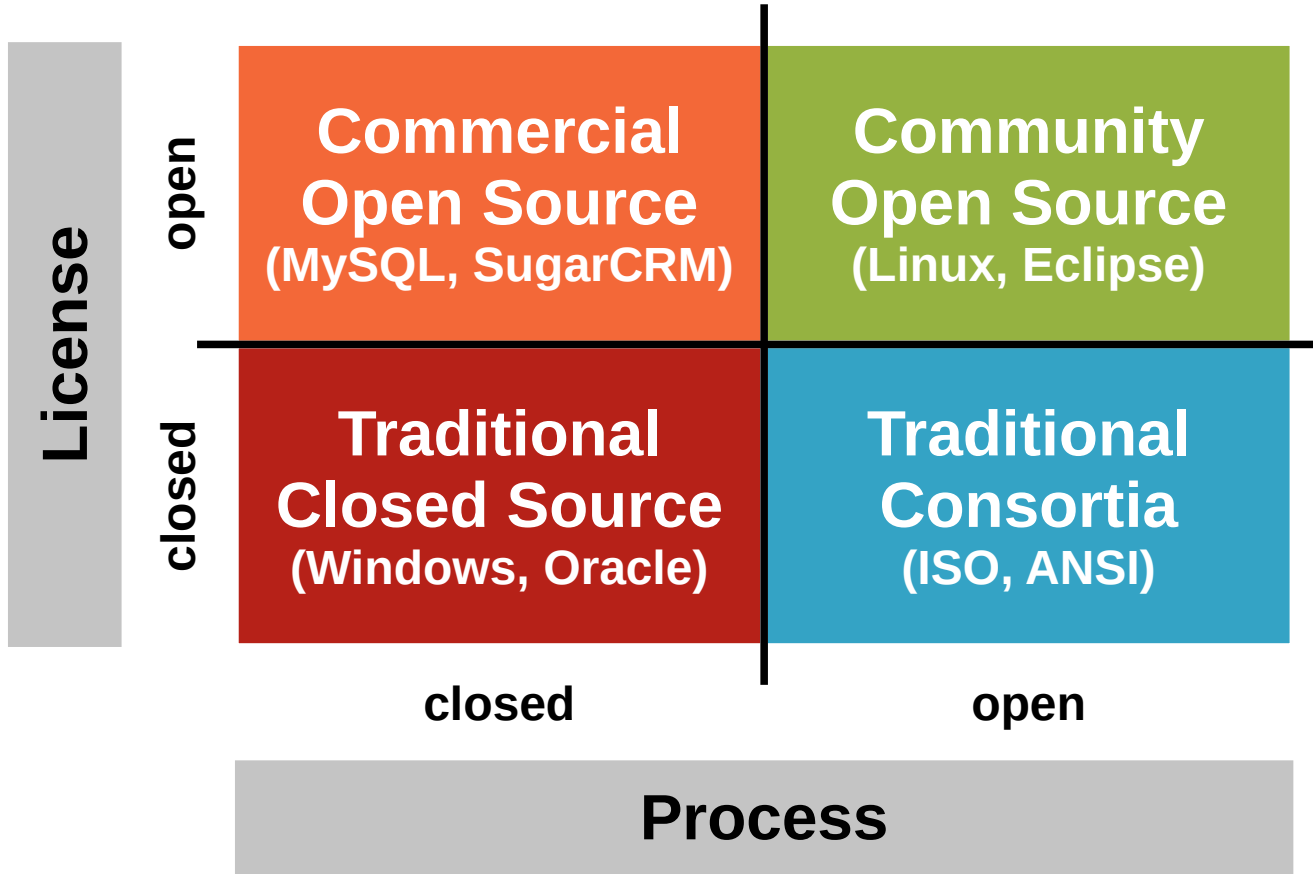
- **Traditional Work**

- **Hierarchical**
 - Closed and hidden silos
 - Assigned to project
- **Status-based**
 - Public + private discussions
 - Hierarchical status decides
- **Assigned tasks**
 - Prescribed process
 - Prescribed jobs

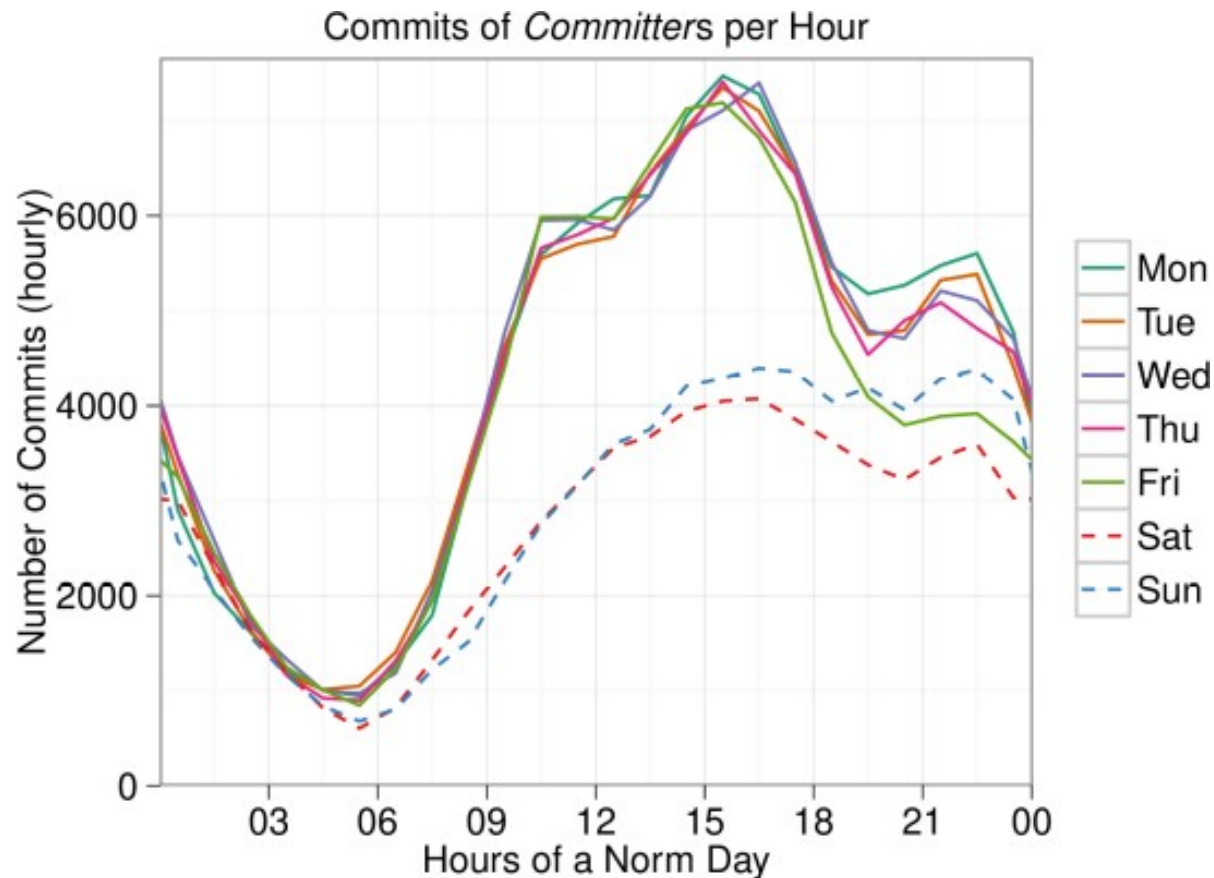
Open Source is Scale-free (Hypothesis)



Open vs. Closed License / Process

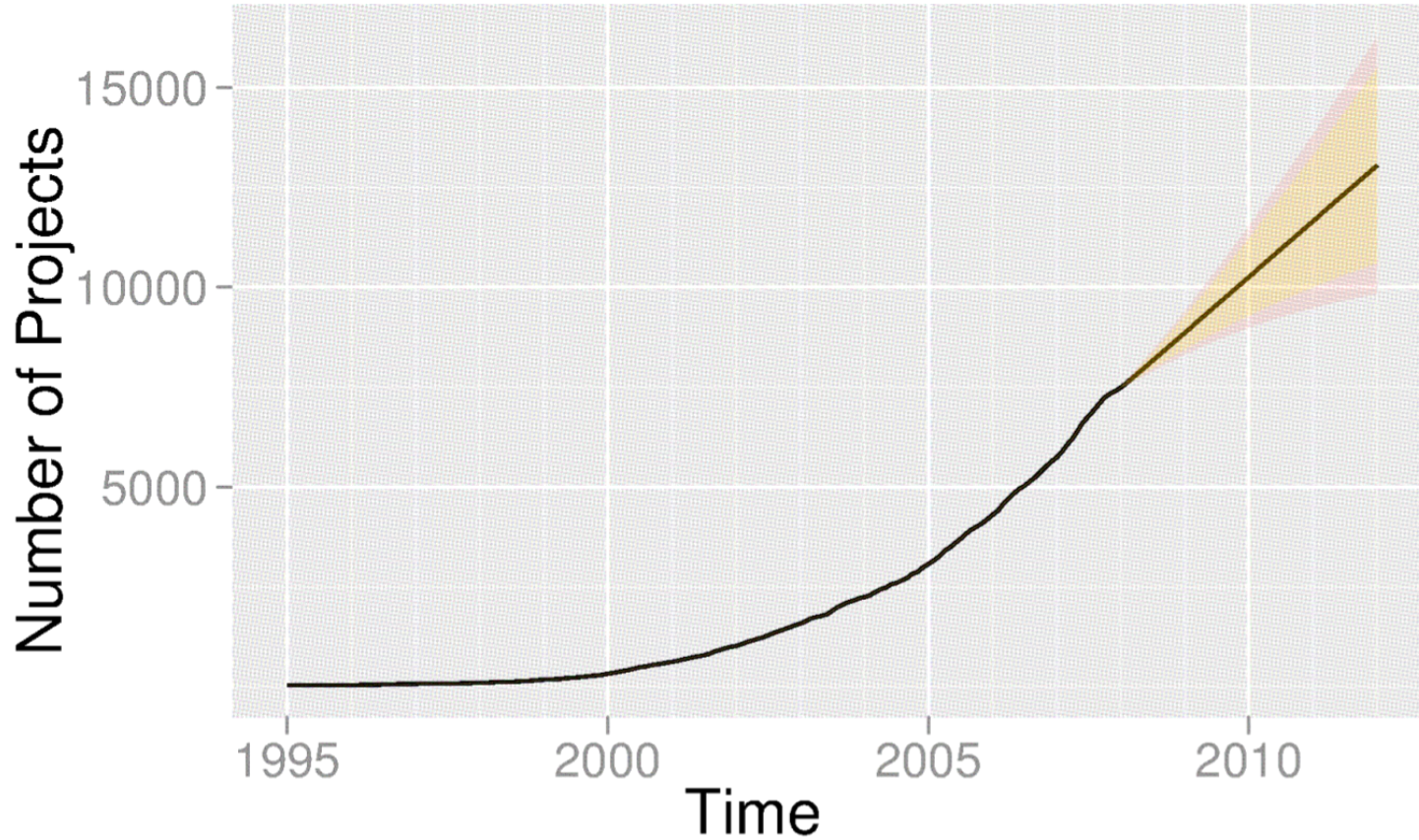


Work on Open Source Software [R+14]



“At least 65% of the code which went into 2.6.20 was created by people working for companies.” [C07]

Growth of Open Source Projects [DR08]



Industrial Use of Open Source

- Open source is in wide use in enterprises [H09]
 - In a large 2009 survey, Forrester Research found that 46% of all responding enterprises were using or implementing open source software
- Most software firms use open source in products [G09]
 - In 2009 Gartner Group estimated that by 2012, at least 80% of all software product firms will use open source software in their products
- Revenues from open source products growing [S06] [I06]
 - In 2006, open source held $\$1.8\text{B} / \$235\text{B} = 0.8\%$ of total packaged product market revenue; will reach $\$5.8\text{B}$ by 2011 (26% CAGR 2006-11)

Huawei's Networking Stack 80% [O16]

Cloud Fusion Sphere → OpenStack ~~CP~~

NTN → OPNF No.1

Network → OpenOS / OpenLight
No.2

PAAS → K8S / Cloud Foundry No.2

Virtual → Xen / KVM
Old New ~~CP~~

Big Data → Apache Hadoop / Apache Spark
Top4

As Vendor.

lock-in.

80%

↓
Product code
OSS.

① change so quick.

A Simple Three-step Maturity Model

- 1. Use**
- 2. Contribute**
- 3. Create and lead**

Venture Capital and Open Source (Recap)

Increasing Open Source Investment Pace

	<5 YEARS	5-10 YRS	>10 YEARS	AGGREGATE
OSS COMPANIES FOUNDED (1ST INST. INV.)	31	19	8	58
VC INVESTMENT BY FOUNDING VINTAGE (\$M)	\$1,802	\$2,847	\$255	\$4,904
VC INVESTMENT BY YEAR BUCKET (\$M)	\$4,237	\$506	\$161	\$4,904
VALUATION BY FOUNDING VINTAGE (\$M)	\$8,174	\$12,719	\$16,992	\$37,886
EXCL. RED HAT			\$1,938	\$22,832

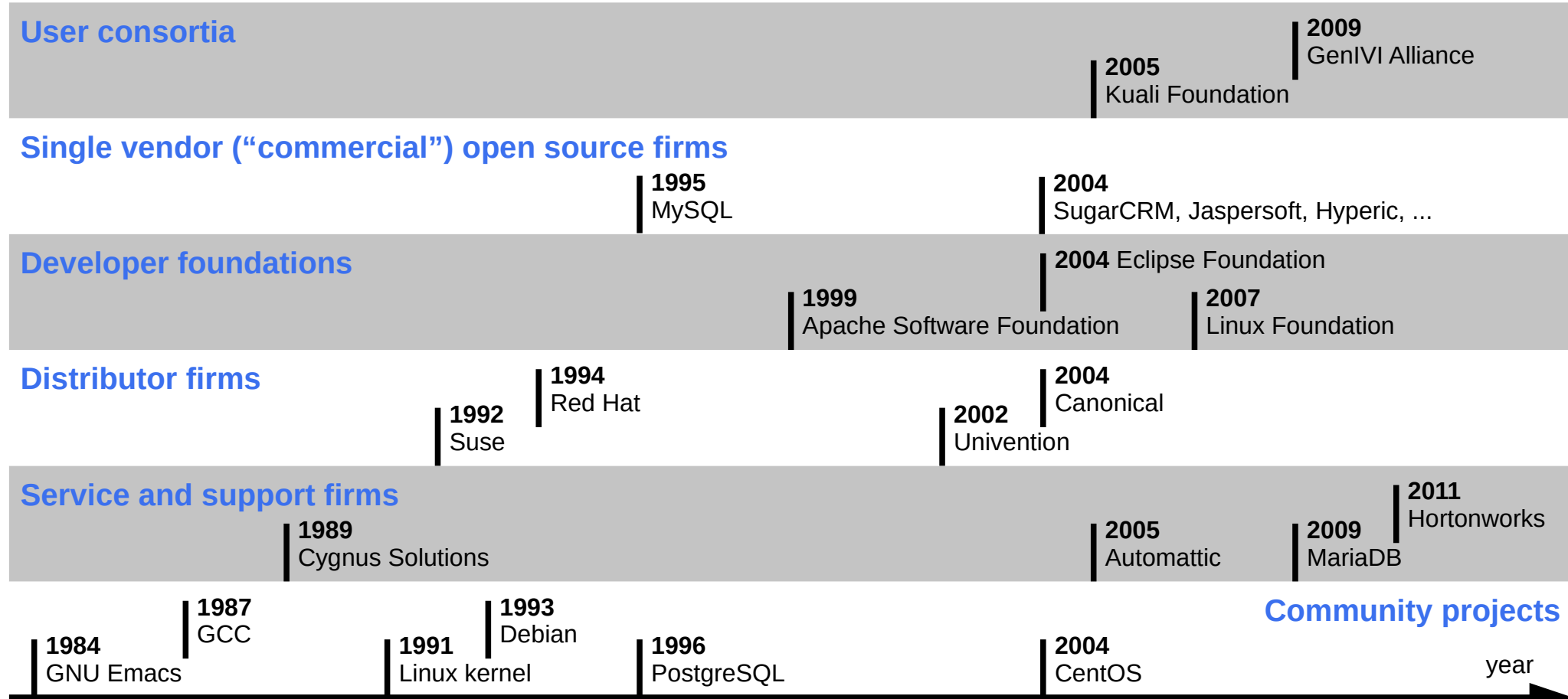
“It is actually open source software that’s eating the world.” [V15]

“When we look at a start-up, we look at the GitHub repositories, we look at Ohloh.net. **We drill down to the level of individual developers. It informs our investment decision.** That fact alone gives open source software developers significant leverage when negotiating their position, salary, and benefits with startups. [Rachel Chalmers, Ignition Partners]

Short History of Open Source

1. 1960-1979: Not-born-yet (the first era) [LT02]
 - Little or no recognition of software as intellectual property
 - Free sharing of source code, allowing for rapid diffusion and innovation
2. 1980-1989: Philosophy (the second era)
 - Founding of the **Free Software Foundation** by **Richard Stallman** in 1985
 - Invention of **GNU public license** for regulating collaboration
3. 1990-1999: Pragmatism (the third era)
 - Founding of **Open Source Initiative** in 1998, increased pragmatism
 - Explosion in number of projects as well as open source licenses
4. 2000-2009: Professionalization (the fourth era)
 - Professionalization of open source, away from pure volunteerism
 - Increased focus on commercialization
5. 2010-today: Mainstream (the current era)
 - “The future is already here, it is just not evenly distributed yet” (Gibson)

Evolution of Open Source Projects



- 1. Legal innovation**
- 2. Process innovation**
- 3. Software tool innovation**
- 4. Business model innovation**

Free Software and Richard Stallman

- Richard Stallman
 - Research scientist at MIT
 - Originator of the GPL license family
 - Defined the “essential four freedoms”
 - Original author of GNU emacs
- Free Software Foundation
 - Founded by Richard Stallman
 - Home and protector of free software



- Copyleft

The Linux Kernel and Linus Thorvalds

- Linus Thorvalds
 - Software developer
 - Originator of the Linux Kernel
 - Hierarchical development model
- Linux Foundation
 - Is a U.S.-based 501(c)(6) foundation
 - Founded to protect and stabilize Linux
 - Founded to rally against Microsoft
 - Is a major home for open source



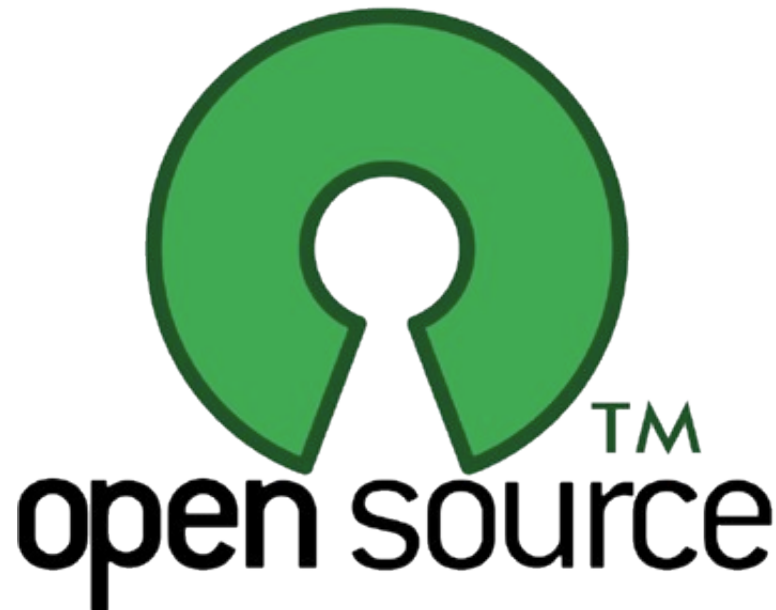
A “Patchy” Web Server and the ASF

- The Apache Web Server
 - is the most widely used http demon (> 50% market share)
 - gave rise to a new development model, codified as the Apache way
- The Apache Software Foundation
 - Is a 501(c)(3) foundation “in the public interest” here open source
 - To stabilize and protect the Apache open source software



The Open Source Initiative

- The Open Source Initiative
 - Is a U.S.-based 501(c)(3) foundation
 - Home to the open source definition
 - Founded to broadly support open source
 - Beyond (what today is the) Linux Foundation
 - Beyond the Apache Software Foundation projects
 - Responding to Netscape open sourcing Navigator



Process Innovation

- Open processes
 - Apache's Meritocracy
 - Open Collaboration

Two Common Misconceptions

- As visitor to the project, you can request a service
 - No, you can't
 - There is no moral or legal obligation to serve you
- As a leader of the project, you can command your followers
 - No, you can't
 - They are volunteers: If you command too much, they will leave

Free vs. Open Source Software

- Free Software

- Free software movement
 - Free software philosophy summarized as “free as in ‘free speech’ not as in ‘free beer’”
 - Initiated (and still led) by Richard Stallman (MIT) in the 1980ties to free software (from being closed)
- Free Software Foundation
 - Is a U.S. 501(c) non-profit organization, see <http://www.fsf.org>

- Open Source Software

- Open source movement
 - “The Cathedral and the Bazaar” describes open source as a development method [R99]
 - Formalized 1998 to address perceived anti-commerce bias of “free software”
- Open Source Initiative
 - Is a U.S. 501(c) non-profit organization, see <http://www.opensource.org>

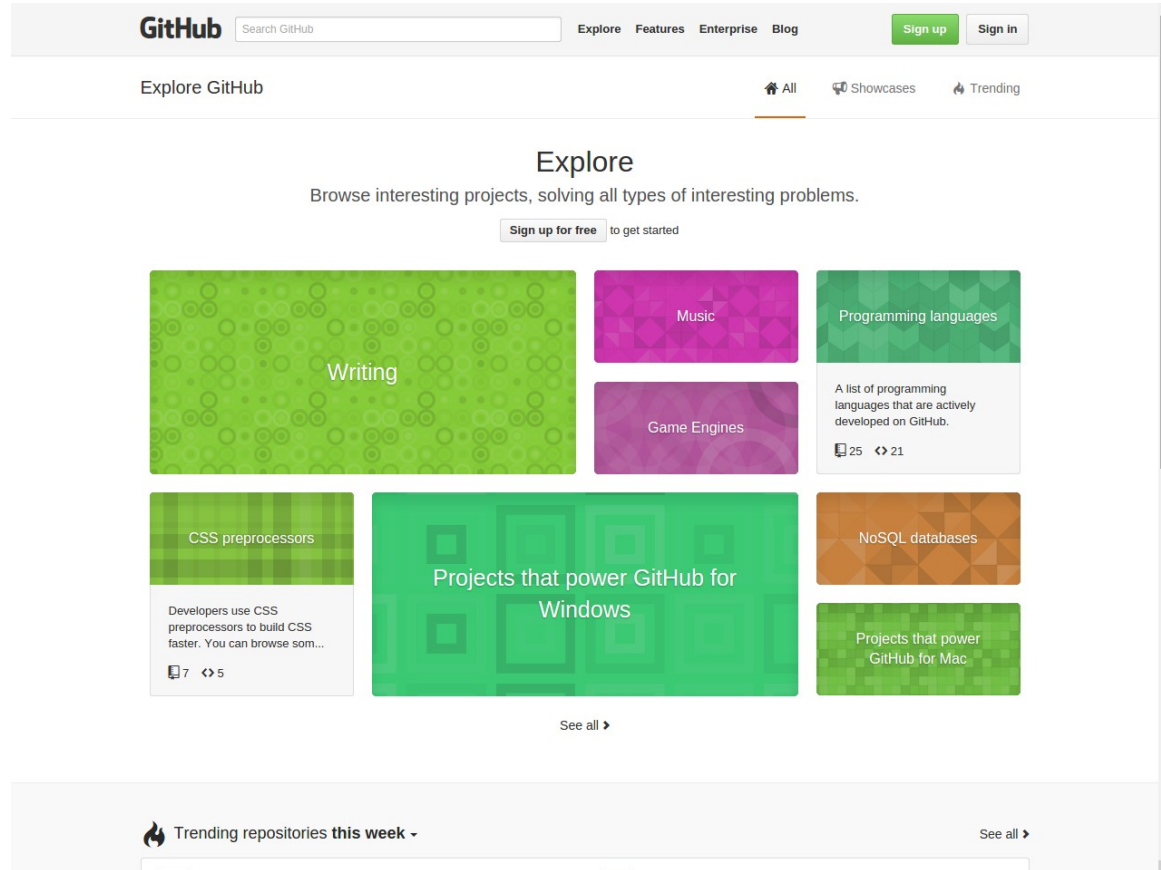
SourceForge in 2000

The screenshot shows the SourceForge website as it appeared in 2000. The browser window is titled "SourceForge: Welcome" and the address bar shows "http://web.archive.org/web/2000012603923/http://sourceforge.net/". The website has a blue header with navigation links: Home, About, Partners, Contact Us, and Login. Below the header is a "SourceForge" logo and a "Site Application Version: 1.0.4" notice. A status bar indicates "Status: Not Logged In" with links for [Login], [New User], [Software Map], [New Releases], [Site Docs], and [Top Projects].

The main content area is divided into several sections:

- SourceForge**: A sidebar on the left with links to Homepage, Code Snippet Library, Software Map, New Releases, Site Documentation, and Top Projects. It also includes a "Not Logged In" section with links for "Login via SSL" and "New User via SSL", and a search bar.
- Latest News**: A central section with a list of recent news items, including "Mirrors at ftp://download.sourceforge.net/pub/mirrors/", "GF1 on sourceforge", "KreateCD becomes SourceForge project - help needed", "HP's Open Source Printing Development on SourceForge", "SOMA Code Release", "Help Wanted in 'SmartSystems'", "Regexx: Regular Expressions C++ solution released", "Pure Java PHP Editor Announce And Request For Help", and "SourceForge Squid project starting up".
- SF Statistics**: A section on the right showing "Your webserver: web2", "Hosted Projects: 1362", and "Registered Users: 7908".
- Top Project Downloads**: A section on the right listing the top 7 days and all time downloads, including "Licq (7489)", "GNOME Transcript (2458)", "IceWM (1212)", "pnm2ppa - HP PPA GhostScript printfilter (1109)", "Sketch (940)", "WeirdX (857)", "ripperX (844)", and "Linux UDF (694)".
- Help and discussion**: A section at the bottom left with links to "SourceForge Help Forum", "SourceForge Open Discussion Forum", "SourceForge Feature Request Forum", "SourceForge Bug Tracker", and "SourceForge Patch Manager".
- Newest Projects**: A section on the right listing the newest projects, including "Apache: mod_cpp (01/25/2000)", "JPython modules created by Finn Bock (01/25/2000)", "AlfaLinux (01/25/2000)", "Prelude (01/25/2000)", "Traitements et Analyses d'Images (01/25/2000)", "PHP Factory Collection (01/25/2000)", "Open Cell Biology (01/25/2000)", "TBT (01/25/2000)", and "XML Toolkit for C++ (01/25/2000)".

GitHub in 2016

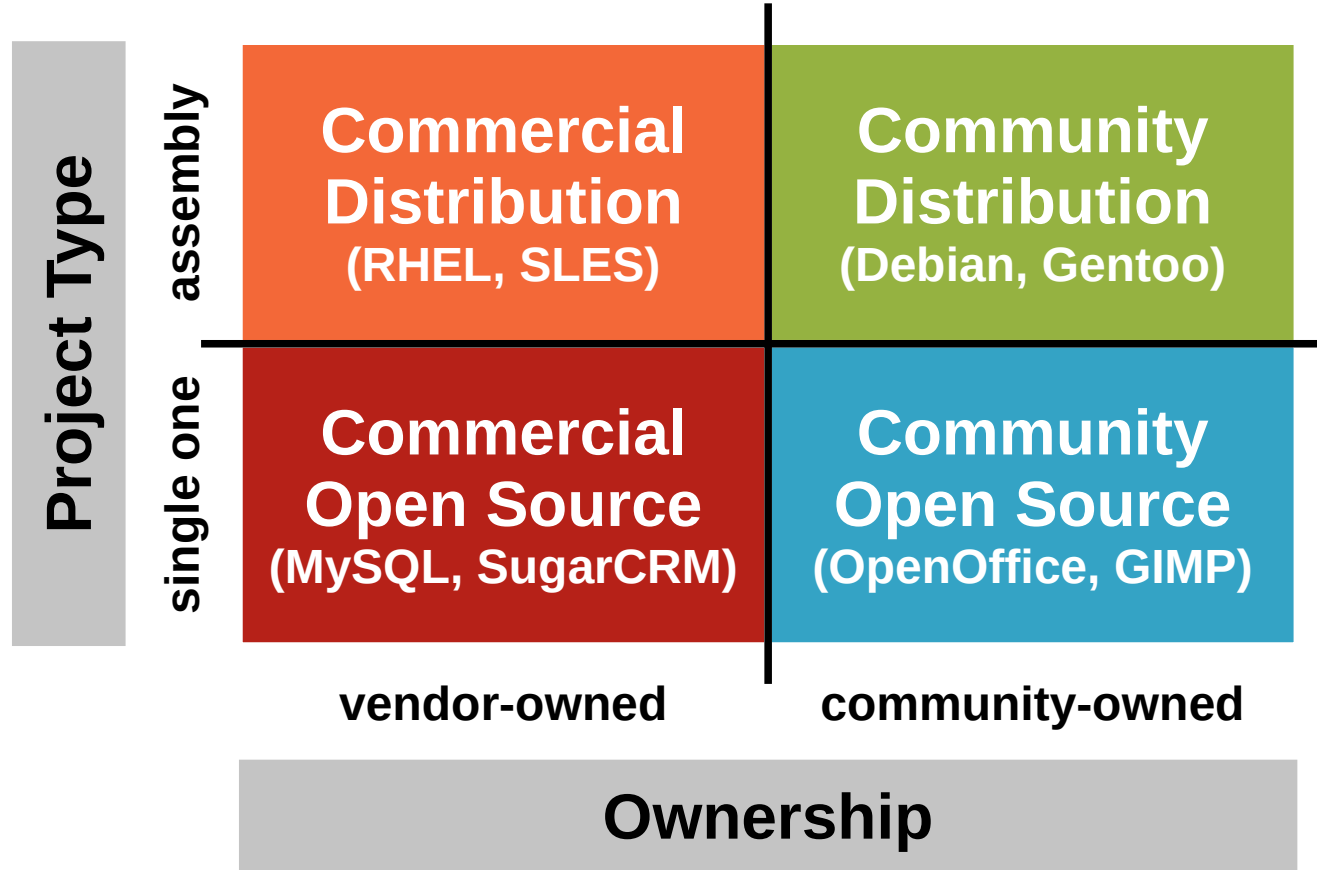


Software Tool Innovation

- Software forges (SourceForge, GitHub, ...)
- Distributed configuration management (git, hg, ...)

**“Some people spend time to save money,
some spend money to save time.” [M10]**

Vendor-owned vs. Community-owned Open Source Software



Review / Summary of Session

- Open source definition
 - Free / libre vs. open source
 - Legal and process definition
- Significance of open source
 - History and growth of open source
 - Developer careers
- Open source innovation
 - Legal, process, tooling, and business models
 - Explained using examples

Thank you! Questions?

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