Open Source Overview and History

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FOSS B01

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Free / Libre and Open Source Software

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Examples of Open Source Software

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Two Complementary Definitions

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

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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

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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

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Process Definition of Open Source

"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]

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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"

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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)

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Open Collaboration [R+09]

- **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

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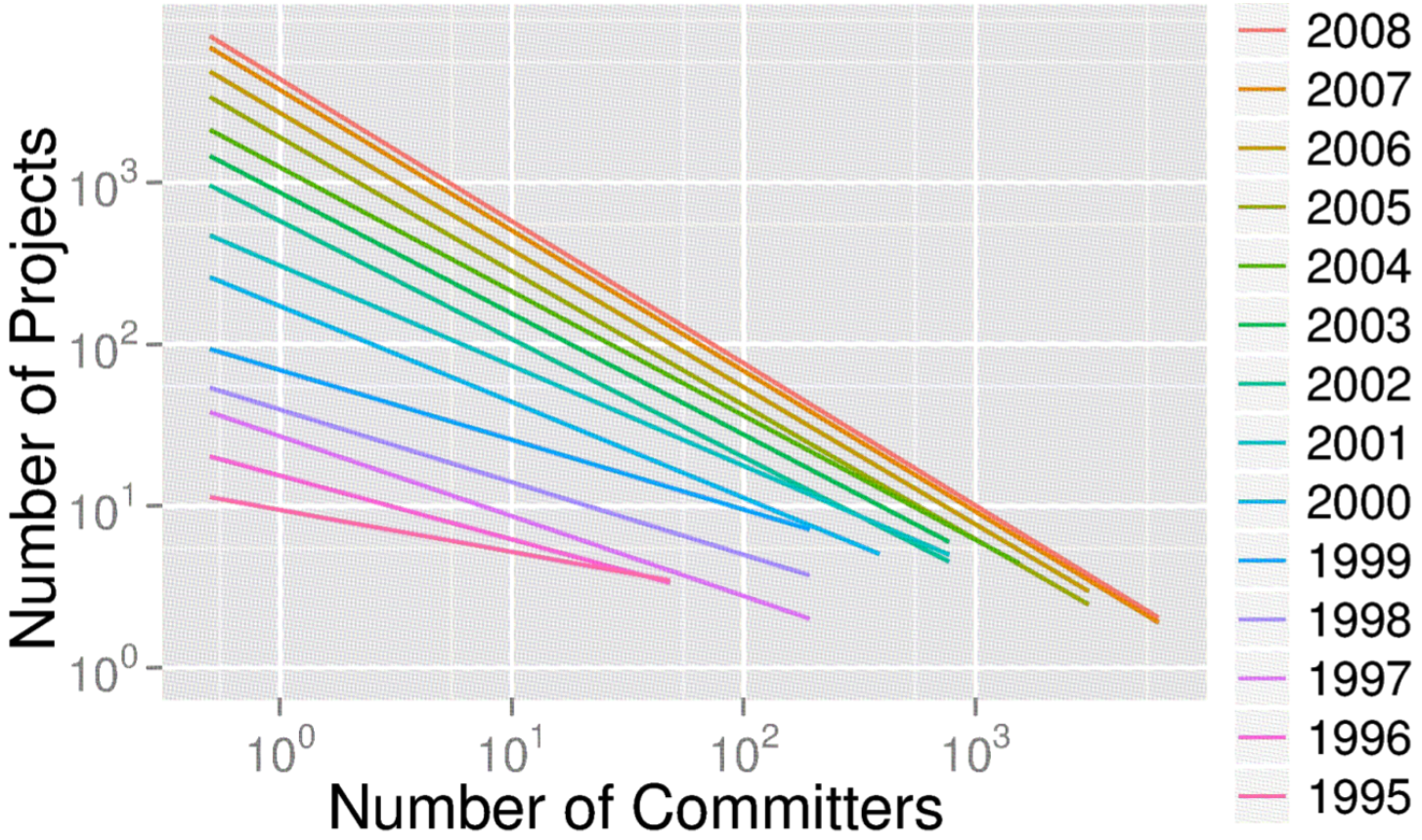
Open Source is Scale-free (Hypothesis)



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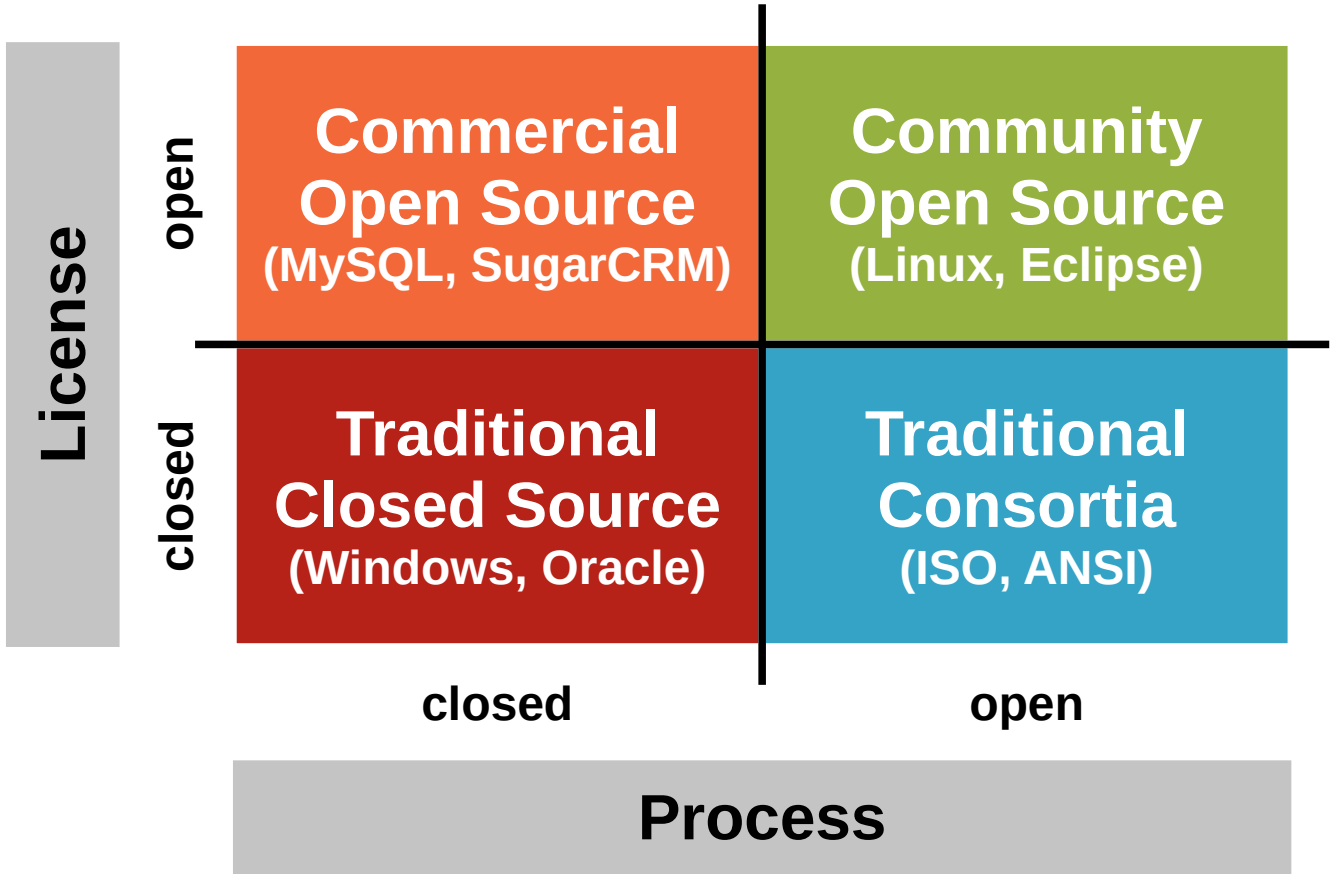
Open vs. Closed License / Process



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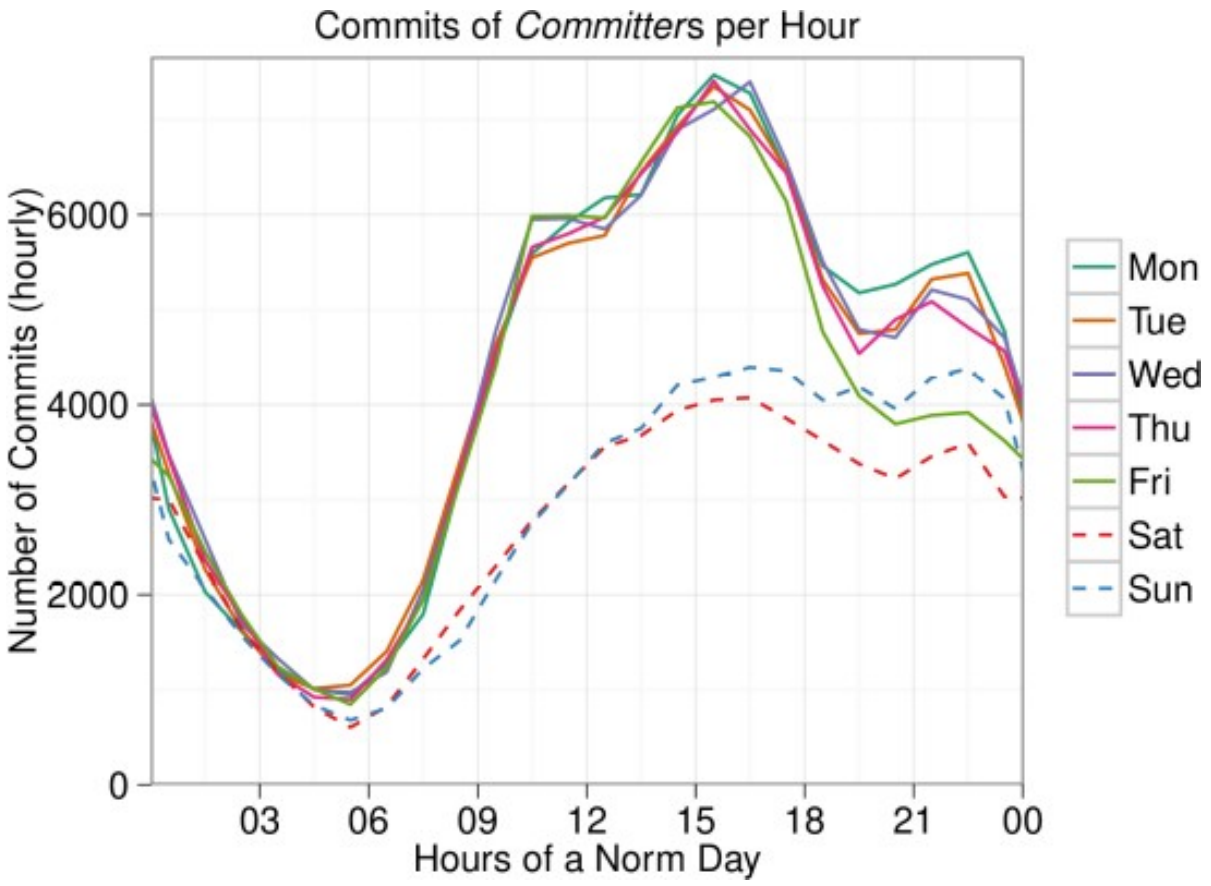
Work on Open Source Software [R+14]



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Work on the Linux Kernel 2.6.20

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

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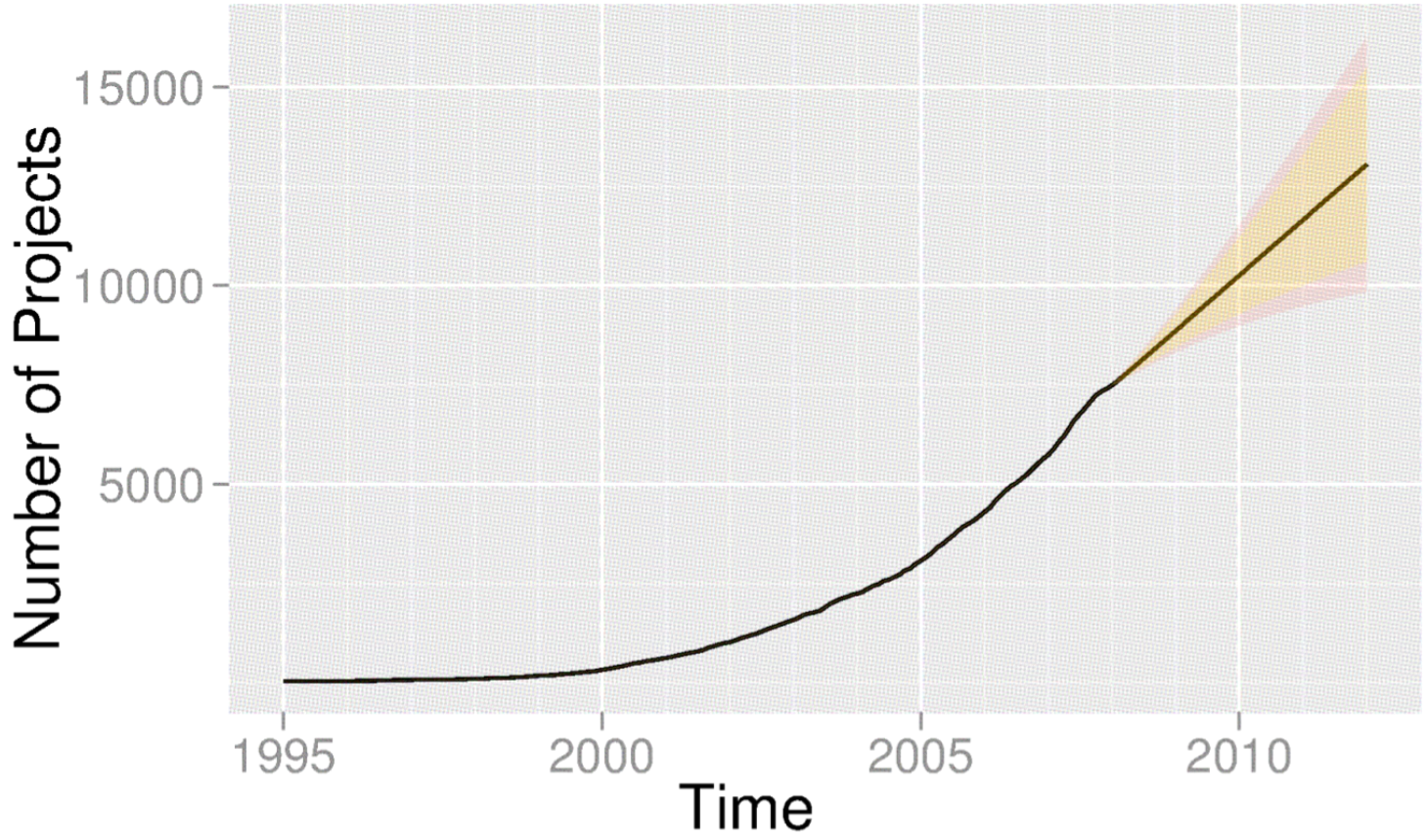
Growth of Open Source Projects [DR08]



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  - 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 $1.8B / $235B = 0.8% of total packaged product market revenue; will reach $5.8B by 2011 (26% CAGR 2006-11)

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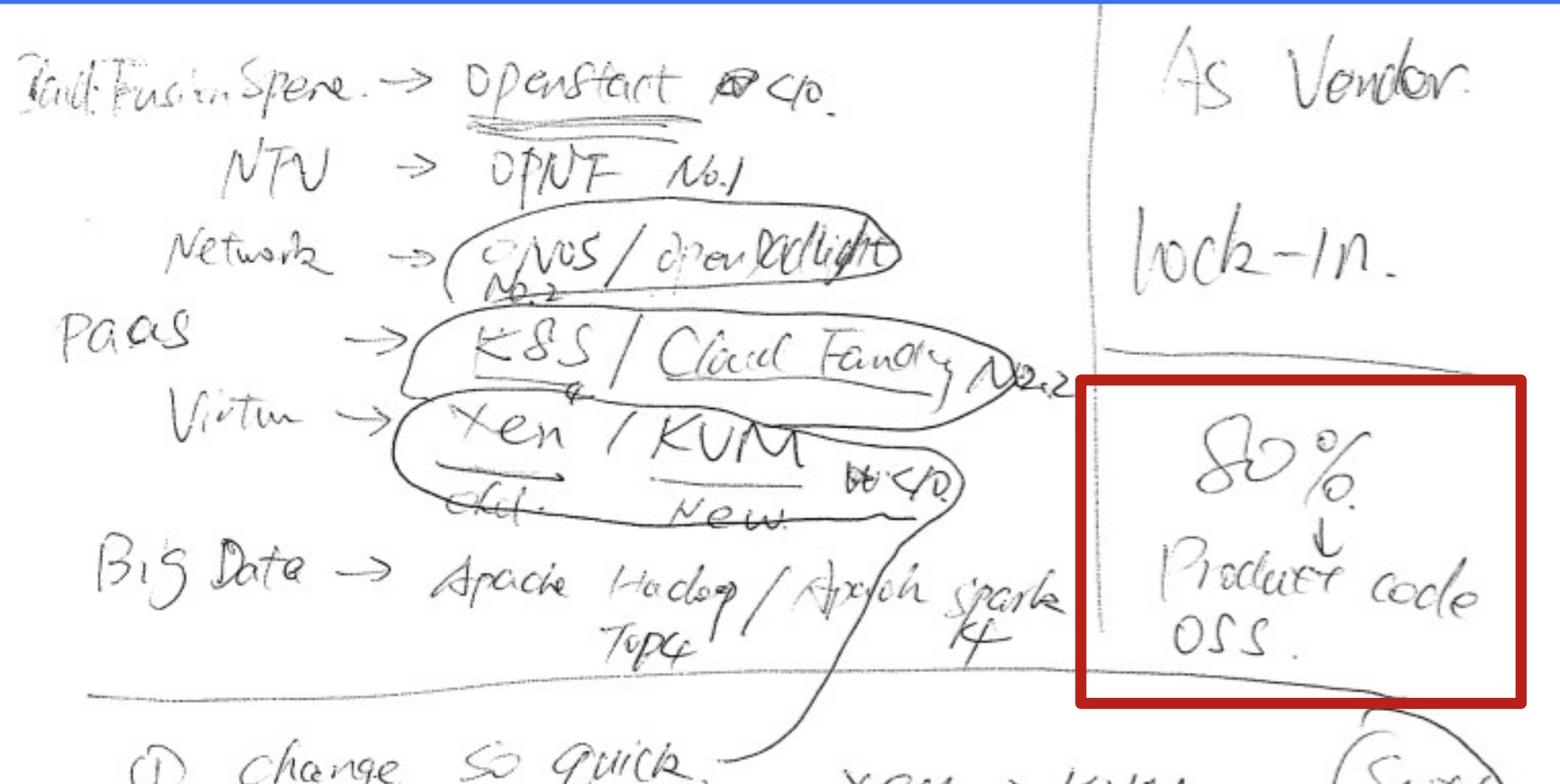
Huawei's Networking Stack 80% [O16]



A Simple Three-step Maturity Model

1. Use
2. Contribute
3. Create and lead

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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]

Developer Careers and Open Source [R15a]

"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]

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   - Founding of **Open Source Initiative** in 1998, increased pragmatism
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4. 2000-2009: Professionalization (the fourth era)
   - Professionalization of open source, away from pure volunteerism
   - Increased focus on commercialization
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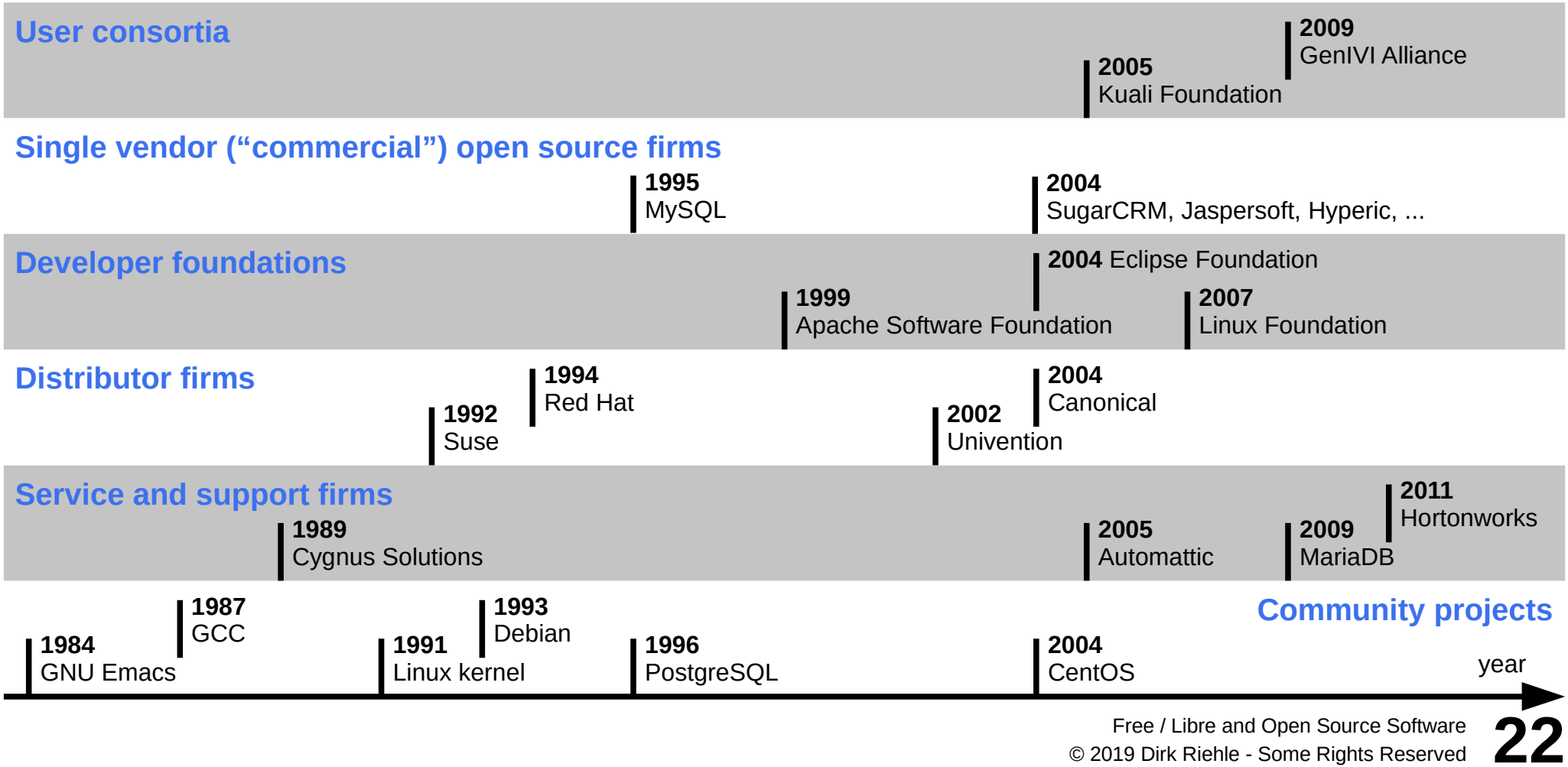

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Open Source and Innovation

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

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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

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Legal Innovation

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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

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A “Patchy” Web Server and the ASF

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  - 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
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THE APACHE® SOFTWARE FOUNDATION

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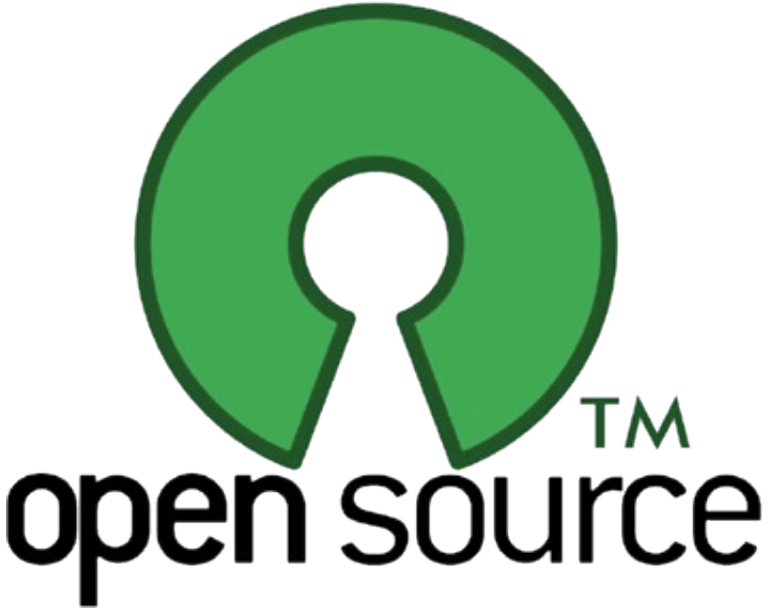

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Process Innovation

- Open processes
  - Apache’s Meritocracy
  - Open Collaboration

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Two Common Misconceptions

- As visitor to the project, you can request a service
  - No, you can’t
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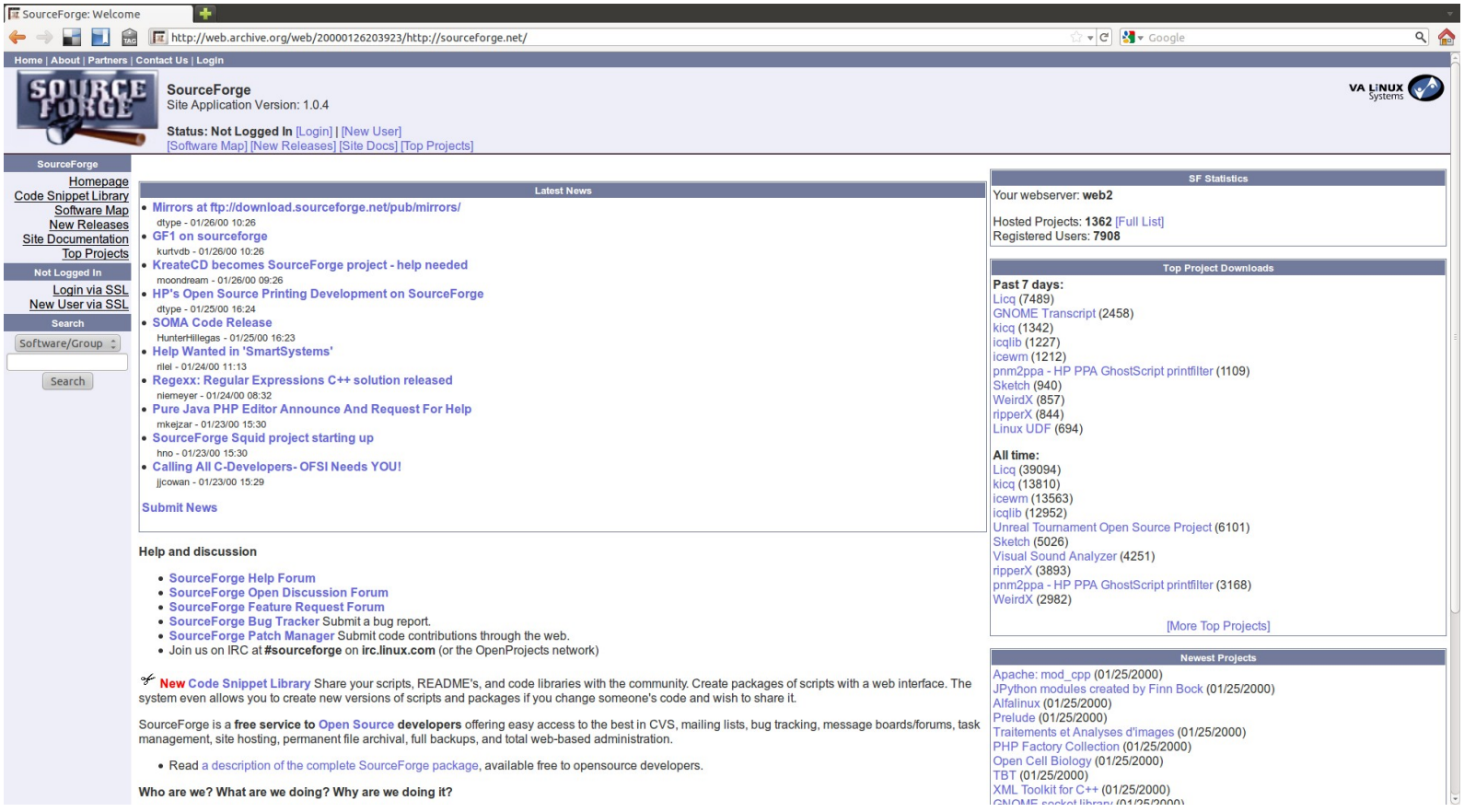
SourceForge in 2000



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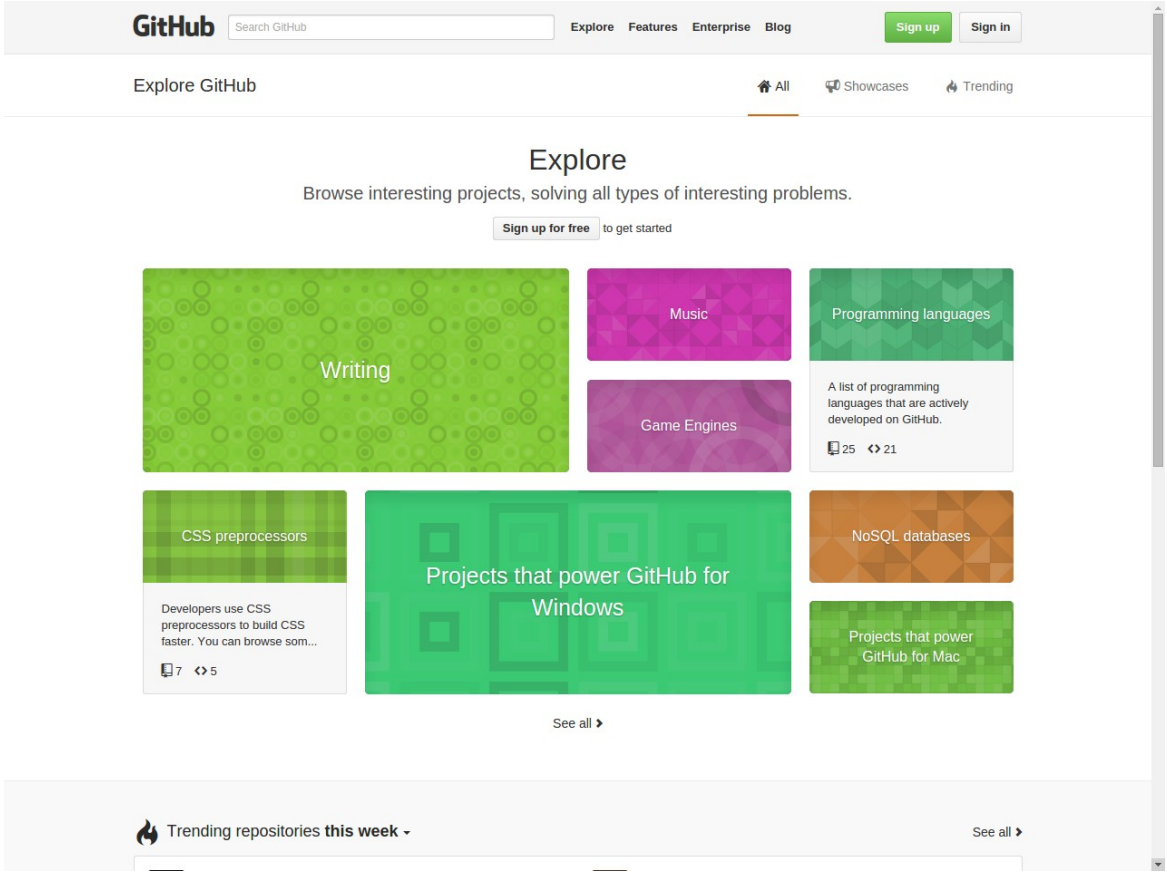
GitHub in 2016



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Software Tool Innovation

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

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Commercial Open Source Software

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

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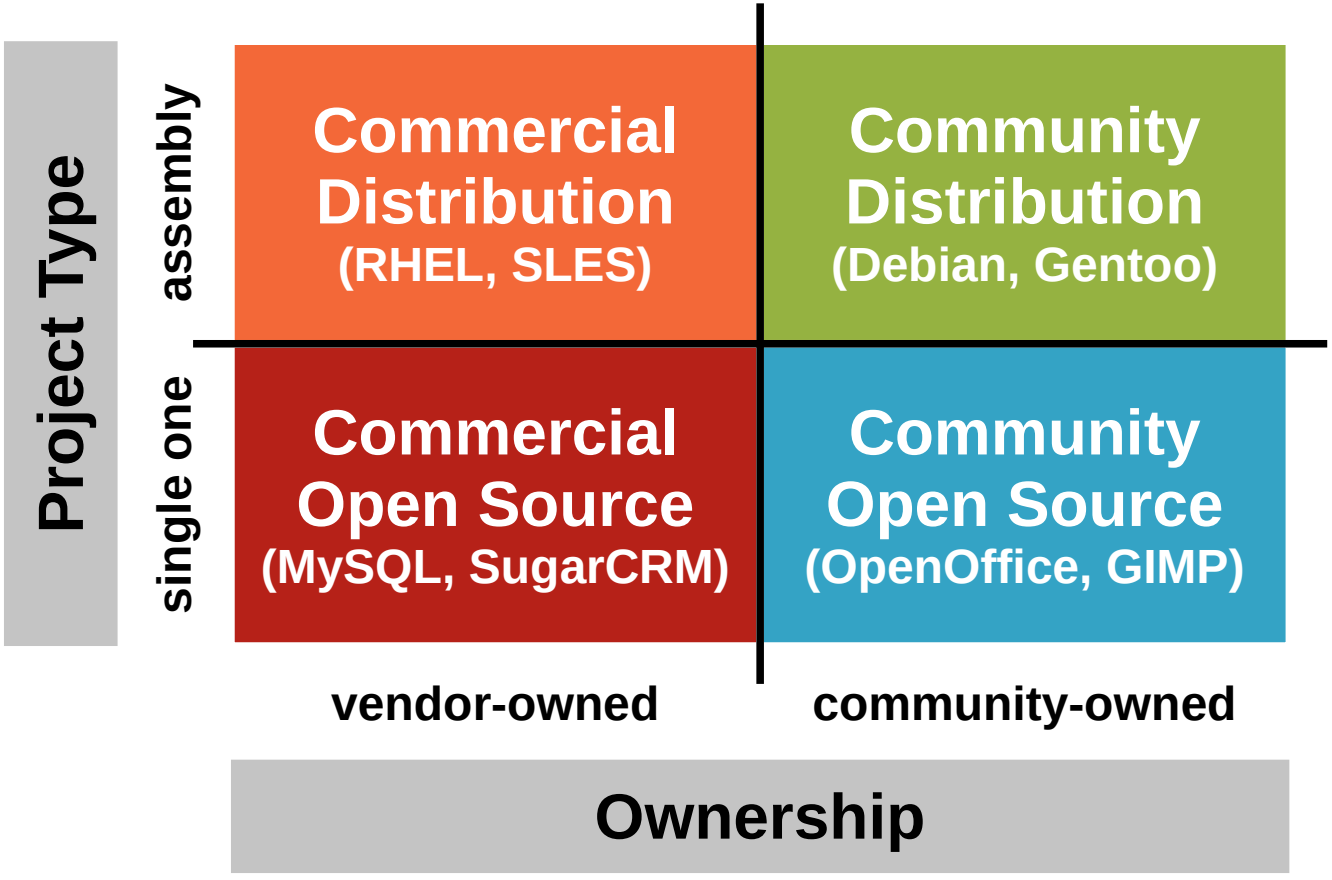
Vendor-owned vs. Community-owned Open Source Software



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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

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Thank you! Questions?

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  - Licensed under Creative Commons Attribution 4.0 International License
- Contributions
  - ...

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It is Friedrich-Alexander University Erlangen-Nürnberg – FAU, in short.

Corporate identity wants us to say “Friedrich-Alexander University”.

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Examples of Open Source Software

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- **Process definition**

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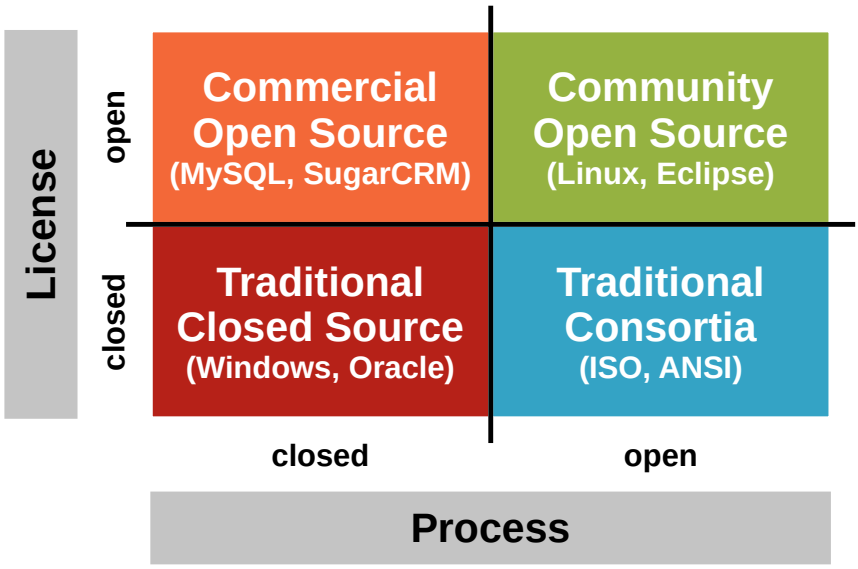

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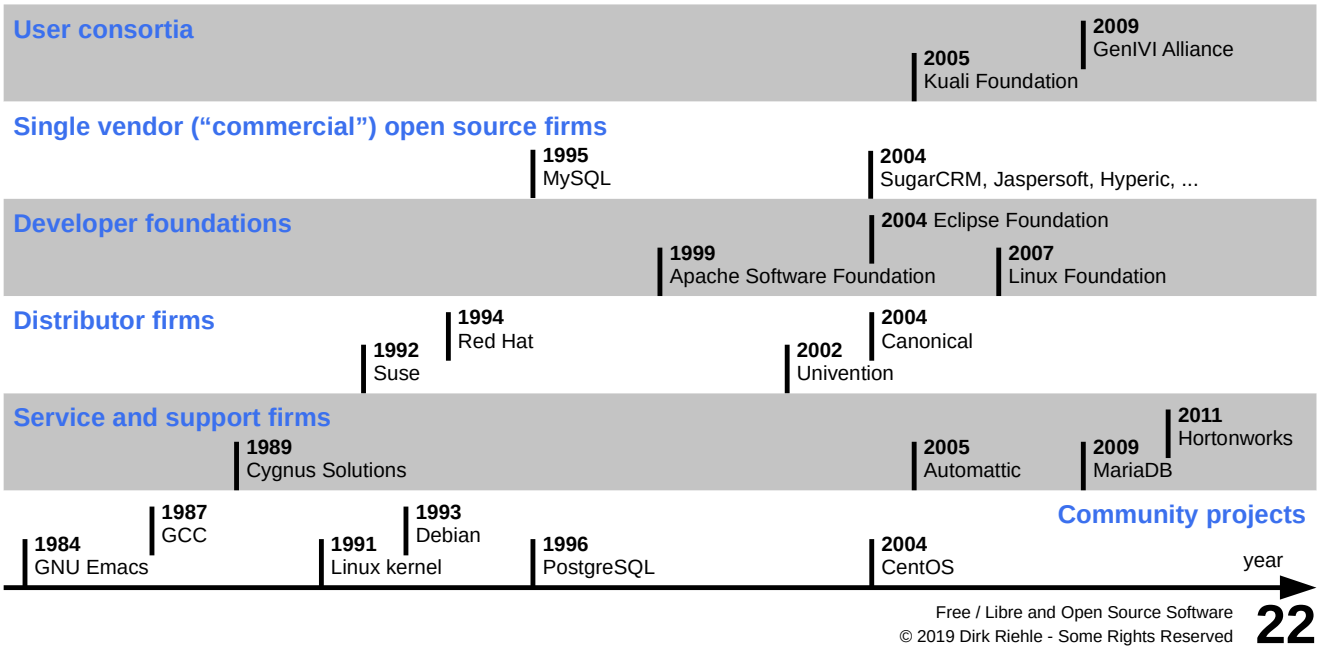

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Open Source and Innovation

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2. Process innovation
3. Software tool innovation
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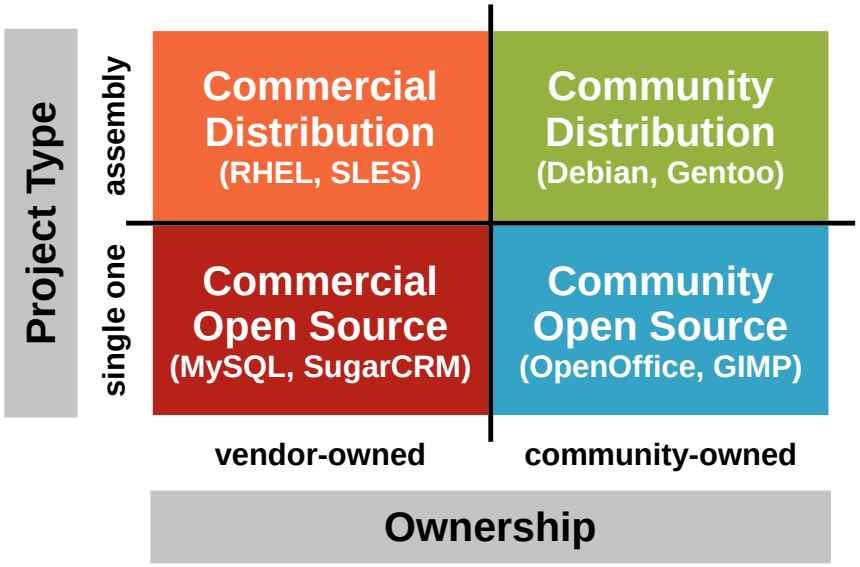

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  - History and growth of open source
  - Developer careers
- Open source innovation
  - Legal, process, tooling, and business models
  - Explained using examples

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Thank you! Questions?

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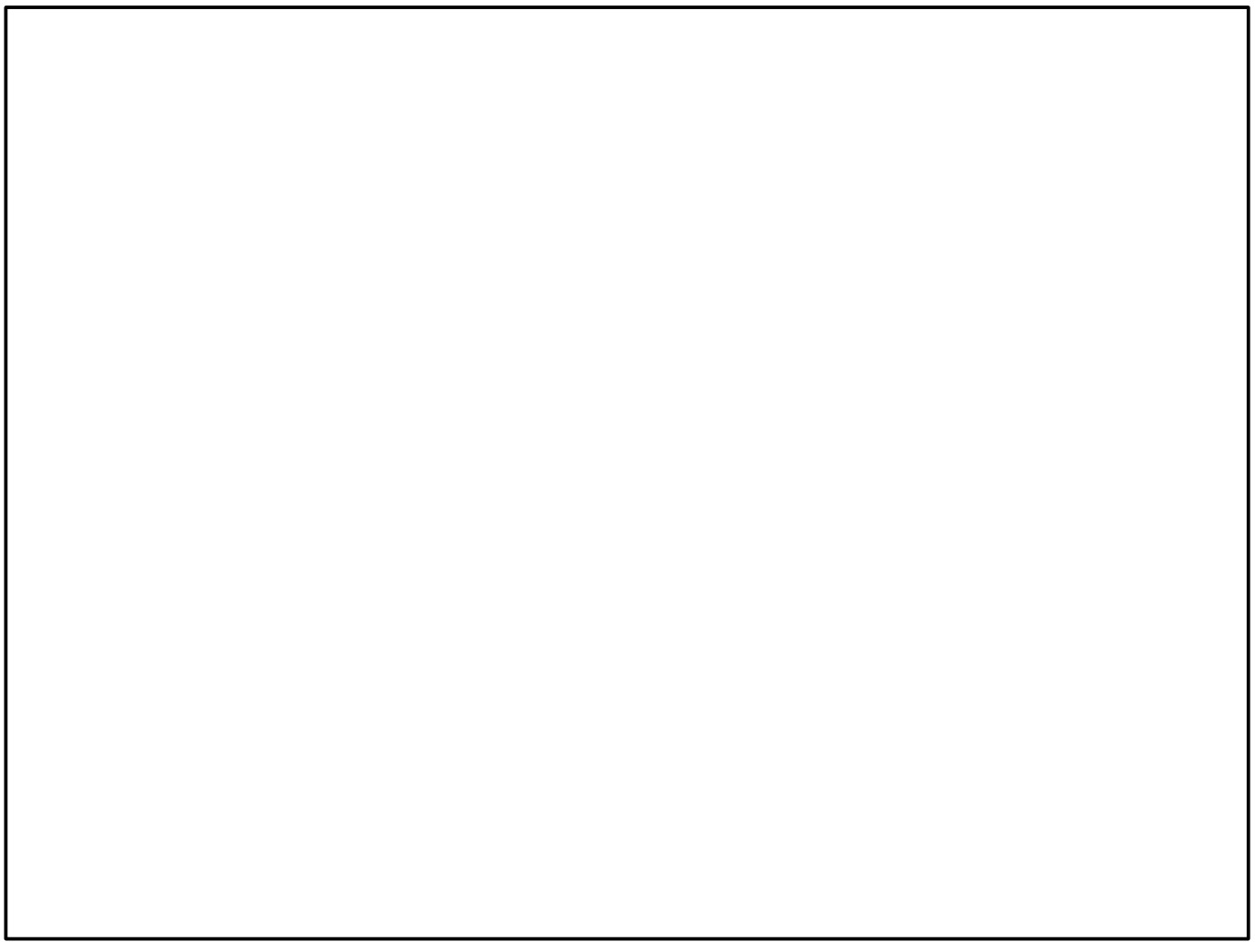

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