

CS 4530: Fundamentals of Software Engineering

Module 6, Lesson 3

Open Source

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Learning Goals

- By the end of this lesson, you should be able to...
 - Understand terminology and explain open source culture and principles
 - Opine on philosophical/political debate between open source and proprietary principles
 - Reason about tradeoffs of different open source licenses and business model

Background: laws and open source

- Copyright protects creative, intellectual and artistic works — including software
- Trademark protects the name and logo of a product
- Patents protect designs and methods (certain algorithms are patented)
- Copyright holder can grant a license for use, placing restrictions on how it can be used (perhaps for a fee)

Some Unix History

- Timeline
 - 1970s: Bell Labs creates Unix, kind of gives it away for the price of the disks (AT&T not allowed to sell it as a product)
 - 1983: AT&T Unix party is over, competing paid OS versions
 - Also 1983: Richard Stallman announces “Starting this Thanksgiving I am going to write a complete Unix-compatible software system called GNU (Gnu’s Not Unix), and give it away free to everyone who can use it”

Free Software

- Stallman's project is an overtly ideological one:
 - Freedom 0: run code as you wish, for any purpose
 - Freedom 1: study how code works, and change it as you wish
 - Freedom 2: redistributed copies (of original) so you can help others
 - Freedom 3: distribute copies of your modified version to others
- GPL is an interesting, unanticipated use of the existing *licensing* mechanism: you can use, but can only distribute if you distribute your changes under the same license.



Richard M Stallman (Licensed under GFDL)

More Unix History (Late '80s to early '90s)

- Berkeley has a fork of AT&T's Unix that they rewrite, license *permissively* (leave in the authors' credit) — the BSD License
- The GPL is used as the license for the Unix-like Linux “kernel”
- Debian is a Linux distribution that wants to only use free software
 - Okay, what's free software?



Some Browser History

- Netscape was dominant web browser early 90's
- Business model: free for home and education use, companies pay
- Microsoft entered browser market with Internet Explorer, bundled with Windows95, soon overtakes Netscape in usage (free with Windows)
- January 1998: Netscape first company to open source code for proprietary product (Mozilla)
 - Netscape Public License



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Netscape unveils its Navigator source code site

Netscape Communications Corp. is rallying its troops for next month's release of the source code for the company's Navigator Web browser.



Written by **Maria Seminerio**, Contributor on Feb. 22, 1998

Open Source

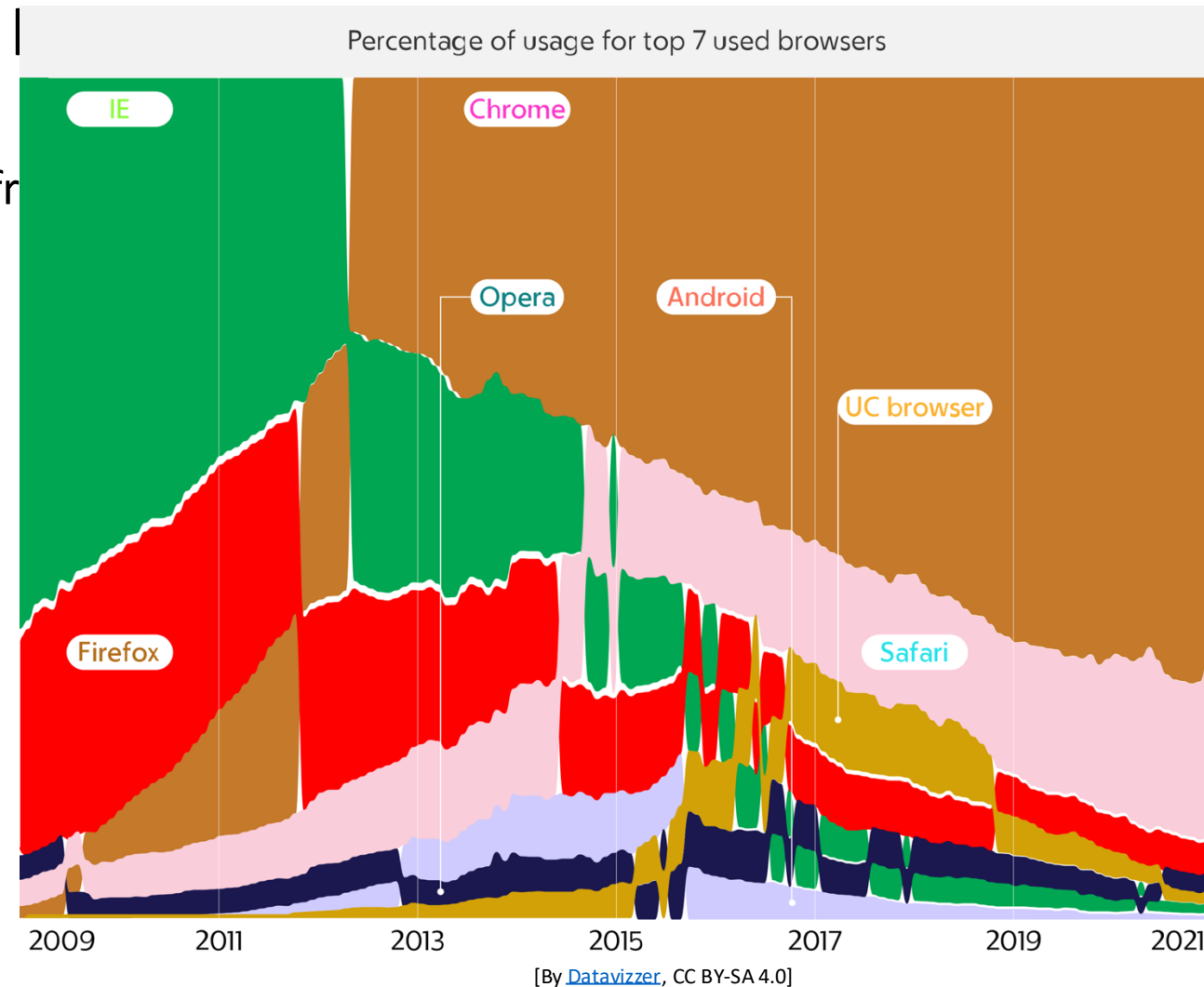
- Open Software Initiative created to steward a definition of “open source”
 - Permissive licenses (MIT, BSD)
 - Free software/copyleft licenses (GNU, Mozilla Public License, Apache License)
- Stallman: “Open Source is a development methodology; free software is a social movement”














Logo of the Open Software Initiative


Firefox lost battle, Open Source wins war


- Firefox lost to Chrome and Safari, but
 - Chrome's core = Chromium OSS
 - uses "Blink" rendering engine forked from WebKit
 - Safari's core = Webkit OSS
 - forked from KHTML and KJS
 - Microsoft's Edge core = Chromium
- How do browsers differentiate?
- Why is there more than one?





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Business and OSS



Business and OSS

We estimate the supply-side value of widely-used OSS is \$4.15 billion, but that the demand-side value is much larger at \$8.8 trillion. We find that firms would need to spend 3.5 times more on software than they currently do if OSS did not exist.



https://www.hbs.edu/ris/Publication%20Files/24-038_51f8444f-502c-4139-8bf2-56eb4b65c58a.pdf

Business and OSS

- Many of the most well-known open-source projects are primarily driven by single large companies
- Often outside contributors are required to assign copyright to central company, a “Contributor License Agreement”
- Variety of motivations for companies here!



Meta

& React



Alphabet

& Chromium
& V8



Adopting OSS has risks, tradeoffs

- Are licenses compatible?
- Including permissive-licensed software in copyleft-licensed software is generally compatible (copyleft takes precedence)
- A significant concern for licenses with copyleft: Adopting libraries with copyleft clause generally means what you distribute must also have same copyleft clause (and be open source)
 - Are you certain that the software truly is released under the license that is stated? Did all contributors agree to that license?
- LLM-driven violation of copyright norms makes whole situation very volatile