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Open Source Challenges in the Enterprise

(The Alan Turing Institute)

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Red Hat, Inc.

Overview

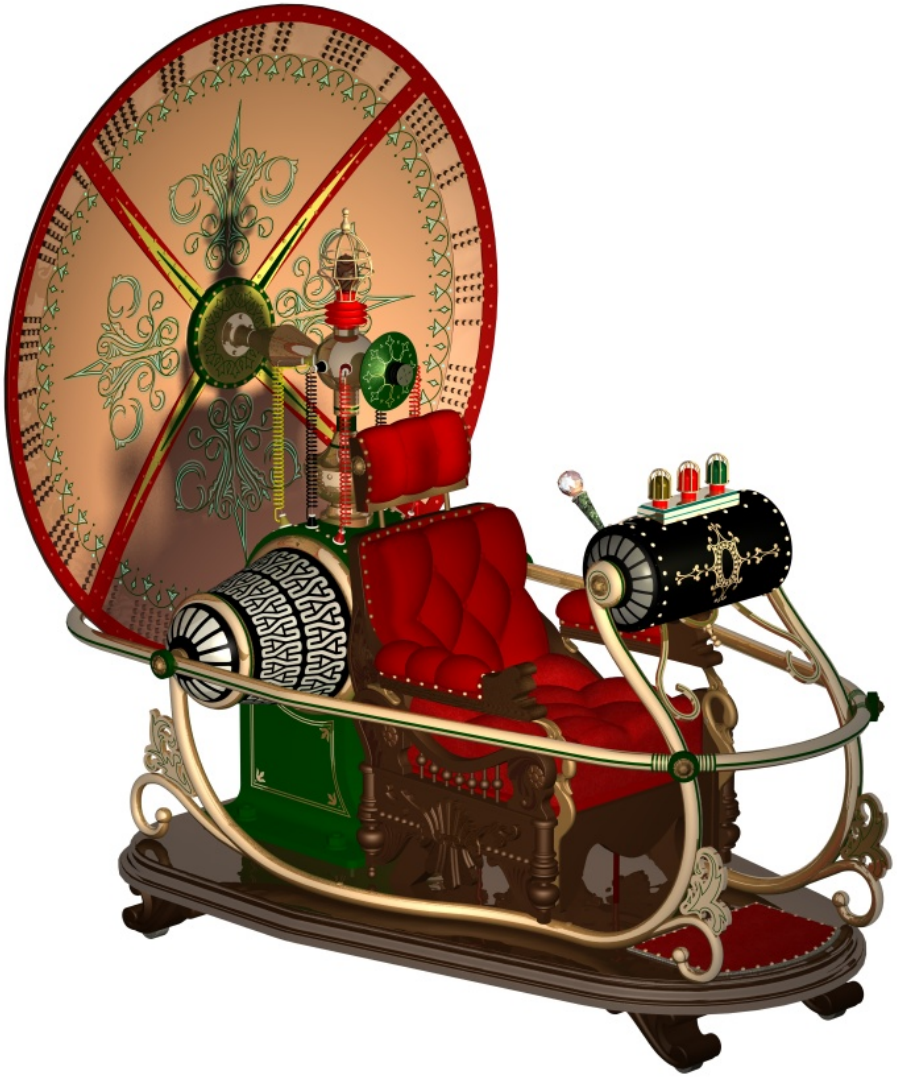
- What is open source?
- How it probably impacts your daily life
- Challenges open source has faced and still faces
  - Close source FUD
  - Reliability and security
- How you can get involved
  - User
  - Contributor

What is open source (software)?

“ Open source software is software with source code that anyone can inspect, modify, and enhance.

[…] Today, however, "open source" designates a broader set of values—what we call "the open source way." Open source projects, products, or initiatives embrace and celebrate principles of **open exchange**, **collaborative participation**, **rapid prototyping**, **transparency**, **meritocracy**, and **community-oriented development**.”
opensource.com, June 2019

A brief history of time …



In the beginning …

- Before 1980's heterogeneous environments encouraged code dissemination
- Personal computing grew through code sharing
  - ZX80, Spectrum, BBC Model A/B, Commodore, …

```
 360 POKEA,104:FORV=1TO6:A=A+1:POKEA,102
:NEXT:POKEA,104:NN=0
 365 PRINTA$"R":BL$;"   ":PRINTA$;"■■■";
 370 IFM=3THENPRINT"TARGET"SPC(21)"TARGE
T":GOTO400
 380 IFB=0THENPRINT"TARGET"SPC(21)"RATTA
CKER":GOTO400
 390 PRINT"RATTACKER■"SPC(20)"TARGET
 400 EE=INT(RND(1)*100)
 410 IFEE>50THENEE=INT(-EE/2):PRINTA$SPC
(13)"R WIND <——"ABS(EE)"■   ■":GOTO430
 420 PRINTA$SPC(13)"R WIND ——>"EE"■
■"
 430 PRINTBL$:PRINTBL$;"□□"
 450 IFM<3THEN490
 460 FORX=1TO4:PRINTBL$;"□":GOSUB1280:GO
SUB1260
 470 PRINTTAB(13)"RACT OF NATURE■□":GOSU
B1280:NEXT
 480 GOSUB1270:GOSUB1270:PRINTBL$
 482 O=1:B$=MID$("HLRT",INT(RND(1)*4)+1,
O):IN$=B$:GOTO520
 490 IFM<>1THENGOSUB1280:GOTO505
```

The 1980/1990s

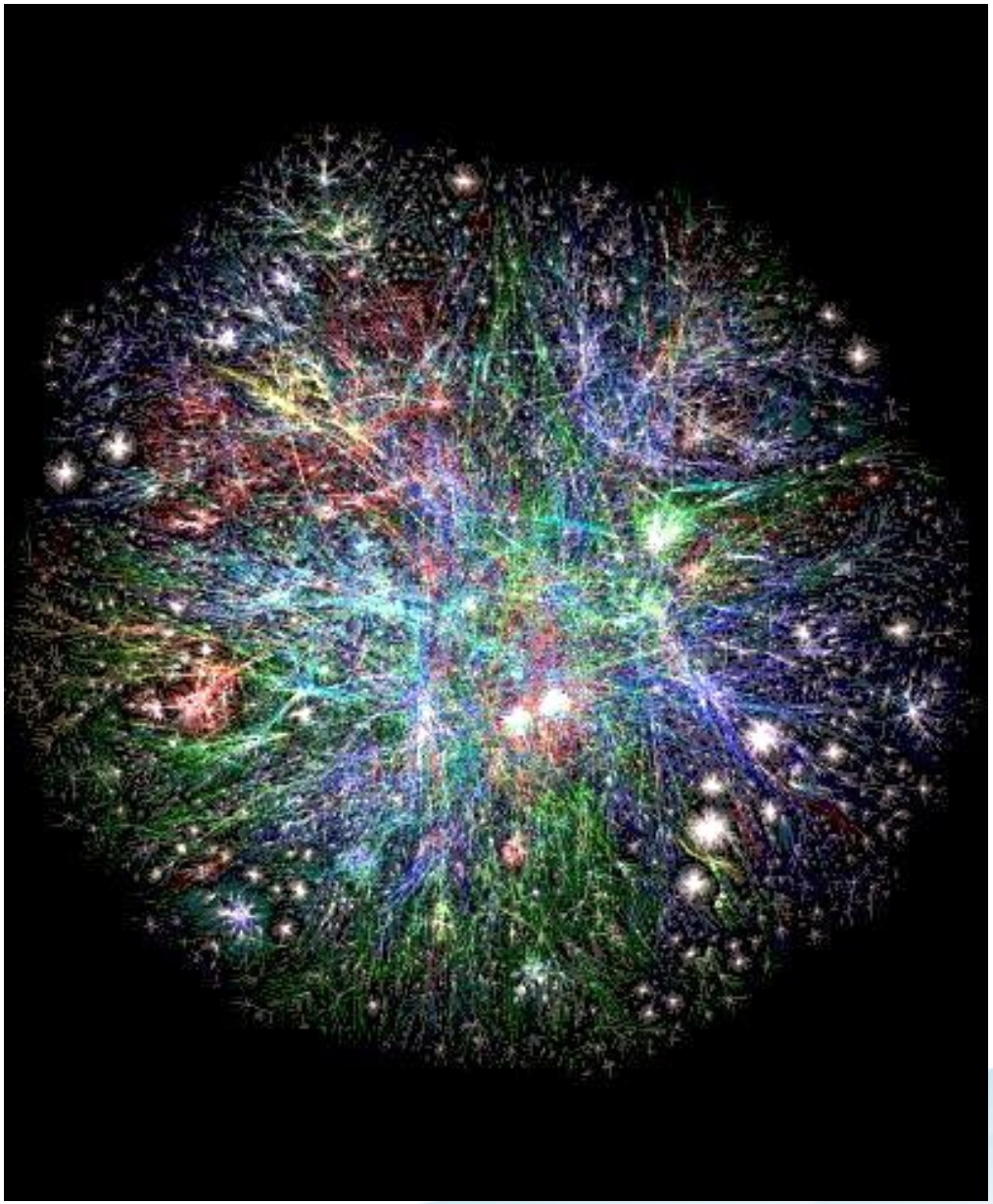
- Richard Stallman launches GNU Project in 1983
  - Free Software Foundation in 1986
  - Gnu Public Licence (GPL) released in 1989
- Lots of free software typically by Universities
- 1991 saw first Linux release
  - Taken to heart by academic and research communities
  - Playstation 3, Android!
- Term “open source” coined in 1998

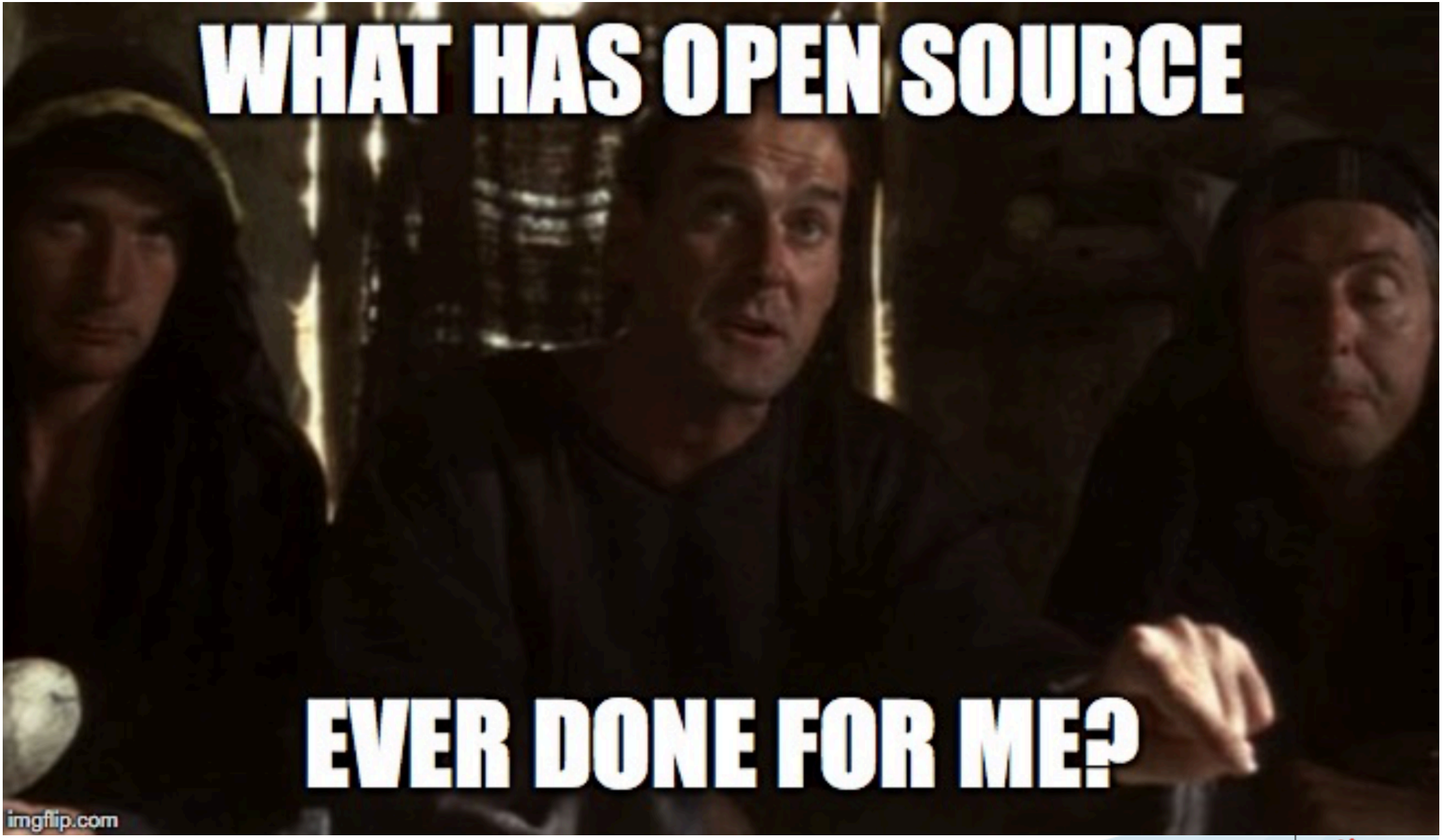
The World Wide Web

- CERN httpd released as open source 1991
- List of ALL websites in 1993 captured on one page!
- Huge adoption and kicked off e-commerce, global use of internet
  - Amazon, Google, Twitter, Facebook, …
- Other benefits came later … REST, Web Services/ SOAP
  - Heterogeneous interoperability out of the box

3D Map of WWW (circa 2009)

http://www.vlib.us/web/worldwideweb3d.html





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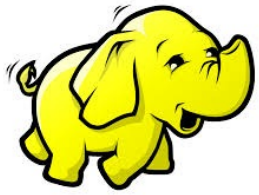
Mobile, cloud and language explosion

- Android
  - Linux
  - Java (-ish)

- EC2
  - Linux

- Facebook, Netflix
- More new languages in the last 10 years than previous 30
  - Ruby, Clojure, Ceylon, Scala, Erlang, Lisp, …

Big Data/NoSQL/RDBMS/Data Grids



Artificial Intelligence/Machine Learning

Things we might assume

- The benefits of open source are obvious
- Open source is competitive with closed source
  - Reliability, dependability, performance
  - Cost (free versus fee)
- Closed source code consigned to the history books
- Open source is the default option for enterprises

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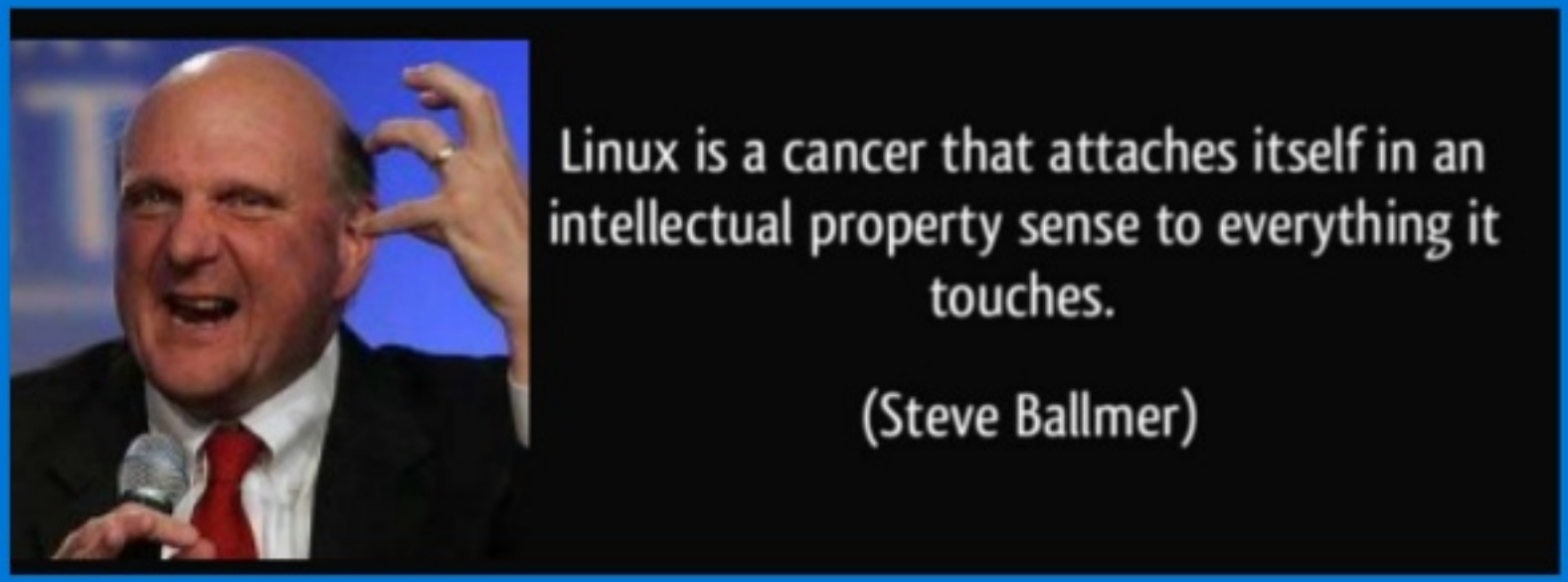
Microsoft 2001

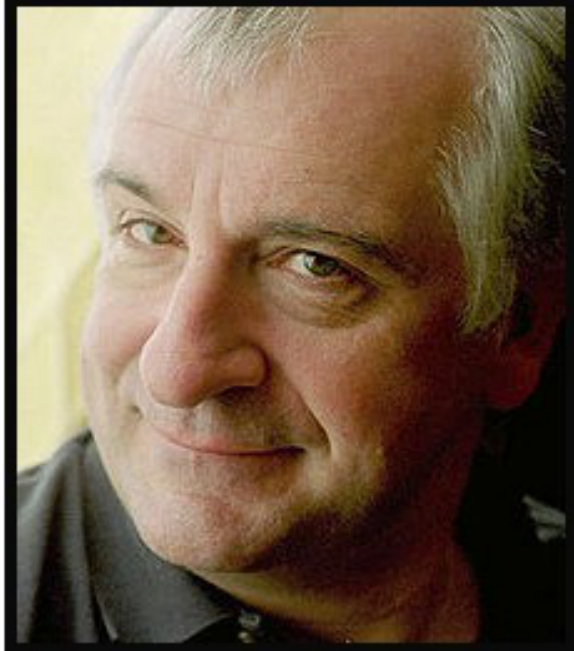


Licence categories

- Copyleft
  - Strong (GPLv2, GPLv3, AGPLv3)
  - Weak (LGPL, MPL, EPL)
- Permissive (MIT, BSD, Apache License 2.0)

Enterprise adoption of open source

- Typical concerns
  - Not enough quality open source code?
  - Not broad enough use case coverage?
- Closed source dominated for so long
- FUD versus reality
  - “Open source good enough for playing but not enterprise”
  - Quality of open source developers versus closed source
- “Where do I start?”



Space is big. You just won't believe how vastly, hugely, mind-bogglingly big it is. I mean, you may think it's a long way down the road to the drug store, but that's just peanuts to space.

(Douglas Adams)

izquotes.com

Trending repositories on GitHub today · GitHub

https://github.com/trending

GitHub is where people build software. More than 11 million people use GitHub to discover, fork, and contribute to over 27 million projects.

- Apricot
- AspectJ
- ATL - A Model Transformation Technology
- b3
- Babel
- BPEL Designer
- BPMN modeler
- BPMN2 Modeler Project
- Buckminster Component Assembly

1 2 3 4 5 6 7 8 9 ... next

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The Apache Software Foundation
http://www.apache.org/

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Indexes
- Alphabetical
- Project Listing
- Releases
- by Category
- by Language
- by PMC
- by Standard

Feeds

DOAP Files
- Guidelines
- Create a DOAP File
- DOAP File FAQ
- Categories
- Programming Languages
- PMC

Documentation
- Dependencies
- PMC Data
- Standards

References & Thanks

Projects Alphabetical Index

An alphabetical list of all projects indexed on this site.

A B C D E F G H I J K L M N O P Q R S T U V W X Z

A

- Apache .NET Ant Library
  This is a library of Ant tasks that help developing .NET software. It includes the "old" .NET tasks like a C# compiler task but also comes with support for NUnit testing or running the popular NAnt or MSBuild build tools.
  Categories: build-management
  Languages: Java
  PMC: Apache Ant
- Apache ACE
  When assembling software out of reusable components, the task of deploying software onto an ever increasing number of targets is not trivial to solve. This becomes even harder when these targets require different components based on who's using them. Apache ACE allows you to group those components and assign them to a managed set of targets. This allows you to distribute updates and new components easily, while keeping a full history of what was installed where during what period. It also helps you setup an automated development, QA/testing, staging and production environment.
  Categories: osgi
  Languages: Java
  PMC: Apache Ace
- Apache Abdera
  The goal of the Apache Abdera project is to build a functionally-complete, high-performance implementation of the IETF Atom Syndication Format (RFC 4287) and Atom Publishing Protocol (RFC 5023) specifications.
  Categories: xml
  Languages: Java
  PMC: Apache Abdera
- Apache Accumulo
  The Apache Accumulo sorted, distributed key/value store is based on Google's BigTable design. It is built on top of Apache Hadoop, Zookeeper, and Thrift. It features a few novel improvements on the BigTable design in the form of cell-level access labels and a server-side programming mechanism that can modify key/value pairs at various points in the data management process.
  Categories: database
  Languages: Java
  PMC: Apache Accumulo
- Apache ActiveMQ
  ActiveMQ is a fast and powerful Message Broker which supports many Cross Language Clients and Protocols and many advanced features while fully supporting JMS 1.1 and J2EE 1.4.
  Categories: network-server, network-client
  Languages: Java, C, C++, Ruby, Perl, Python, PHP, C#
  PMC: Apache ActiveMQ
- Apache Airavata
  Apache Airavata is a micro-service architecture based software framework for executing and managing computational jobs and workflows on distributed computing resources including local clusters, supercomputers, national grids, academic and commercial clouds. Airavata is dominantly used to build Web-based science gateways and assist to compose, manage, execute, and monitor large scale applications (wrapped as Web services) and workflows composed of these services.
  Categories: network-server, cloud, big-data
  Languages: Java
  PMC: Apache Airavata
- Apache Allura
  Apache Allura is an open source implementation of a software "forge", a web site that manages source code repositories, bug reports, discussions, wiki pages, blogs and more for any number of individual projects.
  Categories: content
  Languages: Python
  PMC: Apache Allura

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Apache ActiveMQ

Apache Camel

Apache CXF

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Challenges for open source in the enterprise?

- Perception versus reality
  - Closed source is more dependable?
- Should open source have more challenges?
  - Design and implementation
    - Skills and understanding of principles
  - Hardware provisioning and testing
    - “Builds on my laptop"
  - Testing at scale
    - How to duplicate deployment environments?

Reliability and security

- Closed source “reliability through experts”
- Open source reliability
  - “peer reviewed software, which leads to more reliability”
  - Stress testing of software is critical
- Closed source “security through obscurity”
  - Or even security through not admitting loopholes exist!
- Open source security
  - “enables anyone to examine software for security flaws”
  - What about exploiting issues?

Compare and contrast

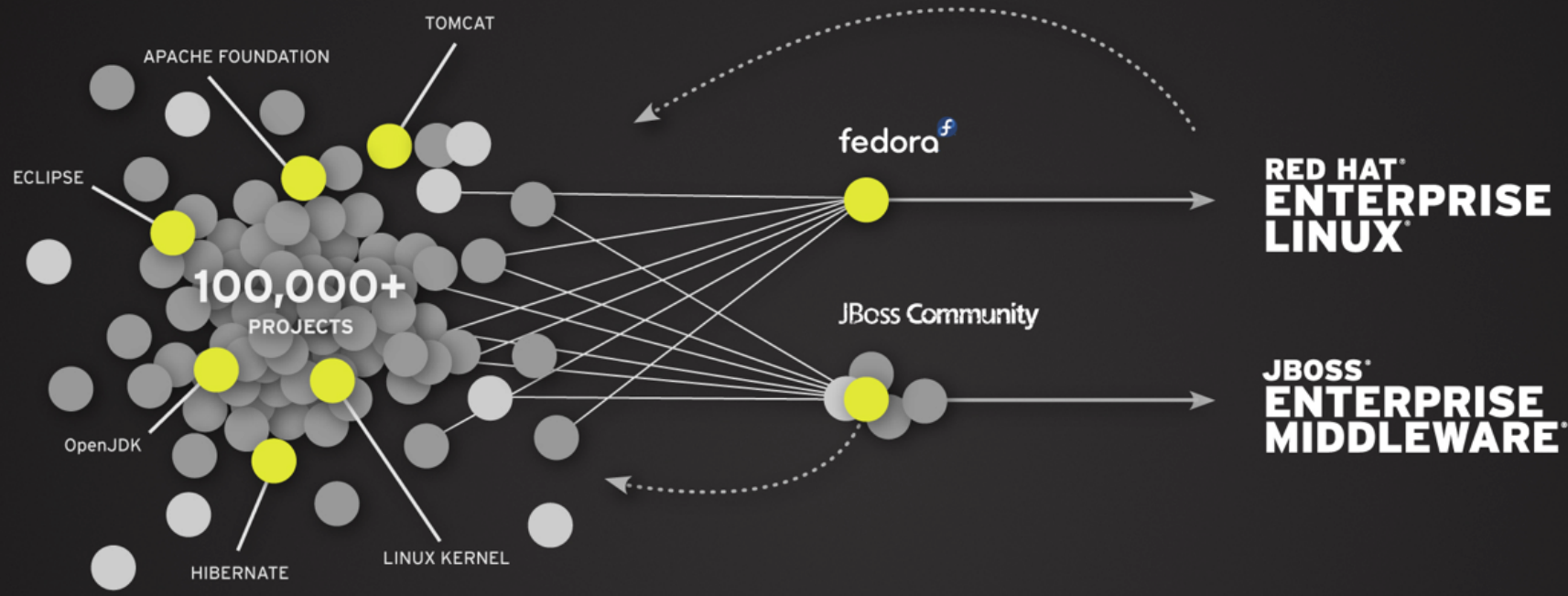
- 1988 first internet worm via sendmail and fingerd
  - But code availability mitigated the spread
- Apache HTTP more reliable that MSFT IIS
- MITRE 2001 “open-source products have access to extensive expertise, and this enables the software to achieve a high level of efficiency”
- Software defects at similar levels but …
  - e-Week Labs “FOSS organizations in general respond to problems more quickly and openly, while proprietary software vendors instinctively cover up, deny, and delay.”

Coverity code analysis

- A four-year research effort on Linux kernel
  - Fewer software bugs in it than the industry average
- 985 defects in the 5.7 million lines of code
  - According to CMU, a typical program of similar size would usually have more than 5,000 defects
- Another separate study found MySQL had fewer defects than 200 proprietary programs
  - https://tinyurl.com/y5g5bkwx
- "In open source model, code is written with more care and creativity, because developers are working only on things for which they have real passion."

Productisation is crucial

- Few projects are product ready by default
- Not everything in an upstream project should go into a product
  - May be too immature
  - May be a feature that doesn't make sense
- Sanitisation of projects is important
- Not everything in a product may have gone mainstream yet
- Not everything in a project may have been built from source



PARTICIPATE INTEGRATE STABILIZE

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(Stress/Production) Testing

- Upstream projects typically focus on unit tests
  - Unit tests != QA
- Hardware and software limitations
  - Also impacts time to release
- Performance testing similarly
  - It's hard to do!
- Be prepared to commit people and hardware

Long term support implications

- Critical systems have long operational lifespans
  - Nuclear power - 30 years
  - Banking systems - 20 years
- Maintenance has to account for losing the vendor
  - Code into escrow but not skills
- Does open source help or hinder?
  - Communities can disappear over time too
  - But knowledge can be shared from the start

https://opensource.com/resources/getting-started-open-source

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NETFLIX | OSS

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JAX 2015 Award

Industry Awards!

Netflix is honored to receive the Jury's choice award for Innovation at JAX 2015 conference.

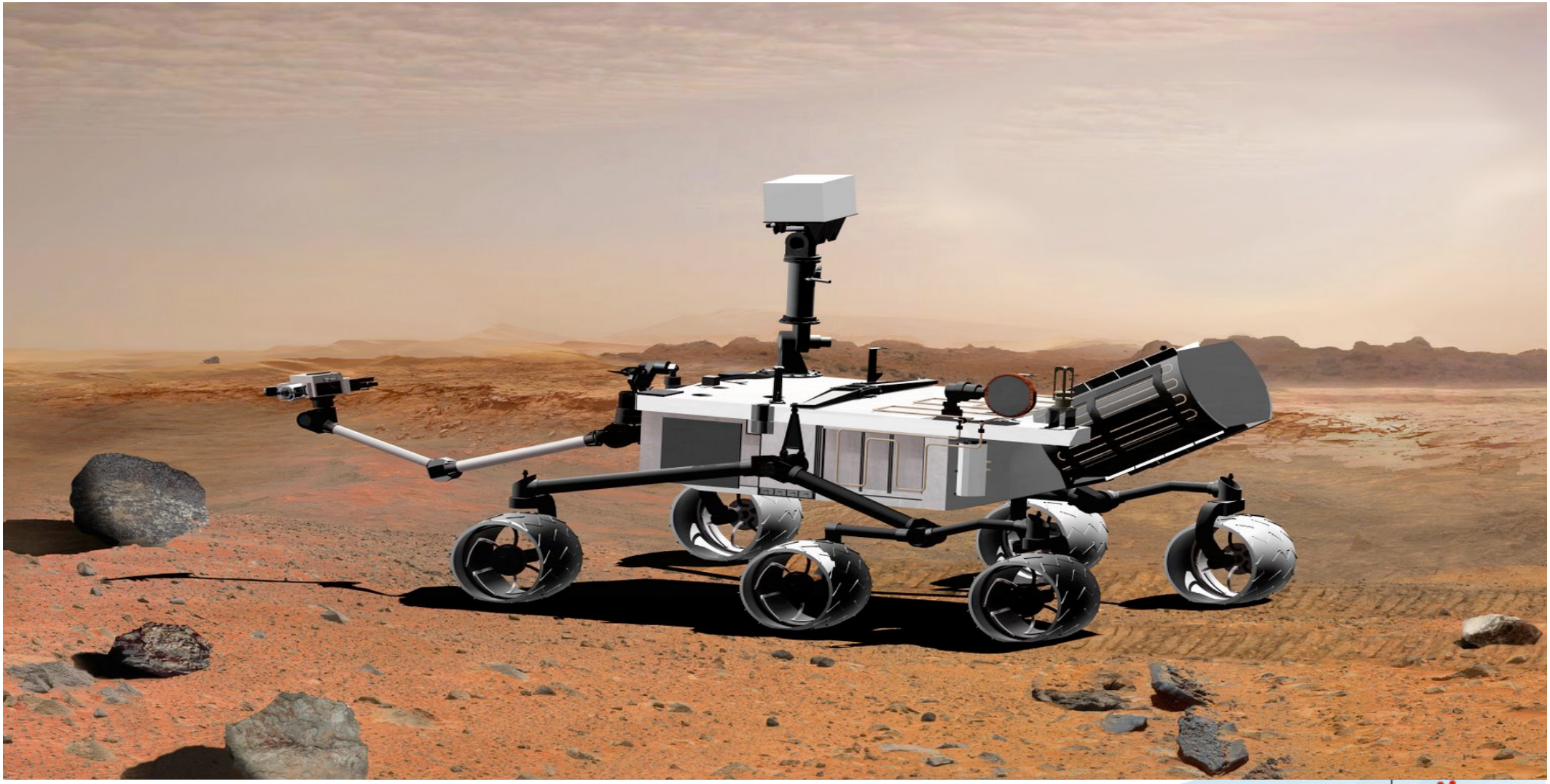
We would like to thank all of those who contribute to the Netflix open source community including our Netflix developers, all external contributors, and our active user base.

Netflix Open Source won the JAX Special Jury Award. Jury member Neal Ford was quoted as saying "that architecture is cool again, that it can be used as a business differentiator, and when done right it is a huge advantage. Netflix showed the power of internalizing DevOps into their architecture; all architectures will do this in the future.

Netflix Open Source Software Center

Netflix is committed to open source. Netflix both leverages and provides open source technology focused on providing the leading Internet television network. Our technology focuses on providing immersive experiences across all internet-connected screens. Netflix's deployment technology allows for continuous build and integration into our worldwide deployments serving members in over 50 countries. Our focus on reliability defined the bar for cloud based elastic deployments with several layers of failover. Netflix also provides the technology to operate services responsibility with operational insight, peak performance, and security. We provide technologies for data (persistent & semi-persistent) that serve the real-time load to our 62 million members, as well as power the big data analytics that allow us to make informed decisions on how to improve our service. If you want to learn more, jump into any of the functional areas below to learn more.

Space exploration!



High Energy Physics

Open Source and Education

- Open source removes artificial barriers for teachers and students
  - No licence fees
  - Students can duplicate teaching environments
- Communities around the world collaborate
  - Schools and universities
- Developers can help educate the next generation

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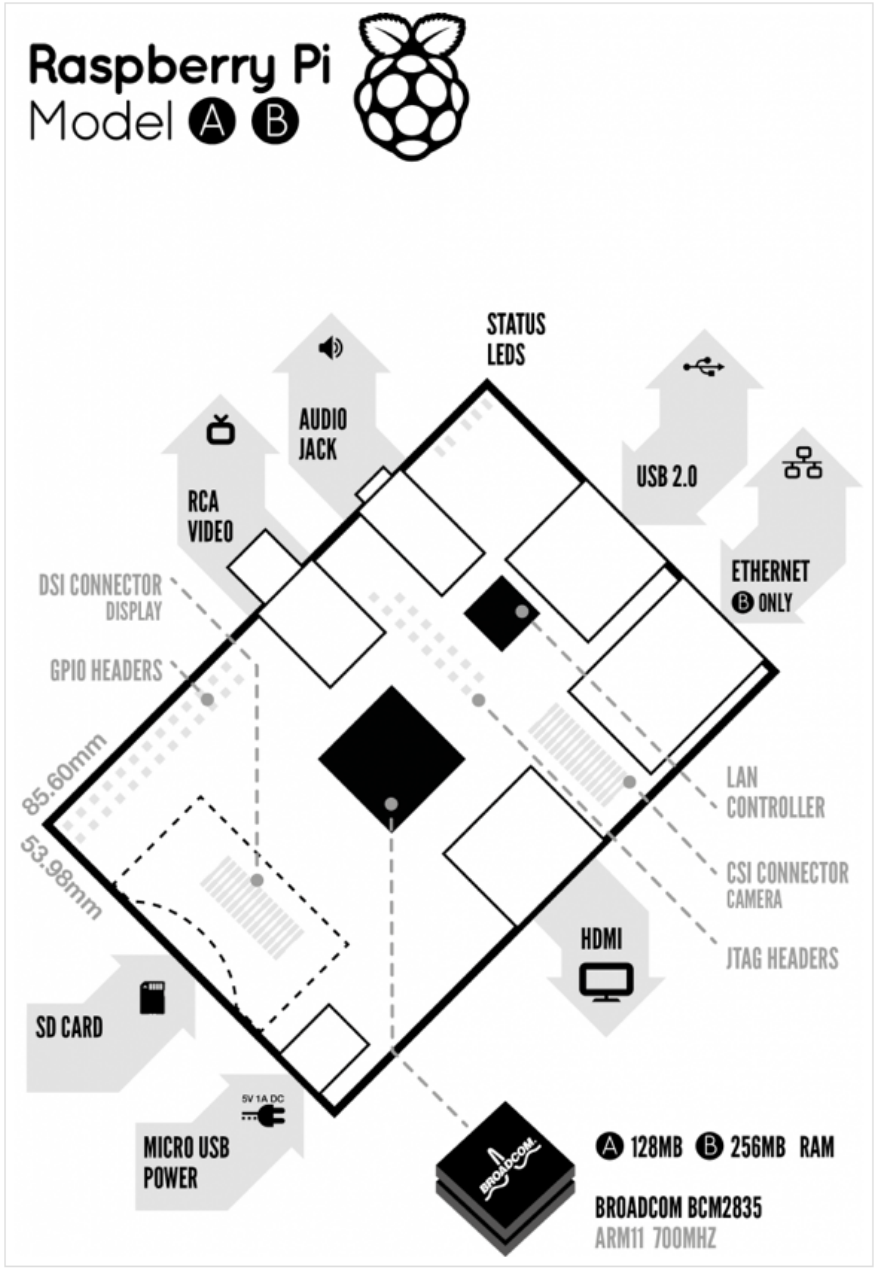
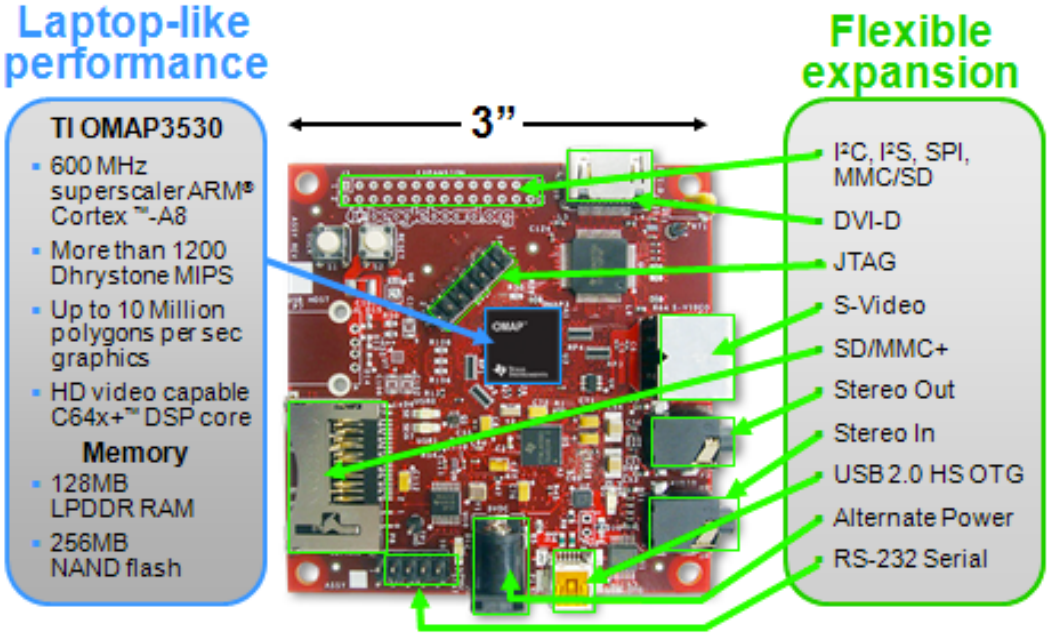


Beagleboard

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Conclusions

- Open source is mainstream
  - It has been at the heart of significant waves for 20 years
  - Surprising where it's used!
- It is now typical to see open source driving developer efforts
- It brings benefits in terms of collaboration, code quality, immediate feedback on suitability, shared experiences etc.
- www.opensource.com