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Open Source Software in the Future Internet

Ubiquitous and personalized access

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creating and sharing knowledge for telecommunications

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Open Source Software (OSS)

- *“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.” - <http://www.opensource.org/>*

It is not about:

inexpensive software (one can charge for OSS, e.g. RedHat)

simply being able to read the source code (e.g. Microsoft Limited Public License)

loss of rights (copyright, intellectual property)

The Open Source Definition

1. Free Redistribution
2. Source Code
3. Derived Works
4. Integrity of The Author's Source Code
5. No Discrimination Against Persons or Groups
6. No Discrimination Against Fields of Endeavor
7. Distribution of License
8. License Must Not Be Specific to a Product
9. License Must Not Restrict Other Software
10. License Must Be Technology-Neutral

Open Source Initiative, <http://opensource.org/docs/osd>

Open Source and Internet

Open Source shares many principles with the Internet

Anyone can use, create, merge, modify

Information is available and flows from many to many
not necessarily free in all scenarios

Open Source empowers people

People feel motivated to contribute (feeling of belonging)

Anyone can add the features they need

Many small contributions create big and useful solutions

Increases usefulness to a broader range of scenarios

Solving bugs is easier as users can pinpoint them in the source

Open Source drives the Internet

Anyone can think about something and start implementing it right away

Anyone can create and deploy complex web applications

See: PHP, Drupal, Joomla, Django, TurboGears, etc..

Some numbers to think about

More than **60% of Web Servers** run a OSS web server (Apache, nginx, lighttpd) – *netcraft mar 2010*

Approximately **40% of Web browsers** are based on OSS (Firefox, Webkit(Safari, Chrome) – *wikipedia 2010*

30% of Internet email is handled through OSS (Sendmail, Postfix, Exim) – *O'Reilly 2007*

75% of all DNS domains are serviced by an OSS server (mostly BIND) - *Don Moore 2004*

Is gaining momentum in the mobile environment (Android account for **9% of the Smartphone** market and growing). – *comScore Nov 2009*

OSS appeared with the easy distribution channel provided by the Internet.

Internet developed thanks to the OSS contributions.

Open Source and Internet companies

Google: Project hosting, GSC, Google Code, Linux, many contributions to OSS projects

Youtube: intensive use of Linux, Apache and Python (part of Google)

Facebook: intensive use of PHP and C++ in a LAMP stack, Scribe, Thrift, Cassandra, DS

Yahoo: use of Linux and Yahoo Traffic Server (now incubating at Apache)

Wikipedia: uses MediaWiki and LAMP platform (part of Google)

Blogger.com: intensive use of Linux (part of Google)

Twitter: Linux, Apache, Mongrel Cluster, Nagios, MySQL and now C, Scala/JVM

Most top web applications (*alexa*) use open source technology

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How to promote FI developments?

Development process of new applications/services

- Hard to do.
- Hard to agree on
 - Need to promote diversity at the same time!
- Hard to distribute and promote to users and application developers (yes, the new popular target for FII development).

Many to Many trend is increasing. That imposes:

easier access to tools, platforms and code

simpler customization of technologies to specific scenarios

Complexity is increasing and will keep increasing

open source allows sharing solutions and refinement by everyone

OSS in the Future Internet

- The Future Internet should be Open (?) and Free (?)
 - Thus the software that runs it should be likewise
 - Avoiding vendor lock in
 - Empowering citizens
- Research perspective
 - OSS is the only tool available to academic researchers in order to promote innovative ideas and concepts
 - OSS is an effective tool at promoting standardization
(OSS implementations usually become the protocols implementation against which everyone tests for interoperability, easing the whole inter-op process)
 - Provides the means for smaller teams/researchers to contribute to technology advancement

GLOBALLY BUILDING a COMMON CONSTRUCT

Open Source and Future Internet: Research

Open Source will become more and more important.

Number of applications for a given technology/device/scenario is increasing

closed solutions will always follow new usage scenarios with some distance

open solutions will be rapidly adopted and adapted

e.g. SunSpot nodes

.... This can be seen in EC Research: we have seen the same wheel being reinvented how often?

OSS and FI research and development

Free, unrestricted and most importantly instant access to code
able to quickly implement and test novel functionalities/paradigms
adapt to target scenario or application
allow real, effective, effort concertation across researchers

Quickly develop prototypes which others can contribute to
Code can be peer reviewed
Good for standardization and validation of solutions

Generate momentum and new collaborations
which allow more complex/novel/disruptive ideas

Rapidly transfer innovation to industry
involving industry in the development
making disrupting technologies cheap

Open Source and Future Internet: Industry

Complexity of Future Internet will require a large amount of collaboration

Single companies must be really dominant to have fully closed solutions and drive innovation

IS this what we want in a user-centric environment?

Cheap access to technologies

also large amount of documentation

large user base with a myriad of different problems already solved

Transparency on the evolution of the technology

Don't have to wait for the 2011 changelog and see what comes new and find that feature XPTO requires a forced upgrade

Participate in the development and follow it

Open Source can create momentum around an enterprise

assimilate contributions from community (cheap development)

create opportunity to more complex (paid) solutions

Community vs Enterprise versions (dual license)

Real example: OSS @ HNG in IT-Aveiro (hng.av.it.pt)

- Various OSS projects:
 - COPSpp – IETF COPS protocol implementation
 - MRD6 – Multicast Routing Daemon for IPv6
 - Odtone – IEEE 802.21 protocol implementation
 - PMIPv6 – IETF Proxy Mobile IP Protocol Implementation (ongoing)
- Licenses
 - We have used GNU General Lesser Public License in all projects
 - requires derived works to be available under the same license terms
 - The LGPL places copyleft restrictions on the program itself but does not apply these restrictions to other software that merely links with the program.
- Feedback from the community
 - MRD6 has become part of the Debian distribution.
 - COPSpp has been used in some small ISPs.
 - Odtone is being explored in several EC projects

Conclusions

For policy makers:

OSS is a unavoidable trend, that should be promoted as a way of impacting the future of the FI: effective and accepted standardization

For companies:

OSS does not necessarily mean “non-revenues”

It **CAN** mean:

vast development process

more complete usage scenarios

wide acceptance of a key differentiating technology

For developers:

OSS is a way for small teams to find their expertise niche ... and eventually stop being small...

For users:

OSS caters for the construction of a common FI.