

Keynote Speech

Free and Open Software: Features, Development, Experiences, Benefits and Opportunities

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Computer Software

- A collection of computer programs, procedures and documentation that perform some tasks on a computer system
- The intangible objects inside the computer
- Wide array of products and technologies developed using different techniques like:
 - Programming languages,
 - Scripting languages
 - Microcode
 - FPGA state.

Software Classes

- Three major classes:
 - System software,
 - Helps run the computer hardware and computer system.
 - Programming software
 - Provides tools to assist a programmer in writing computer programs, and software using different programming languages in a more convenient way.
 - Application software,
 - Allows end users to accomplish one or more specific (not directly computer development related) tasks.
- The distinction is arbitrary, and often blurred.

Software Technologies

- Web pages
 - Technologies: HTML, PHP, Perl, JSP, ASP.NET, XML,
- Desktop applications
 - Technologies: C, C++, Java, etc.

- Operating systems
 - Technologies: Microsoft Windows , Unix, Linux, etc.

Software Issues

- Architecture
- Documentation
- Library
- Standard
- Execution
- Quality and reliability
- License
- Patents
- Ethics and rights

Software License

- Legal instrument governing the usage or redistribution of copyright protected software
 - All software not in the Public domain are copyright protected.
- Aims
 - Grants an end-user permission to use copies of software
 - Allocate liability and responsibility between the parties entering into the license agreement.

Licenses Categories

- Proprietary licenses
 - Ownership of the software remains with the software publisher
- Free software license
 - Ownership of the software is transferred to the end-user.
 - End-user may use the software without accepting the license
- Open source licenses
 - Source code available under terms that allow for modification and redistribution without having to pay the original author.
- Closed Source Model
 - Source code is not disclosed to the public and competitors
 - Developed and maintained by a team
 - Produces the product in a compiled executable state, which is what the market is allowed access to.
 - End-user purchasing the right to use the software.
 - Motivation:
 - To protect the products from software piracy or misuse,
 - To protect the products from reverse engineering and duplication,
 - To maintain competitive advantage and vendor lock-in.

- FOSS Model
 - Allows for any user to view and modify a product's source code
 - Motivation (OSS)
 - the benefit that gains from improvements to the software provided by the community of software developers is more important than protecting their competitive advantage.
 - Not for Free software !!

Open Source

- A development method for software that harnesses the power of distributed peer review and transparency of process.
- Usually developed as a public collaboration and made freely available.
- A certification mark owned by the Open Source Initiative
- Open source Promise
 - Better quality,
 - Higher reliability,
 - More flexibility,
 - Lower cost, and
 - An end to predatory vendor lock-in

The Open Source Initiative (OSI)

- Non-profit corporation formed
 - to educate about and advocate for the benefits of open source
 - to build bridges among different constituencies in the open-source community.
- Most important activities
 - maintaining the Open Source Definition for the good of the community.

Open Source Trademark

- Can be used by developers of software that is intended to be freely shared and possibly improved and redistributed

OSS: Rights and Obligations

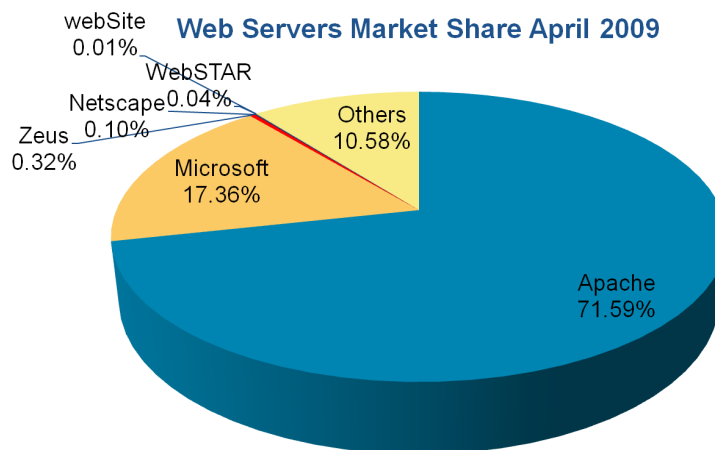
- No royalty or other fee imposed upon redistribution.
- Availability of the source code.
- Right to create modifications and derivative works.
- May require modified versions to be distributed as the original version plus patches.
- No discrimination against persons or groups.
- No discrimination against fields of endeavour.
- All rights granted must flow through to/with redistributed versions.
- The license applies to the program as a whole and each of its components.

- The license must not restrict other software, thus permitting the distribution of open source and closed source software together.

FOSS Products



Web Server Survey



Copyright © 1998-2009 E-soft Inc.

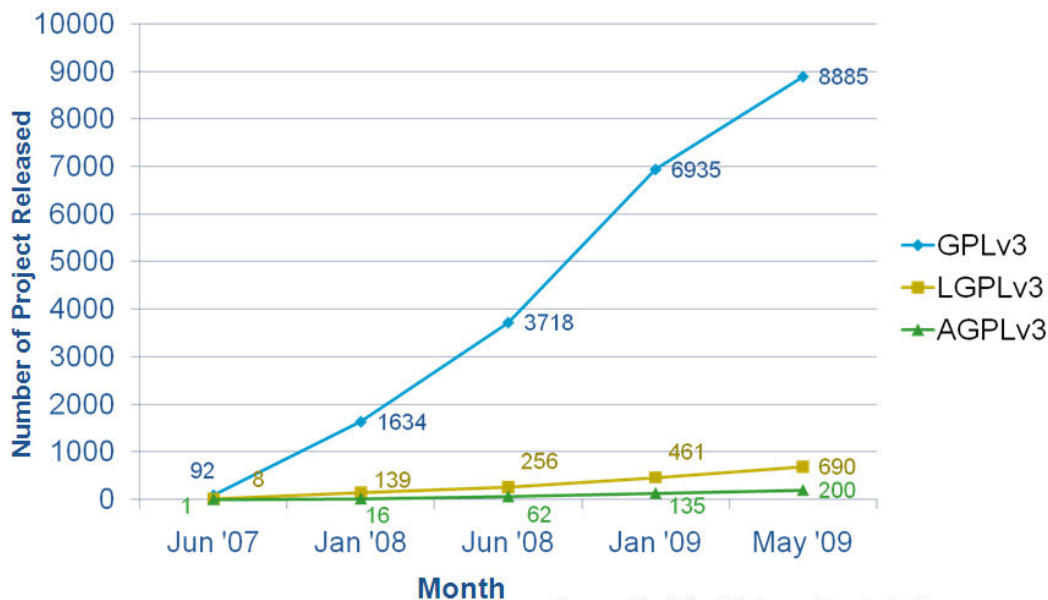
OSI Licenses Categories

- Licenses that are popular and widely used or with strong communities (9)
- Special purpose licenses (3)
- Other/Miscellaneous licenses (5)
- Licenses that are redundant with more popular licenses (8)
- Non-reusable licenses (25)
- Superseded licenses (5)
- Licenses that have been voluntarily retired (4)
- Not categorized

Popular OS Licenses

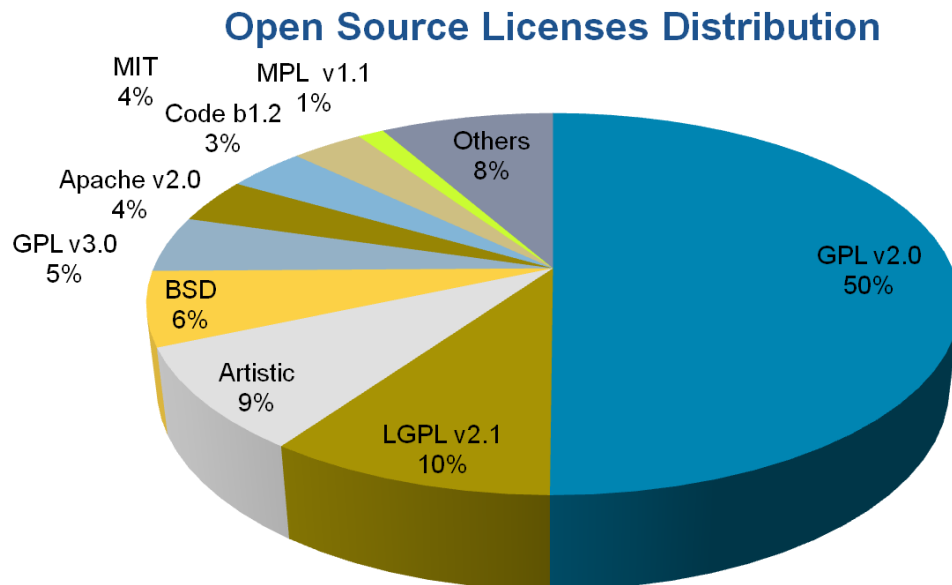
- Apache Software License 2.0
- New and Simplified BSD (Berkeley Software Distribution) Licenses.
- GNU General Public License (GPL)
- GNU Lesser General Public License (LGPL)
- MIT (Massachusetts Institute of Technology) License
- Mozilla Public License (MPL) 1.1
- Common Development and Distribution License
- Common Public License 1.0
- Eclipse Public License

Projects Released Under OS License



Source: Black Duck Software KnowledgeBase

OS Licenses distribution



Source: Black Duck Software KnowledgeBase 29 May 2009

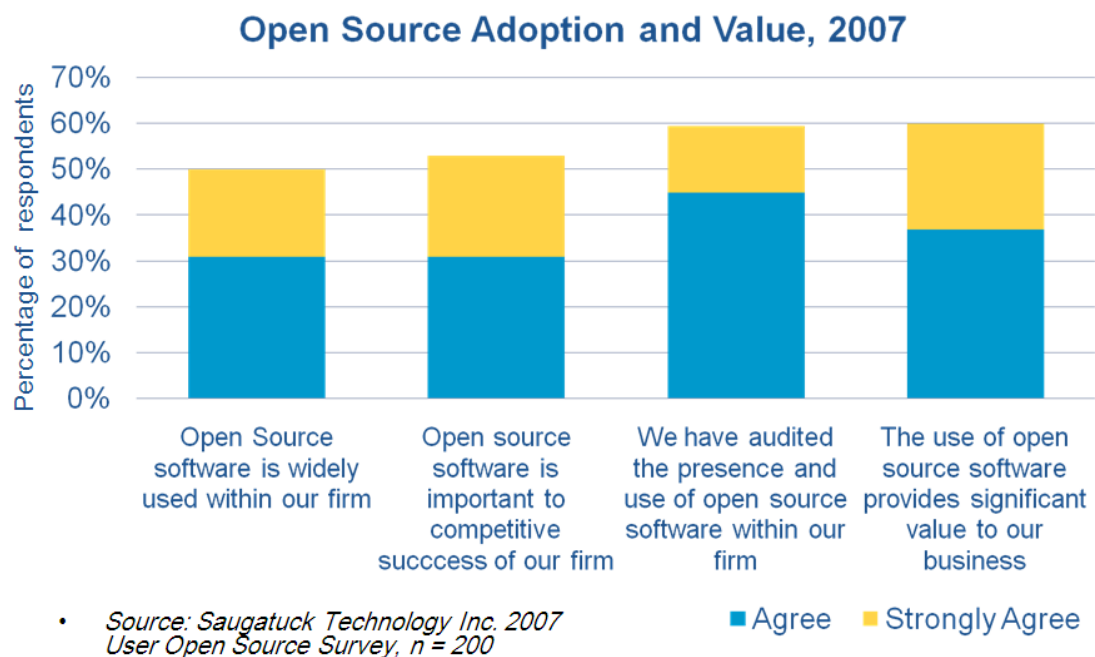
Terms used in OS Licenses

- Combined work
 - The combination of a program linked with a library
 - Statically or using a shared library,
 - a derivative of the original library.
- Proprietary Software linking
 - Linking closed sourced applications/libraries with applications/libraries licensed under Open Source licenses.
- Distribution of 'the Work'
 - The work means a combination of a software with the library or application licensed under Open Source licenses
- Redistributing of the code with changes
 - The act of redistributing a modified application/library based on the application/library licensed under the given OS license

Common Licensing Options

Software License	Available at No Cost	Distribution Allowed	No usage restriction	Source Code freely available	Source code modification allowed	Derived work must be freely again	Linking with proprietary Software allowed
Public Domain	✓	✓	✓	✓	✓		✓
Freeware	✓	✓	✓				
GPL	✓	✓	✓	✓	✓	✓	
LGPL	✓	✓	✓	✓	✓	✓	✓
MPL	✓	✓	✓	✓	✓	✓	✓
MIT & BSD	✓	✓	✓	✓	✓		✓

Open Source Adoption and Value



Free Software Movement

- Campaigned for computer users' freedom since 1983.
- In 1984 the free operating system GNU launched the development of,
 - To avoid the non-free operating systems that deny freedom to their users.
- During the 80s, the GNU General Public License developed,

- to protect freedom for all users of a program.
- In 1998, a part of the free software community splintered off and began campaigning in the name of "open source."
 - The term was originally proposed to avoid a possible misunderstanding of the term "free software,"
 - It soon became associated with philosophical views quite different from those of the free software movement.

Freedom Limitation

- To run the program for any purpose
- To study and modify the program
- To copy the program
- To improve the program, and release the improvements to the public

OSS and FS

- The two terms describe almost the same category of software.
- Stand for views based on fundamentally different values.
 - Open source is a development methodology
 - Philosophy considers issues in terms of how to make software "better"
 - in a practical sense only
 - Non-free software is a suboptimal solution
 - Free software is a social movement.
 - Free software is an ethical imperative
 - Only free software respects the users' freedom
 - Non-free software is a social problem
 - Moving to free software is the solution
- The Free Software Foundation has related but distinct criteria for evaluating whether or not a license qualifies a program as free software.
- All licenses qualified as free software are also considered open source licenses.
- Free software and open source are in most cases equivalent and may be found abbreviated as FOSS, F/OSS or FLOSS

Common Misunderstandings

- Free software:
 - Unintended meaning, "software you can get for zero price"
 - Intended meaning, "software which gives the user certain freedoms."
- Open source supporters have accepted a few licenses that are considered unacceptably by Free Software Foundation.

OSS Business Model

- Low Initiation Fees (No Licensing Fees)

- Less Support Costs (50% - 70%)
- Creates a Sustainable Financial Incentive for Networking if Done Thoughtfully
- Promotes Collaboration Across Networks by Sharing Interfaces, Clinical and Quality Management Tools

OSS Business Revenue Streams

- Alternative models for funding OSS development other than from the basic profit from selling a software license
 - Consulting and Migration services
 - On-site custom development
 - 'Professional' versions which have enhanced capabilities and are sold commercially.
 - Governments and public authorities may fund open source development companies for their software needs, rather than pay for commercial licenses.
 - Subscription support services
 - Ongoing maintenance services 24/7
 - Email or phone help desk
 - Indemnification
 - Access to Operations Network
 - Training services
 - Web-based how-to's, tutorials (also retail books)
 - On-site customer training (Direct or via Certified Partners)
 - Services sold on a direct basis (e.g., in North America and Europe), and via Certified Partners (globally)

Bazaar Model

- Traditional Model, separate roles
 - Designing
 - Managing the project
 - Implementation
- In Bazaar model roles are not clearly defined, and exhibit the following patterns:
 - Users should be treated as co-developers
 - Early releases
 - To increase one's chances of finding co-developers early
 - Frequent integration
 - to avoid the overhead of fixing a large number of bugs at the end of the project life cycle
 - Several versions
 - There should be at least two versions of the software.
 - Stable version with fewer features
 - Buggier version: (the development version)
 - More features

- For users who want the immediate use of the latest features, and are willing to accept the risk
- Users can then act as co-developers, reporting bugs and providing bug fixes.
- High modularization
 - Allowing for parallel development
- Dynamic decision making structure
 - Makes strategic decisions depending on changing user requirements and other factors.

OS Communities



OS Developer Community

- Very large
 - Many tens of thousands of active developers;
 - Hundreds of thousands of active beta testers;
 - About 5 million Non-commercial user base of supporters

Development Rationale

- **FOSS** changes patterns of access, control and ownership of information and knowledge systems.
- **FOSS** philosophy and methodologies can be applied to all areas of development endeavour

- generic HIV/AIDS medicine, free textbooks etc.

OSS Development tools

- Development is often performed "live and in public"
- Participants (mostly volunteers) are distributed amongst different geographic regions
 - tools are needed to aid participants to collaborate in source code development.
 - Often these tools are also available as OSS;
- Tools for centrally manage the source code files and the changes to those files for a software project
 - Revision control systems such as Concurrent Versions System (CVS) and later Subversion (svn)
- Tools for Internet communications between developers
 - Mailing lists, IRC, and instant messaging
- Utilities that automate testing, compiling and bug reporting help preserve stability and support of software projects
 - Bugtrackers include Bugzilla and GNATS.
- Some sites centralize all the features of these tools as a software development management system,
 - e.g. GNU Savannah, SourceForge, and BountySource.

Projects and Organizations

- Prominent organizations
 - The Apache Software Foundation,
 - Creators of the Apache web server
 - Loose affiliation of developers headed by Linus Torvalds
 - Creators of the Linux operating system kernel;
 - Eclipse Foundation,
 - Home of the Eclipse software development platform;
 - Debian Project,
 - creators of the influential Debian GNU/Linux distribution;
 - Mozilla Foundation
 - Home of the Firefox web browser.
- Several Open Source programs have become defining entries in their space, including
 - GIMP image editing system;
 - Sun's Java programming language and environment;
 - MySQL database system;
 - FreeBSD Unix operating system;
 - Sun's 2 OpenOffice.org office productivity suite;
 - Wireshark network packet sniffer and protocol analyzer

OSS Security

- Measure of assurance or guarantee in the freedom from danger and risk inherent to an open source software system
- Ongoing debate on whether open source software increases software security or is detrimental to its security.
- Benefits of OSS Security
 - More people can inspect the source code to find and fix a possible vulnerability.
 - Proprietary software forces the user to accept the level of security that the software vendor is willing to deliver and to accept the rate that patches and updates are released.
 - The end-user of Open Source code has the ability to change and modify source to implement any extra "features" of security they may wish for a specific use.
 - A compiler can be subverted to create faulty executables that are unwittingly produced by a well-intentioned developer. With access to the source code for the compiler, the developer has at least the ability to discover if there is any mal-intention.
 - Kerckhoffs' principle is based on the idea that an enemy can steal a secure military system and not be able to compromise the information. His ideas were the basis for many modern security practices, and followed that security through obscurity is a bad practice.
- Drawbacks of OSS Security
 - All people have access to the source code, including potential attackers.
 - Any unpatched vulnerability can be used by attackers.
 - Simply making source code available does not guarantee review.
 - Having a large amount of eyes reviewing code can "lull a user into a false sense of security".
 - Having many users look at source code does not guarantee that security flaws will be found and fixed.

Metrics and Models

- There are a variety of models and metrics to measure the security of a system
 - Number of days between vulnerabilities
 - By measuring the number of days between the vulnerability and when the vulnerability is fixed, a basis can be determined on the security of the system
 - Poisson process
 - Can be used to measure the rates at which different people find security flaws between open and closed source software
 - Morningstar model

- By comparing a large variety of open source and closed source projects a star system could be used to analyze the security of the project similar to how Morningstar, Inc. rates mutual funds.
- Coverity scan
 - New baseline for open source quality and security.
 - Utilize innovations in automated defect detection to identify critical types of bugs found in software.

FOSS and WSIS

- The World Summit on the Information Society (WSIS),
 - Geneva, 2003; and Tunis, 2005
 - Recognized the important role played by free and open-source software (**FOSS**) in bridging the digital divide and realizing an inclusive information society.
- The WSIS outcome included statements that support the use of **FOSS** solutions for
 - Promoting access to information and knowledge;
 - Increasing competition, diversity of choice and affordability;
 - Meeting the needs and requirements of users;
 - Strengthening cultural and linguistic diversity, and local content.

Governments and FOSS

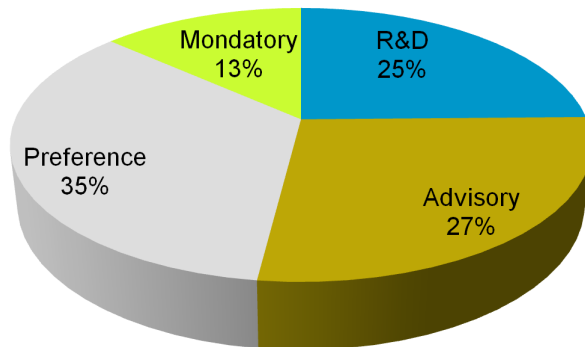
- Various governments launch initiatives to reap the benefits FOSS poses
 - Many are still in the early stages,
 - Significant trend towards incorporating FOSS into procurement and development policies
 - Large numbers of reports and white papers recommending FOSS solutions
 - About 70 proposed laws mandating or encouraging FOSS around the world

Governments' Open Source Policies

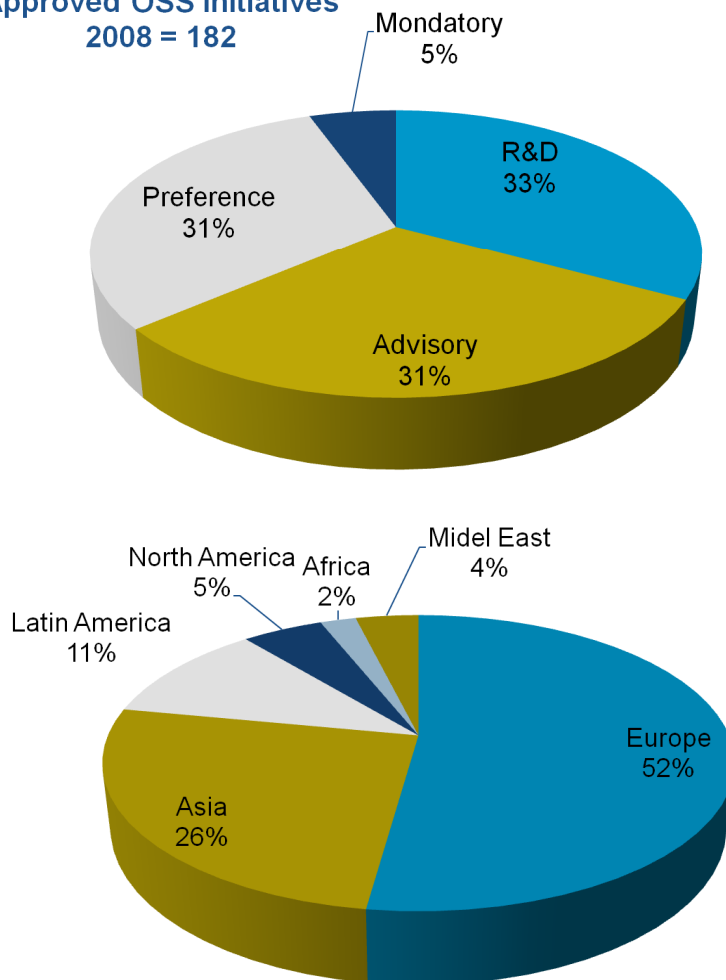
- Center for Strategic and International Studies
 - The sixth update to the CSIS Open Source Policy survey. July 2008
 - The survey tracks governmental policies on the use of open source software as reported in the press or other media
- Open Source Policies categories:
 - Research, mandates (where the use of open source software is required),
 - Preferences (where the use of open source software is given preference, but not mandated), and
 - Advisory (where the use of open source software is permitted).

Open Source Initiatives, 2008

OSS Initiatives, 2008 = 275



Approved OSS Initiatives 2008 = 182



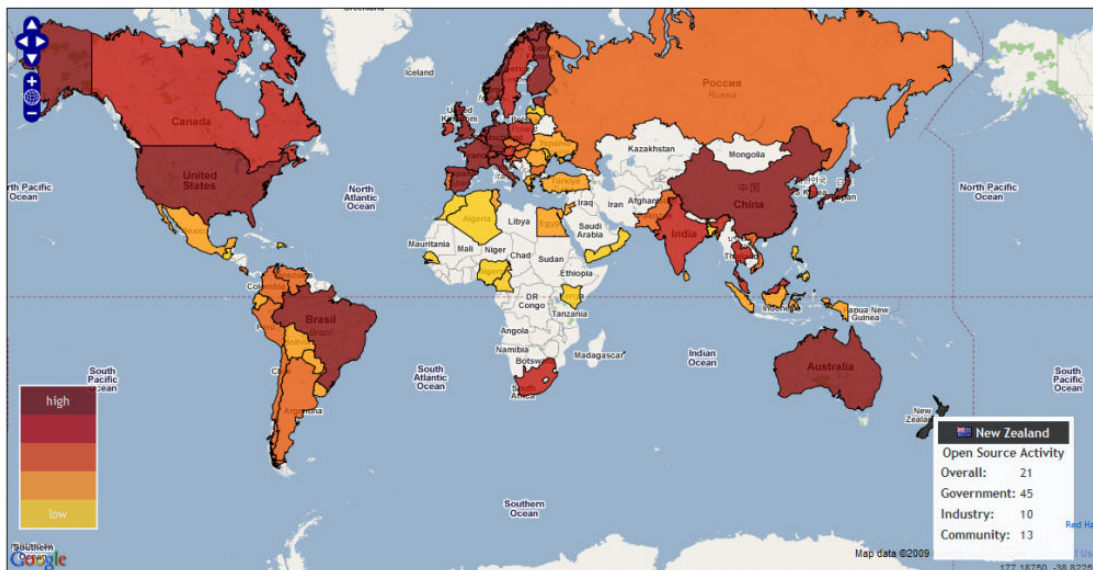
OSS Initiatives Distribution

Open Source Activity Map



Open Source Activity Map

[Open Source Activity Map](#) | [Open Source Environment Map](#) | [FAQ](#)



European Union

- eEurope 2005 Action Plan
 - Recommends open source for a EU "interoperability framework."
- Formulated a Draft Normal Resolution for governments
 - To "promote the introduction and use of free and open source software within their governmental bodies and public administrations" (Jan. 2004)
- Provided 2.2 million euros to study OSS in December 2004 and an additional 660,000 euros in May 2005.
- Created FOSS competency centers and funding the development of certain health-related applications.
- Many other initiatives

Germany

- Many different initiatives underway.
 - The German Bundestag uses Linux on its servers
 - The city of Munich plans to switch desktops to Linux.
 - The police force is transitioning thousands clients to Linux.
 - The German Parliament decided that FOSS products should be used wherever costs could be decreased by their usage (2001) .
 - The Ministry of Finance has an Apache/Linux-based intranet system.

France

- Part of the officially sanctioned Agency for Technologies of Information and Communication in Administration (ATICA) mission counts is

- to encourage administrations to use free software and open standards."
- The Authority for Customs and Indirect Taxation has migrated to Linux
- Security reasons.
- The French agency for e-government has made open standards mandatory for all public administrations to guarantee full interoperability.

United Kingdom

- Published a new policy on Open Source software
 - ensure maximum value for money for taxpayers (2009).
- Produced a policy to "only use products for interoperability that support open standards and specifications in all future IT developments" .
- National Health Service one of the most active proponents of FOSS.

United States

- No official FOSS policy in the US federal government,
- Number of attempts to pass pro-FOSS legislation at the state level.
- The US Department of Defense used a total of 115 different FOSS applications, with 251 examples of their use.
 - MITRE Corporation survey
- Multiple reports recommending the use of FOSS in the US Federal government have appeared,
 - e.g. the (US) President's Information Technology Advisory Committee (PITAC) report
- Few smaller public institutions have shifted over to FOSS platforms.

Brazil

- Plans to migrate 80 percent of all computers in state and state-owned institutions to Linux over the next three years.
 - Pilot programs are already underway and a slow, gradual migration is planned.
 - A "Chamber for the Implementation of Software Libre" has been set up by the government to smooth this transition.
 - Among the reasons cited for this move are
 - lower costs, increased production of local software and "democratiz(ing) access to knowledge" [[]

China

- Has its own government supported version of Linux, called "Red Flag",
- Set to be a major stronghold for FOSS over the next few years.
- FOSS usage in the country is growing rapidly.
 - To create both a hardware and software industry that "will not fall into the foreign intellectual property rights trap" ^{by} developing local technology industry, and FOSS fits well into its software needs.
- Announced that government departments would be barred from purchasing foreign produced software

India

- No official position on the FOSS/proprietary software issue
- Represents a hotbed of FOSS development.
- There are many department level initiatives:
 - The Central Excise Department has moved desktops to Linux.
 - The government supercomputer arm, the C-DAC, has moved over entirely to GNU/Linux
 - The Supreme Court has several pilot projects.
- At the state level, there have been several FOSS initiatives.
- Opposition party announced that the national government will standardize on open standards and open source software if the party is elected to power (May 2009)

Malaysia

- Strong preference for OSS under the Malaysian Public Sector Open Source Software Masterplan.
- Encourage the use of Open Source Software (OSS) in the Malaysian Public Sector.
 - The Malaysian Administration Modernisation and Management Planning Unit (MAMPU) of the Prime Minister Department is given the responsibility to implement the OSS Initiative
- OSS implementation in agencies like the Treasury, while other ministries have begun implementing OSS on their servers."
- Conducting pilot studies on how to switch over to OSS.
- \$36 million fund for start-ups developing OSS.
- Developing a national OS based on Linux.

Japan

- Approved OS desktop software as eligible for future bids.
- 1 billion yen in FY04 on OSS Development and Deployment.
- The Ministry of Internal Affairs and Communications announced its plans to shift key government systems to Linux
 - To decrease its dependency on Microsoft products (2005)
- Linux and open source a priority for all IT procurements, starting this July.
- Government plans to spend around \$1.25 trillion yen, or \$10.4 billion, on IT over the next year.

Tunisia

- National plan on open source was agreed on in June 2003.
 - focuses on the education and research sectors
 - represent a challenge for building the local experience, and that can mobilize awareness about the benefits and limitation of the deployment of open-source tools in the public sector.

- Solutions based on **FOSS** must be perceived as complementary to the implementation of information systems, rather than be imposed

South Africa

- Adopted an official policy promoting the use of open-source software. (February 2003)
- Promoting FOSS applications when proprietary ones offered no advantage (2003).
- The role of open source software (OSS) should be explicitly recognized in e-Government policy. (June 2003)

Pakistan

- 3 step strategy to promote FOSS
 1. FOSS Literacy for Masses
 2. FOSS Fluency for Organizations
 3. FOSS Education for ICT Professionals

Others

- Singapore
 - Offers tax breaks to companies that use GNU/Linux operating systems instead of proprietary ones to encourage development of the local software sector
- S. Korea
 - About 1,000 information systems development projects for local autonomous governments would switch to OSS as part of a larger plan to move more systems to OSS.
 - Promote OSS use in government by offering a total of 3 billion Won to agencies switching from proprietary software.
- Russia
 - Plans to reduce its dependence on foreign commercial software by installing domestically-developed GNU/Linux open source software on all of its schools' computers by the end of 2009.
- Iran
 - Government is developing OSS alternatives in preparation for a migration for national security reasons and to increase its chances of entry into the WTO through better enforcement of IP laws.
- Israel
 - to distribute thousands of Open Office programs on CD-ROM at public computer centers and eventually community centers across the country,"
 - Proposed that government ministries use the free Linux open operating system as well."
- Ghana
 - The government of Ghana is serious about free and open source software.

- Tasked Ghana-India Kofi Annan Centre of Excellence in ICT to spearhead the national consultation process on open source policy and to provide an initial draft document for our consideration'."
- China, S. Korea, and Japan
 - collaboration to develop and promote OSS to replace proprietary operating systems.
- And many other stories and initiatives

FOSS and Government Policy in Africa

- No major initiatives (except South Africa)
- Many governments in Africa have stated an intention to increase the uptake of ICT in their countries as a step toward economic development, and they are looking to define the role of FOSS in their strategies.
- FOSS advocates from many sectors are encouraging governments to take clear positions in support of FOSS.
- Motivation
 - To provides an opportunity to lower the cost of ICT and thereby increases ICT access for larger parts of society;
 - To provides an ideal training environment for the development of computer skills; and
 - To turn African countries from consumers of technology to producers of technology

South Africa OSS policy

- Choose FOSS:
 - Implement FOSS unless proprietary software is demonstrated to be significantly superior.
- Migrate to FOSS:
 - Migrate current proprietary software to FOSS whenever comparable software exists.
- Develop in FOSS:
 - All new software developed for or by the South African Government will be based on open standards, adherent to FOSS principles, and licensed using a FOSS license where possible.
- Use FOSS/Open Content licensing:
 - Ensure all Government content and is made Open Content
- Promote FOSS in South Africa:
 - Encourage the use of Open Content and Open Standards within South Africa

UK OSS Policies

- Actively and fairly consider open source solutions alongside proprietary ones in making procurement decisions

- Procurement decisions will be made on the basis on the best value for money solution to the business requirement
- To develop where necessary a suitable mix of open source and proprietary products to ensure that the best possible overall solution can be considered.
- Where there is no significant overall cost difference between open and non-open source products, open source will be selected on the basis of its additional inherent flexibility.
- Avoid becoming locked in to proprietary software
- Licenses to be available for all public sector use
 - for licenses already purchased to be transferable within the public sector without further cost or limitation

FOSS and Sudan

- Limited Initiatives
 - Higher education sectors (University of Khartoum)
- No government policy
- 13 June 2005 : SIS & National Information Center Seminar an Open Source
 - Attended by an audience of 400,
 - SIS distributed more than 150 CD that's contain Open Source Applications that could operate in Windows environment, to encourage users to start using open source applications, the CD contains Open Office, GIMP, ...ect .

FOSS and Developing Countries

- Financial constraints limit the adoption of software solutions and of information and communication technologies (ICTs),
- Use of **FOSS** presents an opportunity to encourage innovation and adoption of ICTs as an enabler for social and economic development.
- Partnerships on **FOSS** can help to liberate people from the proprietary and costly software solutions
- Governments need to be informed and aware of the benefits offered by **FOSS**
 - To be able to consider it as an alternative to commercial software

FOSS in The Public Sector

- Requires strategic planning at the national and regional levels,
- Building ICT skills and capacities
- Establishment of partnerships between the private and public sectors
 - To sustain the availability of support services for open-source software.
- Learning from the existing experiences in terms of adopting and using software modality
- To promote and support the localization of successful experiences

Opportunities

- Promoting the development of local software capabilities,

- Thereby improving the growth of ICT industry and developing a knowledge-based economy;
- Improving the localization of software such that it meets local needs and develops local expertise in providing support services in a timely manner;
- Expanding applications aimed at satisfying the basic needs in the large socio-economic sectors of education and Government;
- Developing partnerships and expanding collaborative work, thereby leading to international networks and capacity-building.

Benefits

- Reducing costs;
- Improving security
- Reducing reliance on imports,
 - Avoiding political pressures and delays in updates;
- Encouraging vendor independence through open standards;
- Reducing software piracy,
 - Thereby avoiding penalties by the World Trade Organization (WTO) on intellectual property rights (IPRs);
- Increasing technical skills of the software development community

Strategy To Adapt FOSS

- Pilot experience
 - List of positive and negative points
- To convince the decision-makers
 - The best criteria: the costs
 - The best international practice and experiences
 - Presentation of a business plan
- The means for the migration
 - Financiers, human beings
 - Political Will: implementation of decrees, more binding laws
- The users
 - To convince them and to force them (application of the law)
 - Prepare and train them for the new environments

Conclusions

- Enormous potential for developing countries
 - No need for software piracy
 - Develop its own software and servicing industry
 - Currency stays in the country
 - Freedom to choose
 - Freedom to distribute