Open Source Software: towards Self-reliance and Industrialization

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Abstract

Open source software has grown from hackers-only community to become one of the world's largest multi-national collaboration. Its growth is due to the difference in attitudes towards debugging of programmers working for pay and those OSS programmers who work for pride and joy.

In 2003, the Royal Thai Government has set out to promote the software and automotive industries. This provides an excellent opportunity for the local software community to show their potentials and make a good step forward in their development with the support from the government. The ICT Master Plan (2002-2006) has been announced by the government, as a direction to achieve the goals of promoting the software industry.

This paper presents the overview of open source software (OSS) in terms of its concept, the various types of software licenses, and the open source software movements around the world and in Thailand, in particular.

Introduction

Software has become an essential part of many people lives, be it in schools, universities, hospitals, government houses, shops, and various types of vehicles. Proprietary software (PS) is what many view as a common phenomenon – people are expected to abide to the licensing agreement that comes with the software. That is, to use the software as is provided, without the freedom to improve or modify it to better suit their exact requirements. Furthermore, the cost of some PS has also become formidable for many small businesses or home users, especially in developing countries.

Open source software, a composition of software development, has emerged as a promising alternative. It offers free redistribution of the software whose license must include source code and allow redistribution of the source code as well as the software in its compiled form. The rights attached to the software must apply to all who use it without the need for execution of an additional license by a new user. Moreover, the license must not depend on the program's being part of a particular software distribution. And the license must not place any restriction on other software that is distributed along with.

Eric S. Raymond [Raymond] related the two fundamentally different software development styles of PS and OSS. By using Linux as his example of OSS, Raymond used the terms "cathedral" – model of most of the commercial world versus the "bazaar" – model of Linux world where thousands of part-time developers around the world, whose communication channel is the Internet, join forces to develop one of the most reliable operating system available today. Via the

Internet, any software developers are able to collaborate in order to strengthen the capability of free software – the software with freedom to use, study, modify, and redistribute – without obstruction of the commercial license agreement. Moreover, open source policy offers the developers an opportunity to study the source code and to modify it in such a way that meets the developers' own demands. Considering the fact that this kind of software development is a global collaboration, developers around the world have been spending their time brain storming in order to get the best out of the software and the result of which can be undeniably astounding.

Proprietary software and Open Source software

The differences between PS and OSS are described in Table 1 in terms of production and in Table 2 in terms of overview, respectively.

Table 1 Proprietary VS Open Source Software Production[1]

	Proprietary Software	Open Source Software
Model	Cathedral	Bazaar - marketplace
Resources	Known	Unknown
Period of Planning	whole project	step by step
User	paying customer	co-developer
Objective	fulfill contract/ specification	Solve problem
Enforcement	Strong	Weak
Progress	Private	Public
Collaboration	face to face	via Internet
Quality Assurance	Management	competition, peer review

Table 2 Proprietary VS Open Source Software in general[2]

	Proprietary Software	Open Source Software
Development	Closed	Open, collaboration via Internet
License	Use only	Use, study, modify, redistribute
Business Goal	Dominate the market	System integration, Customization, and Localization
Delivery	Business	Academy
Ownership	Single, limited	Multiple, unlimited

One crucial term that must be further discussed is the term "freedom" (not free of charge) of redistribution. There are many categories of software concerning the "freedom" of redistribution and use. Followings are the common examples collected by the Free Software Foundation (FSF)[3]

Free software

[1] http://user.cs.tu-berlin.de/~tron/opensource

[2] http://www.links.nectec.or.th/virach/publication.html

[3] http://www.gnu.org

Free software is a matter of the users' freedom to run the program, for any purpose, to study how the program works, and adapt it to their needs, to redistribute copies for helping others, and to improve the program, and release your improvements to the public for the benefits of the whole community.

Public domain software

Public domain software is software that is not copyrighted. If the source code is in the public domain, that is a special case of non-copylefted free software, which means that some copies or modified versions may not be free at all. In some cases, an executable program can be in the public domain but the source code is not available. This is not free software, because free software requires accessibility of source code.

Copylefted software

Copylefted software is free software whose distribution terms do not let redistributors add any additional restrictions when they redistribute or modify the software. This means that every copy of the software, even if it has been modified, must be free software.

Freeware

The term “freeware” is commonly used for packages which permit redistribution but not modification (and their source code is not available). These packages are not free software.

Shareware

Shareware is software which comes with permission for people to redistribute copies, but says that anyone who continues to use a copy is required to pay a license fee. Shareware is not free software, or even semi-free. For most shareware, source code is not available.

Commercial Software

Commercial software is software being developed by a business which aims to make money from the use of the software. “Commercial” and “proprietary” are not the same thing! Most commercial software is proprietary, but there is commercial free software, and there is non-commercial non-free software.

Open Source software

Open Source software is the software that its source code is intended to be distributed to anyone under certain conditions determined by a licensing agreement.

The Open Source Initiative (OSI) precisely defines “Open Source” by the following criteria [The Open Source Definition (V1.9)[4]]:

1. Free Redistribution

[4] http://www.opensource.org/

The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources.

2. Source Code

The program must include source code, and must allow distribution in source code as well as compiled form.

3. Derived Works

The license must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original software.

4. Integrity of the Author's Source Code

The license may restrict source-code from being distributed in modified form only if the license allows the distribution of "patch files" with the source code for the purpose of modifying the program at build time. The license must explicitly permit distribution of software built from modified source code. The license may require derived works to carry a different name or version number from the original software. That is, users have a right to know who is responsible for the software they are using. Authors and maintainers have reciprocal right to know what they're being asked to support and protect their reputations.

5. No Discrimination Against Persons or Groups

The license must not discriminate against any person or group of persons.

6. No Discrimination Against Fields of Endeavor

The license must not restrict anyone from making use of the program in a specific field of endeavor. For example, it may not restrict the program from being used in a business, or from being used for genetic research.

7. Distribution of License

The rights attached to the program must apply to all to whom the program is redistributed without the need for execution of an additional license by those parties.

8. License Must Not Be Specific to a Product

The rights attached to the program must not depend on the program's being part of a particular software distribution. If the program is extracted from that distribution and used or distributed within the terms of the program's license, all parties to whom the program is redistributed should have the same rights as those that are granted in conjunction with the original software distribution.

9. The License Must Not Restrict Other Software

The license must not place restrictions on other software that is distributed along with the licensed software. For example, the license must not insist that all other programs distributed on the same medium must be open-source software.

10. The License must be technology-neutral

No provision of the license may be predicated on any individual technology or style of interface.

Licenses

The growth of the Linux society over the decade together with the gradual spread of the Internet, “Open Source” is now commonplace, occurring in many communities. But how to be “open” is under ongoing discussion.

There are many categories of licensing agreements. The common licenses are GNU General Public License (GPL), GNU Library General Public License (LGPL), Berkeley System Distribution License (BSD), MIT License, Mozilla Public License (MPL), among others. [Details at http://opensource.org/licenses]

Since there are many licenses for “Open Source Software”, users have to determine the most suitable licensing scheme for their use. Examples for selecting the appropriate license are illustrated in Table 3. And corresponding characteristics of the licenses are compared in Table 4.

Table 3 Suggestions for appropriate OSS license

Condition	Proposed License Category
If the modified source code is needed	GPL or LGPL
If the modified source code is not needed. (taking modification private)	X or Apache
If it is allowed to mix with other software.	LGPL (if modified source code is needed) X or Apache (if not)
If you want to sell commercial licensed version which is not Open Source.	Dual license (GPL + commercial license)
If the privilege is need.	IT IS NOT Open Source Software

Table 4 Comparison of various OSS license characteristics

Characteristics	GPL	LGPL	BSD	NPL	MPL	PD
Can be mixed with non-free software	N	Y	Y	Y	Y	Y
Modifications can be taken private and not returned to you	N	N	Y	Y	Y	Y
Can be re-licensed by anyone	N	N	N	N	N	y
Contain special privilege for the original copyright holder over your modifications	N	N	N	Y	N	Y
Combine with proprietary and redistribute	N	Y	Y		Y	
Combine with GPL'ed code and redistribute	Y	Y	Y		N	
Must share source of redistributed version	Y	Y	N		Y	

Open Source Software status around the world

Many countries open their arms to Open Source idea and movement. Open Source related organizations gradually spend more and more effort to encourage the development and utilization of OSS. The status of OSS in many regions around the world is summarised in this section, starting with activities in Asia and followed by activities from the rest of the world in alphabetical order.

In **China**, January 2002, Beijing government awarded many software contracts to local software vendors to outfit government computers with its own version of Linux. In **Hong Kong**, the government has installed more than 100 Linux servers in its various departments over the past 3 years. It was reported to have saved money, strengthened security, cutting down software piracy, and increased competency of its local software workforce by switching to use OSS [Berger, 2002].

Korean government agencies officially use Hancom Linux, OS and an Office Suite. Hancom Office is a powerful office productivity suite for Linux that includes word processing, spreadsheet, graphics and presentation applications. Hancom Linux Inc., held an agreement with the Korean Government to sell 120,000 copies of Hancom Linux Deluxe 2.0[5]

In the **Philippines**, there are 3 major support groups of OSS movement – government agency, business sector, and local community. For the government agency, the Advanced Science and Technology Institute (ASTI), an attached agency of the Department of Science and Technology mandated to provide central direction, leadership, and coordination of all science and technology activities in the country, has already released Bayanihan Linux, a Philippino localized Linux. "Jumpstarting Electronics Governance in the Local Government Units Project (eLGU)"[6] is to provide its local governance units with a web-enabled information system using OSS technology in order to assess and collect property and business taxes in a more efficient and transparent manner.

With regards to OSS community in the Philippines, there are 3 groups focusing on different issues, The Philippine Linux Users' Group (PLUG)[7] focusing on the policy's issues, Open Minds Group – an umbrella organization for Linux users' groups, government agencies, schools and businesses – focusing on technical issues, and The Bluepoint Linux Users Elite (BLUE)[8], an online community of Linux program graduates from the Bluepoint Institute of Higher Technology Foundation, focusing on training issues.

In **Chinese-Taipei**, an OSS project was started at the beginning of 2003 and is aiming to save some $295 million in royalty payments to Microsoft. The project includes research and development of office suite using available resources in OSS community. At the end of 2000, there were about 1.23 million PCs in use by public service agencies and schools and figure is increasing. There are also plans to set up six training centers around Taiwan to train OSS developers. It is predicted that, within 3 years, the centers will be training 120,000 users and 9,600 advanced users [ZDNet News, 4 June 2002].

In **Thailand**, there have been many Linux distributions since 1995, including Kaiwal Linux, Burapha Linux, Linux SIS (School Internet Server), Linux TLE (Thai Language Extension: TLE, pronounced /ta-le/ which, in Thai, means the sea). There are also Thai office suite OSS, such as Office TLE, Pladao office, and KOffice. OSS awareness promotion has been taken place over the past few years as OSS workshops have been arranged twice a year since 1999. One of the most important step forward in OSS activities in Thailand is the annoucement of ICT Master Plan

[5] http://en.hancom.com

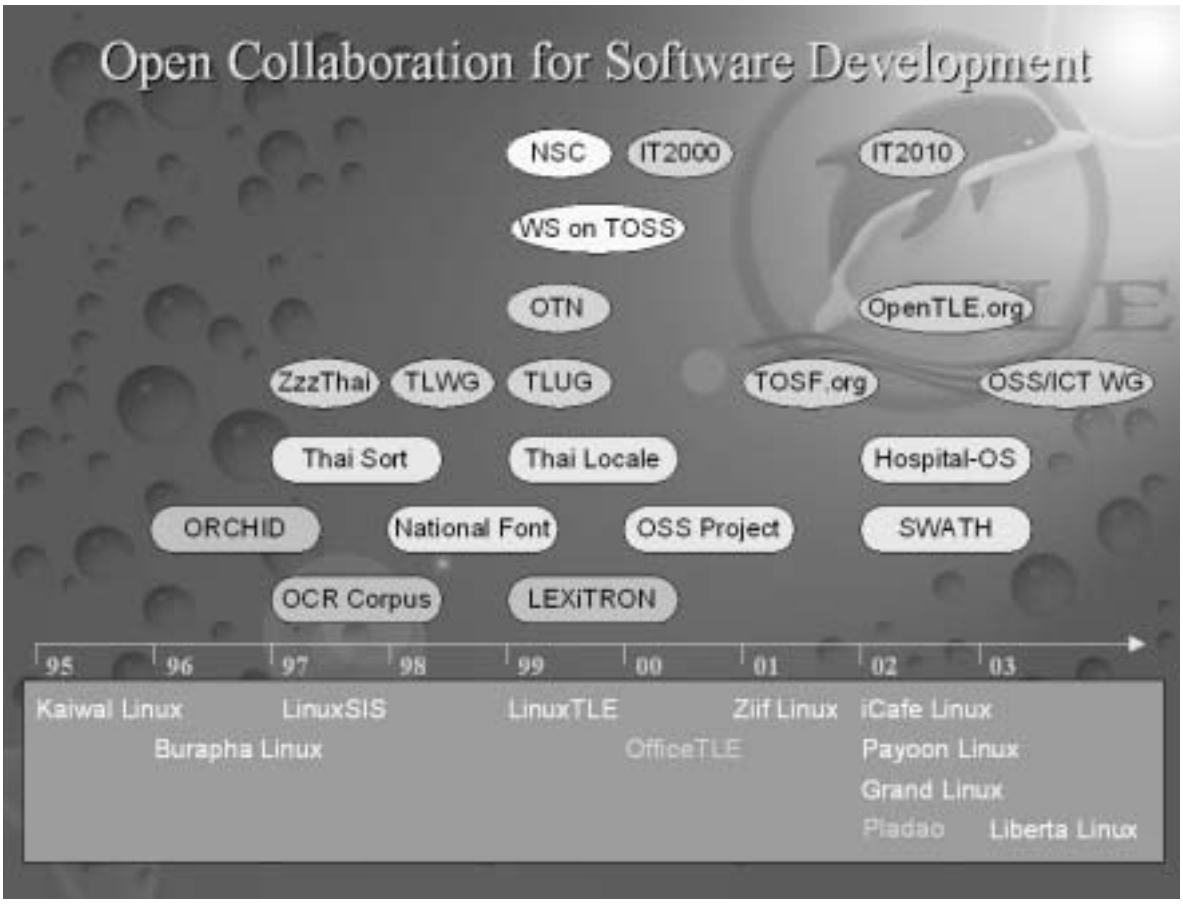
[6] http://elgu.ncc.gov.ph

[7] http://plug.linux.org.ph

[8] http://www.bluepoint.com.ph/blue/

(2002-2006) by the Thai government. Seven strategic plans have been proposed and four of those plans involve OSS in various issues, including R&D, education, industry, and society. Thailand aims to achieve 50% OSS share in the software market within 5 years. Figure 1 shows the open collaboration and timeline of software development in Thailand – OSS applications, working groups, government policy are all represented.

Figure 1 Open collaboration for software development in Thailand



In **Vietnam**, the Ministry of Science and Technology (MOSTE), the Ministry of Culture and Information (MOCI), the Ministry of Industry (MOT), and the Vietnam Electronics and Informatics Corp (VEIC) present their roles on promoting OSS. The last conference on OSS, in January 2003, organized by the Ministry of Science and Technology with more than 250 participants clearly indicates the awakening to OSS in Vietnam. Moreover, it is reported that Vietnam is now drafting a clear OSS action plan for the year 2003. All of the support put Vietnam as one of OSS strong supporters in Asia.

For the rest of the world, in **Finland**, twenty eight employees from 13 government agencies completed a project in April 2002 to test the Open Office productivity suite, called Star Office. The recommendation was to promote the use of the suite to people who do not regulary exchange documents with those who use competing productivity software. The Finnish government has also been hosting seminars to promote awareness of Linux and other OSS. There are about 13% of government servers running Linux, however, the country has no mandate what software the government agencies use [Berger, 2002].

In **France**, the French ministry of culture and communications replaced many its server OS's with a version of Linux in January 2000. Other OSS that was being developed included the Apache web server and Zope – an OSS application server. It was reported that reliability of the servers has improved and money has also been saved [Berger, 2002].

In **Germany**, the lower house of parliament considered switching to Linux in October 2001, but managed to revise a deal with Microsoft to lower the cost of its software [Berger, 2002]. The German government recently announced a deal with IBM and Linux company SuSE to address concerns that it was relying too heavily on Microsoft products. [ZDNet News, 4 June 2002]

In **Peru**, a bill requiring government agencies to use OSS was under debate. PS and other commercial applications would only be used when OSS alternative was not available. Peruvian congressman has said that the legislation would cut cost of software expense by about 60%. However, there was an opposition voicing that the government had no business in mandating what type of software should be used and that the law would be counter-productive [Berger, 2002].

Open Source's Push and Pull in Thailand

There are three groups of OSS movements in Thailand – government sector, universities, and business sector. The leading organization in the government sector is National Electronics and Computer Technology Center (NECTEC), affiliated with Ministry of Science and Technology. They play their role in OSS community by developing and maintaining the Thai Language Extension (TLE) of Linux operating system and office productivity suite (Office TLE based on OpenOffice.org). Linux TLE was developed specifically for desktop use and Linux SIS (School Internet Server) was developed for server use. Apart from NECTEC, there is Electricity Generating Authority of Thailand (EGAT) who supports developments of OSS for internal operations of the organization.

Leading universities, such as Kasetsart University, Burapha University, and Prince of Songkhla University, have developed their own Linux package for using within campus and promoting the use of OSS in other universities. Current OSS projects include, but not limited to, Beowulf Linux Cluster Project from Kasetsart University, and Burapha Linux from Burapha University.

Business sectors, following suit of software houses and internet café, are turning to OSS for their daily productivity and development tools, such as groupware and server solutions as developed by Ice Solutions, packages for small and medium businesses (SMEs) by Micro-X Co. Ltd., and office productivity suite Pladao (based on OpenOffice.org). The list of such examples is becoming longer by the year.

The growth in interest in OSS in all three sectors signifies the move into the right direction – OSS can be used to achieved productivity gain, economic gain, and, at the same time, the development efficiency.

Recently, the government has approved a five-year **ICT** (Information and Communications Technology) **Master Plan**, which is effective from 2002 to 2006. The strategic plan covers seven major areas as follows.

1. To be a regional leader in ICT industry development – including promoting OSS and locally developed software to Thai users.

2. ICT utilization to improve standards of life – including promoting teachers to use ICT as a teaching tool, easy access to local contents, and nationwide broadband service with competitive service rates.
3. To improve ICT R&D potentials – including industry-led and OSS-based ICT development for local software industry to build on.
4. To raise potentials of local workforce and local competitiveness – emphasizing OSS and its related technologies in syllabuses in all levels of education.
5. To raise competitive advantage of local businesses in order to compete in international markets – including promotion of Thailand brand, and provision of broadband access for businesses to share resources.
6. To promote use of ICT in SMEs (Small and Medium Enterprises)
7. To utilize available ICT in improving government management and services – including implementation for information sharing system, back and front office systems, with priority given to OSS and locally developed software.

From all seven areas of ICT Master Plans, OSS is involved in 4 of them. This has shown that Thailand considers OSS as a strategic tool for its advancement in ICT. The targets for OSS in the ICT Master plan can be summarized as follows.

1) To promote the use of OSS in software industry development.
2) To increase research and development using OSS technology.
3) To strengthen the OSS presence in education.
4) To use OSS in system development for government services.
5) And as one of the most urgent project, to establish a software bank for OSS.

At the beginning of 2003 fiscal year, the Royal Thai Government has announced a policy to promote software and automobile industries as two leading industries in Thailand. As a result of this policy, various software groups have joined forces to establish Thailand Open Source Federation (TOSF.org). The Federation was founded on 3 September 2002 with founding members from 14 institutions from various sectors including educational, business, government, and non-profit organisations. The main objectives of TOSF are to promote OSS as a more efficient and cost-effective alternative to PS, and to promote the software industry in the country using OSS.

What do we do at NECTEC?

National Electronics and Computer Technology Center (NECTEC) is a major player in nurturing Open Source Community in Thailand. Over the past three years, NECTEC together with other sectors have initiated and organized many Open Source activities (see Table 5).

Table 5 OSS activities in Thailand as organized by NECTEC

Category	Activity
Seminars/ Workshops	- Five consecutive workshops - 15 July 1999: 150 attendees - 20 September 1999: 200 attendees - 21 November 2001: 361 attendees - 23 March 2002: 557 attendees - 2 September 2002: 3000 attendees - and more than 30 moderate seminars

OSS distributions	- Linux SIS - Linux TLE - Office TLE
Book/Article/Publication	- Linux TLE - Office TLE - Linux for network administration
Trainings	- Linux system administration and end user - Participating organizations include NECTEC, EGAT (Electricity Generating Authority of Thailand), MOST, SchoolNet project members, Local Brand PC makers technicians, and PC retailers. - Linux TLE and Office TLE trainings for school teachers and students in five regions of Thailand, including __ schools and ___ platforms (Nov-Dec 2002)
Community	- Thai Linux User Group (TLUG) - Thai Linux Working Group (TLWG) - Prince of Songkhla University-Linux User Group (PSU-LUG) - Thailand Open Source Federation (TOSF.org) - Open TLE project (opentle.org)
Web sites	- http://linux.thai.net - http://opensource.thai.net - http://www.tosf.org - http://www.opentle.org - http://www.linux.psu.ac.th/ - http://www.buraphalinux.org
Others	- National Software Contests - 2001: 9 acceptance from 9 proposals - 2002: 37 acceptance from 38 proposals - 2002: 70 acceptance from 106 proposals

NECTEC's Information R&D division (RD-I) focuses on software and information R&Ds according to the economic and social structures of Thailand. It aims to achieve public access to quality information, under His Majesty the King of Thailand's Sufficient Economy Philosophy, in order to enhance quality of life and stability throughout the country. The RD-I is committed to stimulating independence in science and technology and, subsequently, to reducing imports of foreign technologies. It also provides support and development of Linux TLE and Office TLE as well as many other software projects.

Summary and Recommendations

The concept of OSS and an up-to-date version (as of March 2003) of OSS around the world has been presented. We can see that the level of OSS exposure has grown from strength to strength. However, recommendations for further actions are as follows.

1. To promote the local software industry – it is important to invest in software efficiently, both in terms of development and applications. OSS has many desirable features to achieve efficient investments, including availability of new technologies as basis for development in an "open" environment.
2. To devise a software standard – in order to enhance collaboration among OSS communities, to put Thailand on an OSS map and among OSS world stages. Examples of OSS standard are such as documentation format, communications protocol, device controllers, and software interfaces.

The two recommendations above can be divided into 7 action plans as follows.

1. Training and seminars – to help equip the public with OSS concept and to help train advanced OSS developers.
2. Documentation – to provide the public and OSS community with documentation of relevant OSS topics.
3. OSS development promotion – outlines for development collaborations such as grouping of software into government sector, educational sector, fundamental software sector (internet applications, office suite, databases, etc.), devising standards for communications protocol, information exchange, and storage.
4. Software development – to provide resources and support for OSS developers.
5. Software bank – to provide a center of software information, source code, news, and other relevant tops for both technical and business users. The software bank will also provide a connection with other software banks around the world. The most important concept of software bank to the support software "re-use" and to provide means for efficient software development.
6. Public relations – to promote OSS awareness to wider audience.
7. OSS support and services – to set up call centers to support OSS developers and users.

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