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The Importance of Open Source Software

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Abstract: Open-source refers to the practice of making source code freely available to the public, allowing anyone to view, modify and distribute the code. In computer science and software development, open source is important for several reasons, as explained in the below sections. By allowing anybody to access, evaluate and alter the source code, open source encourages greater transparency and security. This increases the software's overall security and stability by allowing developers and security professionals to find and repair bugs and security vulnerabilities more rapidly.

Keywords: open source; open access; electronic publishing; free software

Introduction:

Fig.1 A Software Taxonomy

Free/open source software provides lot of benefits to users like less cost, more freedom of use etc. It has come a long way from a single man movement to hundreds of thousands of subscribers to the idea. During the early days, those who wrote software shared their programming code freely among others in academia, so that all could benefit from the work that they did. The code was passed back & forth among the members of the community.

Today, a vast majority of software development, projects use license for its use, the users can only use the software. For example, Microsoft Word software can be used under license, we are not supposed to edit the code. This type of software is called **proprietary software** meaning company owns the software. Open source is the opposite of proprietary.

Richard Stallman of the Free Software Foundation(https://www.fsf.org) assets that "Free software is a matter of liberty, not price". Stallmand continues "Free software is a matter of the user's freedom to run, copy, distribute, study, change and improve the software". It refers to four kinds of freedom for the users of the software.

1)The freedom to run the program for any purpose(Freedom 0).

2)The freedom to study how the program works and adopts it to your needs(Freedom 1).

3)The freedom to redistribute, copies so that you can help your neighbour.(Freedom 2)

4)The freedom to improve the program and release your improvements to the public, so that the whole community benefits(Freedom 3).

An area where open source software can be used are schools. Schools don't have to spend money on proprietary software license. Many alternative are available like open source software Gimp(image manipulation tools) and openoffice.org can be made use. The most widely known and used open source software is the Linux operating system. Linux was created by Linux Trorvalds in 1991. As a project for college coursework, Torvalds began the creation of a computer operating systems based upon Minix, a Unix derivates. He shared his work with other students to gain their support and assistance.

OSS vs Proprietary Software:

The advantages of OSS include better flexibility, freedom, interoperability, learning, reusing the code as building blocks, portability etc that OSS offer make them better than proprietary software. To understand the concept of Open Source, one must understand that what Source is. Source is the shortened form of the term source code. Source code is a textual human readable form of a computer program & is typically written by a human programmer.

A computer program is simply a step by step list of explicit instructions written in a programming language by the programmer to instruct the computer in performing a task. Unlike human languages, programming languages have a strict syntax to minimize ambiguities. Like human languages, there are many programming languages. The following is a simple example of source code instructing a computer to add numbers and display the result.

```
a:=100;
b:=50;
c:=a+b;
write(c);
```

Before a computer can act upon these instructions, the program must be converted from the human readable programming language form into a computer instruction form which is called executable code, machine code or binary code. Executable codes are sequences of numbers which are meaningless to humans. The process of conversion is termed “compiling”.

Purchased software is almost always executable code and the cost of the purchase entitles the purchaser the “right to use” of the software. The purchaser does not “own” the software. Users of purchased software almost never get access to source code. Most proprietary software producers consider their source code to be their “trade secret” and kept private and proprietary. This is termed “Closed Source software”.

Software product where the source code is freely available is termed “Open Source”. To most people Open Source means free software. However, there is more to Open Source than just free software. Simply put, Open Source means software with freely available source code(software in human readable text form, before compilation into machine executable binary form). The source code is freely “open” for many purposes. Free software without available source code is not Open Source. Open Source is at its heart a form of software licensing with the following common key principles:

- There is no license fee charged for the software.
- The source code is freely available(however this does not necessarily mean zero cost).
- There are no restrictions on the use of the software, even for commercial purposes.
- Derivatives of the software or “greater works” of which the software is a component are allowed and encouraged with credit given to the original authors(s)

Although possible, there are no known cases of litigation following violations of such licenses.

Open Source is also a collaborative software development model where anyone can participate. The people contributing towards any Open Source project are collectively referred to as the Open

Source Community. This Community has no boundaries and contributors come from all over the world and many who work together on projects may have never met physically.

A full definition of Open Source is on the Open Source Initiative's website http://www.opensource.org. There are over thirty types of Open Source license(approved by the Open Source Initiative) but most are variants of the Free Software Foundation's GPL (GNU Public License) or the BSD (Berkeley Standard Distribution) license. The two differ in many details but one key point is that derivatives of GPL software must also be GPL whereas BSD type licenses have no restrictions on the use of the source code including the commercialisation of the product or derivatives. Non-profit organizations such as the Free Software Foundation, FreeBSD Foundation and Apache Foundation, research and educational institutions, individuals and loosely organised groups of individuals, all have one common principle: Software is knowledge and knowledge should be freely available to anyone who needs it.

Open Source software also comes from commercial entities such as Apple Computer, Sun Microsystems and Red Hat and forms part of their business strategy. These vendors have realised that the Open Source development model has advantages that outweigh any perceived advantage of keeping software proprietary. Many software businesses also provide Open Source software as scaled down version of their top-of-the-range products and many have business models which generate revenues from services such as consultancy, training and customisation rather than direct software licensing.

There is a wide range of Open Source software which covers everything from operating systems to specialized applications such as the following sample.

Operating Systems: various BSD UNIX variants such as FreeBSD, Darwin (the core of the Apple's Mac OSX).

NetBSD and OpenBSD, and various Linux distributions such as Red Hat, SuSE and Debian;

Server software: BIND DNS server, Apache web server, exim MTA(message transfer agent) server, Darwin streaming server, Samba SMB/CIFS file/printer sharing server, OpenLDAP directory server, MySQL and PostgreSQL database servers, jBoss and Tomcat J2EE applications servers.

Office applications such as OpenOffice applications suite, Koffice office application suite; AbiWord word processor; Gnumeric spreadsheet.

Specialized tools such as BLAST molecular sequence database search tools and cluster computing software such as MPICH(cluster message passing solutions) for Beowulf High Performance Computing clustering systems.

OSS in Mainstream:

Open Source software, once primarily associated with computer operating systems, is now being used by companies for critical functions and software applications such as storing data, managing customers, and analysing business information.

The success of Linux, the free computer operating system created in the early 1990s by Linus Torvalds and developers around the world, has paved the way for a growing open-source ecosystem. Numerous websites such as Google, eBay etc are now operated on open source software. Mozilla Firefox is an open source Web browser that has been downloaded more than 75 million times. OpenOffice is a suite of desktop applications, including word processing and spreadsheet, popular in developing countries, such as India and Brazil. A worldwide community of developers write and contribute to creating open-source software. That in turn can make the software cheaper and better than proprietary products, open-source advocates say, because the developers don't charge for it and collective brains are constantly improving it.

Sales on the Rise:

IDC forecasts that worldwide sales of open-source applications, tools and system software running on Linux-while just a slice of overall software sales of more than US$200 billion this year will increase from $5.4 billion in 2005 to nearly $17 billion in 2009. Early-generation open-source companies such as MySQL, which makes database software and JBoss proved that open-source can work as a business model.

JBoss, for example gives away its software, which helps manage a company's software infrastructure, but charges service and maintenance fees. The company relies on the open-source community- developers around the world - to suggest improvements and fixes for bugs.

Efficient Development:

SugarCRM, an open-source company sells software for customer relationships management or CRM, showed its product to the open-source community from the beginning, getting input from developers around the world. You can develop superior software with less money. The software has been translated into 24 languages, including German, Turkish and Chinese- through the open-source community.

Other relatively new software companies using open-source as part of their business models include JasperSoft, a San Francisco maker of business intelligence software; Compiere, whose application software helps companies manage factories; and Funambol, a Redwood City wireless applications company.

Yet some think that open source is still far from fulfilling its promise.

"It has attached a great deal of venture attention", said Peter Fenton, a partner with Accel Partners, which has funded two open-source companies. "Much of it is a hype". We think there will be some widespread failures, in which investment will be made before there is widespread adoption.

The advantages of Open-source Software:

There are four simple reasons why a non-profit organization would use OSS:

- Lower cost
- Licensing that permits freedom
- Community based technical support and Development
- Alignment with mission and values.

While the initial costs of "free software" are obviously of benefit, the long-term costs of maintaining an open-source network infrastructure are considerably less than that for proprietary solutions. While migration and setup costs may seem initial barriers, the stability of Linux machines results in substantially lower support costs, which tend to be the largest area of technology outlays.

The licensing arrangement of OSS also permits full-freedom to make strategic technology decisions that are independent of a corporate agenda or schedule. OSS is always available for download somewhere, and as long as an application is still useful, there is undoubtedly a user community to support it.

This is in contrast to proprietary licensing arrangements such as those of Microsoft. Microsoft announced this year that it would not release a patch for a security hole in Windows NT, raising questions about their commitment to support the server. In this case, an application with a significant user base must be abandoned by any user wanting an up-to-date and secure system. This is decision made not by the user(who doesn't even have the option to pay someone for an update), or the user community(which does not have access to the source code and therefore cannot support the system itself), but by Microsoft.

Collaboration and innovation

The creation of the Linux operating system is a prime illustration of how open source promotes cooperation and innovation. Linus Torvalds founded the open-source Linux project in 1991. It is one of the most popular open-source projects in history and is widely used in servers, smartphones and other devices today. Thousands of programmers from all over the world work together on the Linux project to develop the operating system by correcting problems, adding new features and enhancing performance. Anyone can contribute to the project because the source code is openly available for developers to inspect, alter and share.

The collaborative spirit of the Linux project has sparked quick innovation and produced an extremely sophisticated and dependable operating system. There are numerous instances where open source has aided in collaboration and creativity, including the creation of the Python programming language, the MySQL database and the Apache web server, to name a few.

Cost savings

Since open-source software is frequently free to use and distribute, both enterprises and individuals can significantly cut the cost of software creation and deployment.

The use of the LibreOffice productivity suite is one example of how open-source aids in cost savings. Alternatives to expensive, closed-source office productivity suites, such as Microsoft Office, include LibreOffice. Businesses and individuals can avoid paying high software license fees by utilizing LibreOffice.

Increased transparency and security

By allowing anybody to access, evaluate and alter the source code, open source encourages greater transparency and security. This increases the software's overall security and stability by allowing developers and security professionals to find and repair bugs and security vulnerabilities more rapidly.

For instance, a group of developers that work on the project can remedy a problem if a security flaw is found in an open-source project. This community is capable of promptly identifying a fix and producing a patch that can be widely applied, enhancing the software's security for all users.

Community support

Open-source software often has a large and active community of users and developers who provide support and help to improve the software. This can result in faster and more efficient problem resolution. The creation of the WordPress content management system is one instance of how open-source fosters community support. Since its initial release in 2003, WordPress has grown to become one of the most widely used content management systems in the world, powering millions of websites.

A sizable and vibrant community of users and developers work together on the WordPress project to advance the platform. Through online forums, documentation and tutorials, this community helps to make WordPress more approachable and user-friendly by offering assistance to other users.

Education and training:

Students and professionals can access real-world software projects using open-source software,

giving them a chance to learn and advance their abilities. Additionally, open-source programming languages, such as Python, Java and Ruby, are frequently utilized in education and training courses because they are affordable, simple to learn, and have a big user and developer community that can offer assistance and resources.

For instance, many colleges and institutions teach computer science and software development using open-source programming languages because they allow students to use tools and technologies that are currently in use and help them build skills that are applicable to the labour market.

Conclusion:

Indeed, open sources still faces some major hurdles. One obstacle is that open-source software can be complicated to set up and run compared with proprietary software. If a company has problems integrating the open-source software into its systems, it might spend a princely sum- making it actually more expensive the proprietary products- to hire outside experts.

And the open-source industry still has to work on cultivating and expanding its community of developers. Without a community of developers willing to support its software, the open source product will never gain acceptance, said Mike Milinkovich, Executive director of the Eclipse Foundation, an open source consortium of more than 100 companies. Open source licensing encourages innovation through collaboration. Without it, many of the technologies we take for granted today would never have developed, or would be locked away behind patent law. The open source movement is the reason that technology has developed at such a breakneck pace for the past few decades.

References:

1. The free Software Foundation, http://www.fsf.org
2. The Open Source Initiative www.opensource.org
3. https://www.gnu.org/
4. Apache Software Foundation www.apache.org
5. FreeBSD Foundation https://www.freebsd.org/
6. The Linux Kernel Archives https://kernel.org/
7. Open Source Software An Introduction, Edited by Ravi Kumar Jain B
8. The importance of open-source in computer science and software development: https://cointelegraph.com/news/the-importance-of-open-source-in-computer-science-and-software-development
9. What is open source, and why is it important? https://www.bigcommerce.com/ecommerce-answers/what-open-source-and-why-it-important/