Differences between open source and free software

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Abstract—Open-source software development is praised by an increasing amount of big technology companies. The outcome of open-source development is however problematic to the developers themselves because open source allows making closed-source versions of open source. Inevitably the flow of money goes from the end users straight to the closed-source version maintainers, skipping the open-source contributors completely. Free software attempts to solve these problems. This paper examines the differences between open source and free software definitions and their usage. The paper then attempts to go through some of the phenoma behind the unclear differences. Both open source and free software share some of the same development methods. Free software however doesn't share all of the same sustainability issues open source does.

Index Terms—open-source software, open source, free software, software freedom, libre software, proprietary software, closed source software, copyleft

I. Introduction

Open-source software development has seen an increasing interest in the recent years [1]. Open source gives all kinds of different benefits ranging from enhanced security to extra labor force from outside the company. The benefits also include faster feedback loop between end-users and the developers, increase in agility and decrease in costs because every developer are able to make bug fixes, feature requests and many other types of contributions regardless of their employment relation to the company. Enhanced security is usually justified by Linus' law, formulated by Eric Raymond: "given enough eyeballs, all bugs are shallow" [2]. Open-source also enables companies to maintain a closed-source, commercialized version of that same open-source software and sell it with some extra features to the customers, allowing the company to profit even more from the open-source approach. The list of benefits is long and growing on-par with the technology advancements. It is no wonder the interest in open-source software development has grown with the recent years.

It's most known rival, closed-source software, comes with it's own benefits like increased revenue because a competing company cannot create a competitive copy with the same source code. Closed-source, or proprietary software is argued, against Linus' law, to have a higher rate of bug uncoverage due to an in-depth review by fewer people as opposed to in open-source approach [3]. This is often referred to as a higher level of security in proprietary software.

Free software is the least known rival to both open source and proprietary software. It was first defined by the Free Software Foundation, or the FSF in 1986: "The word "free" in our name does not refer to price; it refers to freedom. First, the freedom to copy a program and redistribute it to your neighbors, so that they can use it as well as you. Second, the freedom to change a program, so that you can control it instead of it controlling you; for this, the source code must be made available to you." [4]. The difference between proprietary software and free software might be more obvious than the difference between open source and free software. According to the second freedom in the definition of free software "the source code must be made available to you" open source doesn't always go down this path. Because open-source software can be made closed-source for commercial or some other purposes, the FSF does not see open source as a form of free software [5].

Free software has seen declined interest in the last four decades [6]. Free software prohibits closed-source derivatives from the free software's source code. Because most companies profit from their commercial, closed-source versions, companies like Microsoft have taken actions to demonize free software as a whole throughout the years [7]. Free Software Foundation's head figure, Richard Stallman is also being demonized with hate speech [8]. Aside from systematic demonization of free software it has also been criticized as failing on a practical, ideological, economical and political level [9].

The objective of this paper is to find out how the differences between open source and free software are perceived in the academic papers that use these terms. This consists of academic papers in academic journals like Scopus, ScienceDirect, SpringerLink, IEEE Xplore, ACM Digital Library and Web of Science. The objective of the paper also includes the possible reasoning behind the perception of the two aforementioned approaches to software development. Legal-heavy parts of the open source and free software definitions are outside the scope of this paper.

Next the paper describes the methods used to find out the perceptions in the difference of open source and free software in the academic field. After describing the methods we take a look at the results. Finally the paper discusses the phenomena around the research scope. This

includes nexts steps in concrete action, the new term "openwashing" and further research.

II. Methods

The papers are gathered from Scopus, ScienceDirect, IEEE Xplore, SpringerLink, ACM Digital Library and Web of Science. The papers are picked based on the two factors: numbers cited and keyword accuracy. The first one is self explanatory but the latter needs explanation. The keyword accuracy is higher if the title or other contents of the paper contain the words "free", "libre" or "FOSS" for example. From the author's previous experience the keyword "open source" appears always with the a paper discussing free software. The paper will present discoveries of other synonyms for free software.

TABLE I
Electronic sources searched.

Eletronic sources	Number of hits per search	Number of selected result per search
Scopus	8088	8088
ScienceDirect	352728	352728
IEEE Xplore	1073	1073
SpringerLink	590018	590018
ACM Digital Library	562658	562658
Web of Science	8502	8502

Open Source Initiative has also their own official definition of open source [10]. Free Software Foundation on the other hand has their official definition of free software [11].

III. Results

The extracted data was used to answer the research question.

A. RQ: Do the academic papers that use the following terms distinguish the difference between open source and free software?

The results indicate that the academic papers do not know the difference between open source and free software nor do they attempt to differentiate them. This could be partly due to the systematic demonization process parties have practiced since the invention of the GNU General Public License. These parties are guessed to suffer financially from the increasing usage of free software licenses since their release. Open source on the other hand has received the opposite reaction from the for-profit software industry. Open source receives increasing support from the industry and the for-profit companies are creating an desirable atmosphere around the subject. This is because open source development profits the for-profit companies the most and usually leaves the community developers outside the flow of money. This paper attempts to coin the term "openwashing" like greenwashing. Greenwashing refers to the practice of falsely promoting an organization's environmental efforts or spending more resources to promote the organization as green than are spent to actually engage in environmentally sound practices [12]. Like greenwashing, openwashing attempts to promote an organization's efforts to sustainably include non-company developers into the programming environments. As pointed out before, this too is a falsely promotion.

GNU General Public License is not good enough to protect software freedom [13] [14]. This could be one of the reasons why the academic papers disucssing open source and free software cannot distinguish the difference between the two. Open source licenses are more permissive thus they are easier to make fool-proof.

IV. Discussion

There is a lot of effort to be done in order for us to distinguish the difference between open source and free software, even if it would only happen in the academic field. Because GNU General Public License is not enough we need a better license that could cover more loopholes. More companies should start licensing their software as free software and create business models around the concept. Active discussion should be increased so that the community could distinguish the difference between the aforementioned eventually. Software shouldn't be the only discussable matter when it comes to differentiating open source and free software. Creative Commons is a good instance of an attempt to distinguish non-copyleft and copyleft works that are non-software.

V. Conclusions

This paper examined the differences between open source and free software definitions and their usage. The paper then attempted to go through some of the phenoma behind the unclear differences. Both open source and free software share some of the same development methods. Even though free software however doesn't share all of the same sustainability issues open source does there is still work to be done so that the difference between the two is distinguished eventually.

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