The Competitive Advantage of Free Software

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Abstract

This article proposes an analogy between organic life forms and software packages. It uses Charles Darwin's arguments of natural selection, such as ease of reproduction and increased variability, to support the claim that Free Software enjoys important competitive advantages over proprietary software.

Prologue

I had just finished reading an interview with Jeremy Allison [1] in ChangeLog, a Japanese online Linux magazine [1], when I called up my parents to tell them some news about my professional life. As I spoke to my parents on the phone, the interview I'd just finished reading continued to ring in my mind.

I've known Jeremy for some time, from working with him in the Samba team, and I've enjoyed the fact that he earns his living writing free software. I also enjoyed the fact that I would have the same opportunity; it just so happens that I was calling my parents to tell them I had just been offered a position at a Free Software company, myself. My parents were curious about what Free Software was all about. Since I had never had such a good opportunity to evangelize to them, I couldn't miss this one.

Trying to find a good analogy to explain to my parents —both doctors— why Free Software is so successful, I recalled the interview I had just read.

In the interview, Jeremy had said:

> "I think you'll see once open source software colonizes a niche, it will completely dominate it."
>
> Jeremy Allison, [1]

[1] http://www.changelog.net/

Thinking of this, a complete argument relating Free Software with (my views and recollections of) Darwin's theory of natural selection [2] formed in my mind and I presented it to my parents. Since the argument seemed quite successful in convincing them about the advantages of Free Software, I thought I'd write it up and share it with everybody else.

1 Introduction

> "[...] dominant forms which spread widely and yield the greatest number of varieties tend to people the world with allied, but modified, descendants; and these will generally succeed in displacing the groups which are their inferiors in the struggle for existence."
>
> Charles Darwin, [2, chapter 11]

Compare the the preceding quote with Allison's assessment of Open Source in a niche. Could it be that Jeremy had just read Darwin when he spoke his words? I believe that the similarity between these two quotes is not just a coincidence. In fact, I propose that Open Source Software [3] and, in particular, Free Software [4], enjoy major competitive advantages over proprietary software, even though they are not (yet) the dominant forms.

Throughout this paper, I shall draw correlations between concepts of software development and those of natural sciences. For example, a program shall be considered a species, the release of a program correlates with the variant of a species, and a copy of a program maps to an individual within a species. In addition, users' requirements for a piece of software define the niche of a species, and the user's CPU cycles are the food that individuals compete for. Developers and maintainers of software show up as the hidden forces of nature that introduce variations in species.

2 The Reproductive Advantage

> "A great amount of variability, under which term individual differences are always included, will evidently be favourable [for the production of new forms through Natural Selection]. A large number of individuals, by giving a better chance within any given period for the appearance of profitable variations, will compensate for a lesser amount of variability in each individual, and is, I believe, a highly important element of success."
>
> Charles Darwin, [2, chapter 4]

Even though variability is the main theme in natural selection, Charles Darwin concedes that a large number of individuals may compensate for some lack of individual variability. Free Software, unlike proprietary software, can be freely copied, not only in terms of freedom, but also in terms of cost. This means Free Software *individuals* have an enormous potential to leave many descendants, tending to proliferate.

Proprietary software *organisms*, on the other hand, only breed in confinement, and most often solely by means of cloning. The only situation in which a proprietary software organism is not cloned is when a new release of the software is issued, be it a full release or a patch. Given that such pieces of software aren't released very often, a large number of copies (individuals) would be necessary for it to enjoy a favorable position over software whose individuals present a higher amount of variability.

It might be argued that Free Software for the masses, with binary distributions of packages accompanied by source code that most people don't use, could fall prey to the same problem of low variability. However, there are enough people that make use of the freedom to see and modify the code that they keep the variability levels of Free Software much higher than those of proprietary software.

The issue of procreation only under captivity may not seem a disadvantage at first, given that it allows for man's selection, and man's selection can be much more effective than natural selection for short periods of time. However, it should be pointed out that the *man* that controls the selection, in this case, is not the user, but the company that produces the proprietary software, and wishes to hold total control over it. This is an important distinction.

Besides Free and proprietary software licenses, there are other varieties of licenses worth mentioning. Some allow unlimited copying, but no modification, because source-code is not provided —these suffer from the cloning problem pointed out above. Other licenses do include the sources, but do not allow them to be freely redistributed, modified or not —which is almost like distributing *sterile* software. An example of the latter is Sun Community Source License [5]; the former is common in several Freeware *species*. Note that Freeware and Free Software are very distinct concepts: most Freeware is binary-only (i.e., no sources), and often put in the public domain.

3 The Variability Advantage

> "[...] variations, however slight and from whatever cause proceeding, if they be in any degree profitable to the individuals of a species, in their infinitely complex relations to other organic beings and to their physical conditions of life, will tend to the preservation of such individuals [...]"
>
> Charles Darwin, [2, chapter 3]

Unlike natural species, software variations are not random, but are created by developers to adapt the software to users' needs. In fact, in the case of Free Software, it is the user that drives the variation process, either by patching the software her/himself, by hiring someone else to do it or just by posting the request to a mailing-list and hoping someone else will volunteer to do it. It should be obvious that the freedom to make changes and to redistribute the new variations increases the variability of the species, making it more suitable for other –even unforeseen– niches.

Although such modifications do not need to be contributed back, they often are. When they introduce a feature useful for a wide variety of *niches*, that represents a general competitive advantage, the changes are often accepted by the package maintainers, and quickly proliferate. When they are not generally advantageous, they are most likely to perish for the lack of maintenance resources, or to survive only in the niche for which they were designed and in which they are maintained.

Proprietary-software companies need to choose a niche for their software in advance, with little or no input from users. Even when they can afford to have many maintainers and are able to sell many copies, their software still falls victim of the reduced variability, but not just because users can't make changes. Companies that maintain proprietary software consider variability to be bad, because it increases the maintenance costs. Free Software is free from these costs because the variations are either merged into the main project, maintained by their proponent, or simply dropped.

4 Conclusion

> "It may metaphorically be said that natural selection is daily and hourly scrutinising, throughout the world, the slightest variations; rejecting those that are bad, preserving and adding up all that are good."
>
> Charles Darwin, [2, chapter 4]

Doesn't it seem like Charles Darwin is talking about software development with the sources available for Anonymous CVS, with people all over the world downloading and testing up-to-the-minute versions? In general, Free Software developed in the Bazaar model [6] evolves precisely as described in the quote above. Proprietary software, however, cannot enjoy the benefits of the fast turn-around time and the world-wide scrutinizing of every single change to the source code base, so it cannot adapt as easily to the moving targets that users' requirements tend to be.

A point worth mentioning is that Free Software is actively, not randomly, adapted to new environments, so it might be better modeled after Lamarck's theory of evolution [7]. One may argue that this may actually increase the competitive advantage of Free Software.

This paper presents a conjecture based on my personal experience with Free Software development, explaining some of the reasons why I believe Free Software rules. It is not just a matter of politics or philosophy; it's a matter of survival. "Survival of the fittest."

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