

Why Free Software for Education?

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About the author

- Teacher in a French high school: physics, chemistry and computer science
- Free Software activist for twenty years. Got bored by Windows 97.
- Debian Developer for ten years. Has someone a free-libre package to upload?



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Free Software



Richard Stallman

When I talk about Free Software, I often add the “libre” Latin word: I mean free as in freedom, not just free as a free beer. Software freedom requires four liberties:

- 1 Unlimited use for everybody, for any purpose
- 2 The right to understand how the software works
- 3 Unlimited right to copy and distribute the software
- 4 Freedom to improve the software and to distribute its enhanced version

Examples: [LibreOffice](#), [Firefox](#), which you *may be* already using? [SendMail](#), [Bind 9](#): if you access Internet, you *are* using them.



Open Source Software



Open source means: you can see the source code of the software, which entails at least the second freedom explained above (understand how the software works). Also, if you have both the run-time form of the software and its source files, you can improve the software *locally*.

Example: in my school, the local area network (LAN) is ruled by the software [Kwartz](#), mostly written in Perl language. Kwartz features some services, authentication, IP address allocation, e-mail, file shares, *owncloud*, ... I can access the source files, because it is Open Source Software. However Kwartz' licence does not allow me to copy or redistribute it. I am allowed to use it only in my school.



Closed Software

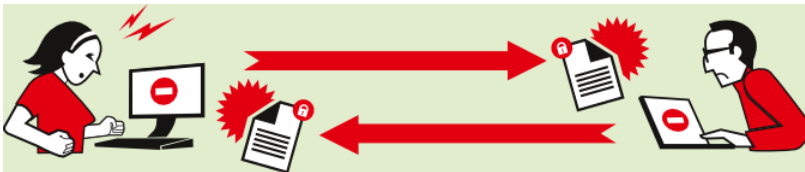
Companies earn money based on various economic models. Closed Software, which may be available for free, or cost something, is the basis for economic models based on *secrecy*.

Not every company giving or selling Closed (Proprietary) Software harms its customers. However there are [documented cases](#) for it.

My school uses some Closed Software tools, for example the software driving our colorimeters comes with no source, and I wish I could fix some of their damned bugs.



Free Formats



Every useful software deals with *data*; every developer may define her/his own standard to read and write those data. Fortunately, most developers are using standard formats, so data can be exchanged between various software pieces.



Free Formats



In order to respect our freedom, a file format must fulfil some requirements:

- 1 be based on an underlying open standard
- 2 anyone must be able to develop the underlying open standard
- 3 be fully documented
- 4 be free of encumbering patents, copyrights or other restrictions



Which col-or makes the TV display nice?

Once upon the time, Black & White TV was invented. If you are old enough, you may remember that some humans walked on the moon in year 1969: their images were broadcast on monochrome TV screens.

Today, most people prefer watching colourful movies. This is possible thanks to TV screen featuring Trichromacy, i.e. able to generate three kinds of sub-pixels.

- Is this progress due to the Green Colour?
- Is this progress due to the Red Colour?
- Is this progress due to the Blue Colour?



Fragile environments



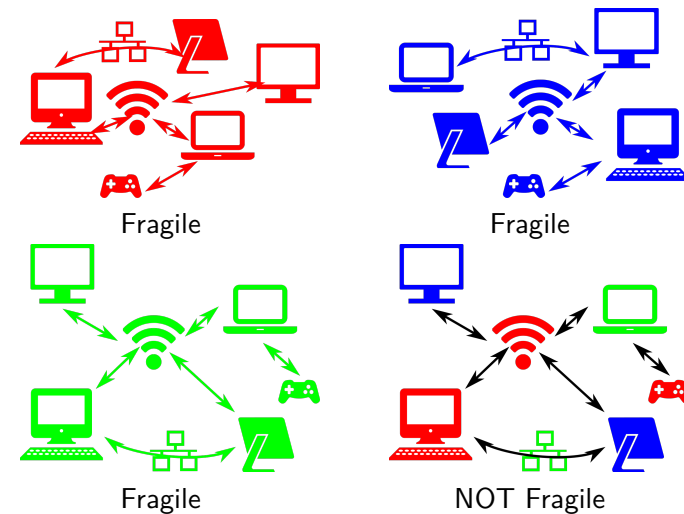
Above you can see « Forêt des Landes », a nice forest grown in the South-West of France, since king Louis XIV ordered it. This forest is uniquely made of Pinus pinaster, as king Louis XIV wanted pine wood, to build a fleet stronger than the English Navy. The picture on the right was taken there in year 2009, after Cyclone Klaus



Fragile environments



Let us learn from mistakes!



Which colour will we choose?

As in the TV screen metaphor, the interesting thing is not *one* colour, but the combination of all of them. Such a combination is feasible only if standards (the *black* arrows) are used to communicate:

- Standard Protocols
- Free File Formats

Even when secrecy is needed, standard protocols are the way to go. When you communicate with your bank over Internet, standard communication protocols are used. Secrecy stems from cryptography algorithms, which are also public standards.



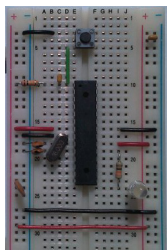
10 Reasons why Free Software must be used

Here are ten reasons why Free Software must be preferred and used:

- 1 NOT because it is always cheaper
- 2 NOT because it is the easy way to go
- 3 Because one cannot know what a closed software does
- 4 Because free software empowers *local* companies
- 5 Because science cannot rely on secrecy
- 6 Because free software makes us independent
- 7 Because our daughters and sons can afford free software
- 8 Because free software survives its developers
- 9 Because free software permits to share good ideas with no hindrance
- 10 Because free software permits diversity in our digital environment



A short story : first, bare components



Fifteen years ago, French high schools used to have an optional course named "*Mesures Physiques et Informatique*" Physic Measurements Computer Science. Therefore, I was very interested by the emerging cheap solutions based on ATmega microcontrollers and eventually affordable for students.

A colleague from Université de Strasbourg, helped my school in year 2005 to purchase a few ATmega chips and upload them a microprogram, to sample analogical signals and send the records to a computer by serial link.



Discovering PHOENIX

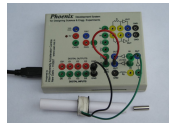


My manager and I were crazy enough to dare open this course as remote learning. Our purpose was to allow students in "*Sport-Études*" section (sports+studies) to remain at home one day longer in the week. During the seven first weeks of the school year, they were taught three hours every Saturday morning in the school, then they were allowed to attend the course remotely from November to June, and send their homework by Internet.

Unfortunately, breadboards are too fragile for our students, and we had a lot of issues with them. Then, my colleague e-mailed me that [PHOENIX](#) was born in IUAC!



Discovering PHOENIX



The first PHOENIX

box was linked to computers by a parallel cable, and was bulky. When PHOENIX-M became available, we bought 30 boxes for the school and began to distribute them to the next students, with the same training schedule: 7 weeks on Saturdays in the school, and later remote learning.

Each PHOENIX-M box was enclosed in a plastic wallet, with a booklet summarising its features, a few external components for experiments, and a CD-ROM providing the distribution Freeduc. So, homework could be done by booting one student's computer with the CD-ROM, and working within exactly the same software environment as they were taught in the school.



As a matter of fact, ExpEyes-17 is cheaper than comparable products; additionally, it is free hardware, powered by free software. It can spread even faster than recently.

Here is my opinion about it:

- it spreads faster when you can access training sessions
- it spreads faster when it is supported by the hierarchy
- so far, few vendors provide add-ons for ExpEyes: colleagues ask me about ready-made colorimeters, pH-meters, ...
- no vendor dares to sell it together with services, at a higher price
- so far, few authors write about ExpEyes, few people publish tips and tricks doable with it



In year 2010, the optional course MPI went out of the curriculum, and many physics teacher have missed it, because it yielded measurable consequences on students' knowledge and abilities, even when they were tested two year after the course, during the "Baccalauréat" exam.

Quite at the same time, ExpEyes was released and I passed the New Member Application of the organisation Debian. So, for ten years approximately, I keep maintaining the packages for ExpEyes which are part of Debian, Ubuntu, and satellite software distributions.



Credits

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