Which tools to fight software piracy ?

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Abstract: Appeared with the democratisation of the commercial softwares during the eighties, software piracy was revealed as a true curse for software publishers, even sometimes the cause of the bankrupcy of the smallests of them. This article aims at explaining how shareware authors, being the most sensibles to this kind of steal, managed to create tools to protect their creations.

1. Reminder of the history and principle of shareware

1.1 History of shareware

1.1.1 Birth of the freeware, precursor of shareware

Just one year after IBM released its PC, two coders, Andrew Fluegleman and Jim Knopf wrote in 1982 two major applications: *PC-Talk* (a communication software) and *PC-File* (a database manager). However those authors didn't wanted to invest all their time and money to see their creations being distributed in stores. So they decided to take advantage of the unofficial distribution networks (mainly users groups and BBS which are then very popular) and therefore allow to see their softwares copied at the express condition that the user send money to the author so that the author can continue the development of the application.

Fluegleman named this *Freeware* and registered this word, so nobody else could distribute a software without his permission. As with the public domain softwares distributed in the seventies, Fluegleman distributed also the source code of his software and quickly lost the control over the development when other coders started to distribute "enhanced" versions of *PC-Talk*.

On his side, Knopf zealously supported *PC-File* and managed to create around his software a company with a sales figure of several million dollars.

Even if other softwares appeared and have got their success (such as the famous *LIST* from Vernon Buerg), these 2 major applications majeures established the credibility of the *Freeware* as a source of supported and quality softwares.

1.1.2 Bob Wallace creates the shareware term

In 1983 another coder, Bob Wallace, created *PC-Write*, a wordprocessor which quickly became one of the PC killing app.

While the word *Freeware* was registered and so couldn't be legally used, and that the alternative word *User Supported Software* was far too cumbersome, Wallace decided to use the term *Shareware* for his software.

Shareware allowed to remove the existing confusion for the users between *Freeware* and the public domain (where there's no copyright on the software) and to clearly indicate that the softwares distributed as such weren't free of charge.

1.1.3 Nelson Ford popularize the concept with PSL

During the first years, the sharewares were mainly distributed via the BBS, restricting the concerned public. In order to reach the people who didn't had access to these computer networks, Nelson Ford, who was at this time working as a journalist for an american computer magazine, take the decision to create *PSL* (The *P*ublic *S*oftware *L*ibrary) and distributes sharewares on floppy disks. In the same time the first magazine dedicated to sharewares is launched: *PSL News*.

Nelson Ford must face at the beginning a few critics from authors who didn't conceived that you could distribute for a price softwares which were free, even if it was obvious that *PSL* had operation costs to cover and helped a lot to popularize and promote the softwares.

As the time passed, the shareware authors understood all the interest of such distributors to increase their incomes and voluntarily proposed their creations to Nelson Ford or his colleagues.

1.1.4 Recent evolutions of the shareware

While in the eighties the main sharewares were productivity applications such as *PC-Write*, the nineties have seen the success of games and utilitaries.

The decline of productivity appliications was mainly the consequence of the growing popularity of Windows and the emergence of applications suites published by large software publishers such as Microsoft.

The success of video games as sharewares is due to an innovative marketing strategy launched by Scott Miller from Apogee Software. This method consists in only distributing the very first levels in the public version of an action game. That way the satisfied users of the game have to pay the author to enjoy the full game.

Historic successes such as *Doom*, *Duke Nukem* or *Quake* appeared thanks to this method.

Moreover the democratisation of the internet has on one hand helped the promotion of the authors and the distributors for the public possible, and on the other hand the creation of organisations promoting the shareware.

We can also notice that, today, some companies, being some or large, using this distribution system are taking liberties, sometimes, toward the concept. Mais quoi qu'il en soit, dans tous les cas les utilisateurs ne payent que s'ils sont satisfaits du produit. Ce qui, en fin de compte, est l'essentiel.

1.1.5 Europe and shareware

The shareware really appeared in Europe in the beginning of the nineties. This is at this time that we see the first professional structures (for example *DP Tool Club* or *IFA* in France) promoting the shareware for the mass market. The first european succesful sharewares were released on the popular platforms of this period, which were the Amiga, Atari and DOS systems ; the shareware took off very quickly and imposed itself as the prefered method of distribution for the independant authors.

Since many services have been created around the shareware concept, such as networks dedicated to the promotion and translation of the european sharewares (for example *Europe Shareware*[1]), online payment services (*Yaskifo*[2] , *Kagi*[3] ...) or online registers that list the software by categories (*AnShare*[4] *, TuCows*[5] ...).

1.1.6 Main european successes

Not satisfied by catching up their american counterparts, the european coders are taking advantage of their situation to enter markets that are monopolistic markets on the other side of the Atlantic ocean (internet browsers, wordprocessors...) where software patents are making impossible any innovation outside the large publishers.

So Europe see the creation of *Opera* (fastest browser of the world), *GoLive* (best webpage layout creation software), *iCab* (was elected as the best browser for the Macintosh), *Graphic Converter* (best graphical tool for the Macintosh) and many others.

The success of the shareware is so important in Europe that the shareware is now the first software distribution method according to the number of available applications. Protected by the lack of software patents, the european sharewares are massively adopted by the users from the other continents and allow to keep a competitive the software market.

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[1] http://www.europe-shareware.org

[2] http://www.yaskifo.com

[3] http://www.kagi.com

[4] http://www.anshare.com

[5] http://www.tucows.com

1.2 The shareware principle

1.2.1 The shareware principle in a few points

- an author creates a software and distributes to the users an **evaluation version** (via the internet, the shareware distributors, on CDs, with the magazines etc...).
- any user can then try the software to test it and to know if it corresponds to his/her needs.
- if the user adopts the software and use it frequently, he/she must register himself to the author of the software by paying the amount of money indicated in the documentation. If the **evaluation period** isn't limited in time, the user still has the moral duty to pay the license ever since he/she use regularly the software.
- once owner of a **registered version**, the user can continue to use legally the software. Some authors offer to their users a few more advantages, such as a paper documentation.

1.2.2 The evaluation

The evaluation is **free** (*libre*) and **free of charge**:

- there's nothing to pay to get an evaluation version (excepted, possibly, the storage media, for example a CD-ROM, which price must not be higher than 5 .).
- there's no obligation to buy, no repeated follow up messages, nor agressive reminders.
- the software doesn't collect informations on the user nor his/her system without his/her knowledge.
- if the user takes the decision to use not the software, he only has to (and he's compelled to) uninstall it: he will find his/her system as it was before the installation.

This is a **full** evaluation:

- the evaluation version allows to test all the features of the software and that way to have a precise idea of its possibilities and limits.
- as it isn't a version intended for a everyday and regular use, the author will generally include a screen, a link or a page which indicates how to register. He can also include one or two reminder screens, a limit to the number of objects that can be processed, an "evaluation" watermark on the printed documents, etc. A video game can include only one or two levels. Sometimes the evaluation period is limited in time, generally 30 days (still some authors prefer to name the software as "demoware").

1.2.3 The advantages of the user

- he/she can test the software before buying it, that way he/she leaves nothing to chance to be satisfied of his/her purchase.
- he benefits of generally cheaper prices than the prices of commercial softwares.
- he can easily communicate with the author to get an efficient technical support.

1.2.4 The advantages for the author

- he/she directly receives the feedback of the users and can that way be very reactive to their requests.
- this method of software distribution is really free. It allows the young authors to start

creating softwares with less fees to bear. Once their popularity achieved and their economic activity reliable, they can then create their company.

- the success of a shareware provides a true popularity of the author by the users and by the largest software publishers, and that way ensure him/her a great future that few other roads could have offered him/her.

2. The legal protection of the software

The computer programs are protected, whatever method or form of expression, by the copyright according to the article 2 of the Berne Convention[6] (acte de Paris, 1971). The World Intellectual Property Organisation (WIPO) has renewed this protection in 1996 in its Treaty on Copyright[7] (article 4) as well as the World Trade Organisation (WTO) via the TRIPS Agreements[8] (article 10).

As specified by the article 2 of the WIPO Treaty on Copyright, the protection only covers expressions of the software:

> *Article 2*
> Scope of Copyright Protection
> Copyright protection extends to expressions and not to ideas, procedures, methods of operation or mathematical concepts as such.

That way the copyright protects the author of a software against the pure and simple copy of his/her work, but not against the publishing of competing softwares that make a use of some ideas of his/her software.

3. The tools used by the shareware authors

During the eighties and up to the democratisation of the internet in the end of the nineties, the authors used two kinds of protection for their softwares:

- a physical protection (specific floppy disk formating, hardware key...)
- a software protection

But with the advent of the electronic trade the software is no more delivered on a physical media but dowloaded by the user ; moreover the awkwardness of the physical protection (impossibility to make backup copies in the case of a specific floppy disk formating or the occupation of a hardware interface of the computer in the case of a hardware key) was a source of discontent and was much more harmful for the legal users than for the pirates. The physical protection was therefore been abandoned by the shareware authors in the favour of a full software protection.

The shareware has been, long before any other form of proprietary software, the first to take advantage of the possibilities of the internet, the authors proposing full versions of their softwares on the network.

In order to avoid the spreading of illegal copies of their works on the network, the shareware authors have adopted different protection and identification systems, the more popular are:

- the registration keys
- the watermarking of the binaries

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[6] http://www.wipo.int/clea/docs/en/wo/wo001en.htm

[7] http://www.wipo.int/clea/docs/en/wo/wo033en.htm

[8] http://www.wto.org/english/docs_e/legal_e/27-trips.pdf

3.1 The registration key

principle

The author of the software freely release on the internet an unlimited version of his/her software (generally associated with a test period of thirty days). In order to take ride of the limitations of the software, the user must register his/her copy to the author and he/she will get back a key that will allow him/her to get access to the features of the full version.

This key can be:

- either an alphanumerical set that the user has to enter in the related field of the software.
- either an encoded file to put in the application's folder (or any other place pointed out by the author).

During the registration process the key is saved by the software so that its owner doesn't have to re-enter it each time he/she wants to use the program.

protection

When a full version (registered version) of the software appears on the internet, the author can like that know what is the incriminated serial number (given by the key) and can then find the name of the corresponding customer. Even if the independant authors , who doesn't have the necessary financial ressources of time, don't sue frequently the faulty customer, thanks to the system of registration key they can insure themselves that all the people using a pirated version of their software won't be able to get access to the next versions and to the technical support.

In fact, the author only has to place this key in a *black list* (a list of non-valid keys) like that the registration mecanism of the next versions will reject the key, then limiting the piracy to the previous versions.

- advantages for the author:
  only one binary to create
- advantages for the user:
  one key to enter one time for ever, then unlimited use of the actual software and of the updates

3.2 The watermarking of the binaries

principle

The author of the software freely release a limited version of his/her program. During his/her registration, the user receives a final version of the software that is watermarked with his/her personnal informations (the choice of the informations to give is in the hands of the author, these informations can simply be the name and first name or the email adress or even more). This version displays these informations either during the launch, eitheir in a freely accessible menu of the software ; that way any person using the program can view them.

protection

The principle is quite simple here, once the pirated version is located, the author has immediatly all the informations about the user who's at the source of the piracy. The advantage here compared to the key is that not only the author, but any person susceptible to use this pirated version is aware of the name of the faulty user.

- advantages for the author

  The freely distributed file isn't the final version of the application with a simple software limitation, therefore it isn't enough to break this limitation to pirate the program.

  The public disclosure of the name of the pirate allow to create a moral pressure from the community on this faulty user.

• disadvantages for the author

The watermarking process is really heavy to manage (creation of the binaries and forwarding to the customers), this kind of protection is inadvisable for the softwares which are frequently updated.

• disadvantages for the user

In the case of a loss of the program (corruption of the hard drive, virus...), it is necessary to contact the author in order to receive again a watermarked version (with the registration key system we can note this key on a paper ; if we ever loose the software we only have to download the latest online version and to enter again our key).

4. Specific legal provisions for the computer programs in the European Union

Being given the differences of legislation between the member States, the 91/250/CEE[9] directive concerning the la protection juridique des programmes d'ordinateur has been ratified the 14th of may 1991. This directive protects the computer programs with the copyright as litterary works in the sense of the Berne Convention (Art. 1).

As it is defined in the Art. 1 paragraph 3 of the directive:

3. A computer program shall be protected if it is original in the sense that it is the author's own intellectual creation. No other criteria shall be applied to determine its eligibility for protection.

The Article 4 protects the original programs as defined by the Article 3 from the illicit copy, therefore from the piracy.

Unfortunately it appeared with the passing years and with the advent of the internet that this directive wasn't protecting the authors of computer programs from the release of softwares which sole aim was to circumvent the non-physical protections of the commercial computer programs.

In fact the pirates, in order to limit their legal risks, instead of distributing *cracked* versions(versions of commercial applications from which the pirates have removed the software protection, allowing anybody to copy and use the program free of charge and without limitation), have started in the mid-nineties to create and distribute softwares which role was to automatically suppress the protection. The authors of such kind of softwares declines that way any responsibility of piracy on the users of these tools.

These softwares can be of differents types, including these ones:

• a generator of valid keys: the pirate has here discovered what was the algorithm which encoded the keys of the commercial software, he/she offers a small tool that generates valid keys in order to use the full version of the application, frequently a shareware.

• a tool to remove the thirty days time limit: here the piracy software modifies the binary in order that the application doesn't verify anymore the date and works therefore without any limitation in time as a full version (the thirty days trial period is extended to infinity for the sharewares).

That way a kind of *democratisation* of piracy appeared, we were seing the substitution of networks of pirates distributing *cracked* versions by the free distribution of tools allowing each user to pirate himself. The legal responsibility of the act of piracy was shifting from a few pirates to the whole group of users being owners of illicit copies, it was becoming impossible for the software creators to enforce their rights on their works.

[9] published in the Official Journal number L 122 of the 17/05/1991 p. 42 - 46

Taking account, the european legislator has decided to reinforce the copyright protection by writting the 2001/29/CE[10] directive, which is particularly attached to forbid the publishing of tools to help software piracy, as the paragraph 47 or the preambule indicates:

(47) Technological development will allow rightholders to make use of technological measures designed to prevent or restrict acts not authorised by the rightholders of any copyright, rights related to copyright or the *sui generis* right in databases. The danger, however, exists that illegal activities might be carried out in order to enable or facilitate the circumvention of the technical protection provided by these measures. In order to avoid fragmented legal approaches that could potentially hinder the functioning of the internal market, there is a need to provide for harmonised legal protection against circumvention of effective technological measures and against provision of devices and products or services to this effect.

The 2001/29/CE directive of the 22 may 2001 principaly brings a legal protection against the circumvention of technical measures, being the subject of the Art. 6:

Article 6

Obligations as to technological measures

1. Member States shall provide adequate legal protection against the circumvention of any effective technological measures, which the person concerned carries out in the knowledge, or with reasonable grounds to know, that he or she is pursuing that objective.

2. Member States shall provide adequate legal protection against the manufacture, import, distribution, sale, rental, advertisement for sale or rental, or possession for commercial purposes of devices, products or components or the provision of services which:

(a) are promoted, advertised or marketed for the purpose of circumvention of, or

(b) have only a limited commercially significant purpose or use other than to circumvent, or

(c) are primarily designed, produced, adapted or performed for the purpose of enabling or facilitating the circumvention of, any effective technological measures.

A technical measure being defined as follow in the paragraph 3 of the Art. 6:

[...] Technological measures shall be deemed 'effective' where the use of a protected work or other subjectmatter is controlled by the rightholders through application of an access control or protection process, such as encryption, scrambling or other transformation of the work or other subject-matter or a copy control mechanism, which achieves the protection objective.

[10] published in the Official Journal number L 167 of the 22/06/2001 p. 10 - 19

5. Economic analysis

5.1 The protection should not put a burden on the honest users

The economic analysis (Shy & Thisse, 1999) as well as the investigations with the users have demonstrated that a too heavy protection was more harmful for the people using legally the software than for the pirates. That's why we've seen the vanishing of anti-piracy systems which were using a hardware key that compelled the program owner to do restricting manipulations and were lessening the confort of use. During the design of the protection system, the author must take into account that the user can change his/her computer and must be able to store his/her software on the backup media of his/her wish (CD, DVD, Zip...).

Consequently, a protection mecanism must fulfill the following conditions:

- to authenticate the user in order to avoid any piracy
- not to be dependent of the computer or of the used storage media
- to minimize the restrictions of manipulation for the honest user
- to allow the quick identification of the user who is at the origin of the piracy

5.2 The cost of piracy and the improvement of protection systems

5.2.1 Calculation of the cost of piracy

Contrary to classical physical goods produced by the industry, the value of a software doesn't rely in its scarcity but in the size of its community of users. Therefore the purpose is to allow an easy adoption of the software by the maximal number of people and in the same time being sure that those persons purchase or will purchase in the near future the computer program. Upon this criteria the shareware principle can be considered as a model : the user tests without any fee the software during the period allowed by the author and, once this period ends, he/she is compelled to pay the author.

The shareware can therefore eliminate the individuals, more or less numerous according to the type of the application, who simply pirate the commercial softwares to test them and to know if they suit their needs (it is in fact impossible to know the quality of such softwares as *Word*, *AppleWorks* or others because the publisher doesn't offer any demonstration version), now once the pirated version in hands the incitement to buy the original software is far lower.

If some users still persist to pirate the software in spite of the test period, it is necessary to measure the impact of this phenomenon on the sales level and, if possible, to remedy to this situation. Firstly the calculation methods of the cost of piracy turn out to be subject of discussion (Shy, 2002). In fact the traditional method applied by the software publishers leads to an overestimation of the piracy cost, it consists in doing the following calculation:

number of estimated illicit copies * unit price of the software = total sum of the non-realized sales

But many people who are using pirated versions wouldn't have bought and used the software is the only mean to get it would have been to buy it at the legal price. That way with such an observation we can't be satisfied by the calculation method.

The larger the network of users is, the higher the utility (the valorization of the software) is (Varian & Shapiro, 1998 ; Shy, 2002) because the users can exchange their files with a largest group of people. We have to take into account that piracy can

improve the sales level since the network of users will be larger than we the honest users alone, the value of the software is therefore higher and encourage the individuals to purchase it. Unfortunately this externality can be hardly isolated to figure out the sales level in the absence of piracy. Moreover it is necessary that the profit that the legal users get from the pirates shall be higher than the profit that those ones get from the legal sales level, otherwise there would be no advantage to buy the software.

In the same case, if we can manage by any mean to figure out the number of non-realized sales, it isn't easy to estimate the financial loss since we can't clearly decide which price to use to account for the value of each purchase that didn't happened.

5.2.2 Protections that can be put in place

We've already seen that the shareware was the first to use the system of registration key, a system which proves to be today one of the most reliable. We consider here the improvements to bring to this kind of protection.

With the democratisation of pure pear to pear networks (we mean by *pure pear to pear networks*, fully decentralized networks of the kind of *Gnutella* and not networks relying on a central server such as *Napster*) it becomes extremely difficult to find the origin of piracy and to sue the guilty persons. One of the only measure to take is to complexify as much as possible the task of the pirates.

Thanks to the unique structure of the european market (a common market but with different languages) the software authors are able to maximize their profits by discriminating their customers (creation of national versions of their softwares, enabling a price policy suited to each country), but they can the same way split up the efforts of the pirates.

With the actual development tools and the tremendous progress that has made the cryptography these latests years, it becomes possible to use powerful and differentiated encoding keys for each national version of the software (for example a A key for the german version, a B key for the french version...). That way if a national version of the software comes to be pirated, the sales figures of the other versions doesn't suffer from this piracy since système the encoding system of the registration keys is different ; the effort to produce by the pirates is therefore much more important and diminish their incentive to pirate.

Instead of having to face a homogenous and global group of pirates helping each other (increasing the probability that the software will be pirated in the near term), the shareware author who produces national versions of his/her software splits this group and isolates the pirates. Those people can no more share informations about the means to crack the software (the keys being no more the same) and they still have to produce the same level of efforts in order to circumvent the protection system with a group of partners reduced to the national level.

The delay of appearance of a pirated version are therefore greatly lenghtened, this incites the persons who were using in a professional manner of very frequently pirated versions of softwares to become again honest users since the opportunity cost of using a too old version (the national pirated version) becomes to high.

There still exists of course a few individuals who will continue to obtain these pirated national versions, but we can consider that the pirated softwares used by those people aren't non-realized sales as, whatever we do, they won't by the software.

The localization enables a double maximization of the profits:

- discrimination by the prices
- confinement of piracy in national limits

The most powerful encoding system must be used with the english version since this version is the most susceptible of piracy as a larger number of persons can use it, even among the non english-speaking countries where translated in the national

language versions are available for sale. As no technical measure is invulnerable, it could happen that a pirated version of the english version appears ; nevertheless the impact on the sales level will be widely reduced, the following costs appearing for an illegal use of the software:

- cost of the opportunity to wait for the appearance of a pirated version (the pirated version appears with a lateness as the efforts of the pirates are scattered on the different national versions)
- cost of use of the software in english (for the non-anglo-saxon users for whom a national version of the software is available for sale)

Conclusion

Piracy still is, in spite of all possible technical measures, a major curse which particularly strikes the small and medium publishers. Moreover piracy destabilizes the adjustment of the supply and demand on the softwares market since the users of pirated softwares, having no more budget restraint, choose in general the softwares according only to the quality criterion and not according to the quality/price ratio. The average market price of a software is therefore imperfect and we can believe that this price is higher than the one we could have observed in a situation of pure and perfect market competition, since only the users with a high utility function are buying their softwares.

However there's an optimistic note. Beyond the softwares, piracy is now extending to the musical sector as well as the cinema industry ; the media are now taking an interest in the problem and are informing the opinion of the illegality and related legal sanctions of piracy.

It is therefore necessary to fight against the development of tools and services making piracy easier ; the 2001/29/CE directive is in this sense a secure and suited regulation to reach this goal.

References

1. Economic documents

Besen, Kirby (1989) Private Copying, Appropriability and Optimal Copying Royalties

Fisher (1998) Theories of Intellectual Property

D. Friedman (1999) Clouds and Barbed Wire: The Economics of Intellectual Property

S.J. Liebowitz (1985) Copying and Indirect Appropriability: Photocopying of Journals
<http://wwwpub.utdallas.edu/~liebowitz/knowledge_goods/jpe/jpe1985.html>

C. Shapiro, H. Varian (1998) Information Rules: A Strategic Guide to the Network Economy

O. Shy (2002) Internet, Peer-to-Peer, and Intellectual Property in Markets for Digital Products
<http://econ.haifa.ac.il/~ozshy/freeware19.pdf>

O. Shy, J. Thisse (1999) A Strategic Approach to Software Protection

2. Law documents

TRIPS Agreement
<http://www.wto.org/english/docs_e/legal_e/27-trips.pdf>

Berne Convention for the Protection of Literary and Artistic Works (1971)
<http://www.wipo.int/clea/docs/en/wo/wo001en.htm>

Directive 91/250/CEE on the legal protection of computer programs (1991), Official Journal number L 122 of the 17/05/1991 p. 0042 - 0046

Directive 93/98/CEE harmonizing the term of protection of copyright and certain related rights (1993), Official Journal number L 290 of the 24/11/1993 p. 0009 - 0013

Directive 2001/29/CE on the harmonisation of certain aspects of copyright and related rights in the information society (2001), Official Journal number L 167 of the 22/°5/2001 p. 0010 - 0019

WIPO Treaty on Copyright (1996)
<http://www.wipo.int/clea/docs/en/wo/wo033en.htm>

3. Files

D. Corbier (1994) The Shareware Author & User Case Study

P. Mayer (199?) What is shareware ? <http://www.paulspicks.com/whatis.asp>

S. Perchaud, B. Leprêtre (2002) Le Shareware Européen
<http://www.europe-shareware.org/pages/dossier_shareware/shareware.pdf>