

**'Free as in Freedom':
Software
as
Culture**



Why Software Should Not Have Owners

RICHARD STALLMAN

Digital information technology
contributes to the world by making
it easier to copy and modify information.

Computers promise to make this easier for all of us.

Not everyone wants it to be easier. The system of copyright gives software programs "owners", most of whom aim to withhold software's potential benefit from the rest of the public. They would like to be the only ones who can copy and modify the software that we use.

The copyright system grew up with printing - a technology for mass production copying. Copyright fit in well with this technology because it restricted only the mass producers of copies. It did not take freedom away from readers of books. An ordinary reader, who did not own a printing press, could copy books only with pen and ink, and few readers were sued for that.

Digital technology is more flexible than the printing press: when information has digital form, you can easily copy it to share it with others. This very flexibility makes a bad fit with a system like copyright. That's the reason for the increasingly nasty and draconian measures now used to enforce software copyright. Consider these four practices of the Software Publishers Association (SPA):

- >>> Massive propaganda saying it is wrong to disobey the owners to help your friend.
- >>> Solicitation for stool pigeons to inform on their coworkers and colleagues.
- >>> Raids (with police help) on offices and schools, in which people are told they must prove they are innocent of illegal copying.
- >>> Prosecution (by the US government, at the SPA's request) of people such as MIT's David LaMacchia, not for copying software (he is not accused of copying any), but merely for leaving copying facilities unguarded and failing to censor their use.

All four practices resemble those used in the former Soviet Union, where every copying machine had a guard to prevent forbidden copying, and where individuals had to copy information secretly and pass it from hand to hand as "samizdat". There is of course a difference:

The motive for information control in the Soviet Union was political; in the US the motive is profit. But it is the actions that affect us, not the motive. Any attempt to block the sharing of information, no matter why, leads to the same methods and the same harshness.

Owners make several kinds of arguments for giving them the power to control how we use information:

>>> NAME CALLING

Owners use smear words such as "piracy" and "theft", as well as expert terminology such as "intellectual property" and "damage", to suggest a certain line of thinking to the public – a simplistic analogy between programs and physical objects.

Our ideas and intuitions about property for material objects are about whether it is right to take an object away from someone else. They don't directly apply to making a copy of something. But the owners ask us to apply them anyway.

>>> EXAGGERATION

Owners say that they suffer "harm" or "economic loss" when users copy programs themselves. But the copying has no direct effect on the owner, and it harms no one. The owner can lose only if the person who made the copy would otherwise have paid for one from the owner.

A little thought shows that most such people would not have bought copies. Yet the owners compute their "losses" as if each and every one would have bought a copy. That is exaggeration – to put it kindly.

>>> THE LAW

Owners often describe the current state of the law, and the harsh penalties they can threaten us with. Implicit in this approach is the suggestion that today's law reflects an unquestionable view of morality - yet at the same time, we are urged to regard these penalties as facts of nature that can't be blamed on anyone. This line of persuasion isn't designed to stand up to critical thinking; it's intended to reinforce a habitual mental pathway.

It's elementary that laws don't decide right and wrong. Every American should know that, forty years ago, it was against the law in many states for a black person to sit in the

front of a bus; but only racists would say sitting there was wrong.

>>> NATURAL RIGHTS

Authors often claim a special connection with programs they have written, and go on to assert that, as a result, their desires and interests concerning the program simply outweigh those of anyone else – or even those of the whole rest of the world. (Typically companies, not authors, hold the copyrights on software, but we are expected to ignore this discrepancy.)

To those who propose this as an ethical axiom - the author is more important than you - I can only say that I, a notable software author myself, call it bunk. But people in general are only likely to feel any sympathy with the natural rights claims for two reasons. One reason is an overstretched analogy with material objects. When I cook spaghetti, I do object if someone else eats it, because then I cannot eat it. His action hurts me exactly as much as it benefits him; only one of us can eat the spaghetti, so the question is, which? The smallest distinction between us is enough to tip the ethical balance. But whether you run or change a program I wrote affects you directly and me only indirectly. Whether you give a copy to your friend affects you and your friend much more than it affects me. I shouldn't have the power to tell you not to do these things. No one should. The second reason is that people have been told that natural rights for authors is the accepted and unquestioned tradition of our society.

As a matter of history, the opposite is true. The idea of natural rights of authors was proposed and decisively rejected when the US Constitution was drawn up. That's why the Constitution only permits a system of copyright and does not require one; that's why it says that copyright must be temporary. It also states that the purpose of copyright is to promote progress – not to reward authors. Copyright does reward authors somewhat, and publishers more, but that is intended as a means of modifying their behavior. The real established tradition of our society is that copyright cuts into the natural rights of the public – and that this can only be justified for the public's sake.

>>> ECONOMICS

The final argument made for having owners of software is that this leads to production of more software. Unlike the others, this argument at least takes a legitimate approach to the subject. It is based on a valid goal – satisfying the users of software. And it is empirically clear that people will produce more of something if they are well paid for doing so. But the economic argument has a flaw: it is based on the assumption that the difference is only a matter of how much money we have to pay. It assumes that "production of software" is what we want, whether the software has owners or not. People readily accept this assumption because it accords with our experiences with material objects. Consider a sandwich, for instance. You might well be able to get an equivalent sandwich either free or for a price. If so, the amount you pay is the only difference. Whether or not you have to buy it, the sandwich has the same taste, the same nutritional value, and in either case you can only eat it once. Whether you get the sandwich from an owner or not cannot directly affect anything but the amount of money you have afterwards. This is true for any kind of material object

– whether or not it has an owner does not directly affect what it is, or what you can do with it if you acquire it.

But if a program has an owner, this very much affects what it is, and what you can do with a copy if you buy one. The difference is not just a matter of money. The system of owners of software encourages software owners to produce something – but not what society really needs. And it causes intangible ethical pollution that affects us all.

What does society need? It needs information that is truly available to its citizens – for example, programs that people can read, fix, adapt, and improve, not just operate. But what software owners typically deliver is a black box that we can't study or change.

Society also needs freedom. When a program has an owner, the users lose freedom to control part of their own lives. And, above all, society needs to encourage the spirit of voluntary cooperation in its citizens. When software owners tell us that helping our neighbors in a natural way is 'piracy', they pollute our society's civic spirit. This is why we say that free software is a matter of freedom, not price.

The economic argument for owners is erroneous, but the economic issue is real. Some people write useful software for the pleasure of writing it or for admiration and love; but if we want more software than those people write, we need to raise funds. For ten years now, free software developers have tried various methods of finding funds, with some success. There's no need to make anyone rich; the median US family income, around \$35k, proves to be enough incentive for many jobs that are less satisfying than programming.

For years, until a fellowship made it unnecessary, I made a living from custom enhancements of the free software I had written. Each enhancement was added to the standard released version and thus eventually became available to the general public. Clients paid me so that I would work on the enhancements they wanted, rather than on the features I would otherwise have considered highest priority.

The Free Software Foundation (FSF), a tax-exempt charity for free software development, raises funds by selling GNU CD-ROMs, T-shirts, manuals, and deluxe distributions, (all of which users are free to copy and change), as well as from donations. It now has a staff of five programmers, plus three employees who handle mail orders. Some free software developers make money by selling support services. Cygnus Support, with around 50 employees [when this article was written], estimates that about 15 per cent of its staff acti-



vity is free software development - a respectable percentage for a software company. Companies including Intel, Motorola, Texas Instruments and Analog Devices have combined to fund the continued development of the free GNU compiler for the language C. Meanwhile, the GNU compiler for the Ada language is being funded by the US Air Force, which believes this is the most cost-effective way to get a high quality compiler. [Air Force funding ended some time ago; the GNU Ada Compiler is now in service, and its maintenance is funded commercially.]

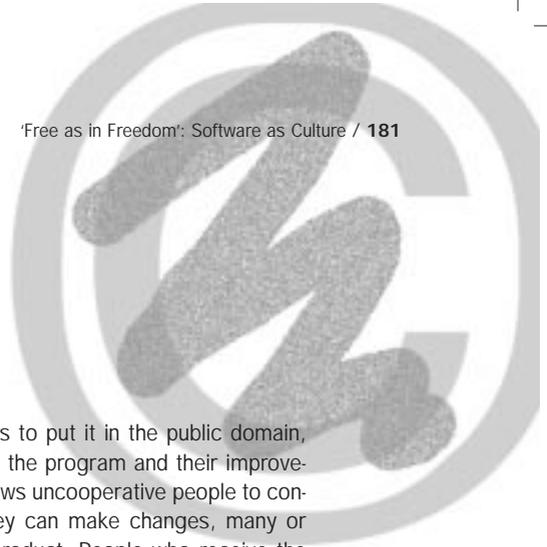
All these examples are small; the free software movement is still small, and still young. But the example of listener-supported radio in this country [the US] shows it's possible to support a large activity without forcing each user to pay.

As a computer user today, you may find yourself using a proprietary program. If your friend asks to make a copy, it would be wrong to refuse. Cooperation is more important than copyright. But underground, closet cooperation does not make for a good society. A person should aspire to live an upright life openly with pride, and this means saying "No" to proprietary software.

You deserve to be able to cooperate openly and freely with other people who use software. You deserve to be able to learn how the software works, and to teach your students with it. You deserve to be able to hire your favorite programmer to fix it when it breaks.

You deserve free software.





What Is Copyleft?

The simplest way to make a program free is to put it in the public domain, uncopyrighted. This allows people to share the program and their improvements, if they are so minded. But it also allows uncooperative people to convert the program into proprietary software. They can make changes, many or few, and distribute the result as a proprietary product. People who receive the program in that modified form do not have the freedom that the original author gave them; the middleman has stripped it away.

In the GNU project, our aim is to give all users the freedom to redistribute and change GNU software. If middlemen could strip off the freedom, we might have many users, but those users would not have freedom. So, instead of putting GNU software in the public domain, we 'copyleft' it. Copyleft says that anyone who redistributes the software, with or without changes, must pass along the freedom to further copy and change it. Copyleft guarantees that every user has freedom.

Copyleft also provides an incentive for other programmers to add to free software. Important free programs such as the GNU C++ compiler exist only because of this.

Copyleft also helps programmers who want to contribute improvements to free software get permission to do that. These programmers often work for companies or universities that would do almost anything to get more money. A programmer may want to contribute her changes to the community, but her employer may want to turn the changes into a proprietary software product.

When we explain to the employer that it is illegal to distribute the improved version except as free software, the employer usually decides to release it as free software rather than throw it away.

To copyleft a program, first we copyright it; then we add distribution terms, which are a legal instrument that gives everyone the rights to use, modify, and redistribute the program's code or any program derived from it but only if the distribution terms are unchanged. Thus, the code and the freedoms become legally inseparable.

Proprietary software developers use copyright to take away the users' freedom; we use copyright to guarantee their freedom. That's why we reverse the name, changing 'copyright' into 'copyleft'.

Copyleft is a general concept; there are many ways to fill in the details. In the GNU Project, the specific distribution terms that we use are contained in the GNU General Public License (available in HTML, text, and Texinfo format). The GNU General Public License is often called the GNU GPL for short.

Some Confusing / Loaded Words + Phrases

(that are worth avoiding)

There are a number of words and phrases which we recommend avoiding, either because they are ambiguous or because they imply an opinion that we hope you may not entirely agree with.

'For free'

If you want to say that a program is free software, please don't say that it is available 'for free'. That term specifically means 'for zero price'. Free software is a matter of freedom, not price.

Free software copies are often available for free - for example, by downloading via FTP. But free software copies are also available for a price on CD-ROMs; meanwhile, proprietary software copies are occasionally available for free in promotions, and some proprietary packages are normally available at no charge to certain users.

To avoid confusion, you can say that the program is available "as free software."

'Freeware'

Please don't use the term 'freeware' as a synonym for 'free software'. The term 'freeware' was used often in the 1980s for programs released only as executables, with source code not available.

Today it has no particular agreed-on definition.

Also, if you use other languages than English, please try to avoid borrowing English words such as 'free software' or 'freeware'. Try to use the often less ambiguous wording that your language offers, e.g. (Hindi: mukt software)

- > Hebrew: tochna hofshit
- > French: logiciel libre
- > German: freie software
- > Russian: svobodny programy
- > Chinese: ziyou ruanjian
- > Japanese: jiyuu [na] sofuto
- > Esperanto: libera programaro
- > Swedish: fri programvara
- > Dutch: vrije software

By forming a word in your own language, you show that you are really referring to freedom and not just parroting some mysterious foreign marketing concept. The reference to freedom may at first seem strange or disturbing to your countrymen, but they will get used to it soon and thereby find out about the real message behind free software.

Give away software

It's misleading to use the term 'give away' to mean, 'distribute a program as free software'. It has the same problem as 'for free': it implies the issue is price, not freedom. One way to avoid the confusion is to say, 'Release as free software'.

'Intellectual property'

Publishers and lawyers like to describe copyright as 'intellectual property'. This term carries a hidden assumption - that the most natural way to think about the issue of copying is based on an analogy with physical objects, and our ideas of them as property.

But this analogy overlooks the crucial difference between material objects and information: information can be copied and shared almost effortlessly, while material objects can't be. Basing your thinking on this analogy is tantamount to ignoring that difference.

Even the US legal system does not entirely accept this analogy, since it does not treat copyrights just like physical object property rights.

If you don't want to limit yourself to this way of thinking, it is best to avoid using the term 'intellectual property' in your words and thoughts.

Another problem with 'intellectual property' is that it is an attempt to generalize about several legal systems, including copyright, patents, and trademarks, which are much more different than similar. Unless you have studied these areas of law and you know the differences, lumping them together will surely lead you to incorrect generalizations.

To avoid confusion, it is best not to look for alternative way of saying 'intellectual property'. Instead, talk about copyright, patents, or whichever specific legal system is the issue.

'Piracy'

Publishers often refer to prohibited copying as 'piracy'. In this way, they imply that illegal copying is ethically equivalent to attacking ships on the high seas, kidnapping and murdering the people on them.

If you don't believe that illegal copying is just like kidnapping and murder, you might prefer not to use the word 'piracy' to describe it. Neutral terms such as 'prohibited copying' or 'unauthorised copying' are available for use instead. Some of us might even prefer to use a positive term such as 'sharing information with your neighbour'.

'Protection'

Publishers' lawyers love to use the term 'protection' to describe copyright. This word carries the implication of preventing destruction or suffering; therefore, it encourages people to identify with the owner and publisher who benefit from copyright, rather than with the users who are restricted by it.

It is easy to avoid 'protection' and use neutral terms instead. For example, instead of

'Copyright protection lasts a very long time', you can say, 'Copyright lasts a very long time'. If you want to criticize copyright instead of supporting it, you can use the term "copyright restrictions."

'Sell software'

The term 'sell software' is ambiguous. Strictly speaking, exchanging a copy of a free program for a sum of money is 'selling'; but people usually associate the term 'sell' with proprietary restrictions on the subsequent use of the software. You can be more precise, and prevent confusion, by saying either 'distributing copies of a program for a fee' or 'imposing proprietary restrictions on the use of a program', depending on what you mean.

See *Selling Free Software* for more discussion of this issue.

'Theft'

Copyright apologists often use words like 'stolen' and 'theft' to describe copyright infringement. At the same time, they ask us to treat the legal system as an authority on ethics: if copying is forbidden, it must be wrong. So it is pertinent to mention that the legal system - at least in the US - rejects the idea that copyright infringement is 'theft'.

Copyright advocates who use terms like 'stolen' are misrepresenting the authority that they appeal to. The idea that laws decide what is right or wrong is mistaken in general. Laws are, at their best, an attempt to achieve justice; to say that laws define justice or ethical conduct is turning things upside down.

Piracy is Your Friend

JARON LANIER

Piracy is a phony issue that record labels are hyping to rip off artists. Piracy has always existed. That's why there's a mountain of blank cassettes in any big electronic store.

When someone decides to buy your music instead of copying it, they're doing it for a lot of reasons. Maybe they're ethical. Maybe they like the convenience of not having to hassle with the uncertainty of copying something - Will it come out right? Is it done yet? Maybe it's their way of expressing good-will to you.

But face it, if your music wasn't available for free in some form, no one would have a chance to hear it to decide to buy it in the first place. The old form of 'free' music was radio (which is often taped by pirates) and MTV, but eventually the Internet is going to take over everything. There will still be TV and radio, but they'll be implemented digitally. Give it 10 years. When that happens, the idea of not giving away music for free will be exactly the same thing as never promoting music at all.

The real question should not be, "How can I keep my fans from hearing my music for free?" It should be, "How can I best make money from my fans?" Those are two different questions. Sure, you 'lose' money to pirates. But you also lose money to a label that isn't doing anything for you.

It used to be that a label was needed to finance, manufacture, store, ship and market your music. That's how they earned their cut. The arrangement made sense. If the music business wasn't shrinking before our eyes, it would still make sense.

But in the digital era, it costs nothing to ship your music over the Internet to a fan. So the biggest reason for labels just went away.

As for financing, well, if advances were stacked up against finance deals in other industries, they'd look a lot like usury - except that they aren't even loans: once they're paid back, the label still owns the master. There is simply no worse conceivable form of financing. We can do better if we take charge of our own careers.

But what about marketing? Can labels still do that? Of course they can, for a few big acts. But once you are established, your own Web site connects with your fan base better than the label can.

Even if you are a huge artist, think whether in the course of your whole career, not just the next couple of years, you lose more money to pirates or to labels who will be taking most of your money for no reason at all?

When somebody in a dorm room buys thousands of dollars' worth of gear and stays up all night hacking MP3s just to get 'free' music, that's what you call an opportunity, not a problem. You have found yourself a new generation of fanatics. The only problem is that computer companies are making the money right now instead of musicians.

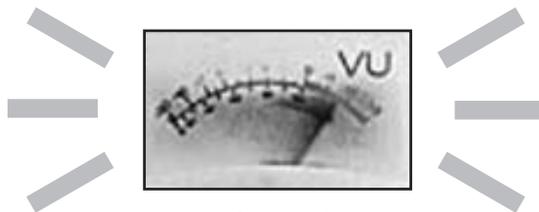
Labels can't prevent piracy. No one can. I know computers as well as anyone on the planet, and I promise you, kids will break whatever copy protection scheme the labels come up with. And the industry knows it.

In fact, the easier it is to copy music, the less of a threat piracy will become. When piracy gets easier, professional pirates have less to offer. The only pirates left will be fans. And there are lots of ways to make money from fans.

The reason the Recording Industry Association of America and the labels are pushing anti-piracy laws and technologies, has nothing to do with preventing piracy. They're doing it so that they can control the new digital music channels. To keep anyone else, like you, from sharing the power.

They're doing it to rip you off. Period.

You can make more money in the new era of 'free' digital music. But only if you break free of label mind control.



www.freeradio.org

Welcome to Free Radio Berkeley. Founded on April 11, 1993 as a Free Speech voice challenging the regulatory structure and power of the Federal Communications Commission (FCC), Free Radio Berkeley is engaged in ongoing legal battle with the FCC. Until it was silenced by a court injunction in June 1998, Free Radio Berkeley was broadcasting 24 hours a day, 7 days a week at 104.1 FM with 50 watts of power as the alternative voice for the greater Berkeley/Oakland area. The original Free Speech mission to provide community news, discussions and interviews, information, a wide range of music, and more has now been taken up by Berkeley Liberation Radio (www.berkeleyonline.net) while Free Radio Berkeley awaits the outcome of legal motions before the 9th Circuit Court of Appeals. Free Radio Berkeley was instrumental in helping to create an ever growing micropower broadcasting movement to liberate the airwaves and break the corporate broadcast media's stranglehold on the free flow of news, information, ideas, cultural and artistic creativity. This movement has created an ungovernable situation for the FCC which is now exercising damage control by proposing some sort of low power FM service. Our response to this is being represented by the National Lawyers Guild Committee on Democratic Communications.

Following the example of Free Radio Berkeley, hundreds of micropower broadcast stations have taken to the air across the United States and in other countries as well. Current FCC regulations mandate a minimum broadcast power of 100 watts and require such a high cost of entry so that only the rich and well endowed can have a voice. Micropower broadcasting is helping to restore grassroots democracy, bringing back the concept of open and free civic discourse among all citizens. Further, it is a direct challenge to a broadcast system based entirely on wealth. As opposed to the hundreds of thousand dollars required under the current FCC structure to even think about starting an FM broadcast station, a micropower FM broadcast station can be put on the air for a cost ranging from \$1000 - \$2000. An affordable amount for any community desiring to have a voice.

Free Radio Berkeley has two somewhat distinct entities - Free Radio Berkeley 104.1 FM, a silenced broadcast Station that was operating with 100 volunteer programmers, and - Free Radio Berkeley IRATE (International Radio Action Training, Education), which provides transmitter kits, technical support and training and is involved in national and international outreach and organizing efforts.

On this site you will find information on Free Radio Berkeley including our current programming schedule and current legal status. Our web storefront is also available offering the latest in micropower broadcasting kits, accessories, complete station packages, audio equipment and antennas. Also check out the Micropower Broadcasting section containing information and links to help you start your own community micropower radio station.

INTERVIEW

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~ **RICHARD STALLMAN:** ... In 1971 when I joined the staff of the MIT Artificial Intelligence lab, all of us who helped develop the operating system software, we called ourselves hackers. We were not breaking any laws, at least not in doing the hacking we were paid to do. We were developing software and we were having fun. Hacking refers to the spirit of fun in which we were developing software. The hacker ethic refers to the feelings of right and wrong, to the ethical ideas this community of people had --that knowledge should be shared with other people who can benefit from it, and that important resources should be utilized rather than wasted. Back in those days computers were quite scarce, and one thing about our computer was it would execute about a third-of-a-million instructions every second, and it would do so whether there was any need to do so or not. If no one used these instructions, they would be wasted. So to have an administrator say, "well you people can use a computer and all the rest of you can't", means that if none of those officially authorized people wanted to use the machine that second, it would go to waste. For many hours every morning it would mostly go to waste. So we decided that was a shame. Anyone should be able to use it who could make use of it, rather than just throwing it away. In general we did not tolerate bureaucratic obstructionism. We felt, "this computer is here, it was bought by the public, it is here to advance human knowledge and do whatever is constructive and useful". So we felt it was better to let anyone at all use it -- to learn about programming, or do any other kind of work other than commercial activity.



> *So what happens in the early 1980s to change that? The arrival of 'black box' software?*

~ **RS:** The black box type of software was crucial. People could no longer learn hacking the way I did, by starting to work on

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STALLMAN



a real operating system, making real improvements. In fact, in the 1980s I often came across newly graduated computer science majors who had never seen a real program in their lives. They had only seen toy exercises, school exercises, because every real program was a trade secret. They never had the experience of writing features for users to really use, and fixing the bugs that real users came across. The things you need to know to do real work.

> *Is that around when you resigned from the AI lab?*

~ **RS:** Well I resigned from the AI lab, but that's getting ahead of the game. To explain why, now, would make a confusing order of things, so let's talk about that later when I talk about how I went about the GNU project. I saw that the world, the social system that encouraged people to cooperate was being replaced by one in which cooperation was called piracy, and I decided that all I could possibly get by participating in that was money, and that just money was not enough to live for. I had to aim for something more important than that.

> *What was that?*

~ **RS:** Giving people freedom. I was a skilled operating system developer, I had the ability to try at least to change the way things worked. It was clear this was the most important thing I could try to do. By developing another operating system that was free I might or might not advance technology, but I could certainly advance society. I might give people technical abilities and features they didn't have, but certainly, by succeeding to write the operating system, I could give them freedom they didn't have. Giving people freedom and encouraging people to cooperate are the two highest goals of any work we can do.

The Hacker Anti-Defamation League

<http://members.nbc.com/jcenters/HADL.html>

Since the early 80's, the press has used the term 'hacker' to mean a malicious security breaker, someone who likes to break into computer systems for fun. This is not a hacker at all. This is in fact a cracker.

Hackers, rather, are people who like to break out of boundaries and find solutions to problems. Hackers not only exist in the software community, they are musicians, engineers, artists. You can find hackers in almost any field. Here, we discuss mainly the software hacker: a person who enjoys programming and exploring computers.

Hackers are the people who built the Internet. They created Unix. They made the World Wide Web work. Without the work of hackers you wouldn't be viewing this page today, and I wouldn't have written it. The modern world owes a lot to hackers.

As a matter of fact, here are the definitions of hacker and cracker as defined by RFC 1983 (Internet Request for Comments protocol):

> **CRACKER**

A cracker is an individual who attempts to access computer systems without authorization. These individuals are often malicious, as opposed to hackers, and have many means at their disposal for breaking into a system. See also: hacker, Computer Emergency Response Team, Trojan Horse, virus, worm.

> **HACKER**

A person who delights in having an intimate understanding of the internal workings of a system, computers and computer networks in particular. The term is often misused in a pejorative context, where 'cracker' would be the correct term.

Free Science Campaign

freescience@zoo1.su.se

THIS CAMPAIGN HAS BEEN STARTED ON JUNE 18TH 1998 (.)

> *Preamble*

When authors of scientific papers submit their manuscripts for publication in scientific journals, they are frequently asked to sign a copyright-transfer agreement to the publishers of the journal. After such a transfer, the authors may retain little freedom to use their own papers. For example, some copyright agreements forbid authors to make their works available on a web page: you might be reading something more interesting than this, now! We feel that such copyright policies greatly reduce the freedom of scientists and researchers to exchange information and ideas. In our view, what is important is making scientific literature fully available to all scientists, free of the restrictions that are imposed today. Who owns the copyrights is a secondary issue (please read our objectives for more information). Why should copyright policies change? The answer is simple: because many of the existing copyright policies deny to scientists the right to freely exchange information about their research, slowing down and hampering the communication process of ideas and results which is at the heart of scientific research. Since nowadays most scientists and researchers type their manuscripts directly on a computer, it is possible to share the manuscript with other scientists immediately through computer networks. Many copyright-transfer agreements are currently an obstacle to this possibility. Scientists are not free to put their manuscripts on their web pages so that everyone can easily access them. Moreover, the creation of public databases that can be accessed by everyone is usually not permitted.

> *The goal of our Campaign is very simply stated.*

We want that the existing copyright-transfer agreements be modified so to grant to everyone the rights to freely distribute the works to which the copyright applies for non-commercial purposes. These rights should include:

Personal pages: the right for authors to make available their manuscripts on their web pages, on their institution's web pages, or on the web pages of any other organisation which does not require fees of any kind to access the manuscripts.

Public databases: the right for people other than the authors to distribute and store the copyrighted works on any media they like, provided they do not alter the original works and do not ask any fees for these services. This allows for the creation of publicly accessible databases which are a powerful tool to promote ideas and research. These databases can also provide valid help to scientists in developing countries, where availability of printed journals may be limited. Please note that all these requests are made solely to promote and facilitate the free exchange of ideas and scientific results. We do not ask that the copyright agreement produce any economical benefits for the authors of scientific papers. This campaign is not concerned with the commercial use of scientific papers, only with non-commercial distribution on the Internet or with other media. We state clearly that all rights of distribution and copy granted to the authors and the community would be restricted to non-commercial use. Journal publishers need not regard this campaign as antagonistic. Some journals and publishers already use copyright agreements that meet the goals of this campaign (e.g. the American Mathematical Society and American Physical Society); other publishers can surely do the same thing. Our aim is to make sure that this happens. For example, a publisher may have an on-line database which is chosen by individuals and Universities because it is better organised than others, or provides some additional services. But it should not be the only possible choice because the publisher 'owns' the papers in the database. Further information on copyright policies is here. To achieve the goal of our Campaign, we take the following initiatives. **Raise attention.** The first and most important thing is to raise the attention of a great number of people. If the entire scientific community agreed at once on not submitting manuscripts to journals which impose too severe restrictions, the matter would be settled in a couple of weeks. You can help us do this! **Speak with publishers.** We are contacting publishers to see to what extent they are willing to change their policy. As stated above, we think that a satisfactory agreement is possible. If you would like to bring these issues to a particular publisher, please contact us so that we can act together. **Promote initiatives** at the institutional level. It would be of great help to have the support of Universities and other Institutions whose employees write scientific papers. These institutions may require that the manuscripts written by their employees be archived on a publicly accessible web server. Also, institutions might forbid their employees to sign agreements that would restrict access to the papers. **Read our page** on how to help us if you want to start such initiatives at your Institution. **Publish papers.** You can publish your papers on your web pages, your institution's ones, or on public databases, if they are available in your field.

The Free Music Philosophy (v1.4)

RAM SAMUDRALA

What is the Free Music Philosophy (FMP)?

It is an anarchistic grass-roots, but high-tech, system of spreading music: the idea that creating, copying, and distributing music must be as unrestricted as breathing air, plucking a blade of grass, or basking in the rays of the sun.

What does it mean to use the term 'Free Music'?

The idea is similar to the notion of Free Software¹, and like with freeware, the word 'free' refers to freedom, not price. Specifically, Free Music means that any individual has the freedom of copying, distributing, and modifying music for personal, noncommercial purposes. Free Music does not mean that musicians cannot charge for records, tapes, CDs, or DATs.

The above definition of Free implies that any tangible object cannot be made free. However, something that can be copied arbitrarily many times, like music, should be set free. When I say music, I mean the expression of ideas (in the form of a musical composition or a sound recording) on some medium, and not the medium itself. Thus you have the freedom to make a copy of a CD I've created, the freedom to download soundfiles of songs I've created from my server on the Internet, the freedom to cover or improve upon a song I've written, but you are not necessarily entitled to free CDs.

Why must we Free Music?

Music is a creative process. Today, when a musician publishes music, i.e. exposes it to the outside world, only a privileged set of individuals are able to use the music as they please.

However, the artist has drawn from the creativity of many other musicians and there is an existential responsibility placed upon them to give this back unconditionally, so creativity is fostered among people. As a dissenting opinion in the *Vanna White vs. Samsung* case², Judge Kozinski writes, "All creators draw in part on the work of those who came before, referring to it, building on it, poking fun at it; we call this creativity, not piracy".

Why is freeing music the ethically right thing to do?

First, limiting your creativity to specific audiences, especially based on monetary reasons, is shirking existential responsibility and destructive to society as a whole; today, when people create, they're creating by standing on the shoulders of giants. Second, it's fair that people pay for music only if they like it after listening to it first; the present system does not allow for this for all forms of music. Third, in order to prevent 'illegal' copies from being made, a tremendous burden (restricting legitimate expression) must be placed on all individuals to circumvent what is human nature. This is a rather impossible task and is probably the reason the AHRA was passed in the first place. Fourth, the derivative works clause prevents the incorporation of your own ideas to enhance other people's expressions, and this is abridges the free exchange of ideas and information.

Finally, the current practices of the recording industry, which exploit both artist and consumer in the interests of profit, are unethical, and one must take steps to force changes.

What about the intellectual property rights of the individual?

Intellectual property and other such 'rights' have essentially existed to benefit society rather than the individual. The U.S. Constitution, for example, states that the purpose of Copyright is "to promote the progress of science and useful arts". The Free Music Philosophy ensures that both society and the individual benefit. The individual's creative freedom is completely unabridged. This freedom is more important than any 'right' society could give. To quote Stallman,¹ "*Control over the use of one's ideas* really constitutes control over other people's lives; and it is usually used to make their lives more difficult".

Won't musicians starve to death if they freed their music?

Musicians currently make money through a variety of sources: sales of records, merchandise and concert tickets, and royalties from commercial airplay. Freeing music will certainly not be detrimental to the sales of merchandise and concert tickets, nor will it affect compulsory or performance royalties. If anything, it will improve sales since people will continue supporting artists they like by going to their concerts and buying their merchandise. Profits from record sales will also not be affected because people will be encouraged to buy directly from the artist for the added bonuses of liner notes, lyrics sheets, and packaging. Thus Free Music can be used as a marketing tool to ensure that musicians do not starve. An approach where people send the artist a 'donation', if they found value in the music they copied, is another way to make money in a direct fashion. This could become an ingrained practice in society, like tipping, where even though there is no enforced requirement to tip for various services, people do anyway.

Won't talented and dedicated musicians give up music because there's a possibility they won't be multi-millionaires?

Consider the fact that except for a few hundred musicians who are on top of the billboard charts, the chances of making a living by record sales in the present system are very low. This system cannot be worse for most musicians. In fact, this is an excellent reason to justify the statement that most musicians perform and record with creativity as the primary motivation – any money-minded person can easily use their talents in other fields to increase the probability of actually making some. Thus the source of talented music will never dry up. What we might actually see is more creative and self-indulgent forms of music being perpetuated.

Shouldn't musicians ask rewards for their creativity?

Sure they can. As a musician, I'm happy when someone appreciates my creativity and shows it in some form. But I also do not believe that musicians should want rewards in ways that restrict the spread of music. As Stallman writes,¹ "The desire to be rewarded for one's creativity does not justify depriving the world in general of all or part of that creativity".

But the above question is worded wrong. It should be: Should record companies, controlling people's activities in order to achieve monetary gains, make every music lover pay them in the name of musicians as long as they give back a small fraction of what they make in order to justify the charade?

I think not.

What should you, as a music fan, do?

If the freedom of copying and using music appeals to you and you would like the idea spread around, then when you copy an album of anyone, regardless of whether they follow this philosophy or not, send them a donation to enable them to continue their making of music. What you contribute should be dependent on what the music was worth to you. You could also go to the artist's concerts or buy releases and merchandise directly from the artist. Finally, if you have the resources, you could support band(s) which have adopted the FMP by putting their music on the Internet. Support the music you like in some way! (This is independent of the notion of Free Music.)

Why will the Free Music Philosophy work?

In this digital age, the quality of home recordings has substantially increased, to a point where 'perfect' replicas of audio recordings are made easily. Recordings can thus be spread around without the need for major distribution. If the music is good, it will spread far more rapidly, in an almost exponential fashion, rivalling the distribution power of a major record label. Further, the Internet allows for an even greater distribution. If you consider the approach that asks for donations, listed above, you could, in theory, make more money than by being on a major label, and still retain all the creative freedom possible. You will be eliminating all the middlemen and be able to provide CDs for prices four times cheaper than what they are sold for, and still make more profit per CD sold than you would by being on a major label!

The freeware idea in terms of computer software, which operates under similar prin-

ciples, has worked.² Consider the fact that the best-written pieces of computer software are also software that can be copied without restriction (this includes Linux, and all the GNU software, and various software related to making music like sound format converters, sequencers, and multitrack recorders). Further, there is a thriving commercial sector based on the distribution of free software. I see no reason why the Free Music should also not produce equally excellent results.

How does one go about freeing music?

1. Set up a server on the Internet with your music, or deposit your soundfiles in a Free Music Archive (FMA) where people can access your music over the net. I am currently compiling a list of sites that will let you store your music files.³

2. Include a notice of this form with all records, tapes, CDs, and DATs you sell/give away: Permission to copy, modify, and distribute the musical compositions and sound recordings on this album, provided this notice is included with every copy that is made, is given for non-commercial use. If you obtained this by making a copy, and if you find value in this music and wish to support it, please send a donation, based on whatever you thought the music was worth, to the address given on this notice and include a copy of this document if you wish. If you do support the Free Music Philosophy idea, and have a site on the Internet, a link back to this site would be useful. In a sense, that statement is copylefting your music.⁴

The donation request is an optional one. Restricting it to noncommercial uses is also optional.

NOTES

1 <http://www.gnu.ai.mit.edu/gnu/manifesto.html>

The GNU Manifesto by Richard Stallman.

2 <http://www.gnu.ai.mit.edu>

The official GNU/Free Software Foundation www site.

3 <http://www.ram.org/ramblings/philosophy/fmp/fma.html>

List of sites where you can free your music (and those that support it).

4 <http://www.gnu.ai.mit.edu/copyleft/copyleft.html>

What is Copyleft?



Free Software as Collaborative Text ¹

FLORIAN CRAMER

> WHAT IS FREE SOFTWARE?

Why discuss Free Software in the context of net arts and net cultures?

Since about two years, Free Software - or 'Open Source' - has drawn increasing attention from artistic net cultures. The *Wizards of OS* conference, first held in Berlin in 1999, was the most prolific event to bridge the gap between the arts, humanities and social sciences on the one hand and Free Software culture on the other. The politics of copyleft and free distribution of code and knowledge soon turned out to be a common ground of discourse. In this paper, I will take a different aspect into consideration by reading Free Software as a net culture and its code as a multi-layered, collaborative text. Seen as a literary practice, Free Software development is an avant-garde of writing in digital networks, and even more: Since Free Software is at the heart of the technical infrastructure of the Internet, it has - to a large extent - written its own digital network.

Definition of Free Software

In this paper, 'Free Software' does not refer to 'Freeware', 'Shareware' or other proprietary software given away at no cost - like Microsoft Internet Explorer, QuickTime and Real Player - but is understood in accordance with the definitions of Free Software Foundation <http://www.fsf.org> as software which is "free as in free speech, not as in free beer". Among the best-known examples of Free Software are the Linux kernel, the GNU tools and the Apache web server.

Since 1998, the term 'Free Software' competes with 'Open Source', a term launched by a group around the writer and programmer Eric S. Raymond. According to this group, 'Open Source' is only a different name for the same thing to gain more mainstream acceptance in the world of computing.² The Open Source Definition ^[Opeb] therefore draws upon the older Free Software Guidelines ^[Deb] of Debian, a non-commercial GNU/Linux distribution made by volunteers.³ The guidelines can be summarized as follows:

- 1 Free Software may be freely copied.
- 2 Not only the executable binary code, but also the program source code are freely available.
- 3 The source code may be modified and used for other programs by anyone.
- 4 There are no restrictions on the use of Free Software. Even if Free Software is used for commercial purposes, no license fees have to be paid.

5 There are no restrictions on the distribution of Free Software. Free Software may be sold for money even without paying the programmers.

Since the same criteria apply to 'Open Source', the two concepts indeed do not differ in technical terms. Yet each of both terms has its ambiguities: While 'Free Software' tends to get confused with Freeware and Shareware,⁴ 'Open Source' is easy to be mixed up with 'open standards' - like the HTML format and the http protocol - and with software like Sun's Java whose source code is publicly available, but only under a restrictive license. It is particularly important to differentiate 'Open Source' and 'Free Software' from open standards. While open standards are mandatory technical specifications set up by committees like the Internet Engineering Taskforce (IETF) and the World Wide Web Consortium (W3C), 'Open Source' or 'Free Software' developers code whatever they like for their own fun, and they are free to split their projects and develop the code into separate directions if a consensus can no longer be reached.⁵

Since misconceptions of 'Open Source' are so common, I will stick with the less popular, but somewhat clearer term 'Free Software'.

Free Software History

It is not accidental that history of Free Software runs parallel to the history of the Internet. The Internet is built on Unix networking technology to a large extent. Academic institutions could get Unix for a 'nominal fee' including its source code in the early 1970s, and it remains to be the historical base or model of the common Free Software operating systems BSD and GNU/Linux.

The affinity of the Internet and Unix technology still persists on various level: E-Mail is nothing but the Unix mail command. An E-Mail address of the form xy@z.com is made up of what's historically a user name on a multiuser operating system and, following the "@", the system's host name. This host name is resolved via the free Unix software bind according to the Internet domain name system (DNS); DNS itself is nothing but a networked extension of the Unix system file /etc/hosts. Since the Internet has marginalized or even replaced proprietary computer networks like IBM's EARN/Bitnet, Compuserve, the German Btx and the French Minitel, Unix networking technology is standard on all computing platforms.

In the 1970s, multiuser operating systems particularly attracted student hacker communities at the MIT and at the University of California at Berkeley. The concepts of open, decentralized computer networks and free multiuser operating systems have their origin in the computer science labs of these institutions. While the MIT hackers wrote their own operating system ITS and the Berkeley hackers improved and extended the original Unix codebase, their 'hacks' eventually evolved into:

- 1 the BSD family of operating systems with the free versions FreeBSD, NetBSD and OpenBSD. All of them use a codebase that was originally developed in Berkeley under the project leadership of Bill Joy.
- 2 the GNU/Linux operating system. All major Linux-based operating system distributions- RedHat Linux, SuSE Linux, Turbo Linux, Debian GNU/Linux, Mandrake Linux, Corel Linux OS and Caldera OpenLinux, to name only a few, build on the GNU software written since 1984 by the Free Software Foundation (FSF) and on the Linux kernel written

since 1991 under the project leadership of Linus Torvalds.⁶ The FSF was founded and is still being led by former MIT hacker Richard M. Stallman.

Open technology has been a key factor for the acceptance of computers and networking: The open architecture of the IBM Personal Computer made computers cheap and popular since the 1980s, and with the open architecture of the Internet, global networking became popular in the early 1990s. Lately, Free Software has made high-end Unix server computing available to anyone willing to learn the technical details. Whether Free Software can become as popular on mainstream desktop computers and eventually de-commoditize all computer software remains to be seen, but is not the question I want to investigate here.

> FREE SOFTWARE AS A NET CULTURE

In the middle of the 1990s, 'net culture' became the keyword for artistic, art-critical and political discourse in the Internet. The term was closely identified with mailing lists like Nettime <http://www.nettime.org> and Rhizome <http://www.rhizome.org>, conferences like the one where I present this paper and print publications like the Nettime anthology ^[BMBB + 99]. 'Net culture' used to be pronounced as a singular noun in these forums and media referring only to the discourse they created.

Free Software is an outstanding example that there is not one, but many net cultures. It predates artistic net cultures in the Internet by roughly twenty years. The Free Software copyleft can be seen as the quintessential reflection of this long experience. Invented to preserve the traditional academic-artistic freedom of speech and citation in the digital realm, the copyleft has radically rewritten it nevertheless. The concept that code, i.e. text, may not only be freely copied but even modified ('patched'), willfully recycled and commercially redistributed by anyone without the author's permit is foreign to the post-medieval Western arts and sciences. In print culture, such practices are considered plagiarism and theft.

Even for the digital net arts, the copyleft remains an unresolved challenge. Many, if not most, net artworks depend on proprietary authoring and display software,⁷ and the distribution terms of their code are rarely clarified.⁸ Yet Free Software has as subtly as significantly influenced the digitally networked arts. Without free E-mail server software like Majordomo <http://www.greatcircle.com/majordomo/> and Sendmail <http://www.sendmail.org>, and the overall possibility to set up inexpensive servers using the GNU/Linux and BSD operating systems on stock PC hardware, the artistic net cultures of Nettime et al hardly could have operated non-commercially and with free participation.⁹ Friedrich Kittler's observation that artistic tools conceptually shape what is made with them ^[KIBBS] also applies to the net arts. The fact that Majordomo and Sendmail became major tools of artistic net activity is an important - but of course not the sole - explanation why contemporary Net art tends towards conceptual, discursive and text-heavy work instead of the immersive 'virtual reality' environments many critics had expected them to deliver. The latter would have required expensive proprietary software for design and display, closed high-speed networks and, as a result, dependence on highly funded institutional infrastructures, limited community participation and top-down instead of bottom-up organization of this particular net culture.

> FREE SOFTWARE AS WRITING

The relevance of Free Software for other net cultures is not limited to the tools it has created and the infrastructures it has made possible, simply because those tools themselves are the very object of Free Software culture: they are text, results of complex textual processing. Moreover, this text is being produced with tools which themselves are free code.

While the phenomenon that text is being built with tools which are source text themselves applies to the proprietary software as well, there is an important difference: Free Software source text is not withdrawn from the public. It cannot be abandoned by company management and does not disappear when development has ceased. All Free Software builds up to a public repository of text-coded, free-to-use knowledge. It accumulates to an archive. Instead of being written from scratch, new Free Software can be built from whatsoever is in that archive. Free Software therefore is highly intertextual. Free Software development is the earliest and still most successful practice of collaborative writing in computer networks. With its system of textual production and politics of code, Free Software is by far the more advanced net literature than what is commonly understood as net poetry and net fiction.¹⁰ Free Software may be seen simultaneously as

- ~ a freely accessible, ever-growing body of code-a text archive;
- ~ recursive (i.e. self-applied) text processing, since available text is used both as a source and as a building tool to create new code;
- ~ text processing even through the medium of text, because Free Software development infrastructures mostly depend on mailing lists and command-based version control systems.
- ~ a 'hacker' culture which advocates freedom of information and codes its politics into the legal texts of the copyleft.

The coded copyleft might be the clearest interstice between Free Software as a net culture and Free Software as net text. Both these aspects already come into play when Free Software is being written. Free Software development is typically achieved by self-organized volunteer projects whose members communicate and collaborate via the Internet. The development work consists of:

1 Writing program source text

This involves the evaluation of available Free Software source code for possible inclusion and adaptation. It also involves picking and compiling the coding tools which themselves are Free Software source text.

To accommodate its own needs, Free Software has developed arguably the most sophisticated writing tools for the distributed authoring of text. Particularly outstanding is the Concurrent Versioning System (CVS)^[Cod99] which allows authors to take portions of text-regardless whether it is written in programming language or in natural language-over the Internet, work on them at home, and synchronize the changes with the revisions of other collaborators any time. CVS-based writing might be technically the most radical departure from the typewriter and mail paradigm in text editing to date.

2 Writing documentation text

Documentation is both internal and external to the program source text when the latter contains annotations and separate reference documentation is being written. Free manuals remain a political issue within Free Software development. A number of companies base their business model on giving away the software under free licenses and charging for documentation and support.¹¹ In the ideal case however, a second textual recursion occurs within Free Software which is common in all modern knowledge systems since Diderot's and d'Alembert's *Encyclopédie*.¹² The text teaches the reader all steps which were necessary for its creation so that all the information it contains may be re-applied to itself.

3 Communication over mailing lists, bugtracking systems and IRC

Free Software development teams almost exclusively constitute themselves and communicate over the Internet, in mailing lists and on IRC servers. Interpersonal communication therefore is a third layer of text which regulates the design of both program and documentation source text. It operates as a cybernetic feedback loop for the development process.

4 Writing legal text

Free Software is legally defined. It is software under certain licenses, i.e. legal documents. The most common types of copyleft include the GNU General Public License <http://www.gnu.org/copyleft/gpl.html>, the BSD License and the Perl Artistic License. Whether program source text is free solely depends on whether it is copylefted. Legal text therefore is the fourth layer of text regulating the entire flow of text generated in Free Software projects.

Free Software is thus a highly sophisticated system of recursive text generation for a public pool of knowledge. It is text code created from text code with text-coded tools and textual communication over networks. The types of texts processed in Free Software are extremely diverse: They include executable binaries,¹³ text written in programming languages, text written in natural languages for documentation, text written in natural languages for communicating and steering development, and legal texts defining the fair-play rules of the recursive textual processing.

> OBJECTIONS

Both the Free Software engineering and the net artistic camps are traditionally skeptical about attempts to read Free Software in terms of the net arts. The objections were particularly voiced when the Linux kernel was awarded the Golden Nica in the 'net' category of Ars Electronica 1999. At the Wizards of OS conference in the same year, the net artist Alexej Shulgin argued that Free Software is 'functional' while Net.art is 'non-functional', self-sufficient code.¹⁴

I do not find this point viable from an analytical perspective, since the division between 'functional' and 'non-functional' is purely arbitrary and subjective. I/O/D's Web Stalker ^[/097],

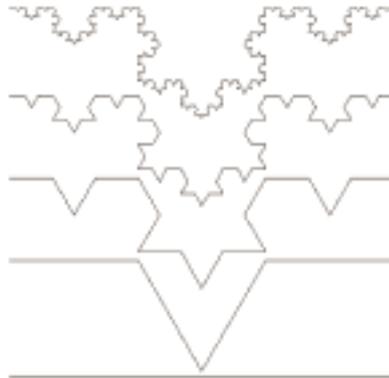
an experimental Web browser and well-known Net.art work, is arguably more 'functional' than the teddy bear desktop emblem xteddy which is contained in all major GNU/Linux distributions. Moreover, the distinction between 'functional' Free Software and 'non-functional' Net.art falls back into late-romanticist notions of the absolute artwork versus lower craftsmanship. It also neglects that with its multiple self-applications of text, the development and use of Free Software is to a large extent its own purpose. No other operating system is as open and seductive to be used as an end to itself as GNU/Linux.

Just as arbitrary as the distinction between 'functional' and 'non-functional' software is that between program source code and poetry. To date, all attempts to formally define poetry and poetic language have failed. The decision whether a text is poetry will always be up to the reader. The notion of 'program code' versus 'poetry' was first put into question by the French poet and mathematician François le Lionnais, who co-founded the Oulipo group with Raymond Queneau. In 1973, le Lionnais released a volume of poetry written in the programming language Algol. The practice has been revived in the 1990s by people who write poems in the Perl scripting language.

> CONCLUSION

Read as a net literature and a net culture, Free Software is a highly sophisticated system of self-applied text and social interactions. No other net culture has invented its computer code as thoroughly, and no other net culture has acquired a similar awareness of the culture and politics of the digital text.

Much Net.art, net literature and critical discourse about them has focused on the aesthetics and politics of desktop user interfaces. In its focus on code, Free Software shows that net cultures are about more than just what is between people and the network. To date, it remains a rare example of electronic literature which does not confuse the Internet with web browsers.



ACKNOWLEDGEMENT

This paper was written using the Free Software programs LYX, LATEX, bibtex, bibtools, pdflatex, latex2html, lynx, XEmacs and GNU Ghostscript on an office and a home PC running Debian GNU/Linux with reiserfs, XFree86 and larswm. Thanks to Ronda Hauben for some corrections of the section on Free Software history.

NOTES

- 1 This paper was presented at the conference Interface 5 on the panel "Minor Media Operations", Hamburg, Warburg-Haus, September 15, 2000.
- 2 To quote from Raymond's Frequently Asked Questions about Open Source, "The Open Source Initiative is a marketing program for free software. It's a pitch for free software on solid pragmatic grounds rather than ideological tub-thumping. The winning substance has not changed, the losing attitude and symbolism have".
[Open]
- 3 Both the Debian Free Software Guidelines and the Open Source Definition were originally drafted by Bruce Perens, a Free Software developer and editor of the website technocrat.net <http://www.technocrat.net>.
- 4 i.e. binary-only software which can be downloaded freely and used without licenses fees (Freeware) or by paying comparatively small licenses fees (Shareware).
- 5 A prominent example is the XEmacs <http://www.xemacs.org/text> editor which 'forked' its codebase from GNU Emacs <http://www.gnu.org/software/emacs/emacs.htm>. The same would be impossible in open standards development. The social dynamics and institutional control of open standards development is excellently described in Jeanette Hofmanns (German) essay *Der Erfolg offener Standards und seine Nebenwirkungen*.
[Hof99]
- 6 There is an ongoing debate in Free Software culture whether operating systems based on the Linux kernel should be called 'Linux' or rather 'GNU/Linux'. In order to be functional at all, a 'Linux' setup relies upon the GNU C Compiler (gcc) to translate all program sourcecode into machine-executable binary software, the GNU C Library (glibc) as the interface between the Linux kernel and userspace applications, and the GNU tools for the basic user commands. Although it is possible to replace at least the GNU tools and the glibc with non-GNU workalikes, all common 'Linux' distributions use the Linux + GNU software setup. I will therefore stick with the name 'GNU/Linux' where I refer not only to the kernel, but to the whole operating system.
- 7 Such as Macromedia's Shockwave and Flash in *Net.art*, Opcode's MAX in electronic music and Eastgate's Storyspace in hypertext fictions.
- 8 The artist group 0100101110101101.ORG <http://www.0100101110101101.org> put this issue up front when it mirrored and partially modified well-known Net.art web sites on its own web site.
- 9 Early artistic computer networks like the Thing BBS <http://www.thing.net> charged their subscribers (at least in Berlin) before they migrated into the Internet.
- 10 How net literature - 'hyperfiction' and 'new media poetry' - relates to poetic practices rooted in programmer's cultures is discussed in more detail in my (German) paper.
[Cr00]
- 11 Among those companies are O'Reilly publishers, Sendmail Inc., VA Linux, Scriptics, Helix Code and Eazel. All of them are involved in the development or documentation of critical components of GNU/Linux operating systems.
- 12 I thank Wau Holland for pointing this out to me in a preparatory meeting for the first Wizards of OS conference.
- 13 Which can be read as 'text' if text is linguistically and semiotically defined as a finite number of discrete

signs chosen from a finite set of signs. In computing, 'text' is rather colloquially understood as code from natural-language alphabets as opposed to binary code. Being a philologist, I refer to the prior concept of 'text'.

- 14 According to [Bos98], the label Net.art was coined in 1996 by the net artist Vuk Cosic and has been associated with a particular generation of net artists since (involving, among others, Cosic himself, Heath Bunting, Olia Lialina, Alexej Shulgin, jodi and I/O/D).

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Cooking Pot Markets: Gift Economy

RISHABH IYER GHOSH

What is value? / Is the Internet really an economy?

This is perhaps the wrong question - akin to asking whether direct-sales, or academic research is an economy. There is much of value to be found on the Internet, much production and consumption of goods and services. This is hardly surprising, given that the Net has attracted 60 million people and is growing in population at more than 100% annually. Many of the things found on the Net, though, can be found off it - free software such as Linux¹ is distributed on CD-ROMs (for which you pay), not just on Internet FTP sites. The Net is not another planet, the people populating it are part of some 'real world' society too, trading, producing and consuming things off-line.

Although the word 'virtual', like 'cyber', has come to be associated with everything on-line, the act of creating products - such as home pages and notes published in discussion groups - is as real on the Net as it is in a factory or newspaper office. The 'virtual' trade in knowledge products on-line, their 'virtual' consumption and production by millions of people, are very real indeed, and affect the world outside the Net if only because its own population forms an increasing (if still small) part of that world's.

This makes it all the more important to take note of differences between the part of the world's economy that is on the Net, and the rest. Millions of people have been interacting and participating in what they clearly value, using an economic logic different from what they might normally use in off-line lives. So there must be a definite possibility of the on-line economic logic spreading beyond the confines of the Net - it's the same people in both worlds, after all. There is no question that there are differences between the economic logic - the application of basic economic principles - on and off the Net.

To begin with, much of the economic activity on the Net involves value but no money. Until a few years ago, there was almost no commercial activity on the Internet. As commerce discovered the Net it was natural for the Net to become commercial - which makes the incredibly vast amount of resources still available free remarkable. The free resources of the Net greatly outweigh all commercial resources, especially if one counts only purely on-line transactions (e.g. a bookseller like Amazon² makes money selling books, which requires the physical transportation of goods). It is quite hard to put a price on the value of the Internet's free resources, at least in part because they exist because they don't have prices attached. They exist in a market of implicit transactions.³

The economics of gossip

I prefer arguing with extreme cases, so I won't start with the obvious worth of free operating systems (Linux) or Web server software (Apache)⁴. Newsgroup discussions are a less obvious case, so I'll begin there.

If you are a heavy user of the Net, you might wonder how all your little posts to discussion groups - say, rec.pets.cats - could possibly be called economic transactions. But they are.

The Internet has, of course, changed enormously in the past couple of years, indeed it changes all the time as its population keeps doubling⁵. Many early users of the Net complain about recent users - pejoratively calling them 'newbies' - and the 'junk' they post. Although posts were more relevant and better written, on average, before the Net became headline news, few were likely to be accepted for publication in the average newspaper, leave alone an academic journal. But I, like most people, found many of these the implicit tag of 'intra-office industry gossip distributor' or 'junior colleague advisor'. But on the Net these implicit transactions stand out in stark relief, suggesting even more strongly that in a knowledge economy, every exchange of knowledge in any form is an act of trade⁶.

Every snippet posted to a discussion group, every little Web page, every skim through a FAQ list and every snoop into an on-line chat session is an act of production or consumption, often both. There is no specific economic inherent value in a product. Value lies in the willingness of people to consume a good, and this potentially exists in anything that people can produce and pass on.

Having settled that bad writing and even junk mail is a part, however reprehensible, of the Internet's economy, let us proceed to Linux. After all software, in particular large operating-system software occupying up to six CD-ROMs when distributed off-line, is undeniably an economic good⁷. And Linux with its loosely organised community of developer-users, and its no-charge policy, undeniably has an economic logic that seems, at first, new.

Something for nothing?

Linus Torvalds did not release Linux source code free of charge to the world as a lark, or because he was naïve, but because it was a "natural decision within the community that [he] felt [he] wanted to be a part of".⁸ Any economic logic of this community - the Internet - has to be found somewhere in that "natural decision". It is found in whatever it was that motivated Torvalds, like so many others on the Net, to act as he did and produce without direct monetary payment.

Of course, it is the motivation behind people's patterns of consumption and, what is more relevant in the case of Linux, production that forms the marrow of economics. Such motivation is usually expressed in terms of curves of supply and demand, measured by costs and prices in dollars and cents. Figuring out what motivates, leave alone measuring it, is much tougher when price tags don't exist. It is simpler to just assume that motivations only exist when prices are attached, and not attempt to find economic reason in actions motivated by things other than money; simpler, therefore, just to assume as we often do that the Internet has no economic logic at all.

This is wrong. The best portions of our lives usually do come without price tags on them; that they're the best parts imply that they have value to us, even if they don't cost money. The pricelessness here doesn't matter much, not unless you're trying to build an economic model for love, friendship and fresh air. But you don't need to be an economist to know that all of these things do involve motives, and perhaps also the matching of (ordinal) demand and supply, even if demand curves are not easily measured without price tags. Economics may not often need to be used in an environment where valuables are free, but that doesn't necessarily mean it can't be so used. And any economic logic of the Internet has to have come to terms with the difficulty of measuring such value.

Being on the Internet is not quite like being in love (though some would argue about that) - but it brings with it the same sheen of pricelessness. On the Internet, through much of its past, the bulk of its present and the best of its foreseeable future, prices often don't matter at all. People don't seem to want to pay - or charge - for the most popular goods and services that breed on the Internet. Not only is information usually free on the Net, it even wants to be free, so they say⁹.

But 'free' is the wrong word: like love, information, however free in terms of hard cash, is extremely valuable. So it makes sense to assume that the 3 million people on the Internet who publish matters of their interest on their home pages on the Web, and the several million who contribute to communities in the form of newsgroups and mailing-lists, and of course anyone who ever writes free software, believe they're getting something out of it for themselves. They are clearly not getting cash; their 'payment' might be the contributions from others that balance their own work, or something as intangible as the satisfaction of having their words read by millions around the world.

While writing my weekly newspaper column on the information society¹⁰, I was distributing an e-mail version free of charge on the Internet. A subscription to the e-mail column was available to anyone who asked, and a number of rather well known people began to receive the column each week. My readers often responded with useful comments; I often wondered whether people would pay for a readership like this. Many readers add to your

reputation, they make good contacts, helping you out in various ways. Simply by reading what you write, they add value to it - an endorsement, of sorts. So who should pay whom - the reader for the work written, or the writer for the work read?¹¹

The notion that attention has value is not new - and has been formally analysed in the advertising industry for decades. In the context of information and the Internet, the 'attention economy' has been described in recent papers.^{11a} It would be facile to suggest that attention necessarily has innate value of its own. In some situations, being read by certain people may well have value in itself - assuming the attention of such people is a rare commodity with respect to what you write. But more often than not - especially when it is the attention of a large distributed audience in question - attention is a proxy for further value. This may appear in the form of useful comments (or bug reports from Linux users), assistance and contacts - or simply an enhanced reputation that translates into better access to things of value at a later point [see section "Is reputation a Convertible Currency?"].

Even those who have never studied economics have an idea of its basic principles: that prices rise with scarcity and fall in a glut, that they are settled when what consumers will pay matches what producers can charge. These principles obviously work, as can be seen in day-to-day life. But that's the 'real world' of things you can drop on your toe. Will they work in a knowledge economy? After all, this is where you frequently don't really know what the 'thing' is that you're buying or selling, or clearly when it is that you're doing it, or, as in the case of my column, even whether you're buying - or selling. Contrary to what many doom-sayers and hype-mongers suggest, it always seemed to me that the basic principles of economics would work in an economy of knowledge, information and expertise. They are, after all, not only logical on the surface but also practically proven over centuries - a powerful combination. Even if the Internet appeared to behave strangely in how it handled value, there was no reason to believe that, if it had an economic model of its own, this would contradict the economic principles that have generally worked.

However, if Paul Samuelson's textbook definition of economics as the "study of how societies use scarce resources to produce valuable commodities and distribute them among different people"¹² remains as valid now as ever, almost all the terms in there need re-examination. This is because of the same peculiar economic behaviour of the Net that suggests it has developed its own model, the economic model of the information age.

The Internet looks like an infant microcosm of the wider tions, some 3 million copies every day across India. The whole operation, particularly the co-ordination of advertising and editorial, depends on RespNet. This internal network won the Times a listing in ComputerWorld magazine's selection of the world's best corporate users of information technology. RespNet runs on Linux, and other similar free software got off the Net.

Raj Mathur, who set up Linux on RespNet, agrees with Torvalds when the latter says, "people who are entirely willing to pay for the product and support find that the Linux way of doing things is often superior to 'real' commercial support". This is thanks to the large community of other developers and users who share problems and solutions, and provide constant, sometimes daily improvements to the system. The developer-users (the Linux incarnation of Toffler's producer-consumers, or prosumers) naturally include operators of networks similar to RespNet. So many of them can provide separately assistance that might

not be available if they were all working together in a software company - as Linux Inc - where they would be producers of the software but not consumers. This shifting base of tens of thousands of developers-users worldwide working on Linux means that the Times of India would have a tough time figuring out whom to pay, if it wanted to, so it's just as well that the support from these developers is free.

The fact that on the Internet people go looking for other people, and Linux developers look for others like them, is just one instance of the immediacy of much of the trade that takes place on the Net. When you post your message to rec.pets.cats, or create a home page - whether personal or full of your hobbies and work - you are continuously involved in trade. Other cat-lovers trade your message with theirs, visitors to your home-page trade your content with their responses, or perhaps the satisfaction of knowing that you're popular enough to get a few thousand people discovering you each week. Even when you don't charge for what you create, you're selling it, because you're using your work to buy the work of others - in a discussion group - or to buy the satisfaction of popularity - through your Web site.

What is most important about this immediacy of the implicit trades that go on all the time on the Net is its impact on notions of value. Unlike the 'real world', where things tend to have a value, as expressed in a price-tag, that is sluggish in response to change and relatively static across its individual consumers, on the Net everything is under constant reevaluation. Without the intermediary of money, there are always two sides to every transaction, every transaction is potentially unique, rather than being based on a value derived through numerous similar trades between others - i.e. the price-tag.

Continuing to alternate between examples from the worlds of free software and USENET - to reiterate their equivalence in economic terms - we can see the two-sided nature of trade in this hypothetical example about cats. You may value the participants in rec.pets.cats enough to post a long note on the nomadic habits of your tom. In a different context - when the same participants are quarrelling over the relative abilities of breeds to catch mice - you may not find it worthwhile contributing, because the topic bores you. And you may be far less generous in your contributions to rec.pets.dogs. You value the discussion on dogs, and catching mice, much less than a discussion on tomcats, so you're not willing to make a contribution. This would be 'selling' your writing cheap; but when you get feedback on tomcats in exchange for your post, it's the right price.

This example may seem somewhat contrived, but only because decisions on when and where to post a message or participate in on-line discussions are taken all the time, so often that they're barely noticed as actual decisions. In a knowledge economy, however, the decision to write and freely distribute your note on cats rather than dogs is no less an economic one than is the decision to order Chinese take-out instead of pizza in the 'real world'. Both are a question of resources allocation - your time and effort in one case, your money (which actually represents your time and effort) in another.

Unlike noodles and bread, readers on Internet newsgroups don't come with price-tags pinned on, so common-place decisions involving your on-line acts of production require that you figure out the relative values of what you get and what you give, all the time. Others are figuring out the worth of your contribution all the time, too. Life on the Internet is like a per-

petual auction with ideas instead of money.

That note on your tomcat probably does not deserve the glorious title of idea; certainly the warm feeling that you got in exchange for posting it - when people responded positively and flocked to your homepage to see pictures of your cat - couldn't possibly be classed with 'real ideas' (such as the one to black out the Web in protest against the CDA).¹⁴ Still, for the sake of convenience the subjects of trade on the Net can be categorized as idea (goods and services) and reputation (which when enhanced causes all those warm, satisfied feelings, and more tangible benefits too).

Ideas are sold for other ideas or an enhanced reputation; reputations are enhanced among buyers of ideas, and reputations are themselves bought and sold all the time for other reputations, as we shall see later. The basic difference is that reputation (or attention) is, like money, a proxy. It is not produced or consumed in itself, but is a by-product of underlying production of actual goods ('ideas' in our binary terminology).

Two sides to a trade

Unlike the markets of the 'real world', where trade is denominated in some form of money, on the Net every trade of ideas and reputations is a direct, equal exchange, in forms derivative of barter. This means that not only are there two sides to every trade as far as the transaction of exchanging one thing for another goes - which also applies to trades involving money - there are also two points of view in any exchange, two conceptions of where the value lies. (In a monetary transaction, by definition, both parties see the value as fixed by the price.)

As the poster of notes on tomcats, the value of your posting something is in throwing your note into the cooking-pot of participatory discussion that is *rec.pets.cats* and seeing what comes out. As the author of a page on cats, what you value in exchange for your words and photographs is the visits and comments of others. On the other hand, as a participant on *rec.pets.cats* I value your post for its humour and what it tells me to expect when my kitten grows up; as a visitor to your Web page I learn about cats and enjoy pretty pictures.

When I buy your book about cats, it's clear that I am the consumer, you the producer. On the Net, this clear black-and-white distinction disappears; any exchange can be seen as two simultaneous transactions, with interchanging roles for producer and consumer. In one transaction, you are buying feedback to your ideas about cats; in the other, I am buying those ideas. In the 'real world' this would happen in a very roundabout manner, through at least two exchanges: in one, I pay for your book in cash; in the next, you send me a cheque for my response. This does not happen very often! (The exception is in the academic world, where neither of us would get money from the *Journal of Cat Studies* for our contributions; instead our employers would pay us to think about cats.)

As soon as you see that every message posted and every Web site visited is an act of trade - as is the reading or publishing of a paper in an academic journal - any pretence at an inherent value of economic goods through a price-tag is lost.

In a barter exchange the value of nothing is absolute. Both parties to a barter have to provide something of value to the other; this something is not a universally or even widely

accepted intermediary such as money. There can be no formal price-tags, as an evaluation must take place on the spot at the time of exchange. When you barter you are, in general, not likely to exchange your produce for another's in order to make a further exchange with that. Unlike the money you receive when you sell something - which you value only in its ability to be exchanged for yet another thing - in a barter transaction you normally yourself use, and obviously value, what you receive.

When the contribution of each side to a barter is used directly by the other, it further blurs the distinction between buyer and seller. In the 'real world' barter did not, of course, take place between buyer and seller but between two producer-consumers in one transaction. When I trade my grain for your chicken, there's no buyer or seller, although one of us may be hungrier than or have different tastes from the other. On the Internet, say in the Linux world, where it may seem at first that there's a clear buyer (*The Times of India*) and an equally clear, if aggregate seller (the Linux developer community) there is, in fact, little such distinction.

Just as the existence of the thousands of independent Linux developers are valuable to the newspaper because they are also users of the product - and may face similar problems - other Linux developers welcome *The Times of India* because how it faces its problems could help them as Linux users. As Torvalds says, "[t]here are lots of advantages in a free system, the obvious one being that it allows more developers to work on [Linux], and extend [Linux]". However, "even more important" is that making Linux free brought "in one fell swoop ... a lot of people who used it" - not just reporting problems, but playing a crucial role in the further development of the system. Torvalds notes that a single person or organisation "doesn't even think of all the uses a large user community would have for a general-purpose system" - so the large user base of Linux was "actually ... a larger bonus than the developer base".

Of course Linux is far from being the only software product that blurs the producer-consumer divide. Much software - even the kind sold by companies for money - is now highly dependent on user feedback. This feedback is not just to give the producer information on market needs - which is not normally thought of as something consumers can barter with - but for testing and sometimes fixing technical problems with programs. Netscape has had a public campaign to encourage users to find bugs in their code - which were traditionally, and expectedly, scanned for and fixed within software companies. So 'real world' companies also often buy from their customers even as they sell.

(When it starts giving its source code away free, Netscape will encourage users to fix bugs too, and in general to become developers. It will become a company grown even closer buying from its customers than most.)

Can you eat goodwill?

Perhaps you will agree that when you next post a note on cats, you're not giving away something for nothing. But what you get in return is often pretty intangible stuff - satisfaction, participation in discussion and even answers to cat-related questions are all very well, and may be fair exchange for your own little notes, but don't seem substantial enough to make much of an economy. As for Linux - it's fine to talk about a large base of user-developers

all helping one another, but what has all this brought Linus Torvalds? Although Linux did get vastly improved by the continuing efforts of others, none of this would have happened without Torvalds's original version, released free. Assuming that he's not interested in Linux as a hobby, he's got to make a living somehow. Doesn't he seem to have just thrown away a great product for nothing?

First, let's see what intangible 'payment' Linux brought. In the circles that might matter to Torvalds's career, he's a sort of god. Most of the technology of the Internet, including tools such as Linux, HTML (the language of the Web) and the Web server Apache (with 45% of the total market, enough for Bill Gates to call it Microsoft's "biggest competitor"¹⁵) have been developed and distributed without payment. As government and academic participation declined as a proportion of the total Internet developer community, most recent 'free' technology has not been subsidised, either. The main thing people like Torvalds get in exchange for their work is an enhanced reputation. So there are, in fact, lots of Net gods.

Net gods get hungry, though, and reputation doesn't buy pizzas. So what does Torvalds do? As it turns out, he was still in the University of Helsinki (in October 1996, when I first interviewed him; he's now with an American company where "it's actually in [his] contract that [to do] Linux part-time"). "Doing Linux hasn't officially been part of my job description, but that's what I've been doing", he says. His reputation helped - as Torvalds says, "in a sense I do get my pizzas paid for by Linux indirectly". Was this an academic sense, perhaps? Is Linux, then, just another of those apparently free things that has actually been paid for by an academic institution, or by a government? Not quite. Torvalds remained in the University out of choice, not necessity. Linux has paid back, because the reputation it's earned him is a convertible commodity. "Yes, you can trade in your reputation for money", says Torvalds, "[so] I don't exactly expect to go hungry if I decide to leave the University. 'Resume: Linux' looks pretty good in many places".

Is reputation a convertible currency?

Suppose you live in a world where people trade chicken and grain and cloth - a very basic economy indeed! Suddenly one day some strangers appear, and offer to sell you a car; you want it, but "Sorry", says one of the strangers, "we don't take payment in chicken; gold, greenbacks or plastic only". What do you do? It's not hard to figure out that you have to find some way to convert your chicken into the sort of commodities acceptable to car dealers. You have to find someone willing to give you gold for your chicken, or someone who'll give you something you can trade in yet again for gold, and so on. As long as your chicken is, directly or indirectly, convertible into gold, you can buy that car.

What holds for chicken in a primitive barter economy holds also for intangibles such as ideas and reputation in the part of the economy that operates on the Internet¹⁶. And some of these intangibles, in the right circumstances, can certainly be converted into the sort of money that buys cars, leave alone pizzas to keep hunger away. This may not apply to your reputation as a cat enthusiast, though; it may not apply to all software developers all the time, either.

In the primitive barter economy, trade is limited to basic commodities with only the occasional car thrown in. Not everyone will want to buy cars, however rich they may be in

grain and cloth. Much of their earnings will go back into buying more basic commodities; only some of it will be converted into car-buying things like gold. Then again, only some people at some times will be able to find the right sequences of trades to convert chicken into gold, which may depend on context and the general demand for such unusual things in the economy.

On the Internet - indeed in any knowledge economy - it is not necessary for everything to be immediately traded into 'real world' money. If a significant part of your needs are for information products themselves, you do not need to trade in your intangible earnings from the products you create for hard cash, because you can use those intangibles to 'buy' the information you want. So you don't have to worry about converting the warm feelings you get from visits to your cat Web page into dollars, because for your information needs, and your activities on the Net, the 'reputation capital' you make will probably do.

"The cyberspace 'earnings' I get from Linux", says Torvalds, "come in the format of having a network of people that know me and trust me, and that I can depend on in return. And that kind of network of trust comes in very handy not only in cyberspace". As for converting intangible earnings from the Net, he notes that "the good thing about reputations ... is that you still have them even though you traded them in. Have your cake and eat it too!"

In 1990, Colin (Col) Needham was a research engineer for "a major US computing company which has a large industrial research facility in the UK".¹⁷ What on earth was he doing developing the Internet Movies Database, which quickly became perhaps the most comprehensive source of data on films anywhere?¹⁸

"I started the database as a fun activity back in 1990", says Needham. "There was already a list of actress filmographies being posted" - by the Net's ubiquitous hobbyists who don't want to charge for the work they do - "to [the USENET newsgroup] rec.arts.movies and I added to that by creating a companion actors list just for a little bit of fun combining movies and computing".

I never believed that people could do so much work just for 'fun'. Yet it's the most common reason I have always seen for anything of value produced on the Net. Some of these people, including Needham and Torvalds, spend several hours a day, forgetting to sleep, writing programs and creating articles and Web pages. Fun?

For close to three years, I have been publishing frequent articles on the Internet, analysing the Indian telecom and broadcasting markets. Unlike my weekly column, my analyses are published on-line only, and don't even get the fees Indian newspapers pay. True, I enjoy doing this, as I have enjoyed my prolific posts to various discussion groups over the years, but none of this has been just fun. But I have to admit that it takes a while to get to more substantial reasons for the Internet's huge productivity. After all, few people think of economics while developing free resources on the Net, and since they're not getting paid for it, the first answer that pops up to the question 'why am I doing this?' is Fun.

But there's more. "The original motivation", says Needham later, "and [the] sustained motivation right through to today was just to put something back into the Internet community in one small way ... [it's just that] over the years it turned into a bigger way!" Now that's more like it. Putting something back into the Net seemed not much clearer than 'fun' at first, but it is at least a sign that there is something Needham, like all of us, took out of the Net

in the first place.

There is, here, the first glimpse of a process of give and take, by which people do lots of work on their creations which are distributed not for nothing, but in exchange for things of value. People 'put it' to the Internet because they realise that they 'take out' from it. Although the connection between giving and taking seems tenuous at best, it is in fact crucial. Because whatever resources there are on the Net for you to take out, without payment, were all put in by others without payment; the Net's resources that you consume were produced by others for similar reasons - in exchange for what they consumed, and so on. So the economy of the Net begins to look like a vast tribal cooking-pot, surging with production to match consumption, simply because everyone understands - instinctively, perhaps - that trade need not occur in single transactions of barter, and that one product can be exchanged for millions at a time. The cooking-pot keeps boiling because people keep putting in things as they themselves, and others, take things out.

Torvalds points out, "I get the other informational products for free regardless of whether I do Linux or not". True. But although nobody knows all the time whether your contribution is exceeded by your consumption, everyone knows that if all the contributions stopped together there'd be nothing for anyone: the fire would go out. And that wouldn't be fun at all.

Needham was a film buff, and had reason to put back into the section of the Internet that fed his interest in films. He had no plans to trade in the reputation capital the IMDb earned him for money, at first, because he had a job and was using his 'reputation earnings' as brownie points, of sorts, in the on-line world of film. His intangible wealth was being used as a ticket to the consumption of intangibles, similar to the chicken-breeder's spending on grain and cloth, but not cars, in the primitive barter economy.

In contrast, Rob Hartill, who developed the software for the Web version of the IMDb, and has maintained the Web version since its inception, is a self-described 'computer junkie'. Indeed, he's better known now as one of the core developers of the free Web server, Apache¹⁹. As for movies, he says, "I like watching films when I get the chance, but I don't take it seriously; no video collection, no LD player, no movie books".²⁰ He didn't have much reason to put anything into the Internet - at least, not into its movie-loving parts. Nor could the reputation of having worked on the "greatest possible entity" that Needham sees as the IMDb be much good to Hartill; why should a computer junkie care about what film buffs think of him?

Of course, the work Hartill was extremely computer-related. "I loved the idea of database being available to jog my memory and generally just be there to play with", he says, so 'fun' was important for him too. "For me, the Web was a new media [sic] that hadn't been exploited for anything interesting", so Hartill was, naturally enough, willing to develop an interesting application with a lot of effort, in order to give it away. Someone had put the new medium of the Web into the Net, Hartill felt obliged to put in something himself. "I was looking for things to do with the Web...and I just happened to have the [movies] database sitting in my filespace". So his involvement with movies was coincidental; what Hartill was putting into the Net concerned his area of work and interest, programming for the Web. Indeed, "if it hadn't been the IMDb", says Hartill, "I'd have burnt my eyes out with some other pro-

gramming project I'm sure".

Hartill, unlike Torvalds, then decided to cash in on the reputation capital his contribution to the IMDb earned him, perhaps answering those who asked "ask why on earth I spent so much time working on [IMDb] for no apparent gain". He went to work at Los Alamos National Laboratories. "My boss at Los Alamos hired me on the basis of what he'd seen of the IMDb" - which was pretty famous, and very popular, by that time. Hartill's contribution to it was well known, so "I didn't have an interview or even talk to [Los Alamos] on the phone before meeting him on my first day [at work]".

But the IMDb, to use Needham's words, "snowballed". It has now grown so big, that Needham is working on it full-time, as are Hartill and several others with whom they formed a company. IMDb is still free, and still relies on inputs from readers - like the original version, based on the content of rec.movies.reviews. The motivation to develop it further, according to Needham, is not very different from what it was originally - "it's seeing what the database has become and means to hundreds of thousands of users and the challenges of taking it forward which motivate me". However, the fact that Needham and Hartill have formed a company to work on the database full-time means that IMDb has to be their source of real income. It is not enough for IMDb to earn intangibles such as reputation to meet their needs for intangible information products on the Net; Needham and Hartill now need their work to make some real money, tradable in the economy outside the Net. As Needham adds parenthetically, "of course I now have [the] added motivation that if we fail then my wife and kids starve too". Reputation capital can help earn tangible monetary returns: IMDb now takes paid advertising.

Cooking-pot markets

One can attempt to estimate the monetary value of the static resources of the Internet. This could be extended to software systems such as Linux, even though this is not truly a static resource as much of its value lies in the organisation of its developer community, rather than any single copy of the operating system software.

For instance, calculating that since Linux users have, on average, much fancier hardware than Windows users and could therefore pay more for the software, the 5 million-odd estimated installed base of Linux is worth some \$500 million in annual revenues. (This sort of valuation is faulty, as not everyone who uses free software would buy a full price version; however, the Business Software Alliance uses the same method to calculate losses through software piracy, where the same caveat applies.) The Apache Web server if paid for in cash ought to have revenues exceeding \$500 million, given its commanding technical and market lead over regular commercial software.

Such valuations may be imprecise and controversial - I could using similar estimates give a figure of at least \$50 billion as the notional revenues of 'free' resources on the Net - but at least they can be reasonably attempted using statistical valuation methods not altogether unfamiliar to analysts of brickspace markets. Using the Net, though, has made it quite clear that the real worth is in dynamic resources, the communities of people that make up much of the value of even the 'static' software on-line. The worth of dynamic resources is exceedingly hard to quantify, particularly since, like communities in the 'real world', they

are riven with intangibles. Try calculating the worth in dollars of, say, your neighbourhood watch community; or your old-boys'/girls' network; or simply the folk you hang out with to discuss politics (perhaps even economics!). Not easy, maybe impossible.

Yet a rough estimate of the importance of dynamic resources is possible: just figure out how much of your energy on the Net is spent in interacting with other people - through discussion groups, interactive Web sites or sites where you give feedback, on-line chat, e-mail - and compare this with the time spent simply reading static Web pages. Until recently on the Net it was universally the case that people spent most of their time interacting with others; now with the explosion of new content, and new people who are still finding their way around, the ratio may not be so high, but I expect that it will always be, in the long run, the Net's dynamic resources that are most valuable.

If dynamic resources are the most difficult to evaluate, they are also the most intangible to trade in. Yet whenever you post to rec.pets.cats this is what you're doing: trading in dynamic resources, in your post- of-the-moment that is valuable temporarily, while your value remains. The workings of this system of trade stem from the same motivation of 'fun' present when Colin Needham developed the Internet Movies Database - which, built upon newsgroup discussions, is half-dynamic. It is Needham's need to "put back" into the Net after having "taken out" so much that drives most trade in dynamic resources. It is the cooking-pot market of a seemingly altruistic value-in-giving norm that drives the economy of interacting people.

If it occurred in brickspace, my cooking-pot model would require fairly altruistic participants. A real tribal communal cooking-pot works on a pretty different model, of barter and division of labour (I provide the chicken, you the goat, she the berries, together we share the spiced stew). In our hypothetical tribe, however, people give what they have into the pot with no guarantee that they're getting a fair exchange, which smacks of altruism.

But on the Net, a cooking-pot market is far from altruistic, or it wouldn't work. This is thanks to the major cause for the erosion of value on the Internet - the problem of infinity²¹. Because it takes as much effort to distribute one copy of an original creation as a million - and because the costs are distributed across millions of people - you never lose from letting your product free in the cooking-pot, as long as you are compensated for its creation. You are not giving away something for nothing. You are giving away a million copies of something, for at least one copy of at least one other thing. Since those millions cost you nothing you lose nothing. Nor need there be a notional loss of potential earnings, because those million copies are not inherently valuable - the very fact of them being a million, and theoretically a billion or more - makes them worthless. Your effort is limited to creating one - the original - copy of your product. You are happy to receive something of value in exchange for that one creation.

What a miracle, then, that you receive not one thing of value in exchange - indeed there is no explicit act of exchange at all - but millions of unique goods made by others! Of course, you only receive 'worthless' copies; but since you only need have one copy of each original product, every one of them can have value for you. It is this asymmetry unique to the infinitely reproducing Internet that makes the cooking-pot a viable economic model, which it would not be in the long run in any brickspace tribal commune.

With a cooking-pot made of iron, what comes out is little more than what went in - albeit processed by fire - so a limited quantity must be shared by the entire community. This usually leads either to systems of private property and explicit barter exchanges, or to the much analysed *Tragedy of the Commons*.²²

The Internet cooking-pots (in the plural, as it turns out, an examination of which is beyond the scope of this paper) are quite different, naturally. They take in whatever is produced, and give out their entire contents to whoever wants to consume. The digital cooking-pot is obviously a vast cloning machine, dishing out not single morsels but clones of the entire pot. But seen one at a time, every potful of clones is valuable to the consumer as the original products that went in.

The key here is the value placed on diversity²³, so that multiple copies of a single product add little value - marginal utility is near zero - but single copies of multiple products are, to a single user, of immense value. If a sufficient number of people put in free goods, the cooking pot clones them for everyone, so that everyone gets far more value than was put in.

An explicit monetary transaction - a sale of a software product - is based on what is increasingly an economic fallacy that each single copy of a product has marginal value. In contrast, the cooking-pot market rightly allocates resources on the basis of where consumers see value to be, in each distinct product.

A calculus of reputation

A crucial component of the cooking-pot market model is reputation, the counterpoint to ideas. Just as money does not make an economy without concrete goods and services, reputation or attention cannot make an economy²⁴ without valuable goods and services, which I have called 'ideas', being produced, consumed and traded.

Like money, reputation is a currency, i.e. a proxy, which greases the wheels of the economy. Monetary currency allows producers to sell to any consumer, without waiting for the right one to offer a needed product in barter exchange. Reputation encourages producers to seed the cooking-pot by providing immediate gratification to those who aren't prepared to pull things out of the pot just yet, or find nothing of great interest there, and keeps the fire lit.

Money also provides an index of value that aids an understanding not just of individual goods (or their producers), but the entire economy. Reputation, similarly, is a measure of the value placed upon certain producer-consumers - and their products - by others. The flow and interaction of reputation is a measure of the health of the entire cooking-pot economy.

Unlike money, reputation is not fixed, nor does it come in the form of single numerical values. It may not even be cardinal. Moreover, while a monetary value in the form of price is the result of matching demand and supply over time, reputation is more hazy. In the common English sense, it is equivalent to price, having come about through the combination of multiple personal attestations (the equivalent of single money transactions).

Money wouldn't be the same without technology to determine prices. Insufficient flow of information required for evaluation, and insufficient technology to cope with the information, has always been responsible for the fact that the same thing often have the same price across all markets.

The management of reputation is far too inefficient today to be a useful aspect of a working economy. Its semantics are poorly understood; moreover, there is nothing remotely akin to the technology that determines prices based on individual transactions in the monetary economy.

In a forthcoming paper I examine the calculus of reputation networks, especially as they would work in a cooking-pot market, and describe a possible technological solution to the problem of efficient reputation management.

Conclusion

The common assumption that the Net feels at home with free goods and vague trade because its population is averse to money, altruistic or slightly demented is wrong. It is becoming more obviously so as floods of 'normal' people arrive from the world outside, and initiate themselves into the ways of the Net.

An economic model based on rational self-interest and the maximisation of utility requires the identification of what is useful - sources of value - as well as a method of expressing economic interaction. In the cooking-pot market model, it is seen that while scarcity creates value, but value is subjective, and may therefore be found in any information at all distributed on the Net.

The cooking-pot model provides a rational explanation for people's motivations to produce and trade in goods and services, where a monetary incentive is lacking. It suggests that people do not only - or even largely - produce in order to improve their reputation, but as a more-than-fair payment for other goods - 'ideas' - that they receive from the cooking-pot. The cooking-pot market is not barter, as it does not require individual transactions. It is based on the assumption that on the Net, you don't lose when you duplicate, so every contributor gets much more than a fair return in the form of combined contributions of others.

Reputations, unlike ideas, have no inherent value; like money, they represent things of value, as proxies. Reputations are crucial to seed the cooking-pot and keep the fire lit, just as money is required to reduce the inefficiencies of pure barter markets. However, reputations require a calculus and technology for efficient working, just as money has its price-setting mechanisms today.

The cooking-pot model shows the possibility of immense value being generated through the continuous interaction of people at a numbing speed, with an unprecedented flexibility and aptitude towards intangible, ambiguously defined goods and services. The cooking-pot market already exists, it is an image of what the Internet has already evolved into, calmly and almost surreptitiously, over the past couple of decades.

The cooking-pot model is perhaps one way to find a rationale for the workings of the Internet - and on the Net, it finds expression everywhere.

NOTES

- 1 <http://www.linux.org>
- 2 <http://www.amazon.com>
- 3 Rishab Aiyer Ghosh, 1994. "The rise of an information barter economy", *Electric Dreams*, #37 (21 November), at <http://dxm.org/dreams/dreams37.html>
- 4 <http://www.apache.org>
- 5 <http://www.genmagic.com/Internet/Trends>
- 6 Rishab Aiyer Ghosh, 1995. "Implicit transactions need money you can give away", *Electric Dreams*, #70 (21 August), at <http://dxm.org/dreams/dreams70.html>
- 7 see, e.g. Linux distributed by Red Hat Software, Inc - <http://www.redhat.com>
- 8 This, and other quotes from Torvalds, are from e-mail dialogues held with the author since October 1996. A consolidated version is published as an interview in *First Monday*, Vol. 3 Issue 3, March 1998, http://www.firstmonday.dk/issues/issue3_3/
- 9 Credited to John Perry Barlow.
- 10 *Electric Dreams*, <http://dxm.org/dreams/>
- 11 Rishab Aiyer Ghosh, 1995. "Paying your readers", *Electric Dreams*, #67 (31 July), at <http://dxm.org/dreams/dreams67.html>
- 11a Michael Goldhaber, 1997. "The Attention Economy: The Natural Economy of the Net", *First Monday*, Volume 2, issue 4, http://www.firstmonday.dk/issues/issue2_4/goldhaber/index.html; Richard A. Lanham, *The Economics of Attention*, <http://sunsite.berkeley.edu/ARL/Proceedings/124/ps2econ.html>
- 12 Paul A. Samuelson and William D. Nordhaus, 1995. *Economics*. 15th ed. New York: McGraw-Hill.
- 13 <http://www.timesofindia.com>
- 14 Or the similar Blue Ribbon campaign, see <http://www.eff.org/blueribbon.html>
- 15 Tim Clark, 1996. "Gates: Explorer will be huge", C-NET News (August 1), at: <http://www.news.com/News/Item/0,4,2009,00.html>
- 16 Rishab Aiyer Ghosh, 1995. "Implicit transactions need money you can give away", *Electric Dreams*, #70 (21 August), at <http://dxm.org/dreams/dreams70.html>
- 17 Needham's quotes are from private correspondence on file with the author.
- 18 <http://www.imdb.com/>
- 19 <http://www.apache.org>
- 20 Hartill's quotes are from private correspondence on file with the author.
- 21 Rishab Aiyer Ghosh, 1995. "The problem with infinity", *Electric Dreams*, #63 (19 June), at <http://dxm.org/dreams/dreams63.html>
- 22 Garrett Hardin, 1968. "The Tragedy of the Commons," *Science*, Volume 162, pp. 1243-1248, and at <http://dieoff.org/page95.htm>
- 23 Rishab Aiyer Ghosh, 1995. "Trade reborn through diversity", *Electric Dreams*, #65 (10 July), at <http://dxm.org/dreams/dreams65.html>
- 24 On the importance of attention, see Michael Goldhaber, 1997. "The Attention Economy: The Natural Economy of the Net", *First Monday*, Volume 2, issue 4, http://www.firstmonday.dk/issues/issue2_4/goldhaber/index.html

To: "Jeebesh Bagchi" <jeebesh@sarai.net>

From: "Pankaj Kaushal" [mailto:pankaj@fig.org] Web Administrator, 19 yrs.

From: "Supreet Sethi" [mailto:supreet@fig.org] System Administrator, 20 yrs.

Sub: On hacking, free software, etc.

> *What would you mean by the term 'hacking'?*

~ **PK:** Hacking to me and to all hackers is just stuff that one should do. Most people call it the 'feature creature', and that all hackers are slaves of the 'creepy feature creature', which stands behind the shoulder of every hacker, poking him in the back and urging "MORE features!", you need "MORE" you wanna learn "MORE", you need MORE features in this application, you need to make this app BETTER. No matter what the definition of better be. And one who responds to the 'creepy feature creature' is a hacker.

~ **SS:** Hacking would be a term used for any thing that lets a particular object perform better from a user's point of view. Better could be in terms of faster (speed, efficiency) or become more flexible to that users taste.

> *What was your first hack?*

~ **PK:** Well I don't know if it can be called one, but for me it was one. The fact is that "Need" makes you hack, Need is the creator of everything. I needed 2 do it so I did it. I had a game named Donkey which was written in Basic. The objective was to help the donkey cross the road and not be hit by a car. The game was a little fast because it was written for an XT and I was playing it on a new PC, a 286. So I hacked the source for a week, understood some of it. First I changed the colours (well I had a B&W screen, but there were shades of grey and white!) Later, I understood most of the code and was successful in changing the speed of the cars.

~ **SS:** My first hack would indisputably be the use of Windows 3.1 winword macros to print 'asdf;lkj', and then transferring this to WordStar to show to my dad!

~ **PK:** I improved my alarm clock once not to ring out the alarm, and I also wrote a minimum ping pong game on my PB300. This contained some of my first original code. It started like this. A lab I used to visit was headed by a stupid teacher who banned all games, the most famous being a 2d game called Dave, and another fighter game called Twin bees. So I wrote a minimal fighter game. It had "_H_" as a character, and this character was the fighter, and you had to take it through various tunnels. I wrote it in Basic, and we used to play it a lot. Me and my friends enhanced it, but the "Fire" instruction took so long to fix properly that we soon found a new way to get games into the lab.!

It looked something like this.

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- > *What do you mean by the word 'free' in 'free software'?*
- ~ **PK:** Its what you interpret it to be. For me the free part is not the software but the information that comes with it. By using GNU/Linux I have learned so much, but still its so little that I know. Free software gives me the freedom to copy, share, and modify, and to help my friends. Software that is not free i.e. proprietary is like a dozen apples that only "you" can eat i.e. you cannot enjoy the apples you bought with 5 of your friends.
- ~ **SS:** Freedom, *mukt*. Initially free software was more for *phun* because I didn't ever have to depend on Nehru Place for software which I needed. Till now I have only bought 2 CDs of pirated software. I think I bought them in 1997. The first time the question of 'free' came into my mind was when I saw the Debian site and then the Gnu site. There are great articles on the 'free' concept at www.gnu.org.

- > *When did you start insisting on this term, as opposed to open-source and why?*
- ~ **PK:** Being open-source is just one part of free software and it's not me who started using the term open source, its people who are not making free software who began using the term 'open-source' just to be different. Why? Beats me! I started using the term free software as soon as I knew what it meant and what was the difference between the two. Why I use the term 'free software' is because the only way to refer to an apple is by calling it an "apple", and not a "monkey". That's why!
- ~ **SS:** I was well into domain of the free when this 'open source' term came up and Netscape launched its browser. It was controversial from the start.

- > *Why is there resistance to the usage of the term 'free software' in the Linux community?*
- ~ **PK:** I think the Linux community is fast becoming users' community, not a developers' community. Anyone who steps in or wants to step into developer mode, and who joins the hacker community, knows the reasons why he who or she is there, and learns the reasons why it is called free software, and why it should be so. On the other hand, users and commercial people who are interested in Linux just because it's happening don't know the meaning of free software or what GNU is all about and what free software really is. The Linux community is full of novices.
- ~ **SS:** I think the community fears that they will die if big guys like IBM, SGI etc. don't support them. IBM and other such empires tend to like the term 'open source'. So free software guys come on to the wrong side of the fence.

- > *What is the developmental model followed by the free software community?*
- ~ **PK:** Well in simple terms, the model is that if you need anything or you think someone needs something, try to find out if anyone else is already working on it. If yes, join the mailing list and try to contribute to the software. If not, or if the project has different goals than the ones you have in mind, you start a project, get a web page/ftp location for it, set up a mailing list and try to code. If it's good, then developers/beta testers/users will join in.
- ~ **SS:** The development model is plain and simple. The software should be easy to program and easy to use. The Unix model. Then mailing lists need to be made for users and developers, and a community is built around the program. Additions/Changes are made accord-

ing to problems pointed out by people using the software.

- > *Why do you think a vibrant free-software community is yet to emerge in our society?*
- ~ **PK:** Well, I think computing in India, let alone free-s/w, is in its infancy and a large number of people who relate themselves to the computing industry are trying to make a fast buck. 'Minimum Input Maximum Output' and free-s/w fits there very well, so everyone is using it but very few are trying to contribute to it. There is a lack of knowledge for what free-s/w actually stands for, and it's very hard to tell people who are brainwashed by the media image of computers about ethics.
- ~ **SS:** I think India would be the best testing ground for free software because the pirate economy concept is already wide spread. What is most important is that young and intelligent minds engage with this social imagination.

- > *What do you think needs to change in the public domain at large for there to be a active understanding of free s/w?*
- PK:** Actually, I believe that hackers are not reaching the public at all. The most important thing is the image that the media displays of hackers and their work. The Media are controlled by big media empires, which are connected to big s/w empires and are therefore brainwashing the public. The public at large is not worried about whether they are using proprietary s/w or free, or if they are pirating it. Frankly, they need not be bothered, but at least they should know that there exists an alternative to proprietary s/w.
- SS:** I think common people think that all this is part of social talk that arty people indulge in!
- ~
- > *Is there a shortcoming in the community of software developers in our society that stops them from becoming a part of the free s/w community?*
- ~ **PK:** No. Any one who is a programmer will be a hacker at heart, and would like to share and learn more. It's not software developers who are worried about free-s/w - they all love it. It's the managers, the CEOs who are afraid of it. These are the guys who don't understand it.
- ~ **SS:** Yes there is. Because there is no money in many careers, people are running to work in software without any real interest in doing it. It's a lucrative career option. People see money abundance in software, which there is in software development. Actually, its not abundance in software, its only a lack of it in other career streams.

- > *What is your present project, and what is the developmental model you are following?*
- ~ **PK:** At present I'm active in the GNU/Hurd mailing list, and am working my way to hacking the Hurd and producing something neat. GNU/India and net4rural are the projects I'm working on, as also trying to get as much free-s/w into Sarai as possible.
- ~ **SS:** Trying to solve all the crazy network and application problems that are emerging at Sarai! But soon, in the very near future, I would like to plan for a very low-cost net connectivity solution. It is a must, if the Net has to expand in India.

Fire, Work With Me

L. FITZGERALD SJÖBERG

As most of you are aware, congress has recently passed as law to allow copyright to be applied to individual works of fire, both in terms of actual fires and in terms of manufactured oxidation potential like matches and lighters.

I, for one, am glad to see justice finally served. I mean, think about it. You go through all the work to create a fire, and someone comes up to your fire and pokes a stick in it. They can then walk away, having stolen your fire, and use it for anything. Say they use it to light the ore smelter at a metals processing plant. They'd be making millions off your fire without having to give you a DIME!

Unauthorized fire transfer is exactly like walking into the original firestarter's home, stealing their VCR, TV, and all their tapes of *Earth 2*, then sexually violating their household pets on the way out. It's exactly the same, and should be prosecuted as such.

There are a few drawbacks, of course. To begin with, you can't buy matches anymore; you'll license them. And of course most licenses will forbid you to give anyone else a light without first extinguishing anything you lit with the same book of matches. But isn't that worth it to protect the rights of the original firemakers?

Well, the employers of the original firemakers, actually. Most ignition is done on a 'Fire for Hire' basis, meaning that the company that commissioned the firemaker gets the copyright. But still.

Now, the real problem is that of enforcement. Given all the fire out there, it's going to be nearly impossible for holders of fire copyright to track down the billions of dollars worth of pirated fire stolen every year. Lots of companies are working on developing fire that will only work with their proprietary ignition materials, but you and I both know that those ruthless fire pirates will find a way around any protections. Already they're starting to whine about how 'conflagration wants to be free'. Godless socialists.

The only answer, of course, is the force of law. That's why I encourage you all to write to your representatives, encouraging them to pass strict legislation outlawing the possession of any unlicensed flammable materials. The only way to stop the immoral hordes of fire pirates is to keep the tools of their brutal trade -- paper, wood, charcoal briquettes -- out of their hands. Only then can we ensure a warm and well-lit future.





Copyrighting fire!

IAN CLARKE

I was in the pub last night, and a guy asked me for a light for his cigarette. I suddenly realised that there was a demand here and money to be made, and so I agreed to light his cigarette for 10 pence, but I didn't actually give him a light, I sold him a license to burn his cigarette. My fire-license restricted him from giving the light to anybody else, after all, that fire was my property. He was drunk, and dismissing me as a loony, but accepted my fire (and by implication the licence which governed its use) anyway. Of course in a matter of minutes I noticed a friend of his asking him for a light and to my outrage he gave his cigarette to his friend and pirated my fire! I was furious, I started to make my way over to that side of the bar but to my added horror his friend then started to light other people's cigarettes left, right, and centre! Before long that whole side of the bar was enjoying MY fire without paying me anything. Enraged I went from person to person grabbing their cigarettes from their hands, throwing them to the ground, and stamping on them.

Strangely the door staff exhibited no respect for my property rights as they threw me out the door.

