

# Intellectual Property Rights and Intellectual Property Left — The Case of the Operating System Linux\*

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X XXX 1998

## Abstract

The starting point of this presentation will be the Property Rights Theory. The Property Rights Theory will be presented as the fundamental principle of private ownership in market economies and also as the fundamental principle of Intellectual Property Rights. One central idea in Property Rights Theory states that private ownership is paramount to economic efficiency, and, in contrast, public ownership is inefficient due to lack of incentives. We will put this theory to the test by examining two basic propositions. First, to what extent is the Property Rights Theory applicable to Intellectual Property Rights? Second, taking into account the rapid development in software technology, will the central ideas still hold true? In trying to answer these questions, we will examine the genesis of the operating system Linux.

## 1. The Theory of Property Rights.

The Theory of Property Rights is based on neo-classical microeconomics and provides the basis for private ownership in market economies. There are two central statements: the distribution of Property Rights only among collective entities as opposed to individuals and the restriction of Property Rights lead to economically inefficient behaviour with regard to the goods concerned. The reason for this, according to the Theory of Property Rights, is that the economic consequences of individual actions will not be borne by the individual alone but by the collective. Only private ownership facilitates efficient use of resources and offers sufficient incentives to increase production. The founders of the Theory of Property Rights, Harold Demsetz, Armen Alchian (1) and Douglas C. North (5:93), find themselves in the tradition of the bourgeois' Theory of Property Rights based on John Locke and his work "The Second Treatise of Government" (1690).

According to John Locke, the world was given to all human beings. All things brought about by nature - fruits, animals and so forth - are offered to human beings for their livelihood and for them to enjoy. This is public ownership. However, every human being 'owns' oneself and has an exclusive right to oneself. Original ownership of each individual is, according to Locke, the work of one's body and the work of one's hands, because "(...) labour puts a distinction between them and common. That added something more than Nature, the common mother of all, had done, and so they become his private right." (§28) (3:354). To appropriate these gifts of nature and put them to their intended use, they have to be taken into possession, for example through hunting or gathering. In this process, labour

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\*Published in: E. Altvater and K. Prunskiene (Eds.): Intellectual Property Rights in Central and Eastern Europe, IOS Press, Ohmsha 1998. This version of Feb 2002 with minor corrections.

is added to nature. This takes away a part of the original nature and adds something different instead. Now a claim exists to an individual, a private right to a part of nature. This claim excludes public rights, which had existed before.

Locke considers work as not merely the work of each individual. Typical for his time, he considers work in the social context: "Thus the grass my horse has bit; the turfs my servant has cut; and the ore I have digged in any place, where I have a right to them in common with others; become my property, without the assignation or consent of any body. The labour that was mine, removing them out of that common state they were in, hath fixed my property in them." (§28) [3, 354].

So Locke also means by "my" work, the work from "my" slaves and horses. The creation of private Property Rights therefore requires, as a prerequisite, a relationship of power between the "master" and nature and the slave. It provides a specific social relationship and a specific relation to nature. Common ownership, according to Locke, may exist only in untouched and unspoiled nature and is as such of no use to men. Nature becomes useful only through labour and, subsequently, private property. The conclusion is that only private property is beneficial to men. The right to ownership is valid as long as the owner uses his goods before they perish or exchanges perishable goods against goods which are not perishable, for example, money.

According to Locke, the possession of goods, which are not perishable, does not interfere with the rights of others, irrespective of the amount of goods accumulated. The opportunity to exchange acquired, perishable goods for money also creates conditions for the accumulation of property because "(...) Where there is not something, both lasting and scarce, and so valuable, to be hoarded up, there men will not be apt to enlarge their possessions (...)" (§ 48)[3, 366]. Furthermore, Locke not only sees private property as defined by labour, he also recognises its limitations: "(...) The same law of nature, that does by this means give us property, does also bound that property too." (§ 31) [3, 355]. Locke already realises, that the claiming of Property Rights resulting from private property, bears external effects: "(...) Nor was this appropriation of any parcel of land, by improving it, any prejudice to any other man, since there was still enough, and as good left; (...)" (§ 33) [3, 356]. The conclusion is that, if there is not enough land available, the opportunities to acquire property rights through labour are no longer evenly distributed.

The American economic scientist Douglas C. North also argues in this way. To him, economic growth in societies is based substantially on the efficiency of Property Rights. Efficient, in this sense, means providing enough incentives for active participation in the economic process by providing individuals with access to all the knowledge necessary to facilitate economic gain. The reason for the first economic revolution was not that the main economic activity changed from hunting and gathering to an agricultural economy. The actual revolution was the transformation within the incentive structures resulting in the increase of individual benefit. The cause of this change within the incentive structure was the transformation from public ownership to private ownership, as it was "(...) Thus labour, in the beginning, gave a right of property (...)" (§ 45) [3, 364]. Labour and the division of labour, as Adam Smith later proclaims, are the basis for the "Wealth of Nations"(8).

From North's point of view, there is no incentive to improve technology or to acquire knowledge if the means of subsistence remain in possession of common ownership. Exclusive right to private property, from which the owner can profit, offers, in contrast, a strong, lasting motivation to increase efficiency and productivity. The rapid progress of humankind over the last 10.000 years - in contrast to the slow development in the centuries before, where people were hunting and gathering - has its cause in the historical transformation of the incentive structure of economic individuals, which was generated through the establishment of private property. North states that the nature of property and disposal rights change every time the expenditure for introduction and compliance of

Property Rights change. Fewer transaction costs lead to more profit and, subsequently, to more efficiency in the underlying property right. Even North criticises, in the same manner as Demsetz and Alchian, that common ownership causes an excessive claim on goods and resources. Moreover they criticise common ownership, as it offers no incentives to maintenance or careful treatment of resources. This is also the subject in the famous proposition "Tragedy of the Commons" from Garrett Hardin [2, 1243-1248]. On the basis of this anthropology and the historically derivative propositions and, considering the use of private property rights applied to intellectual property, we have come to the following results: at first, it seems doubtful to us whether the Theory of Property Rights may be applied to intellectual property as well. Private property, by definition is exclusive. To call something one's own, requires demarcation to show what is "mine" in contrast to what is not "mine". Being entitled to Property Rights is based on the "principle of exclusion" [4]. Demarcating tangible goods such as a tract of land, for example, is easily accomplished by putting up a fence and a sign indicating: "Private Property". In addition, it becomes necessary to create an underlying legal framework which legitimates the claim to private ownership.

In contrast to tangible goods, it is difficult to distinguish intangible goods. It is not feasible to assign intangible goods to their creator and exclude others from their use. From the moment an idea is expressed, the recipient is immediately in possession of that idea, but the person who expressed the idea has not lost it. The scientific results of research or computer-programmes may be duplicated many times without reducing their quality. Therefore the criticism of common ownership, concerning the waste of resources, is not valid in the realm of Intellectual Property Rights. It is impossible to use up or to "waste" ideas, knowledge, programmes, and so forth. Scarcity of resources does not exist in the field of intellectual property unless it is artificially generated, by restricting access to existing knowledge.

Through rules of exclusion such as protection by patent, the resources of knowledge are artificially restricted. This sort of problem occurs predominantly in the scientific area. Knowledge and research undergo constant change and expansion. Science requires cooperation and a whole host of performers. The bigger and more multifarious the intellectual input is, the more progressive and more efficient becomes the research. This is also true in the field of Software-Development. In the following, we will show that protection of Intellectual Property by patent may hinder progress. The main emphasis of our considerations concerns the thesis that only private ownership leads to further development and the acquisition of technical innovations. A steadily increasing group of developers and users in the realm of software-technology give efficient product-development a push based on "common ownership" and "Copy Left". This seems to prove the opposite. As an example for this trend, we will illustrate the genesis of the PC-Operating System — Linux.

## 2. What is Linux?

Linux is an Operating System for personal computers that is freely available. An Operating System is a collection of programs and subprograms responsible for running the computer hardware. It is an integral part of the interface between human being and computer [9, 37]. Basically, Linux derives from another, very powerful system called UNIX. Now ranking as one of the most widely used operating systems in the world, it was created in the early seventies by Bell Laboratories of the American telecommunications giant, AT&T. Back then, there was not much use for operating systems, thus AT&T decided to grant licenses to universities for research purposes. Since then, generations of

students have developed and expanded this system [6], much to the benefit of almost all other contemporary commercial software systems.

In the eighties, AT&T restricted the free use of UNIX and decided to charge license fees, as more and more powerful and important companies such as IBM and Sun Systems had discovered that UNIX was the most versatile system for their workstations and servers. Currently several large corporations in many countries use UNIX to run their computer networks. Also, most internet computers all over the world use UNIX to their advantage. In the late eighties, independent software developers and students in different places all over the world came up with the idea of a freely accessible operating system. In Finland, a student of computer science, Linus Torvald, had developed, with much help from friends and volunteers, a simple system modelled on the basic design of UNIX.

The first results of the project were published in the internet in 1991. During that year, the number of people who participated via e-mail in its further development constantly grew. Many LINUX developers were students of computer science or programmers who worked in their spare time. They donated time, ideas and creativity towards the further development of the new LINUX system. Today the LINUX system is as sophisticated as commercially available systems such as WINDOWS or UNIX. Recently, LINUX was voted best operating system of the year by the American computer magazine *Infoworld* [7]. Asked how they judge Microsoft's rival product, LINUX users sometimes give a very plain answer: "Hiroshima 45, Chernobyl 86, Windows 95". Currently LINUX runs on an estimated five million computers' all over the world<sup>1</sup> in universities, private households, and already in some commercial enterprises. According to an opinion poll by Datapro, an American institute, 27% of the companies in Germany use the operating system LINUX.<sup>2</sup>

Naturally, it could be assumed that a volunteer group of programmers who work simultaneously on a very comprehensive operating system would not be able to accomplish anything. In the beginning, LINUX was known as "a system from hackers for hackers". After a while, however, it became apparent that one of the most effective developments in computer programming was taking place. The decisive element in the success of LINUX was that it was accessible to all developers and that all necessary development tools could be used free of charge. A considerable quantity of the necessary tools was provided by the Free Software Foundation (FSF), which was founded in the eighties in America by the programmer Richard Stallmann in direct response - and protest - against AT&T for licensing the UNIX system. Stallmann's objective was to also develop a freely accessible operating system. It became necessary to turn the principles of Intellectual Property Rights upside down. This will be explained in more detail in the next section.

### 3. Open Source Software.

Software is written in a special programming language. Then, a so-called compiler is used to translate the programming language into a specific language the understood by the computer. Only then may a computer run the particular software programme. Once compiled, the original programming language will no longer be needed. A piece of software that exists in its original programming language is called a source code. It is comparable to the secret recipe of Coca-Cola. Without the source code, software cannot be changed or further developed. It is almost as impossible to trace the source code from a compiled piece of software, as it is to work out the ingredients of Coca-Cola from its taste alone.

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<sup>1</sup>The Linux-Counter, on the internet: <http://counter.li.org>.

<sup>2</sup>"Betriebssysteme von A-Z", a series of german tv station 3 Sat., on the internet via 3Sat-Homepage <http://www.3sat.com>, downloaded May 14, 1998.

Commercial software companies keep the source codes for their software secret and place the software and the corresponding codes under copyright law to protect them against unauthorised use.

To fight the licensing of software, which led to commercialising of the software world, the Free Software Foundation (FSF) was founded. Its main objective was, as it was for LINUX, to create a free of charge, freely available operating system. Named GNU (GNU is not UNIX), it was meant to be an alternative to UNIX that by now had become a commercial product. The philosophy behind its approach explains the FSF on the GNU website:<sup>3</sup> “The GNU project was conceived in 1983 as a way of bringing back the co-operative spirit that prevailed in the computing community in earlier days to make co-operation possible once again by removing the obstacles to co-operation imposed by the owners of proprietary software. In 1971, when Richard Stallman, started his career at Massachusetts Institute of Technology (MIT), he worked in a group which used free software exclusively. Even computer companies often distributed free software. Programmers were free to co-operate with each other, and often did. By the 1980s, almost all software was proprietary, which means that it had owners who forbid and prevent co-operation by users. This made the GNU project necessary. Every computer user needs an operating system; if there is no free operating system, then you can’t even get started using a computer without resorting to proprietary software. So the first item on the free software agenda is a free operating system.”

By the 1990s, the Programmers of GNU had either found or written all the major components except one — the kernel (literally the ‘seed’ or the nucleus of a software system). At the same time, Linus Torvald, as we have explained above, put his simple operating system on the internet. Combining Linux with the almost-complete GNU system resulted in a complete operating system: a Linux-based GNU system. However, the GNU project is not limited to operating systems. The GNU-Programmers aim to provide a whole spectrum of software, whatever many users want to have. This includes application software. They also want to provide software for users who are not computer experts. Actually they are working on a drag-and-drop icon desktop to help beginners use the GNU system. In addition they also want to provide games and other recreations. Some free games are already available.

How far can free software go? “There are no limits”, so the answer from the GNU-Community, “except when laws such as the patent system prohibit free software entirely. The ultimate goal is to provide free software to do all of the jobs computer users want to do—and thus make proprietary software obsolete”. Consequently, the Free Software Foundation developed a new idea: ‘Copyleft’ instead of ‘Copyright’. It guarantees that software is basically free of charge and can be altered by users to any extent desired. The FSF turned the purpose of Intellectual Property Rights upside down: the GNU General Public License (GNU GPL) protects authors of software programs from having their software appropriated by other users as private property. Software, which is bound by this licence, becomes public property, much like a park, which is cared for by the people who use it. No one is entitled to own exclusive rights. Any one who uses the programme, such as amateur programmers, students of computer science or even companies, are invited to make suggestions for further development. Which one of the suggestions will become part of the program is usually decided by the original authors.

The GPL grants every one who wishes to use GNU software the following rights: “First, the freedom to copy the program and give it away to your friends and co-workers; second, the freedom to change the program as you wish, by having full access to source code; third,

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<sup>3</sup>GNU-Homepage <http://www.gnu.org>, downloaded Mai 11, 1998.

the freedom to distribute and improved version and thus help build the community". The philosophy of open source software calls into question the efficiency of private property as it was previously described. Richard Stallmann states that private Property Rights on software are wasteful and damaging for society as a whole. In comparison to commercial software development, this new alternative, with its idea of departing from exclusive Property Rights and using many volunteer programmers to develop new software, increased production efficiency dramatically.

Therefore, the idea of public property leads to a substantial reduction of transaction costs for the LINUX community and the members of the FSF, respectively. Because associated members have twenty-four hour access to necessary software and developing work-foster members via the internet, information costs can be greatly reduced. This also makes possible a degree of flexibility in the co-ordination of work, which would not be conceivable for a group of employed programmers, working for an isolated commercial software company. Rectifying possible mistakes is easier and quicker, and as there are more suggestions and ideas, and they may be implemented much faster.<sup>4</sup>

Beyond this the necessity for enforcing private Property Rights becomes obsolete. Costs are also brought down. In the first instance, it seems that the trend towards collective ownership on the means of production is negligible and restricted only to the outlandish spheres of a very special occupation, but this is not so: without open source software, the internet would not be of the high level of technical sophistication we experience today. Half of the internet servers run a program called Apache, a free programme that is constantly developed and updated by its creators. The same is true for internet-protocols, which are responsible for the transfer of data between computers all over the world. These programmes are also freely available. Even Netscape Communications Corporation, based in Mountain View, California, has discovered the creative potential of collective work. They have recently released the source code for their well known World Wide Web Browser Netscape Communicator, in the hope that programmers all over the world will feel encouraged to further develop and subsequently perfect their product.

At this point we would like to clear up a possible misunderstanding. It is not prohibited to earn money from a software programme that is under the GNU General Public License. On the contrary, it is perfectly legitimate to distribute any software programme by the FSF but financial gain is only allowed from additional services. Within the LINUX community, a small commercial software industry has emerged: some software companies have tailored the basic LINUX operating system to meet the specific needs of their clients. When they distribute the system, they are allowed to charge for services like support, advice or the distribution of operating manuals.

#### **4. Intellectual Property Rights : Too Much or Not Enough Regulation?**

Considering this development in the field of programming, the thesis that only private property creates economic efficiency becomes doubtful. It seems that at least in the field of Software development, common property is an efficient alternative. The final product benefits substantially from the great number of 'common owners' and co-developers, who may pool their resources, discover more mistakes during the development process and are faster in eradicating them. In general, they are faster and much more flexible than small

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<sup>4</sup>The LINUX community is very efficient. In October, 1996, a fault was discovered in a Microsoft software programme which caused system crashes not only for Windows-PC but also for computers that ran other operating systems. It took them only two hours provide effective protection for the LINUX operating system whereas commercial software companies needed weeks to eliminate the problem.

teams of programmers who work for commercial companies under the restrictions of secret source codes and stringent copyright laws.

To achieve the same results, commercial software companies need more resources and must invest more money. In the sense of keeping down transaction costs, the organisational structure of the LINUX community and the FSF, respectively, seem to offer more efficiency. When the thesis of Douglas C. North, that changing transaction costs bring about a change in Property Rights, is applied to LINUX, it appears that, at least in the field of software development and communication, this very change is taking place. It seems that in software development collective ownership of the means of production has a progressive effect.

The question remains, however, whether this is only due to the specific conditions in the field of software technology or whether it was possible to apply this to other areas of intellectual production. Evidently, the success of LINUX is based on co-operation in creating a pool of knowledge and experience and by providing free and unlimited access to accumulated information. Only optimal use of resources offers a basis for high-quality products.

We feel that this fact may also be applied to other areas of science and research. Denying or restricting access to already existing knowledge through the prerogative of private ownership may lead to the exclusion of many capable minds. This would be counterproductive to the improvement and further development of knowledge in general. For scientific results and society, private property appears to be counterproductive rather than useful. But where is the individual motivation in common ownership, that, according to the orthodox theory, does not at all exist? There is more than only monetary incentives to achieve something. Richard Stallmann of the FSF explains: "They got many kinds of non-monetary rewards: fame and appreciation, for example. And creativity is also fun, a reward in itself."<sup>5</sup> Free software developers are, therefore, not necessarily motivated to earn much money from proprietary software.

Another incentive is to create a good product—a product that is more powerful than comparable commercially available products. This points to a very important aspect: market forces alone are no guarantee for good products. Had the World Wide Web been developed under market conditions, without free access to resources and the huge number of voluntary developers, it would still be in its early stages.

Only the rapid development of the internet, based on free access to resources, brought about world-wide co-operation that, in turn, facilitated the development of the operating system LINUX. With the help of faster, more precise and more flexible communication techniques, the world-wide exchange of data, knowledge, and news will increase dramatically. As a consequence, intellectual property will become more and more difficult and costly to protect. Private property, which is based on exclusion must, at least in this field, reach its limits. That private property creates incentives and common property destroys incentives has been the central statement of traditional bourgeois theory of private property since John Locke. This has become part of the transformation theory of post-socialist countries, where the aim is to increase efficiency by privatising the economy. However, we find it important to put this black and white philosophy into perspective.

It should be carefully considered whether private property always leads to the intended increase of efficiency, or whether, in some circumstances, it could have the opposite effect. These considerations are important with regard to the fact that the basic principle of private property is exclusion. Intellectual Property Rights, if only temporarily, lead to the exclusion of knowledge that would otherwise be of great value to the whole of society.

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<sup>5</sup>Quoted from the GNU manifesto, online via: GNU-Homepage <http://www.gnu.org>, downloaded May 17, 1998.

Post-socialist countries currently go to great lengths in implementing, without further consideration, the property laws of the WTO and OECD countries. Simultaneously, there is a new trend emerging in Western societies that goes in the opposite direction: the "Intellectual Property Left". It seems advisable to rethink the function and usefulness of private property and also the central theories of traditional, bourgeois philosophers. With the introduction of Intellectual Property Rights, the main objective should be to carefully consider all the implications and not simply place the demands of market economy above everything else.

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