Free Software and Romania
Achievements and Opportunities

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Tudor Hulubei <tudor@cs.unh.edu>
Andrei Pitiş <pink@roedu.net>

Abstract

In this paper we will discuss the impact that free software had on the development of the Romanian networking infrastructure. We will point out the advantages and opportunities of using free software based solutions in both public and private institutions. A special consideration is being given to schools and universities. Some of the aspects presented here are specific to Romania, but we believe many do apply to other developing countries as well.

1 History

Computers first appeared in Romanian colleges quite a while ago, but PCs have only become accessible to students around 1991. Two years later, "Politehnica" University of Bucharest, the largest university in the country, started providing full Internet access to both its professors and students.

A key group in the development of P.U.B's infrastructure has been the Communication Center, which built the physical network with the technical and financial help of the Technical University in Darmstadt and later the German Scientific Network - DFN-Verein. As part of that effort, the use of free software solutions has been promoted throughout the campus. Although there were many aspects to the evolution from a few computers connected to the outside world via a 9600bps modem line to todays network of 14,000 computers connected via two satellite links totaling 5.5Mbps, we will discuss here only those aspects that are relevant in the context of the free software (r)evolution.

The work on the development of P.U.B's network started around the time the first GNU/Linux distributions came out. Although the 1993 PC's were not powerful enough to handle all the university's networking services[1], they were

[1] The Communication Center's main machine was initially a HP server running HP-UX, later replaced by a Sun Enterprise running Solaris, soon to be upgraded to UltraPenguin.

more than adequate as routers or small ftp servers for the domains corresponding to the various departments in the university. In time, as the network grew bigger and bigger, so did the performance of the PCs of that time, and although some of the GNU/Linux systems acting as routers have been replaced by specialized hardware, they have rarely been replaced by proprietary systems.

The role of the Communication Center has been gradually extended from that of a university provider to that of a provider for all the non-profit organizations in Bucharest and in the rest of the country. The biggest beneficiaries were, of course, the educational institutions, and the service and support were free of charge.

The Center's policy was simple. Initially, given the lack of technical expertise in most of the institutions requesting connectivity, the machines supposed to act as gateways, routers, etc. were brought to the Center, left there for a few days for installation, configuration and testing. Software of choice? The latest and greatest version of a GNU/Linux system.

A few departments tried to use Windows NT as a domain server. The Communication Center offered them no support other than providing the required network parameters. Some of them gave up due to performance/reliability issues. Others insisted (department policy, personal preferences, etc.). We still don't know what happened to them...

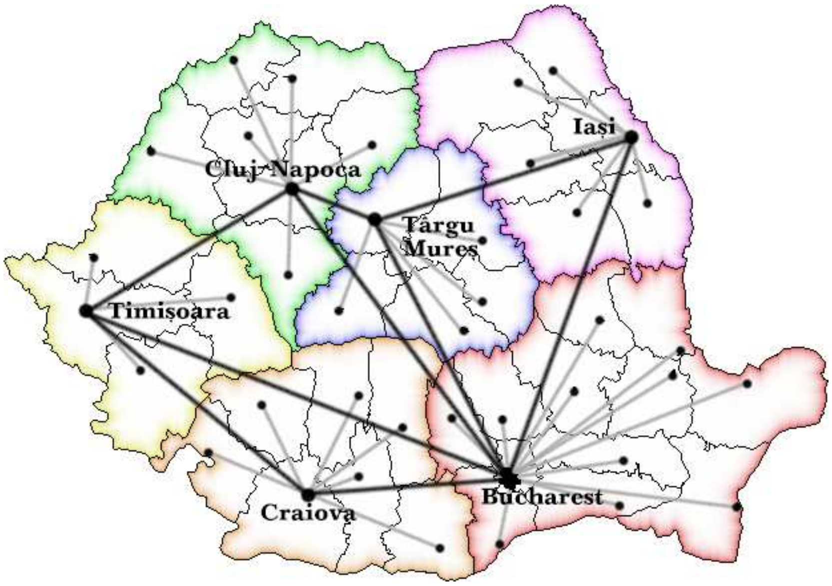

Fig. 1: RoEduNet
14,000 computers, 120,000 users, 500 institutions

Eventually, in 1996 the Communication Center became a national provider and changed its name to RoEduNet (The Romanian Educational Network, http://www.roedu.net/). Its growth, presented in Fig.2 and 3, was made possible by the small group of enthusiasts at the Communication Center. They used and promoted free software-based networking solutions to decision factors as a very reliable yet inexpensive way of extending and upgrading the network. The Ministry of Education was very pleased with the proposed solutions, as its budget was very limited.

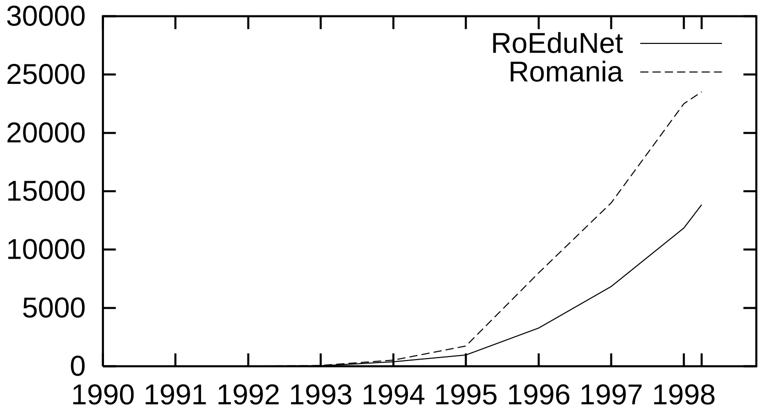

Fig. 2: Number of hosts (RoEduNet/Romania)

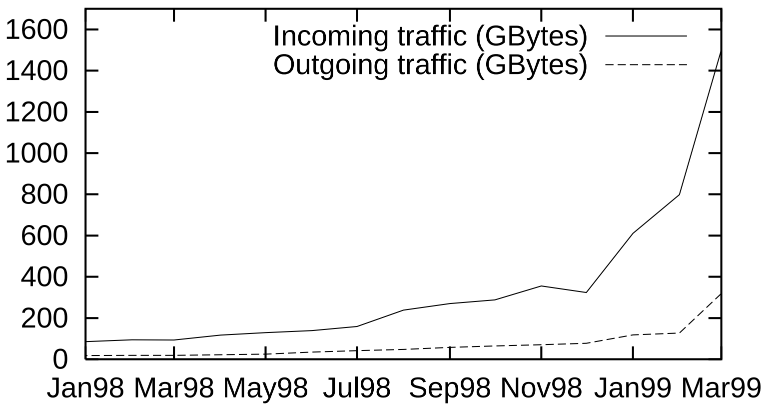

Fig. 3: RoEduNet: Incoming and outgoing traffic

The current RoEduNet structure (which includes only educational establishments and non-profit cultural and scientific research organizations) is presented in Fig.1. 90% of the servers in this network run some flavor of the GNU/Linux operating system. After supervising the creation of what is arguably the largest network in Romania, we believe RoEduNet is currently in a very good position (both technically and politically) to further promote solutions based completely on free software.

Free software also made its way into the academic curriculum at the Computer Science Department. Students are being taught Perl, Lex, Yacc and Java. Since the number of computers available is still insufficient, the students must complete their projects at home, and many of them do so on their own computers running GNU/Linux.

2 Contributions

As free software became more and more popular, Romanian students (in particular those in the Computer Science Department) realized its benefits, and some of them contributed back to the community. We donated the copyright for the GNU Interactive Tools[2] package to the Free Software Foundation, developed an Unix-like operating system called Thix[3] that is currently used in the Computer Science Department in the Operating Systems course, a microkernel named PicOS[4], a distributed log splitter[5], etc. There is also work being done on various fronts, including the translation of various GNU utilities (emacs, bash, glibc, etc). Complete translations of the two popular desktops, KDE and GNOME, would be most helpful, making GNU/Linux more attractive to people that do not understand English.

3 Context

3.1 Access to Information

One of the major problems in Romania is the access to information. There are several reasons for that, none of them being political in nature.

The first reason is quite obvious - poverty. Most Romanians cannot afford a PC, nor can they afford paying for Internet connectivity.

Those who can afford a PC and Internet connectivity are usually limited to email, as local calls are very expensive. Just to give an idea, the average salary in Romania is somewhere between $100 and $150. An unlimited PPP account with any major commercial provider is between $25 and $40. University students are probably the most fortunate category, having access to the Internet at the university (probably that is why you would find so many free software advocates among them).

Another reason why people are not well informed is, surprisingly, the press. Without over-criticizing the Romanian press, we believe it is safe to say that it only emphasizes events that "sell", not events that "matter". Something so "remote" as the free software movement is not yet on the radar of most publications and TV stations[6]. People in other countries can turn to the Internet for

[2] See http://www.cs.unh.edu/~tudor/git or ftp://ftp.gnu.org/pub/gnu/git.

[3] Available under GPL from http://www.cs.unh.edu/~tudor/thix.

[4] Available from ftp://ftp.roedu.net/pub/PicOS.

[5] See http://www.roedu.net/~pink/logsplit/.

[6] This is not necessarily specific to the Romanian press (anybody remember CNN's coverage of the Kasparov vs. Deep Blue match?).

technical news. Romanians can't.

With only a very small percentage of the population having access to technical news on a regular basis, it is understandable why so many people simply have no idea whatsoever what's currently happening in the software industry, what are the trends, etc. To further complicate matters, things are happening at very fast pace, with companies making announcements of support each and every day. People that do not keep track of this fast changing landscape are unlikely to consider the free software model as a viable alternative.

Sadly, there is no immediate solution to the problem of lack of proper access to information, and the reality is that it's hard to convince a business partner of the reliability of a system or model he/she never heard of. To make the free software ideas somewhat more accessible to people who do not understand English, we recently translated the GNU General Public License into Romanian (there are plans of translating the GNU LGPL as well). Both will be available soon through the Free Software Foundation's main site[7].

3.2 Cost

Romania is a developing country, were cost is of paramount importance. Free software helped keeping the costs down - should we have tried alternative, proprietary solutions, our network wouldn't have been what it is today (nor in terms of quality, neither in terms of cost). We would like to take this opportunity and thank to all the people who made that possible.

While in general we are advocating free software as offering people freedom of choice, we acknowledge the fact that not everybody sees that as being the strongest argument when comparing free and proprietary software.

We'd like to make a point about the distinction between free as in "freedom" and free as in "no cost". It is important for that distinction to be made in some cases, depending on the background, interests and concerns of the institutions involved. Sadly, no matter how attractive the "freedom" argument is for some people, it is irrelevant for a large category of government and business people. For them, cost and efficiency are the most important issues, and the free software model can seem counterintuitive and utopian. In such situations, the argument should be centered around cost effectiveness - bringing up freedom can make the person advocating it look immature in the eyes of the businessman.

Convincing the average Romanian businessman that the model works is not going to be easy, especially if he doesn't have any previous knowledge about the subject. There are however a few examples that can be used. One of them is the Y2K problem, pointing to a major flaw in the economics of the proprietary software model. Another one is that of the major companies jumping in the free software bandwagon (IBM, Sun, Apple, Hewlett-Packard). The "me too" syndrome should not be underestimated.

[7] http://www.gnu.org/copyleft/

3.3 IT Infrastructure

Today, many institutions have a very weak (sometimes almost inexistent) IT infrastructure. Even "Politehnica", while fully connected to the Internet, doesn't have any kind of computerized system to keep track of students, books, schedules, etc. Before graduating, each student has to personally go to each and every library in the university (there are about 20) and obtain an official proof that he returned all the books. There is no centralized way of verifying that, and most of us got used with the idea that for each degree earned there we have to spend two days of our life performing this silly ritual.

This weak IT infrastructure is clearly something that will be improved over time. Our point here is that the current situation is a huge opportunity for the free software community to step in. The majority of institutions, whether private or public, do not have the kind of money required to buy solutions from IBM, Baan, SAP[8] and the likes, and would most likely be interested in alternative solutions, possibly paying for enhancements to existing free software projects (i.e. KOffice).

There are a few things though that need to be considered in order to make sure that the people running these institutions understand the free software model and its benefits. We will discuss them in the following section.

4 Opportunities

Someone made a very interesting observation a while ago, namely that the market is driven by momentum, and not necessarily by the number of users an operating system has. In terms of software, Windows users today have pretty much everything they want, and thus what generates business is the need for software in the markets where the number of users grows very fast and where users need software that does not yet exist. This observation is especially true in Romania (and most likely in other developing countries) since even people that would otherwise use Windows, might find it difficult to allocate a month's salary just to buy the operating system, let alone the additional applications required to make it useful. In the past, such people used unauthorized copies of whatever software they needed, but with the new copyright law in place, people will hopefully stop doing that and use software that is both cheaper and legal to copy/modify/redistribute.

4.1 Support

One type of business that is likely to grow very fast in Romania is that of software support. With proprietary solutions being so expensive for the average Romanian business, solutions based on free software are very likely to succeed. The demand for support for freely redistributable software will grow in both the operating systems and applications space.

[8] It is estimated that an average 1000 users installation of SAP R/3 users costs $4,000,000.

With cost being such a critical factor in developing countries, companies selling support for free software programs can advertise themselves as complete solution providers, as there is no need to buy the software - just the support (one side-effect of the fact that computers are so expensive compared to what people make for a living is that most companies selling computers in Romania do not force their customers to buy any operating system). The advantage that Romania and other developing countries have is that there is no need to displace any existing infrastructure based on proprietary software. There is a void that needs to be filled, and free software will be able to do that just fine, provided that there are people willing to promote and implement the right strategy. We are hopeful that the new generation of students, being raised in an environment that is far more sane than it used to be in the old days of proprietary software domination, will help free software penetrate further the educational market as well as the commercial one.

4.2 Software Contracts

The software contracts that we believe will benefit everybody the most are those which ends up producing GPLed software. The developers would benefit from a faster development cycle - external testers and developers might be attracted to the project, contributing significantly to its quality. The institutions ordering the project will benefit by having full access to the software they are paying for, as well as the capability of fixing problems even if the company that originally wrote the software gets out of business. The Y2K problem is a powerful example of the kind of trouble that proprietary software can cause.

4.2.1 Government

Government payed GPLed projects will be available in source code form not only to other government institutions (which could in theory get it anyway), but also to any other interested parties. This way, the government uses taxpayers' money to perform a service that is useful to the society. We don't see this as being different from fixing the roads, or building a bridge. What needs to be done is convey the idea that by promoting free software the government keeps the IT related costs down, helping the economy to recover.

Let us pick a small example: financial software. During the transition from the previous communist regime to the current democratic regime, there have been several changes in the Romanian legislation. There were a few competing financial programs on the market, all of which were either not up to date (legislation wise), or way too expensive. As computer science students, we've got quite a few requests for creating "cracked", unauthorized copies of those programs from people who were otherwise running small, but legitimate businesses. We turned down those offers, of course, but the point is that people running small businesses where unable to afford the price of a commercial, proprietary financial software tool. Should the government develop such a tool, it would help prevent the so called "software piracy"[9] problem, help small businesses be more efficient, and ensure a common platform for all financial data.

4.2.2 Companies

Depending on the nature of the contract, the institution/company that will end up holding the copyright of a GPLed piece of software might be worried that competitors can use it free of charge. This is a legitimate concern, but many software companies these days seem to get a point stressed over and over by free software advocates, namely that the competitor's access to the source code is a minor disadvantage when compared to the benefit of having a potentially unlimited number of external, unpaid developers working on the project. *Netscape* did it with the browser, *Sun Microsystems* recently did it with **Java**, *Troll Tech* did it with their flagship product, the **Qt** library. For economical reasons, if not for ethical ones, Romanian companies would benefit from the adoption of a similar model.

It looks like in the future more and more companies will begin offering their software free of charge and provide support for it as a mean of obtaining revenue. The landscape is changing and people with decision power will eventually figure out that by making the source code public you can attract more developers, raise the popularity of your product, and eventually increase the demand for support.

Adapting the existing free software base to the specifics of the Romanian environment is something that should (in our humble opinion) be done by the government or by software companies. It can be tedious, and students are more likely to work on projects that somehow relate to their work, rather than spend time translating huge amounts of manuals and documentations. Companies interested in using a particular free software product in a commercial environment would save money by translating and adapting that product rather than buying an equivalent proprietary solution. Moreover, in contrast with the average student, the government and/or software companies are much more likely to have the financial power to hire professional translators, economists, lawyers, or whatever professional help is needed for the adaptation of a particular project.

Romania doesn't have at this point something that can be called a "software industry", without the risk of a gross exaggeration. The major reason is cost and tough international competition. A small example will help understand the situation.

A few years ago, while we were still undergraduates at P.U.B., we worked part time for a software company. The product that we were supposed to develop was a simple text editor - the company's business "strategy" was to create a product that would very small, perform the basic text editing operations

[9] It is public knowledge that this is considered a real problem in developing countries, regardless of whether or not free software advocates care about it. Ideally, free software will end up rendering the copyright law obsolete, but in the meantime, we can use in some contexts the argument that by promoting free software the government will have a good shot at reducing the number of copyright infringements. Nobody steals fresh air.

reasonably fast, and be marketed as cheap alternative to the expensive text editors from Microsoft and others. The reason why that never worked was that most people have been exposed at some point to the existing technology and were unlikely to buy the inexpensive, but technologically inferior solution when they could simply make an illegal copy of the more expensive, but technically superior package.

Clearly, no Romanian company will have the financial power required to fight Microsoft Office, even on the local market. The only way to attract a big number of developers to a project is to make it free software.

4.2.3 Schools

Schools and other educational institutions might be more sensitive to the "freedom" argument. Although price is important, especially in developing countries, teachers should be more concerned with what their students get used to, rather than how much money the school pays for the equipment. Although free software usually comes with a very small price tag (0, if you exclude installation/administration costs) there are situations where commercial software vendors can make "attractive" offers to schools. There were rumors at some point that Microsoft was offering free or low cost computers to Romanian schools, provided that they install and use Windows.

The teachers need to be aware of their options in order to make the right decision. They need to know that it is in their students' best interest to get used to high-quality software that the students have the freedom to study, modify, improve, and redistribute, rather than some poor-quality software that surrounds them with an endless list of license agreements and things they're not allowed to do. Students intending to pursue Computer Science will study Unix in college anyway, so getting them used with the system as early as possible is a good idea. In that context, Windows can be used as a very good example of how things should not be done.

Recent announcements from Mexico (the Scholar Net project) and France, both planning to install GNU/Linux-based systems in primary, junior high and high schools, and working to make them user-friendly for students, are good examples of where the Romanian educational system should be going. The RoEduNet team is currently working on a proposal that is similar in spirit, although different in detail - without going into the specifics of the project, we will just say that the proposal includes a strategy for bringing computers into the Romanian junior high and high schools, and the development of a GPLed educational software platform. The idea is to create a large community of teachers that contribute computerized materials for their courses. The design of the software platform should make it as easy as possible for teachers to input their material, and for students to accumulate it.

5 Conclusions

The free software movement had a dramatic impact on the development of the Romanian Educational Network, the largest network in Romania. It basically helped building the network from the ground up, in a technically sound manner and without the sky high costs usually associated with proprietary software.

With such a large installed base, we are hopeful that free software will continue to make inroads into both the educational and commercial market. We have presented here a few ideas that might be helpful in arguing the benefits of free software to the Romanian Government, to other public and private institutions. We are hopeful that the above institutions will adopt the free software model, building more cost effective IT infrastructures and offering more freedom of choice to people.