Desktop4education: Bringing new environments to Austrian schools

In 2003 the secondary school of Weiz, Austria, started the development of an open source operating system. The overall objective has been to develop a system that was easy to maintain, sustainable in the future, and free of licensing costs: the so called desktop4eduation. Although open source software is not extensively used in Austrian schools yet, it is becoming more and more important, as the government tries to promote free software over proprietary solutions increasingly. Today the desktop4education project is being frequently used as a reference case by the Austrian Federal Ministry for Education, Arts and Culture and as such promoted by them throughout Austria.

Quick facts

Name	desktop4education
Sector	Education
Start date	2003
End date	ongoing
Objectives	Creating an open source operating system for schools in Austria
Target group	Students, teachers
Scope	Regional, national
Budget	N.A.
Funding	Partially national
Achievements	Development of a well functioning operating system, which is used increasingly.

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Introduction

In 2003 Helmuth Peer, a math teacher at the Weiz secondary school (Bundesgymnasium) decided that it was time to migrate the schools' IT system to a new platform, that would be easy to set up, easy to maintain, and easy to connect via a network. Together with his students, which he involved in the project, he searched for a solution that would allow for customization and correspond to the needs of each school level concerned. He found that the Linux distribution openSUSE 11.1 would qualify as a suitable solution, and building a system on this basis seemed sustainable in the future and the right choice to him. The team therefore started developing what was to be called the 'desktop4education'

for the school's workstations and a server version they named 'server4education'. Once the project grew and matured, the Ministry of Education, Arts and Culture (BMUKK) became aware of it and realized its potential for other schools throughout Austria. The Ministry's IT department, under the direction of Robert Kristoefl, consequently started to support the project by dispatching around 2.000 CDs and DVDs to other Austrian schools. Although the system is working very well and does not require any type of licensing fees [due to the use of free and open source software], many schools are still reluctant to use the solution, as they prefer to opt for proprietary software solutions (i.e. Microsoft). However, by the time of writing the situation is about to change as the Federal government increasingly adopts a policy that promotes the use of open source software in Austrian schools. Exemplary to this is the government's decision to pay any school €10 for each workstation that runs the free productivity suite Open Office that is provided by Sun Microsystems in replace of Microsoft Office, for which the government introduced a calculative license fee of €10. Although the schools opting for Microsoft Office still do not pay the full amount of the license, this policy creates a give-or-get framework which clearly illustrates the schools a financial loss or reward. With further political steps in this direction on the one hand and decreasing regional budgets on another hand, an increasing number of schools is about to realize the potential of educational Linux distributions as desktop4education, or also the related Linux Advanced project, which is a similar initiative focused on an easy to use live booting operating system for students. The desktop4education solution has seen to be not only an economical viable alternative to proprietary solutions, but also an alternative of equal quality.

Organisation and political background

The Austrian government under the auspices of the Ministry of Education, Arts and Culture (BMUKK) in 2004 commissioned a study to the Donau University in Krems, Austria, with the task to investigate the state of open source software solutions for the educational sector. The central outcome of the University's study was that there were no open source solutions mature enough at that time to replace proprietary solutions entirely, says Gerhard Schwed, eLearning coordinator at the Donau University, who took an active role in this study. However, it was highly recommended that students should gain experience in at least one other software environment than Microsoft Windows, in order to be more flexible and to have a broader knowledge of software solutions.

Already about three years before this study has been published, by 2003, Helmuth Peer, who is a teacher at the secondary school in Weiz, launched a project with the aim of freeing the school from software licensing costs and by the same time providing a software solution that was easy to network and administer. Together with some of his enthusiastic students Peer conducted a market research for available free operating systems that would allow for easy customisation according to the school's needs. After thorough research the team decided to deploy openSUSE, which is an operating system built on Linux and that is freely available under a GNU general public license. After consensus on the system was reached they than began with customization, including different software packages for different age grades, and named the overall solution with the characteristic

name 'desktop4education'.

The study that has been commissioned in 2004 to the Donau University was eventually published in 2006, recommending 10 software solution to the Ministry that perhaps could build the base for an open source software strategy for the Austrian public school sector. Since by the time of 2006 the desktop4education project had become one of the more experienced projects to be named within this study, the Ministry decided to use the Weiz school and their desktop4education project as a reference case to be promoted to Austrian public schools on efficient implementation on open source software solutions. After having secured support from Sun Microsystems, which provided the CDs, the Ministry then sent out 2.000 copies of the desktop4education to schools all over Austria. Today, the system can be downloaded for free at the project's website (www.d4e.at) and can be additionally ordered free of charge from the Ministry, even comprising nowadays a DVD with extensive training material for the productivity suit Open Office.

As Gerhard Schwed from the Donau University states, this was one example that proved the ministry's openness towards open source software. Encouraged by the Weiz case and based upon the evidence gathered through the commissioned study the Ministry decided upon changing its policies towards the handing out of licenses for productivity suites. As of the school year 2009 – 2010, the Ministry is paying every school in Austria €10 for each workstation that uses the Open Office suite instead of Microsoft Office. Contrary to that schools have to pay a €10 licensing fee for the use of Microsoft Office. Therefore the savings of using Open Office instead of Microsoft Office amount to €20 per workstation, with the ultimate decision on which software to deploy being left with the respective school. Such an economic measure (called 'Zuckerl' in Austria), as Peer describes it, has already lead to significant changes on the grade of deployment of open source software. Since there are still no incentives or pressures to do the same with regard to the operating system, many schools are still reluctant to take this bigger step. As of 2012 the governmental contracts with Microsoft will expire, and this perhaps will change the status of open source operating systems, such as desktop4education or Linux Advanced, from being marginally used to becoming the main IT systems at Austrian schools.

Budget and Funding

The financial resources in the starting phase of the desktop4education project were covered entirely by the school and Peer himself. Because the solution is entirely based on free software there were no license fees involved and only few additional equipment had to be purchased. However, the project involved a great deal of time investment and without the personal motivation and commitment of the people involved, such an undertaking would not have been possible. As Peer explains jokingly: “I am not so interested in the financial aspects of a project, I'm a bad business man and this is not in the foreground for me”. Motivation and interest were instead the driving force to invest a great deal of free time in researching, testing, developing and the final roll out of the desktop4education solution at a school level.

At another Austrian school, the secondary school in Rechte Kremszeile, the situation has been similar and it was again a group of enthusiastic teachers together with the help of some IT specialists that started the development of the Linux distribution “Linux Advanced”, which is a live booting distribution of the free operating system. Linux Advanced is build on the Debian Lenny distribution, as this ensures longevity, security, stability, and flexibility. The case of Rechte Kremszeile supports the notion that successful school wide IT changes can result out of the actions that were taken on an individual level, and even in the absence of external funding.

Although neither of the two schools mentioned above has carried out an analysis of the savings generated from the use of open source software, it is believed that there are economic benefits. While the licensing fees for the use of Microsoft Windows are still carried entirely by the federal government, schools have little motivation to employ an open source operating system, as this does not imply additional savings. And at the same time however they tend to opt for the Microsoft Office, productivity suit, which does imply licensing costs. On the contrary, when schools decide to employ an open source operating system, the decision to use an open course productivity suit usually goes hand in hand, which also brings financial benefits. In particular since the year 2009 / 2010 that introduced the “save €10,- / pay €10,-” licensing model, that rewards schools that save on license cost. The licensing fee of €10 that schools have to carry for the use of Microsoft Office quickly adds when using it on every workstation.

Technical issues

For the migration to desktop4education from their previous Microsoft-based software platform the Weiz secondary school did not have to acquire any new hardware. Quite on the contrary, the new system introduced new minimum hardware requirements that were even below the previous ones. On the other hand, would the school have decided to migrate to a newer version of Microsoft Windows, this migration would have even been much more expensive, since the computers in place did not meet most of the requirements a newer version would have had. “If I think of Windows Vista or Windows 7”, explains Peer, “we do not even have the hardware to deploy these solutions. With desktop4education the system can run on the school's older workstations, some of which have not more than 256 MB of memory and Pentium 3 processors. The deployment of Linux therefore not only brings the advantage of saving licensing costs, but also permits the school to use older workstations for a much longer period”.

For the selection of the different software packages, that the team wanted to include in the desktop4education software solution, they carried out an extensive research on freely available and good quality educational applications, of which there are many, as Peer highlights. They had to bear in mind that the different school levels had distinct needs. As such, it would not make much sense to present a 3rd grader with the more complex software that is used in the 10th grade. Luckily the system allowed just this in a very easy fashion, giving the administrator the rights to chose between basic school packages and higher education packages. “It's very easy to modify, and there is a lot of quality software on the Web, especially for the educational sector” states Peer.

In additional to the productivity suits OpenOffice and Sun StarOffice and other software that comes with most Linux distributions, the project website lists the following applications with particular importance for the educational sector:

- Tuxmath – math application
- Tuxpaint – basic paint programme
- Tuxtype – 10-finger typing software
- G-Compris – learning software for pupils age 2 – 10
- Qcad – 2D Construction programme
- Geogebra – dynamic math software
- WX Maxima – GUI for the computer algebra system (CAS)
- Qucs – integrated circuit simulator
- Dr. Geo – interactive geometry software
- KDE-Edu – free educational software based on KDE technologies

These programs make it very interesting for the classroom, since the software facilitates the understanding of sometimes very abstract learning content. To mention just one example, Dr. Geo is a geometry learning software, which helps students in understanding basic geometry functions in a playful manner. This makes it very easy to integrate into a normal geometry class, seeing that it is more of an extension to the teacher that asks for more interaction and participation. Most applications follow this idea, of helping students to learn content more easily. Having a great variety of learning applications also gave Peer the chance to select the appropriate software for each school level.

As a server operating system Peer also had to find a solution that was able to control both: Windows and Linux operating clients. An additional requirement was that it had to be easily integrated in existing networks, as his school, but also other schools, would have to be able to dual boot, choosing either the Windows or the Linux distribution. Further, students had to be able to access their data from their home computer, which in most cases was running Windows. This is how the development of server4education came about, which met exactly these requirements. It is built on Suse Linux Server and features the following network services:

- CUPS print server
- DHCP dynamic IP allocation
- DNS
- NTP as time server
- openLDAP as the centralized user administration
- Samba as the data server
- Apache-Webserver with PHP5
- MySQL and PostgreSQL database servers

The pre-installed applications make it easy to administer the content and to work seamlessly on the network. And just like with desktop4education, all of them are freely available under various open source licenses:

- Joomla! – the content management system
- Moodle – the learning platform
- Gallery (v.1) – easy administration of photos
- DokuWiki – common online-notebook
- phpMyAdmin – administration of MySQL database
- phpPgAdmin – administration of PostgreSQL database
- x2go – terminal server
- squid – proxy server
- gnump3d – mp3 file server

During the development process relatively few problems occurred, and web based search usually helped to solve problems and to find just the right answers. Although Peer and his development team did not participate actively in any open source communities they often used the expertise found in various forums and websites. In addition to this the team went to many open source conferences, most notably the Knoppix Days, where they acquired important information, which helped significantly in mapping out the risks and avoiding pitfalls, therefore facilitating the overall development process.

Legal issues

The desktop4education team had to consider only very few legal aspects in the accumulation of different software products. The only thing that they had to bear in mind was that the selected solutions that formed a part of the desktop4education were freely available under licenses that permitted the free use and distribution thereof. For the most part, this did not become a difficult task.

The other aspect the team had to keep in mind was that some products consisted of 'free software', but had no open source license, and for this reason it was necessary to ask the user to agree to the products end user license agreement (EULA) each time an application would be started. For those few applications that required such an EULA agreement the most simple solution was to simply ask the user to agree or disagree upon the start of those applications on the EULA license agreement, therefore coming at the 'cost' of one further mouse-click, but no license fee cost.

Change management

Before starting the development of desktop4education, Peer searched for server solutions that enabled him to control Microsoft Windows clients and Linux clients alike, as this was an absolute necessity if he wanted to install a Linux distribution on the schools workstations. Server4education met this requirement and further allowed students to access their data from Windows clients just as easily as from any Linux operated workstation. Considering that most of the resistance towards an open source migration comes from teachers and parents, as Peer, Schwed and Schwarzinger agree, this was very important for eliminating the fears many of those teachers and parents had.

As Schwarzinger, who oversaw the migration at the secondary school of Rechte Kremszeile, explains: “It is necessary to implement a solution slowly. Anyone who thinks a migration is merely a simple software change will come into trouble”. Preparing the students, the teachers and the parents to the software migration, by highlighting the benefits and removing the fears, was a very important step prior to the actual software migration. This helped in creating support for the solution and to further diminish resistance.

For Peer another important factor for a successful migration was an easy installation process of such a solution, while bringing as little problems as possible. In order to avoid any complications in the migration process, the team tested all application until they were sure to have a properly functioning solution. As noted by Schwed “There are now two suitable distributions, which are working well and have a good software package”, referring to desktop4education and Linux Advanced. This two distributions are of potential relevance to other schools,that wish to base their migrations on solutions that are known to work out successfully.

For most users the new software environment hardly presented any problems. Clearly, the look and feel was different to some extent, but once an application was started it was all the same for most students. Peer illustrates this with a smile: “The only thing that's different for them is where to find the 'start button' to shut the computers down. So really it's not an issue at all for my students.” Most students easily adapt to the new operating system and after a short introduction period use it just as they used to use Windows. The only point Peer raises that perhaps could be improved in the future is the incompatibility of most games with the Linux environment, which is a drawback especially for younger boys.

For teachers and parents a software migration is more challenging, since they are usually less flexible and do not want to re-learn how to use an operating system, but often prefer to remain in the environment familiar to them. Although this is understandable, Schwed states that this is mostly a “psychological barrier”. Essentially most recent Linux distribution have a very simple user interface and offer the same functionality as Microsoft Windows. But, as most Linux distributions have no or very little corporate backing, starting expensive advertisement campaigns is hardly an option. So in order to solve the image problem the government would have to promote open source operating systems, by introducing a similar licensing system for schools as it did for OpenOffice and Microsoft Office. In 2012, when many of the federal government's contracts with Microsoft will expire, it remains to be seen whether new licensing terms to be introduced by the Ministry will make Linux distributions, such as desktop4education, more attractive for schools.

Cooperation with other public bodies

Although the desktop4education project has been promoted to basically all schools in Austria, and despite being freely available for download from the project website, it is difficult to give numbers how many schools actually deploy the system. Peer however estimates that the number of schools that use it actively and daily is rather low.His team is offering support to at least two schools who use desktop4education extensively, and he is positive that this number will grow in the future. With

regard to the financial crisis he states: “I think the time we are in right now is working in favour for our project, as many have to find ways to cut down current costs”. Although schools still do not have to pay for the licenses of the operating system, the federal and the regional government urges increasingly to save resources where possible. Thus, although not directly, financial matters do play an increasingly important position in budgetary discussions. The promotion of the project through the Ministry therefore clearly is of help too, as it gives schools an option to save costs. Since the first version of desktop4education several thousand CDs and DVDs have been sent out to schools, and many schools have requested the solution. Especially the OpenOffice video training material, which is delivered with the most recent version, seems to meet actual needs and further helps to overcome fears to be left alone in the process of learning to deploy and use such a new software. Peer however has some doubts whether these desktop4eduation DVDs are actually deployed on the school's workstations, or if they simply end up somewhere in a teachers room desk drawer. The increasing interest and the amount of requested DVDs from the Ministry lets him hope that more and more schools will actually use it. In addition to that Peer and his team members, most of which are higher education students by now, continue to participate in as many conferences as possible, and follow requests for workshops as their time allows. Participation at such events on the one hand contributes to the improvement of the software, and on the other hand helps to make it more popular. Peer notes that the number of people that approach him is constantly increasing, which he believes is a fairly good indicator of the projects popularity. The team even offers to go to schools and to supervise the migration process, which according to Peer can be completed in just one day.

Evaluation

Achievements / Lessons learned

For both Peer and Schwarzinger it is clear that in order for such a project to be successful one needs a team that works out of conviction. This is important, because there have been hardly any financial rewards in the past and a lot of resistance in the way. “You have to be passionate and enduring” says Peer, in order to make a good solution and to convince anyone thereof.

The careful planning of the project implementation, not only from a software perspective, but also from a social and change management perspective, is therefore very important. Only by delivering a product that actually meets all the requirements and compares well to proprietary solutions allowed the team to gain acceptance for their project from the various stakeholders involved, and to remove doubts and resistance.

Schwarzinger also mentions that it is important to use comprehensive software, which not only functions on a Linux system, but on many other systems as well. Using applications such as Mozilla Firefox and Thunderbird, or OpenOffice makes this very easy, as the students do not only use them at school, but also at home irrespective of the operating system that is used there.

The live booting USB drive version of both operating systems (desktop4education and Linux

Advanced) contributed to a successful deployment in the two schools in particular. Not having to install a new system on the parents computers, but simply plugging in a USB drive, took away much of the fear parents initially had shown. This way, students can work even at home with the exact same desktop environment that they are seeing at their school workstation, without having to do any of the complicated installation processes.

As a result of those individual success cases, and backed by sound studies provided by the Donau University, the Austrian government provides today an increasingly beneficial framework for the use of open source products in the educational sector. As the Ministry has realized the potential of such software products, licenses with proprietary software providers perhaps will fade away step wise. The financial reward that is given to schools, for the use of OpenOffice and resulting savings on licence costs, is just one example of this policy change.

Conclusion

The Desktop4education project shows how free open source solutions can compare to proprietary solutions, without any shortcomings quality wise. The software provides all a school needs, it is easy to administer, and does not bring about any licensing costs. Especially for the educational sector it is therefore potentially attractive, since budget savings can be used elsewhere to improve the learning facilities and educational provision. It also became clear that a common misconception in schools is that free or open source software is inferior to commercial proprietary solutions. However the desktop4education case clearly demonstrates that such a conception perhaps should be reconsidered, as open source products in most cases provide the same functionality and quality, while being based on standards, having easy customization options, ultimately resulting in cost savings.

It also has been shown that governmental initiatives that share part of the real cost of software license fees with the schools can be a viable mean to make schools paying closer attention to the type of products available to them and their underlying cost. The Austrian government in this respect appears to have taken a suitable approach, with further steps likely to follow in the coming years. While the promotion of the use free software in the educational sector is certainly desirable, the question to what extent the government should intervene in the market is another aspect worth mentioning. The “save €10,- / pay €10,-” licensing model, that rewards schools that save on license cost appears to have been a viable approach. However, if the same approach would be equally viable for the exchange of the operating system, be it in terms of market intervention, financial aspects, technical complexity or required cultural changes, remains to be further investigated.

For projects such as thedesktop4eduation an important criteria to succeed on a larger scale appears to be 'public awareness' of open source software products and to not see those as inferior solutions to proprietary ones. The fact that many, if not most Austrian schools are still reluctant to use open source software illustrates this very well. Perhaps one suitable way to change such public perceptions would be a closer cooperation amongst similar projects to gain on visibility. In any

case, just sending out CDs and DVDs appears to be too little, or the wrong type of promotion, seeing that it has not been very fruitful so far. While financial incentives may be effective to some level, it might be equally important to have an increasing number of workshops, trainings and other events on a regional and national level, that would allow to showcase the products and to overcome misconceptions. As noted by the Desktop4eduation project team, participation at workshops and events or providing support to other schools can have a positive impact on the deployment of open source software, but to foster large scale deployments perhaps requires equally large scale actions, but not only individual ones. It remains to be seen if the government's new policies will bring about this change, and whether or not such policies will support large scale deployments of solutions such as the desktop4education one.

Links

- Desktop4education project website
- News item about desktop4education (German)
- OSOR.eu news item
- Linux Advanced project website
- The Austrian Federal Ministry for Education, Arts and Culture
- Donau University - Gerhard Schwed
- Study by the Donau University: Linux in der Schule (2006) (German)

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This study is based on interviews with Hemluth Peer, team leader of desktop4education and teacher at the Weiz secondary school, Gerhard Schwed, e-learning coordinator at the Donau University, and Rene Schwarzinger, team member of the Linux Advanced project and teacher at the Rechte Kremszeile secondary school.