Closing The Gap

Computer Technology in Special Education and Rehabilitation

The Linux operating system: Coming to a school near you?

Part one of a two-part series on Linux and assistive technology

By Janet Hopkins

With heavyweight support from IBM, Dell, Sun Microsystems and Hewlett Packard, the Linux OS is fast becoming the operating system of choice for many business and educational institutions worldwide. Described as cost-effective, stable, revolutionary, dynamic and philosophically appealing, Linux is being taken as a serious threat by its more established competitors.

Linux proponents view the system as a low cost means of providing access to computer technology. Originating with Finnish developer Linus Torvalds in 1991, Linux has been developed collaboratively over the Internet for the last decade primarily by volunteer programmers worldwide. In contrast to the secretive development practices of proprietary software companies, Linux is based on open-source code meaning that all users can view, alter, copy and redistribute the software for free. As a result, Linux is a highly customizable technology that has evolved into a multi-distribution OS with an estimated 10 to 12 million users.

Pekka Himanen, author of The Hacker Ethic: A Radical Approach to the Philosophy of Business (Random House, 2001), has examined the social and technological dynamics that have fueled the evolution of Linux. The prologue of his book is written by Linus Torvalds. Himanen explains that the Linux hacker culture thrives on curiosity, enthusiasm and passion while defying the 9 to 5 Protestant work ethic. Picture a global workforce of computer hackers realizing their passion together. Programmers around the world who help develop Linux see it as a form of entertainment that results in the creation of something of enormous community value.Today, there are a number of commercial Linux distributions available including those from Caldera International, SuSE, MandrakeSoft and Turbolinux. These companies and the leading distributor, Red Hat Linux, package open-source components into their products, then sell them along with a support program. In February 2002, Sun Microsystems also announced their intention to produce their own version of Linux. Red Hat is vigorously pursuing the education market announcing its K-12 Red Hat Linux Education Program in May 2002. North Carolina schools participating in this initiative receive free Red Hat software and services. Red Hat will assess the current and future computing needs of these schools and then install appropriate open source software and programs.

Schools consider alternatives

The K-12 education system may be fertile ground for the adoption of the Linux operating system. Many school districts are having a difficult time managing the high costs that accompany relentless technology demands. The expense of maintaining and upgrading systems and software is especially challenging for under-funded school systems. Additionally, several high profile incidents of perceived corporate bullying of public school districts have ignited feelings of resentment over the technological status quo. Intense software licensing scrutiny of computers in school districts in Philadelphia, Oregon and Washington State by Microsoft over the last year have jolted other districts into looking for alternatives to the Windows operating system. ("Microsoft puts the squeeze on NW schools," Steve Duin, The Oregonian, 4/21/02; "Open Schools to Open Source," Matthew J. Szulik, Linux Magazine, Feb. 2002). The media attention focused on these incidents have some school districts worried that they may be targeted to produce proof of software legality for all computers in their own schools. As many schools rely on donated computers that frequently arrive without Windows installation manuals and CDs, it is difficult for districts to prove that the software on these machines is not pirated. Some school officials have become concerned that software audits could result in additional expenses.

Classrooms without windows

In British Columbia Canada, the move to Linux is now underway in the public school system. The economic challenges facing the province's resource sector have led

Address
526 Main St.
P.O. Box 68
Henderson, MN 56044

Phone
507-248-3294

Fax
507-248-3810

Web site
www.closingthegap.com

E-mail
info@closingthegap.com

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to unprecedented cuts in public funding for government programs and school budgets.

The recent establishment of the BC K-12 LUG (Linux Users' Group) Forum at <7of9.sd73.bc.ca/forum/> is one sign that technology in BC schools is heading for a shake up. The Kamloops / Thompson School District in central BC is leading the province's schools' Linux revolution. "We are very big proponents of Linux and Open Source software and believe that it has a great deal of potential in the K-12 education system," says Gregg Ferrie, the district's Manager of Information Technology.

Ferrie outlined the rationale and process followed by his district in adopting Linux when I interviewed him on May 15, 2002.

Q: To what extent does your school district plan to implement the Linux OS?

A: At this time we have replaced all of the Microsoft NT servers at all 11 Secondary Schools. These servers provide student/staff e-mail, Web services, Web content filtering, firewalls, and other educational content.

All District-based Web servers, e-mail servers as well as database servers are now running on Linux-based systems.

In our (40) Elementary Schools we have installed Linux servers at 17 schools, which are deploying X-Terminal services to the teaching lab and some classrooms. As we install the Linux servers we are removing the Novell servers. The X-Terminal solution provides a system which is totally Open Source with the exception of the typing tutor program we use. We hope to have another 10 schools changed over by the end of June and the remainder finished by June of 2003.

In our Secondary School we will be starting a pilot project before the end of this school year, which will explore the potential to eliminate our Novell servers and replace them with Linux servers. We also anticipate piloting a Linux/Open Source X-Terminal system by September of this year.

In total we hope to have be running almost entirely on Linux-based servers by the summer of 2003.

(Note: The Kamloops/Thompson School District had over 600 desktops running Linux by July 24, 2002)

Q: Which other educational jurisdictions are you aware of that are using the Linux OS? Did you study or review any of their approaches?

A: We carefully investigated the model that the Riverdale Oregon school district developed and altered it to suit our specific environment and needs. Since that time we have spoken with the Portland Public School District and found out that they are also deploying Linux/Open Source X-Terminals systems in their schools as well.

BC K-12 LUG (Linux Users' Group) Forum at <7of9.sd73.bc.ca/forum/>

Q: What have been the key management reasons behind this decision?

A: Several management reasons. First of all the cost of maintaining expensive Windows-based systems with a declining student enrolment and declining budget. Secondly, the buggy and unstable nature of the Windows platform makes support difficult. We have pretty much stopped purchases of new high-end computers and are utilizing older donated computers in many cases, which function very well in this environment. Finally, the Linux system is more secure and stable.

Q: Do you think the strong corporate support of IBM and HP for Linux is having an influence on how Linux is being viewed by business and educational institutions?

A: It certainly is for us, although we would proceed regardless of this. But it does lend a lot more credibility to Linux as being a strong commercial product.

Q: What are some of the challenges/advantages for educators in working with Linux? What support systems are being designed to assist educators?

A: So far the feedback we are getting from our educators is extremely positive. Support for the Linux-based systems is much lower, stability is higher, the cost is dramatically lower and the software, for educational purposes, is more than adequate to teach skills in a K-12 environment. Perhaps it would not work in a college or university setting but for our skill-based instruction it's more than adequate.

The biggest challenge we have faced is retraining network technicians who are skilled in the Novell/Windows environment. We have worked out a training plan, which is almost complete but there was some initial resistance there. Fortunately we have two extremely capable people on staff who are knowledgeable with Linux and the X-Terminal environment.

Q: Have you identified any specific areas of need in terms of the development of educational software, assistive technology or other applications?

A: We would like to see more software for specific curriculum areas such as math, social studies, and special needs. Software that is Web-based running off a server would allow us total flexibility to utilize any platform necessary.

Q: I received the following quote from an Ontario school district computer educational resource technician. "There is software available that will allow you to emulate other operating systems. This means it is actually possible to run both Mac and Windows software on your Linux computer. WINE, for example is a free software that allows any Linux computer to run software made for Windows, and DOSEMU is available to run anything that was created for DOS. However, my experience has been that this can be tricky to set up for users unfamiliar with Linux and will sometimes fail to work with certain software/hardware combinations."

Question, does your school district plan to use these or any similar applications?

A: We are certainly looking at the possibility of using emulators such as WINE, however we would prefer to make a clean break from Windows-based software wherever possible and keep to a totally Open Source Linux or Web-based environment. That is where the real savings lie we believe.

Q: What advice do you have for other educational jurisdictions considering Linux?

A: I would advise other educational jurisdictions to give Linux/Open Source a very serious look. We believe that the monetary savings over a five-year period can be reduced by as much as 60 to 70 percent by utilizing second-generation hardware and Linux/Open Source software solutions. In an age when dollars are getting scarcer this means a huge potential savings. Secondly though, there are tremendous efficiencies to be made in support of the system. We have developed a sophisticated system, which requires a mere fraction of support time by the teachers and the support required by the technical support staff has been reduced very dramatically as well. It does require a fundamental change in attitude but once educators recognize that we are teaching skills not software then it's quite easy.

International appeal

Linux has already been embraced by school systems in Mexico and France ("Low cost computing can jump start South Africa education," Andre Muller, <www.linuxuser.co.za/articles/000026.php3>) and is likely to find its way into many more classrooms around the world. As well, the SchoolForge Project <schoolforge.net/>, launched in January 2002, is a collaborative effort involving individuals, schools, organizations and companies focused on developing free software to meet the needs of teachers and students around the world. The question that some special educators and clinicians may be asking is, "How much assistive technology is available for Linux?" This topic will be discussed in Part 2 of this series.

Janet Hopkins is a RESNA Certified Assistive Technology Practitioner and educator in Kamloops, BC; E-mail <At_consulting@canada.com>; Web site <ca.geocities.com/janethopkinsbc/>