Why Linux Works for Libraries

by Paul H. Lewis

I started testing Linux as I got ready to migrate my library's Web server from Windows to Linux. Now I won't give it up.

If you use a personal computer, chances are very high that your machine runs some version of Microsoft's Windows operating system (OS). Or perhaps you're a Mac user, in which case you use some version of Apple's Macintosh OS. For a very long time we have had a basic choice of these two operating systems, with Windows being by far the dominant one. But today there's Linux, a variant of the UNIX operating system, and it provides a powerful, user-friendly, and very attractive third option.

I began testing Linux in preparation for migrating my library's Web server from Windows to Linux. I have been using a version called Mandrake Linux at work and at home for about 8 months and have found it to be an extraordinarily capable OS that meets all my computing needs. Though I have been a Windows user for many years, I have decided for a number of reasons to stay with Linux as my primary OS. In this article I'll share some basic information about Linux and show you why it's an option well worth considering to manage your library's Web pages, or your own.

Linux Begins and Grows

Originally developed by a Finnish graduate student named Linus Torvalds, Linux is an open source operating system that has been under continuous development by a large community of programmers around the world since its release on the Internet in 1991. Widespread perceptions of Linux are that it is a command-line-driven OS (remember pre-Windows

MS DOS?) for computer gurus and that it is only suited for network server environments. But thanks to efforts of countless programmers in the open source community who have developed Windows-like graphical user interfaces (GUIs) and user-friendly productivity software programs such as word processors, spreadsheets, Web browsers, etc., Linux is quite capable of challenging Windows and Mac as the operating system of choice for mainstream computer users.

The basic idea behind open source is that the programming code upon which the software is built—whether it is an OS or an application like a word processor—is freely available to any software programmer to modify in any way he chooses without restrictions. If a modification is deemed to be a worthy enhancement by the open source community of developers and users, it might be incorporated into the original software. On the other hand, proprietary software code such as the Microsoft Windows OS is closely guarded intellectual property. Access to the underlying code is denied to all except developers who work for the company that produced the software. Consequently, many people argue that the peer review process that's built into the open source software development model leads to operating systems and applications that are more stable than commercially produced products. For example, software bugs are squashed much more quickly by communities of open source developers and users dispersed over the whole Internet than by busy commercial software firms.

Price and Performance

Under what's known as the GNU General Public License, open source software is available for use without charge. However, under open source licensing guidelines, companies are permitted to make money by charging for technical support, consulting fees, and training programs. And of course companies that produce shrink-wrapped Linux distributions for retail sale are entitled to recoup manufacturing fees and make a profit. That is why you can expect to pay anywhere from $30 to $150 for a Linux distribution from companies such as Mandrake, Red Hat, Caldera, Dobbin, Sure, Turbo Linux, and others at your local computer or office supply store. Many open source software projects encourage users to donate to support development efforts. But purchasing the software is really optional because most if not all Linux distributions and open source programs are free to download from the Internet and free to use for individuals and institutions.

Different Linux versions are designed to meet special needs. Some distributions are quite small. Most popular Linux versions that you can purchase at a local store, however, are quite large, and so downloading one from the Internet requires a reliable, high-bandwidth connection and the ability to burn CD-ROMs. The benefits you get from purchasing a shrink-wrapped Linux package usually include printed installation manuals and free company technical support via phone and e-mail. The Mandrake Linux version I use

(version 8.2) was downloaded in three separate 600-plus MB files and it filled three CD-ROMs. The programs are large because in addition to the basic Linux OS, called the "kernel," usually hundreds of open source software programs are included, along with an extraordinary volume of documentation to assist with systems administration.

Some of the major appeal of Linux is in its high level of performance and its reliability when run on older hardware, especially in a network environment. There are many older Pentium and even 486-class PCs running Linux for file and printer sharing, mail servers, and other server applications. Some versions of Linux are tuned specifically for getting the most out of older computers. But Linux performance and reliability on newer computers is outstanding. Whether it's used as a server or as a workstation, Linux tends to be much more stable than Windows.

Simple Installation and Good Configuration

I chose my particular distribution principally for its reputation for easy installation. Until fairly recently, Linux was famous for installation difficulties. This is no longer the case. Anyone who has ever installed or upgraded Windows will feel very comfortable with the graphical user interface installation programs that are built into today's popular "flavors" of Linux.

Most Windows users who decide to experiment with Linux choose a "dual boot" configuration that permits both Windows and Linux to coexist on the same machine. A dual boot setup allows the user to select either Windows or Linux from a graphical menu when the computer is turned on. If you have Windows programs that you simply cannot live without, then dual

Open Source URLs You Can Use

Web sites devoted to open source operating systems and applications number in the thousands. It's almost as if there is an alternate open source Internet out there waiting to be discovered. Below is a small list of Web sites related to resources mentioned in this article as well as some to open source projects that should be of special interest to librarians.

Open Source Definitions and History

For a complete definition of open source see
http://www.opensource.org.

For a complete definition of the GNU General License see
http://www.gnu.org/copyleft/gpl.html.

An excellent history of open source is at
http://www.oreilly.com/openbook/freedom.

Linux Distributions

Mandrake Linux Web Site
http://www.mandrakelinux.com/en

Red Hat Linux Web Site
http://www.redhat.com

A fairly comprehensive list of Linux distributions:
http://www.ibiblio.org/pub/Linux/distributions

Linux Desktops and Applications

GIMP's Official Web Site
http://www.gimp.org

Gnome's Official Web Site
http://www.gnome.org

KDE's Official Web Site
http://www.kde.org

OpenOffice Web Site
http://www.openoffice.org

Ximian's Evolution Web Site
http://www.ximian.com/products/ximian_evolution

Open Source Software Repositories

Freshmeat
http://www.freshmeat.net

SourceForge
http://www.sourceforge.net

Libraries Using Open Source Systems

Beauregard Parish Public Library
http://www.beau.lib.la.us

Meadville Public Library
http://mplcat1.meadvillelibrary.org/os

Library-Related Open Source Sites

Greenstone Digital Library Initiative
http://www.greenstone.org

Koha Open Source Integrated Library System
http://www.koha.org

Open Source Systems for Libraries
http://www.oss4lib.org

PhpMyLibrary Open Source Library Automation
http://www.phpmylibrary.n3.net

Prospero Open Source Internet Document Delivery System
http://bones.med.ohio-state.edu/prospero

booting is a safe solution. Partitioning a single hard drive, however, to permit dual booting can cause even experienced users to break out in a cold sweat. A partitioning misstep can render your computer useless and require a hard drive reformat and a full reinstallation of all your software and data. I highly recommend a product like Partition Magic from PowerQuest Corp. or some similar third-party utility for partitioning a single hard drive for dual booting, especially if Windows 2000, NT, or XP is already installed.

A more cost-effective, and less stressful, dual boot option is simply to add a second hard drive to your computer and install Linux there instead of spending money on software. Under this arrangement the Linux GUI installation program automatically sees the second, empty hard drive and installs Linux there with minimal input from you.

As I mentioned previously, Linux is often used in a network environment in some type of server application. For example, Linux and the open source Apache Web server power millions of Web sites. Indeed, it's estimated that Apache runs 65 percent—nearly 11 million—of the sites on the World Wide Web. The open source mail server program, Sendmail, which is commonly used in combination with Linux, delivers an estimated 80 percent of the e-mail on the Net. These and numerous other server programs are included in most popular Linux distributions and the user has the option to install them or not, depending on need. Even if the goal is to install Linux for testing as an end-user workstation, there is no harm in installing some server programs if you're curious.

The current crop of Linux packages does an excellent job of recognizing and configuring system peripherals such as CD-ROMs, modems, network cards, printers, and universal serial bus (USB) devices during installation. Configuring Internet and network connections is usually very smooth using installation Wizards. There are some occasions, however, when devices originally designed for Windows aren't detected automatically. A wealth of resources is available in the installed documentation and online to turn to when such problems occur.

Linux is a multiuser OS, which means that it can accommodate multiple user accounts on the same computer. Each user is assigned a username and password and a home directory that other users may not access. Linux employs a system of permissions for users and groups of users designed to strengthen system security. These read, write, and execute permissions apply to every file, directory, and program on the computer. A superuser account, called "root," is provided for the Linux systems administrator. Root may access any file or directory. Even on a single-user workstation, it is recommended to have two accounts: one as a normal user and one as the root superuser. Software installations and other system upgrades require root privileges.

Running Your Web Sites

The Apache Web server running on Linux is a remarkably powerful tool with capabilities far beyond simply serving up traditional Web pages. The basic Apache Web server is easily configurable using a simple text file package, and it comes with numerous additional open source modules that extend its functions and enhance its security. Using open source scripting languages such as Perl (Practical Extraction Report Language) and PHP (PHP Hypertext Preprocessor) in combination with the Apache Web server make it easy to add exciting interactive elements to otherwise staid Web sites. Many Webmasters install Apache on their workstations so that they can develop Web sites locally before going live on the Web.

Thousands of open source Perl and PHP scripts can be downloaded from the Web. Some of the many types of interactive scripts include local Web site search engines, event calendars, surveys and polls, quizzes, keyword-searchable image galleries for photo archives, and much, much, more. Open source database applications such as MySQL, used in combination with Perl or PHP and Apache, enable users to deliver locally developed databases via the Web. This is an especially valuable capability that can aid many libraries that have wanted to put their local special collection databases online.

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It's important to note that these scripts are written by computer programmers for use by non-programmers. A simple edit or two to a text configuration file is generally all that is required to put them to work, so knowing how to program in these scripting languages is not required.

There are of course proprietary scripting languages such as Microsoft's active server pages (ASP) and Macromedia's ColdFusion, as well as commercial Web-enabled database applications from Microsoft, IBM, Oracle, and others that offer similar functionality, but these can be very expensive solutions.

Desktops and Applications

Linux distributions usually include several graphical user interfaces to choose from, but the two most popular are Gnome and the K Desktop Environment (KDE). I personally have not been able to choose one over the other. Both offer the usual windows, icons, menus, and mouse pointer navigation elements we have all grown so accustomed to using with Windows and Mac operating systems. Both include excellent file manager programs for navigating and managing files and directories. Both offer easy access to system control panels for configuring desktop look-and-feel options. The default desktops for Gnome and KDE are very attractive. Hundreds of desktop themes for Gnome and KDE are available, so it's possible to configure the system to look like a Mac or a Windows XP machine one day and something completely out of this world the next.

The KDE package (see Figure 1) comes with its own suite of applications, called Koffice, which includes word processor, spreadsheet, presentation, Web browser, e-mail, project management, and personal information manager (PIM) programs among others, all of which are quite fine. Gnome offers Gnumeric, an excellent spreadsheet program; and Galeon, a fast, outstanding Web browser. All of the "office" type applications easily import files from equivalent Windows applications. Thanks to what must have been an extraordinary collaboration between the developers of Gnome and KDE, all of these applications are readily accessible in both desktop environments. Both environments offer CD-ROM burning, instant messaging, chat, PDA synching, a host of audio and video multimedia programs, and many other applications as well.

Beyond the KDE and Gnome desktops and their applications, thousands of additional software programs developed by the open source community run on the Linux desktop. There are three notable programs I use regularly: OpenOffice, Evolution, and the GIMP.

OpenOffice (Figure 2) offers all the applications found in Microsoft's Office suite, except a database. In addition to near-100-percent compatibility with Microsoft Office's file formats, OpenOffice also permits exporting files in Microsoft Office file formats, a feature Koffice does not have. This functionality makes it easy to work with Microsoft Office users. Anyone familiar with Microsoft Word or any other Windows word processor will feel right at home with the OpenOffice word processor, and the same is true for the OpenOffice presentation package and spreadsheet, etc.

Ximian's Evolution (Figure 3) is a combination e-mail, calendar, and PIM that's very similar in features and appearance to Microsoft's Outlook program. One particularly enjoyable feature is the Summary screen where you can add hyperlinked news-feed headlines from popular Web sites, local weather updates, to-do lists, appointments, tasks, and the like. Evolution offers all the functionality and none of the e-mail viruses that plague Microsoft's Outlook.

The GIMP (which you can see in the bottom right corner of Figure 1) is a graphic image manipulation program that matches nearly the entire feature set and

Figure 1: Here's an example of the K Desktop Environment.

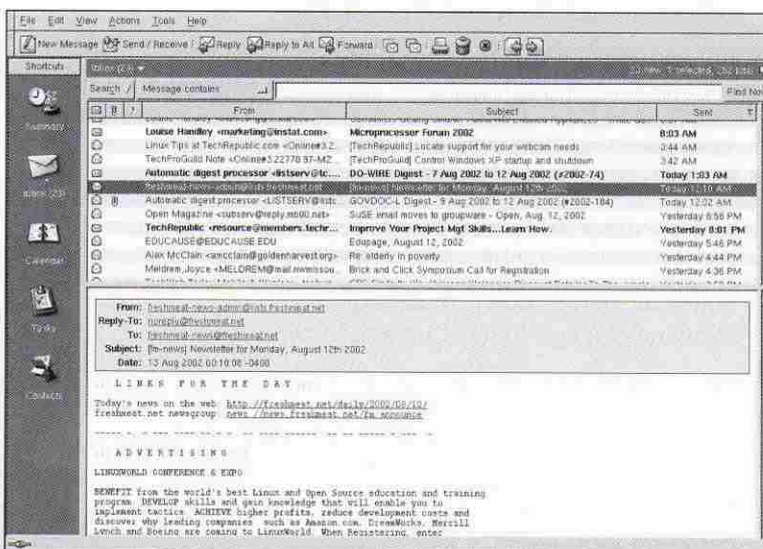*Figure 2: This is a sample screen from OpenOffice.*

Figure 3: Here's what my e-mail looks like in Ximian.

functionality of Adobe's Photoshop, the premier $500-plus graphics package available for Windows and Mac. The GIMP is an excellent program for quickly producing Web site graphics or for more elaborate design projects for print publications.

Like Gnome and KDE and the Linux OS kernel, OpenOffice, Evolution, and the GIMP are major software projects under constant development by the open source community. Improvements are built into each new release and these enhanced versions are then rolled into each update of the major popular Linux distributions. Because of intensive development efforts like these, Linux and the applications that run on it match and often exceed the polish, quality, and capability of any comparable software made for Windows or Mac desktops. The key difference is that open source software is free.

"Many people are skeptical that anything given away for free could possibly offer such immense value."

And there's more! The open source software universe is by no means limited to just Linux. Any programmer can develop an application for any OS and release that application as an open source project. The goal of many open source efforts is to engineer software applications for use across multiple OS platforms. For example, the open source community has produced versions

(aka "ports") of the Apache Web server, OpenOffice, the GIMP, and even the K Desktop Environment to run on the various Microsoft Windows versions. Thanks to these efforts it's very easy to try some of the best software the open source community produces without even installing Linux.

Are You Ready for Linux?

Although most libraries have invested heavily in Microsoft operating systems and applications, Linux and other open source software deserve serious attention from the library community. Perhaps the greatest difficulty libraries face in embracing open source is not the technology itself but rather a natural reluctance to change. There is an indisputable high comfort level in sticking with software we have used for years. Many people are skeptical

Linux and Open Source PROS and CONS

PROS

- The software is free.
- The software is not subject to ever-increasing licensing fees.
- Freedom from forced costs associated with operating system/applications upgrades
- It's more stable.
- Runs well on older computers, providing a longer life cycle for PCs.
- Bug fixes and security patches are generally much more quickly available.
- Enormous open source community support for troubleshooting
- Graphical user interface provides familiar, easy-to-use Windows-like control.
- Office productivity software allows easy transfer of files and data with Windows users.
- Software source code is modifiable, allowing changes to meet unique local needs.
- Fewer problems with software viruses
- Freedom from privacy concerns associated with Microsoft licensing issues
- Freedom to choose technology solutions based on local needs

CONS

- Windows applications don't run natively in Linux.
- Some devices (e.g. printers and modems) designed for Windows won't work under Linux.
- Costs associated with new training
- Organizational and individual stress and resistance to change involved with implementing a new way of computing
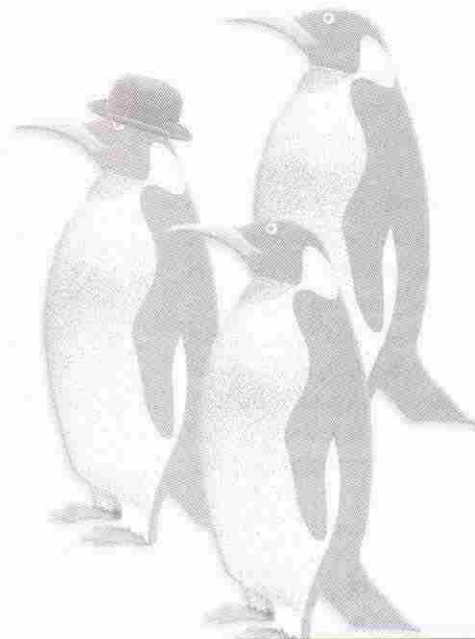
that anything given away for free could possibly offer such immense value.

Some libraries, however, have already embraced Linux and open source to meet their needs. Two notable examples are the Beauregard Parish Public Library in

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Louisiana and the Meadville Public Library in Pennsylvania, both of which have moved over to open source solutions for virtually all facets of their operations. Although the cost benefits of implementing Linux and other open source software

alone should be a significant incentive for libraries to explore this approach to meeting their technology needs, money is not the issue entirely. Values of openness and access and making technology and information available to everyone are principles

very much shared in common by the open source and library communities. Open source provides the means for libraries to chose technologies to meet the needs of the communities they serve, rather than having those technologies dictated to them.

Here at the library at the University of South Carolina–Aiken, we have migrated our Web site from Windows 2000 to Linux and the Apache Web server. Using Linux, Apache, PHP, and MySQL, we have implemented a Web site content management system software called phpWebSite, which is an open source software project hosted at Appalachian State University in Boone, North Carolina. In addition, we have installed the GIMP software on our public workstations. So far these efforts have been generally very smooth, and we look forward to putting other open source software to work in the future. 🖱

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