Using Linux and Samba
to Create a Low Cost Print Server

Presented by
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Abstract:

This presentation will describe how Rider University Libraries is utilizing the Samba software suite and the Linux operating system in a print server for Rider University's Moore Library Computer Lab/E-Classroom. A brief introduction to the software used, including Samba (an Open Source/Free Software suite that provides seamless file and print services) and Linux (a free Unix-type operating system), will be provided. Samba and Linux are both freely available under the GNU General Public License.

The decision-making process that led to the implementation of this project, as well as the reasons why Rider University Libraries chose this Linux/Samba combination for their printing needs in the E-Classroom-including its low cost-will be described. A relatively non-technical step-by-step explanation on how the project proceeded will also be provided.

Presenter Biography:

Edward Corrado is the UNIX Administrator/Library Systems Manager at Rider University. He is also the president of LUG/IP (Linux Users Group/In Princeton).

Edward's conference presentations include "Linux Outside The Cave: Using Linux on a Public Internet Workstation" (Internet Librarian 2000) and "Linux: Internet Applications for Libraries" (Internet Librarian '99). Recently, he co-authored the paper "The Multi-Purpose Library Computer Lab: Tips and Techniques for Successful Operation and Management" published in the journal College and Undergraduate Libraries.

Introduction (the Problem):

Rider University's Moore Library needed a new print server for their Computer Lab/E-Classroom. The computer lab's print serving function was only one application on a multi-purpose Novell Netware server. This Novell server was also the print and file server for the Library's approximately 45 faculty and staff members and performed the function as the LAN server for a number of CD-ROM databases. This server was being stretched to its limits and it needed to be replaced. It was determined that the server would be replaced by a newer machine that only performed the CD-ROM database serving for the LAN, and that the other applications were going to be spun off to other servers. With the exception of the Library, the faculty and staff at Rider University already used a centralized file and print server that was administered by the Office of Information Technology (OIT). OIT agreed to add the Library's faculty and staff to their file and print server. Therefore, of the three server functions, only the print serving for the computer lab was left. The Library did not have an existing server that the print serving function for the computer lab could be installed onto—another server needed to be added. To complicate problems, there was no source of funding available for a new server and an either low- or no-cost solution had to be found.

About the Computer Lab:

The Moore Library Computer Lab/E-Classroom serves as an open computer lab for Rider students, faculty, and staff when it is not being used for library instruction. The lab has a total of twelve (12) Dell Optiplex GX1 personal computers in it. Eleven (11) of these computers are configured for student use while the other computer is used by Library faculty during instruction sessions and by computer lab assistants. All of these computers have 64 MB of RAM and 266 MHz Pentium II processors. They use the Windows 98 operating system and applications installed on the computers include Microsoft Office 2000, Adobe Acrobat Reader, and Netscape Navigator. The computer used by the Librarians at the reference desk also prints to the computer lab's printer through the print server. The reference desk computer has recently been upgraded to a Dell Optiplex GX150 with a 1 GHz Pentium III processor and 256 MB RAM. This computer has all of the same software as the computers in the lab, as well as various Library-specific programs such as access to clients for our Voyager library automation system.

Hardware:

The printer that is being used in the computer lab is a Hewlett-Packard LaserJet 8000N printer that has a built in JetDirect Card (Ethernet card). This is the same printer that was that was connected to the Novell server that was being replaced. A Dell computer was acquired, at no cost, by the Library to be the print server when another department on campus was discarding it because it was being replaced a newer model. This computer is a Dell GXMT 166 MHz desktop PC with 64 MB of RAM and a 2GB hard drive. During the testing phase of this project, it had only 32 MB of RAM, but extra memory was salvaged from an old computer that was being discarded and added to the print server. This computer, as the specifications show, is not very powerful and would not be a good choice to run a server operating system that has significant minimum operating requirements.

Software:

The operating system for the new print server had to be able to satisfy a number of criteria before being selected for this application. The major considerations were:

1. Low Cost – This project had no budget to purchase equipment or software.
2. Reliable/Stable – The print server (and printer) has to be up and running whenever the Library is open (normally 8:00 AM to midnight weekdays, 10:00 AM to 7:00 PM on Saturdays, and Sundays from noon until 11:00 PM). Also, no library systems staff are on duty during evenings and weekends to rectify any problems (and they don't want to be bothered at home).
3. Secure – With any server, security should be a major concern.
4. Low Overhead – As previously described, the computer that is being used for the print server isn't very powerful.

Operating systems that were considered for this print server included Microsoft Windows 2000 (or Windows NT), Solaris x86, OpenBSD, and a few different distributions of Linux, including Redhat, Suse, and Mandrake. The University has a site license with Microsoft, so the Windows 2000 OS would not have cost the Library anything but was rejected as a possible choice for a number of reasons, primarily the high overhead of the operating system. For example, Microsoft recommends at least 256 MB of RAM and supports a minimum of 128 MB (Microsoft 2002). The computer that the Library obtained did not even come close to meeting these specifications.

The Library systems staff had previously obtained a copy of Solaris x86 (the version of the Solaris operating system by Sun Microsystems that is for computers with Intel-based processors) at no cost from Sun Microsystems. The use of Solaris x86 was seriously considered since it was available for free and because the Library already used the Sparc version of Solaris on a number of servers and was using the x86 version for another application. However, it was not the choice in this situation because it did not appear to run as well on the older hardware as some of the versions of Linux did during testing and, to a lesser extent, because Hewlett Packard no longer offers a version of Web JetAdmin for Solaris. While the print server did not necessarily need to run Web JetAdmin, the Library systems staff thought it would be a good idea so that Library staff could send the printer commands remotely, such as canceling print jobs once they are on the printer. The keypad on the printer has been disabled in order to prevent patrons from accidentally, or otherwise, changing the printer settings.

This left the versions of Linux along with OpenBSD as possible choices. All of these operating systems can be obtained for free. The two main reasons Redhat was selected over the other remaining choices was that the Library systems staff already was using it for other applications, and they had a current version of the distribution available in the Library that was provided to them by Redhat at a recent Linux-related conference. While the systems staff was intrigued with OpenBSD for security reasons, they had no prior

experience with it in a production environment. The version of Redhat that is currently installed on the print server is 7.2.

In order for the computers in the lab to use the print server running the Redhat Linux operating system, the Samba software suite was installed on the server. "Samba is an implementation of a Server Message Block (SMB) protocol server that can be run on almost every variant of UNIX in existence. Microsoft clients can use this protocol to access files and printers located on your UNIX box just as though it were a native Windows server" (Carter 1999). The reasons why the Library installed Samba include that it is free software available under the GNU General Public License and it provides Windows NT-like file and print serving to SMB clients such as Windows 95 and Windows 98. While print sharing is the application Samba is being used for in this project, Samba is capable of much more. For many networks, according to the Samba website, "Samba provides a complete replacement for Windows NT, Warp, NFS or Netware servers" (Samba 2002). Other things that Samba includes are a NetBIOS name server (which among other things gives browsing support), a ftp-like SMB client so you can access PC resources (disks and printers) from Unix, Netware, and other operating systems, and a command-line tool that supports some of the NT administrative functionality, which can be used on Samba, NT workstation, and NT server. The Samba website (http://www.samba.org) has more information about Samba and how it can be acquired for free.

The Library also decided to install Hewlett-Packards' Web JetAdmin on the print server. Web JetAdmin is a web-based solution for remotely installing, monitoring, and troubleshooting network-connected printers and is available via a free download from the hp.com website (Hewlett-Packard 2002). The Library uses this software to configure the Network printers, remotely control some of the printer's functions, and to create print queues on the Linux server. The current version of Web JetAdmin is 6.5 and that is what the Library has installed.

Brief, Non-technical Guide to the Software Installation and Configuration Process:

1. Verify that your hardware is compatible at http://hardware.redhat.com.
2. Acquire a current distribution of Red Hat Linux (In this project the Library used version 7.2). These can be done via download at http://www.Red Hat.com and you can burn the image to a CD if you have a CD burner, or one may be bought from a bookstore such as Borders.
3. If the computer cannot boot directly from the CD drive (and you don't already have a boot floppy), you will need to make a boot floppy disk. Refer to the x86 Installation Guide online at http://www.redhat.com/docs to learn how to make a boot floppy.
4. Follow the "Installation Instructions" to install Red Hat Linux. You can chose to select Windows File Print sharing from the "custom install" menu if you wish to use the version of Samba that comes with Red Hat Linux 7.2, or you can download the most current version from http://www.samba.org/. Look for the Red Hat directory in the binary distributions directory of the download server to

download the appropriate RPM package for your distribution. Once you have installed you OS, you can use the rpm command included with Red Hat to install the Samba software. See the Samba website for information on how to install and configure Samba on your computer. Be aware that by default Red Hat may install ipchains or iptables to protect your computer from being hacked. If this is the case, you will either have to "punch a hole" in these applications to allow other computers on your network to talk to your Samba server, or disable them completely (which, especially if your machine is on the Internet, is not recommended).

5. Download Hewlett-Packard's Web JetAdmin (6.5) for Linux from http://www.hp.com/go/webjetadmin and follow the install instructions. If you wish to use the HP Print Server Manager software on Red Hat Linux print servers, you must enable the rexec service on each print server. Directions on how to do this can be found in the FAQ on the HP JetAdmin website.

6. Follow the directions in the "HP Web JetAdmin - WJA 6.5, Configuring a Print Queue for Linux, HP-UX or Solaris" document available on the HP JetAdmin website to create a print queue. To setup a print queue for Windows clients, use the "Text-only Printer driver." This driver is a pass through driver.

7. Once you have the print queue correctly configured, you will need to make sure Samba is configured for your print queues. If you want to automatically load your printers instead of setting them up separately, you should have the following lines in your Samba configuration file (smb.conf, which on many Red Hat systems is installed in the /etc/samba directory):

> printcap = /etc/printcap
> Load printers = yes

8. Install the printer on your personal computer as you would any other network print queue.

9. Enjoy!

Conclusion and Future Directions:

Despite the lack of a monetary budget and the old equipment being used for the print server, the Linux/Samba printing solution has been a success. This configuration did not cost any money and the Library systems staff has not encountered any problems. The only "cost" to the Library was the time it took the Library Systems Manager to install and setup the Linux/Samba print server. If the Library had to do this project again, they would proceed in the same direction.

The HP Web JetAdmin software has been installed and is being used by the systems staff; however, none of the Library staff or the computer lab assistants have used it, yet. In the future, the lab assistants (and the Librarians who would like to use it) will be trained on how they can use Web JetAdmin to control some of the printer's functions. Another future project will be to move the print server function to a more powerful machine. A Dell 2100 PowerEdge server with a 200 MHz Pentium Pro processor and over 300 MB of RAM is being replaced in the near future and will be available for this application. While this computer's processor is not much faster, the greatly increased

RAM and faster hard disks should increase the performance and capacity of the print sever. Once this machine is installed, the other printers in the Library will be installed on it so it can be used as a backup print server for the Library's faculty and staff in case, for some reason, the one that OIT uses is unavailable. Another thing that the Library is considering in the future is a way for the lab assistants to manipulate the print queues from a web browser.

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