



Migrating Mail and Web Servers to Linux

Pierre Fricke, EVP and Research Director

EXECUTIVE SUMMARY

Linux is now a mainstream infrastructure platform as demonstrated by the growing mass of users who deploy Linux for file and print, web, mail, and other infrastructure services. From its earliest days, web serving was one of the largest uses of Linux. Mail serving followed soon after with an early focus in Internet development communities. System administrators and technical decision makers quickly embraced Linux. As a result, this open-source operating system has moved up the corporate ladder and has reached the CIO, CTO, and even CFO agendas for new and replacement web and mail infrastructure.

Linux offers several value propositions that encourage user migration from other platforms. The primary motivators include lower cost hardware, less expensive upgrades, reduced or no license fees, a choice of technical support and service provider, avoiding vendor lock-in, and reliability and high availability advantages. These are real driving forces. UNIX users are particularly interested in lower cost hardware and upgrades. The savings can be substantial, even reaching a factor of ten. By contrast, Windows users are more enamored with reduced license fees, security, and reliability improvement. Linux-based mail alternatives to Windows, for example, may cost 25% – 50% of Microsoft Exchange deployments. Consider this reliability fact: The research for this paper discovered that some users report Linux systems running for months without a reboot, while their NT systems require two or more reboots per month. Microsoft has reportedly reduced rebooting pain in Windows .NET Server, now in beta. UNIX and Windows users share a preference for the ability to choose a technical support provider, a clear benefit that Linux allows.

Given the attractiveness of Linux, there are a number of migration types. The most common are UNIX-to-Linux migrations, which have proven fairly easy. The similarity of user interfaces, administration tools, and programming models facilitate a reasonably quick and painless migration. This is particularly true when the source and target system web or mail server software are the same. Moving to the Apache web server on Linux, for example, is usually an easy migration with some taking less than one day. Many of the source UNIX-based web servers are Apache or Sun ONE and there are numerous service firms such as Covalent to assist with the transition. Sendmail offers Linux-based mail packages that are

D.H. Brown Associates, Inc.

www.dhbrown.com

A summary of this report is available to all of our subscribers. Sponsors of our collaborative program in Operating Environments for Industry Standard Servers receive the full report as part of our comprehensive services. Those interested in the program should contact marketing@dhbrown.com.

good Linux target mail platforms for customers who are coming from UNIX-based mail systems.

Windows-to-Linux migrations are becoming more frequent, particularly mail-based migrations away from Microsoft Exchange. These migrations, which are more complex than their UNIX counterparts, may still offer clear benefits in certain situations. The pain experienced in upgrading to new Microsoft Exchange versions as well as cost can drive users to consider Linux-based alternatives such as Bynari, which offer Exchange 5.5 compatibility and relatively easy migration paths. Moving from Microsoft's IIS web server, which is not as common, can prove to be a laborious task for anything but simple static websites. However, there are tools that ease this transition as well, notably, Sun's ChiliSoft ASP and Stryon's iASP. Some users do not like being locked into a proprietary web server or mail solution and server operating system. These organizations also may consider Linux migration.

Windows offers an easy-to-use, highly integrated environment and has many advocates, but it does not allow a great deal of customizability or flexibility as compared to UNIX and Linux. So, system administrators will experience a learning curve to become familiar with the UNIX/Linux way of doing things, often with command-line tools that can be very productive for the well initiated, but daunting for those not familiar with them. However, this issue is being addressed with new graphical administration tools on Linux. With these ease-of-use enhancements, migrations from Windows to Linux are beginning to be implemented.

This document is copyrighted © by D.H. Brown Associates, Inc. (DHBA) and is protected by U.S. and international copyright laws and conventions. This document may not be copied, reproduced, stored in a retrieval system, transmitted in any form, posted on a public or private website or bulletin board, or sublicensed to a third party without the written consent of DHBA. No copyright may be obscured or removed from the paper. D.H. Brown Associates, Inc. and DHBA are trademarks of D.H. Brown Associates, Inc. All trademarks and registered marks of products and companies referred to in this paper are protected.

This document was developed on the basis of information and sources believed to be reliable. This document is to be used "as is." DHBA makes no guarantees or representations regarding, and shall have no liability for the accuracy of, data, subject matter, quality, or timeliness of the content.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
MIGRATION AND CONSOLIDATION REASONING	4
<i>Unix-to-Linux Migration</i>	<i>4</i>
<i>Windows-to-Linux Migration</i>	<i>4</i>
<i>Consolidating on Linux</i>	<i>5</i>
METHODOLOGY	7
CUSTOMER EXPERIENCES	8
WEB SERVERS ON UNIX CONSOLIDATED TO LINUX	8
<i>User Experiences Moving UNIX-Based Web Servers to Linux</i>	<i>8</i>
<i>Summary and Analysis</i>	<i>11</i>
MAIL SERVERS ON UNIX CONSOLIDATED TO LINUX	11
<i>User Experiences Moving UNIX-Based Mail Servers to Linux</i>	<i>12</i>
<i>Summary and Analysis</i>	<i>13</i>
WEB SERVERS ON WINDOWS CONSOLIDATED TO LINUX	14
<i>User Experiences Moving Windows-Based Web Servers to Linux</i>	<i>14</i>
<i>Summary and Analysis</i>	<i>16</i>
CONSOLIDATING MAIL SERVERS ON WINDOWS TO LINUX	17
<i>User Experiences Moving Windows-Based Mail Servers to Linux</i>	<i>17</i>
<i>Summary and Analysis</i>	<i>19</i>

MIGRATION AND CONSOLIDATION REASONING

Only in the last nine months (mid-2001 to mid-2002) have deployment service firms and vendors started to see real momentum in deploying and migrating to Linux. Many of these users are in the so-called “mid-market” – from 250 users up to 3,000 or even 5,000. (A few larger users are included.) One deployment in Europe runs Bynari mail servers for 30,000 users on Linux.

There are numerous service firms that assist users in these migrations ranging from start-ups such as Covalent and Sendmail to such well-established operations as HP Services and IBM Global Services.

UNIX-TO-LINUX MIGRATION

Cost is the primary motivation for migrating from UNIX to Linux. For example, a large transportation systems company we spoke to considered migrating to Linux due to the high cost of maintaining the hardware support for UNIX. The company still has to use UNIX in some cases because its engineering tools are developed on UNIX. But, for file servers, it could end up spending about \$300,000 for half a terabyte of disk space using a UNIX solution. By contrast, a SCSI-based RAID solution running on commercial off-the-shelf hardware costs \$25,000 to \$30,000. The client systems still run the engineering software on UNIX. But the company uses Linux servers to run NIS (Network Information Services), Domain Name Services (DNS), Web Services, and File and Query Authentication Services on the back end. These servers do not depend on high-cost hardware and the steep cost of support agreements associated with UNIX servers.

This transportation company achieved as much as a ten-to-one reduction in acquisition costs for hardware and software. The administrators and users view these Linux deployments as good enough to get the job done and enjoy the cost savings.

WINDOWS-TO-LINUX MIGRATION

User motivations for migrating from Windows are more varied. These include,

- *License Costs* – Depending on what third-party software is required in addition to a Linux distribution, license costs for a Linux web or mail server may be 25 – 50% of a Windows-based server for similar workloads. The Windows-based server may provide greater functionality, but system administrators and deployment specialists report “Linux is good enough” and provides more flexibility for most deployments.
- *Remote Management* – Linux offers the ability to perform most system administration tasks remotely using standard UNIX/Linux remote login and other remote features. This may save considerable travel time in a campus or metropolitan area and save payroll or service contract dollars in more remote locations.

- *Better Uptime* – Some users surveyed have experienced higher availability for a single Linux system than Windows NT Server. A typical system administrator or deployment consultant will say that Linux stays up for months whereas Windows NT may need two or three reboots per month. This matches the common wisdom and was borne out by our research.
- *Lighter Hardware Requirements* – Many of these Linux servers run without the X-Windows system and desktop GUI, which frees up system resources for mail or web serving. Windows cannot be configured similarly.
- *Freedom of Choice* – Some users do not like being locked into proprietary formats such as Microsoft Active Server Pages for web serving or Exchange. Linux-based solutions offer a choice of mail solution providers and technical support offerings.

Mindbridge, an Internet/intranet software and services company, moved from Windows to Linux. The first thing it did was move to Linux internally – and continue to use its own IntraSmart, an intranet software suite used for document management, calendaring, messaging, etc. The target platform included Linux, MySQL, Apache, J-Serve deployment, and the Sun JVM. This open-source platform is a typical configuration for entry-level web applications. It includes dynamic content, and application platform and an entry-level database. Apache was chosen since it works on all Windows platforms as well as Linux and has no license fees. J-Serve was a good choice for Java servlet applications and dynamic content. MySQL was chosen for the same reasons as Apache, and the fact that it is typically distributed with Linux systems is viewed as a big plus. Further, there are lots of free and inexpensive management tools available for this platform on both Windows and Linux, which ease the migration. And finally, the licensing of MySQL on Windows and Linux costs a tiny fraction of what the other database vendors charge.

From an operational point of view, the downside to MySQL is its lack of “fault tolerance” and its susceptibility to file-system corruption. However, if regular backups are made, one can minimize the potential loss of data. For one deployment consultant, in three years and with approximately one half of its customers using MySQL, only one incident of this sort was seen. It was resolved quickly with the tools MySQL provides. For larger organizations, deployment consultants recommend the enterprise databases: IBM DB2 and Oracle9i.

CONSOLIDATING ON LINUX

Server consolidation is widely trumpeted as a cost-saving means to greater operational efficiency. With Linux, this usually means an IBM zSeries mainframe with Linux capability, at least until Intel-based Linux gains partitioning and greater shared memory workload scalability. Motivations for moving to Linux on an IBM zSeries are many. They include reaping the benefits of IT’s rigorous management over previously distributed infrastructure resources as well reduced cost of ownership. In existing zSeries and S/390 IT shops, Linux may enable existing mainframe assets to be redeployed or extended to solve additional needs

beyond those originally scoped. Further, these assets may be fairly easy to extend to web or mail serving workloads, depending on the amount and configuration of excess capacity. Another strong motivation for consolidating on the zSeries is the ability to leverage the higher performance channel I/O and to reduce network data traffic. Linux on the zSeries currently supports Apache, Sendmail mail servers, standard Linux mail facilities, and the Bynari mail servers.

Leading vendors such as HP and IBM Global Services offer server consolidation services that includes Linux. For example, IBM Global Services provides a Linux server-consolidation offering that includes four different workloads:

- E-mail
- Web Serving
- File/Print
- TCP/IP Infrastructure

The service offering is comprehensive and includes an up-front assessment as well as design, implementation, and deployment.

METHODOLOGY

D. H. Brown Associates, Inc. (DHBA) interviewed customers and migration services experts who have completed various kinds of successful migrations to Linux-based systems. The migration scenarios studied fall into four general categories:

- UNIX-to-Linux E-mail
- UNIX-to-Linux Web Serving
- Windows-to-Linux E-mail
- Windows-to-Linux Web Serving

DHBA conducted in-depth interviews with the customer and service company personnel. Further case study work and documentation was used as well.

CUSTOMER EXPERIENCES

As Linux has moved into the mainstream, organizations are coming to realize its potential to solve problems with existing mail and web infrastructure. Users report considerable success with Linux in these IT arenas. These subsections highlight user experiences migrating to Linux in the four scenarios outlined in the methodology. (See previous page.)

WEB SERVERS ON UNIX CONSOLIDATED TO LINUX

A significant number of early web servers were deployed on UNIX, primarily Solaris. These used the Netscape (now Sun ONE), NCSA (National Center for Supercomputing Applications), and Zeus web servers among others. The open-source Apache web server also became popular on UNIX, eventually reaching the top-two level among UNIX-based web servers. (The other is Sun ONE.) On Linux, Apache has always been the web server of choice and is included with leading Linux distributions such as Red Hat. With few exceptions, such as a tiny number of Zeus or Sun ONE web servers, a Linux web server is built with Apache.

Migrating from UNIX web servers to Linux web servers involves operating system migration including moving from UNIX to Linux-based administration tools. The web server migration to Linux may involve the same system – from Apache to Apache, Sun ONE to Sun ONE, or Zeus to Zeus. Or, it may be from Sun ONE, Zeus, or another web server on UNIX to Apache on Linux. Finally, unless moving from SCO UNIX web servers (a rare combination), UNIX-to-Linux web server migration usually means replacing the RISC hardware with Intel hardware. Other options include re-purposing the RISC UNIX servers as RISC Linux servers or moving to an IBM zSeries Linux platform.

USER EXPERIENCES MOVING UNIX-BASED WEB SERVERS TO LINUX

Users and third-party deployment specialists see significant migration from UNIX to Linux web servers. These UNIX web servers are typically Sun ONE (Netscape)-based or Apache-based running on Solaris. Despite initial IT concerns about handling massive capacity, even larger firms are migrating their web servers from Solaris to Linux. They are already using Apache in many cases on Solaris boxes, and migrating to a distribution-based Linux system gives them the ability to update Apache a little more easily.

Sun provides Solaris patches, but it does not always provide access to some of the free software – including the Apache web server – that ends up running on most Solaris boxes. Sun just recently offered a supplementary CD that contains all of the GNU (GNU's Not UNIX) tools.

One of the remaining issues is recompiling Apache whenever one has to put in specialized authentication services, or specialized modules for programming

languages. These may be *mod_perl* or *mod_php*. This process requires specialized skills, and there are not as many people running UNIX with Apache on it as there are people running Linux. As a result, it becomes easier to find people familiar with setting up and maintaining these Apache-based web servers – people with Linux and open-source community skills – than it is to find people with direct experience building these capabilities on UNIX.

Looking at it from a systems management point of view over time, it makes sense to go with a Linux-based binary distribution such as Red Hat, Mandrake, Debian, or SuSE. Users migrate to those platforms in large part because of the maintenance cost required to run a publicly connected UNIX box, and having to build from source-specific service packages.

If the web server is set up inside a firewall, and it is only going to service local internal staff, an administrator need not worry so much about the remote exploitability of certain aspects of whatever packages one is running. But, if the web server is connected to the Internet, the administrator wants to be able to get a high priority security update as fast as possible. It takes quite a bit of time to remember how Apache was compiled the last time on UNIX, and to get it compiled and running. By contrast, Red Hat and Debian Linux take care of the Apache packages and send notifications, making it easy to get the security updates installed quickly.

Getting the migrated system up and running involves a fair amount of effort. To reduce this difficulty, web server appliances are viewed as offering a good value proposition, especially when it comes to purchasing, installing, and deploying. Since these appliances are built around a UNIX or “sealed” Linux (e.g., the Cobalt operating system), there are tradeoffs. Specifically, some web serving appliances are difficult to upgrade without an expensive service agreement, which becomes a significant detriment when security fixes need to be applied. Appliance packaging does not facilitate the required security upgrades.

Deployment service companies recommend Linux for web servers for one compelling reason: Linux offers easy and quick security patch upgrades. Further, with Red Hat, system administrators can register one system at no cost. And they buy the Red Hat support contract to upgrade multiple systems. Debian has an interesting approach that is more effective than the commercial Linux distributions. Debian deals with package dependencies well and back-ports bug fixes into other stable versions. It also does well in regression testing.

Consider this user scenario: Based on a deployment services firm recommendation, a smaller services company has moved to Debian and Apache as a platform for hosting web services. This migration was from Solaris with the Apache web server. Even though it had to provide an initial outlay of hardware, the company recouped the cost in the amount of time that it saved in administration. There is a clear advantage for administration: Instead of focusing on maintaining these ten web servers – including building patches to plug security holes that required a significant amount of time per week – the administrator is

now able to maintain each server for about an hour a week. This is due to the automated notification and patch system provided by Debian.

A good number of UNIX-to-Linux web server migrations are from the older Netscape/iPlanet web servers (now called the Sun ONE Web Server). Many of these servers run on older Sun servers with Linux and Apache running on Intel servers. Sector7, a deployment services firm, has done a number of these migrations and reports up to a 4:1 contraction from the older Sun servers to new Intel servers running Linux. Some of these migrations occur as remaining dot-com or click-and-brick organizations upgrade their infrastructure. These organizations are a Sun stronghold. The primary motivation is cost of ownership and upgrades, licensing fees, and maintenance costs. Return-on-investment (ROI) has been achieved within one year in some cases.

The Sun ONE Web Server¹ ranks among the major UNIX-based² web servers. Migrating from Sun ONE UNIX-based web servers to Apache Linux-based web servers has opened new opportunities. Among those providing this service is Covalent. Its “enterprise-ready” version of Apache, Covalent Enterprise Ready Server, includes proprietary security, management, and other features, including the first one-to-many remote management portal for Apache. Covalent uses the following methodology migrating from the Sun ONE web server to Apache:

- *Assess the Application for Migration* – This includes an inventory of all components of the application including CGI Perl scripts, Java servlets, PHP, etc.
- *Translate the Sun ONE Configurations to Apache* – Some service providers offer services and road maps to do this.
- *Migrate Static Content* – In many cases, after the configuration has been built, the directory structure of the existing website can be copied directly.
- *Combine Multiple Servers* – Apache’s Virtual Host facility enables a number of websites to be combined onto a single server. Key considerations for this process include bandwidth and volume characteristics.
- *Create a Security Configuration* – The web server configuration process includes setting access controls. It is recommended that one start the process with all permissions denied and then grant explicit permissions in each level of the directory hierarchy. This prevents common security holes typically found in easy “out-of-the-box” configurations.
- *Migrate Common Gateway Interface (CGI) and Script Applications* – Most CGI scripts should migrate without change. Apache also supports the *mod_perl* plug-in, which provides a faster execution environment than classic CGI Perl programs. Further, Covalent created a consistent application programming interface (API) and development environment across Windows, UNIX, and Linux to further facilitate development and migration of web applications to Linux.

¹ The Sun ONE Web Server was formerly known as the iPlanet Web Server and before that, the Netscape Web Server.

² The Sun ONE Web Server may be hosted on other operating systems such as Windows and Linux, though it is most commonly found on UNIX.

- *Migrate Netscape API (NSAPI) C and C++ Web Applications* – These can vary from simple communication programs to complete application platforms. This involves mapping the NSAPI usage to the Apache API and porting or rewriting the application. Covalent provides a detailed road map to do this.
- *Migrate Java Applications* – The Sun ONE Web Server supports Java servlets and Java Server Pages. So does Apache with JServ and Tomcat. Tomcat has replaced JServ and is the reference implementation for Java web container applications. Java applications written to the standard should port easily to Tomcat.

Web deployment firms offer a range of services to assist users with migrating from UNIX-based Sun ONE Web Servers to Linux-based Apache servers. In many cases, these migrations are not complex because most web servers running on UNIX using standard web platform capabilities are readily transferable to Linux and Apache.

SUMMARY AND ANALYSIS

Migrating UNIX web servers to Linux is one of the easiest migration scenarios in the industry. This is especially true for Apache web servers moving from UNIX to Linux. Incremental acquisition cost, upgrade cost, and even system administrator productivity are key motivators for this migration. Linux has a small hardware footprint and runs on industry standard hardware reducing new acquisition and upgrade costs. The open-source community and some of the methods used by the team for posting notices about updates and handling security patches increase system administrator productivity and speed in fix deployment. Linux offers an open environment that allows for flexible and customizable deployments due to source availability. Some users and deployment specialists report that migrating small installations takes one day or less.

Even though there is a great deal of similarity to UNIX, this is still a migration to a different platform. Caution and proper planning should reduce risk further. Solid implementation should be done even by people experienced with successful migrations. If in-house skills are relied on, it is a good idea to supplement them with consultants. The overall process calls for configuration, workload sizing, installation, deployment, and management issues – as described above – that need to be understood and planned for. Static websites and simple dynamic applications are easiest to migrate. A trickier task is moving from the Sun ONE Web Server to Apache where there may be differences in capability that need to be compensated for.

MAIL SERVERS ON UNIX CONSOLIDATED TO LINUX

From its earliest days in technical communities, UNIX was a popular mail system. This early acceptance extended to networks and the Internet as those were built. These systems used UNIX mail, open-source sendmail, and numerous mail handlers and tools. The popular mail protocols, software, handlers, and tools are

currently available on Linux, which makes the transition from UNIX to Linux straightforward.

Like the web server scenario, migrating from UNIX mail servers to Linux mail servers involves operating system migration, including a switch from UNIX to Linux-based administration tools. The mail application migration to Linux may incorporate the direct types – from elm to elm, sendmail to sendmail, or qmail to qmail. Or, it may be from one of these mail packages on UNIX to Bynari, IntraSmart, Sendmail mail servers, or others on Linux. Finally, as is the case with web serving, unless moving from SCO UNIX mail servers (a more common combination in small businesses), UNIX-to-Linux mail server migration also usually means replacing the RISC hardware with Intel hardware. Other options include re-purposing the RISC UNIX servers as RISC Linux servers or moving to an IBM zSeries Linux platform.

USER EXPERIENCES MOVING UNIX-BASED MAIL SERVERS TO LINUX

Software and service deployment firms, once UNIX-only shops, have been driven to Linux by their customers, and in the process, they began developing expertise in the operating system. At that point, many began to look at migrating their existing systems to Linux, for cost and management reasons.

Typically, the UNIX-based mail systems are all running either POP or other kinds of mail clients, including the standard UNIX and local mailers. In fact, most organizations do not depend on UNIX systems as mail clients. Most of the companies that employ the high-end UNIX-based workstations on desktops are doing integrated circuit design or other kinds of engineering tasks. If those systems are running mail, it is just the local mail on the system. On the server side, they are running Q-Pop or one of the other POP servers and providing mail services natively out of UNIX.

Given this, users and deployment specialists see the migration as a straight shot because the clients are intimately compatible with UNIX protocols. Hence, there is really no transition to speak of. The clients and the servers are often compared to a lego set – pop one in, pop one out. The protocols are very compatible and there are almost no issues moving from UNIX to Linux.

The tradeoffs experienced between a UNIX-based POP3 mail server and zSeries Linux-based Sendmail Integrated Mail Suite are illustrated with a catalog retailer who moved from Software.com's Post.Office POP3 mail server.³ With e-mail usage rising dramatically for customer service and communications, the company decided to replace its two most important channels for customer-facing e-mail: the eCare and Electronic Gift Certificates channels. The replacement system needed to support the company's goal to consolidate as many applications as possible on the mainframe and provide significant improvements in performance, reliability, and scalability over the existing systems.

³ Source: Sendmail with DHBA updates.

This migration needed to be completed in five days. Given the timeframe and implementation challenges, the goals for its mainframe e-mail system were clear:

- A quick and seamless integration into the existing e-mail environment.
- No e-mail messages can be lost in migrating from Software.com's Post.Office POP3 server and mail relay.
- Externally visible functionality to end-users must be identical to Post.Office implementation.
- Define an optimal system that is reliable and contains the flexibility to scale with projected future demands on the system.

The user evaluated different solution options and chose Sendmail's Mailcenter. This migration was accomplished in the five-day window. Key elements include,

- *Sendmail Running on IBM z900 Under Linux* – An internally developed benchmark tool was used to evaluate the relative speeds of the IBM mainframe-based sendmail system running under SuSE Linux versus a UNIX alternative. The IBM z900-based sendmail system delivered 25 messages per second to an external host compared to UNIX on an older 500 MHz SPARC system that delivered about five messages per second.
- *Sendmail Advanced Message Server (SAMS)* – The eCare system uses the SAMS POP3 server to store e-mail messages for a third-party software application, which manages the eCare system.
- *Sendmail Switch* – The primary mail router for all inbound Internet message traffic including e-mail for the company's approximately 5,000 employees. It also handles the high-priority outbound eCare and Electronic Gift Certificates e-mail.
- *Sendmail Switch at the Internet Gateway* – To manage all e-mail from customers, suppliers, and business partners coming into the corporate network from the Internet.

SUMMARY AND ANALYSIS

Migrating UNIX mail servers to Linux is another relatively easy migration scenario. In this case, it is especially true for moving to the equivalent mail environment on Linux from UNIX. Like the web server migration scenario, incremental acquisition cost and upgrade cost as well as avoiding further proprietary UNIX lock-in motivate this migration. Linux and most Linux-based mail servers have small hardware footprints and run on industry-standard hardware, which reduces new acquisition and upgrade costs. Some mail servers are also open source and others are proprietary packages built on Linux, each offering tradeoffs for support and maintenance in terms of choice of web-based and vendor support.

Like the web server scenario, this is still a migration to a different platform, albeit one with a great deal of similarity with UNIX. Caution and proper planning reduce risk further even if the risk is relatively low. Proper planning and implementation should be performed by people experienced with successful

migrations. If a skilled in-house resource is used, there may be a supplement from outside consultants. Mail migration efforts need to consider such items as address book interactions, mailing lists, and user features for handling mail when migrating to a new mail system. Unlike replacing the web server, changing a mail server and especially the clients will require user training and adaptation.

WEB SERVERS ON WINDOWS CONSOLIDATED TO LINUX

The early Windows-based web servers were also divided among several alternatives including Netscape (now Sun ONE), NCSA, and Microsoft Internet Information Services (IIS). The open-source Apache web server never became popular on Windows due to the prevailing culture in which Windows-trained administrators viewed open source with suspicion, especially in contrast to Windows' IIS. In addition, there were issues related to Apache version 1.x performance and integration with Windows. These have been largely corrected with Apache 2.

Migrating from Windows web servers to Linux web servers involves operating system migration. This includes moving from Windows to a Linux-based operating environment and administration tools. The web-server migration to Linux will likely be from Microsoft IIS to Apache, although moving from Sun ONE to Apache is also possible. The Windows Intel-based hardware can be reused for the Linux web server, but a hardware upgrade may be in order as well. Other options include moving to an IBM zSeries Linux platform.

USER EXPERIENCES MOVING WINDOWS-BASED WEB SERVERS TO LINUX

The decision to migrate from Microsoft IIS to Apache on Linux depends on various factors at work in the organization. Staying with IIS may make sense for a company that maintains a strong internal IT operation. These internal strengths should include software development and running its own server. In addition, the company should be able to handle its primary needs, covering the ability to make changes, and to define sub-webs for people to be able to update departmental type information on a larger website. Microsoft provides effective tools for doing this. In this particular case, it is probably the right tool for the right job. Similarly, for a company that merely wants its primary service on its website to provide updated datasheets to the companies that are using its products, IIS does a fine job. However, there are growing security concerns with IIS increasing the motivation to migrate.

Issues are more likely to fix on service than development. Some users and deployment specialists report that IIS does not scale well and does not perform well under a heavy load. However, for a website that is fairly heavily hit, and that has a fairly complex application backend, especially running some kind of database enabled content, Linux, Apache, and one of the open-source or commercial databases, may be better suited for the job. For example, some deployment consultants do not recommend Microsoft's IIS with Active Server Pages (ASPs) and Cold Fusion for this type of workload.

Some of the motivations for Microsoft IIS-to-Linux Apache migrations are driven by extenuating circumstances, such as webmasters and related skills leaving the company, or customers becoming frustrated when they find out they need to make changes that they cannot complete due to lock-in or scalability in some cases. In these circumstances, deployment specialists and internal website developers work on a custom basis, and it is a fairly significant translation, especially if the project involves the ASP level. To avoid a migration, other Microsoft skills would need to be brought into the mix, typically by hiring. Each circumstance needs a tradeoff analysis specific to the case.

Further, and this should be no surprise, lower cost drives many to make the move to Linux. A database-enabled Microsoft application for the Internet requires about \$10,000, and the biggest chunk of that is software. One deployment specialist, I.D.E.A.L. Technology Corporation, can deliver similar capability for about \$2,499 using the I.D.E.A.L. web servers that include the base Linux preload and the various free components, specifically PostgreSQL or MySQL and Apache.

For quicker development-to-deployment time, some users turn to deployment specialists who also have their own predeveloped components. Most applications that need to get running under Linux primarily use component applications that include shopping carts, contact management, or group collaboration. There are free applications available that run on top of Linux, Apache, MySQL, and PHP or Perl, which may accelerate the timeline.

Starting a new project with two parallel paths, one starting under Windows, and one starting under Linux, the Windows project will require a review of a catalog of products that would have to be purchased. The Linux project would start off on the web looking for other open-source applications that do 80% to 90% of what is called for. However, there may be significant differences in cost and time required.

So, in terms of being able to replicate features and functionality, obviously based in part on the programmer's familiarity with the tools, some deployment experts are comfortable affirming a faster timeline under Linux. This is due in large part because to the availability of free, high-quality applications to start off with. And users and deployment services experts agree on the success of these projects.

There are a few examples of using Apache on NT. One organization interviewed for this paper employed Apache with J-Serve because of security concerns with IIS. And while Apache 2 solves the performance gap and other issues on NT as compared to IIS, even Apache 1.x has been found to be solid and reliable. There is a general user concern about security with Microsoft IIS. This is the reason some of the web server software decisions are made to go with Apache on NT. This sets up the flexibility to more easily move to Linux should such a migration be chosen.

Further motivation for migration centers on the platform becoming somewhat unstable or unreliable. This is usually due to instability in NT Server software or early Apache versions on NT. Response times increase on Apache 1.x on NT. When the situation becomes painful and the decision is simply to replace the old system, Linux is a popular choice. Beyond security and license cost issues, remote management with Linux web servers is considered a big win for reducing administrative costs.

A noteworthy Windows-to-Linux web serving migration and workload consolidation scenario was executed by a large Wall Street financial services company. It was running Microsoft IIS web servers that generated significant network traffic to a mainframe-based DB2 database that could bog the network down. The company decided to migrate to Apache on SuSE Linux on an IBM zSeries mainframe and attach to the database using JDBC and channel I/O. The motivation was the need to reduce network traffic and increase performance.

The IIS website configuration involved no virtual hosting and could be easily migrated to Linux and Apache using Stryon's Instant ASP (iASP) product. iASP is a Java Virtual Machine (JVM)-based runtime environment for running Microsoft ASP applications on Apache running on Linux and UNIX servers. This allows a webmaster to avoid rewriting the Microsoft Active Server Pages programs to JSP since iASP does this automatically. This financial services company then needed a database connection and temporarily used a Neon Type 1 JDBC connector. It waited for DB2 and a type 2 connector that would yield better memory usage and performance. This initial transition took about two weeks of which only a couple of days required direct labor. The labor consisted of defining an alias for the directory that held the web pages on Linux, and installing iASP and FTP on the web pages from Windows to the Linux alias directory. Finally, the company set up the JDBC connection, which involved editing one file, and tested the new website. The results were as expected and the company's IT staff would do the same again, except they would now be able to go directly to a type 2 JDBC connector.

Stryon (formerly Halcyon Software) also reports similar success with other users of iASP including those customers connecting to DB2 and MySQL for dynamic content. These migrations may take one week or less.

SUMMARY AND ANALYSIS

Moving from Windows-based IIS web servers to Linux-based Apache is more complex than most of the other migration scenarios studied in this report. This is because beyond basic standard HTTP and HTML page serving, the web server APIs and support for dynamic web content and presentation involve significantly different programming models. These models require migration and runtime aids on Linux such as ChiliSoft ASP, Stryon's iASP, Apache's iSAPI and CGI capability, and Apache plug-ins for numerous web application platforms or a rewrite of a significant amount of the website code. Further, Windows website

skills are not immediately transferable to Linux and Apache in terms of the development tools, deployment, and management characteristics.

Some motivations to migrate include avoiding proprietary lock-in and avoiding higher and unpredictable licensing costs. Security concerns may prompt a user to migrate. However, properly configured, IIS can be as secure as Apache for most situations. Loss of skills or the need to move from an abandoned third-party web server or tools software may open up the consideration. This thorny scenario remains less common than the other scenarios.

Movement from another web server such as Sun ONE or other web servers on Windows to Linux may be easier than from IIS. This is especially true if they have good tie-in to Java, which is the case with a Windows-based WebSphere application.

CONSOLIDATING MAIL SERVERS ON WINDOWS TO LINUX

The early Windows-based mail servers were divided among several alternatives including Lotus Notes. Microsoft released Microsoft Exchange Server and its Outlook mail client to penetrate this market in the mid-1990s. The UNIX mail programs never gained popularity on Windows because of typical user and administrator aversion to command lines and text screens. On Linux, traditional UNIX mail, open-source sendmail, Sendmail mail servers, and numerous mail handlers and tools are available. These are not compatible with Windows-based mail deployments, which are largely derived from Exchange these days. In addition, Bynari's mail offerings – compatible with an earlier version of Microsoft Exchange – are available as well.

Migrating from Windows mail servers to Linux mail servers involves operating system migration including a move from Windows to a Linux-based operating environment and administration tools. The mail server migration to Linux will likely be from Microsoft Exchange to Bynari or to Sendmail Mailcenter, though it could be from Lotus Notes and others as well. The Windows Intel-based hardware can be reused for the Linux mail server, or a hardware upgrade may be in order. Other options include moving to an IBM zSeries Linux platform.

USER EXPERIENCES MOVING WINDOWS-BASED MAIL SERVERS TO LINUX

A recreational products company was running Microsoft Mail Server using two 500-user licenses. And it was using a shareware product called SpinMail from a company in England that managed its external mail. There were issues with SpinMail and with the NT platform itself. It was crashing from the external side and required additional work from the support staff. In addition, this company was getting a percentage of unreadable attachments, because the mail server was corrupting attachments as they came through. Usually these were Word or Excel documents, and so people would have to resend the material. As a result, the system definitely affected productivity. This firm also used an older Microsoft mail product for internal mail, calendaring, etc. that worked fine as long as a user

was in the same post office. Once a user switched post offices, there was no way to see another individual schedule. Once again, productivity suffered.

The system served 700 users on the configuration described above, all on Intel hardware and Microsoft operating systems. Given how much data was going through e-mail, the company was not really comfortable with the stability and integrity of the deployment. Hence, it decided to make a change and upgrade. Options included GroupWise from Novell and Microsoft Exchange and Outlook. The company ran Novell networks and Outlook and Microsoft Office. Since this company had support issues for the mixed configuration between Novell and Microsoft, it looked at moving to Microsoft Exchange 2000 for greater integration with Outlook and Office.

The cost for the migration and upgrade was enumerated in a proposal and totaled \$100,000. Previously, e-mail had cost them about \$8 per client. The upgrade was going to be about \$70 per client for Exchange 2000, plus the hardware and training to bring the total to about \$100,000. For a 700-user deployment, management asked questions that got at the motivation and benefits of spending such money. The key question was, “Doesn’t e-mail work?”

Following this review, the IT team looked at other options, including a mainframe running the legacy system. Further, the company had experimented with Linux on VM using it for web serving and employing Samba for file sharing. These were nine instances of Linux running on the mainframe doing different things. Bynari offers Insight Server, a Linux-based Microsoft Exchange compatible mail server. It is also supported on Linux on the zSeries. Research found that Insight Server was being used by up to 30,000 clients in a European deployment. Hence, it appeared able to handle the workload easily. Bynari-on-Linux zSeries would use about 7% – 12% of the zSeries capacity supporting 700 mail users. The mainframe implementation was estimated at a more attractive cost of \$ 20 per user.

The company staged the transition and replaced the external e-mail server first. SpinMail was eliminated, and the corrupt attachments and hard crashes went away. Then the company faced the challenge of replacing the internal mail server. These components were using about 15% of the zSeries, rather than the 7% to 12% expected. So, there were real performance issues. The internal mail server was then moved from the mainframe to an Intel server running Bynari and Linux while the issues were addressed. At this time, calendaring and scheduling workload were also added to the Bynari solution.

E-mail was considered mission critical and this was a primary motivator for using the mainframe. IT mainframe rigor was expected. Adding the Integrated Facility for Linux from IBM solved the performance issues described and reduced the usage rate to 7%. The benefits include using less capacity than expected, fixing the corruption and crashing problems, achieving true web mail capability, and accomplishing all of this at about one-third the cost, which included a price break on the upgrade for the Integrated Facility. The company now has 11 Linux

instances running on the mainframe with some of the others running file/print and web serving.

A separate issue concerned the difference between the way Outlook handles the address book and the “To” button and Bynari. Outlook does not require names to be typed in, Bynari does, or it takes an annoying five clicks to find a name in the address book. A clever, temporary work around is to copy the LDAP file to everybody’s hard drive every day. When people sign on in the morning, this 1 MB file is transferred in about two seconds. Now the clients can use the address book as they did before. Some people have started to get used to the Bynari way. Further, Bynari plans to add the Outlook feature in its next release.

The IT team took Linux classes and learned about Bynari on both the client and the server. The workstation upgrades took less than two hours each and were not done remotely nor automatically as neither they nor Bynari had the tools or the experience. The IT team believes the upgrade process can be further streamlined, offering a great opportunity for Bynari and future users. Bynari has built an experience base from these early migrations to further improve and streamline the process.

The users are happy and the company’s IT shop would do it again. However, they agreed on a key lesson learned – understanding the performance and e-mail issues ahead of time.

One of the lessons learned is that if a company has an Exchange 5.5 Server, one can plug in a Bynari server overnight, and the users do not even know they are on a different server. This is a big selling point. Bynari learned a lot as well and is applying that knowledge to migrations from Microsoft Exchange 5.5. Exchange 2000 is different from Exchange 5.5 and requires users to go through training. The migration to Exchange 2000 is not perceived to be so easy. Given the re-engineering and education necessary, users and deployment consultants believe that Bynari offers a significant opportunity to capture Exchange 5.5 customers, especially dissatisfied ones, and move them to Linux for 25% – 33% of the cost of Exchange 2000.

A simpler case is moving from a standard POP3 mail server on NT to Linux. Migrating this mail server to Linux was no more than a case of recreating accounts, so it can be a very straightforward proposition, and requires a range of several hours to a couple of days. Motivations for this type of move include avoiding proprietary lock-in and increasing the choice of technical support providers.

SUMMARY AND ANALYSIS

Migrating from Windows-based mail, usually Exchange, to Linux-based mail is now easier thanks to a third-party mail offering from Bynari, which offers compatibility with most of the features of pre-Exchange 2000 versions. However, the user base is still relatively small and more learning about this scenario

continues. The motivations are typical – license cost and avoiding proprietary lock-in. Further, some users report significant bugs in Exchange, but exposure to these will vary by implementation and by the skill of deployment and administrator personnel. As with web servers, there are open-source mail solutions as well, with the most famous being sendmail. The Sendmail company has packaged mail solutions built on this open-source project and is gaining ground especially in new deployments.

This scenario is not as complex as moving from IIS because it does not involve different programming environments. But, it offers the same issues as moving from UNIX to Linux mail, plus issues related to changing the operating system and mail server. Thorough planning and skilled implementers are a must. Migrating to Linux from Windows for mail can take a few weeks as it requires moving address lists, distribution lists, mailboxes, as well as testing time. Further, user training is necessary, though Bynari significantly eases the pain of this transition.