

The Strategic Value of Moving to Linux

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Table of Contents

The Strategic Value
of Moving to Linux

- 2 INTRODUCTION
- 2 LINUX MOMENTUM
- 5 LINUX MYTHS
- 8 THE NOVELL LINUX STRATEGY
- 12 NOVELL—PART OF YOUR LINUX SOLUTION
- 13 APPENDIX A: LINUX SCENARIOS
- 17 APPENDIX B: LINUX RESOURCES

Introduction

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Linux is here to stay. There is generally no question that Linux has had, and will continue to have, a significant impact on the computing world. If you are a business executive concerned with how your company can reduce IT costs or improve efficiency, you are probably considering Linux and what role it will play in your company.

Many business managers are asking these five questions about Linux:

1. Should I implement Linux?
2. Where should I implement it?
3. When should I make the move?
4. How should I implement Linux?
5. What happens if I do make this change?

This paper addresses the major concerns that business and IT executives have expressed about developing and implementing a Linux strategy. It also describes how the Novell Linux strategy can help you successfully transition to an open source operating system that will improve efficiency and reduce operating costs.

LINUX MOMENTUM

It is widely recognized that the open source movement and Linux have forever changed the landscape of the IT industry.¹ In a very short time Linux has become one of the fastest growing operating systems in the IT industry.

- According to market research firm IDC, Linux is projected to grow at a compounded annual growth rate of 14% between 2002 and 2007.²
- This trend is confirmed by Forrester Research³, which found that 72% of 50 respondents at USD \$1 billion+ companies are planning to

increase their Linux usage over the next two years. The Forrester survey also found that more than half of the interviewees planned to replace other operating systems with Linux.

- According to CIO Research, 64% of 375 companies surveyed are using open source, with a key driver being lower total cost of ownership (TCO). "CIOs say the greatest benefits from using open source are lower total cost of ownership, lower capital investment and greater reliability and uptime compared to their existing systems. IT executives report that open source

¹ Linux, which was originally released in 1991 by Linus Torvalds, is regarded by many as the poster child of the open source community.

² "Worldwide Linux Operating Environments Forecast and Analysis, 2002–2007: Transitioning to Mainstream," IDC, September 2003.

³ "The Linux Tipping Point," Forrester Research, March 2003.

provides greater flexibility, control and faster, cheaper application development.”

Organizations that implement open source solutions like Linux enjoy a lengthy list of benefits, including:

- Ability to run efficiently on a wide variety of hardware choices from leading system vendors
- Substantial reductions in software costs
- Enterprise-quality availability, reliability and scalability
- Reduced operational costs
- Plentiful, experienced development resources
- A rapidly growing body of applications and tools

Hardware: Greater Variety, Better Efficiencies

One of Linux’ greatest strengths is that it runs on a wide range of hardware, from mainframe computers to laptops and PDAs. Linux distributions are available from or are supported by most of the major hardware manufacturers including Dell, HP, IBM, Sun and others. This makes it easier to select the type of hardware that is most appropriate to support the business application.

Further, as Linux is relatively efficient in its use of hardware resources, organizations often find they can support more users with less hardware. And, since Linux runs on both Intel* and RISC*-based hardware, organizations can realize significant savings by running Linux on the less expensive Intel-based hardware. At the very least, the same number of users can be supported on the less expensive hardware. One result of this increased efficiency is that companies can—and do—

deploy Linux on older machines, reducing capital expenditures for new hardware. Switching to Linux reduces the necessity of always having the “latest and greatest,” allowing IT assets a longer useful service life.

Software: Reduced Costs

Linux as open source is free; as a bundled distribution, its costs range from USD \$50-1500. However, since many⁵ commercial distributions of Linux have no per-seat or per-CPU charges, a company can purchase a single copy and then install it on all their machines, resulting in a substantial cost savings over other operating systems (OS).⁶

Availability & Scalability: Increased Uptime, Easier Scaling

Many enterprises select Linux because of its reputation for stability. Linux system uptime is often measured in years rather than days or weeks. For example, Windows*-based computers generally have to be completely shut down and restarted to install a patch or upgrade. Patching or upgrading Linux, on the other hand, generally only requires starting and stopping a single process, which allows the computer to continue supporting the enterprise while it is being worked on. Also, despite its popularity, Linux doesn’t suffer from the security “patch-of-the-day” syndrome or the blizzard of virus attacks typically associated with other software.

Some Linux systems support more than two (2) processors in the same machine. Linux can also scale through cluster-based computing, where multiple individual computers are linked together to form a

⁴ “Open Source Gains Momentum,” CIO Research, December 3, 2002.

⁵ Red Hat Advanced Server and Red Hat Enterprise Linux have per-seat charges.

⁶ Note that this cost savings applies to the Linux software and not to services or support from the Linux vendors.

larger, more powerful computer or storage complex. Thus, even if a single computer has to be shut down and restarted, it does not disable the entire cluster.

With estimates of revenue losses running as high as \$1 million/hour of system downtime, Linux is becoming the OS of choice at companies such as Amazon.com, FedEx and Google, where continuous uptime and rapid response are critical to their business operation.

Operations: Lower Costs, Better Efficiencies

In a study⁷ examining the cost of ownership for Linux Web servers, the Robert Frances Group found that not only are the average salaries for Linux system operators lower than those of operators with expertise in proprietary operating systems, but the nature of Linux is such that they each can support more machines per operator.

The fact that the same image can run on a variety of hardware platforms reduces the cost of training system operators and support personnel because they support fewer distinct operating environments.

Development Resources: Plentiful and Experienced

The open source community consists of thousands of experienced developers collaborating on hundreds of different projects. The distributed nature of the community and the diversity of projects make it much easier to locate and leverage development expertise. With open source, companies find that they are not held hostage to development resources with scarce proprietary knowledge.

Companies deploying Linux benefit from the combined efforts of the open source community. Under specific guidance from Linux experts, the open source community is continually improving the Linux kernel, as well as other open source software, at little or no incremental cost to the end user organization.

Companies also have the option to customize Linux to suit their particular needs, increasing their organizational agility and flexibility (as long as the source code modifications are made available to the open source community). However, this does not mean they must give up any of their standards and professional practices developed over the years for managing other operating systems.

Applications: Compatible and Growing

Large numbers of applications (such as Ximian Evolution[®]) are immediately available for use with Linux from both the open source community and independent software vendors. Open source solutions (such as StarOffice^{*} and OpenOffice^{*}) have been constructed to be completely compatible with comparable proprietary products (like Microsoft Office).

Leading ISVs such as BEA, Computer Associates, IBM, Novell, Oracle^{*}, PeopleSoft, SAP and Sybase have ported (or made the commitment to convert) their applications, middleware and databases to Linux.

Summary

Evidence is mounting from a variety of sources that organizations migrating their applications and IT infrastructure to Linux are benefiting from:

⁷ "Total Cost of Ownership for Linux Web Servers in the Enterprise," Robert Frances Group, September 2002.

- Mainframe-like reliability at Intel economics, with significant cost savings and substantial return on investment (ROI) when compared with other operating systems
- Enterprise-level scalability, reliability and availability
- A sufficient and rapidly growing supply of developers
- Application portability due to the large number of hardware platforms supported by Linux
- An increasing supply of applications from major software vendors
- Open source solutions that provide freedom from vendor lock-in

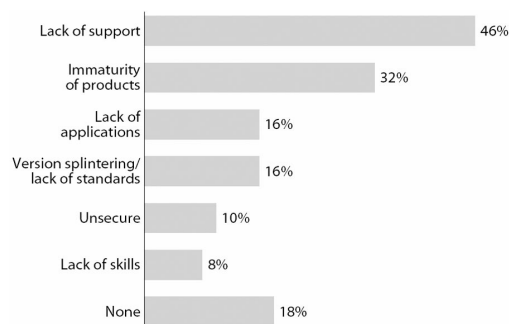
LINUX MYTHS

While these benefits are tangible, they also are offset by concerns that enterprises have with respect to Linux' readiness for the enterprise. According to Forrester Research⁸, the biggest fears companies have about Linux and open source are:

- Lack of support
- Immaturity of products
- Lack of applications
- Vendor splintering
- Security
- Lack of skills

Support

One of the key issues inhibiting widespread adoption of Linux and open source by many corporate IT managers is the perception they will not have access to a credible support organization to back up their IT workers 7/24/365.



Enterprise-level support services go beyond providing a hotline that customers can call when a problem appears. When a large enterprise implements a new operating system, the IT organization must consider many issues, including enterprise architecture, network infrastructure, training (both operator and end-user), application support/availability, data conversion and integration.

IT organizations also need to plan for pre- and post-implementation considerations, including configuration management, availability, backup/recovery procedures and functional and performance testing before they can put new servers into production.

Even organizations with the requisite skills would feel more confident if a large vendor with extensive and deep experience in operating systems, networks and IT infrastructure provided them with support.

Maintenance is another area of concern. Because Linux is open source, customers have access to the source code and can diagnose and fix bugs that may appear in their Linux distribution. However, most enterprises prefer to develop a relationship with a major vendor that has the capability and processes to prioritize and address

Figure 1. Biggest IT officer concerns about implementing Linux/open source software (Source: Forrester Research⁸)

⁸ "The Linux Tipping Point," Forrester Research, March 2003

software problems and implement proven escalation procedures to respond to mission-critical outages.

Today's reality is that enterprise-level support services that address the totality of an organization's Linux concerns are available from both the large system platform vendors (such as IBM and HP), as well as infrastructure solution companies like Novell. These companies have deep experience providing worldwide, round-the-clock support services to large companies.

Application Maturity

Although Linux has been available for over 10 years, it has only been widely accepted as ready for enterprise environments in the last couple of years. Consequently, the list of products and applications that are available on Linux, while growing rapidly, is still relatively small when compared with proprietary operating systems such as UNIX* or Windows.

One area of concern is the availability of application development and lifecycle management tools for Linux. Application development has evolved into two major camps. While there are other approaches (C, C++, Python, etc., running natively on popular deployment platforms), most strategic application development in global enterprises is based on Microsoft .NET and/or Java*. Given that it is unlikely that Microsoft development software will ever be available natively on Linux, organizations that choose Linux will need a Java/J2EE* development environment and an application server environment. Open source Java solutions, such as Tomcat and JBoss, are in

the early stages of their development lifecycle; however, vendors such as BEA, IBM, Novell and Sun, have ported their J2EE-compliant application servers to Linux. In addition, organizations will soon have an alternative to Java in the Mono project—an open source implementation of the .NET development framework.

Closely related to application development is the area of network, system and application management software. Linux has many utilities for software distribution, metering and monitoring, account management, backup and recovery, network monitoring and others. While many of these tools are of excellent quality, there is still concern within the enterprise software community that they have not been adequately stress-tested or integrated in a large-scale IT environment. Also, many Linux utilities only operate on Linux, while most large IT shops are heterogeneous environments that require tools that support multiple operating systems (such as UNIX, mainframe, Windows, NetWare® and OS/400 *).

Critical services such as server provisioning, e-mail and collaboration tools, enterprise directories and file and print are available from a variety of sources, including the open source community. Since many of these applications have not had the degree of stress testing—especially at high loads—that large enterprises require, there is some concern that they may prove inadequate at scale.

The good news is that many large ISVs, including Novell, are either developing new tools or porting already proven tools to the Linux

platform. For example, Novell Linux services have been rigorously tested at load levels exceeding those of major global enterprises.

Cross-vendor Consistency

Some industry observers have expressed concern that Linux may follow the UNIX path of vendor fragmentation, with disparate, inconsistent versions of the software being released by different vendors. Novell does not believe this is a valid concern for two reasons:

1. The Linux kernel upgrade and distribution process is under the control of a single individual—founder Linus Torvalds—who defines the “gold standard” for the current Linux release.
2. The open source community in general, and the Linux community in particular, has developed a sophisticated software upgrade and release process that is outside the control of the major vendors and which will survive Mr. Torvalds.

The fact that the open source community controls the “gold standard” for Linux means that it is unlikely Linux will break up into multiple, incompatible fiefdoms, because companies will always have the choice to obtain the Linux kernel directly from the open source community or from a commercial distribution. The industry’s focus on openness and standards gives commercial vendors a strong incentive to adhere to the Linux standard and deliver compatible value-added software and services.

Security

Security is a broad-based topic that organizations are increasingly taking very seriously. Lately, one aspect of security, identity management, has become an important concern for large organizations—especially those with distributed operations and a diverse constituency of users.

Secure identity management involves more than simple authentication and authorization. A comprehensive identity management solution enables your enterprise to deliver the right resources to the right people, securely, efficiently and affordably. As an operating system, Linux plays a critical but limited role in validating the identity of a user and ensuring the user only has access to the system resources he or she is authorized to use.

Enterprises deploying Linux must be assured the OS can effectively participate in meeting their enterprise-wide security requirements, which include capabilities such as single sign-on, firewalls and reverse proxy, encryption, virus protection, etc., that are not part of the Linux kernel.

As Linux continues to mature and additional resources and tools from companies like IBM, HP, Novell, Sun and others are ported to Linux or integrated into the Linux environment, these security concerns should diminish.

Lack of Skills

Some companies are concerned they may lack the specialized skills required to fully and effectively utilize, manage, or maintain their Linux software. These skills include deployment and integration, Linux-based application development, system administration, tuning and others.

There are operational similarities between Linux and UNIX which, combined with the rapid growth of the Linux market, make it more likely that companies will be able to readily develop or acquire the expertise required to maintain their infrastructures and business applications. In addition, UNIX systems management expertise, which is widely available, can easily be leveraged in a Linux environment.

The Linux vendors recognize that large enterprises require processes and procedures that limit the risk of introducing changes to a running production environment. Rigorous and careful integration and testing will continue to be as necessary in the Linux environment as they are in other operating system environments.

THE NOVELL LINUX STRATEGY

The Novell Linux strategy, which was announced at BrainShare® 2003, is rooted in a commitment to deliver a complete range of Linux-related services, products and solutions to the market. A key benefit of the strategy is the availability of Novell software and services to new, prospective customers who are running Linux and not NetWare. Over time, all of the services associated with the NetWare operating system will migrate to Linux. The final outcome of this migration is a network service environment from Novell that supports Linux or NetWare.

Novell, a Fortune 1000 corporation with over USD \$1 billion revenue, has more than 20 years experience delivering proven, enterprise-quality products and services to the market. The Novell

track record of delivering high availability business solutions is now extended to give current and future customers the same reliable, scalable, secure network services running on either Linux or NetWare as the operating system.

There are four pillars to the Novell Linux strategy:

1. A comprehensive set of professional services, including support, consulting and implementation
2. A full range of products and solutions designed to enhance the Linux environment
3. Industry-leading training and certification processes
4. Strong commitment to the open source industry and ecosystem

Services

Novell brings its deep understanding of the entire network ecosystem to customers through services that support Linux to the same level of performance and with the same professionalism we have brought to NetWare and our other products.

Support Services

Novell has two decades of experience delivering enterprise-level support to our customers. In fact, Novell Technical Support has been supporting a variety of products on Linux for some time. Our global support teams are able to provide 7/24/365 support for our Linux customers—from the network services layer right down to the internals of the operating system.

Novell offers both free and paid support for Novell products running on Linux. Free support

services include a searchable KnowledgeBase, online product support forums, downloadable technical documents and patch information, and Cool Solutions communities that exchange tips, tricks and free tools. Customers can purchase Premium Support, providing a broad range of service levels designed to meet the needs of all customers who run Novell software on various platforms, including Linux, NetWare, Microsoft and others. Optionally, per-incident support (either via telephone or electronically) is also available.

Consulting Services

Novell has a large number of experienced consultants around the world who are prepared to deliver a comprehensive, objective portfolio of service offerings designed to empower clients as they transition to Linux, at a pace that is consistent with their ability to absorb change.

Novell services are based on a robust, mature consulting methodology and industry expertise, enhanced by the acquisition of Cambridge Technology Partners™.

Unlike the big consulting firms, Novell does not believe in running endless IT projects. We have always structured projects in phases with clearly defined deliverables, making it easy for our clients to opt-out at any stage and proceed independently with confidence that they have a solid, business-oriented plan. The Novell phased approach to identifying and implementing solutions combined with our robust project management skills can help clients realize a faster return on investment and achieve tangible results within a short time frame.

Some of our key Linux service offerings are described below:

SERVICE	FEATURE
Discovery	A relatively short direction-setting engagement designed to help CIOs and other business stakeholders understand the ramifications of implementing Linux in their specific environment. Typical deliverables include a summary of business and tactical goals, a high-level conceptual technical architecture and a high-level business justification with recommended next steps.
Strategy	A deeper assessment of the business justification for implementing Linux and its impact on a company's specific IT infrastructure. Typical deliverables include a current technology assessment, business case validation, qualified ROI metrics, target technical architecture, change management methodology and detailed implementation roadmap.
Implementation & Deployment	Implementation offerings encompass architecture, software design and development, migration (including infrastructures to interoperate with, data and applications to migrate, and data conversion), deployment, integration, testing and consolidation.
Application-Related	Novell consultants have a strong background in various enterprise applications and the skill sets required to effectively implement a wide variety of applications on your new Linux platform.

Products & Solutions

With the BrainShare 2003 announcement, Novell demonstrated to its large and loyal customer base that they have a future path providing them with a choice of kernels: NetWare or Linux. Customers who desire to move to Linux will be able to do so with Novell support and guidance, without giving up the NetWare network and network-based services they have come to depend on to keep their businesses running. However, Novell is also dedicated to delivering products that enhance and augment Linux to non-NetWare customers.

Nterprise™ Linux Services

In mid-2003, Novell announced Nterprise Linux Services 1.0, a comprehensive set of products and utilities that enhance Linux with value-add services and capabilities. Novell also announced partnership agreements with IBM, HP and Dell, who will be shipping Nterprise Linux Services to their customers. The Novell acquisition of Ximian in summer 2003 also strongly supported these announcements and the company's stated Linux strategy.

Nterprise Linux Services is a bundle of Novell network-based software services running on enterprise-class Linux distributions from Red Hat* and SuSE*. The following table outlines the services included in Nterprise Linux Services:

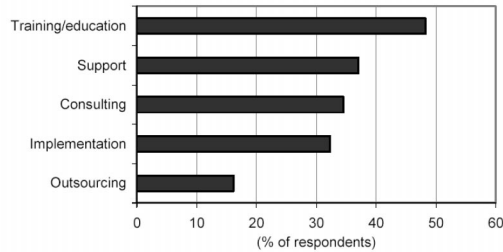
SERVICE	FEATURE
Identity services	The Novell industry-leading, cross-platform enterprise directory, with connectors to NT Domains, Active Directory* and a Web address book
File services	A personal file management system with automatic, built-in file encryption, anywhere/anytime Internet access and automatic synchronization between server and client
Print services	IPP standard-based printing for Windows, Macintosh* and Linux clients
Messaging services	A standards-based messaging and calendaring system that supports 50,000 users per server
Web services	A unified Web access experience with gadgets to all Nterprise Linux services that uses Tomcat and a JVM* and includes Novell exteNd™ and MySQL* for ISVs
Management services	Patch and application distribution in RPM format to Linux servers
Install services	Server-based install that supports express (single server) or custom (distributed) deployments
Administration services	Browser-based single point of administration for all Novell Nterprise Linux Services

Training & Certification

A recent IDC report revealed that the most likely “service” to be procured from an external source, as part of a decision to migrate to or integrate Linux elements into the enterprise, was training and education. The vanguard opportunity that exists for Novell and its partners to respond to this demand cannot be underestimated. Organizations continue to articulate their concern about organically growing and validating the skill set necessary to fully authorize the deployment of mission critical applications in a pure Linux environment.

More than a decade ago, Novell Training Services pioneered the first high stakes IT certification with the release of its Certified NetWare (later changed to Novell) Engineer (CNE®) program. The first five hundred recipients of the distinguished CNE were Novell technical support employees, followed by five hundred authorized resellers and partners. What started as a commitment to delivering quality customer service and support to Novell clients spawned an industry that quickly included customers as the largest number of constituents holding Novell certifications. The CNE was followed by the release of several more industry recognized certifications, including the Certified Novell Administrator™ (CNA™), the Certified Directory Engineer® (CDE®) and the Master Certified Novell Engineer (MCNE™). Today, Novell counts more than three hundred and fifty thousand IT professionals who carry Novell certification credentials as part of the Novell ecosystem and more than seven hundred and eighty certificates have been issued to partners and customers around the globe.

Q. Please rate your likelihood to procure the following professional services for Linux from an external source.



n = 780

Note: Data represents those respondents who said they were likely or very likely to procure each service.

Figure 2. Likelihood to procure services for Linux from an external source. (Source: May 2003 IDC Report # 29452)

Partnering with both of the major players in a duopoly testing service provider market, Novell offers its employees, partners and clients more than six thousand locations around the world as outlets for pursuing a high stakes Novell exam. Additionally, Novell has more than one thousand authorized training partners equipped to deliver authorized programs with authorized curriculum and instructors.

Boasting an enviable heritage as a certification titan and pioneer, Novell continues to demonstrate leadership in the IT training industry with the recently announced Novell Certified Linux Engineer. Recent press coverage underscores the importance of the decisive steps Novell has taken to lead with certification and training programs that support the company’s global product and services strategy around Linux and open source. In addition to the release of the Certified Linux Engineer program, Novell Training Services is exploring opportunities to respond to growing market demand for world class curriculum and high stakes exams that would support the development of skills and resources at a Linux foundations level. A decade of experience and a stellar reputation for designing and building instructionally sound IT curriculum makes Novell a

logical choice for many training providers, clients and end users seeking a structured path to developing their Linux and open source skills.

Open Source Community Participation

Novell has become a major player in the open source arena. Among the open source products that Novell is committed to supporting and working with are:

OPEN SOURCE PRODUCT	DESCRIPTION
Apache Web Server	The most widely used Web server software on the Internet, used by over 70% of Web sites. Novell internal testing shows that Apache on Linux is comparable to NetWare 6.5 and outperforms Apache on Windows 2000 by a factor of two.
MySQL Database Server	MySQL is considered the world's most popular open source database with over 4 million licenses.
Tomcat Application Server	Tomcat is an application server developed by the Apache Group that accommodates Java Servlets and Java Server Pages (JSP).
PHP Hypertext Preprocessor (PHP)	PHP is a widely used general-purpose scripting language especially suited for Web development and can be embedded into HTML. This enables a large collection of existing PHP applications to run without modification on an Nterprise Linux Services server. It also provides developers with the scripting, command line and GUI application tools necessary to create state-of-the-art Internet and XML applications.
Perl	Perl is the most widely used, general purpose programming language for Web-based applications. Perl includes file, text and process manipulation features that are used extensively in Web application and utility development.

Novell Forge

Novell Forge (<http://forge.novell.com>) is a resource offered to the open source community, hosted and supported by Novell. Since its launch in April 2003, Novell Forge has become the repository of more than 250 active open source projects. Developers can use Novell Forge to create projects, upload/download open source code and join or start a focused community of interest.

Novell Nsure™ UDDI Server

As further evidence of its commitment to the open source community, Novell released the source code for the Novell Nsure UDDI⁹ Server to the open source community on Novell Forge. Novell Nsure UDDI Server is a UDDI 2.0 registry built on directory services technology. It works with any LDAP¹⁰ v3-

based directory and offers secure access to the registry contents (authentication and authorization), unified account management and distribution of the registry by leveraging directory services.

NOVELL—PART OF YOUR LINUX SOLUTION

Novell provides clients with high quality services and solutions based on thought leadership, enhancing their existing IT investment with a shared-risk model that delivers incremental, recognizable results.

Ready to Help You Today

Our consulting, support and training offerings, plus our open source participation, provide you with the resources you need to receive the maximum benefit from your Linux investments.

⁹ Universal Description, Discovery, and Integration.

¹⁰ Lightweight Directory Access Protocol.

Consulting

Novell Consulting can help you assess opportunities to leverage the value of Linux and open source by using our business knowledge and deep technical expertise to help you develop a roadmap that will maximize functionality while making efficient use of your limited IT budget. Our expert consultants can help you frame the strategy, define a complete roadmap, assist in selecting the right technology and support your deployment efforts. They offer direction-setting engagements that range from simple assessments to full scale strategy and planning engagements.

Support & Training

Novell Support and Training Services help customers who have deployed Linux-based solutions obtain the greatest value through a range of free and paid support services, as well as comprehensive training and certification programs that enable your organization to obtain the maximum benefit from your Linux platform.

Products

Novell Linux products, including Nenterprise Linux Services, enhance and complement your Linux system with value-added capabilities, such as identity management, messaging, file and print, Web application and administration services. Nenterprise Linux Services is just the first example of the Novell commitment to deliver a comprehensive range of software services that augment the base Linux distribution.

Community Support

Finally, Novell has made a strong commitment to the open source community by creating and opening Novell Forge to Linux and open source developers, and by converting Novell Nsure UDDI Server to an open source solution.

To find out more about the Novell Linux strategy, visit <http://www.novell.com/linux>.

APPENDIX A: LINUX SCENARIOS

If you are considering switching to Linux, you've probably wondered how other companies have grappled with the complex issues and questions that arise as you decide to move to Linux. To help you understand the variety of issues that drive Linux adoption, we have developed two scenarios based on actual Novell customer situations. In both situations, these two organizations (which requested anonymity) faced business issues that migrating to Linux and using open source solutions would address. We have described what a Linux and open source solution would look like for each of these companies.

Scenario #1: Mandate to Cut Costs

Background

Jorge is the CIO of "Fulfillment Enterprises," a membership services company that provides a variety of fulfillment activities for a closely related group of companies including a major insurance provider. They operate five call centers handling inbound and outbound traffic with over 5 million members in their database.

Situation

Current economic pressures have had a negative impact on the company's bottom line. To reduce costs as much as possible, the CEO, Niels, has asked Jorge to trim the IT budget for this year while finding a way to move their old Btrieve database to a newer, more supportable system and development platform. The company has spent millions trying to convert this data to other systems, but their proprietary nature and poor performance forced the company to fall back to their original database.

Analysis

Jorge re-evaluated the current proposal to convert their member services application database and determined that it would require significant hardware upgrades, software purchases, and expensive Microsoft licensing additions. As the team dug into this, they realized that they could convert the database to run with comparable performance and reliability on substantially less expensive, Linux-based open source systems rather than the proposed high-cost, proprietary Microsoft SQL solution.

Next, Jorge evaluated their Intel-based servers for other cost-cutting opportunities. Although the company has been a long-time Novell customer, over the years more and more Windows servers were brought online to serve specific tasks based on application availability or departmental demands. Of their 60 servers, about 70% are Windows and the other 30% are NetWare. They use the Windows servers for Web services (IIS), internet e-mail

(Eudora), database services (SQL), some applications, and, in one division, file and print services. The NetWare servers are used for file and print, internal e-mail (GroupWise.), and database services (Btrieve).

As Jorge analyzed the Intel servers and associated licensing costs, he again became frustrated with Microsoft's licensing policies and high TCO. He also began to wonder why they were still paying Novell for file and print services when they were technically already licensed for them with Microsoft. To compound the problem, at his weekly staff meeting Jorge found out that another worm virus had just attacked their Microsoft Web servers and taken down their Internet fulfillment functions.

Jorge brought in an independent consulting organization to review his situation and help him develop a complete open source strategy that would bring stability and security to his operations. After several weeks of mapping business requirements to functionality, interviewing key stakeholders, and developing a long-range strategy and plan, the team made its recommendation to Jorge and Niels. The lead consultant, Rae, outlined the high points of the plan.

Proposal

Since the company already owned the licenses needed to support NetWare and had continued its maintenance and upgrade protection, moving to Linux on Intel servers and running Novell Nterprise Linux Services was an excellent choice for reducing the cost of many of their IT services. The move

would give Fulfillment Enterprises the ability to deploy a standards-based Internet e-mail system on Linux, replacing the Windows-based internet e-mail system used by their association members. It would also replace their vulnerable Microsoft IIS environment with Apache/MySQL/PHP (AMP) functionality hosted on either Linux or NetWare servers. This plan eliminated a major security problem and gave them greater portability with their Web-based applications.

In addition, Novell Nterprise Linux Services would provide a visual J2EE application development environment and open source database, allowing them to begin developing their mission-critical applications using Novell exteNd and a commercial version of MySQL. These tools would allow them to transition their existing Btrieve database to MySQL and accomplish one of Niels' key objectives. Linux' scalability would also allow them to consolidate 40+ Windows special-use and departmental servers to just 10 Linux servers while leveraging their existing Novell eDirectory environment.

With the estimated savings, the consultant, Rae, recommended that they deploy a storage area network (SAN) and consolidate the 18+ NetWare servers onto an eight-node cluster. This, combined with the reduction in Windows servers, would allow them to recover nearly 1000 square feet of space that they could use for additional offices.

Although this plan's cost was more than had been allocated for the Microsoft SQL project, eliminating other Microsoft licenses was projected to cover the difference. Fulfillment Enterprises projected that the return on investment (ROI)

for the new plan would be 14 months, equal to the Microsoft SQL proposal. Major contributors to the ROI included productivity gains, eliminating lost business revenue due to system downtime, and reduced licensing costs. In evaluating the long-term cost of the project, they calculated that their operational costs would decrease by 32% over a three year period, resulting in a much lower total cost of ownership (TCO)—a conservative value when compared to many analyst findings.

Scenario #2: Mandate to Move to Linux and Repurpose Existing Skills

Background

"CGP, Inc." is a large consumer products company. In addition to its Data Center at corporate headquarters, it operates several distribution centers that support over 150 retail stores. All transactions are handled in the headquarters Data Center.

Situation

CGP's CIO has mandated that the IT department develop plans to restructure and streamline network operations, reduce management expense, and reduce overall infrastructure costs. Martin, a corporate network architect, is part of the corporate architecture team working on these plans.

A project estimated to cost USD \$7 million is currently underway to upgrade CGP's existing Sun systems and Oracle database. Sun has proposed that they install a new directory to provide an identity management system that will tie into CGP's PeopleSoft applications—even though the company has already deployed Novell eDirectory. Work on the project has been slow, and several problems have occurred—largely due to the

immaturity of the SunOne directory and its lack of interoperability. Now Sun is asking for a USD \$1.5 million change order to reprogram the interface that connects PeopleSoft* to SunOne. This, coupled with the costly proprietary hardware, has CGP's CIO considering abandoning this project, but he is unsure of his options.

Martin's team works specifically with NetWare. He is finding it increasingly difficult to justify keeping the NetWare servers to his CIO. He's explained again and again how they are just more reliable and scalable than many other Intel-based servers. He has even demonstrated that the average number of servers per admin on his team is nearly double that of the Windows team. Still, the CIO sees little strategic value in NetWare, although he seems to have stopped trying to get rid of it for now—probably because his latest special project is looking for ways to replace any service possible with Linux and open source solutions.

Analysis

What Martin has seen so far is that the CIO is putting some hard Linux mandates on the other teams. Martin knows it is just a matter of time until the CIO starts trying to get him to replace some of his NetWare servers with Linux. Martin knows that his team can't support the same number of Linux servers per administrator as they do NetWare. And since the services on NetWare are so stable and scalable, he now sees the opportunity to leverage their years of management experience with NetWare on a Linux platform by investing in Novell Nterprise Linux Services.

Proposal

Martin proposed to the corporate architecture team that they deploy Novell Nterprise Linux Services and gain the double advantage of Linux and their extensive NetWare experience. They could support the corporate provisioning initiative by using CGP's existing eDirectory™ as the project's identity store. And by using DirXML_o (which ships with Nterprise Linux Services) to tie their eDirectory deployment into PeopleSoft, they would be able to avoid Sun's USD \$1.5 million change order and tie the two directories together at a significantly lower cost. In addition, by moving their Oracle databases to Linux, they would no longer need new, high-priced Sun servers, which would cut the original project cost nearly in half.

The ROI for the original project had been calculated at 18 months. Martin recalculated the ROI using his proposal, which was almost USD \$4 million less than the original project, and found that the ROI was less than seven months. With some of the cost savings, Martin proposed a clustered NetWare server environment connected to their existing SAN using space that would be available after the Sun systems were decommissioned. Martin also emphasized that the next release of Nterprise Linux Services would have the same functionality as NetWare 7.0.

At the network management level, Martin's team would be able to manage the new Linux servers without having to become instant experts because they could use familiar NetWare management tools. The iManager utility in Nterprise Linux Services would work for both environments, allowing the

provisioning systems to seamlessly add new accounts to either OS and give access based on roles and responsibilities. Additionally, ZENworks for Servers would give them package distribution using Tiered Electronic Distribution, a feature that they've come to rely on for their 175-server NetWare environment, thus eliminating some additional overhead. With the transition to these new platforms, Martin proposed that some of the savings be used to send his team members and some of the UNIX team through training and testing to obtain their Novell Certified Linux Engineer

certification—which would be a big boost to morale.

When Martin evaluated his proposed architecture for its TCO over a five-year period, he found that operational savings would exceed 50%, principally through reduced hardware cost and refresh savings, lower software license costs and simplified management.

APPENDIX B: LINUX RESOURCES

There are a large number of online resources available to Linux users. The list below encompasses only a small segment of those available:

RESOURCE	DESCRIPTION
www.novell.com/Linux	The Novell Linux resource page
www.linux.com	A central source of Linux information
www.linux.org	A central source of Linux information and a voice for the promotion and advocacy of the Linux operating system
www.kernel.org	Primary site for the Linux kernel source
www.suse.com	Producers of the SuSE Linux distribution
www.redhat.com	Producers of the Red Hat Linux distribution
www.li.org	Linux International—non-profit organization of Linux devotees

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