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AUGUST 2004

IBM

LINUX Executive Report from IBM

Business and Linux in an On Demand World

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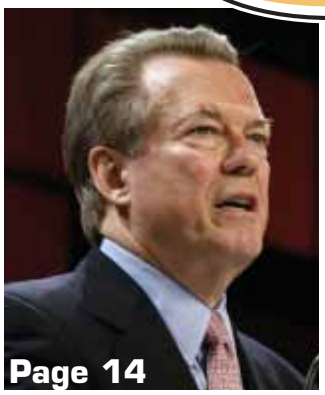

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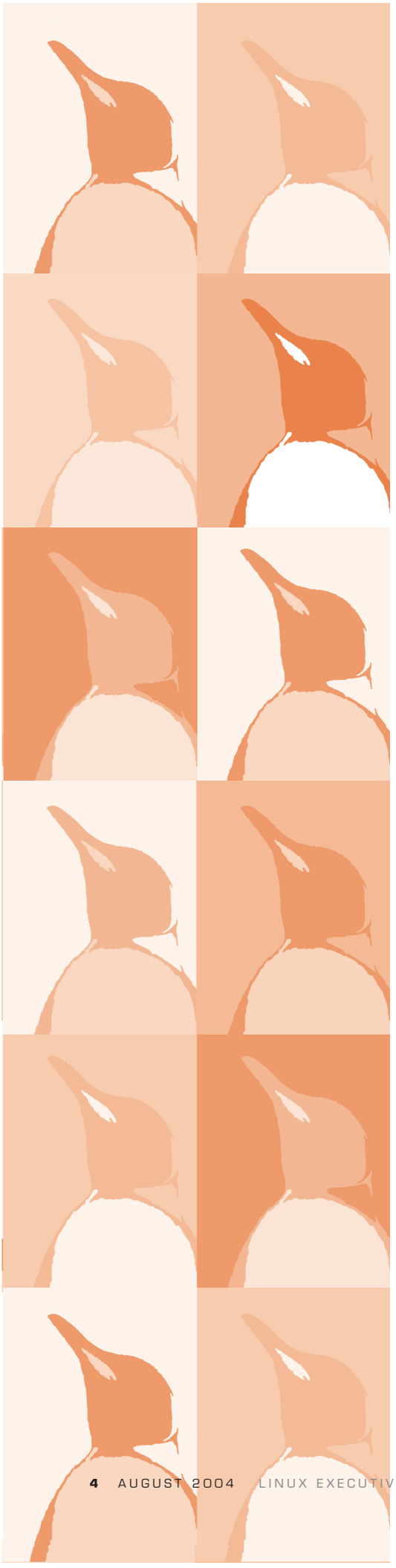

LINUX Executive Report from IBM

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The *IBM Linux Executive Report* is published by the International Business Machines Corporation, Route 100, Somers, NY 10589. The articles in this magazine represent the views of the authors and are not necessarily those of IBM.

Publications Agreement No. 40916539, Canadian Return Address, World Distribution Services, Station A, PO Box 54, Windsor, Ontario Canada N9A 6J5.

Printed in the U.S.A.

Linux: Breaking Down Barriers

Since IBM first embraced Linux* in 2000, we've helped thousands of customers around the world make the move to what is now the fastest growing operating system (OS) in the world.

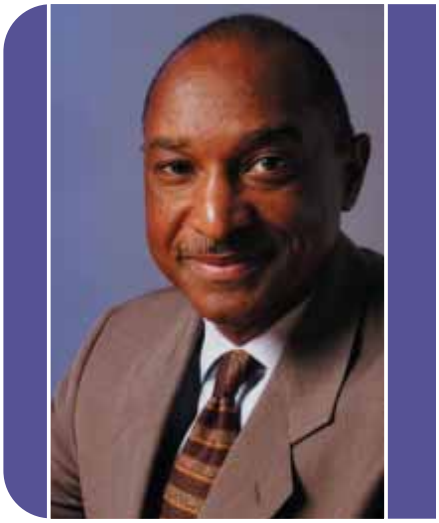
It's not just large businesses making the move to Linux. What started as an evolution is now a revolution, with small- to medium-sized businesses, major governments and emerging economies all building Linux into their plans. Linux is being used to fight disease, predict the weather and help emerging nations jump-start their economies.

Because of its collaborative nature, Linux overcomes many of the traditional inhibitors of proprietary software technology. Once introduced into an organization, Linux breaks down barriers and transforms businesses and governments, allowing them to approach problems from a new direction. It allows thousands of organizations to work more easily and effectively with their customers, partners and employees.

Worldwide, scores of IBM government customers—including agencies in France, Spain, the United Kingdom, Australia, Mexico, the United States and Japan—have embraced Linux to save costs, consolidate workloads, increase efficiency and enact e-government transformation.

In particular, IBM is recognized as an industry leader for helping emerging countries like China, India, Russia, Korea and Brazil create flexible, cost-effective infrastructures that are opening their people and economies to innovation and growth. For example, the Joint Supercomputer Center in Russia consolidates high performance computing resources that will support scientific research nationwide.

What's more, Linux is an ideal target platform from a security perspective for both desktop and server deployments and is more resistant to crippling viruses than other OSs. This makes Linux the safe OS choice, especially when it comes to your most business-critical applications.



We're witnessing a historic sea change in IT that's being driven by the value, choice and flexibility of open standards. Linux has ignited this revolution, and IBM has led in Linux. Understanding and seizing Linux opportunities is a good way for your organization to compete in today's hyper-competitive global market place. Best of luck in your Linux endeavors, and as always, let us know what we can do to help.

Jim Stallings
General Manager, Strategic Growth Initiatives
IBM Corporation

The New Linux FRONTIER

BY RYAN RHODES

The growth of Linux* has been a story of successes and failures, unbridled optimism and guarded skepticism, with unexpected plot shifts all along the way. Gradually, however, Linux has continued to evolve, moving into more and more computing environments, becoming a pervasive presence throughout business IT infrastructures, from servers and storage and, in some cases, all the way down to the desktop.

Thanks to the Internet and the latest market place technologies, the world is increasingly going mobile, a shift that has sparked further Linux innovations. More and more, any device in which a chip can be embedded can be connected over the Internet, giving businesses exciting new ways to connect their customers, suppliers, business partners and employees.

As boundless as the opportunities are, they can also generate new challenges for clients as they try to integrate these new devices into their existing IT infrastructures, as they try to interconnect departments and people, and leverage the new connectivity for competitive advantage in the market place. IBM has been a major player when it comes to figuring out the possibilities and managing new and evolving IT infrastructures.

With its new IBM* Workplace Client Technology, IBM aims to give Linux a further evolutionary nudge, bringing the open source operating system (OS) into the desktop and mobile computing realm. Unveiled in May, the multiplatform solution could help eventually bring to Linux the applications and functionality it requires to become a viable desktop contender in a challenging market place.

"It's like an ingredient for a recipe that, by adding it, makes something that was already good even better."

—Jeanette Barlow, IBM Workplace Client Technology market manager

What is Workplace Client Technology?

The subject of Workplace Client Technology can require some thought, due to the considerable amount of Workplace terminology.

For starters, there's Lotus* Workplace. This integrated family of collaborative products based on open standards includes Lotus Workplace Messaging, Lotus Workplace Documents, Lotus Workplace Web Content Management, Lotus Workplace Team Collaboration and Lotus Workplace Collaborative Learning.

Next, there's IBM Workplace, which is basically IBM's model and product line for providing a managed client environment. IBM Workplace is designed to be cost-effective and flexible. It supports multiple user types and forms of connectivity while enabling access to business processes, applications and content. Four products make up the core IBM Workplace strategy: Lotus Workplace, WebSphere* Lotus Everyplace*, WebSphere Portal and Lotus Notes* and Domino*.

Finally, there's Workplace Client Technology, which IBM views as the next step in network-centric computing. It provides a components-based assembly model for building and deploying rich, reusable client applications that administrators can deliver securely and manage across Windows* and Linux environments. Mac* OS support is also planned for late 2004 or early 2005.

The recently unveiled Workplace Client Technology is based on what IBM calls rich client technology. A rich client is a PC or workstation that's managed from a server, but can be taken offline to perform work that can be synchronized later with the server. Also referred to as a server-managed client model, rich client technology is similar to the client server architecture, but is more flexible. It's a strategic initiative for IBM, and the technology promises to bring more to the table over time.

"When we talk about Workplace Client Technology, we're not talking about a product or a thing. We're talking about a technology that enables applications to provide the rich end-user experience of a client, with the cost-benefits typically associated with browser-based applications, across both Windows and Linux PC environments," says Jeanette Barlow, IBM Workplace Client Technology market manager. "It's like an ingredient for a recipe that, by adding it, makes something that was already good even better. Workplace Client Technology is an application framework upon which we plan to build many products, and we hope our ISV [Independent Software Vendor] Business Partners will build many products."

Barlow stresses that this technology isn't just about Linux. Rather, the message being stressed is that with Workplace Client Technology, the OS on the PC is less relevant overall.

"With the launch on May 10, IBM introduced this concept of IBM Workplace that is essentially four different product families, with Workplace Client Technology being a piece within," adds Amy Reuss Caton, marketing manager for the IBM Workplace Client initiative. "The client technology is an enabling technology that the customers will eventually be able to use. We've gone ahead and enabled two Lotus Workplace technologies with it, which will run on the Linux PC platform as well as the Windows PC platform."

The Lotus Workplace products that leverage this technology are Lotus Workplace Messaging (www.ibm.com/lotus/workplacemessaging) and Lotus Workplace Documents (www.ibm.com/lotus/workplacedocuments).

Curbing Some Enthusiasm

When Workplace Client Technology was introduced, some in the marketplace and press claimed the solution would bring applications and functionality to the open source OS that would rival the Microsoft* Office suite of products, thus making Linux a viable competitor to Windows on the desktop.

However, that unbridled enthusiasm, while understandable, is a bit premature and misplaced. Although Workplace Client

Technology has great potential as a platform on which to bring multiple OSs together on equal footing for application development, it's far too early for such claims.

"Quite frankly, it's a simple announcement: What IBM is saying is that, now, with the IBM Workplace strategy, along with the new rich client technology, we can provide customers with choice as to how they choose to deploy their application; choice as to whether to have a Windows or a Linux environment (or both) on their desktops; choice as to whether they want to provide browser or rich client access to their applications; choice as to what combination of those the customer wishes to deploy to different users in their organization," says Barlow. "That's not to say the choices and capabilities are all available right now, but as the client technology evolves, more and more applications and tools will be supported with Workplace Client Technology and, as a predicted result, more and more Linux applications."

Evolution of the Client Server Environment

To understand why IBM is starting to bring more applications to Linux clients, it helps to revisit how today's IT environments have evolved and why, now, companies are asking for more choices when mapping out their IT infrastructures.

IT infrastructures have evolved from the days of green-screen 3270 terminal computing, where users had to use what was in front of them and a simple application change required months for a specialist to administer.

The terminal computing model evolved into a distributed environment, where a client model featuring PC clients housed applications such as 1-2-3*, SmartSuite* and Office. Although more flexible and user-friendly than the terminal computing model, the obvious limitation was the lack of a central repository. Users had all this information on their PCs, but the PCs couldn't talk to each other.

Then came the client server model. Though again an improvement, because it allowed users to talk to servers, client server ultimately produced silos of applications that couldn't talk to each other, forcing users to respond by opening application after application.

Finally, the idea of portals and integrating applications across an enterprise, with browser access to applications, emerged. The advantages on the back-end in this model are substantial, but it sacrifices, in some instances, usability, because of the limitations of browser environments. For example, although IBM supports Linux through the Mozilla browser, for certain types of applications, such as e-mail, Mozilla and other browsers can often be ponderous and slow.

Additionally, browsers don't typically allow users to work offline. However, with Workplace Client Technology, users can build applications that execute locally on the machine. They can synchronize or replicate, work offline and then get back online and synchronize later.

Moreover, users can still leverage the benefits of the Web-based model in that they can provision and manage from the server. And IT administrators don't need to arm themselves with CDs, trying to load software on everyone's PC.

"What this next evolution does, with the Workplace Client Technology component, is take all that we've learned and benefited from on the Web-based portal framework and extend that out to the clients," says Barlow. "Whereas all the previous evolutionary developments of IT infrastructures typically occurred out of necessity—with companies basically forced to adopt new technologies and models just to stay competitive—now IBM is trying to drive the next evolutionary step by providing choices which, it could be argued, is also a necessity."

Linux Becomes a Viable Choice

Because it incorporates a standards-based middleware infrastructure, delivers standard file formats and a flexible architecture that accepts plug-ins, Workplace Client Technology basically provides customers with a conduit with which they can start to standardize in an open way on the back-end.

"Part of the appeal is that Workplace Client Technology gives Linux users the chance to use really robust client-side applications that are server-managed, which has traditionally been where Windows has dominated," says Caton. "Linux is getting the chance to be a player in the client realm. And Linux is also big on total cost of ownership (TOC) because you don't have to touch those desktops to deliver rich client applications since they're all server-managed. It definitely has some selling points over Windows, although it's not being positioned to compete with Windows directly. Still, it's a choice that wasn't previously available, which is a big message to Linux users."

Workplace Client Technology is like middleware in that it allows different applications to communicate and run on different OSs. Therefore, organizations can look at numerous options when deciding how to align their IT investments with their business goals and the types of user populations they need to serve.

"Let's say 'User Population A' just needs a browser access, 'User Population B' needs Windows and Office and all the costs associated with that, and 'User Population C' needs a lit-

"What this next evolution does, with the Workplace Client Technology component, is take all that we've learned and benefited from on the Web-based portal framework and extend that out to the clients."

—Jeanette Barlow

tle more than browser. Money can likely be saved using a Linux desktop here, because that's all they need," explains Barlow. "Now I don't have to write completely different applications and manage three completely different application stacks. With Workplace Client Technology, it's all the same from a back-end perspective. It basically becomes an operating system-neutral proposition, which suddenly sends the message that, 'Hey, I'm not trapped; at least I have a choice.' "

According to Barlow, ISVs are eager to begin working with IBM to bring more applications and functionality to the managed rich client experience. Their enthusiasm over Workplace Client Technology stems from the fact that it's expensive to build Windows, Linux and Macintosh* versions of the same application. ISVs typically opt to develop for just the Windows version, because that's what most PC clients support. Although such an approach may reduce overall development expenses, it can limit customer choice.

"Now they can build a Workplace Client Technology version of an application and they won't have to care so much as to what operating system it will run on," says Barlow. "Not only do the customers now have a choice over time, they'll have additional choices over their applications and what they're supporting."

Altering the One-Size-Fits-All Approach

Workplace Client Technology's adherence to standards stems from its being built on the Eclipse integrated development engine (IDE) universal tool platform.

"Eclipse is the core framework for Workplace Client Technology, so it's a standards-based story rather than the largely proprietary story of Microsoft-based offerings," says Caton. "The client technology will eventually be provided to our ISVs when Workplace 2.5 ships later this year or early in 2005. Essentially anyone will be able to build rich client applications that are server-managed and can potentially serve the Linux community, which is certainly an attractive story."

What that means to IBM customers is that they have the opportunity to break from the traditional one-size-fits-all application approach.

For example, traditionally, the majority of e-mail applications have run exclusively on Windows, and most desktop applications documents must be created in a Windows environment. Workplace Client Technology is poised to gradually bring those types of application functionalities to Linux.

"What we're hearing time and time again from customers is that they want to have that choice," says Barlow. "We would never be so naïve as to think that customers would switch out all of their Windows desktops for Linux, but they want to at least have the choice."

Barlow points out that certain users in any organization will always need Windows and Office in some capacity. But in the banking sector, for example, tellers and loan officers may not need a full productivity suite to do their jobs. As Barlow says, "They just don't need all that horsepower, so why should a company pay for that when it isn't being really used?"

Meanwhile, the power in Workplace Client Technology comes in its flexibility. It supports a hybrid of pure Web-based and rich client access, allowing one IT environment to serve users the same Windows, Linux (and, ultimately, Apple* Macintosh support, which is currently planned) applications on the back-end, while giving them considerable leeway as to what's set up on any individual systems.

"So, let's say you're in 'User Population A,' which needs the rich client because maybe you travel and go see customers and are often offline," explains Barlow. "And let's say I'm in 'User Population B,' and all I need is a Web-based console. As a matter of fact I don't even have my own PC; I share a kiosk with other employees, and I log on when I'm at work. So, we both have e-mail—Lotus Workplace Messaging, let's say—that's based on the same e-mail system, but I happen to have browser version because I don't get much e-mail. I get stuff like company holiday notices, my electronic pay stub and my work schedule from my boss. But you're a big e-mail user, so you need a rich messaging system with calendaring to set up appointments and all that. Well, guess what? We're working on the same server infrastructure, but it's just that the administrator set me up with a few capabilities and you with a whole lot."

Looking Ahead

Going forward, it's planned that IBM Workplace Client Technology will support more products in the IBM Workplace strategy portfolio to augment the messaging and document offerings supported initially. Customers can also look forward to more IBM software offerings that leverage the technology, as well as third parties that will develop their own applications.

"IBM is already inundated by calls from customers interested in this," says Barlow. "Some of IBM's biggest customers and Business Partners are saying they want to get their hands on this. They're excited about the opportunities this brings to the market. They're excited to have a choice."

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Novell's Open

BY ELLIOT KING

Source Strategy

Sound products and strong support give CIOs alternative IT choices

In January, Novell reshaped the open source universe when it completed its purchase of Linux* pioneer, SUSE LINUX. With a close partnership with IBM, industry veteran Jack Messman, Novell's chairman and chief executive officer, is working hard to drive Linux into the enterprise and to make it an easy choice for CIOs. Messman believes Novell is uniquely positioned to enable enterprises to realize the benefits of Linux and other open source solutions. The *Linux Executive Report* recently sat down and spoke with Messman about his thoughts on Novell's Linux strategy and the open source movement.

Q: How did Novell first get involved in the Linux community?
A: Let me give you the chronology. The NetWare* product line, which has been our core product line for more than 20 years, was slowly declining because our customers didn't see a compelling future path with Novell, or even a credible migration path to other platforms. In January of 2003, we came up with a strategy that we'd take the networking services that sit on top of the NetWare kernel—file and print, collaboration, messaging and directory and so on; services that had been proven in over 20 years in the market place by Novell—and put them on top of Linux. In that way, our customers would see that we would be on a different future path; they could migrate to Linux without having to leave Novell.

Q: What happened after you adopted that strategy?
A: We went to several of our friends in the industry, IBM being one of them, and said, 'What do you think of this?' And they said, 'We think it's marvelous.' The more applications and infrastructure software that work on Linux the more that will drive demand for hardware. So IBM, Dell and HP backed our announcement.

Q: So you won the backing of key hardware players?
A: Yes. There was confusion in the Linux market at the time, in part because of the SCO lawsuit against IBM and its impact on the Linux market, and UnitedLinux in particular. We approached IBM and said that we'd like to put together a consortium of leading players to create a third Linux distribution—beyond Red Hat and SUSE LINUX—that had all the latest features, and that everybody would contribute to. There were seven of us and we met in Chicago. We informally called ourselves the Chicago 7.

Q: What became of those discussions?
A: Everybody seemed to be favorable, but at some point they all said, 'Why don't you just do it, Novell?' At one meeting, the recommendation was made for us to go out and buy a distribution and improve it, rather than launch a new one. IBM, HP and others were investors in SUSE LINUX and they knew that it was for sale. That turned our focus into an acquisition of SUSE LINUX.

Q: So how did you wind up buying SUSE?
A: We entered into negotiations in October 2003. There was an auction and the price got up to $210 million, which was quite high for a company doing $40 million in revenue. We felt

Jack Messman, chairman and CEO of Novell, speaks at BrainShare 2004, Novell's annual users conference, in Salt Lake City.

BrainShare 2004

PHOTOS COURTESY OF NOVELL

that was a high price and we wanted some support. We had $750 million in the bank, so we didn't need cash. We wanted a show of support that our purchase of SUSE was seen as a strong, viable option by the industry. And our friends at IBM stepped up. They agreed to make a $50 million investment in Novell as a sign of their support for this concept and to give us the encouragement to go ahead and make the deal. It was a good investment for IBM. They invested $50 million on a handshake, and then in January that $50 million of stock was worth $75 million. That's the history of the relationship.

Q: But you've made other Linux-oriented acquisitions as well?
A: SUSE was one path. Ximian was another. We had a product called ZENworks that managed desktops. We knew that Linux was going to be on the desktop and that we were going to have to manage Linux desktops. So we were looking for a Linux management tool that we could add to ZENworks, and we ran across Ximian. When we bought Ximian, we got four products: the Ximian desktop; Red Carpet, their Linux desktop-management product; a collaboration product called Evolution, which includes a connector from a Linux client to the Microsoft* Exchange back end; and Mono, a framework that allows you to develop on .NET and deploy on Linux. If you're a developer, you wouldn't have to switch off of Microsoft development tools. We found out that Ximian was already doing desktop work with IBM; its desktop was being used at one of the IBM laboratories.

Q: After the acquisition of SUSE, you announced a broad partnership with IBM.

A: IBM's strong emphasis of Linux on POWER* this year is similar to Novell's strategy of giving customers choice. Novell plans to be a key partner with IBM on the POWER platform.

Q: And your relationship with IBM is expanding.
A: Our upcoming launch of SUSE LINUX Enterprise Server 9 and later in the year our Open Enterprise Server, which is going to have the Novell network services working on both Linux and NetWare, will be fully supported by IBM across the IBM brands. We anticipate this will reenergize our relationship.

Q: And your sales and development teams are working together.
A: We've recently won some deals together. IBM and Novell have developed a retail solution together. There are many large deals in the pipeline and the sales teams on both sides are positively engaged on these opportunities. We're hoping to expand this type of jointly developed solution selling into other markets. IBM and Novell have made some significant wins with the retail solution, which is a hardware product from IBM designed for the retail market, plus some IBM software, plus SUSE LINUX. We anticipate being able to point out joint wins on an ongoing basis.

Q: Are there other areas of collaboration?
A: IBM has co-sponsored with Novell free one-day Linux training. More than 300 classes have been offered on SUSE LINUX and our product called Nterprise Linux Services. The goal was to train 10,000 customers and channel attendees across North America. That program is working.

Q: Overall, how would you characterize your experience so far?
A: We're very pleased that, in an unusual move, IBM stepped up to show its support for making the acquisition and it's worked out for everybody. Customers really want choice. They want lower cost. And they're now paying for things that they don't need. Customers want security, and the cost of viruses is very high. Linux is less vulnerable to attack and requires less computing power. It's faster and allows programs to be executed quicker and better. It's been a really good experience.

Q: But IBM's supporting other Linux distributions as well. Why?
A: IBM wants to make sure that there's more than one competitor in the market place for Linux. They learned their lesson from Microsoft—we all did. They don't want three and they don't want one. They want two. I think that puts Novell with SUSE LINUX and Red Hat into a pretty good position.

Q: What do you see as the differentiators between Novell and other distros?
A: I have about 10 of them. First, SUSE LINUX is a terrific operating system. It's the most secure, stable and enterprise-ready Linux server operating system because we have a unique technology that we use to build the distribution. It's called SUSE AutoBuild. It's an automated way to guarantee quality and the fast production of a uniform code for all relevant hardware platforms. It allows us to take the 3,000-some packages that are in the open source environment, look at them, clean up the code and make patches. We also check the licenses and make sure that there's no problem and then bundle that into a distribution. We don't really sell free code. What we're trying to do is sell a service based on our AutoBuild technology that allows CIOs to use free code.

Q: So you put your distribution together differently?
A: Right. A second differentiator is what I call up-the-stack services. These are services that Novell's had for 20 years that worked on NetWare and now work on Linux. That's a big differentiator. Nobody else has that, and these are services that, by and large, don't yet exist in the Linux environment. We have them available right now.

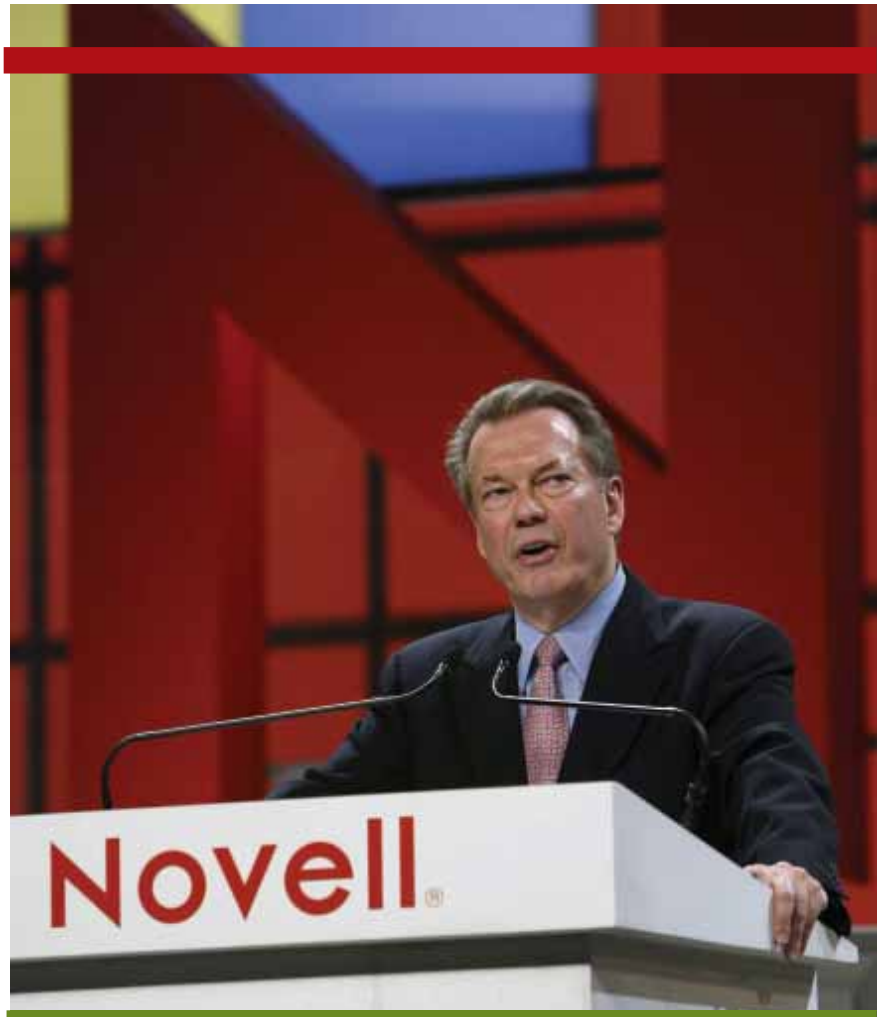
Q: Is that what companies are looking for, more applications?
A: Application support is definitely important, but I wouldn't say it's the most important. The number one issue on the minds of CIOs when we bought SUSE LINUX was technical support. They were worried about who was going to support them if something goes wrong in the middle of the night. And they didn't want to have to look to two small venture capital-based start-up companies—Red Hat and SUSE LINUX. Novell has a worldwide technical support organization that offers 24-7-365 support. We have 650 Linux-trained engineers, which are more people than the entire employee count of Red Hat. We have more people, in general, working on Linux than any other vendor. We think that brings a lot of comfort to CIOs.

Q: Don't CIOs have to worry about the intellectual property issues surrounding Linux?
A: Our fourth differentiator is indemnification. Obviously, there's the SCO issue out there. Because of Novell's unique position in the ownership chain of UNIX*, we can offer indemnification that nobody else offers. We have a license to use UNIX. If there's any UNIX in Linux, our customers can use it without a problem. When we sold some of our UNIX assets to SCO in 1995, we kept a license to use UNIX and the ownership of the copyrights and patents. SCO has challenged that, but we believe that we'll prevail.

> "IBM's strong emphasis of Linux on POWER this year is similar to Novell's strategy of giving customers choice. Novell plans to be a key partner with IBM on the POWER platform."
>
> —Jack Messman, chairman and chief executive officer, Novell

Q: What's the fifth differentiator?
A: The fifth major differentiator is that we have a large IT consulting staff. We bought Cambridge Technology Partners, an IT consulting group, four or five years ago and we have the credentials to help customers design their IT strategies to take advantage of Linux. We're putting together migration methodologies for customers to move from their current configurations to Linux. And we develop solutions methodologies to solve Linux-related problems. If you have problems, we can help you solve them because we have this consulting organization.

Q: Obviously, even if it's open source, not all Linux distributions are the same.
A: True. The next differentiator is that we already have a desktop Linux product. We have one that we got from Ximian and one from SUSE. We're now in the process of putting the two together for one Novell desktop for release in Q4 of this year.



Jack Messman at BrainShare 2004.

Q: Will Linux desktops be ready for prime time then?
A: Yes. And to show that's the case, we're moving from Windows* and Office internally at Novell. We'll have 100 percent of our people off Office and onto Open Office by July and off Windows by the end of the year. We'll be a total Linux house by the end of the year. We hope that by doing this we'll learn some things that we can pass onto our customers, show them how it's working for us and how to achieve significant savings.

Q: How much do you think you can save?
A: We paid in excess of $2 million per year for those Microsoft licenses. There are one-time migration costs, but those are per-year savings. When you look at the perpetual annual savings it's a pretty enticing opportunity. This will be a ready-for-prime-time desktop.

Q: Are all the applications you need ready?
A: They're in process and we're working to do that. We're also the only major company offering retail Linux products. We're offering SUSE LINUX Professional and SUSE LINUX Personal 9.1. These are products for both basic in-home use and for the high-tech individual that wants to work serious projects on Linux at home. And it's a good way for us to beta-test a lot of new ideas that we then put into the enterprise.

Q: In addition to hobbyists, you work extensively with channel partners, don't you?
A: We have a large global network of channel partners. Novell invented the channel in the early 1980s before anybody knew what the channel was. These are value-added resellers, systems integrators and other solutions providers. We have 4,200 active partners signed up. Worldwide, there are probably 14,000 partners who sell Novell in some fashion. We believe the channel will open up the small- and medium-sized business market not only to Linux, but also to the people who sell the hardware that Linux runs on. So I think IBM's focus on the small- to medium-sized business market and our software that's focused on that market will be a great combination to capture the market place.

Q: Your developer program is also expanding.
A: We added 10,000 new developers in the quarter after we acquired SUSE LINUX. It's a nice development.

Q: So what's the big picture opportunity here?
A: Open source is a disruptive technology. It allows faster innovation and speed to market. Innovation gets done collectively, which is a big plus. It's a cataclysmic event. It's a turning point in the industry. People are going to start developing their own projects internally using open source. Most of the software developed in this country is developed privately inside corporations. And we believe that we have the tools that will allow companies to do their own open source development.

Q: What will drive companies to open source development?
A: Its lower cost and less risk. I think this is a paradigm shift in the way that software gets done. And the interesting thing is that the open source community is focused on the bottom of the technology stack first. It started with the operating systems and they're working their way up the stack.

Q: So where will that lead them?
A: I have a concept that I call the virtuous cycle. Open source will move upward from the bottom of the stack. I call that the rising waterline. Over time, the waterline where open source stops and

proprietary software begins rises–and by the way, Penguins do very well on either side of that line. Now the more open source software there is, the more people will use it. And the more people use open source software, the more proprietary software they need to work on top of it. And the more proprietary software they need, the more profit the guys who develop proprietary software have to invest in creating open source contributions to the open source community. That's the virtuous cycle. And I think that proprietary and open source code can coexist.

Q: What are the threats to the virtuous cycle?
A: There are competitive threats. We don't know what Microsoft might do to slow the growth. They may start an intellectual-property war. They can lower prices, although that hurts them more than that helps them.

Q: Other than Microsoft, what are the challenges?
A: I think inertia is a challenge. And IT departments have a lot of accidental architectures.

Q: What's an accidental architecture?
A: They make changes that at the time look like the right thing to do, but then they look back and ask, 'How did we ever get here?' That's why I call it an accidental architecture. And they have programs with a lot of spaghetti code. They can't afford to make changes overnight. We learned from Y2K that we don't want to rewrite anything. It's too expensive. You have to learn to help customers deal with their accidental architectures and their spaghetti-code programs. When you offer them something new, you have to help them figure out how it works with what they have.

Q: What are Novell's goals over the next six to nine months?
A: We're launching our desktop product. We're trying to finalize our partnership relationships. The most important thing we have to do over the next six to nine months is to get some of the larger ISVs to port their software to SUSE LINUX so customers don't have a problem with the programs they want to use working on SUSE LINUX. We're going to do some of that ourselves, but we think ultimately it's going to be the large software vendors who are going to have to do that as well.

Elliot King *is an associate professor at Loyola College in Maryland where he specializes in new communication technology. Dr. King has written five books and several hundred articles over the past 15 years about the emergence and use of new computing and communication technology.*

Partners in Linux

ILLUSTRATION BY JULIA TALCOTT

IBM Business Partner Value Networks for Linux delivers near-turnkey solutions

BY JIM UTSLER

I admit it; I'm a Mac* bigot. Sure, Apple*'s big beautiful boxes—and cute little laptops—cost a bit more, but the interface and stability are marvels to behold. (I can't remember the last time I had unintentional downtime.) More importantly, though, the choice of software, including Apple's iLife suite, continues to grow. And that, for me, is simply one more reason to buy a Mac—the software that comes bundled with it.

Of course, in the business world things may be a bit different. In my case, sure it's great that I can create beautiful music with GarageBand.com and then share it with other iTunes, but does the average company, whether small, medium or large, care for such things? Most likely not. They're more interested in the software that actually matters, including back-office financial and front-end Web applications—you know, the ones that make businesses actually function.

There is, however, a similarity between my Apple-based situation and that of the aforementioned companies. It's simply much more efficient and cost-effective in many cases to receive a consolidated and pre-configured IT solution.

Thankfully, IBM has been addressing this issue, including in the Linux* space. In an effort to help companies make the jump to this open source operating system (OS), Big Blue has created the Business Partner Value Networks for Linux, which is part of IBM's larger PartnerWorld* program. A mouthful, to be sure, but rather simple in concept, as Rich Farber, IBM program manager for Linux Business Partners notes. "A value net is a multipartner solution provided to an end-user customer," he says. "Everything has become so complex that one Business Partner usually can't supply an entire solution; they can do pieces of it. So it's a strategic move for us to facilitate bringing those Business Partners together to provide complete and repeatable solutions to our customers."

A Reverse Conversion

This pairing of business partners isn't unusual in the industry—IBM has been encouraging it for years now—but promoting it in the Linux space is somewhat new. After all, Linux has been around as a viable alternative to other OSs for a mere matter of years. Sure, there were a few early adopters who jumped on the Linux bandwagon in the mid- to late-1990s, but it didn't become mainstream until only recently.

A large part of this increased Linux adoption is that application providers are now writing to it. Notably, much of this development is taking place at the requests of customers, whereas in the past, vendors were often deciding which technologies would enter the mainstream. Now, with their customers looking for alternatives to their more proprietary OSs, vendors are responding.

Farber likens this to a push-pull mentality, with the push being vendors driving technology adoption, and the pull involving customers being behind the wheel. This switch in philosophy has moved vendors such as SAP, eOneGroup and Retek to port their applications to Linux, realizing that the customer may, indeed, always be right.

"When I started calling up Business Partners two or three years ago and asked them if they were involved in Linux, they'd say, 'Well, it's interesting but our customers aren't asking us for it. When I start seeing a little bit more demand I'll get involved,' " Farber recalls. "Today, that's not the case. Business Partners are coming to us and saying, 'My customers are asking me about Linux, and I need to get enabled because I've got to take care of my customers.' It's a reverse conversation."

This tipping point may have occurred in 2003. All of a sudden, Linux wasn't simply a handy OS to run mail servers, but became an accepted part of everyday, heavy-lifting computing, with financial, government, retail, distribution and much of the small-to-medium business (SMB) sectors embracing it. As a result, Linux is no longer a toy for those who like to tinker, but an actual and viable alternative to other OSs, whether UNIX* or other more proprietary systems.

"When I talk to CIOs," says Kevin Gates, Linux solutions specialist with Sirius Enterprise Systems Group (formerly DSG), a member of the IBM* Business Partner Value Networks for Linux, "I present 2000 through 2002 as the years of Linux infrastructure applications. While 2003 was the year of Linux business application investigation, 2004 is the year of business application integration. It's now actually going into production, and not just for infrastructure servers."

IBM has embraced Linux, allowing it to run on all of its @server platforms, including i5*, p5*, xSeries* and zSeries* servers, alongside more traditional OSs. "With Linux, you get the strength of UNIX, but at prices comparable to Intel*. In the past, if you wanted to run on cheaper boxes, you'd most likely have to run Microsoft*, which doesn't offer the same type of security and scalability as UNIX," Farber says. "And with UNIX, you had to buy boxes that cost a lot more. But now, thanks to Linux, you can get a lot of the same security and scalability for a lot less."

Linux is no longer a toy for those who like to tinker, but an actual and viable alternative to other OSs, whether UNIX or other more proprietary systems.

A Bit Like a Dating Service

But as organizations begin widespread deployment of Linux, they may not have the resources, such as Linux-qualified personnel, available to adequately handle the requirements of their new operating environment, especially upon initial installation. Much of their existing skill sets may be geared toward other aspects of their IT infrastructures, such as existing OSs, server platforms and networks.

Thus, the creation of the Value Networks for Linux. Program members, whether resellers, distributors, consultants, system integrators or independent software vendors (ISVs), can, by partnering with one another, provide more easily deployed Linux-based solutions with the software, including Linux and the appropriate business software, for example, being pre-installed on the IBM hardware the customers are receiving.

"This is where the industry is going more and more, especially in the SMB space," Farber notes. "Customers need help in solving problems, and not just by sticking another box into their environment to patch things up. So IBM's taking a leadership role here, making it easier for Business Partners to come together and creating the right environment to do so. It's a bit like a dating service."

Siwel Consulting, based in New York City, and ABAS Software of Germany, for example, have collaborated on a number of projects since December 2003, focusing on the IBM @server xSeries Linux implementations. Together, they provide the hardware, the software (the ABAS Business Software ERP application) and the consulting. As Dan Love, vice president of business development with Siwel, explains, "We've adopted the old AS/400* way of selling, which was saying, 'Mr. Farmer, I have this grain elevator inventory program. It slices, it dices, it chops. It just makes money for you. And, oh, by the way, it runs on an AS/400.' It was one package on one platform. And now we're doing that with Linux. We'll pre-load Linux and the ABAS software and then ship it to the customer and do the installation and conversion."

DSG has a similar relationship with the Palo Alto, Calif.-based VMWare*, with VMWare providing DSG with sales discounts and support. It then sells boxes running Linux and VMWare to its customers, while also providing consulting services. "Our customers are getting a team instead of just a single vendor," DSG's Gates says. "If issues arise, they don't have to depend solely on DSG. If we need to, we can tap on the shoulder of VMWare and get assistance from them. It also doesn't hurt that we can provide the best prices available and keep an eye on the latest technologies for our customers."

Of course, this type of vendor pairing isn't necessary for all businesses. Larger enterprises, for example, often have commensurately larger IT departments and can deploy Linux and the applications and hardware they desire on their own, having enough experienced internal resources to do so. As Farber explains, "They might use a Business Partner for consulting purposes, but they're really driving the decisions."

SMBs, on the other hand, may have a more pressing need for Business Partners that are working in tandem to provide a single solution. After all, they most likely don't have the broad IT staff that larger enterprises have.

"A good example of this involves Siwel and ABAS," Farber says. "After they did their first installation, which took the longest and had the longest sales cycle, they had a real-world reference. And from there, they closed a couple of other deals pretty quickly. They were able to define the solution to the customer in much more detail, and that first install became repeatable. They were able to say, 'Here, we've already done it and it works.' And everyone benefited, including the customer who now has a proven solution."

Leading in Linux

In order to encourage participation in the Business Partner Value Networks for Linux, IBM has created a number of member-beneficial programs. One of them increases the co-marketing incentives for Leaders for Linux, which are select Business Partners that are the foundation of the Value Networks program.

According to Farber, these Business Partners "have to meet three criteria to become qualified for the Leaders for Linux program. One, they have to be either advanced or premier in one of our PartnerWorld tracks. Two, they have to have at least one of the industry-standard Linux certified persons on staff. And, third, they have to provide a customer success story for a Linux solution on an IBM server. So if they hit those three criteria, they get the Leaders for Linux designation and an extra set of benefits specific to them, such as home marketing and inclusion in our trade shows. And they get free education, such as the new NT migration training class, which is worth about $1,500. This is in addition to their normal PartnerWorld benefits."

These Leaders for Linux Business Partners, the numbers of which have increased from 75 to more than 200 within the past year, may also qualify for $5,000 in telemarketing campaigns focused on four related solution areas. And, just recently, they can now get $7,500 if their solutions are based on Linux on POWER* and $10,000 if the solution was created as part of the Value Networks.†

These incentives are in addition to IBM's "Double Your Discount" program, which lets Business Partners keep 60 percent of the discounts they earn when they sell IBM applications that run on Linux (this is up from the typical 30-percent discounts). These larger discounts were created to help IBM Business Partners continue funding their Linux efforts in order to keep up with increasing customer demand for Linux solutions. "From a Linux perspective," Farber adds, "this program says, 'OK, if you sell an IBM middleware product in a predefined, approved solution, we'll double your discount from the 30 percent we're offering you in the Value Advantage Program.' This is a good way to encourage our Business Partners to really drive our IBM middleware products on Linux."

As proof of its commitment to Linux, IBM is offering other programs in addition to the Value Networks program. One, the NT-to-Linux Migration Program, is squarely aimed at Microsoft Corporation's announcement that it's dropping support for Windows* NT and discontinuing the availability of security patches by the end of this year. As a result of this move by Microsoft, some two million customers will have to develop migration strategies, if they haven't already. IBM would like them to move to Linux, preferably on an IBM @server platform. Already, there are 45 active Business Partners that have joined the program, all of them realizing that the NT users will soon be without support, and they're creating a huge new market that will benefit not only IBM, but also themselves.

Although an existing program, ISV Advantage Initiative, which was formed for ISVs supporting the SMB space, is also encouraging program participants to increase their level of support for Linux. Of the 200 participants, 70 percent of them are actively supporting or have expressed a level of commitment for Linux.

> "IBM's taking a leadership role here, making it easier for Business Partners to come together and creating the right environment to do so. It's a bit like a dating service."
>
> —Rich Farber, IBM program manager for Linux Business Partners

Turning the Key

I like my Mac in part, because, well, it's a Mac. I also like it because it offers a suite of software I find attractive and didn't have to pay extra for. (Future upgrades might cost me, but that's another story). Similarly, organizations in the SMB space might well find complete Linux solutions from IBM Business Partner Value Networks for Linux members. Instead of having to buy a box, the software, integration support and additional consulting, they might well be able to buy it all from one vendor, even though the individual components may have come from two.

Additionally, ISVs and their Business Partners can benefit from the increased interest in Linux, not only in terms of IBM incentives, but also as a result of new and emerging markets. As people are often fond of saying, this is a win-win situation for everyone, including IBM, their Business Partners and, most importantly, their customers. As Siwel's Dan Love puts it, "They're getting a total solution, they're getting all their questions answered and they're having everything installed for them. Solutions like these are almost turnkey."

Jim Utsler, *MSP TechMedia senior writer, has been covering the technology beat for nearly a decade. Jim can be reached at jjutsler@provide.net.*

† Additional terms and conditions may apply. Current as of July 2, 2004. Benefits subject to change.

IT Made

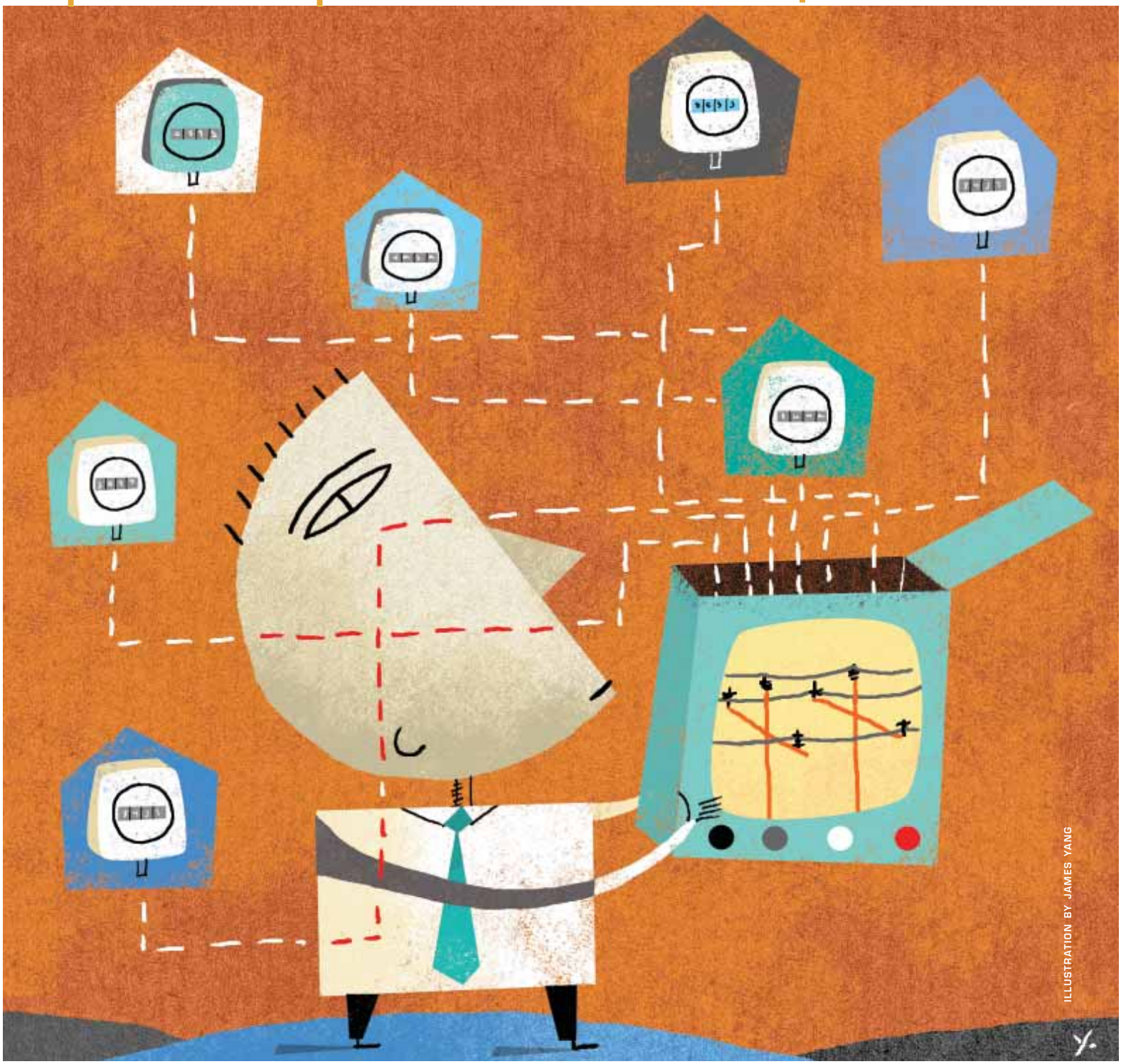


ILLUSTRATION BY JAMES YANG

simple

Linux facilitates IT infrastructure simplification

BY RYAN RHODES

If there's one theme that's been repeated by IBM in 2004, it's "IT infrastructure simplification." Simply put, it's all about taking large, confusing IT environments and sprawling server farms, and bringing them together in a more concise, optimized and less-complicated IT terrain with a small overall footprint.

Additionally, in the emerging on demand IT landscape, infrastructure simplification is often a necessary first step that companies must take to lay the groundwork for on demand computing.

"The idea of infrastructure simplification, from a high-level view, is that companies have to simplify their infrastructure before they're able to achieve an on demand vision," says Mike Wilson, IBM* Linux* strategy and market manager. "Right now, companies are looking toward on demand computing so, obviously, they need to look at infrastructure simplification; you have to simplify before you can virtualize."

Addressing Pain Points

The infrastructure simplification concept sounds nice, to be sure, and the message it conveys is a comforting one for companies wrestling with the difficulties of IT environments that have gotten out of control. Sprawling IT nightmares typically don't happen overnight. Rather, it's usually a gradual process of buying an Intel* server here for one workload, buying another server there for something else, and then buying a bigger server meant to compensate for business growth, and so on. Eventually, the IT environment consists of servers and storage components spinning an expanding technology web, with no one person really knowing everything about it.

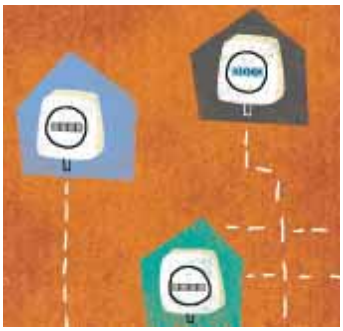
"It's clearly a pain point in the market place," says Wilson. "When you think about the build-up of the infrastructures from the late '90s, you have a lot of companies with hugely complex architectures that don't talk to each other and they have a lot of trouble rationalizing their costs. This has been an issue in the market place for a few years now, ever since the economy started struggling back in 2001."

Infrastructure simplification provides a means by which to end the nightmare and at the heart of the solution, there's Linux. More and more, Linux is acting as the magnet that brings together what were once completely incompatible server and client platforms. Where once it was common for an IT department to sport numerous machines running numerous operating systems (OSs), today there's Linux, with the capability to bridge disparate systems across an IT network.

"The role of Linux is that it's an open, flexible platform that can be the foundation for future growth," says Wilson. "It not only helps to simplify architectures, but its open and flexible nature and its support on multiple platforms allows companies to continue leveraging their existing hardware."

Using Linux as a cross-platform solution, and even as a storage area network (SAN) solution, companies are now able to simplify IT environments as never before, and IBM leverages the useful multi-compatibility functionality across its entire @server line. From the xSeries* server to the iSeries*, pSeries* and zSeries* servers to the emerging BladeCenter*, they all support Linux, making them ideal platforms for performing IT infrastructure simplification.

"Those are a couple of enabling technologies that are a good fit with Linux that, together, go a long way towards simplification," says Wilson. "Another enabling technology is blades, a form factor that simplifies almost every aspect of an infrastructure, including the cabling, deployment and management of low-end systems. Blades is the fastest growing form factor in the market place, and Linux is in a very strong position rivaling Windows* for the lead in shipment volume. From that standpoint, Linux has a strong position in the whole infrastructure simplification play."



"I think it shows that Linux can be an ideal component for bringing large server farms and complex IT infrastructures under control. What we're hearing from customers is that this is a good track to take, and we're going to continue to take it."

—John Ryan, Linux infrastructure solutions and strategy marketing manager

"One of the reasons IBM is so enthusiastic about infrastructure simplification with Linux is because it supports the @server message so well," says John Ryan, Linux infrastructure solutions and strategy marketing manager. "Under the @server umbrella, we've really had four separate server lines—and now, of course, BladeCenter—which basically were recognized as stand-alone servers with their own unique operating systems. Linux has gradually been ushered in and is now supported on all the platforms, but it's been a tough message to get out there. With infrastructure simplification and its strong Linux component, the message is now coming out loud and clear, and customers seem to like what they're hearing."

Even though infrastructure simplification is a relatively new term in the market place, it's already experiencing a slight definition shift. For example, the traditional approach to infrastructure simplification primarily meant a physical consolidation of servers migrating from many locations or data centers to a few or a single location, or from many servers to fewer servers. Moving forward, it now also means data and application integration, and there are a number of emerging technologies that leverage Linux and allow companies to achieve a simplified IT infrastructure.

One such technology is virtualization (the ability to divide processing power among several workloads), which is supported on all @server machines.+ Another, logical partitions (LPARs) (the carving up of drive space to run multiple OS environments on a single server) is supported on zSeries, iSeries and pSeries servers.

+ Virtualization is supported on only select versions of Linux and may require certain minimum configurations. See www.ibm.com for more details.

Simplification with Linux

That strong Linux position is solidly augmented when you consider some of the big name companies that have chosen IBM and Linux when undergoing their own IT infrastructure simplification. Companies representing such diverse industries as banking, automobile manufacturing, retail sales and even government institutions have all jumped on the simplification bandwagon, with Linux and IBM at the head.

"When IBM recommends or helps deploy a Linux solution, IBM wins to a greater extent than it does with other platforms, because our market share on Linux is higher than it is on any other platform," says Wilson. "The more that Linux grows in the market place, obviously, IBM is in a stronger position to take advantage of that than others in the market place. Linux may only be a small piece of the market place right now, but if you're dominating or are the leader in that piece of the market place and it grows and grows, your leadership grows as well."

In the banking industry, Banco do Brasil, the first Brazilian bank to operate in the domestic and international markets, underwent the process of consolidating its European operations onto three iSeries servers at its London office. The bank uses one iSeries server to run its core banking application, a second iSeries server to act as a Dedicated Server for Domino* (DSD), while the third functions as a Linux server connected to an Intel-based xSeries server.

In the automotive realm, Munich, Germany-based MAN Nutzfahrzeuge AG, one of the three largest European commercial vehicle manufacturers, adopted an integrated, Java*-based

infrastructure powered by WebSphere* Application Server (WAS) running on Linux clusters on a zSeries server. The company utilizes the intranet portion of its solution to provide its employees with access to such applications that allow data searching, knowledge management, data warehousing and ERP. The extranet gives the company's customers, distributors, suppliers and other business units with a variety of data sharing, collaborative and transactional applications.

Growth isn't always a good thing, especially when it comes to server farms. To support its family-owned chain of 37 retail department stores, Reading, Pa.-based Boscov's was adding, on average, one Intel PC server per month to its ever-growing server farm. Utilizing Linux on the mainframe, Boscov's consolidated 44 Windows NT servers onto a single zSeries 900 Model 102 equipped with an Integrated Facility for Linux (IFL) engine. The company essentially eliminated its server farm while retaining its enterprise database server capabilities, with the z900 conducting batch and CICS* business functions and file and print services.

The city government of Orem, Utah, (population: 85,000), located 40 miles from Salt Lake City, was using an AS/400* server to run various in-house solutions that handle city processes such as financial applications, utility billings and building permits. However, city officials wanted to make mapping data more accessible and immediate to city engineers and others. Additionally, they wanted to explore a solution that preserved its existing AS/400 applications and skill base while consolidating non-OS/400* compatible applications onto a single server. Linux on iSeries provided that type of environment. Using the LPAR functionality of an iSeries Model 820, the city was able to accommodate both OS/400 applications and those that were gradually ported to Linux.

"There are compelling Linux stories across all of our platforms," says Wilson. "From blades or high-end xSeries, pSeries, iSeries or zSeries servers, this is a story that has really resonated with the customers. Linux is such a positive proof point for IBM because it really brings @server together, with all four server lines now being able to work together under a single operating system. It just makes the job of simplification that much easier, no matter what kind of existing IT environment we're talking about."

"Customer testimonials keep coming out on a regular basis," adds Ryan. "And they all have the same overall positive message. I think it shows that Linux can be an ideal component for bringing large server farms and complex IT infrastructures under control. What we're hearing from customers is that this is a good track to take, and we're going to continue to take it."

The Linux Selling Strategy

There are three primary elements on which IBM focuses when promoting the Linux simplification message. In terms of IBM offerings, there are technology enablers, such as the previously mentioned virtualization, LPARs and blades. There are also "repeatable" solutions, which include promoting security solutions, Windows NT to Linux migration and the "Exchange Your Exchange" initiative. Finally, there are consultative simplification efforts, where IBM utilizes a suite of IT assessment tools that can be used by a sales representative, partners, IGF or the @server consulting team when engaged with a customer.

"Every customer infrastructure is different, so you have to make an assessment and make recommendations," says Wilson. "Assessments can address all manner of projects, from the small and non-complex to those of considerable complexity and broad scope."

As an example, in the less complex, smaller scope realm, simple considerations can quickly turn around to outline a total cost of ownership (TCO) analysis around a specific solution, and the projected results can be calculated easily on a sales representative's laptop. There are also tools that can be used along with techline support that provide some TCO analysis that's more customized. For environments that require a broader scope and are a more complex assessment project, consultants from either the @server services team or IGS are available to cover these more complex projects.

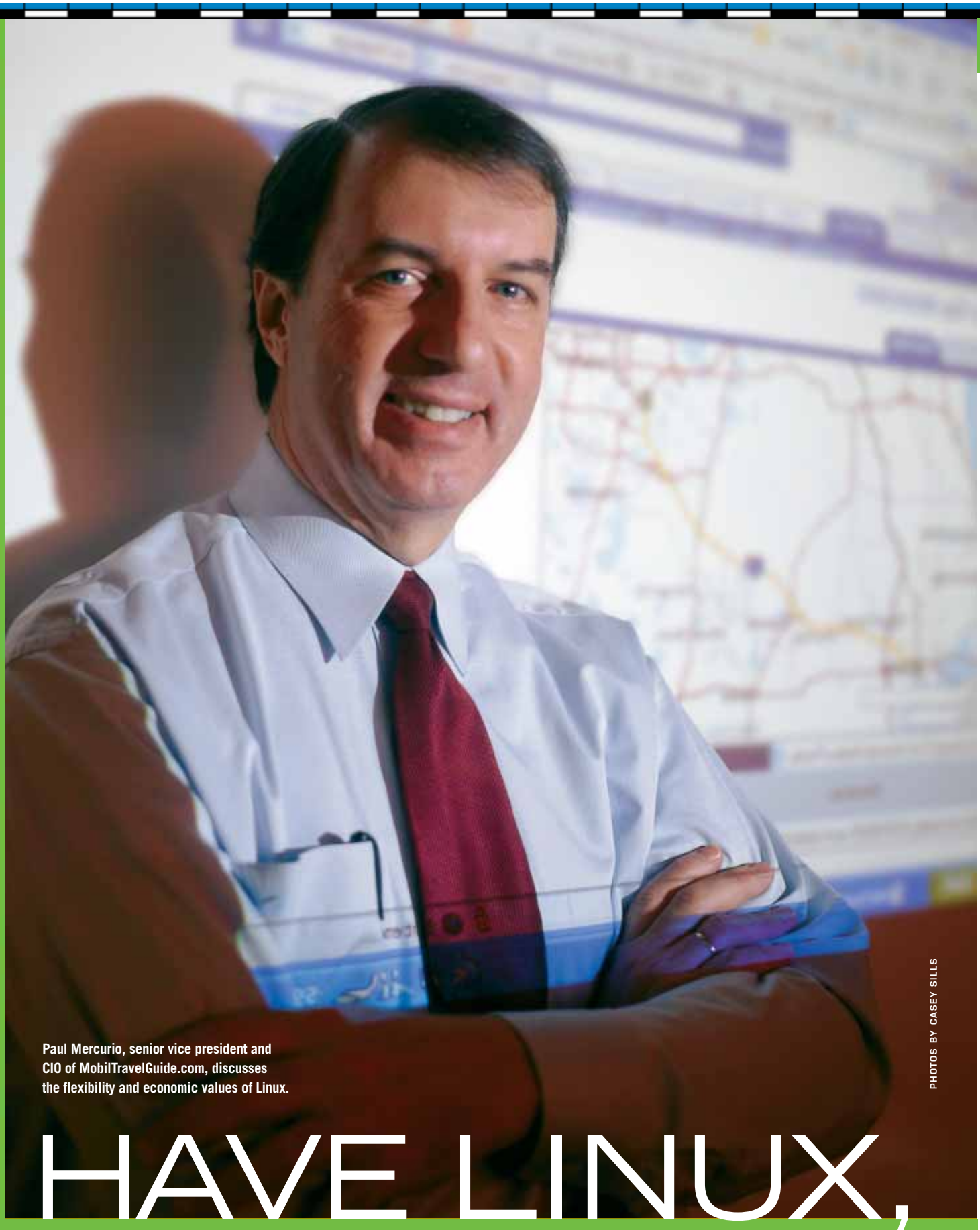
"So there's a spectrum of assessments and tools, which we have in our toolkit, that we use with our customers to help them understand their issues and options and then make a decision," says Wilson. "Linux, probably more often than not, ends up being one of the best solutions proposed by IBM during the consultations, due to the TCO it offers, with its security and open standards also being positive selling points."

Admittedly, not all customers who come to IBM seeking infrastructure simplification are necessarily keen on Linux, whether they're simply resistant to change, they don't have Linux experience on-hand, or they're just not open to the Linux message.

"Linux is still sort of viewed as kind of a rebel in the market place," says Ryan. "Some folks hear 'open-source' and they immediately think non-secure, which is simply not the case. If anything, Linux is more secure than most Windows products out there today. But still there are doubts, and it's always a challenge to make doubts go away. Despite all the positive messages coming from the market place, we routinely have new customers coming to us that have deeply ingrained doubts about Linux."

According to Wilson, however, such doubts often dissipate once the case for Linux is laid out, and many customers end up embracing it. "It's definitely not our goal to push Linux on them," says Wilson. "We present other simplification solutions besides Linux. But when they see all the cards laid out in front of them, it's hard for them to ignore the benefits Linux brings to the table."

Ryan Rhodes *is news editor of* @server Magazine. *He covers product-related news and other topics. Ryan can be reached at rhodesr@us.ibm.com.*



Paul Mercurio, senior vice president and CIO of MobilTravelGuide.com, discusses the flexibility and economic values of Linux.

PHOTOS BY CASEY SILLS

HAVE LINUX,

At Mobil Travel Guide, all roads lead to the flexibility of Linux and on demand computing

BY RICHARD BERMAN

Paul Mercurio, senior vice president and CIO of MobilTravelGuide.com, a new venture partially owned by ExxonMobil, wanted his organization's operating system (OS) to be as flexible as his customers. Among other things, his company inspects and rates more than 20,000 hotels and restaurants across the United States and Canada. Using many of the same criteria his customers utilize themselves, such as cost, service levels, security and capacity, Mercurio determined that spending more time on his customers and his product and less time with IT headaches would be key to his company's success.

Mercurio's OS of choice: Linux*. With no unplanned downtime experienced in the 18 months since the successful and speedy Linux transition, and on demand capabilities from IBM that enable cost savings, Mercurio explains why his decision to use Linux was a good one.

Q: What was the decision process you used when you were shopping for an operating system?

A: We had to consider the fact that we're a start-up company. We wanted to develop an architecture that would allow us to take our products wherever our customers went. When we started looking at an operating system, we were looking at the various UNIX* derivatives such as Sun* Solaris* and various kinds of closed versions of UNIX. As we were doing that, we also were looking to potentially outsource our networking operations. In the process of going through an outsourcing review, IBM proposed that we look at a Linux "on demand" environment where we could scale our processing power in terms of memory, storage, CPU cycles and network connectivity. With this system, we could ramp it up and we could ramp it down as if it were a utility. This was in the late summer of 2002, and IBM was just launching its on demand Linux Virtual Services as a new offering. We decided to take a careful look because we could see some real economic advantages to this utility.

Q: How did the transition and setup go? Was it a smooth process?

A: Our development organization had a version of our database and application running on Linux in a test mode for more than a year and it was fairly stable. Initially, we looked at Linux because of our desire to look at an outsourced model. But as we got further into it, we really discovered that it took very little effort to move our database from UNIX to Linux. We literally got our test environment from IBM within a week after signing a services contract. Less than a month later, we had a test version of our entire application and database in a stable setup on Linux. A month after that, we moved our entire production operation over. Coincidentally, we also had an entirely new database structure and a new Web environment coming up with that move. Everything went according to schedule and was remarkably straightforward.

Q: It seems to have happened very quickly for you. Are you pleased with your decision to run Linux?

A: It's worked out really well. We're now more than a year-and-a-half into production operation and we haven't had one moment of unscheduled downtime. All organizations pull things down in order to bring up new releases and so forth, so for us it's been extremely stable and performance has been good. The things we've wanted to accomplish, the kind of libraries we wanted to use, or whatever, have been there and have worked as advertised, so I would say we're highly satisfied.

WILL TRAVEL

Q: What have been the biggest benefits so far?

A: In the short term, clearly there's an economic benefit to what we're doing and that economic benefit wasn't solely tied to Linux. It was tied to the entire on demand model. Linux is wrapped into IBM's on demand model, so it's difficult to separate the pieces in terms of economy, but there's clearly an economic advantage to what we've done. The environment we brought up was intended to be one that was forward-facing and that would deliver flexibility. We're up on the Web right now, but before the end of the year, we'll have deployed cell phone and other wireless implementations.

Q: And Linux is enabling you to achieve this?

A: Yes. While every cell phone company is out there doing their own thing with regard to the operating platform, one of the benefits of working with Linux is the open source model. As new opportunities emerge, there's a whole community out there that perhaps can move a little faster than the corporate community and also can move in a less self-serving direction. That gives us a foundation for everything we're doing. That is, we're going to evolve as the world evolves. At this point it's pretty well demonstrated that Linux is here to stay, and is constantly gaining share versus other environments. That's happening not only because of the value, but also companies, our company included, wouldn't be moving to it if it wasn't an architecture that you could build on.

Q: Where is this Linux-based service going to take your company in the future?

A: Cell phones aren't a Linux-based technology, but you can go on AT&T wireless right now and see a Mobil Travel Guide-sponsored traffic service with real-time traffic on your cell phone under m mode. We'll be launching a series of traveler support information services on cell phones. If you're on a business trip and you want to find a restaurant in the city you're in, or if you're lost and you need a map, or if you have some free time and you're interested in museums or outdoor adventure, we have a tremendous database of travel information. This information is built by our organization with a set of field inspectors who go all across the United States and Canada and gather first-hand information. That information is then translated into something professional travel writers can use. We're going to take the mobiltravelguide.com model and move that out to the cell phone/PDA world over the next year.

In the cell phone world, the standards are still coalescing. You're starting to see Linux emerge as the potentially important platform. Obviously, there are more proprietary platforms out there now, so we need to deal either as a server that's serving information to the proprietary architecture, or if we want to put an application out on that cell phone, then we have to match the architecture that particular cell phone network has selected. An open source model would be very useful in the wireless world because there are a variety of closed standards that make it difficult to deliver the same experience to customers across whichever cell phone network that customer has chosen on their own.

"At this point it's pretty well demonstrated that Linux is here to stay, and is constantly gaining share versus other environments."

—Paul Mercurio, senior vice president and CIO of MobilTravelGuide.com

Q: What are the primary advantages of using Linux?

A: There are two primary advantages. One is that we can be more flexible in how we move our business forward. The second advantage is that the on demand model allows us to use our dollars more wisely, and I guess there is the third advantage: I don't need to find, retain and motivate a large staff of systems experts.

In terms of flexibility, I can offer an example: In about two weeks our company will begin offering a private label service to another company, a travel Web site that has about 10 times as much traffic as we have. In a traditional IT environment, I would need to go and insure that I had capacity in place. That means spending capital dollars, planning it six to eight weeks in advance, maybe longer, insuring I had the right network facilities to handle the growth in terms of network connectivity and then actually installing the new equipment, the network, memory, storage, etc., and making sure the configuration is

right. Once all that's done, I'm ready to deal with the new volume. With the on demand scenario, we simply notify IBM that we're intending to see this growth and when we're intending to see it and, by using soft commands, open up more of the large server that we sit on, an IBM® z990. We're running a Linux partition in that server. We're going to grow that partition in several dimensions to insure that more processing power is allocated to us. We get more memory and bandwidth changes, so what we're really buying is a virtual resource.

Q: So on demand enables you to react quickly and without too much planning?

A: I can grow quickly and I can grow without capital dollars. I'm not provisioning, installing or owning this hardware, so I can avoid the capital associated with it. In the case of our business, we're focused on services supporting the road traveler. Road travel is about twice as high in August as it is in February in North America, just because of the weather. The kind of vacations that are taken in the winter versus the summer means that as the seasonality falls off. Under my arrangement with IBM on demand, I can pull down capacity to match a reduction in demand. When that happens, my monthly bill goes down proportionately. So it's not quite as simple as an electric utility where you plug the toaster in and the meter starts running; however, the large portion of what we're paying IBM is based on variable utilization of computing resources, so there's an economic benefit. I got a call yesterday from a headhunter offering network analysts, database administrators, all of the various skill sets you might need to run a Web operation. I don't need to hire those individuals and have them on staff. I can focus on my customer and on my product. I can make sure that IBM is meeting the service standards and I don't have to hire skill sets for a variety of disciplines.

Many companies end up outsourcing their server operation simply to get a secure and safe place for that server operation to reside. By going to an on demand model, you're just taking that one step further where you don't own the hardware and you don't have to manage that hardware directly. The rationale is to focus on what you know and to manage your business and allow professionals to manage the things that they know. Underlying all of this is the Linux model of shared development, which is a guiding hand that allows more freedom of action.

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EMERGING MARKETS

OS picking up steam and creating new opportunities globally

BY GARY J. EVANS

IT systems worldwide exist to provide companies and institutions with similar benefits: enhanced communication and collaboration, streamlined efficiencies, and—ultimately—greater profits. For example, a bank in New Delhi using a sophisticated IT system to empower employees and better service clients has the same ultimate goals as a similar institution in New York City. It's true that the circumstances, challenges and day-to-day operations these companies face can vary to a great degree. Issues such as the state of the local economy and existing infrastructures shape the IT needs of companies that seek to thrive in their respective regions of the globe.

However, as markets develop and as IT systems continue to integrate themselves into all aspects of life—and all aspects of business—trends tend to converge. An online storefront in Guangdong, much like its counterpart in Texas, seeks to provide value to its customers, whether selling clothing or petroleum. And customers worldwide react positively to similar incentives: convenience, reliability, efficiency and value. And so businesses across the globe continue to look for technological solutions to provide these very benefits, in the end helping them acquire and retain customers.

Ultimately, the basic hardware needed by these companies, no matter where they're located, tends to be very similar. Machines are needed to serve mail, power intranets, organize and store huge amounts of data, and support electronic storefronts and distribution. The same is true for software. Applications are needed to allow employees to create and share files and to enable them to work together from remote locations. Software is also needed to power customer retention solutions, manage and plan finances and perform heavy statistical analysis.

But no matter how many similarities become evident as the world market matures, the routes used to achieve success varies, and it turns out there are some very basic differences. Operating systems (OSs), for instance, are not global currencies.

Markets outside the West—particularly in the Asia/Pacific region—although already to some degree entrenched in Wintel-powered IT solutions, are open to alternatives. They seek solutions that help them save money, provide greater security, or increase freedom and flexibility. And as these economies seek to solidify their place in the world order, they evaluate many options before deciding on the platforms they'll build their systems around. And the more they look and the more they learn, the more Linux* seems like an ideal proposition.

Logical Progression

There's much about Linux that makes it attractive. The fact that its open source software means that organizations can fully understand how their systems function. Unlike popular proprietary systems, where security holes seem to become apparent on an almost-monthly basis, Linux developers can see and understand the back-ends of their systems to a degree not possible with other commercial OSs. This is attractive to all types of institutions, and governments, companies and research universities are all seriously concerned with the privacy of their data and they seek the solutions most likely to guarantee it.

Additionally, the cost of ownership for Linux systems is often substantially lower than commercial alternatives. In traditionally price-conscious markets, it's no surprise that free and open source software like Linux is particularly attractive.

Factiva, a news aggregator powered by Dow Jones & Reuters, quotes Neeraj Bhai, chief technology officer at IBDI Bank in India, as he demonstrates this technology with a practical example: "Our mail server started off handling 15,000 e-mails a day and scaled up to 1,650,000 e-mails a day. We took an old server and installed ... Linux on it, saving on hardware costs because we didn't have to buy a new box. [Additionally] if I had used [commercial software] I would have had to pay for 1,500 client-access licenses ... [and] I haven't seen instances where my Linux box crashed."

Beyond this, Linux becomes more practical as the amount of hardware and software designed for it continues to expand. Led by IBM, the world's fastest growing Linux vendor, the market is producing more machines and applications built for Linux than ever before, with more coming all the time. Linux-powered products exist at all levels and accommodate all needs. Within IBM alone, the zSeries*, @server p5 and @server i5 servers run Linux, as do the BladeCenter* and xSeries* servers. But it goes beyond this. The amount of software—from mail servers to intranet-management solution—has increased exponentially, and the quality of these applications is world-class.

Support from the Top

Kathy Knaack, program director of Linux Strategies—Emerging Countries at IBM, is optimistic about both what Linux can provide for institutions in the Asia/Pacific region, and what these countries mean to the future of Linux.

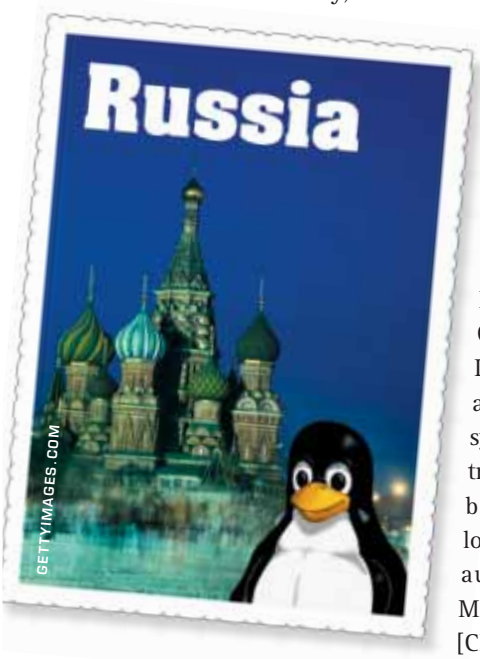
According to Knaack, "Linux is particularly attractive in Asia and is booming in many countries there, including China, India, Korea and Japan. There are many reasons for this." She continues, "Linux provides an opportunity for lower cost of ownership. This is attractive to both governments and businesses who want to provide their constituents with the best possible service at the lowest

"Linux provides an opportunity for lower cost of ownership. This is attractive to both governments and businesses who want to provide their constituents with the best possible service at the lowest possible cost."

—Kathy Knaack, program director of Linux Strategies—Emerging Countries at IBM

possible cost. They see Linux as the way to compete at the highest level in the world market." With less-developed legacy systems in place, these regions have even greater freedom to embrace alternate IT systems based on Linux, even though their economies are already, in many cases, thriving. Knaack points out that one of the most fertile Linux breeding grounds, China, already has a GDP of 8 percent growth and that Linux is seen as a way to increase efficiency and productivity even more.

Knaack also reinforces the security concerns of institutions at all levels in the Asia/Pacific market: "Just as you'd imagine, security is a paramount concern for both governments and corporations in this region. Linux provides a lot of peace of mind. Organizations at all levels find it reassuring to be using an open source system. It's possible to see the code powering your systems and make sure there are no backdoors. People all over the globe have reservations about using code when they can't see the source—how else can you make absolutely certain that things are sealed tightly as a drum and that there are no access points for unwanted traffic?"



Finally, an oft-overlooked benefit Linux provides is the fact that it's a "neutral platform" that offers businesses and nations a choice so they aren't locked into a single, proprietary vendor. As pointed out in a story published by *Newsweek* in March 2004, titled "For China, Linux has Lots to Like," one of the main attractions of Linux-powered systems in Asia/Pacific countries is the fact that they can be built and expanded by local developers. According to author Bruce Einhorn, Microsoft* is "American—and [China] isn't sure that it's a good idea to let in a foreign company with the power to dominate the local software market. In such an environment, developing Linux is a way for the Chinese to hedge their bets by going with an anti-Microsoft alternative."

For all these reasons, support for Linux solutions in the Asia/Pacific region is coming from the highest levels. According to Knaack, in August of last year, the Chinese government passed measures and policies to "help ensure that government agencies and ministries use locally produced software, and they see the key to this as embracing open source software." She adds that moving to Linux helps achieve this goal and "helps stimulate and promote local software development."

This sentiment is true all over the region. In November 2003, computer associations in South Korea, Japan and China—in cooperation with their respective governments—came together to develop nonproprietary software solutions. According to *The Asian Wall Street Journal*, "Officials from all three countries said they would 'strongly recommend' their governments to procure open source software." Additionally, representatives from all three countries would "set up managing bodies in each country to organize collaboration that will include technical exchanges, working groups, and possibly joint-development projects." In this instance, security was once again cited as the gravest concern. "Open source software such as the Linux operating system provides programming instructions that many [proprietary] software companies like to keep private," a concern that has grown "particularly since the rash of computer viruses that hit Microsoft's Windows software last summer." While there may be some truth to the claim that Linux is not fundamentally less vulnerable to virus attacks than other OSs, according to the Factiva, as of November 2003, Windows had been assailed by at least 4,000 strains of virus, while only 11 virus attacks had been recorded that were designed to hamper Linux systems.

Even in economies often considered more "Westernized," Linux is becoming increasingly popular. In an August 2003 article by Venkatesh Hariharan, published collaboratively by Dow Jones & Reuters, this phenomenon is demonstrated by the "Linux invasion" that India is undergoing. According to Hariharan, "What is unmistakable is that CIOs across the country welcome the much-needed competition that Linux ... [has] brought into the market. ... Driven by cost, licensing issues and technical issues, a cascading number [of companies] across the country are now taking a serious look at the world of free and open source software." The article continues to point out that, "It is the banking and financial sector and the government, two segments normally seen as archconservative, that have been early adopters of Linux."

Leading the Way

Knaack is proud of the work IBM is doing to bolster the adoption of Linux in the Asia/Pacific region. As she points out, "IBM is really viewed as the leader in Linux, and it's doing extensive work to reinforce this." She notes that "at every level, we're trying to help institutions in these countries understand

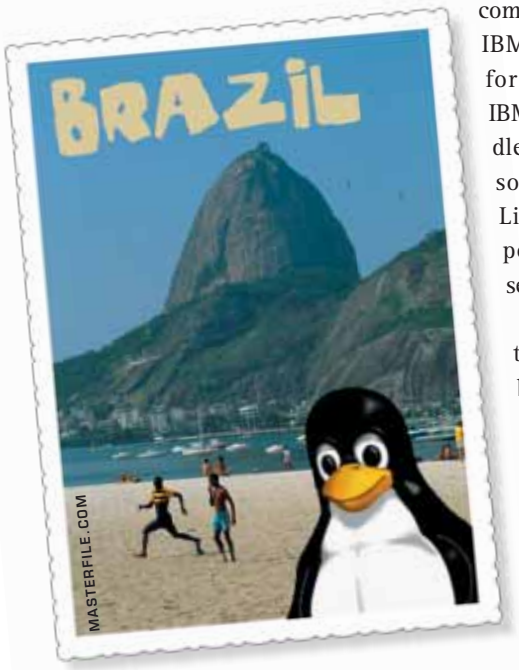
and implement the IT systems that make the most sense. Often, this means helping them establish Linux systems."

In June 2003, IBM jointly established a Linux competency center with the Beijing government in China. According to Knaack, IBM and the Beijing government established this center for many reasons, including "promoting the usage of Linux by helping organizations port applications to a Linux environment; creating end-to-end Linux solutions; as well as providing training for Linux professionals in China." The IBM Web site points out, "With 300 Linux developers in its research and development center in China, IBM is leading the development of Linux by providing technical support, Linux certification and training for professionals."

A second center in Guangzhou, opened in June 2004, provides software testing, project and technology-management services and professional training courses for local software developers.

IBM has instituted similar efforts all over the Asia/Pacific region. According to the *Korea Times* in May of this year, "IBM has been in talks with South Korean officials and industrialists about promoting the global open source computer operating system." Jim Stallings, general manager, Linux -IBM Systems Groups, has met with government officials to "work out a three-year strategy for the promotion of Linux."

IBM also assists in Singapore with efforts such as the IBM Open Source Computing Center in Ang Mo Kio. One of the primary institution nodes, the IBM Linux Integration Zone (LIZ), promotes the adoption of Linux by business partners, customers and developers by providing them with a platform to rapidly build, test and deploy a wide variety of Linux-based solutions. This includes helping create solutions for finance, retail, e-commerce, telecommunications, distribution and manufacturing companies. Through LIZ, IBM provides training for the enablement of IBM Linux-based middleware, products and solutions, as well as Linux technical support and integration services.



Knaack remarks that this is just good business sense: "Deciding which operating system to build around is a huge decision. We can help governments, companies, universities—whatever—determine where and when it makes sense for them to implement Linux solutions." She points out that IBM has followed a similar policy globally, noting that the competency centers in China aren't unique. As she says, "We've had a lot of success with these centers globally. We have them on four continents, in countries from Germany to the U.S. to Japan."

"We've had a lot of success with these centers globally. We have them on four continents, in countries from Germany to the U.S. to Japan."
—Kathy Knaack

For instance, IBM and the Russian Ministry of Communications and Computerization have agreed to create a Linux Competency Center in Moscow to help push greater use of the open source OS in Russia. And late last year, IBM signed a letter of intent with the government of Brazil to jointly expand the use of open source technologies and Linux throughout the country. As part of the agreement, IBM will help create the infrastructure and professional skills to grow the use of open source technology within the public sector. This system of cooperation and education has helped IBM assume leadership at the head of the Linux movement.

Into the Future

Linux's unprecedented growth in the Asia/Pacific region has global ramifications. As alternatives to proprietary systems are adopted and expanded worldwide, the viability of it as an OS continues to increase.

Knaack, as with most experts, stops short of claiming that Linux is about to emerge as the dominant force in OSs in the Asia/Pacific region—at least for now. But she points out that there can be no doubt that it's becoming a huge factor in IT decisions there, and that this trend will continue. "I have no doubt that we'll continue to see this proliferation, and five years from now its growth will be even more established, even more remarkable," she says. "Linux is one of the biggest growth areas in that part of the world, and that trend doesn't look to be ending anytime soon."

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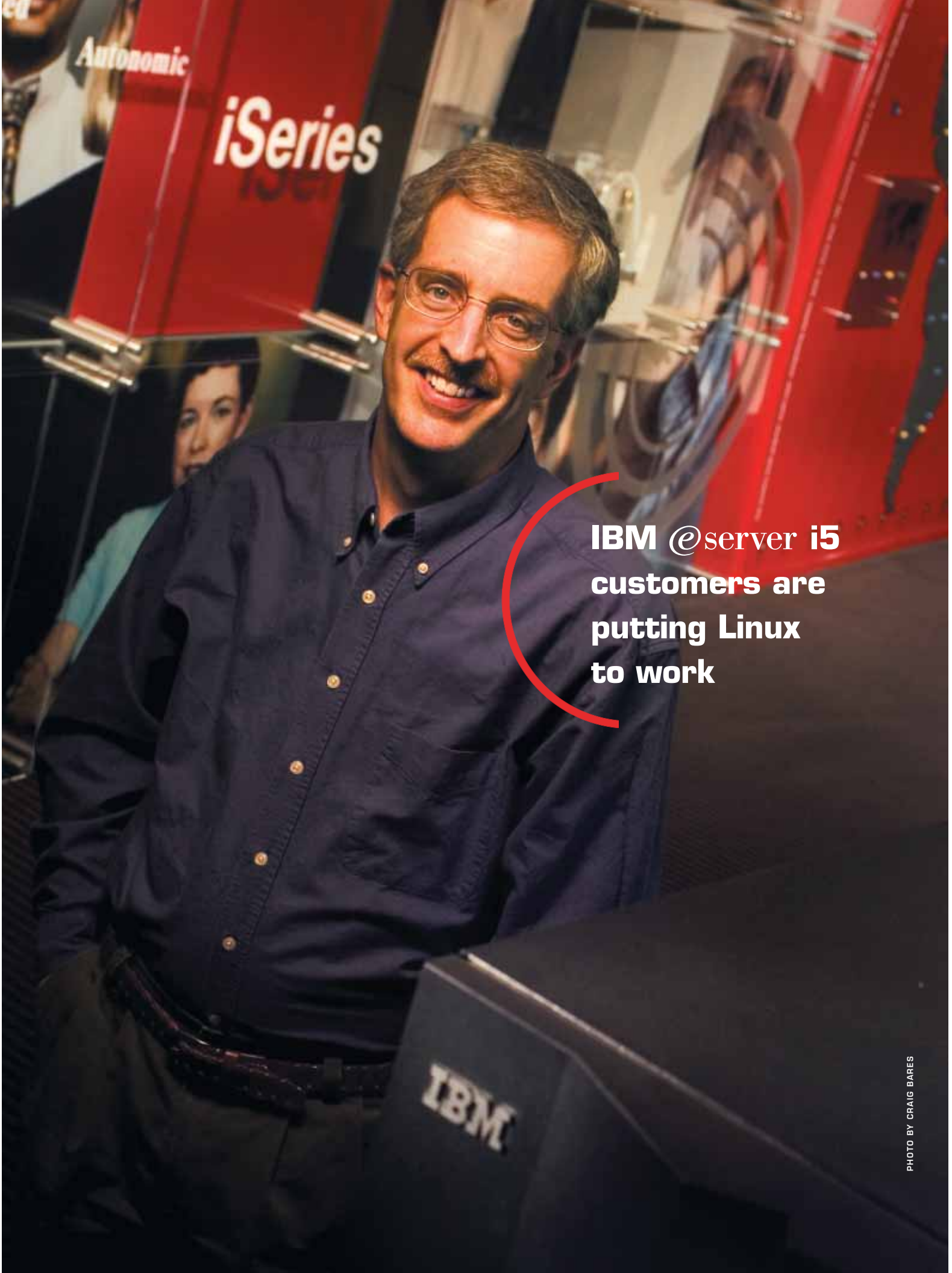
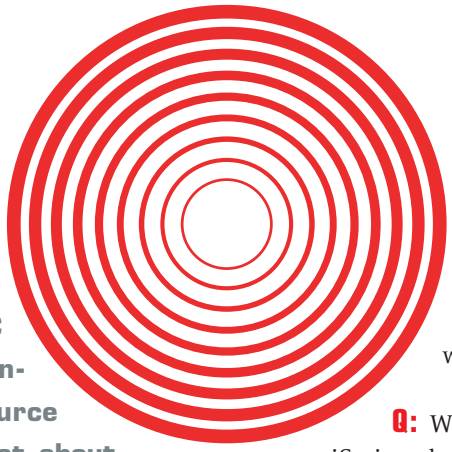


IBM @server i5 customers are putting Linux to work

PHOTO BY CRAIG BARES

LINUX IN THE MIDDLE

By Evelyn Hoover and Doug Rock



IBM's commitment to Linux* is well documented. Its entire @server line (from its most affordable Intel*-based PC servers to its high-end mainframes) supports the open source operating system (OS). But what about IBM customers who work in small- and, more specifically, medium-sized businesses (SMB)? Is Linux viable in the SMB space? If your yardstick is the IBM* @server i5 system, which runs thousands of medium-sized organizations around the globe, the answer is a resounding, yes.

What makes the @server i5 system and Linux such a suitable match? To learn the answer to this question and others, *Linux Executive Report* sat down with IBM's CRAIG JOHNSON, iSeries* product marketing manager for Linux.

Q: What are the forces that move @server i5 (formerly AS/400* and iSeries) customers to run Linux?

A: Customers are selecting Linux to help simplify their infrastructures. For many, the focus of the effort is to replace their Windows* servers with Linux to provide a more stable, secure, cost-effective foundation. In addition, customers are leveraging the Linux application portfolio to implement new business solutions. The @server i5 server enables customers to reduce the complexity and costs, automatically respond to changes in resource demands and expand on-the-fly with flexible growth options.

Q: When Linux was first introduced on the iSeries platform, what was IBM's expectation, and how has Linux met or exceeded those expectations?

A: IBM introduced the support for Linux on the iSeries in 2001 for a couple of reasons. One was to bring new applications to the platform—open source and those from solution providers. The other was to take advantage of the Linux momentum occurring in the industry and at IBM itself. We wanted to offer new solutions to meet the demand we saw from our customers. We thought we could offer a unique solution that would allow our customers to leverage the investments they've made in the iSeries and extend the qualities they like about the iSeries into the Linux environment. Today, IBM is seeing a significant increase in the demand for Linux. In fact, demand is outpacing our projections. We see customers using open source solutions—file servers, Web servers, anti-spam and other security solutions. In addition, a significant number of solution providers are offering solutions on Linux on @server i5 systems, with more than 250 solutions available today and 300 others in the pipeline. There's also definite growth in the number of IBM software solutions. Today, we have more than 30 solutions from IBM Software Group, including WebSphere* Application Server and DB2* Universal Database* for Linux.

Q: We're hearing a lot from IBM about running Linux on POWER*. How does this relate to the iSeries?

A: Linux on POWER refers to the operating environment of running the Linux operating system and applications on POWER technology-based systems. These POWER processors are used in the iSeries and pSeries* family of servers, including the use of the new POWER5 processors in the @server i5 and @server p5 servers. In addition, POWER processors are used in the new IBM @server BladeCenter* JS20 and other IBM and non-IBM products. Novell and Red Hat offer Linux distributions for IBM's POWER servers. This broad use of POWER is driving a stream of new solutions for the servers, including the iSeries.

Q: You said that IBM's expecting additional solutions in the future and obviously hoping for additional customer adoption. Will you provide some insight into recent IBM Linux-related announcements, and is there anything else you can see in the crystal ball for the short-term future of Linux on the @server i5?

A: IBM has a great solution today that really leverages logical partitioning (LPAR) and virtualization to help customers simplify their IT infrastructures. These technology innovations are available across our entire @server i5 product line. IBM continues to work to enhance that solution. We recently enhanced our partitioning capability to support more partitions and automatically move resources between partitions as workloads change in the partitions. We think these facilities will allow more customers to run more Linux workloads on their @server i5 servers.

IBM's also trying to make it easier to acquire Linux and get it up and running. We've added the cabibility for customers to order Red Hat and Novell Linux distributions when they order their iSeries servers.

We recently enhanced the integration of Linux, IBM i5/OS* and the @server i5 server by adding more storage-management facilities to iSeries Navigator. One of the reasons to run Linux on @server i5 system is to leverage their existing iSeries storage subsystem. These iSeries Navigator enhancements make it even easier to carve out storage spaces from OS/400* and dynamically allocate them to Linux partitions.

Q: You touched on automatic LPAR. Can you explain in a little more detail the difference between dynamic LPAR and automatic LPAR?

A: Prior to May, the iSeries servers featured dynamic LPAR. This is where processor resources can be dynamically moved between partitions. Let's say you have a couple of partitions and you want to move part of a processor between partitions—the granularity is one-one hundredth of a processor—you can do that immediately through iSeries Navigator; you can schedule it, or you can write a program to move the resource based on some event.

In May, we announced automatic resource movement. So, if you have the same two partitions and one of them is busy and the other one isn't, the busy partition will automatically receive more processor resources. Customers will have the option to set up partitions on the @server i5 server so the processor resources basically float between partitions based on the activity in the partitions.

Q: You also mentioned an increase in the number of partitions. How many partitions are we talking about here?

A: On the 8xx servers, we supported a maximum of 32 partions. The @server i5 architecture now supports up to 254 partions. We continue to support up to 10 partitions per processor. So, for example, with our latest @server i5 Model 570 announcement, we introduced the option of a 16-way server supporting up to 160 partitions.

Q: Which boxes are most customers running Linux on, or does it really vary?

A: Customers are running Linux across the product line today—from the low-end servers like the iSeries 810 all the way up to the 32-way 890. Since most of our customers purchase small- to medium-sized servers, we have more customers running Linux on those servers.

Q: What can you tell me about customer interest in Linux on iSeries? Of those using Linux, what are they using it for?

A: IBM recently conducted a survey that indicated that 45 percent of iSeries customers are either adopting or considering adopting Linux. That's a significant number of customers given the size of the iSeries install base.

Most of the customers start with infrastructure applications. They'll be running OS/400 or i5/OS business applications with Linux firewalls, Linux file servers or Linux Web servers. Many of those applications are included with the Linux distributions. So if they purchase Linux from Novell or Red Hat, the

most popular open source solutions are on the CDs that the customer gets. That can help the customer get started. Additional open source solutions can be downloaded and installed, as well. You'll see customers starting there.

IBM also has customers moving into more advanced uses of Linux. We have customers running digital media, financial and ERP solutions on Linux, as well.

Q: Is there a typical industry where the adoption rate of Linux is higher?

A: It's across the board as far as the customers who are using Linux. Since a lot of distribution, industrial and financial service customers leverage the iSeries server, we see a lot of Linux being used in these industries. Most of the customers using Linux on iSeries are small and medium businesses. Obviously, if you're a solution provider and you're looking at the iSeries customer set, the most attractive industries are where the largest number of customers are.

Q: Speaking of Independent Software Vendors (ISVs), are they jumping on the iSeries bandwagon or are they still holding back?

A: The majority of the 250-plus Linux solutions today are new solutions for the iSeries. This is consistent with our strategy; we want to expand the application portfolio for our customers. In many cases, these solutions are coming from Intel* or UNIX* systems. For example, S2 Systems and Mosaic Software have announced their financial applications for Linux on the iSeries. They provide electronic funds transfer solutions that tie into back-end OS/400 banking solutions. iSeries customers, like Bynari and ACCPAC, are also leveraging new solutions from ISVs. Some traditional iSeries ISVs, like Lakeview Technology and Hansa Business Solutions, have extended their solutions to Linux on iSeries.

The fast-growing number of POWER-based solutions is a testament to the ease of moving an Intel-based Linux application to the POWER platform. Linux is really opening up the platform, and it's delivering a new set of applications to our customer base.

Q: On another note, which Linux distributions are currently available on iSeries family of servers?

A: IBM works with two major Linux distributors: Red Hat and Novell. Red Hat offers Red Hat Enterprise Linux, and Novell offers SUSE LINUX Enterprise Server (SLES) distributions for POWER platforms.

Q: Does the Linux adoption rate vary by geography?

A: In 2003, and now in 2004, we're seeing a significant demand for Linux across the world. In 2003, this demand exceeded our expectations in each geography. From a volume standpoint, we're seeing most of the Linux adoption in the United States.

> **"Customers are selecting Linux to help simplify their infrastructures. For many, the focus of the effort is to replace their Windows servers with Linux to provide a more stable, secure, cost-effective foundation."**
>
> —Craig Johnson, IBM iSeries product marketing manager for Linux

Q: So at this point, how do you see the remainder of this year shaping up?

A: In a word, busy. With new product offerings, new Linux distributions based on the 2.6 kernel, new solutions from IBM Software Group and solution providers, we're working to make our Linux offering attractive to more and more customers. While the technology IBM is delivering is pretty cool, the more important thing is that we're working to solve customers' problems or enable them to grow their businesses.

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DB2 EMBRACES LINUX

BY RAYME JERNIGAN

Which database provides the best value? Which works best for deploying applications on a Linux* cluster? Which is most scalable? And is high availability really achievable on Linux? To get IBM's take on the continued growth of Linux databases, IBM's *Linux Executive Report* talked to Robert Picciano, IBM's vice president of Database Technology, and Gary Schneider, DB2* director of Linux Business Development. Here's what they had to say.

Q: What's driving customers to move to Linux for their IT infrastructure?

Gary Schneider: There are a number of factors, although total cost of ownership (TCO) remains a key driver. One way to do this is to deploy your IT infrastructure on Linux using commodity-based servers.

Regardless of the platform, customers require scalability, performance and high availability. With the onslaught of data facing customers (Radio Frequency Identification Device, sensors, pervasive devices), databases are growing quickly. If customers don't think about how their database applications can expand from the beginning, they can be boxed in later. It's important to think about these issues up front.

Q: Are you seeing customers deploy mission-critical applications, like a database, on Linux?

GS: Yes. We've come through the early adopter stage where Linux was used primarily for file and print serving. As Linux matures, customers are putting more mission-critical applications on Linux. Database software is fundamental to just about every major business application out there, whether home-grown or from commercial Independent Software Vendors (ISVs).

There's research that shows that customers see database deployments as the main reason they'll purchase their next Linux server.

Q: Which industries in particular seem to be deploying database on Linux?

GS: It's happening across the board, but we're seeing the strongest growth in financial markets, public sector and distribution. These sectors are typically very cost-conscious, so that isn't surprising.

Q: Does DB2 on Linux have any specific advantages over the other major database brands?

GS: There are several: First, DB2 has the lowest total cost of ownership in the industry, so it's a natural choice when considering Linux. Why would you make the move to a low-cost operating system (OS) on a commodity hardware platform, and then potentially overspend on middleware?

IBM sets the record straight on Linux databases

PHOTOS COURTESTY OF DB2

Gary Schneider, DB2 director of Linux Busines Development, IBM

Bob Picciano, vice president of Database Technology, IBM

To reduce costs further, DB2 has included advanced autonomic capabilities that IBM's competitors don't have. This also contributes to IBM's TCO advantage, because it means you need fewer people to manage your database environment. It's all about reducing the cost of computing while delivering the enterprise capabilities customers need.

GS: And let's talk scalability. Data volumes are exploding, so scalability should be one of the primary considerations when looking for a database that can support an information infrastructure. Some database products just don't scale linearly. That means that as the database becomes larger, it will begin to bog down. Adding new servers will only provide so much help, so your cost per transaction begins to rise and manageability often becomes a problem. This can eat up the value that initially brought the customer to Linux.

DB2 is unique in that it delivers unprecedented scalability characteristics that have been designed into the product and perfected over many years. We've also worked hand-in-hand with our Linux distribution partners to ensure that DB2 leverages the extended capabilities of the 2.6 Linux kernel. The result is that DB2 really shines in Linux environments and helps us deliver the promise of scalability for Linux today. In fact, DB2 offers scalability to 1,000 nodes. We know our competitors' products don't scale linearly and are only "certified" to a small number of nodes, like 12 or 16. We back up our claims visibly in the market place, and DB2 has leading performance benchmarks for TPC-C and TPC-H workloads as well as ISV applications.

In the end, all that matters is how our clients' applications perform in delivering critical business value. Head-to-head, DB2 offers better price/performance and lower TCO than Oracle* in key industry standard benchmarks.

Q: What about availability? Isn't it more difficult to achieve high availability in a clustered environment?

GS: You can achieve the same availability on Linux clusters that you can on other platforms. In fact, the lower hardware

IBM DB2 for Linux

Infrastructure on demand—to satisfy tennis fans' demands

By Barry Mittelman and IBM Sponsorship Marketing

Watched on TV in more than 161 countries, the US Open is tennis' premier championship. And for parent organization the United States Tennis Association (USTA), capturing that interest and turning it into revenue was key. But to do that, they needed to set their Web site apart from the scores of competing sports-related Web sites. The USTA can take advantage of access to elements of information from match results and statistics, as well as text, audio and video features and player bios—but so can a lot of other sites. Where the USTA has the most significant advantage is in its exclusive access to the scores of US Open matches in progress. Any sports site can post game-by-game scores, but the ability to publish official results as they occur straight from the umpire's chair, point-by-point, gives the USTA a natural lead. All they needed was the IT infrastructure to make it happen.

To fulfill this goal, the US Open site needed to be dynamically responsive to highly unpredictable geographic spikes in traffic triggered by, among other things, the nationality of a match participant. The USTA wanted a solution that could provide on demand access when it was most needed. Economically, it was important for the USTA to rally the resources of a fully implemented large solution, but without the investment in the fixed infrastructure and skills that go along with it. Luckily, IBM Global Services had a Linux*-enabled solution that met the challenge.

An Infrastructure That Serves All

With IBM* @server xSeries* server running Linux and IBM @server pSeries* server running AIX*, plus software such as IBM DB2* for Linux, IBM WebSphere* Application Server and IBM Tivoli* Intelligent Orchestrator, the tournament—and its Web coverage—went off without a hitch.

Data, statistics and player biographical information are first stored in IBM DB2 for Linux, then published to WebSphere Business Integration Event Broker, which, in turn, through publish-and-subscribe technology, "pushes" real-time score information to fans via formats tailored to their preferences. This means that the scores can be

costs that Linux introduces into your environment means you can do things that would be cost-prohibitive in a more expensive server environment.

Robert Picciano: That's exactly right. For example, you could choose to mirror your compute nodes one-to-one where there is a backup server for every active server in the cluster. That may sound like an expensive architecture, but we're sometimes talking about only a $2,000 compute node. Compare this to larger UNIX* servers that can costs hundreds of thousands of dollars.

So it's not more difficult, it's just different. The strategy you use to create a highly available architecture will vary from one operating system platform to the other.

Q: Oracle tells customers that Real Application Clusters (RAC) makes high availability really easy for Linux clusters. Is DB2 as easy as Oracle RAC?

RP: Aside from having scalability limitations, the architecture of RAC potentially introduces several single points of failures in the system—customers need to be aware of that. And for smaller configurations, customers may be paying too much for Oracle RAC. DB2 comes with system failover software from Tivoli* for the 2-node configuration at no extra charge, for example.

GS: Also, consider that another aspect of availability is scheduled downtime for maintenance. DB2 has several exclusive utilities built into it to allow you to perform preventive maintenance while keeping the database online. And there are many more high-availability features coming in DB2 Stinger, the next update of the DB2 UDB and DB2 Connect products, which will be released later this year.

Q: What do you see as the primary application of DB2 on a Linux cluster?

GS: Business intelligence is a key area where people are using Linux clusters. Business intelligence is the practice of examining, or "mining," data you already have to run your business better or uncover new opportunities.

Mining data like this often requires new infrastructure, and clustered or partitioned databases are very well-suited for business intelligence workloads. They let you break database queries up into smaller pieces and execute them against subsets of the data for faster results.

Look at the Herzberg Institute of Astrophysics under the National Research Council in Canada. They're using DB2 on a Linux cluster of 10 IBM* xSeries* servers because of the price/performance advantages and scalability of DB2. They're analyzing astronomical data, so you can imagine the volumes.

Using DB2 on a Linux cluster, you start small and can scale out with new compute nodes as your data grows, so you don't have to buy all the hardware up front. DB2's scalability

updated automatically as play happens, without the need for users to manually refresh their browsers to receive updated information. Furthermore, because the infrastructure only serves information that changes (instead of refreshing an entire page), bandwidth requirements are reduced substantially, reducing infrastructure load and improving performance.

"For such large sporting events, IBM needs to deliver on the promise of a highly available and highly scalable Web site. The system for the US Open has exceeded all expectations," says John J. Kent, program manager of IBM's Worldwide Sponsorship Marketing.

From Courtside Seat to "Virtual Seat"

The Web site isn't the only place the IBM Linux infrastructure is put to use. Here's how it works: During the game, each point, as well as other information such as whether the serve was an ace or a double fault, is recorded by a staff member at courtside using a handheld device or laptop. This real-time data is automatically routed to the IBM scoring system where it's stored in an IBM DB2 for Linux database. Once in the system, the data is automatically tabulated and published to broadcasters who use the real-time data to display the score on television or create graphics related to the match. Information is also fed to the US Open's large video scoreboard, the source of match information for fans at the tournament, and to www.usopen.org, the source of match information for Internet fans. Viewed this way, it becomes obvious that the IBM Linux scoring system has a profound effect on every fan following the matches.

The incorporation of Linux servers into the USTA solution began in mid-2001, so that by the beginning of the US Open in late summer of that year, several of the solution's xSeries and pSeries servers were already running. While originally deployed for testing purposes, the servers performed as site volume reached a record-setting two million unique visitors. By the 2002 US Open, the IBM solution was fully implemented on xSeries running Linux and pSeries servers. IBM WebSphere Business Integration Event Broker was also deployed to power the delivery of real-time scores to the site's IBM On Demand Scoreboard application. Thrilling the USTA, in 2003 the site was able to maintain 100-percent availability despite more than 15.2 million visits, an increase in site visits of 18 percent from the previous year.

means that you don't run into diminishing returns when it comes time to expand.

Q: What about transactional applications?

RP: For online transaction processing applications, achieving the best performance on anyone's clustered database can be a bit more complicated. You may need to pay attention to how the data's partitioned in order to achieve optimal application scalability in a clustered configuration.

In DB2 Stinger, we'll be helping customers do this with the Partition Advisor, one of DB2's autonomic capabilities. The Partition Advisor allows customers to describe their workload, and then DB2 will make recommendations about how to partition the data on disk. This helps optimize performance of the application for DB2 ICE, or Integrated Cluster Environment. (We'll continue to enhance DB2's autonomic capabilities in this area over time.)

It's also a common misconception that you have to rewrite the entire application to achieve scalability. Some applications partition better than others, but the same considerations apply whether it's DB2 or Oracle RAC. For example, we recently achieved over 1.3 million transactions per hour with a major Wall Street customer using DB2 on a 5-node Linux cluster with IBM xSeries servers, and the application did not have to be rewritten to achieve this result.

Q: What about commercial ISV applications and DB2 on Linux? Are ISVs adopting Linux?

GS: Yes. We're seeing a significant number of ISVs, both large and small, porting their applications over to Linux. PeopleSoft*, for example, has made a significant commitment to Linux, porting 170 applications to the platform this year, and SAP* has been enabled on Linux for some time now. Overall, we have almost 2,000 ISVs today who are enabled on IBM middleware on Linux.

Q: Last year, you introduced DB2 Integrated Cluster Environment. How's that going?

GS: The IBM DB2 Integrated Cluster Environment is a blueprint for deploying DB2 Linux clusters. It's based on the IBM Linux Cluster 1350 offering, which provides a complete Linux cluster/hardware platform with all the pieces and parts fully integrated. It leverages DB2's ability to scale out in that environment.

We have major customers, like Herzberg, using DB2 ICE configurations, but that's just of the tip of the iceberg. Our Linux story goes well beyond this one offering.

Q: So, what else is new for DB2 on Linux?

RP: DB2 Stinger will have enhancements for faster transaction performance and better availability. For example, we'll have High Availability Disaster Recovery, or HADR—

a data replication feature that provides high-availability solutions for both partial and complete site failures. DB2 Stinger also adds additional autonomic features to increase the ease of managing the database, with tools like the Partition Advisor I mentioned earlier and the Design Advisor. It will have better integration with Rational XDE to provide better tools to data architects. DB2 Stinger has first-class integration into popular Integrated Development Environments (IDEs) to ensure that developer productivity is as high as that of the database administrators (DBAs) that rely on DB2.

And we've been working for months with the key Linux distributors to exploit the new 2.6 Linux kernel, so that DB2 is ready when those distributions include that kernel.

Q: Oracle seems to have shifted their business focus to Linux. Is IBM doing the same with DB2?

GS: I think most people know IBM has been an early supporter of Linux and continues to demonstrate leadership on this platform across all of our middleware products. DB2's been available on Linux for more than five years now.

As customers move to Linux, we're finding that they want to re-evaluate their middleware infrastructure decisions, even re-evaluate past vendor relationships. This provides us the opportunity to work with them on a complete middleware strategy to help them become an on demand business.

RP: It's really important to understand that a seamless flow of information across the enterprise is a critical element of an on demand operating environment. Businesses are striving to increase their productivity and get more leverage and value out of their IT investments. In today's world this often means focusing horizontally across business processes and applications and even outside of the firewall. We live in a heterogenous world and we can't expect customers to rip-and-replace their data management infrastructure to achieve this type of integration. A great example of integration includes the work we did as a vital part of a successful solution for the USTA (see the "IBM DB2 for Linux" sidebar on page 48).

Linux is a great unifier because it runs across all of IBM's hardware platforms. DB2 was designed to exist in a heterogenous world. Linux is an opportunity IBM fully intends to capitalize on for the benefit of our clients and partners.

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The Benefits of BladeCenter

Reducing costs, increasing flexibility

IT executives are always faced with the challenges of reducing costs and complexity and maximizing the utilization of existing technology. And they have to do this while trying to serve clients better, as well as be competitive and responsive to their company's business strategies. They're also dealing with computer installations where change is frequently occurring. Change refers to changing customer needs, technology improvements, etc.

Making IT environments more flexible and responsive are both hardware and software issues. Technologies such as Linux*, blade servers and grid computing, and initiatives such as on demand computing are being used to assist IT executives in facing their challenges. And it's no surprise that IBM is an industry leader in developing and deploying these technologies. This article focuses on Linux and IBM* @server BladeCenter* and how they're being used to help reduce cost and complexity and give IT managers the flexibility they require.

BladeCenter Technology

A blade server is a circuit board populated with one or more processors, usually Intel*, memory, network interface connections and an operating system (OS), often Linux. Blades slide into a server chassis contained in a rack-mount cabinet. A full-size 42U rack, where 1U equals 1.75 inches of height, can often hold several chassis. Power supplies, fans, cabling and other components normally included with a server are shared by blade servers in a chassis. Component sharing means that many processors, and hence large amounts of compute power, can be made available in a small footprint at a competitive price.

IBM has one of the broadest blade server offerings on the market today with BladeCenter. A single BladeCenter 42U rack can hold six 7U chassis into which Intel's 32-bit architecture (IA-32) blades and POWER* processor blades can be plugged. Each 7U chassis holds 14 two-way blades for a total of 168 processors per rack.

Today, IBM offers IBM @server xSeries* HS20 blade servers containing one or two Intel Xeon* processors with up to 8 GB of memory and up to 80 GB of Integrated Development Environment (IDE) storage. An optional SCSI storage-expansion option is available that supports up to 147 GB of hot-swap SCSI storage. IBM recently announced the four-way Xeon processor-based HS40 blade server. Each 7U chassis can hold seven four-way HS40 blades (or 28 processors) for a total of 168 processors per 42U rack.

The IBM @server BladeCenter JS20 contains two 64-bit Power PC* 970 processors with up to 4GB of memory and up to 80GB of IDE storage. Linux and Microsoft* Windows* can run on the Xeon processor-based blade servers, and Linux and AIX* can run on the POWER blade servers.

IBM recently announced the BladeCenter T chassis that supports both the HS20 and HS40 blade servers. Because the same blades can be used in either BladeCenter or BladeCenter T,

ILLUSTRATION BY MIKE HOIUM/SLOWDOGSTUDIOS.COM

BY BILL CLAYBROOK, HARVARD RESEARCH GROUP

telecommunications clients may get a lower cost model based on enterprise volumes. The T chassis is specifically designed for the telecommunications industry and is 20-inches deep so that it can fit into existing Telco infrastructure. Forty HS20 blades (80 processors) or 20 HS40 blades (80 processors) can be packed in a Telco 84-inch rack.

BladeCenter T is designed to be compliant with Network Equipment Building System (NEBS) Level 3 and European Telecommunications Standards Institute (ETSI). Optional Gigabit Ethernet switch modules and Nortel Layer 2 through 7 (L2–7) Gigabit Ethernet switch modules are available for BladeCenter T. These switches simplify incorporating BladeCenter T into existing network infrastructures.

In late April 2004, IBM announced that Cisco* Systems' Intelligent Gigabit Ethernet Switch Module (IGESM) for BladeCenter would be available, and in May 2004 a Brocade* switch was also made available for BladeCenter. The Cisco switch enhances BladeCenter's value proposition by seamlessly interfacing to customers' existing data networks through the use of Cisco IOS and industry-pervasive System Network Management Protocol (SNMP)-based management tools such as CiscoWorks. The Brocade switch provides BladeCenter users with two new embedded Brocade switch modules—Brocade Entry Switch Module and Brocade Enterprise Switch Module. These two Brocade switch modules satisfy a variety of storage area networking (SAN) needs that range from small Brocade SANs to larger, more demanding Brocade SANs. The two Brocade switches help reduce complexity and increase SAN manageability.

Like other switch modules (such as Nortel switches) available for BladeCenter and BladeCenter T, the Brocade and Cisco switches relieve the need to switch network infrastructure when BladeCenter and BladeCenter T are incorporated into an existing infrastructure. With rare exceptions, all switches (Ethernet and Fibre) work with both BladeCenter and BladeCenter T. In June 2004, BladeCenter will have the ability to support peripheral component interface (PCI) cards through the use of SMARTEAM P Integration (PEI) that was introduced with BladeCenter T.

BladeCenter is in Sync with Data Center Trends

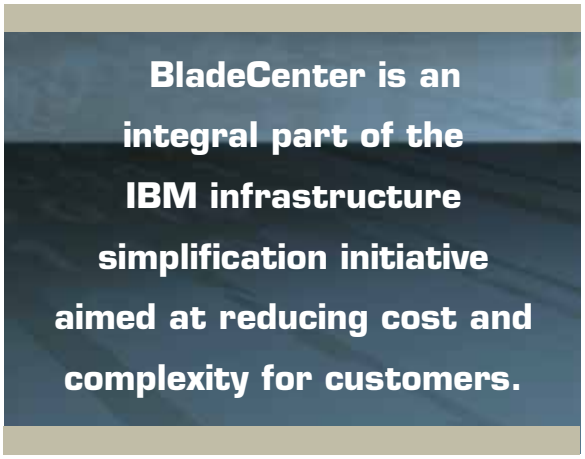
In the past several years, enterprises have increased the number of network devices in their data centers, providing needed functionality while increasing management complexity. Today, IT managers and CIOs are seeking to simplify their data center topologies while cutting costs and creating a network infrastructure that's secure, intelligent,

easy to manage, always available and capable of providing service to customers on demand.

There are several trends in the data center worth watching. They include:

- Cost savings with industry-standard servers.
- Expanded use of open source technology, especially Linux and other open source products such as Apache.
- Controlled spending for new hardware and software.
- Server consolidation—replacing many smaller servers with one or more larger servers.
- Movement to standards, generally resulting in lower costs and productivity increases.
- More compute power in smaller footprints.
- Process automation.
- Increased network intelligence.
- Increased scalability requirements.

BladeCenter is in sync with data center trends. The BladeCenter solution supports reduced downtime through application-level health checking, application failover, blade failover, chassis failover and application load balancing. In addition, BladeCenter provides enhanced security through intrusion detection, prevention of denial of service attacks and virtual IP addressing.



Two questions about blade servers that still linger for some blade suppliers are the availability of blade management software and the availability of independent software vendor (ISV) applications on blades. In the past year, IBM has taken giant steps to direct attention to these two issues: IBM Director for BladeCenter and Cluster Systems Management (CSM) on the management side, and significantly increased ISV support on the applications side.

From 2002 to 2003, blade server revenue jumped by more than 500 percent, according to research group IDC. While sustaining this rate of growth isn't expected, blade server revenue is growing rapidly. IBM leads with about 40-percent share of blade revenue, followed by the usual competitors.

Cost Competitive

High density of processors and memory are the BladeCenter features that often attract the most attention from prospective buyers. When evaluating the relative costs associated with server acquisitions, however, several cost factors should be considered:

- Costs of servers and racks.
- Cost of cabling.
- Costs of networking equipment and storage fabric.
- Cost of OS licensing.
- Costs of power supplies and cooling.
- Cost of floor space.
- Cost of system administration.

BladeCenter systems are frequently less expensive than standalone servers. (For an IBM hardware/software cost analysis for BladeCenter vs. conventional xSeries and Opteron servers, see www-1.ibm.com/support/docview.wss?uid=psg1MIGR-52937.) The largest costs for deploying new computing capabilities are the costs of servers, floor space and system administration. When compared to deploying standalone rack-mounted servers with comparable compute power, blades, in particular BladeCenter, are often big winners with respect to cost.

High density means that an IT manager can pack more compute power in a given space with blade servers than with standalone rack-mounted servers. This leads to lower facility costs. Blades themselves have no particular advantage over traditional 1U and 2U servers with respect to OS license costs.

BladeCenter systems share power supplies and cooling fans and remove other duplicated components found in traditional 1U and 2U servers, making the individual blades more cost-effective. This also contributes to lower power and cooling costs. Properly designed blade server chassis, such as the BladeCenter chassis, and lack of bothersome cabling on the floor can lead to lower management costs than racks of conventional 1U and 2U servers. These features of BladeCenter systems can lead to a competitive advantage from a price/performance point of view over compute farms of most traditional 1U and 2U servers.

BladeCenter is Important to IBM Customers

Various processor architectures and OSs can run in the same BladeCenter rack. Today, Intel processor-based blades running Linux and Windows and POWER blades running Linux can coexist in the same BladeCenter. Later, AIX will be supported on POWER blades. This provides IBM BladeCenter customers with flexibility unmatched by IBM competitors. It also provides them with the opportunity for investment protection, which involves the notion of how often an enterprise has to spend money to maintain its competitive edge. The ability to

easily reprovision blades using IBM Director and tools that can be integrated with it makes BladeCenter especially appropriate in situations where workloads are growing and changing, sometimes daily, and where load balancing among servers is possible.

BladeCenter is an integral part of the IBM infrastructure simplification initiative aimed at reducing cost and complexity for customers. When combined with IBM @server zSeries* systems, BladeCenter systems can help reduce the number of physical computing tiers to a much simpler architecture—BladeCenter systems for compute-intensive, scale-out requirements, and mainframes for large building-block, scale-up requirements. The resulting architecture can help generate cost savings and create a more flexible environment designed to be responsive to changing business dynamics.

BladeCenter and VMware* allow more than one application to run on a single blade. And because VMware virtual machine (VM) can span two processors, it allows a virtual symmetric multiprocessing (SMP) server to be created out of multiple two-way blades. This provides a form of scale-up with highly integrated processes.

The Citrix* MetaFrame Access Suite is enterprise software that presents access to many applications by large numbers of enterprise users. Citrix MetaFrame, when made available on BladeCenter, running various OSs (Linux and Windows today, and AIX in the future) on multiple chip architectures (Intel and POWER), provides an integrated and consistent access infrastructure for deploying and administering hundreds of applications and delivering them to employees anywhere on just about any type of connection.

When the IBM on demand architecture is combined with Cisco's Business Ready DataCenter solution, users can reduce data center operational costs by using self-managing, autonomic computing technologies to simplify the management of IT infrastructures. This includes consolidating servers and networking through the use of BladeCenter with the Cisco Systems IGESM and consolidating storage devices using the Cisco MDS 9000 SAN switch for storage management and virtualization.

Assessing Your Environment

Today, two-way blade servers are very good for Web-serving applications, Linux High Performance Computing (HPC) compute nodes, e-mail/collaboration applications, business applications such as SAP*, supply chain management (SCM), hosting databases and physical server consolidation. BladeCenter generally provides cost advantages over IBM rack-optimized servers because of the low cost of blades, high density and lower administration costs. In the future, four-way blades such as the new HS40 will provide the capability for huge amounts of compute power in a small footprint.

While there are many reasons why customers should choose BladeCenter over other rack-oriented solutions, there are some environments where other IBM rack servers would be a more suitable fit—such as environments in which a small number of servers are required. A BladeCenter chassis is required for a single blade; it isn't cost effective to use BladeCenter unless a chassis is at least half-full.

There are additional situations in which other IBM rack server alternatives should be used. These include cases in which large internal storage is needed (BladeCenter is limited to 80 GB of IDE or 147 GB of SCSI internally), and redeployment of old servers is important (reuse of blades requires that a chassis be redeployed with the blades).

Today, IT managers and CIOs are seeking to simplify their data center topologies while cutting costs and creating a network infrastructure that's secure, intelligent, easy to manage, always available and capable of providing service to customers on demand.

Conclusions

BladeCenter provides flexibility and cost savings that other blade server vendors are struggling to match. And IBM isn't just offering hardware. It's incorporating BladeCenter into initiatives and programs such as infrastructure simplification to provide added value for its customers. In the near future, customers will be able to run AIX, Linux and Windows in the same BladeCenter rack, giving customers added investment protection and flexibility.

Bill Claybrook *is vice president, Linux Strategy of Harvard Research Group, a marketing research firm that focuses on Linux, open source software and commercial grid computing. Bill has more than 35 years of experience in the computer industry, with positions as software development director, chief architect and director of technology, and professor in software engineering. At Harvard Research Group, Bill performs primary research and helps marketing organizations with new product offerings, market strategies and analysis.*

THE POWER OF Linux

Opening eyes with open standards

By James Mathewson

When the Association of Moving Image Archivists (AMIA) needed a solution to the film preservation crisis—half of all film before 1950 is lost and the rest is fading fast—it gathered tech-savvy researchers from across the country to solve the problem. A collaboration with the Library of Congress (LoC), the National Science Foundation (NSF) and three universities led to the development of the Moving Images Collection (MIC) (http://mic.imtc.gatech.edu/index.php), a site that brings together thousands of groups that preserve, archive and consume moving images.

A collaboration of this scope required the most open and standard technologies available. A team of technologists from the University of Washington, Rutgers University and Georgia Institute of Technology chose Linux* on POWER* as the foundation for the project. "I've always had good success with AIX* on POWER," says Jim DeRoest, assistant director of computing and communications at the University of Washington and co-principal investigator for the NSF grant. "Because of the NSF grant, cost was an issue, so we went with SUSE LINUX and a variety of open source and free tools, such as Postgre SQL and IBM* Directory Server, all running on IBM pSeries* machines."

Once the pSeries servers at the University of Washington and Rutgers University were installed, the value of open standards began to shine through. "We had no experience with Linux before this installation," says Grace Agnew, associate university librarian at Rutgers and the principle investigator for the NSF grant. "But we were pleasantly surprised at how easy it was. We had the servers up and running within a week. It was trivial."

Linux on POWER collaborations like this are cropping up all over the world. The combination of cost, performance, ease of migration and open standards make Linux on POWER the choice for a growing number of developers. Brian Connors, vice president of Linux on POWER technologies for IBM, says since Linux on POWER was introduced in the third quarter of 2003, its growth has doubled every quarter.

Connors emphasizes that Linux is a relatively young platform compared with the elder statesman UNIX*. According to IDC, Linux held only 16 percent of the 2003 server market, compared with about 40 percent for UNIX. Connors points out that those numbers are misleading because many enterprises use UNIX on a primary partition with Linux on secondary partitions—a configuration that IDC counts as a UNIX server. Still, IDC predicts that by 2008, Linux will close the gap (even as they currently count server operating systems (OSs)), capturing 30 percent of the server market.

Connors says IBM has several strategic initiatives to help close that gap, both in hardware and software. "Some of the enhancements in POWER5* make up for the immaturity of Linux versus UNIX," he says. "And the IBM Linux Tehnology Center has been instrumental in contributing to the 2.6 kernel, which will allow Linux to scale up to 16 full processors. When you add POWER5's subprocessor partitioning capability, it brings Linux closer to UNIX."

Recent Linux on POWER announcements will accelerate the closing of the gap. "With the advent of the recently released IBM @server BladeCenter JS20 models, we expect Linux on POWER to be a strategic investment for a growing number of customers," Connors says. "The combination of POWER processors

PHOTO BY JURGEN VOGT

Main Reading Room in the Library of Congress

and the 2.6 Linux kernel will help Linux on POWER close the gap with enterprise-level hardware."

Operating System Cost Wars

The cost issues in Linux's favor are hard to quantify. Though distributions like SUSE and Red Hat aren't free, most of the Linux tools are free and open. For the MIC project, for example, it represents tens of thousands of dollars in initial cost savings.

But some studies claim that the total cost of ownership (TCO) for Linux is higher than it is for competitors such as Windows* NT because of the higher cost of qualified labor. The studies suggest that because Windows NT administrators are more prevalent than Linux administrators, NT administrators will be cheaper and easier to recruit, thus lowering server costs over time.

Douglas Welsh disputes those studies. Welsh is a lecturer and senior professional technical staff member for the department of molecular biology at Princeton University. The department is host to a sophisticated genetic analysis database accessed by researchers all over the world through the Web—running Linux on POWER. Welsh, the project manager for the database, says one of the main benefits to running Linux is readily available talent.

"Linux is now the standard for teaching computer science and programming at the university level," he says. "The people we hire have been trained and are familiar with Linux systems. That makes it cheaper and easier to administer Linux over time."

Some studies, including one as early as July 2002 conducted by the Robert Frances Group (RFG), confirm Welsh's position. The RFG study shows that, on average, one Linux administrator can administer significantly more servers than NT administrators can. Taking a host of variables into account—initial cost, labor cost, administrators per server processor and relative security—the RFG study concluded that the three-year cost of a 100,000-hit processing unit was significantly different among three systems: Sun* Solaris* costs $561,520, Windows costs $190,662 and Linux costs $74,475. The study was conducted on x86 systems to control for hardware variables. Considering Linux's 30-percent annual growth rate, Linux should cost less in 2004 than it did in 2002.

Chip Performance Wars

The abundance of inexpensive x86 hardware makes it difficult to compare the costs of POWER5 systems to x86 systems such

as the IBM xSeries* servers. Where POWER shines is in the workloads it can assume per processor. With its mature 64-bit architecture, POWER5 compares favorably with Sun SPARC* on performance, making comparisons to x86 costs similar to apples and oranges.

Connors says the overwhelming market share advantage for 64-bit processors goes to POWER. "Sixty-four bit POWER has been around for five generations, whereas other x86 64-bit processors, such as AMD's Opteron*, are in their first generation," he says. "There are a lot of ways this maturity plays out. For example, Opteron only scales to two-way.

"A better comparison for Opteron is HP's Itanium* 2—Opteron is the clear choice there," he adds. "Itanium is dead. They merely took what's been there for 15 or 20 years and added some extensions. That's why HP only shipped maybe 10,000 units, whereas we've shipped millions of POWER chips in its eight years on the market."

When you consider how much more work a single POWER5 processor can handle versus a single x86 processor, you begin to see savings in server consolidation and performance improvement. Welsh, who upgraded his Princeton genetics analysis database from 32-bit x86 to 64-bit POWER4* processors, says the performance jump was "probably an order of magnitude."

When you add in multithreading, subpartitioning and other performance enhancements in POWER5, it becomes clear that POWER5 is in another league altogether. "The end result is a two-by performance improvement over Linux on 64-bit x86," Connors says. "And while SPARC continues to lose ground, POWER grows 34 percent year after year."

Migrating Penguins

The Princeton genetics database and the MIC project have one thing in common: The technologists leveraged expertise in other platforms or architectures to seamlessly move into Linux on POWER. DeRoest's team at the University of Washington applied AIX on POWER expertise to Linux on POWER. Agnew's team at Rutgers applied Sun Solaris on SPARC expertise to Linux on POWER. And Welsh's team at Princeton applied Linux on x86 expertise to Linux on POWER. The central theme is that Linux is close enough to UNIX and runs on enough common platforms that it makes for an easy migration path.

Welsh says the upgrade from Linux on x86 to Linux on POWER was transparent. "One of our main goals was to get a platform that ran a 'standard' version of Linux (Red Hat, SUSE, etc.) rather than a customized, off-the-beaten-track version," he says. "That was one of the primary reasons we chose IBM. From our developers' perspectives, the technology is the same, just the box is different."

On the MIC site, collaboration drives much of the move to open standards. The site consists of a union catalog and an archive directory, which together comprise the largest database of moving images in the world. The union catalog, under development at the Rutgers site, brings together hundreds of thousands of records of moving images—films, videos, newsreels and the like—with a description of the owners of those archives. It enables archive owners to write the metadata descriptions of their film or tape resources. The directory, under development at the University of Washington site, is a Lightweight Directory Access Protocol (LDAP) technology that allows users to search and retrieve the information at the union catalog, whether or not they can access the actual archives. In addition, the Georgia Tech development focuses on the Web portals and other front-end elements of the site.

Agnew says a main driver in the choice of Linux on POWER was to pave the way for future work on the project. "For a project like MIC that could potentially scale into 3,000 different organizations with multiple archives or collections with millions of individual listings and millions of hits per month, we needed something that could scale," she says. "But we also wanted something that we could easily migrate and replicate, if necessary."

Jane Johnson, MIC project manager and the overseer of the project for the LoC, says, "I continue to be amazed by how well the project goes. The standards-based approach has enabled this to run as smoothly as it has."

A cardinal rule of collaboration is to establish common ground before getting down to business. Power Architecture* runs on just about every platform, from Nintendo game cubes to Apple* Macs* to midrange @server i5 and @server p5 servers to large supercomputer clusters. Linux runs on everything from embedded systems to mainframes. Because almost everyone has experience using either

POWER or Linux, it becomes the common ground that enables large-scale collaboration to succeed.

"The whole strategy around open systems revolves around customer choice," Connors says. "Linux is the unifying architecture for an array of customer choices."

Open Horizons

Clearly, IBM has put Linux on POWER at the core of its open-standards strategy. In May, *Forbes Magazine* reported that IBM is investing billions of dollars in Linux development. According to Forbes, more than 12,000 IBMers work on Linux at least part time, and IBM has invested millions of dollars in Red Hat and SUSE. It has also spent millions more to co-found and fund the IBM Linux Lab, and has opened 20 Linux training centers in developing countries.

The following new products related to Linux on POWER have been released in just the first seven months of this year:

- The POWER5 chip, a significant upgrade from POWER4*, which IBM showed off at a special Power Everywhere* conference running on a multitude of devices and form factors.
- The IBM @server BladeCenter* JS20, at a little more than $2,500 per blade, competes with Intel*-based blades on price with a POWER5 under the hood, running either AIX, Linux or both.
- @server i5 servers, based on the OS formerly known as OS/400*, which also run Linux.
- @server p5 servers, based on the AIX OS, which can run Linux either in partitions or natively.

While acknowledging that Linux on POWER is central to IBM's future, Connors is quick to point out that giving customers choices also means continuing to develop the wide range of platforms and product families that have always been a strength of IBM. "We're going to continue to invest heavily in AIX itself, and in @server i5 systems and in the z/OS (which also runs Linux) and xSeries in Intel or Opteron," he says. "But for new consolidation projects or new applications, customers can make a strategic investment in Linux on POWER."

In the process, customers can join the growing legion of Linux collaborators around the globe.

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OPEN

Grid computing and Linux team up

BY JUDI ADOLINO

When Hewitt Associates, the global human resources outsourcing and consulting firm based in Lincolnshire, Ill., wanted to contain expenses while boosting critical business analytics operations on its mainframe, it opted for a grid computing solution that allowed it to see a nearly immediate improvement—10 percent in processing response times with the first application deployment and a 90-percent cut in the cost of complex pension calculations.

But it was the use of Linux* and an open architecture that enabled Hewitt to easily deploy additional applications that helped it maintain a reputation as a speedy provider of data to customers.

Grid computing, which helps organizations optimize and share resources by virtually tying together distributed and heterogenous computing and data resources, doesn't require a Linux underpinning. But increasingly, the two are being used together to enhance technology performance and scalability and reduce cost structures. Particularly when coupled with an ultra-dense, highly advanced server blade environment like that at the heart of Hewitt's grid solution, Linux provides another layer of business value.

"Grid allowed us to marry these technologies—Linux, mainframe and blades—in a cooperative model that delivers significant benefit for Hewitt and our customers," says Hewitt's CIO.

At the industry analyst firm IDC, John Humphreys, senior analyst for global enterprise server solutions, agrees. "Modular server platforms provide an ideal environment because of the scalability, flexibility

architecture

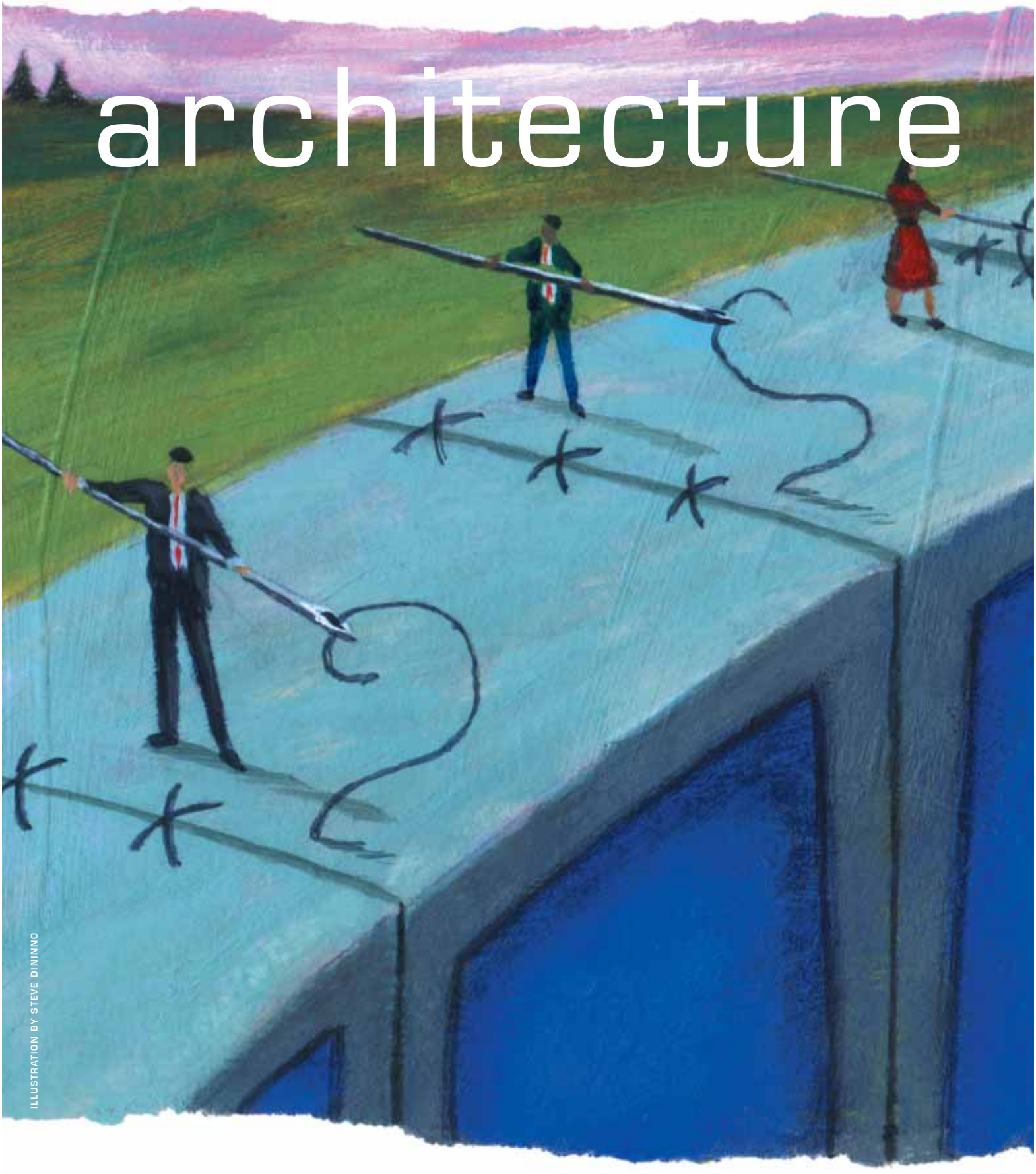

ILLUSTRATION BY STEVE DININNO

and licensing model of the Linux operating system," Humphreys says. "Not only do we see enterprise customers continuing to adopt Linux for their general purpose standalone servers, but these customers have even a stronger propensity toward Linux as they migrate to server blades."

A large financial services institution, was among those ready to adopt an open environment. The company was interested in creating an infrastructure to support increased trading volumes and reduce the time-to-results of risk reports in fixed income and capital markets. The IBM solution to the company's analytics challenge included Linux on blade servers. Risk report turnaround improved from as much as 15 hours to mere minutes on a real-time basis. The solution also enabled four times more trading volume and 25 times more modeling simulations. The complexity of the jobs rose, as did the resiliency of the applications.

"We haven't scratched the surface yet for how we envisage using grid computing to meet our ongoing product development and trading activity," says the company's head trader.

The use of grid computing to tackle business analytics is a natural outgrowth of the research and development adoption that heralded the emergence of the technology a few years ago. Where the early adopters were universities and research labs, the new trend is toward commercial enterprises with similar high-computational needs.

Particularly when coupled with an ultra-dense, highly advanced server blade environment like that at the heart of Hewitt's grid solution, Linux provides another layer of business value.

Royal Dutch/Shell is a global group of energy and petrochemical companies operating in more than 145 countries. Exploration and production, often referred to as "upstream" is the foundation of the petroleum industry—strategically important, but very expensive to undertake. The company challenged IBM to help it improve the accuracy and speed of its summarization and scientific modeling applications for seismic data. It also wanted a more robust, scalable infrastructure that could flex when volumes fluctuated. With Linux and the open standards Globus Toolkit, IBM also enabled the environment for easy integration of existing software.

"Grid computing is important to Shell because it offers the potential to create a truly unlimited resource with a uniform interface to a variety of services. This is a significant opportunity for Shell to engage its independent companies in closer cooperation," says the principal research physicist at Shell International Exploration and Production B.V. As Shell found, greater collaboration is an offshoot of a virtualized environment—something that's essential in global research and development, but valued in any organization.

Another example is the massive China Grid project sponsored by the China Ministry of Education to advance research, scientific and education capabilities across China's leading universities. Initially designed to link a dozen universities, the grid and Linux solution will eventually stretch to nearly 100 universities across the nation, touching more than 200,000 students and faculty and making it the largest grid project in the country and among the largest in the world. China's university system hopes to save on development costs, since each school will focus on its area of expertise and tap into other applications as needed via the grid, and share computer power, storage capacity, applications, knowledge and information resources.

Interestingly, while grid is well-suited to these huge projects, it's just as beneficial to a medium-sized organization. An East Coast-based college already noted for its leadership in using technology to enhance teaching and learning, the college wanted a more stable, resilient and powerful platform to support internal operations as well as an instructional lab for students interested in emerging technologies. Consolidating servers onto a Linux mainframe partitioned into hundreds of virtual machines (VMs) not only lowered costs for license fees and maintenance, but it also created a more resilient grid environment.

For many of IBM's customers, the vision of e-business on demand* resonates, and they're making strategic decisions that pave the way toward achieving an integrated, open, virtualized and autonomic operating environment. By building on an open platform with open source Linux and grid open standards like Open Grid Services Architecture (OGSA), customers can leverage emerging technologies to become more responsive, competitive and, ultimately, more successful.

Judi Adolino *is an award-winning corporate communications professional, with a focus on leading-edge technology and related services. She is currently the worldwide marketing manager for Linux and Grid services in IBM Global Services' emerging business group. Judi can be reached at vdjadoli@us.ibm.com.*

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Quotable Quotes

Customers explain the business benefits of deploying Linux

Shainin LLC

"With our current server, you have to buy the program, and then you have to buy client-access licenses for each user. We're a growing company, so we have to keep buying more licenses. With Open Exchange, your license is based on concurrent users. That reduces our upfront cost greatly.

"The new system will be more secure, too. Our users have no idea how many problems I deal with when it comes to our previous operating system and people trying to get into the system. We have increased the reliability of our data and applications.

"We need to stay on top of security, and the switch to Linux* is going to make that happen.

"Our company has the capability to double in two years. Our new system is more than adequate for that growth, with room to spare. In my opinion, this puppy does not ever have to go down." **—Charlie Crabtree, IT Technical Manager, Shainin LLC, Washington**

Pep Boys

"By using open technology, Pep Boys can expand as the business requires. This flexibility will allow Pep Boys to better serve its customers and enhance its business. With the added stability and efficiency of the new technology, we will improve our daily operations and our customer service, as well as our ability to develop systems and grow our company. This project allows Pep Boys to create a solid base from which to operate and expand."

—Mike Elmore, CIO, Pep Boys, quoted in a Pep Boys news release on new technology to be installed in all 595 stores and service centers that will take advantage of the open source Linux operating systems.

America First

"Rapid acceptance of online services means that our members now expect services like home banking and bill paying to be available anywhere, anytime. Using our z800 server to host the new S2 suite on Linux* makes us more responsive and resilient. By boosting our ability to deploy new services, we can respond to customer demands effectively without investing in new hardware."

—Dan Williams, Vice President of Information Systems, America First

Banca Popolare di Milano

"With the implementation of this new project, we aim to serve all of our clients better through whichever channel each of them prefers to use. We are now able to keep our customers informed in an interactive way about all the new products and initiatives they are interested in. Ultimately, this solution enables us to offer 'tailored' solutions on demand."

—Ernesto Paolillo, General Manager, Banca Popolare di Milano, Italy, on the bank's decision to use IBM* middleware and Linux to implement Europe's first fully integrated, multi-channel banking solution.

The Chronicle Herald

"Our employees convinced me to add Linux* into the mix. It proved itself so well that we've ended up using it for many of our applications. Because we publish every day, the reliability of Linux is extremely attractive. And when IBM made a specific commitment to support Red Hat, hardware support for Linux servers became available, too. At that point, we decided that IBM* servers would be our Linux platform because the support is excellent. IBM's corporate commitment to Linux is outstanding, and our experience has been virtually trouble free.

"Our organization is still evolving after 180 years as a successful newspaper business. And with IBM BladeCenter* and Linux, we'll continue to meet challenges by being responsive to our employees' needs for effective and resilient technology solutions."

—Paul Williams, Director of Information Technology, The Chronicle Herald, Canada

ICMB, the National Center for Scientific Research

"Scalability is not usually an issue when we invest in new hardware. We need always to be at the cutting edge of technology, and we find that it is almost always more cost-effective to start from a blank canvas when we refresh systems because the IT market moves so rapidly, making old technology obsolete.

"The p630 server offered us the best performance potential for our limited budget, and the fact that it runs Linux* was also a key advantage—porting the software to this operating system was actually easier than rewriting it for a different variant of UNIX* would have been. In addition, we already had in-house experience with Linux, so selecting the p630 server allowed us to avoid introducing a new skill set."

—Dominique Bernard, Research Scientist at ICMB, the National Center for Scientific Research, France

Bandai

"Not using Linux* means you are depriving yourself of a high level of security. And it's also strategic for the future. Companies may end up paying a high price for not preparing for Linux as of today. We are benefiting, via the Firewall under Linux, from the reliability of the IBM* iSeries* (server) to which our Notes* server is connected. I have every confidence in this platform. Its simplicity, reliability and running costs beat an NT* server hands down. Its integration means there is no need to reinstall the system each time we add a disk, and we don't have to shut it down for maintenance operations. I've got all the advantages of both the iSeries (server) and Linux. Perfect!"

— Benoît Roux, Head of IT at Bandai, France.

Translational Genomics Research Institute

"We knew that Linux* would provide the open, reliable computing platform that we were after at an attractive price. IBM provided hardware and Linux software installation support for the Cluster 1350. With IBM consultants coordinating the setup, we were able to focus on our core research activities."

—Dr. Edward Suh, CIO, Translational Genomics Research Institute

Swisscom IT Services

"Going live with a virtual server in two hours instead of four weeks—that's a big advantage to Linux* and z/VM* on the IBM* zSeries* (server)."

—Boris Boetzel, Head of Systems Engineering, Swisscom IT Services

Intermountain Health Care

"The Linux* partition today serves as a test environment for assessing performance, ease of administration and security.

"We had really gotten to a spot where we had too many servers. Not only was the environment expensive, difficult and time-consuming to manage, but also many of the servers were under utilized, making inefficient use of resources. Additionally, IHC's environment didn't support the organization's growing need for Linux. The organization wanted to test Linux-based applications and formulate a strategy to host these applications in a production environment as the open standards-based operating system becomes more prevalent in the health care industry."

— Fred Holston, Director of IT Architecture, Intermountain Health Care

Lawson Products

"We saw Linux* on the mainframe as a way to extract more value from our existing assets, while at the same time avoiding the proliferation of servers. The fact that we could deliver such a valuable service at such a low TCO (total cost of ownership) really sent the right message to our management."

—Frank Snyder, Manager of Technical Support, Lawson Products

DAKSOFT

"We were interested in leveraging the available Linux* operating system and our existing skill base. Our Linux skills were easily transferred to Linux on the iSeries*.

"A representative from IBM* Global Services worked with us over a two-day period to perform the necessary configurations to create the Linux environment. After that, IBM simply turned the system over to us and we proceeded with installing the specific applications. The fact that we were running Linux on an iSeries partition was hardly noticeable. We dealt with our standard installation screen and went through the same process we were used to with an Intel* chassis. It felt exactly the same as working on any other Linux box. The process was virtually flawless."

—Harold Steele, Open Source Implementation Manager, DAKSOFT

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