WHITE PAPER

Linux in the Mainstream: Growing Deployment of Business-Critical Workloads

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IDC OPINION

Linux has established a firm presence in the industry, and today it is a viable platform for supporting the deployment of business-oriented application workloads. This progression has led Linux to a role as a platform for business-critical workloads being deployed on a broad variety of hardware architectures.

☑ Linux has steadily moved from what was initially considered to be a fringe solution to a mainstream solution considered mature enough for noncritical IT infrastructure tasks, and today it is seen as a platform suitable for new deployments of enterprise application software. Customer deployments have grown to include a variety of workloads, typified by health insurance provider Highmark Inc., which uses Linux to host multiple business applications and database environments.

☑ As Linux is the fastest-growing operating system when measured on the basis of percentage growth of new unit subscriptions and revenue growth, it is apparent that customers are finding business value associated with Linux solutions.

☑ Database workloads are growing quickly on Linux today, and related business applications will have a natural affinity with Linux as the database layer becomes increasingly pervasive aboard Linux. IDC believes that Linux will emerge as a solution for other critical solutions, including those mandating adherence to service-level and application performance commitments. Boston University does this today with its commercial database and monitoring/management tools deployed on Linux.

☑ Application software providers, including the industry's largest ISVs, have come to see Linux as a platform that is essential to support and proactively promote deployment. Today, most Unix ISVs support Linux as a new deployment vehicle.

☑ Today, customers try to minimize the number of unique platforms they need to support, on both a hardware level and a software level. Such is the approach being taken by Casas Bahia, which is leveraging the availability of Linux on multiple hardware architectures. The pervasiveness of Linux empowers customers to choose to standardize at the operating system level and select the underlying hardware based on requirements including scalability, reliability, and ability to support other operating environments in conjunction with Linux.

IN THIS WHITE PAPER

This IDC White Paper takes a look at the growth of Linux as a server operating system and how deployment form factors have changed over time. Today Linux has become a key server for supporting commercial workloads. This paper considers both workload data and the ecosystem that has grown up to support the opportunity for Linux deployments, including application software, application development and deployment software, and infrastructure software.

SITUATION OVERVIEW

Linux and Business Computing

Change Is the Norm in High Tech

The tech industry has seen many stunning changes in the past 25 years, but few can rival the dramatic change to the industry that Linux has ushered in. Much like the disruptive server operating environment products that preceded it, Linux changes the playing field in multiple ways. Two of the key attributes of Linux are the availability of multiple competitive Linux distributions and the availability of Linux on multiple hardware architectures.

The availability of multiple Linux distributions, including paid, commercially supported subscriptions and nonpaid versions that are identical or close to identical to the commercially supported distributions, means that customers see Linux as having less potential for vendor lock-in. While IDC believes that any commitment to an operating system of any sort — Linux or otherwise — constitutes a form of lock-in, the availability of alternative products that can be embraced without enormous migration costs is a significant value that Linux provides. Further, IDC sees Linux providing a cross-architecture standardization layer that no other operating system can provide.

The second benefit of Linux is more significant than it sounds at first: Linux is available on multiple hardware architectures. In fact, Linux is arguably the most broadly ported operating system that has ever existed. The operating system runs aboard every major architecture today, including, at the high end, IBM's System z and POWER Systems, Hewlett-Packard's Itanium-based Integrity product line, Sun Microsystems' SPARC architecture, and, of course, x86 platforms from a multitude of vendors around the globe.

IDC finds that many customers have two types of distributions in use, even if they are, in effect, the same product: Linux distributions that are commercially supported and nonpaid, noncommercially supported Linux. In other words, it is not uncommon for a customer to use subscription-supported Red Hat Enterprise Linux on some portion of the company's Linux deployments, but it may also use instances of Red Hat Enterprise Linux that are not covered by a paid subscription support package. It is IDC's belief that most customers are best served by using commercial subscriptions to support their Linux distributions so that IT staff can focus their expertise on business-specific value-add activities rather than supporting the Linux kernel directly. This is particularly true for Linux servers supporting business-critical workloads.

In other cases, customers will mix a commercial distribution with a closely affiliated noncommercial distribution, such as pairing up Red Hat deployments with Fedora Core deployments or CentOS deployments, or SUSE Linux Enterprise with openSUSE. The deployments of no-cost Linux distributions typically complement the paid subscription copies, but they typically will support less critical workloads.

Compared with Windows, Linux brings forward some of the favored attributes usually associated with the Unix market, where multiple commercial versions of the operating system provide good application portability across a multivendor environment, reducing the potential for hardware and operating system vendor lock-in.

Compared with Unix, Linux opened up broad access to the attractive price points and multivendor hardware solutions available in the x86 server market while preserving a Unix-like configuration, management, and reliability experience. In particular, the availability of Linux aboard commodity-priced x86 server hardware has had a detrimental impact on the traditional RISC/Unix market.

Figure 1 illustrates the growth of the Linux ecosystem through 2013. The economic meltdown of 2008 has caused a pause in growth of the overall ecosystem during 2009, but our forecasts remain strong for the long-term success of Linux and layered software solutions on the Linux operating system.

FIGURE 1

Worldwide Linux and Open Source Software Ecosystem
Revenue, 2006−2013
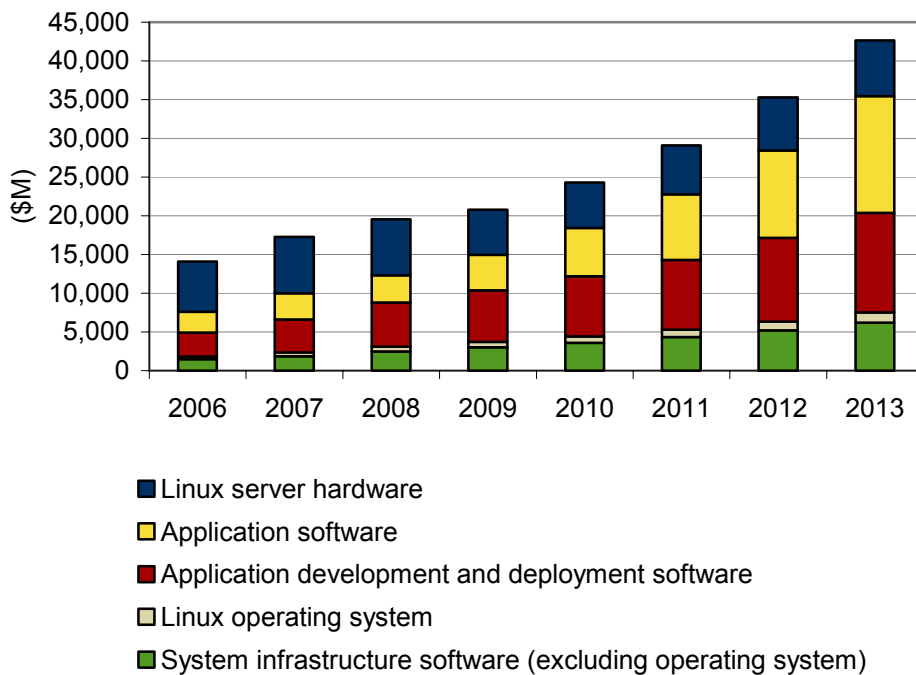
Source: IDC, 2009

Figure 1 includes the following elements:

- ☑ Linux hardware revenue, which includes factory revenue associated with the sales of servers that are sold where Linux is deployed as the primary operating system either at the factory or in the channel.

- ☑ Linux operating system revenue, which is primarily server operating environments-related revenue.

- ☑ System infrastructure software, which is defined by IDC to include systems management software, security software, storage software, as well as virtualization and clustering software.

- ☑ Application development and deployment software, which includes information and data management software (including RDBMS software), development tools, development life-cycle products, application deployment software (including application serving, transaction, and middleware software products), and data analysis software.

- ☑ Application software, which includes collaborative application software, content management software, ERP software, customer relationship management, supply chain management, manufacturing applications, and engineering applications.

Workload Relationships for Linux

Shipments alone tell only one part of the overall story. To fully understand the transitions that Linux is going through, one needs to look back at previous entrants in the operating environments market.

When Unix workstations arrived on the market in the 1980s, they were seen as a technical solution for designers and engineers. However, those users had a tendency to generate massive amounts of data that ended up being stored on a Unix file server. It took years for Unix to break into commercial use, despite being tested in such a demanding environment, and even then its breakthrough was due to the high-performance attribute and resulting price/performance benefit, not the availability of applications. Ultimately, this led to broad adoption of RISC/Unix systems. The application portfolios did in fact follow, and ultimately the Unix platform offered a compelling solution for shops that had skills to support a Unix environment.

By comparison, Windows followed a different path to mainstream adoption. Instead of proving its capabilities through high performance, the low cost of the operating system and the associated x86 hardware drove the price/performance ratio. Windows was a solution that departments could afford and could configure and manage without IT support, leading to a proliferation of Windows installations. Windows NT began shipping in 1993, and the operating system rode the wave of low-cost x86 hardware into a key role in corporate deployments. However, from an application perspective, Windows was most successful first as a print/file server and in support of collaborative workloads, specifically email.

Linux has followed a slightly different trajectory and gained its initial entry not through ad hoc departmental adoption but rather through quiet endorsement by IT professionals who initially adopted Linux before there was CXO-level approval for the technology. However, like the appeal of Windows, much of the appeal of Linux comes from the affinity between the commodity x86 server platform and the inexpensive nature of the Linux operating system. The first workloads that Linux successfully addressed have been basic infrastructure workloads that historically were supported by Unix servers or Windows servers.

Figure 2 brings forward the view of workload splits for Linux server operating environment new license shipments (paid and nonpaid combined).
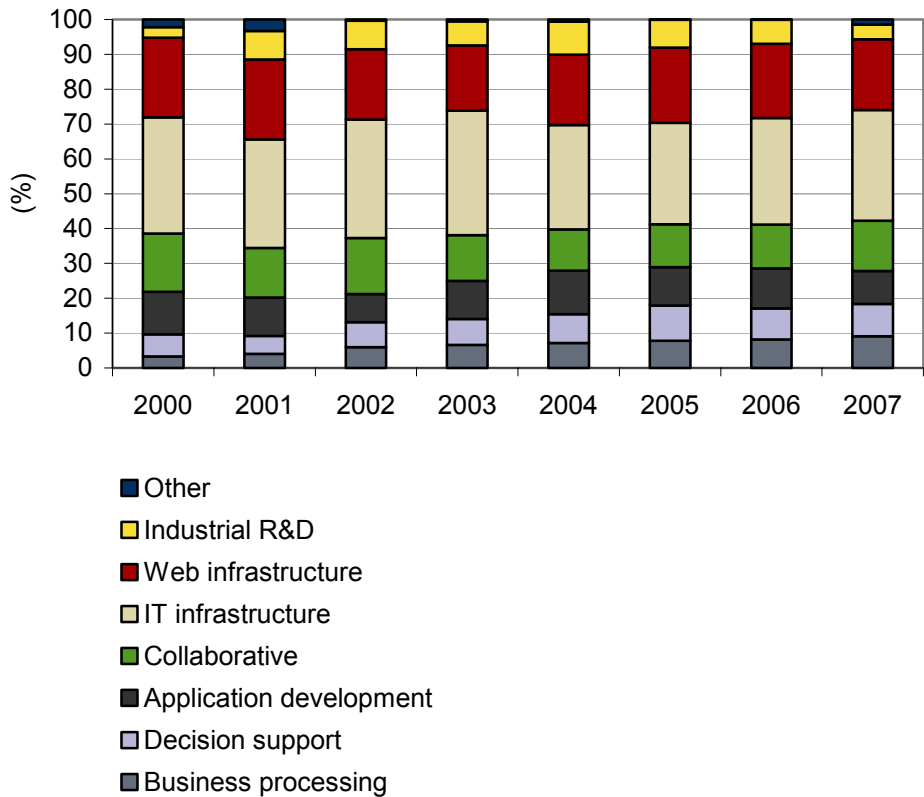
As depicted in Figure 2, the bread-and-butter workload for Linux continues to be infrastructure services, as Web infrastructure and IT infrastructure services account for more than 50% of total Linux shipments. While the number has tapered modestly during the past eight years, this workload area is expected to continue to be a key workload area by percentage and by volume for the foreseeable future.

One key growing area — key because of the significant pull-through of associated software sales and services — is business-oriented workloads. Business processing, which covers critical enterprise applications including ERP and CRM, grew from 3.3% in 2000 to 9% in 2007 and was roughly the same in 2008. In addition, the share of decision support has increased by roughly half during that same period, from 6.3% to 9.2%.

IDC believes the growth in commercial workloads is a natural evolution, one that was not possible until the basic infrastructure was in place to support those applications. Given the strong installed base of Linux as an infrastructure server, providing Web application services as well as database and related middleware capabilities, the stage has been set for continued growth of business applications on Linux.

FIGURE 2

Linux Server Operating Environment Workload Shares, 2000–2007

Legend:
- ■ Other
- ■ Industrial R&D
- ■ Web infrastructure
- □ IT infrastructure
- ■ Collaborative
- ■ Application development
- □ Decision support
- ■ Business processing

Source: IDC, 2009

Drilling down one layer deeper into the business processing category, one finds that four subcategories make up that market: ERP (32% of the business processing category), batch (28%), CRM (21%), and OLTP (19%). By comparison, the decision support category breaks down into data warehousing/data marts (70% of decision support) and data analytics/data mining (30%).

However, workload shares alone do not tell the whole story. It is necessary to look at unit shipment volume in conjunction with shares to fully understand the effect on the Linux market.

The data presented here incorporates all platforms supporting Linux into a single view. Underlying this top-level data is the expectation that the workloads depicted will vary by platform. High-end platforms such as IBM's System z and POWER Systems, Hewlett-Packard's Integrity product line, and RISC systems supporting Linux from Sun and other companies are more likely to support business-critical workloads, while volume x86 server platforms are more likely to have a higher association with infrastructure deployments. The case studies in this white paper present examples of various types of business-critical workloads.

FUTURE OUTLOOK

Some Historical Context

Linux's penetration of platforms, workloads, markets, and use cases would have been hard to predict. Looking back 10 years, IDC saw Linux as having a great deal of potential to change the dynamics of the industry, but Linux went further than we might have expected back then.

In 1999 we wrote, "The application software and middleware software community is rushing to support Linux, led by companies that compete most directly with Microsoft. IBM, for instance, has embraced Linux in a big way, shipping Linux versions of DB2, WebSphere, and its VisualAge for Java development tool during 1999. IBM's Lotus subsidiary delivered Lotus Domino for Linux just before yearend. Endorsements by major players such as IBM, Dell, and Compaq automatically raise end users' confidence levels in a given technology and help address 'lack of business application software' objections." (See *Server Operating Environments: 1999 Year in Review*, IDC #21219, December 1999.)

The transitions that followed in 2001 and 2002, with the dot-com bust, led to change in economic conditions that, when combined with the growing maturity of the x86 architecture, led to an irreversible shift in industry dynamics favoring the adoption of Linux.

Looking Forward

Multiple factors help shape the future outlook, including:

⊠ **The current economic outlook.** The incredible depth of change in the overall industry in a radically short period of time has created an environment where IT departments once again will face the relentless challenge of doing more with less, driving down costs but maintaining or improving service levels. Linux saw a boost in penetration during the dot-com bust for use to support infrastructure software workloads. We believe the current economic conditions will help boost the deployment of Linux, this time in the context of supporting business applications.

⊠ **Continued growth of high-importance workloads.** A significant portion of the business application workloads that have moved to Linux have come from Unix migrations. IDC research has found that a substantial portion of the most easily migrated workloads previously hosted aboard Unix servers have moved to Linux already. What remain are increasingly critical workloads, workloads having high expectations for availability and scalability, and workloads where application code is not easily moved or replaced aboard Linux platforms.

⊠ **Current workloads on Linux lead the way for tomorrow.** Given the high percentage of infrastructure workloads on Linux today, it is likely those workloads will continue to account for the lion's share of deployments moving forward. However, we see potential for additional growth of business processing workloads.

- **Unix won't be the sole driver** for Linux application growth. Aboard the Unix platform, business processing accounts for between 20% and 27% of new deployments. However, because the overall volume for Linux is so much higher than the overall volume for Unix, the surprising effect is that a lower percentage of business processing workloads still account for a larger number of systems. In fact, the comparison is dramatic: In 2007, Linux business processing deployments accounted for 242,000 units, while Unix accounted for only 185,000 units. This growth today is increasingly originating from organic growth of the Linux installed base.

- **Impact of virtualization.** Because virtualization and virtualization management software empowers customers to improve system availability and recoverability, virtualization software inherently helps a customer experience a better service level with any operating system. It is likely that combining Linux with virtualization software will lead to a better, more robust Linux environment — an environment better suited to manage more critical commercial workloads.

- **Impact of cloud computing.** Cloud computing serves as an extension to virtualization and will extend the value proposition that virtualization is providing today. Further, a substantial number of the first-generation cloud infrastructures that are emerging already have leveraged Linux and/or the Xen hypervisor as part of the core design. We believe that this affinity will continue moving forward, and Linux will benefit from the growing interest in cloud computing.

- **Workloads to consider deploying.** IDC believes customers should continue to look at Linux as a good candidate for new business workloads. Customers already deploy database systems and are moving forward with ERP, CRM, and other mission-critical business applications. We believe collaboration software, one of the bigger market segments where Linux plays a comparatively small role, is a good candidate for customers to consider.

CHALLENGES/OPPORTUNITIES

Challenges

- **Size and stickiness of the application portfolio.** Customers typically have a substantial installed base of applications and will weigh the benefit of a migration to Linux against the risk of the migration, the cost of the migration, and the length of payback for the migration. Unless the payback can be justified in an acceptably short period of time, the argument to "stay the course" is hard to fight.

- **Continued competition by Windows.** Microsoft has long competed for Unix migrations, and it will continue to do so. Microsoft's Unix migration initiatives are nearly as applicable to Linux as they are to Unix. While it's unlikely that a customer will migrate from Unix to Linux then consider yet another migration to Windows, if past behavior is any indication, Microsoft will be looking to tap the Linux installed base to fuel its business in the future.

- **Other competitive solutions,** including Unix on RISC and Solaris on x86, remain viable alternatives to Linux on any architecture.

Opportunities

☑ **Affinity with Unix installations.** Linux shops often have a common heritage — that of a Unix background — and given the transferability of skills from Unix to Linux, it is a natural expansion for a shop to move from Unix to Linux. Add to that the portability of applications from one environment to the other, and it not only is natural but also makes good business sense.

☑ **Linux is a key solution for most non-x86 platforms.** The graying of IT professionals with skills for supporting IBM's large systems, including the System z with z/OS and the POWER Systems running i (i5/OS) or AIX, and the lack of emerging applications that run natively on these systems make Linux a natural fit for these platforms. IT shops are able to hire fresh developer talent that knows Linux and put that talent to work on these scalable and reliable platforms.

☑ **The growth of business workloads on Linux.** Where there is market growth for applications, it is probable that the ISV community will be supporting those applications with fresh releases and new functionality to address changing market conditions.

CONCLUSION

Linux has already established a solid position in the industry and can be expected to expand its footprint in all workloads. The shift in workloads to continue favoring business-oriented applications will continue, although the magnitude of the shift on a percentage basis is likely to be outstripped by the growth of Linux itself during the post–economic crisis period.

IDC believes that Linux is a viable platform for Linux deployments favoring business workloads and believes that customers that are using Linux today should be looking at the potential for new deployment scenarios.

CASE STUDIES

Competitive Selling Using Linux Everywhere

Brazilian retailer Casas Bahia is not a typical Linux customer, but Casas Bahia is also not a typical retailer. Founded over 50 years ago, the organization evolved a unique business model to serve a market segment with innovative and flexible solutions that empower its customers to buy products they want and need.

Headquartered in São Caetano do Sul in the state of São Paulo, Casas Bahia generates US$7 billion from its 560 department stores and is one of the top retailers in Brazil. The company sells a wide variety of goods — including appliances, furniture, household goods, and consumer electronics — and is the largest mobile phone retailer in Brazil, selling more than 8,000 phones every day.

Casas Bahia's typical customer comes from lower-income brackets and has difficulty obtaining credit, but this huge customer base — 22 million — has become more diversified lately. Many of the installment payments are made at the store where the goods were acquired. The return visits increase the number of transactions surrounding each purchase and also provide additional selling opportunities and opportunity to service the customer. Transactions must be conducted quickly and completely to provide the level of service required.

Frederico Wanderley, CIO at Casas Bahia, is bullish on the use of Linux across his organization. The company has moved to deploy Linux as the primary operating system throughout its organization, with the heart of the IT infrastructure being a pair of IBM z10 servers. Throughout the organization, every server, every point of sale (POS) terminal, and every client machine touches the IBM mainframes.

Each of the IBM systems is well equipped with eight Integrated Facilities for Linux (IFLs) to drive the Linux applications. The company has committed to SUSE Linux Enterprise Server, of which about 120 instances are running on 16 IFLs, along with DB2 for the central data repository.

The company writes most of its own applications, and today the z10s run a variety of applications, including a WebStore, which is, in effect, a dashboard that consolidates all the information from the stores in a way that can be presented to customers. Everything that is sold at the store level is visible on a dashboard at the corporate level, replicated in real time over 1MB MPLS connections. Managing directors have access to sales information in real time. The company believes this capability is unique among its competition in Brazil.

The z10s also run other business applications, including a logistics application used to manage the company's truck fleet of 2,300 vehicles and a biometric fingerprint reader that enables employees to gain access to the system.

While the z10s are the heart of the IT infrastructure, the company also employs 600+ x86 servers that also run SUSE Linux Enterprise Server 10. These distributed servers serve as local database replication servers to protect against any possible network connectivity disruption to the IBM z10s. These servers have several additional essential roles and provide local print serving to the stores. Of even more importance is that these machines act as boot servers to stream Linux down to approximately 40,000 diskless devices as they come online through the course of a day's business throughout the retailing giant's sprawling network.

The POS systems are used specifically for financial transactions, while an in-store sales force uses a different class of diskless systems for presenting characteristics of the products, negotiating with customers, and presenting the sales price to customers.

The company has over 3,000 office workers who run OpenOffice, which is hosted on x86 servers, and every access through a desktop or a browser is using Linux. When needed, 3270 emulation also is rendered using Linux.

Casas Bahia's IT infrastructure handles about 4 million transactions per hour every day, and during holiday sales peaks, the company has closed 350,000 sales in one

selling day along with 1.5 million installment payments transacted. Wanderley says the z10s offer him the scalability required to handle a variable workload, and during the holiday season, no additional scaling or capacity needs to be brought online.

The company's commercial software list is heavily served by IBM's software business as well. When asked what IBM software products Casas Bahia uses, Wanderley quips that it's probably easier to cite the products the company does not use. The products in use include DB2, Content Manager, a full suite of Tivoli monitoring products, WebSphere, the Omegamon suite, and more.

Wanderley says the company's experience with Linux as the foundation for a commercial deployment has been that Linux is solid and consistently reliable. Since deploying Linux initially in 2001 as a replacement for aging OS/2 installations, the experience has been that Linux is versatile and can efficiently serve business needs. As a result, Novell SUSE Linux Enterprise 10 is running not only on the 600+ x86 store servers but also on the z10 IFLs to support the new Casas Bahia WebStore.

Managing Healthcare Costs in Pennsylvania with Linux

David Robinski is a man on a mission: to collapse his server infrastructure down to the smallest number of physical units as is practical. As the director of software and database services for Highmark Inc., one of the largest health insurers in the United States, Robinski still has some room for further consolidation.

Highmark was formed by the 1996 consolidation of two Pennsylvania licensees of the Blue Cross and Blue Shield Association. The organization today has 20,000 employees and provides health insurance coverage for customers in western Pennsylvania.

Robinski is responsible for managing software on all the company's server platforms, from the System z to x86 servers, and everything in between — which happens to include a collection of Solaris and AIX Unix servers, along with a Stratus and Teradata server platform.

The company's infrastructure is currently quite diverse. While the mainframes already support the major applications, another layer of systems includes 270 Windows servers — typically Windows Server 2003 — and another 175 Linux deployments on x86 servers. Including the Linux images on System z, about 200 Linux images are currently in use. Robinski's goal is to move as much of that infrastructure over to Red Hat Enterprise Linux on the System z and its 10,000 MIPS as possible.

The company first began its Linux consolidation initiative back in 2004, when it started a migration project to bring Web applications that, at the time, were hosted on Solaris over to Red Hat Enterprise Linux (RHEL) on x86 servers.

The centerpiece of Robinski's infrastructure today is a pair of z10 systems, with seven Integrated Facilities for Linux (IFLs) on each mainframe. Robinski expects that an eventual total image count of about 180 Linux guests will land on those two machines over the next 24 months, when the consolidation is done. Much of that work has yet to take place.

The company has long been a Red Hat shop, and today it has a mix of RHEL 3 and RHEL 4 on its platforms. Meanwhile, new deployments are being made on RHEL 5. Because of the company's experience with RHEL on the x86 platform, the decision was made to leverage that relationship and the staff experience and stay with Red Hat on the System z deployments.

While the company's first major Linux deployment on the System z was its Lotus Notes environment, in the long term, the majority of Linux on System z will be Web application servers. The deployment of nine Domino partitions on the two System z machines served to consolidate multiple instances on aging Unix systems and now supports a total of 11,000 end-user accounts.

Today the organization is in the second wave of consolidation and standardization and is moving those existing x86 Linux instances, many of which are on Fujitsu RX600 2U rackmount servers, over to the System z. This activity will collapse the x86 Linux images onto virtual machines on the two System z machines. The workloads being moved over are largely business-oriented solutions built on Web application servers — the same applications that previously had resided on the Sun servers. There will also be an Oracle database environment that will deploy on Linux aboard System z. Finally, other applications also run on the RHEL servers, including PeopleSoft Financials and a billing system. Some of these applications are homegrown, while others are purchased from an ISV.

One of the benefits that Robinski realizes from his consolidation work is the reduction in software license costs. "I am managing a software budget here. The software budget is a lot higher than our hardware budget," says Robinski. "The more Intel footprints you have, the higher your maintenance costs are. By consolidating on a more powerful platform, you can reduce the value units. In some cases, we have cut maintenance costs by 50%."

Highmark's experience with Linux has been good. "When we first got into Linux, we had some technical issues to deal with. We had an Oracle/Red Hat/EMC issue we had to resolve, and it turned out to be a Red Hat issue," recalls Robinski. "We found the issue, debugged it, and fixed it — it had to do with an elongated restart after failure. Red Hat gave us the solution there. I have had very good support from Red Hat and very good support from IBM."

Highmark has enjoyed a strong relationship with its technical account managers from Red Hat and IBM. Based on its experience, Robinski says the company has no reservations about using Linux for any and all of its critical business applications. "Our core platform is Linux. [For] anything new coming in, the new core platform is Linux," he says.

"The key to look out for is your operational costs," says Robinski. "The z platform has given us a scalable platform with a cost containment [solution] for our middleware."

A University Learns to Solve Business Needs with Linux

The academic hub of Boston has long been along the Charles River, where several prestigious universities are comfortably integrated into Boston proper. Nestled among the winding streets of the city is Boston University, a fixture of the city for 170 years. Long considered a premier academic and research university, Boston University counts Martin Luther King, Jr. (Ph.D. 1955) among its many notable graduates.

More recently, the university has been proactively embracing an agent of change through the deployment of Linux as the foundation of its business operations. Providing services to its 3,900 faculty members and 33,000 students, the university's IT department has been using SUSE Linux Enterprise Server since 2004.

Assistant Director of Technical Services Gerard Shockley says the university initially got involved with the original port of Linux to the System z in 2001, long before Linux was considered a "safe" choice for business application deployment.

Today, Boston University has more than 1,000 MIPS of IBM mainframe capacity, which is used for business purposes — not for computer labs or for student education. Shockley says the mission of the IT department is to serve the needs of faculty, staff, alumni, and students. The mainframes are configured into two separate parallels — one is used for database workloads and the second specifically for Java and other open source applications. The Java applications are business-critical workloads that are consumed by administrative users across the university's two campuses.

A number of applications running on Linux on the System z are used by staff and faculty, and others are used by students. One of the more interesting solutions is an image-rendering solution used for student scheduling, which can be initiated as many as 100,000 times per day during peak times. The application takes inputs, including class selections and meeting times, and renders a graphical representation of a student's schedule. Shockley likens the output to an "Outlook schedule" for the student. Students use the application in an iterative manner in real time as they plan each semester's classes. The downside is that the application has a very "spiky" use profile that runs 24 x 7 during the registration period.

Faculty have some unique applications as well, such as an in-house-created application called "BU Chart." This application uses Java and Tomcat to perform grade analysis.

The IT department also has successfully implemented some green solutions on Linux, including a print-elimination solution the university calls the "EOS thin client," which enables report browsing without printing. This application also runs as a servlet on a Java application aboard a Linux instance.

The university has a variety of databases in use, including DB2, Oracle, and PostgreSQL, for business intelligence and for a photo ID application, all of which are supported on the Linux instances.

Shockley says Boston University has been on the cutting edge and, at times, on the bleeding edge of using Linux. "We've done a lot of work at the [SUSE Linux] kernel, using SLES 9 and SLES 10. When we began, we were using SLES 7 [2.2 kernel]. We have done several successful business recoveries — tests — with SUSE Linux." Shockley notes, "We have modified kernel parameters for guest utilization. The kernel parameters have been optimized for Java, Oracle, and DB2 workloads." The university is looking forward to doing trending, workload analysis, and memory profiling using Linux.

Shockley says Boston University selected the System z platform for the flexibility and the robust support for Linux in a virtualized environment, and the resulting high availability, high-bandwidth capacity, and ability to concurrently support disparate workloads.

The university also has ongoing work with Linux on x86 and is using a grid control monitor system running on Linux on x86. These systems are using openSUSE, the open source development arm of the SUSE Linux Enterprise Server product. The grid control monitor application allows the university to receive agent feeds from individual Linux environments, providing a total view of that virtualized Linux environment for resource utilization and availability — in other words, monitoring data flow between applications. Today, this application is used in conjunction with Oracle, but in the future, it will work with other workloads. "We do have some other workloads on x86," adds Shockley. "We are hosting some open source workloads, but not for administrative purposes."

While System z is well known as a reliable, scalable platform, the combination of System z and Linux offers another benefit that is becoming increasingly important: availability of skills. "Recently, I hired a professional that has no experience with System z," says Shockley. "The recent hire was a production DBA [and] was able to be highly productive immediately. This skill shortage is real, and Linux has opened new opportunities in an otherwise closed environment."

Italian Food Supplier Likes the Taste of Linux

Gruppo Amadori is a wholesale distributor of poultry products based in Cesena, Italy. The company services its customers daily through its 50 branch offices and 5 corporate sites located throughout the country. The company's 6,000 employees handle the production and processing of product as well as delivery logistics for customers within Italy, where the company holds a 32% market share, and for a smaller number of international customers. Linux fits this company's taste when it comes to operating systems.

The company has been working on a general theme to move toward Linux and has a number of initiatives under way, including a Windows-to-Linux migration for its collaborative solution, and it is about to kick off a Windows-to-Linux migration on a portion of its desktops.

According to the Gruppo Amadori CIO and Director of Organization Gianluca Giovannetti, the vast majority of the company's employees don't need to access a computer to do their jobs, and as a result, the company has a relatively small number

of PCs compared with its employee count, with approximately 1,000 PCs in use across Gruppo Amadori's network. That network of client systems is currently running on a Windows infrastructure, but it is slated to be partially migrated to the Red Hat Enterprise Linux Workstation client operating system solution in 3Q09. At that time, plans call for the first 200 of the production employee PCs to be converted to Linux. The hinge point for that migration to start is the availability of version 1.3 of IBM's Symphony office solution — a product that Giovannetti expects will deliver the functionality his company needs.

Giovannetti is expecting to maintain a mix of client systems in use for the longer term, with Windows remaining the desktop of choice for the power users — due to a variety of Access-based applications that can't be easily migrated to Linux. The first client systems to move to Linux require the Lotus collaboration suite (Notes, Sametime, and Quickr connector), only a Web browser to access an ERP application, and the ability to exchange documents with Microsoft Office through Symphony version 1.3.

On the server side of its business, Gruppo Amadori currently has three corporate sites housing parts of its server infrastructure. While today many of the 50 branch offices have a local IBM System x server running Red Hat Enterprise Linux, those distributed systems are being reintegrated into corporate datacenters, and the applications will be consolidated aboard two IBM POWER Systems servers. In total, the company has about 150 servers in use today, but that number targeted to drop to under 100 systems once the consolidation is complete. In addition, the company still has two IBM System i machines in use and a collection of Windows Server 2003 operating systems installed aboard IBM System x hardware.

The company is currently moving an Exchange collaborative environment hosted on Windows Server 2003 over to a Domino environment hosted on Red Hat Enterprise Linux. But not all the Windows servers will be decommissioned. In fact, Active Directory will remain the backbone of identity services for Gruppo Amadori. The first 150 Exchange users moved to Lotus Domino during the second quarter of 2009, and the migration is expected to expand to the entire company through the course of a year-long transition period, during which both collaboration environments will remain active. Plans also call for implementation of an archiving system, Content Collector for Email, and Sametime.

The company uses VMware for x86-based virtualization services, with at least six servers currently supporting multiple guest operating systems through the use of VMware. These machines are primarily used for legacy application consolidation.

Giovannetti says the deployment philosophy is to focus on Linux first and foremost. He says the company uses Linux, particularly for warehousing and logistics applications, because in his experience, Linux delivers good responsiveness and performance. If a software vendor supports applications aboard Linux, Gruppo Amadori will deploy on that operating system.

However, Giovannetti is practical and pragmatic: If the software vendor does not support Linux, he'll install on Windows where necessary. He says that experience with Linux has been good but notes that it's not the solution for every single workload.

The benefits that keep Giovannetti focused on Linux are the acquisition costs and his experience with the operational costs. "At the moment, we have some technical people that are skilled on Linux, so we can do a lot of maintenance for ourselves. It is cost-effective [and] cheaper than Microsoft," he adds. "[The] Linux environment is the right choice for very focused applications."

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