The Case for Migrating from Sun SPARC to IBM System x-Linux

Sponsored by IBM and Intel

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Executive Summary

Following Sun Microsystems' acquisition by Oracle Corporation, enterprise customers on the Sun SPARC-Solaris platform face uncertainty in on-going support and development and should look for alternatives. They would do well to consider IBM System x and BladeCenter servers running on Red Hat Enterprise Linux. System x and BladeCenter are built on a philosophy of collaborating closely with Intel enabling IBM and Intel teams to jointly deliver solutions that are fully optimized for current and emerging processor technology. The Intel Xeon 7500 processors offer better performance at a lower cost compared to SPARC[1]. IBM uses the 5th generation of the X-Architecture to continually innovate and optimize systems designed to improve the performance, reliability, energy efficiency, and total cost of ownership (TCO) of the System x family. The eX5 enterprise systems and the Intel Xeon 5600 series-based M3 servers in the IBM System x family are industry leaders in their segments. IBM also works with the leading distributors of Linux such as Red Hat to help make Linux more scalable and robust for the enterprise computing environment. IBM and Red Hat have jointly collaborated to provide migration services that make the migration to Linux straightforward and easy for customers to embrace. The IBM System x and BladeCenter Linux environment has been extensively used in customer environments to run enterprise workloads (we showcase SAP applications as an example in this paper). This degree of collaboration and innovation on all fronts including processor technology, hardware, software, middleware, operating systems, and enterprise workloads ensures that the IBM System x and BladeCenter servers based on Intel Xeon processors and running Red Hat Enterprise Linux has a clear roadmap, is easy to deploy, lowers businesses overall TCO, and has ongoing support. For customers, this means that their investment is protected against changing market conditions.

[1] SPECint_rate_base2006, published on SAP.com as on 6/10/2010

Introduction

In January 2010, Oracle Corporation completed the acquisition of Sun Microsystems. Most analysts see this development as being disruptive to users of the Sun SPARC-Solaris platform since the roadmap for support and development of both Sun SPARC and Solaris is now uncertain. Sun's customers should, and are, exploring alternative platforms for their enterprise IT workloads. One of the most widely available alternatives to Sun's SPARC-Solaris platform is the IBM System x or BladeCenter and Red Hat Enterprise Linux based platform. Ten years ago, early adopters realized significant benefits in starting the migration from Solaris and SPARC to Linux and x86. Today, the rest of the information technology community is building on the success of the early adopters and accelerating the migration to Linux and the operating system trusted by thousands of enterprises around the world -- Red Hat Enterprise Linux. Migrating from SPARC-Solaris to x86 –Linux must necessarily address three core issues. In all three, IBM System x and BladeCenter platforms running Red Hat Enterprise Linux offer compelling value:

- **Hardware:** Consolidating existing SPARC to System x and BladeCenter Servers
- **Operating Systems:** Replacing Solaris with a stable, trusted platform: Red Hat Enterprise Linux
- **Workloads:** Migrating enterprise workloads

Consolidating existing SPARC to System x and BladeCenter Servers

The prospects for SPARC are not encouraging. SPARC RISC CPU volumes have sharply declined from a peak of about 800,000 in 2004 to less than 200,000 by 4Q09[2]. And the trend continues. As a category, Unix server sales in 2Q10 declined by 7.2% compared to 2Q09[3]. This, in combination with the fact that the developmental road ahead for SPARC is uncertain on both the architecture and manufacturing fronts, makes x86 servers a viable and popular alternative to SPARC.

The prospects for SPARC are not encouraging. SPARC RISC CPU volumes have been on a sharp downtrend from a peak of about 800,000 in 2004 to less than 200,000 now.

Intel x86 processors have consistently followed Moore's Law (the number of transistors per square inch on integrated circuits roughly doubles every year), doubling performance about every 18 months. Intel processor performance in Uni, 2S, 4S, and 8S server implementations outperform respective SPARC based servers, and the price/performance of Intel processor based servers is significantly better than SPARC based

[2] IDC Server Tracker 4Q09
[3] IDC Server Tracker 2Q10

servers. Industry-standard benchmarks (see Fig. 1) demonstrate the performance advantage offered by IBM System x and BladeCenter servers.

Intel Xeon 5000-based servers are up to 75% less expensive than SPARC-based servers and Intel Xeon 7500-based servers are up to 58% less expensive than SPARC-based servers[4]. In terms of energy efficiency, Intel Xeon 7500 processors are up to 4.7x more efficient compared to 4S UltraSPARC T2 on Java[5]. Performance improvements this significant offer the opportunity to consolidate workloads and potentially save substantial amounts on software licenses.

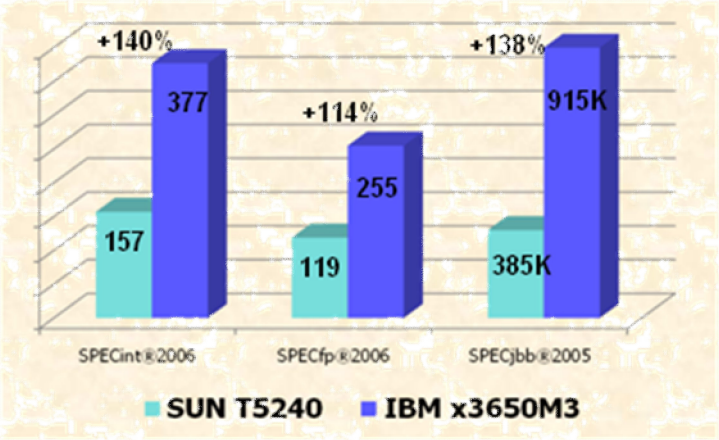

Fig. 1 - Benchmark results from www.spec.org as of 6/2010

IBM's history of close collaboration with Intel has consistently resulted in servers that leverage the full power of Intel processor performance. The latest series of eX5 enterprise systems and System x M3 servers based on Intel Xeon 7500 and 5600 series processors continue that collaboration to deliver performance that no other manufacturer can match.

eX5 enterprise systems. IBM's eX5 enterprise portfolio, encompassing servers and Solid State Disk flash technology, (a way to expand the memory footprint considerably and greater server flexibility), significantly improves the economics of large-scale, memory-intensive x86 workloads. The IBM System x3850 X5 comes in four- and eight-processor configurations using the Intel Xeon 7500 processor. This 4U box can hold four-, six- or eight-core Xeon 7500s. The eX5s have out-performed anything the competition can offer. The x3850 X5 scored the highest number of transactions-per-second ever achieved by a four-processor system on the TPC-E benchmark -- the top spot for four-socket and 32-core systems using Nehalem EX. The BladeCenter HX5 comes in 2- and 4-processor configurations. It also features the Xeon 7500 or the

[4] Pricing from Sun, HP, Dell and IBM company websites as on May 2010
[5] Performance comparison of SPECjbb2005 best published benchmarks as of January 4, 2010.

Xeon 6500. It has eight I/O ports (two sockets). IBM has engineered it to be able to hold up to a 320 GB of memory on one HX5 blade using MAX5. The IBM System x3690 X5 comes in a 2 processor configuration featuring the Intel Xeon 6500 or 7500 processor. Another key feature of eX5 enterprise systems is memory scalability. MAX5 is a server building block which offers the potential to scale memory by adding 32 (or 24 memory DIMMSs in BladeCenter HX5 configurations) to the x3690 X5, x3850 X5, and BladeCenter HX5. This additional memory enables these servers to support more virtual machines per server and to support larger database workloads.

IBM System x M3 servers. This new line of System x products includes the x3650 M3 and x3550 M3 rack servers, the x3500 M3 and x3400 M3 towers, the BladeCenter HS22, and the virtualization-optimized BladeCenter HS22V. These provide 50% more cores and a performance hike of about 50% compared to the previous generation. IBM lists consolidation ratios of 20:1 compared to models from three or four years ago[6]. In addition, IBM has released the two-socket dx360 M3 iDataPlex server. Aimed at power-intensive computing, this form factor lets blades and racks work well together. In all cases, IBM emphasizes its virtualization credentials as well as lower power and more processing capability. The HS22V, for instance, is claimed to enable 30% to 50% more virtual machines on a single blade, has memory that consumes 15 percent less power, and runs Java applications up to 43 percent faster than IBM's prior-generation, two-socket blades. All of these servers use the Xeon 5600 processor.

The difference is innovation

Such demonstrable performance and reliability gains are a result of the innovative IBM X-Architecture that encompasses IBM System x and IBM BladeCenter servers, IBM System x iDataPlex solutions, energy-efficiency and cooling via IBM Cool Blue technology and proactive management. The Systems and Technology Group at IBM is specifically tasked with driving innovation in the X-Architecture.

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IBM has a long history of collaborating with Intel to design systems that incorporate processor features and optimize performance and capabilities. An example is the collaboration on blade technology starting in 2002 with the development of the first BladeCenter servers, and continuing in 2006 when IBM, Intel and other industry leaders formed Blade.org, the industry consortium driving open innovation in blade-based solutions that today has over 200 members. Similarly, IBM’s strategy of working with Intel during the evolution of

[6] IBM benchmark tests

the Intel Xeon processors positions it ideally to design and build systems that use current and emerging processor technologies in the shortest possible time.

Further, IBM has made sustained technology investments to enhance functionality, performance and reliability across its portfolio of systems and technology offerings. Investments in semi-conductor processor technology and architecture, and RAS (reliability, availability, serviceability) features that are part of the mission-critical System z mainframes have been systematically implemented across the IBM portfolio and next generation energy-efficient data centers. A recent survey[7] -- which we believe to be the most comprehensive recently published study of high performance computing application workload performance, system utilization and system availability using a Linpack peak performance benchmark -- found that the x86 based IBM HS-21 based BladeCenter returned availability figures of 100% compared to a 95% availability for a SuperMicro based x86 system. This is an illustration of how IBM's approach of bringing mainframe inspired RAS features into x86 based servers helps enterprise computing at all levels. At the processor level, the Intel Xeon 7500 has 20 new RAS features designed to protect data, increase availability and minimize planned downtime.

Another example of how IBM innovates to achieve leadership in system design is in its use of complex CFD (computational fluid dynamics) to optimize the thermo-electrical-mechanical properties when laying out components (processors, memory systems, and interconnect hardware) and cooling systems within servers. This helps achieve optimal energy efficiency within the power/cooling envelope for datacenters. The resulting efficiency gains are significant -- for a 1U configuration, the energy consumption has been reduced from about 19W to 6W for the IBM System x iDataPlex server. Each Watt saved translates to about $7 of customer savings/server/year. Lower energy consumption results in lower TCO (total cost of ownership) and higher reliability as components operate at lower temperatures.

IBM also innovates on server management to optimize the IT administrator experience for its System x servers. IBM Systems Director is a platform management foundation that streamlines the way physical and virtual systems are managed across a multi-system environment. Leveraging industry standards, IBM Systems Director supports multiple operating systems and virtualization technologies across IBM and non-IBM platforms. Through a single user interface, it provides consistent views for visualizing managed systems and determining how these systems relate to one another while identifying their individual status. This improves the IT staff efficiency as well and helps them to be more responsive to business needs.

[7] Alan Simpson, Mark Bull, and Jon Hill, Identification and Categorization of Applications and Initial Benchmarks Suite, PRACE Consortium Partners, 2008.

Replacing Solaris with Linux

Analysts believe that enterprise customers should "develop migration plans for Solaris on x86 to move to Linux. Even with Oracle's Solaris support on x86, we believe Linux is less risky because it has support from several vendors, including Oracle."

(Gartner Research, 29 June 2010).

In the past, enterprise customers were wary about moving from UNIX to Linux. Not so much now.

In the past, enterprise customers were wary about moving from UNIX variants such as Solaris to Linux. The concern was that Linux wouldn't match UNIX in scalability and reliability in enterprise computing environments. Those concerns are rapidly being put to rest.

Linux is 40% less expensive than a comparable x86-based Windows solution and 54% less expensive than a comparable SPARC-based Solaris solution.

The market share case for Red Hat Enterprise Linux

Since Solaris is considered to be the flavor of UNIX closest to Linux, in most cases, porting applications from Solaris to Linux on the x86 architecture, requires only minor changes to the source and high-level changes to the build environment (makefiles, directory paths, complier, and linking switches). This is one of the reasons why Linux is increasingly gaining acceptance in the enterprise market.

The adoption rate of Linux in the enterprise server segment has been increasing at a rapid pace in recent years. A recent IDC study[8] estimates that worldwide revenue from Linux operating system software will grow at a compound annual growth rate (CAGR) of 16.9% from 2008 to 2013. Linux server operating system subscriptions are also expected to grow through 2013 (in spite of a contraction in 2009). IDC notes that in addition to new server deployments, Linux deployments will also be taking place on existing servers, a metric not directly considered in the predicted growth of net new subscriptions and deployments.

Red Hat meets the challenge of maintaining a stable, trusted platform in many ways as Red Hat Enterprise Linux is the long-term predictable operating platform that embraces open source software and delivers to customers an enterprise-ready solution that can handle any workload. With a rigorous engineering process, Red Hat ensures long-term stability, embraces industry innovation, and puts customers in control of their environment.

[8] Linux Operating System Market Grows in 2008, IDC Press Release, 26 Aug 2009

The TCO case for Red Hat Enterprise Linux

Over the last 15 years or so, UNIX (Solaris is a version of UNIX) has established a reputation for solid reliability in the data center. It is often used to run mission-critical applications including back-end databases, and has demonstrated good performance, high reliability, proven scalability and trustworthy security. But these benefits come at a relatively high TCO. UNIX generally requires proprietary software and hardware and involves significant annual maintenance costs. These expenses are a key factor in recent, widespread migrations to other platforms – in particular, Red Hat Enterprise Linux.

TCO studies[9] have shown that Linux is 40% less expensive than a comparable x86-based Windows solution and 54% less expensive than a comparable SPARC-based Solaris solution. The comparison is built on a 3-year period of ownership for a system supporting 100,000 operations per second on the standard SPECjbb benchmark.

The scalability and performance case for Linux

Making the decision to switch from Solaris on SPARC to servers running Red Hat Enterprise Linux on x86 doesn't mean accepting lower performance or scalability. Red Hat has reported several benchmark test results to showcase scalability and performance. For example, Red Hat Enterprise Linux has reported results for the SPECweb2005 benchmark for evaluating the performance of web servers using three distinct workloads for banking, e-commerce, and support[10].

- The highest score of 71,045 was achieved on a Red Hat Enterprise Linux 5.3 (2.6.18-128.el5) system using Rock Web Server v1.4.7 (x86_64), Rock JSP/Servlet Container v1.3.2 (x86_64), in April 2009.
- As of April 2009, the top ten published SPECweb2005 results are based on Red Hat Enterprise Linux.
- In August 2008, Red Hat Enterprise Linux was used to host a DB2 database and achieved 1.2 million transactions per minute on the TPC-C benchmark at a cost of $1.99/tpmC. This was the first tpmC result on an x86 server that exceeded the one million tpmC result. The TPC-H benchmark is used to measure a platform's ability to host decision support systems that examine large volumes of data, execute queries with a high degree of complexity, and provide critical business intelligence.
- In November 2008, Red Hat Enterprise Linux achieved a record-setting score on the 2-Tier SAP SD benchmark by showing it could sustain a processing load of 5156 concurrent user connections and in turn delivering the best 24-core performance on x86_64 servers and beating Solaris x86 by more than 10% on comparable hardware[11].

[9] TCO for Application Servers, Robert Frances Group, Aug 2005
[10] Red Hat Enterprise Linux 5: Your Solaris Alternative, White Paper, Red Hat, Inc.
[11] www.sap.com/benchmark

- In February 2009, Red Hat Enterprise Linux running on a 96-core Intel Xeon processor-based server achieved the best SPEC JavaBlackBelt (JBB) score on an Intel Xeon processor-based server with 2,150,260 business operations per second (bops).

Red Hat continues to innovate and deliver advanced functionality of the highest quality to its customers. Red Hat works continuously with hardware and software partners to enhance the performance of its platforms.

The reliability case for Red Hat Enterprise Linux

Operating systems acquire a reputation for robustness based on their perceived reliability and stability. When unpacked from its subjective shell, reliability is often measured in terms of the mean time between failure (MTBF) and the mean time to repair (MTTR), which factor into an overall percentage of up-time. Measuring and comparing the reliability of platforms can be difficult because hardware choice and environmental conditions affect the results drastically. Stability is often characterized by the rate at which defects are found and fixed in the system, and this can be equally difficult to track.

Top Linux distributions notched the biggest reliability improvements, decreasing per server per annum downtime by an average of 75%.

Surveys by industry analysts show that CIOs, IT managers, and system administrators generally consider Red Hat Enterprise Linux to deliver the reliability needed for business-critical workloads. Industry-standard hardware running Red Hat Enterprise Linux has reached a level of maturity where one can configure fault-tolerant systems that are strong enough to match UNIX systems on proprietary hardware. For example, the Yankee Group *2007-2008 Global Server Operating System Reliability Survey*[12] found that the top Linux distributions notched the biggest reliability improvements in their most recent survey, decreasing per server per annum downtime by an average of 75%.

In a study[5] comparing Linux deployments with Windows and Solaris, it was found that it is easier to lock down a Linux system and deploy patches and that Linux patch deployments reduced downtime. This also reduces security vulnerabilities and improves reliability and availability -- factors crucial to enterprise computing. And Red Hat meets the challenge of maintaining a stable, trusted platform in many ways. Support for the latest hardware is included with service packs and is delivered through minor releases. Applications do not need to be re-built or re-certified with each release update because the application programming and binary interfaces are stable for the full life of a Red Hat Enterprise Linux release, regardless of the physical or virtual deployment model. This means that Red Hat eco-system of thousands of

[12] Unix, Linux Uptime and Reliability Increase, Yankee Group, 18 Jan 2008

applications is immediately available, avoiding delays that would otherwise occur with expensive and time-consuming re-testing efforts.

ISVs are increasingly adopting Red Hat Enterprise Linux

An operating system's success is linked with the number and quality of applications that run on top of it. As Red Hat Enterprise Linux becomes increasingly attractive because of open source, TCO, and reliability considerations, ISVs (independent software vendors) are moving to it in a big way. According to an IDC study[13], software spend in the Linux ecosystem – comprising Linux and open source services, application software and application development and deployment software – is predicted to grow from about $11 billion in 2007 to about $28 billion in 2012. One reason for this is that a traditional hindrance to applications development on Linux -- the multiplicity of Linux variants and distributions -- now has a technology fix. The Linux Standard Base created by the Linux Foundation (www.linuxfoundation.org), a non-profit consortium for promoting and standardizing Linux, has reduced the differences between Linux distributions and helps ISVs to reduce their porting and testing costs. In addition, most ISVs with solutions running on SUN Solaris have been providing versions of their applications running on Linux for many years. And Red Hat Enterprise Linux is certified on more than 3,000 ISV's and that list continues to grow.

The Linux Standard Base (LSB) solution not only makes life easier for individual application developers and ISVs, it also makes a huge positive impact on the entire Linux eco-system by allowing more applications to be widely introduced to the Linux operating system. The LSB directly helps vendors and community groups into two specific ways:

- Reduce the costs of porting an application from one Linux distribution to another
- Reduce the costs of supporting a Linux application

Migrating enterprise workloads

Customer concerns on migration are centered on the following issues:

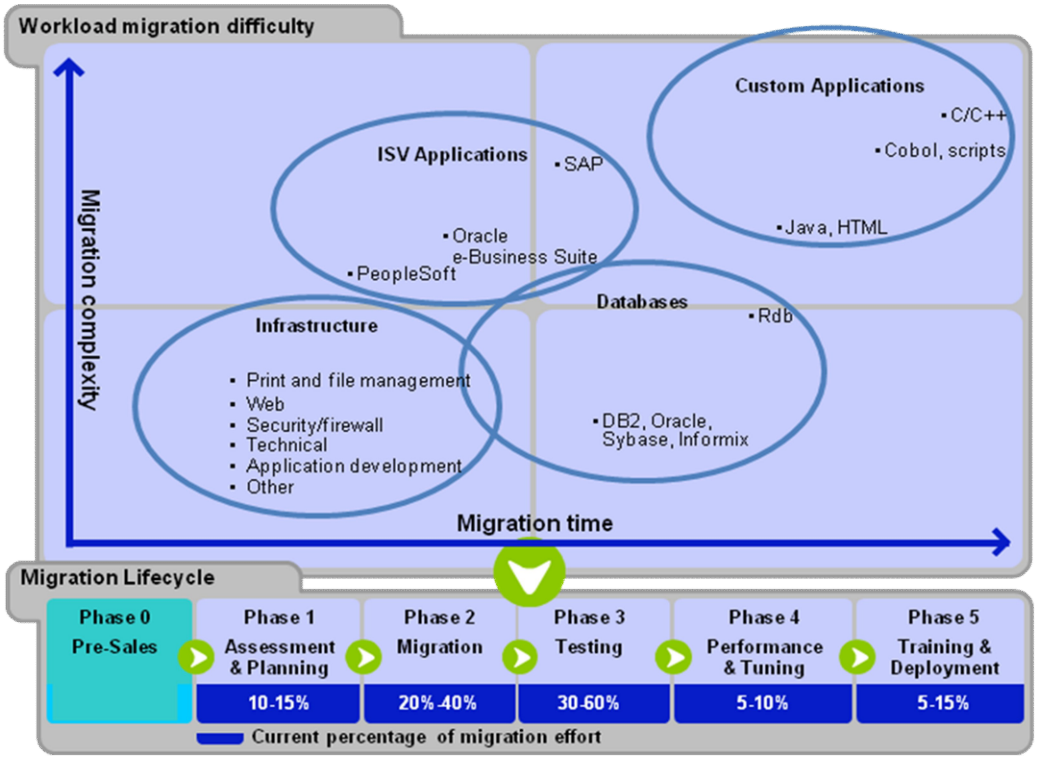
- Technical: Can it be done?
- Costs: Can it be done within budget?
- Schedule: Can it be done on time?
- Skills and culture: Are the required resources available?
- Operational: Will it work?

[13] The opportunity for Linux in a new economy, IDC, Apr 2009

IBM and Red Hat address these concerns through its (1) proven track record of migrating tens of thousands of applications and database migrations, (2) promise of quick return on investment through increased asset utilization and potentially significant lower software costs after consolidating server and workloads to achieve rapid migration payback, and (3) a well defined migration strategy for infrastructure, databases, enterprise applications, and custom migrations if needed.

There are four separate and related areas that require migration (see figure below):

- Infrastructure (e.g. File & Print, Web)
- Database Migrations (e.g. Oracle, Sybase, DB2)
- Enterprise Application Migrations (e.g. SAP, Oracle EBS)
- Custom Code Migrations (e.g. C/C++, Fortran, shell scripts)



Source: IBM

While there is some variance, the items of each category are closely aligned by relative complexities and amount of migration times. Because database items are of lower complexity and are accessed by the other items as they are migrated, migration often starts with database migrations. As expected, custom applications are the most difficult and generally take the most time to migrate.

The Migration Lifecycle chart also shows the approximate percentage of effort required relative to each phase of migrating any item or category of items. Note: While the migration lifecycle chart is placed

directly below the "Workload Migration difficulty" chart, the two charts should not be interpreted as having the same or relative X-axis.

An important step to managing migration is setting expectations and understanding budgets. These both start with "good" assessments. IBM's Migration Factory and Red Hat's Migration Center are highly qualified to perform a number of different levels of assessments. Assessments can be deeply involved and take many weeks, or they can be very provided on a Rough Order of Magnitude in a matter of a few days. The level of assessment should match the complexity of the migration being considered.

Types of Assessments	Inputs	Deliverables	Typical Duration	Typical Usage
Migration Factory in a Box	Assumptions & basic environment info	Price subject to detailed assumptions.	Days	Rough Order of Magnitude (ROM) estimates, Pricing for standard migrations
Server/SAP/Oracle Makeover	Standard environment info ("typical" assumptions to fill gaps)	Indicative migration cost estimate & Report on consolidation and TCO expectations	1-2 weeks	Identification of initial migration targets
Rapid Assessment	Detailed environment info & working with client SMEs	Cost estimate & Project plan subject to some assumptions	2-4 weeks	Medium complexity migration planning, High complexity ICE
Full Assessment	Access to client's environment, code and SMEs	Cost & Detailed project plan (no/few assumptions)	6-8 weeks	Complex and large scale projects

The IBM approach to migration is to use a proven end-to-end process that has been successful in tens of thousands of migration of applications and databases. The process utilizes tools wherever possible. These are standard UNIX tools, commercial tools and custom IBM tools such as Insight for SAP and Insight for Oracle. In addition, IBM reuses code wherever possible. Reusing code allows for more cost effective migrations while taking advantage of previous implementations. For custom applications, IBM works closely with client teams on requirements as they are the subject matter experts. The IBM migration process synchronizes code at each iteration of the new development and repair. Working with ISV applications and databases, IBM will also upgrade to new versions if the customer wishes. The IBM process believes in testing and re-testing extensively. Testing is an integral part of the methodology. This means testing on an iterative basis and also collaborative basis with customer and IBM teams. And lastly, benchmarking of the new system against the old system is essential to ensure that operational capabilities and expectations are met.

Red Hat's Migration Center offers field-tested Linux veterans who guide the customer through migration planning and ensure successful new deployments of Red Hat Enterprise Linux. Red Hat consultants have decades of experience working with leading companies in the Financial Services, Healthcare, and Telecommunication industries, as well as most government agencies. Red Hat provides valuable insight into migration best practices enabling businesses to be better equipped to migrate opportunistically.

Six reasons to migrate:

- I**f your hardware roadmap is uncertain, make the move.** You need better visibility. With Red Hat Enterprise Linux and IBM System x you get a breadth of system offerings on a single platform with a clear roadmap.
- **If you need to get the most from packaged software, switching is smarter.** It's the right long-term decision. When your business needs the latest features from your ERP vendor, or wants to pilot social networking, deploy on a platform your vendor knows, supports, and will continue to support.
- **If you question your vendor's stability or viability, choose a platform with a future.** How can you manage with confidence if your vendor is unstable, unpredictable, and uncommitted? There's nothing more disruptive than to be forced into a platform decision because your vendor no longer exists.
- **If you have increased performance and capacity demands, it's time to migrate.** Not only has the rate of improvement in industry standard servers caught up to that of RISC platforms, it has surpassed it. Check the scoreboard. Red Hat Enterprise Linux has the leading scores on SpecWeb, SpecJBB, and over 1.2M transactions per second on TPC-C on multi-core x86 servers.
- **If cost and budget pressures are increasing choose a platform your CFO will love.** Red Hat Enterprise Linux on IBM System x lowers capital and operational expenses, reduces administration costs, and offers a flexible subscription model that eliminates vendor lock-in.
- **Management during and after the migration.** Completing the migration to a new platform is just the step on the road to success. Once the migration is done, you have to have the right tools in place to easily and cost-effectively manage the platform on an on-going basis. Red Hat and IBM have the tools to maximize your investment in your new Red Hat Enterprise Linux and IBM System x infrastructure.

IBM & Red Hat Support

IBM provides telephone or online access to IBM support specialists through IBM’s Linux Support Line and Linux Advanced Support offerings. This is available for all users from small to medium businesses running just a few Linux servers or mission critical enterprise customers requiring highly customized and proactive support. The offering include options for 9x5, or 24x7 support, unlimited calls and callers, client customized response times, and support for IBM and non-IBM Servers.

With a Red Hat subscription, businesses have access to an around-the-clock global network of the most experienced, motivated, and knowledgeable Linux and Middleware support engineers. This expertise can virtually extend in-house capabilities and enable customers to deploy with confidence. With a Red Hat subscription businesses are entitled to unlimited incidents, available 24x7 access around the world, not limited to issue resolution, unmatched technical expertise, extended relationships with partners like IBM and rich content guiding businesses through planning, deployment and operating IT.

Customer success stories

IBM has extensive experience in working with enterprise customers to set up, optimize, or migrate their enterprise workloads from almost any computing environment to any environment. Enterprise customers looking to migrate their workloads to System x-Linux can draw inspiration from the following real-world customer cases featuring SAP workloads on IBM System x-Red Hat Linux environments.

NYSE Technologies runs innovative multi-core server test for high performance trading in Asia

Customer: NYSE Technologies is the commercial technology unit of NYSE Euronext – which operates some of the world's most active equities and derivatives exchanges and accounting for approximately one-third of the world's equities trading. NYSE Technologies offers broadly accessible, comprehensive global connectivity and transaction capabilities, data and infrastructure services, and managed solutions for a range of customers requiring next-generation performance and expertise for mission critical and value-added trading services.
Industry: Capital Markets
Country: USA
Challenge: Asian exchanges are offering new connectivity and colocation services that will create new high performance trading opportunities. Multi-core servers provide a scalable and cost effective way to implement low-latency trading strategies crucial to realizing this potential.
Solution: Multi-core architectures were evaluated using market data from the Tokyo Stock Exchange. The tests were designed to simulate an algorithmic trading system that is colocated at an exchange's hosting facility along with the market data feed and order management components.
Software: Red Hat Enterprise Linux with NYSE Technologies' Data Fabric middleware and Feed Handler for the 'Arrowhead' trading platform of Tokyo Stock Exchange
Hardware: IBM System 3850 X5 with 4 x Intel Xeon 7560 processors
Benefits: The results make a strong case for consolidating automated trading systems onto large-scale

multi-core servers to take advantage of reduced latency and to reduce the hardware footprint in colocated data centers.

More information: www.catena-technologies.com/reports/multi-core-trading.pdf

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Great Offshore reduces cost, increases performance and scales business growth

Customer: Great Offshore Limited
Industry: Utilities: Oil & Gas: Offshore
Geography: Mumbai, India
Challenge: To design a robust, stable, high-performing, secure, and cost-effective Enterprise Resource Planning (ERP) system based on a combination of SAP and IBM DB2 technologies
Solution: Great Offshore selected Red Hat Enterprise Linux as the operating platform for its business-critical SAP and IBM DB2-based Enterprise Resource Planning system
Software: Red Hat Enterprise Linux Advanced Platform with integrated virtualization and clustering technologies, SAP Business Suite (150 users) with modules such as Financials & Controlling (FICO), Sales & Distribution (S&D), Material Management (MM), Project System (PS), and Human Resources (HR), Database DB2 (Approx. avg. size of the database is 200 GB)
Hardware: 8 Intel Xeon processor-based IBM System x servers
Benefits: Decreased IT costs, simplified management, reduced systems maintenance, increased scalability and performance, and increased hardware platform flexibility.

Alpine Electronics plans sales for next-generation mobile media technology

Company: Alpine Electronics
Industry: Electronics: Consumer
Geography: United States
Challenge: Without a single integrated enterprise resource planning and supply chain management solution, Alpine lacked the consolidated business data required for accurate long-term planning
Solution: IBM Global Business Services leveraged its electronics and automotive industry expertise to design, deploy and manage a solution based on SAP Business Suite. An IBM Business Partner helped to implement IBM Cognos Planning which captures sales and budget data downloaded from the SAP NetWeaver Business Warehouse system at the Japanese headquarters location
Software: SAP Business Suite, SAP ERP 6.0, SAP NetWeaver, IBM Cognos 8 Planning, and Red Hat Enterprise Linux

Hardware: IBM System x: System x3850

Benefits: Enhanced process efficiencies have led to much more rapid access to business intelligence. By using SAP ERP, monthly financial closes can be completed up to 30% faster than before, and there has been a 40% reduction in operational workload for the finance department.

YPF migrates SAP applications

Company: YPF SA

Industry: Oil and Gas

Geography: Argentina

Challenge: Renovate proprietary infrastructure with the goal of reducing costs and boosting performance with open source solutions

Software: Red Hat Enterprise Linux 5 with integrated virtualization, Red Hat Network, SAP Enterprise Resource Planning (ERP), 10g DB, Red Hat Consulting.

Hardware: Intel Xeon Processor-based IBM System x 346, 366, 3650, 3850 servers

Migration Path: From SUN Solaris, HP-UX, and IBM AIX to Red Hat Enterprise Linux 5 with virtualization on Intel Xeon Processor-based IBM System x servers

Benefits: Reduced capital and operational costs, boosted performance and efficiency of administrators, increased internal customer satisfaction by reducing implementation time, increased scalability and agility, and expanded flexibility.

Kliniken enhances patient care and cuts costs

Customer: Kliniken des Landkreises Lörrach

Industry: Healthcare

Country: Germany

Challenge: Kliniken des Landkreises Lörrach, a hospital with 1,400 staff and an annual budget of around €100 million, wanted to improve both business and clinical efficiency. Users found that SAP applications were slow to respond to their requests, as the underlying database had reached its performance limit. The system could not be extended or developed, and the database had to be taken offline for maintenance.

Solution: The hospital implemented the latest SAP applications and selected IBM DB2 running under Red Hat Enterprise Linux on the IBM BladeCenter platform. It also chose IBM System Storage and IBM System x hardware to support a new storage area network for clinical imaging.

Benefits: SAP application and database response times have been cut by more than 30% and users gain rapid, reliable access to critical business data. Database maintenance can be completed online, avoiding

interruptions, and a clustering solution ensures system reliability. The new SAN offers scalable storage up to 112 TB, a tenfold increase in current capacity.

IBM System x running Red Hat Enterprise Linux investments are protected against obsolescence

As enterprise computing moves away from the Sun SPARC-Solaris lock-in environment to the more flexible and economical open source Red Hat Enterprise Linux environment, enterprise customers can rest assured that their investments are protected against market or technology changes. This is because IBM, Red Hat, Intel and other industry-leading vendors routinely collaborate at a fundamental level to ensure that hardware, software and platform changes are seamlessly incorporated into the System x and Red Hat Enterprise Linux environment.

Intel Xeon processors offers next generation capabilities -- and IBM System x is ready

In March 2010 Intel announced the release of its next generation of Intel Xeon processors for the expandable server segment, codenamed Nehalem-EX. The new processor features up to eight cores inside a single processor supporting 16 threads and 24MB of cache. Ideal for server consolidation, virtualized applications, data demanding enterprise applications and technical computing environments, Nehalem-EX offers up to nine times the memory bandwidth of the previous-generation Intel Xeon 7400 platform. IBM was the only systems manufacturer to showcase a server, IBM eX5, at the March 2010 announcement -- another instance of IBM's strategy of working in joint teams with microprocessor manufacturers to take full advantage of emerging technologies.

Next generation virtualization with KVM

KVM (Kernel-based Virtual Machine) is a full virtualization solution for Red Hat Enterprise Linux on x86 hardware containing virtualization extensions. KVM technology within the Red Hat Enterprise Virtualization solutions enables users to run multiple virtual machines running unmodified Red Hat Enterprise Linux or Windows images -- in effect, KVM can turn the Linux kernel into a hypervisor. IBM is working closely with Red Hat, help IBM System x customers reap the benefits of data center virtualization while enjoying the economies and flexibility of customization offered by open source solutions.

As cloud computing goes mainstreams, most delivery models will be on Linux

In many ways cloud computing is a logical evolution, building upon the industry's rapid adoption of Linux, open source solutions, SOA (service oriented architecture) and more recently, virtualization. Cloud computing provides dynamically scalable and often virtualized IT (hardware, software, and applications)

resources as a service to a large set of users who may possess a broad but differing range of knowledge, expertise in, or control over the technology infrastructure.

While the evolution of public cloud adoption has been rapid, particularly with smaller businesses and individual developers, early adopters at larger enterprises are increasingly turning to private and hybrid clouds to address concerns (with public clouds) of security, regulatory compliance, governance, reliability, and IP protection.

Today, most large public cloud-service providers such as Google and Amazon use Linux in their large-scale, high-demand, extremely-elastic cloud environments. IBM also uses Linux for its private cloud offering, the IBM WebSphere CloudBurst Appliance[14] based on the IBM BladeCenter for application deployment to cloud and virtualization environments.

Further Reading

IBM migration kit for Solaris to Linux:
ibm.com/systems/migratetoibm/systems/x/movefromsun.html

Intel Server Room: Online Server Community
intel.com/server

XSW03088-USEN-00

[14] IBM private cloud offering: ibm.com/software/webservers/cloudburst/