



## **Creating sustainable business value with Linux and IT optimization**

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## Contents

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- 4 *Employing a business value-based framework***
- 6 *Placing Linux into an optimization strategy***
- 10 *Proof positive: Linux and open source in the enterprise***
- 16 *Into the future, on demand***
- 17 *IBM Global Services: Reducing risk with expert assistance***
- 19 *Summary***

In today's highly competitive business environment, many CIOs find themselves at the center of an uncomfortable tug-of-war between shrinking budgets and a demand for more responsive IT services. As companies make the shift to e-business on demand,<sup>TM</sup> they are faced with a growing and fundamental reliance on their IT infrastructure – from servers, networks and applications to Internet and intranet sites, security and e-mail solutions, data centers and storage sites. The business stakes associated with IT support and advancement are high; these technologies can be a deciding factor in determining whether companies are successful overall.

The challenge for IT executives lies in translating “less cost” into “more business value.” This means trimming the fat from the IT infrastructure and, at the same time, optimizing processes, reducing risk, fostering innovation, and delivering the services and service levels that will support business growth.

Now, a growing number of organizations are finding answers in open source applications and the Linux operating system. Linux can deliver a highly reliable, flexible platform – helping to drive down costs and enabling the reallocation of resources for new initiatives. Indeed, more and more enterprises are growing comfortable with Linux, and realizing measurable cost and operational improvements through its implementation. As a result of these successes, many are ready to move Linux more deeply into the infrastructure and out onto the desktop.

That said, it is important to mitigate the risks involved with introducing a new platform into an enterprise IT environment. Applying the proven principles of IT optimization can help companies identify where and when to bring Linux into the infrastructure – in an informed context that aligns IT spending with key business drivers.

## **Employing a business value-based framework**

An early step toward realizing the benefits of Linux in the enterprise is one of simple but crucial assessment as to which areas of IT services are candidates for improvement. For example, most organizations could benefit addressing one or more of the following value propositions:

- *A scalable, adaptable infrastructure* supportive of e-business processes and applications such as supply chain management (SCM) and customer relationship management (CRM)
- *More effective data management* including improved global access to corporate data, with an emphasis on sharing various forms of information across and beyond the enterprise
- *Consistent service delivery* achieved through improved systems performance, inclusive of server configurations and locations, network performance, systems management, capacity planning, application performance and design, as well as skills and organizational design
- *Optimized use of IT assets* by leveraging an integrated, consolidated and standardized infrastructure designed to help ensure seamless enablement of new technologies while maintaining service levels and operations

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**Highlights**

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***Successful, strategic IT optimization begins by identifying areas for improvement, and mapping those against specific business strategies.***

- *Global consistency of IT management* through redefined, enhanced management systems and services, increasing overall efficiencies and improving the consistency of service delivery
- *Reduction of total IT spending* incorporating critical examinations of the IT expense-to-revenue ratio, as well as the overall IT capital and operations budget
- *Streamlined technical architectures and vendor networks* through the reduction or standardization of vendor interfaces and the accompanying architectures

The next step is to map specific value propositions to business strategies. By understanding what a company wants to accomplish, its IT organization can work to deliver optimum business value for the lowest possible cost. The result of this alignment process is a framework for prioritizing IT investments and optimization initiatives according to a company’s business requirements. (See Table 1.)

*Table 1: Mapping IT optimization value propositions to business strategy*

<b>Business strategy</b>	<b>IT optimization value proposition</b>
Enable new business	<ul style="list-style-type: none"> <li>• Enable an adaptable IT infrastructure</li> <li>• Leverage data more effectively</li> </ul>
Promote customer satisfaction	<ul style="list-style-type: none"> <li>• Provide consistent service delivery</li> </ul>
Improve internal efficiencies	<ul style="list-style-type: none"> <li>• Optimize use of IT assets</li> <li>• Establish global consistency of IT management</li> </ul>
Reduce cost	<ul style="list-style-type: none"> <li>• Reduce total IT spending</li> <li>• Reduce number of IT architectures and vendors</li> </ul>

## **Placing Linux into an optimization strategy**

An IT infrastructure consists of management and technical components that can be further segmented into discrete, interrelated “domains.” Collectively, these domains define the potential areas for optimization. However, it is important that no single domain perspective determines where open source might fit into the overall IT environment; opportunities for efficiency, effectiveness and cost improvements often span multiple domains. Moreover, each domain can apply to any or all value propositions. While a comprehensive IT optimization assessment addresses both management and technical components, for the purpose of developing an open source implementation plan, the focus is narrowed to the following:

### **Infrastructure**

- How can the enterprise increase server utilization and storage capabilities?
- What is the lifecycle of current hardware?
- How can the IT organization improve provisioning and enable resource allocation on demand?

### **Applications and data**

- Where and on which platforms are specific applications and databases running? Are there duplications or redundancies across the enterprise?
- Are applications easily portable across hardware platforms? Can the IT organization “develop once and deploy anywhere”?
- Which applications can be moved to a different platform?
- What is the lifecycle for these applications?
- What new applications will be deployed in the future?

### **Data center resources**

- How many data centers and how much floor space does the enterprise maintain?
- What are the lease terms for each location?
- How much could be saved by centralizing resources?

### **Cost**

- How could the business reduce IT costs?
- In which areas could the company afford to cut costs most significantly?

### **Standardization**

- How can the company reduce infrastructural complexity?
- How can open standards help with data integration?

### **Application development**

- How can the IT organization build software faster – with less code and better debugging?

### **Staffing**

- How can enterprise IT personnel deliver greater value?

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**Highlights**

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***Utilizing a proven methodology for IT optimization can help a company deploy Linux to deliver real business value.***

The key to a successful IT optimization roadmap is its holistic nature – the total infrastructure must, in the end, be greater than the sum of its parts. Likewise, planning an open source strategy should be all-inclusive. Using a matrix to bring together all three elements of the analysis – business strategies, value propositions and domains – can provide a strategic plan for deploying Linux and open source such that they deliver the greatest business value to IT optimization.

The applicability of Linux to these domains is somewhat consistent across enterprises, and the matrix in Table 2 offers a sound starting point for evaluation. The values in the matrix indicate the degree to which Linux or other open source solutions can support IT optimization efforts and help the company achieve the associated business objectives. Once business strategies have been prioritized, it is possible to identify “high value” Linux initiatives in which investments might deliver the best business benefit, most rapidly.



Table 2: Linux points of value in IT optimization

	Infrastructure	Applications and data	Data center resources	Cost	Standardization	Application development	Staffing
<b>Enable new business</b>							
Enable adaptable IT infrastructure	H	M	M	H	M	M	H
Leverage data more effectively	H	M	L	H	H	H	M
<b>Promote customer satisfaction</b>							
Provide consistent service delivery	H	M	M	H	M	M	M
<b>Improve internal efficiencies</b>							
Optimize use of IT assets	H	M	H	H	H	M	H
Establish global consistency of IT management	M	M	L	M	H	M	L
<b>Reduce cost</b>							
Reduce total IT spending	H	M	H	H	L	M	H
Reduce number of IT architectures and vendors	H	M	L	H	H	M	L

H=High M=Medium L=Low

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### Highlights

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***Already, Linux offers enterprises across industries world-class reliability... cost-effective workload consolidation... and application standardization and portability designed for the future.***

## **Proof positive: Linux and open source in the enterprise**

Today, companies around the world are deploying Linux and open source strategies to great acclaim. These success stories can serve as models for other enterprises interested in using Linux and open source as part of their larger IT optimization efforts.

### **Infrastructure history**

The Internet boom drove the initial business adoption of the Linux operating system. Service providers and mainstream businesses alike have seized on the strong reliability and low cost of Linux and the open-source Apache Web Server software. Today, Apache runs 60 percent of the world's Web sites.<sup>1</sup> The marked success of Linux on Web server farms encouraged data center administrators to employ it on other components, including security devices, load-balancing servers, and file and print serving.

### **Enterprise-class reliability**

Today, Linux reliability in Web infrastructure is approaching legendary status, with reported time between necessary reboots ranging from months to years. The following testimonials<sup>2</sup> are typical:

- “Red Hat 8 server unplanned downtime for the last *five* years is zero, other than the huge U.S. blackout.”
- “Our firewall runs Linux; it went over two years running without a reboot.”

- “Uptime before the most recent reboot: 211 days. Reason for boot: lost UPS from overheated battery room. Uptime before next previous reboot: 191 days. Reason for boot: emergency power switch hit by electrician.”
- “The only time I had to reboot in the last year was to put a new kernel in place. It [took] decidedly less time than five minutes, so my ‘five-9s’ (99.999 percent uptime) are good to go!”

According to a recent study by the Standish Research Group<sup>3</sup>, downtime in a clustered Linux environment was less than half that of Microsoft® Windows®. Indeed, IBM Business Partner Aitana SBS, based in Valencia, Spain, recently moved its hosting business to IBM @server™ xSeries® Intel-based servers running Linux. The result? The company reduced downtime for its customers’ hosted applications by 73 percent, significantly increasing customer service and satisfaction.<sup>4</sup>

Another service provider, Automatos, headquartered in Cupertino, California, migrated its remote support applications to IBM DB2® running on Red Hat Linux. The new platform enabled Automatos to meet its service level agreement commitments of 99.994 percent.<sup>5</sup>

### **Workload consolidation**

Conventional wisdom in the era of distributed computing was to dedicate individual servers to specific tasks, such as Web serving, application serving, file and print serving, data storage and internal network management. However, as more and more servers were added, companies began struggling under

the weight of multiplying operating costs. Each server required networking connections, middleware, firewall protection, redundancy, backup and more – leading to infrastructural complexity, performance issues, potential points of failure and significantly higher support costs.

Today, many companies are optimizing their IT environments – and achieving substantial savings in total cost of ownership – by using Linux to consolidate workloads from multiple distributed servers. On all IBM @server platforms, Linux can run in dozens, or even thousands of partitions – each operating as an independent server, with full security and workload separation.

For most companies, the starting point is to consolidate Web serving, e-mail, collaboration and file serving – which can help reduce per-user and per-transaction costs, simplify infrastructure management and deliver higher levels of efficiency. Plus, these experiences offer a foundation for migrating commerce sites and mainstream business applications to more cost-effective Linux platforms.

The maturation of Linux is supported by a wealth of Linux-friendly, enterprise-ready software. Recent studies report that 51 percent of North American developers plan to target most of their applications to Linux.<sup>6</sup> Major independent software vendors (ISVs), such as SAP, PeopleSoft, IBM, Oracle and BEA have already made the move to Linux. For example, all key IBM middleware products are available for Linux. Plus, there are more than 4,000 Linux applications available today through IBM Global Services and its Business Partners.

### **Commodity economics**

The economics of Linux make it very attractive for companies to consolidate applications from distributed UNIX servers onto Intel-based servers. A recent study found that Linux offers the lowest licensing, installation, administrative and support costs – as well as the greatest flexibility and ISV support – as compared to UNIX® and Windows NT.<sup>8,7</sup> Other research reveals Linux on Intel-based servers delivers a 1.8 to 1 cost advantage over UNIX/RISC for Web workloads, and a 5.5 to 1 cost advantage for collaborative workloads.<sup>8</sup> These savings accrue from lower hardware costs, higher utilization rates and radically enhanced administrator efficiency, which boosts the effectiveness of IT staff and helps reduce labor costs.

As an example, Exxcom, a British management services firm, analyzes its customers' telecommunications billing records for cost, performance and utilization – a data-heavy mission managed by a DB2 database running on Linux. On this platform, the company has managed customer growth of more than 2,000 percent and, at the same time, enhanced availability by 20 percent, all without adding any personnel to its small staff.<sup>9</sup>

Enterprises are realizing additional benefits by switching from proprietary systems to Linux running on commodity hardware. To note: E\*TRADE Securities launched its online trading system on the Sun Solaris UNIX platform – investing in 60 Sun servers priced at US\$240,000 a piece, plus an additional US\$25,000 per year in maintenance. E\*TRADE recently migrated

to Intel servers priced at US\$4,000, requiring a total investment of less than two of the Sun boxes.<sup>10</sup> With the cost savings comes the freedom to switch hardware vendors – or make favored vendors work harder to keep the company’s business – plus the flexibility to mix and match hardware, peripherals and sources.

### **Migration recommendations**

According to Forrester Research, Linux on multiprocessor Intel-based servers offers the reliability and performance required to run most enterprise application workloads today – at the most attractive price point. To achieve the optimum price-performance profile, Forrester recommends migrating mainstream applications from UNIX/RISC platforms to Linux on commodity servers as the applications reach the end of their lifecycle.<sup>11</sup> For more business-critical applications, Forrester recommends Linux on mainframe-class machines such as the IBM @server zSeries® platform for its 99.999 percent business reliability, grace under load and mature management tools.<sup>12</sup>

Although the idea of a migration can seem daunting, Linux and UNIX share many core elements – making it relatively easy for UNIX programmers to become Linux programmers very rapidly. Plus, the move can deliver significant advantages including consistent management and application portability as well as skill set simplification and virtually open-ended scalability. The potential savings in hardware and software costs as well as raised-floor real estate, electricity and air conditioning is increased with each individual server a company chooses to replace. For example, a European telecommunications

firm recently consolidated 70 Sun servers onto a single zSeries server running Linux. While increasing availability, enhancing security features and augmenting long-term scalability, the company realized significant savings, including a 50 percent reduction in energy consumption.

### **Application portability**

Perhaps the most significant long-term advantage of making Linux a component of an IT optimization strategy is that it separates applications from the underlying server platform by making the same application programming interfaces (APIs) available on every server platform. In an optimized IT environment, the operating system can run any application, the applications can run on any server, and either the application or the server software can be updated independently at any time. Linux enables this open-ended flexibility, granting businesses the ability to run the right applications at the right place at any point in time.

### **Standardization**

The combination of Linux on Intel-based servers can facilitate the creation of highly standardized and replicable configurations. Within the data center, this “cookie cutter” approach simplifies administration, management, provisioning and maintenance by reducing the number of IT architectures you have to support and the number of vendors. The high reliability and stability of Linux make it an ideal platform for deploying a standardized server image at hundreds or thousands of locations – such as branch offices, retail outlets and government field offices – where technical skills are slim to nonexistent.

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Highlights

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***Linux-supported IT Optimization can help companies evolve to an on demand operating model—characterized by responsive IT and business processes; variable and adaptive cost structures; a clear focus on core competencies; and resilient systems***

## Into the future, on demand

Employing Linux to help optimize the IT infrastructure can position an enterprise for evolving to an on demand operating environment that will be cost-effective, integrated and automated. As a cross-platform operating system, Linux enables IT organizations to manage servers as a pool of resources that can be allocated as necessary in line with business objectives and in response to new opportunities and customer requirements.

Already, application service provider Determine Software is becoming more nimble by migrating its 23 custom UNIX servers to Red Hat Linux running over IBM xSeries servers. The company projects equipment expenditures savings of up to 40 percent (US\$3.3 million) and a US\$35,000 reduction in third-party software spending. At the same time, Determine expects to deploy services 25 percent faster and, thus, increase sales by 15 percent.<sup>13</sup>

Linux can also help companies evolve gracefully to autonomic computing—facilitating seamless resource allocation based on business rules rather than IT architecture constraints. IBM @server systems already incorporate self-healing, self-configuring, self-protecting and self-optimizing capabilities. Other autonomic products from IBM are Linux-ready as well, including IBM Tivoli® management tools and IBM Director, which offers simplified central hardware management. Plus, IBM is investing significant resources in developing new Linux-enabled autonomic technologies, including grid computing, Blue Gene® and Enterprise Workload Manager.



## IBM Global Services: Reducing risk with expert assistance

IBM Global Services has developed one of the most comprehensive portfolios of IT optimization and Linux services in the industry, making us especially qualified to help businesses leverage Linux and realize significant cost-savings, enhanced flexibility and world-renowned reliability. What's more, IBM brings to the table extensive industry-specific experience, proven best practices and deep knowledge that can translate into faster, more focused solutions and a sustainable competitive advantage. To note:

- *IT Optimization*—IBM can deliver world-class optimization solutions by drawing on services and capabilities from across IBM Global Services to address a customer's requirements. Other IBM offerings – including product-specific expertise and even the IBM research organization – can be engaged to solve unique optimization challenges when necessary. IT Optimization solutions consultants provide a single point of contact for coordinating skills, methodologies, processes and services to take a company from assessment to a detailed optimization strategy.
- *Linux Strategy Workshop*—This cost-effective, short-term customized workshop is structured to produce a high-level strategy for incorporating Linux into the IT environment, based on an enterprise's existing infrastructure, business issues and budget requirements, as validated by their IT staff.

- *Application portfolio assessment*— IBM can help companies evaluate their application portfolios and assess portability with a limited degree of business disruption. Our Linux application porting services offer an easy path to identifying and assessing applications for porting, testing or redeveloping critical applications.
- *Linux services*— IBM Global Services offers services designed to help customers transport existing applications to a wide variety of IBM and non-IBM platforms running Linux; implement and support high-performance Linux clusters; access expert technical assistance on demand, and optimize the performance of Linux systems.

## **Summary**

For forward-looking companies working toward e-business on demand, IT optimization is becoming a mandatory stepping-stone. Linux can play a key role in this transition – providing the requisite performance, scalability, reliability and security attributes which, in turn, enable a business to respond to customers, competitors and shifts in the marketplace in realtime. However, managing an in-house, end-to-end IT optimization initiative can be a daunting, expensive and complex proposition. It is in answer to this challenge that IBM Global Services offers its world-class skills, proven technologies and deep expertise to companies like yours – aiming to incorporate Linux into an optimized IT infrastructure.

### **Find out more**

For more information on IBM Linux solutions, or to learn how IBM Global Services can help your company gain and sustain a competitive advantage in the e-business marketplace, contact your IBM sales representative or visit:

**[ibm.com/linux](http://ibm.com/linux)**



## References

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