



Computer Associates®

White Paper

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# **Exploiting the Potential of Linux**

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## Executive Summary

Organizations today are struggling with how to expand their business and compete in the face of lean IT budgets. Doing more with fewer resources, optimizing systems and revitalizing IT infrastructures for greater efficiency and agility to respond to ever-changing business conditions remain at the top of many business leaders' agendas.

The Linux operating system is not only ushering in a new approach to software development worldwide, but also solving key problems and limitations that have plagued enterprises for decades. Linux is reducing costs; increasing customer satisfaction and providing business benefits through greater reliability, efficiency and scalability; and offering unprecedented flexibility by extending computing capabilities to new devices. Linux is no longer considered a "fringe" operating system; it is now becoming part of the mainstream corporate IT infrastructure.

While solving many IT problems, Linux also presents unique challenges of its own. Since few organizations have homogeneous computing environments, they have to be able to integrate Linux with their other systems to provide seamless access to applications and data. They have to be able to monitor, manage, secure and back up Linux systems like their other platforms. And they need to take full advantage of Linux by deploying more applications that run on it.

As the management software experts for more than 28 years, Computer Associates International, Inc. (CAI) provides the support necessary to allow organizations to leverage the Linux operating system, meeting the technology demands of today and the future, and enabling companies to focus on their core businesses.

## Linux in the Enterprise

More than a dozen years have passed since Linus Torvalds put Linux — the UNIX-like operating system he created — on the Web, making it available to anyone who wanted to download it or develop it further. Much in the way the combustion engine revolutionized transportation, this open source approach has transformed software — the way it's developed, paid for and supported. Using a participative development model and a unique licensing approach, Linux has grown from a handful of users on the Web to an integral part of corporate IT organizations worldwide.

Linux initially entered the market as an alternative to proprietary operating systems in the server room, where its adoption was driven by commodity hardware and customers who were trying

to minimize the cost of their software investments. Over time, as this open source solution demonstrated its ability to address traditional computing needs, Linux moved into the mainstream market. Today, it's used by major global organizations attracted to its flexibility, power and potential in both server and mainframe environments. Small footprint devices are also leveraging Linux more frequently, and Linux is emerging as the operating system of choice in embedded solutions for consumer electronic devices, handheld devices and other fixed-function appliances.

The adoption of Linux is expected to increase even further in the future. The analyst firm IDC anticipates that Linux will grow from its 2002 market share of 4.6 percent to 16.1 percent by the end of 2007. A Forrester study reports that 72% of IT executives of \$1 billion or larger companies plan to increase their investments in Linux. Clearly, open source is becoming more pervasive, and Linux is becoming a significant competitor in the enterprise market.

## Linux: The Right Alternative

Linux is ideally suited as an enterprise-class operating system for many reasons. One is its reliability. Linux systems offer mainframe-class stability with reported system uptimes of a year or more. Google, one of the Internet's foremost search engines, runs on Linux servers and has run continuously for more than one-and-a-half years without any downtime, according to Google Chairman Eric Schmidt.

Google's operations also demonstrate another significant benefit of Linux: its scalability. With Linux, Google processes more than 200 million searches and serves up 4 billion web pages a day, and it does this on inexpensive Intel processors — more than 10,000 of them.

This scalability significantly extends computing capacity. A 232-node Linux cluster helped the Genome Sciences Centre at Canada's British Columbia Cancer Agency to decode the genetic sequence of the coronavirus believed to be responsible for SARS in a matter of days rather than months. Scientists report that the cluster of inexpensive Linux systems made this development possible. Linux is also about to enable the creation of the world's largest supercomputer, IBM's Blue Gene/L. At one petaflop, researchers claim that it will be roughly three times more powerful than the fastest computer in existence today.

The scalability of Linux extends both vertically and horizontally. Vertical scaling refers to adding more processors to a given operating environment. Horizontal scaling refers to adding more computer

systems to the environment to work together in parallel. In this kind of environment, each computer system might have its own operating system and one or more processors controlled by each system image. Blade servers are based on this model, where a dedicated processor board with one or more processors runs Linux on each board. With full horizontal scaling, tasks can be split up across multiple Linux images running on multiple system boards, providing faster results for queries, more comprehensive data mining, and optimized access to processing and data.

Since Linux runs on many different types of hardware — from PCs to servers to mainframes — resources can easily be shared across multiple computers on-demand, allowing transaction processing to be distributed during peak times, improving performance and responsiveness. An application running on an Intel-based processor can quickly be moved over to the mainframe if bandwidth is needed. A mainframe process can be offloaded onto an Intel blade. And porting time between systems is reduced to hours, rather than days or weeks. This offers organizations tremendous flexibility in how they use available equipment and can significantly reduce their total cost of ownership.

Linux also presents new business opportunities by introducing computing capabilities into non-traditional arenas, including smart phones, consumer electronics and other devices. The on-demand video service, TiVo, uses Linux to control access to live and recorded television programming. BMW uses Linux in 17 of its 18 on-board computers, including critical systems used for braking and engine cooling. The diversity of systems that Linux supports and the level of connectivity it offers contribute to the growing dominance of Linux in the embedded market.

In addition, because it's supported by an open source community of more than 400,000 developers worldwide, Linux offers more stability and potential for innovation than virtually any other operating system available today. These developers engage in an informal competition to discover and fix problems in the software, acting as a huge quality assurance and technical support team. Commercial software companies simply don't have the infrastructure or budget to compete with that level of support.

## **Integrating Linux Into the IT Infrastructure**

To fully reap all the benefits of Linux, however, it's critical for organizations to treat it as part of the overall IT infrastructure. Handling Linux as an isolated "island" of technology prevents companies from realizing the advantages it has to offer. For example, having

additional processing or storage resources on a Linux system is ineffective unless those resources are visible and accessible to the entire enterprise. Maintaining separate security for Linux systems rather than taking a holistic approach can reduce operational efficiencies, increase costs and make the organization more vulnerable to threats. Storing data on Linux systems is unproductive unless that data can be easily accessed by those who need it.

Clearly, the greatest challenges to adopting Linux are not presented by the capabilities of the operating system itself, but rather by organizations' ability to integrate it into their existing IT infrastructure and manage it as an integral part of the enterprise.

## **CA's Linux Expertise**

Addressing the challenges of implementing Linux requires intimate familiarity with this operating system, and CA is a leader in the Linux community. As one of the 45 members of the **kernel.org** committee, CA helps determine the direction of future Linux kernel releases. We are a founding member of Open Source Development Labs, and we are active in the Embedded Linux Consortium, the Open Group and EMBLIX — all key organizations accelerating Linux innovation and adoption.

CA also contributes to the Linux code base. A CA-authored security intercept has been proposed for the next version of the Linux kernel. It will allow Linux users to take full advantage of CA and other security and management tools. We are not only extending the benefits of Linux for our customers, but are also participating in optimizing the software for the greater community as well.

In addition, we have firsthand experience with Linux. CA uses Linux in-house for a number of our mission-critical systems, so we understand the issues that organizations face in deploying Linux throughout their enterprise.

## **CA's Solutions for Linux**

As a result of our extensive expertise with Linux and our many years of management software experience, CA has released a comprehensive set of solutions that can help you integrate Linux with your existing environment, manage Linux as part of your overall IT infrastructure and leverage Linux as a platform for your applications. Each of our six focus areas — infrastructure management, security, storage, portal and business intelligence, life cycle management, and data management — includes products that support the Linux platform.

Most organizations today have heterogeneous environments that include many different types of hardware and operating systems. CA helps you integrate Linux into this kind of environment by providing solutions that allow you to manage it like any other platform. For example, with Unicenter® Software Delivery, you can automatically deploy applications to Linux platforms as well as all the other platforms in your enterprise. With Unicenter® Asset Management, you can automatically determine what software is installed anywhere in your organization, including on Linux systems.

Security is a top concern in many organizations, and it's an area that must be addressed with Linux. eTrust™ Access Control provides policy-based control of who can access specific systems (both Linux and others), what they can do within them and when they are allowed access.

Data protection is as critical for Linux as it is for your other systems. On the mainframe, BrightStor® Enterprise Backup can back up individual Linux files, while BrightStor® VM:Backup® can back up the entire Linux environment. The backup image can then be used to rapidly clone additional Linux clients, requiring only minutes of additional customization. For distributed servers, BrightStor® ARCserve® Backup for Linux provides fast, reliable backup and recovery.

To help you further leverage the Linux operating system, many of CA's products run on Linux and take advantage of this operating system's unique features. For example, Unicenter® ServicePlus Service Desk runs on Linux. If an increase in the number of concurrent users causes performance degradation, it's possible to automatically start another instance of the application that can share the data and network resources with the original instance, providing instant scalability and increased responsiveness.

Advantage™ Ingres® r3 has been enhanced to support clusters and grids on Linux and also takes advantage of other open source technologies, including OpenDLM and OCFS.

One of CA's key information management solutions, CleverPath™ Portal, not only runs on Linux (including zSeries Linux) but also provides access to

information stored on Linux systems to enhance collaboration and effective decision-making. Likewise, Advantage™ EDBC® provides real-time, high-performance access to Linux data sources from Windows, UNIX, client/server and web-based applications. Another member of the CleverPath™ family of solutions, CleverPath™ Aion® Business Rules Expert, is one of the few business intelligence products available today that runs on Linux.

If your organization is using Linux as a development environment or simply leveraging Linux for application development life cycle management, AllFusion® Harvest Change Manager provides a comprehensive, integrated, repository-based change and configuration management solution that runs on Linux and can help your organization effectively manage complex, enterprise-wide development activities.

The fact that so many of CA's products run on Linux enables you to easily move key applications and business activities from other systems to Linux, allowing you to consolidate servers to improve efficiency and reduce costs. It also means that you can use Linux as a management platform. For example, you can manage the health and availability of all your diverse operating systems, network devices, business applications and databases by running Unicenter® Network and Systems Management on a Linux server.

## Conclusion

As Linux continues to become more predominant in the corporate IT infrastructure, IT managers can take full advantage of all the benefits it offers while being assured that they can integrate, manage and leverage Linux in the same way as their other platforms.

Through our leadership role in the Linux community and our extensive expertise in management software, CA will continue to influence the development of this technology, foster innovation and provide the tools that businesses need to achieve their goals.

**For more information, visit [ca.com/linux](http://ca.com/linux)**



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