



I D C T E C H N O L O G Y S P O T L I G H T

Linux as a Strategic Platform for Building Resilient Private Clouds

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The outcome of the economic downturn is now clear, and the real winner during the recovery has been the x86 server platform and all the operating systems that run on it. The list, of course, includes Linux and the one operating system that will be the stiffest competitor and a continued threat to Linux for the foreseeable future, Windows. This Technology Spotlight discusses the growth of Linux as a strategic platform for enterprises as well as the benefits of Linux and the central role the platform plays in helping enterprises build resilient private clouds. The paper also looks at the role of Symantec in this important market.

Linux on the Rise

Linux is growing its role as one of two mainstream solutions for volume server deployments. The success of Linux has historically been closely linked to the demise of Unix servers, and IDC's research has found that Linux has had its greatest success in penetrating organizations that were classic Unix shops. The success of Linux in those organizations has come from both replacing some or all of the existing Unix servers and, equally importantly, capturing growth opportunities for installed systems — growth opportunities that previously would have most likely gone to new Unix installations had Linux not arrived on the scene.

However, the growth of Linux is no longer tied to just Unix replacements. Linux growth continues to ramp and has expanded far beyond what Unix solutions ever held in terms of unit volume and cross-platform pervasiveness. Paid subscription revenue for Linux grew 16% year on year in 2010 and accelerated further to 18% in 2011.

Confidence in and customer satisfaction with Linux are also growing. Among other indicators, IDC research finds that Linux is increasingly seeing use as a platform for supporting business-critical applications. IDC's research also confirms that workload shifts continue to mature in the Linux market, with an increasing portion of total Linux deployments being made today to support more business-oriented and increasingly business-critical workloads.

At the same time, enterprise versions of Linux (products including SUSE Linux Enterprise and Red Hat Enterprise Linux) are becoming more capable, allowing more workloads to migrate from Unix servers to Linux instances aboard x86 servers or, at some customer sites, to Linux VMs aboard a mainframe server.

Application portfolios are likewise growing. Key commercial, non–open source business solutions, including databases, continue moving in favor of Linux, and major vendors such as Red Hat and Novell claim several thousand application solutions for their operating environments.

This growth of applications aboard Linux is reflected in other ways. For example, IDC forecasts that the worldwide 2010–2015 compound annual growth rate (CAGR) for Linux application software revenue will be 24.1%. This includes ERP, CRM, supply chain management, manufacturing, and engineering applications. IDC's ongoing Server Workloads studies, modeled against Linux server shipments, show that business-oriented workloads for Linux, such as business processing and decision support, are growing very quickly.

Similarly, the worldwide CAGR for system infrastructure software, which includes systems management, virtualization software, storage, and security applications, is projected to be 21.4% for the forecast period.

Benefits

IDC research indicates that a value proposition is associated with using commercially supported Linux distributions, particularly for enterprise customers and datacenter deployments.

Commercially Supported Linux

IDC makes the following observations about commercially supported Linux versus self-supported forms of Linux:

- Most IT organizations are not in the business of building and supporting operating systems; rather, they are charged with delivering the information technology application services and productivity tools that other departments and end users within their company need to accomplish the organization's primary business goals. Supporting and maintaining an operating system can often be a distraction that is far more effectively handled through a commercial support provider.
- Using a commercial Linux distribution gives IT continuity and long-term support (including mainstream and extended support periods), as well as support from independent software vendors (ISVs). IDC notes that ISVs will typically develop for a very limited number of operating system variations. In the Linux market, this typically means the top two or three distributions are supported by ISVs. Other distributions are not tested and are not supported by these ISVs. In fact, the majority of commercial applications available for Linux today are certified to run on only two major commercially supported distributions.
- Commercial Linux ensures better compatibility, interoperability, and application support. One of the benefits associated with commercial Linux distributions is that the commercial providers typically are active within the greater industry, will work to promote interoperability and manageability, and will certify hybrid system combinations.
- Regulatory compliance is a concern. Using a non-commercially supported version of Linux may make regulatory compliance complex or impossible for organizations in regulated industries.

Virtualization and Linux

Virtualization is considered a mainstream solution that no longer has significant risk associated with it. With several years of history and broad evidence of customer success using virtualization in conjunction with Linux, it is fair to say this technology is mature today. This mainstream acceptance is helping Linux virtualization adoption move forward.

Virtualization is increasingly a part of the core value proposition associated with Linux distributions. Where the open source Xen hypervisor was originally integrated and delivered with Linux distributions (although it is effectively a block of standalone software), today Kernel-based Virtual Machine (KVM) technology has become the preferred virtualization solution for most commercial Linux distributions. However, Xen hypervisor technology continues to be widely used and is the basis for x86 hypervisor products sold by Citrix and Oracle. We believe that KVM is on the cusp of making measurable share gains within large Linux accounts.

Cloud Computing and Linux

Linux is well positioned to capture a significant role in cloud computing. IDC's view on cloud computing is that it is a natural extension of and enhancement to a well-managed and virtualized infrastructure. We identify three generic forms of cloud computing as follows:

- Infrastructure clouds offer infrastructure services, such as CPU, networking, and storage, often presented as a virtual machine over the Web. Users install their own operating system and applications on top of this type of infrastructure cloud.
- Platform clouds are effectively an operating system hosted in a cloud form factor, providing an application development and runtime environment.
- Application clouds virtualize an entire application stack and what are today often described as SaaS. These services may be consumed in their entirety as a solution or may be delivered as individual services, accessed through application programming interfaces (APIs), which allows those services to be aggregated into another application solution that may be hosted locally in a company's intranet, on a second cloud, or on the same cloud that is providing the application services.

Cloud computing also will have a drastic effect on how computing is consumed and leveraged by end users. The near instantaneous provisioning and fine-grained metering provided by clouds promise to offer an entirely new class of service and utility to business units. Previously, projects could require a substantial investment in hardware and software licenses and weeks of provisioning time, which involved a lengthy justification process. With clouds, resources can be provisioned instantly, and this utility-like model incurs minimal charges. Thus, users are free to experiment and innovate, which can lead to faster time to market and the creation of unique products and services for the company.

IDC believes that Linux will be a key component of many cloud infrastructures and will serve as both the base technology for cloud providers and an operating environment for customers who wish to access the Linux operating system and Linux services that are hosted in a cloud. Linux has gained traction among cloud providers because of its low cost and its ability to be customized. Cloud providers are building cutting-edge, highly complex services and often require source code access and the ability to modify the base code to their highly specific needs.

Platform Considerations

Unix servers have long held a well-deserved reputation for being platforms that are highly reliable and perform well under heavy workloads. In the early 2000s, Linux was first seen as a solution that could perform some of the noncritical roles that Unix held, primarily for network infrastructure and Web infrastructure deployments. Linux proved itself in those roles and over time has continued to mature and scale.

Linux was first seen as a solution that was suitable for handling business-critical deployments aboard higher-end systems, such as mainframe servers, with impeccable reputations for availability, reliability, and scale. With the continued evolution and maturing of servers built on the x86 processor family, extended in March 2010 with the launch of servers built around the Xeon 7500 processor, Linux is able to offer a scale-up story on all major server platforms. Today, Linux is one of two heavyweight solutions on the x86 architecture, but at the same time, it continues to compete with and often replace traditional Unix solutions. However, Linux has found ways to compete with Unix, at times by emulating the best of the Unix environment and in other cases by embracing a differentiated solution using modern software. Some areas to consider include:

- **Uptime.** A migration to Linux from Unix may create the potential for some reduction in uptime, mainly because of the affinity between the operating system and the underlying hardware. Unix servers and the operating systems they run have long been designed by a single company,

allowing the tightly integrated operating system to exploit sophisticated hardware features that simply do not exist in the x86 world. In addition, Unix servers often have the ability to use predictive failure analysis and to support hot-swap capabilities to promote high levels of uptime. These capabilities are working their way into the x86 architecture and the Linux operating system.

- **Storage.** Storage consumption in a Linux environment is likely to be similar to storage consumption in a Unix environment — assuming a like number of servers are in use.
- **Performance.** Unix servers have long set the standard for performance beneath mainframe-class systems, but today they are increasingly seeing direct competition from more scalable x86-based servers. Many customers still see Unix as the right solution for some of their most demanding and most scalable business applications and large databases, but Linux serves as an alternative for the next tier of applications.
- **Skills transfer.** Unix administrative, management, and development skills transfer very naturally to a Linux environment, especially considering that many of the layered software products in use on a Linux server are the same tools that are used on Unix.

Considering Symantec

Symantec offers a wide range of application and data protection and management solutions for Linux server operating environments on both physical and virtual infrastructures. These solutions include storage management, high availability, and disaster recovery and allow organizations to proactively minimize downtime, become disaster proof, and fortify their datacenter operations whether they are just starting out on their virtualization strategy or are moving to a more advanced cloud-based model. Symantec's products support all major enterprise operating systems such as Linux, Solaris, AIX, HP-UX, VMware, and Windows, with excellent performance characteristics across all platforms.

Symantec's approach is to help enterprises on their journey to building a resilient private cloud by helping them achieve the following goals within their Linux environment:

- **Maximize availability of business-critical applications on Linux.** Planned and unplanned downtime can be dramatically reduced, allowing business-critical applications to stay up and running within physical and virtual Linux environments. Organizations running multitiered applications will benefit from Symantec's ability to monitor and automatically recover the complete business service through a single user interface, not only for Linux but also across all other operating platforms. This is done for local high availability, as well as disaster recovery across any distance. Additionally, faster failover can be accomplished by allowing multiple servers to concurrently share the same storage pool. Data recovery can be made simpler by using Symantec's data management solutions such as host-based mirroring and replication. Integrated into these solutions is the ability to do proactive and nondisruptive disaster recovery testing without having to take down a running application that could hurt business productivity.
- **Maximize multivendor asset efficiency.** Storage utilization rates can be significantly increased, thereby reducing capital expenditures and operational costs. With Symantec's Linux-focused storage management products, organizations can optimally take advantage of thin provisioning storage arrays for efficient storage utilization and dynamic multipathing for faster storage performance. Wasted storage can be reclaimed and returned to the array's free storage pool while keeping applications online. In addition, business data can be stored on the appropriate tier of storage dynamically, depending on its importance and the criteria established by the organization. Symantec's Linux solutions offer full visibility across the entire storage layer and include necessary features such as snapshot-based replication, deduplication, and compression so that organizations can achieve higher storage utilization while keeping asset costs to a minimum.

- **Improve Linux-based infrastructure agility.** Organizations can create a lean, agile datacenter by standardizing on a single storage management, high-availability, and disaster recovery solution across diverse hardware devices and operating system platforms whether physical, virtual, or cloud based. By standardizing on infrastructure software, organizations can simplify migrations to another operating system platform, such as Linux, while the data and applications remain online and available. Likewise, organizations can migrate data to new storage infrastructure much faster by not having to copy it to new devices, all while data and applications are up and running.
- **Automate operational tasks efficiently.** Operational processes can be greatly streamlined and automated, thereby reducing operational complexity and costs. The ability to reduce complexity and increase visibility and management across physical and virtual platforms helps organizations reduce their total operating expenditure, which is especially important for organizations introducing Linux into their environments. With Symantec's centralized storage and high-availability management tools, tasks that affect multiple servers can be done from a central interface. All servers using Symantec's software can be observed and managed from a single pane of glass, and administrators can be alerted of potential problems before they occur.

The following Symantec products help enterprises achieve their goals:

- **Veritas Storage Foundation** offers an integrated storage management platform that virtualizes storage across heterogeneous server and storage infrastructure, resulting in more efficient use of existing multivendor assets across physical, virtual, or cloud platforms.
- **Veritas Cluster Server** provides high availability and disaster recovery for physical or virtual servers and applications running on Linux as well as other platforms, enabling a cross-platform solution for minimizing business-critical application downtime.
- **Veritas Storage Foundation Cluster File System** enables multiple servers to concurrently share the same storage pool to help organizations achieve fast application failover, improve the performance of applications that work in parallel across multiple servers, and reduce storage costs.
- **Symantec ApplicationHA** provides high availability and coordinated recovery of applications in VMware and KVM environments, enabling a faster journey to the cloud.
- **Veritas Operations Manager** provides a single pane of glass for all storage management and high-availability needs for virtual, physical, and cloud-based infrastructure.

Challenges

However, Symantec faces the following market challenges:

- **Open source alternatives to its products.** The open source developer community continues to enhance the Linux portfolio with related technologies and already offers clustering and file system software solutions. In most cases, open source–developed solutions tend to lag the maturity of commercially developed solutions, especially when the commercial solutions evolved from Unix solutions that may have been in the market for a decade or longer.
- **Competitive commercial vendors.** Symantec is one of the leading vendors in the markets in which it competes, but other commercial solutions can compete with portions of Symantec's portfolio.

Conclusion

The Linux ecosystem continues to become more robust, and Linux is one of two major operating systems that will be a survivor in tomorrow's IT and will play an instrumental role in cloud computing into the future.

Linux growth has ramped up and has gone far beyond what Unix ever was in terms of unit volume and cross-platform pervasiveness. Confidence in and customer satisfaction with Linux continue to soar, with that confidence translating to the willingness to use Linux as the foundation for business-critical application deployments.

The intersection of the growth and maturation of Linux — along with virtualization and cloud computing and, of course, the very nature of Linux as an open source technology — leads to significant opportunity for Linux into the future.

In the meantime, Linux is successfully being used to address enterprise business needs and should be on the evaluation list for any organization that has used Unix or Linux in the past, when it is time to deploy new solutions for enterprise business needs.

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