



The Benefits of Virtualizing Citrix XenApp with Citrix XenServer

This white paper will discuss how customers can achieve faster deployment, higher reliability, easier management, and reduced server foot print by virtualizing Citrix® XenApp™ using Citrix XenServer™.

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Date Created: January 2008

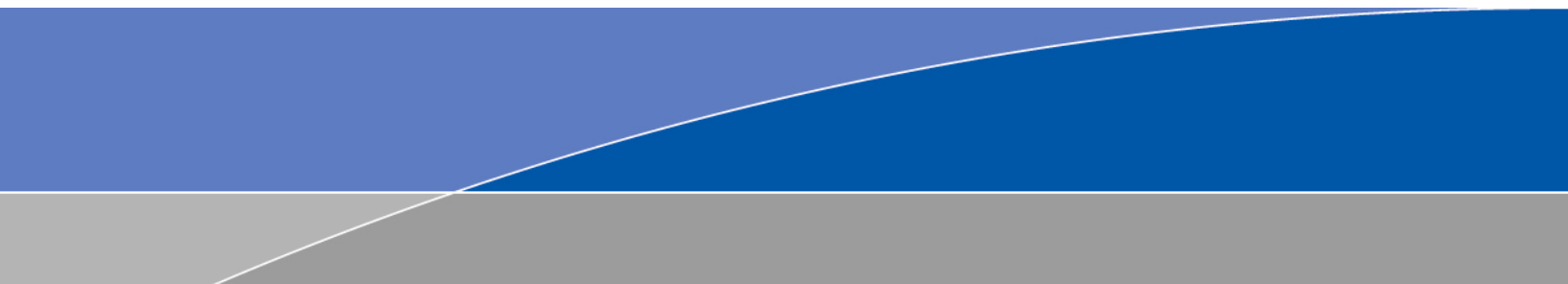


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Summary

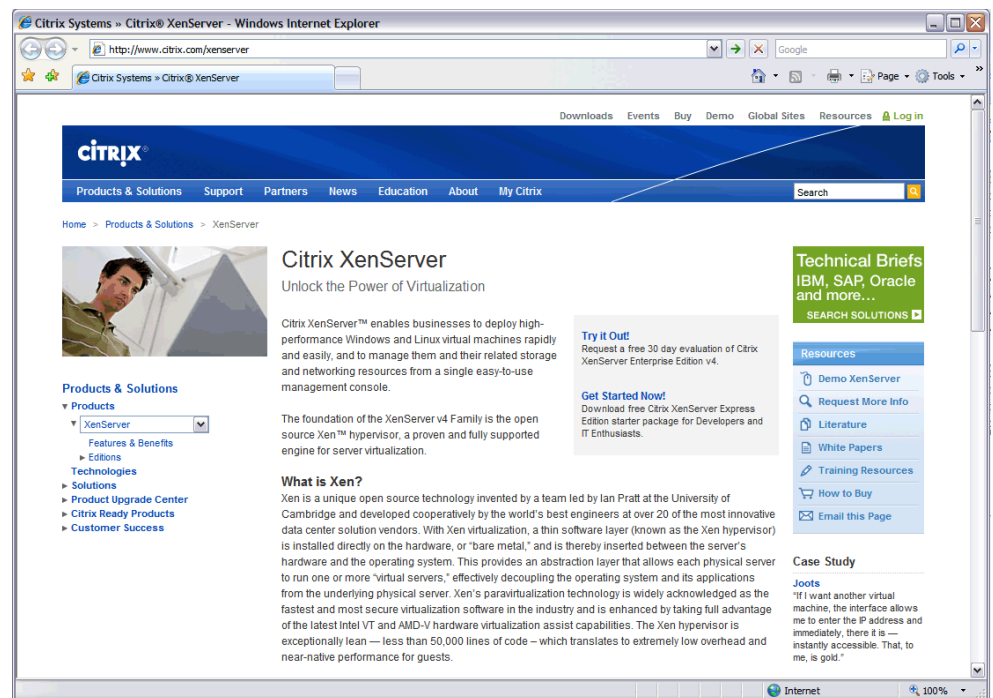
IT organizations are constantly seeking ways to improve capacity utilization, reduce costs, increase security, improve reliability and accelerate response to business imperatives. In 2007 IT began to recognize virtualization as one of the key enablers of these objectives. Now, the challenge for these organizations is to navigate the virtualization stack to enable the selection of the right strategic vendor with the best solution set for their business.

More than 180,000 organizations around the world are Citrix customers who have already experienced the benefit of application virtualization through Citrix XenApp™. They are seeking to benefit from the entire virtualization stack by adding server virtualization to their existing Citrix solution. With Citrix XenServer™, customers can accomplish this through a complete, end-to-end solution from a single vendor. More importantly, the combined XenApp and XenServer solution promises great performance with all of the benefits of virtualization, especially when compared to piece part solutions from other vendors.

Virtualizing Citrix XenApp with Citrix XenServer will result in:

- End-to-end virtualization from a single vendor with support for the complete stack
- Reduced server/datacenter footprint with improved fail-over and redundancy
- Zero-downtime hardware maintenance
- Rapid server, application and capacity provisioning

Historically, these benefits have been offset by prohibitive performance degradation exhibited by other vendor solutions. However, today the server virtualization solution enabled only by Citrix XenServer makes the impact of this resource trade-off much more economically feasible. To download a free copy of Citrix XenServer Express or a 30-day evaluation of Citrix XenServer Enterprise Edition, visit <http://www.citrix.com/xenserver>.



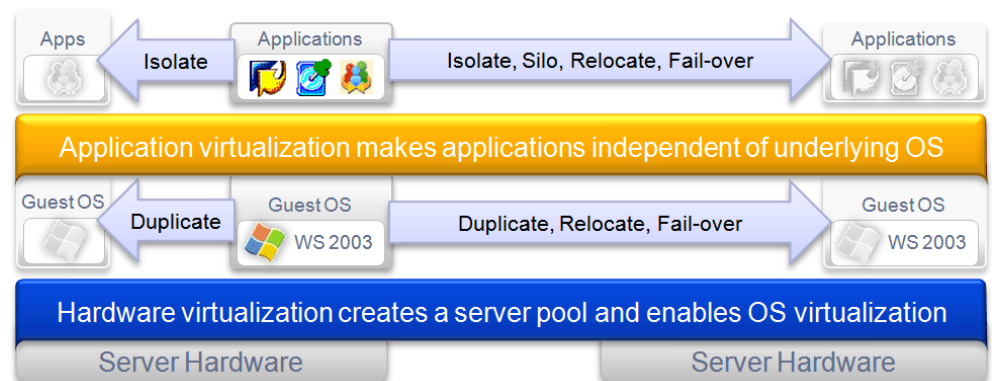
Overview of the Virtualization Stack

While the technologies within the virtualization space continue to evolve, today the server virtualization technology stack consists of three key components. These are:

- **Hardware virtualization (e.g. Paravirtualization)** – a technique that creates a software interface that is similar but not identical to that of the underlying hardware. This enables one physical server to support multiple guest operating systems (OS) at the same time. It also has the added benefit of making multiple physical servers appear to have the same hardware, enabling guest OS's to easily be moved between them. This type of virtualization is typically implemented to improve performance, compatibility and capacity of hardware.
- **Operating System (OS) virtualization** – a technique for isolating an operating system from the hardware it is running on such that the operating system can freely move across hardware devices and can additionally run in parallel with other operating system instances on the same device.
- **Application virtualization** – a technique for isolating an application from the underlying operating system so that applications can run in parallel with others that may traditionally exhibit compatibility issues and move freely across devices and operating systems.

Citrix XenApp is an application virtualization solution that enables the delivery of any application to any device or operating system. Citrix XenServer can further expand customer capability by providing OS and hardware virtualization for XenApp servers. When used together, XenApp and XenServer create a dynamic virtualization stack to enable any layer to be modified without significant impact to the other layers in the stack – a loosely coupled system.

For example, in the graphic below, individual server hardware is virtualized which results in a pool of hardware that can easily be used to manage service workloads more effectively. Virtual servers and their workloads can be duplicated to the same physical server or transferred between physical servers within this hardware pool in real time. Virtualized applications can be siloed, isolated and relocated throughout the environment with drag and drop simplicity – across hardware hosts and virtualized servers and operating systems.

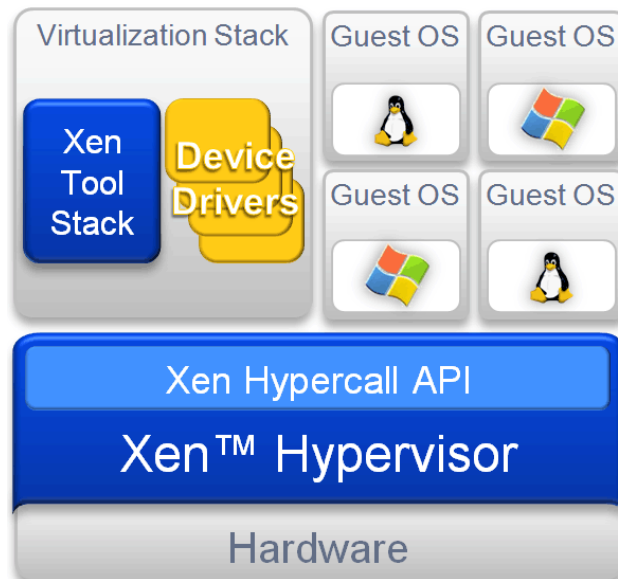


Overview of Citrix XenServer

Citrix XenServer enables businesses to deploy high-performance Windows and Linux virtual machines rapidly and easily, and to manage them and their related storage and networking resources from a single easy-to-use management console.

The foundation of the XenServer Family is the open source Xen™ hypervisor, a proven and fully supported engine for server virtualization. With Xen virtualization, a thin software layer (known as the Xen hypervisor) is installed directly on the hardware, or “bare metal,” and is thereby inserted between the server’s hardware and the operating system. This provides an abstraction layer that allows each physical server to run one or more “virtual servers,” effectively decoupling the operating system and its applications from the underlying physical server. Xen paravirtualization technology is widely acknowledged as the fastest and most secure virtualization software in the industry and is enhanced by taking full advantage of the latest Intel VT and AMD-V hardware virtualization assist capabilities. The Xen hypervisor is exceptionally lean — less than 50,000 lines of code — which translates to extremely low overhead and near-native performance for guests.

Citrix XenServer combines the performance, security, and openness of the Xen technology with XenCenter comprehensive management — a platform perfect for rapid adoption of virtualization for server consolidation, business continuity and software development and test. Citrix XenServer is a native 64-bit virtualization platform with the scalability required by business-critical applications. The highest host and guest CPU and memory limits available, coupled with fine-grained resource controls for CPU, network and disk enable it to deliver optimal quality of service.



Why use Citrix XenServer with Citrix XenApp?

Citrix XenApp is an end-to-end application delivery system that offers both client-side and server-side application virtualization. Its deployment requires a variety of server-side components working in unison to control application delivery to users connecting from any device over any connection. Virtualization using Citrix XenServer provides significant benefits to the scenarios summarized in the following pages.

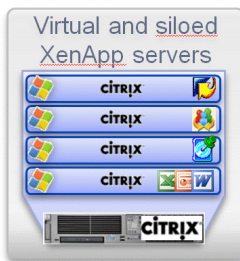
Reduced server/data center footprint



- + Application isolation
- Increases server sprawl
- Underutilized servers

Customers create application silos for a number of reasons. The application isolation technology included with Citrix XenApp is an excellent solution when compatibility issues prevent applications from running on the same server. However, when silos are necessary for other reasons - such as chargeback, regulatory compliance or even ownership - server silos may provide a better solution. But the drawback to this system design comes when siloed application servers experience marginal use. In the example to the left, consider a system with 4 XenApp servers – one hosting SAP®, one for Microsoft Dynamics CRM™, one Oracle® and one for Microsoft Office 2007®. In this scenario, we'll assume that the applications are isolated from each other for compatibility reasons. We'll also assume that in each case the servers are experiencing an average of 20% resource utilization.

- + Application isolation
- + Fewer servers
- + Optimized server utilization

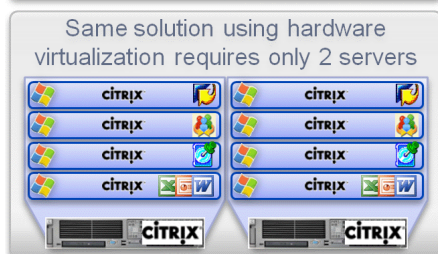


To increase resource utilization and free up hardware for use with other services, these four servers might be better isolated using Citrix XenServer. By creating isolated virtual servers on 1 physical piece of hardware the number of servers needed is reduced from 4 to 1. Accounting for the overhead of virtualization, this single server exhibits an average of 90 – 100% resource utilization. The result is reduced power consumption, freed rack space/server hardware. The same solution can be applied to infrastructure servers which may also have a light workload such as domain controllers, print servers and other components of XenApp (e.g. web interface, data store and licensing server).

Improved fail-over and redundancy



Customers also create silos to simplify application-specific redundancy and fail-over in order to meet requirements for service-level agreements. This works fine for one or two applications. However, with many siloed applications, this design results in significant unused capacity, especially for critical apps that receive infrequent use (See "Reduced server/data center footprint"). To retain the availability benefits of redundancy while reducing physical server footprint, under-utilized XenApp servers can be deployed into the Xen Hypervisor.



In the example to the left, consider a system with 4 redundant XenApp pairs, 2 servers hosting SAP, 2 for Hyperion, 2 for Oracle and 2 for Microsoft Office 2007. We'll also assume that in each case the servers are experiencing an average of 20% resource utilization. A redundant design without hardware virtualization requires a total of 8 servers. The same solution with virtualization requires only 2 servers. As shown in the illustration, this design maintains redundancy and application isolation while maximizing resource usage and reducing the number of servers needed. Accounting for the overhead associated with virtualization, the solution improves capacity usage by increasing average resource utilization to about 90-100% on each physical server. This same solution can be applied to critical components of XenApp such as the data store and licensing server.

Zero-downtime hardware maintenance

In traditional server deployments, hardware maintenance usually means reduced application availability. IT must schedule after-hours maintenance windows to power down servers in order to replace faulty or outdated hardware. With XenMotion, a feature of Citrix XenServer, actively running virtual machines can be migrated across physical servers with no service interruption. This allows essential workloads to remain running, enabling zero-downtime maintenance. A virtual machine running Citrix XenApp (or sets of virtual machines) can be moved seamlessly from one physical server to another in a simple drag-and-drop operation without impacting users or their application sessions.

Rapid server, application and capacity provisioning

With bare metal server installations, expanding XenApp capacity could take hours or even days through manual means. With Citrix XenServer, virtual machines preinstalled with XenApp can be converted into templates, and used for rapid provisioning across a resource pool. New virtual clones of the corporate standard XenApp can be made available in seconds. Using XenApp Application Streaming, the virtual server can be live and delivering applications to users in minutes.

Fast, easy and portable test and demonstration environments

Many organizations have trouble justifying the hardware required to create test, demonstration and training environments. Using Citrix XenServer, IT can have access to copies of real-time production environments to test the quality and impact of applications, hot fixes and configuration changes prior to rolling them out into production. In addition organizations can create complete and portable training and demonstration environments for socializing new services and applications throughout the organization.

Conclusion

While the benefits of virtualization in early generation products were often offset by performance and complexity trade-offs, only a Citrix XenServer solution makes virtualization simple and economically feasible for Citrix XenApp environments as well as other key infrastructure components. The use of XenServer will result in a consolidated infrastructure that enhances availability and continuity of applications while helping to optimize hardware capacity utilization without sacrificing the performance of critical business services. With Citrix XenServer and Citrix XenApp IT can really do much more with less.

Interested? To download a free copy of Citrix XenServer Express or a 30-day evaluation of Citrix XenServer Enterprise Edition, visit www.citrix.com/xenserver.

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