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Better virtualization of XenApp and XenDesktop with XenServer

XenApp and XenDesktop customers can achieve increased consolidation, easier management, improved application availability and excellent performance by virtualizing with XenServer.

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Summary

IT organizations successfully deploy virtualization every day to maximize utilization of existing computing resources and more quickly provision systems, services, applications and desktops. Virtualization helps reduce datacenter capital and operating expenses while increasing the availability of critical business systems. The result is an IT organization with greater agility and a new ability to address even the most complex business imperatives.

This paper illustrates how Citrix® XenServer®, Citrix®XenApp™ and Citrix® XenDesktop® virtualization technologies are complementary and how they can—and should—be combined to increase the financial benefits and management impact for IT and the business. More importantly, this paper will provide some pragmatic methods to combine Citrix server, application and desktop virtualization technology to deliver a more dynamic, agile and cost-effective IT infrastructure.

Brief overview of the virtualization stack

Server virtualization enables one physical server to support multiple workloads simultaneously by decoupling workloads—consisting of an operating system, application set and configuration—from the physical computing platform and running them in separate virtual machines (VMs). Benefits include isolation (running multiple workloads safely and securely on a single computing platform) and workload portability (the ability to move workloads across different physical computing platforms). Advanced server virtualization platforms can even migrate actively running workloads across physical servers, allowing the workload to float across a pool of physical computing resources, which enables IT departments to maximize available computing resources, reduce costs and deliver applications to users reliably and effectively.

XenServer is a free, enterprise-ready, cloud-proven server virtualization platform that contains all the capabilities required to create and manage a virtual infrastructure. XenServer brings together valuable features to deliver immediate benefits to organizations of any size. These features include:

- Citrix® XenMotion®, which allows administrators to move a running VM from one XenServer to another
- Citrix® XenCenter® management console
- XenConvert, a free physical and VM conversion utility
- Disk snapshots
- Active directory integration
- A high-performance, reliable and scalable hypervisor

On top of this base of rich yet free technology, premium versions of XenServer provide a host of features that enable customers to integrate virtual environments with existing storage services and automate key IT management processes. The XenServer premium editions increase IT

flexibility and automation, which in turn lowers costs and helps to transform complex IT environments into simplified virtual computing centers. XenServer improves server utilization, lowers costs and simplifies server administration and deployment of applications across physical and virtual environments.

The foundation of XenServer is the open source Xen® hypervisor, a proven reference standard for server virtualization. The Xen hypervisor is an extremely thin layer of software that resides between the bare-metal hardware and the virtualized operating systems, and allows a physical server to run one or more virtual servers. The Xen hypervisor is widely acknowledged as being the most scalable, robust and secure virtualization platform, delivering the greatest degree of virtualization performance and security in the market. This translates to minimal overhead and near-native performance for virtualized workloads. With more the 45,000 customers worldwide, XenServer is a clear leader in server virtualization.

Application virtualization is a technique for isolating an application from the underlying system and allows IT to run the application on a server in the datacenter but display the application interface on the user's desktop, regardless of the underlying platform or operating system.

XenApp is a Microsoft® Windows® application delivery system that manages and virtualizes all applications in the datacenter and delivers them on demand to office, task and mobile users for optimal application performance and flexible delivery. These applications either run centrally in the datacenter or are streamed to the user's preferred device.

A single copy of the application is managed centrally, reducing support and maintenance costs by as much as 40 percent. With more than 100 million users and 99 percent of the Fortune global 500 as customers, XenApp is the leader in delivering Windows-based applications with the best performance, security and cost savings.

Desktop virtualization abstracts the desktop workload—including the operating system and applications—from the desktop hardware. Combined with server virtualization, multiple desktops can be secured and run on the same host server in a datacenter completely isolated from one another. This desktop computing model is generally referred to as virtual desktop infrastructure (VDI).

XenDesktop is a desktop virtualization and VDI solution that delivers a complete Windows desktop experience as an on-demand service to any user, anywhere. XenDesktop can quickly and securely deliver individual applications or complete desktops while providing a high-definition user experience. Citrix® FlexCast™ delivery technology, included in XenDesktop, enables IT to deliver any type of virtual desktop, on any device. With XenDesktop, IT can manage single instances of each OS, application and user profile and dynamically assemble them which increases business agility and simplifies desktop management. Unlike first-generation VDI solutions that were applicable only to a narrow set of users, XenDesktop with FlexCast is the first product in the industry to support every desktop virtualization model in a single, integrated solution. This approach extends the benefits of virtualization to every employee in the enterprise. With the full integration of XenApp functionality, customers can deliver on-demand applications as a seamless part of their overall desktop management strategy.

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The challenges of application and desktop virtualization

Application virtualization challenges

The challenges of application virtualization include supporting legacy applications, quickly responding to changing IT needs and ensuring protection against failures and disasters.

- **Supporting legacy applications** – Technological shifts, such as the transition from 32- to 64-bit computing platforms, have introduced more complexity to virtual application environments. While many customers are eager to migrate to 64-bit platforms to take advantage of greater memory limits and higher user densities per server, many of these legacy applications are either not supported by or are incompatible with 64-bit platforms. As a result, silos of low-density 32-bit servers must be maintained as the rest of the environment transitions to 64-bit, resulting in more complexity combined with greater management overhead.
- **Responding quickly to IT requirements** – While application virtualization has proven extremely effective in accelerating delivery of new applications, scaling the datacenter to ensure that the computing and storage infrastructure supports the new applications remains a challenge. One example is the widely recognized need to minimize the time associated with server change management, especially since changes must proliferate across development, test and production environments. Similarly, IT is looking for better strategies to provision servers more rapidly, consistently and economically with fewer resources.
- **Ensuring protection against failures and disasters** – The financial impact of planned and unplanned hardware maintenance can be significant. Downtime is especially painful when the delivery of applications is governed by service level agreements or the application is part of a revenue-generating business process, such as point of sale in retail environments, because the uptime provided by an individual server is still linked to the uptime of the underlying hardware. In other words, if a server or component fails or a server needs to be powered down for hardware maintenance while applications are running, all user application sessions on that server will be disrupted.

Desktop virtualization challenges

Challenges related to desktop virtualization include the need to ensure ROI, availability and performance.

- **Ensuring ROI** – Organizations considering desktop virtualization need greater assurances of the return on their desktop virtualization investments. ROI in a hosted desktop virtualization model is largely a function of the availability and performance of the underlying virtualization technology as the centralized nature of desktop virtualization means the desktop will be run in a VM on a host server.
- **Availability** – Uptime is critical. Since virtualization consolidates hundreds of desktops onto a single server, a failure of that server will prevent hundreds of workers from getting their jobs done. Therefore, virtualized host servers require higher service levels than in the traditional client-server environment in which users employ their own desktop machines.
- **Performance** – One of the biggest challenges with desktop virtualization has been the ability to guarantee legacy desktop performance in a virtual infrastructure. The main performance issue has been lag time. When the network is highly congested, users experience a lag between pressing a key on the keyboard and seeing the letter show up on the screen. Network congestion can also cause applications to load slowly. For example, users can wait a considerable time between selecting an application as simple as Microsoft® Word from the start menu and when it actually loads. Real-time applications such as voice, video and collaboration present even greater performance challenges.

Maximizing the number of desktop VMs per server by using the highest performing and most reliable hypervisor technology translates into fewer servers, which means less capital expense for server hardware and reduced operational costs for power and cooling, increasing the organization's return on its desktop virtualization investment.

XenServer – Addressing the challenges of application and desktop virtualization

Better hardware utilization via higher consolidation ratios

While many physical XenApp servers already operate at high utilization rates and may not seem like good candidates for virtualization, several common scenarios exist in which IT organizations can achieve meaningful consolidation of their XenApp servers with XenServer. For example, due to limitations in the

memory architecture in the 32-bit editions of Windows Server® 2003, 32-bit XenApp customers can quickly run into scalability barriers that govern user density on the server due to the Windows memory management architecture that constrains each application to its own virtual 4 GB memory space, which is evenly divided into two parts—2 GB of memory for kernel usage and 2 GB for application usage. Although each application gets its own 2 GB of memory, all applications must share the same 2 GB of application usage space. As users load a XenApp server, the total number of user sessions that the server can support is constrained by the shared kernel memory limits.

One opportunity for consolidation is to virtualize silos of 32-bit XenApp servers and consolidate them on 64-bit servers running XenServer. Consolidation of 32-bit servers on a 64-bit virtualization platform allows the XenApp administrator to break through the 4 GB memory barrier imposed by 32-bit platforms. 64-bit virtualization also allows XenApp servers to be scaled horizontally. In other words, by moving multiple instances of 32-bit XenApp VMs onto a single 64-bit server platform, XenApp customers can increase their XenApp user density per physical server, especially with new 64-bit x86 servers that come with 32, 64 or even 128 GB of RAM pre-installed. Finally, XenServer virtualization allows organizations that are not ready to migrate off their legacy 32-bit applications but wish to replace their outdated 32-bit servers to leverage the capacity of 64-bit servers without an expensive and complex upgrade for the underlying applications.

Similarly, many XenApp customers discover that they can consolidate underutilized XenApp support and infrastructure servers, such as the licensing server, SmartAuditor server or Web Interface, allowing the XenApp administrator to achieve consolidation without impacting user experience or application performance.

Virtualization with XenServer allows XenApp administrators to isolate and consolidate rarely utilized application silos as unique VMs running on a single host server, and consolidate XenApp server farms. The resulting savings in power, cooling and real estate can be significant. Since much of the cost associated with operating a server is due to power and cooling consumption, organizations can now green their IT operations and ultimately consume fewer natural resources. Such green IT initiatives allow businesses to significantly reduce costs through lower utility bills, adopt environmentally progressive social responsibility programs and, in some jurisdictions, benefit from government tax incentives.

Simplified management

Since XenServer is a bare-metal hypervisor, multiple VMs can run on a single physical server without a heavyweight operating system. This bare-metal approach means that there is no underlying host operating system to manage and that the VMs are entirely portable and can be managed entirely within the easy-to-use and lightweight XenCenter management console. With this console, VMs can be started, stopped, moved, created, copied and backed up—all with a couple of mouse clicks.

In addition, the premium editions of XenServer make it possible to achieve greater flexibility in XenApp or XenDesktop deployments by allowing OSs and applications contained in the VMs to be streamed to either the physical or virtual infrastructure from a single virtual disk or golden image using

provisioning services. These capabilities make it easier to maintain, manage, update and patch the application stack as well as ensure a consistent process regardless of whether physical or virtual infrastructure is utilized. As a result, both XenApp and XenDesktop workloads can be delivered on demand rather than be physically installed on top of individual servers. XenServer allows an administrator to create a virtual image of any XenApp or XenDesktop workload to be streamed from network storage to either physical or virtual servers. These target servers do not need internal storage and can be bootstrapped from a single workload image stored on the network. In some scenarios, up to 1,000 desktops can be booted from the same golden image, dramatically reducing storage usage and a significant expense in large XenDesktop deployments.

The use of provisioning services also allows IT staff to rapidly scale up to meet application demands and scale down when demand diminishes. Consider a scenario in which increases in seasonal staff put pressure on IT staff to scale out XenApp application delivery capacity. XenServer can help provision new XenApp or XenDesktop workloads nearly instantaneously to meet demand.

XenServer also helps automate, manage and control test and development processes for XenApp workloads or XenDesktop deployments, providing greater flexibility. This flexibility and control is delivered via Lab and Stage Manager in XenServer Platinum Edition. The lab and stage functions help the IT organization speed development and testing of applications or desktop builds. These functions coordinate the movement of a VM from the development to test to QA to production environments and keep the test environment in sync with the production environment. As a result, IT can share resources across each stage of the cycle, and production environments are armed with the most recent, reliable and fully tested desktop or application builds.

Application availability

XenServer premium editions features—such as workload balancing, high availability, live migration and site recovery—make it simple for IT to provide users with a more resilient and highly available infrastructure than with physical servers. These capabilities help businesses achieve a more agile and responsive IT infrastructure and solve disaster recovery and application availability challenges.

Leveraging XenServer with XenApp or XenDesktop can minimize the impacts of hardware maintenance on application uptime and availability by allowing for real-time maintenance. For example, if IT needs to replace a hardware module in a server, it must typically schedule a maintenance window and power down servers during which the applications and user sessions running on that server are interrupted. Since virtualization separates the application from the hardware, customers can leverage XenMotion, the live migration feature of XenServer, to eliminate planned downtime by migrating actively running VMs from one physical server to another without interruption. As a result, XenApp servers and applications remain running even if an entire server is taken down, enabling zero-downtime maintenance. Live migrations of XenApp virtual servers are seamless: they can be initiated via a simple drag-and-drop operation or command and do not impact the user or the running applications.

The premium editions of XenServer all include high availability for VMs and third-party options for continuous fault tolerant operation, making XenApp and XenDesktop environments highly available. A VM and its associated workloads can be restarted automatically on another physical host should the original host fail. Thus, if the host experiences a failure, all the XenApp or XenDesktop VMs residing on that host will automatically start elsewhere in the resource pool. Extending this benefit is workload balancing (WLB). WLB allows VMs to be dynamically moved within the resource pool based on application requirements and host utilization. Should a XenApp or XenDesktop VM be constrained by demand from other applications running in VMs on the same host, XenMotion can automatically move the VMs to other hosts in the pool. In this way, customers can optimize application performance and ensure that service levels are always met.

Finally, the Site Recovery feature of XenServer helps organizations streamline their approach to disaster recovery (DR) for XenApp or XenDesktop workloads. Site Recovery enables IT to rapidly transfer XenApp and XenDesktop workloads and applications from a primary datacenter to a DR site as part of a simple business process. In addition to coordinating replication, Site Recovery also allows IT to implement the DR plan with just a few clicks. This operation includes booting the secondary environment, switching services and ultimately failing back services once the primary site is back online. By leveraging Citrix® StorageLink™ with Site Recovery, IT organizations can shift applications from one site to another in minutes using a fraction of the physical infrastructure at the disaster recovery site while leveraging their existing advanced storage management software.

Better together – 1 + 1 = 3

While other server virtualization solutions offer similar capabilities, XenServer is uniquely capable for hosting XenApp and XenDesktop workloads. The XenServer platform delivers best in class performance for XenApp and XenDesktop workloads (as well as for other Citrix workloads such as Citrix® NetScaler® VPX). The XenServer performance advantage helps customers reduce both capital and operational costs, which are critical to successful desktop and application virtualization deployments.

These performance benefits have been documented internally as well as through independent third-party testing. The most recent Virtual Reality Check (VRC) testing by Log In Consultants found that XenServer was the clear performance leader—especially when leveraging hardware technologies such as hyper threading. Using hyper threading along with XenServer to host XenDesktop and XenApp workloads allows a system to host more users and deliver better response times. In one case, VRC found that XenServer offered a 20 percent performance advantage over other leading virtualization platforms. Citrix internal testing confirmed these findings. Citrix tests used a similar methodology and found that XenServer could host more desktop VMs per server and boot more desktop VMs faster than any other server virtualization platform.

XenDesktop installations running on XenServer will require fewer servers, thereby reducing costs and improving ROI. Additionally, the more rapid boot time with XenServer means that employees using XenDesktop will experience faster application opens, which will improve user experience and productivity, reduce support calls and lower operational costs.

Citrix also delivers simple packaging and technology licensing. All automation capabilities are bundled into XenServer Platinum, rather than requiring the customer to purchase high value capabilities such as Site Recovery and Lab Manager as ala carte modules. Extra charges for core process automation technology add significant expense to any desktop or application virtualization project.

In addition, with XenServer, Citrix has committed to a transparent per-server licensing model, which means that with XenServer, upgrading hardware (for example, when processor manufacturers add cores to processors and server OEMs add processors to servers) will not drive up virtual software costs as it will with other leading vendors. By committing to licensing at the server, Citrix delivers more value and predictability to licensing costs—which most organizations find extremely important.

Conclusion

Citrix XenServer makes virtualization simple and economically feasible for both Citrix XenApp and Citrix XenDesktop environments and other key infrastructure components. XenServer provides:

- Consolidation for XenApp servers that optimizes use of servers to reduce costs
- Simplified management that makes it easy to achieve flexible deployments, rapidly scale to meet application demands, and better manage and control test and development processes
- Application availability for XenApp and XenDesktop with capabilities that minimize the impact of hardware maintenance on application uptime and availability, and streamline disaster recovery fail over and fail back

XenServer delivers best in class performance for XenApp and XenDesktop workloads, and customers achieve these benefits at half the cost of competitive solutions from VMware.

Interested? Begin by downloading XenServer for free. When you're ready for advanced management capabilities including provisioning services, choose one of three premium XenServer Editions to meet your unique needs.

Citrix XenServer – Free product download

Citrix XenServer, Platinum Edition – Free 45 day trial

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About Citrix
Citrix Systems, Inc. (NASDAQ:CTXS) is a leading provider of virtual computing solutions that help companies deliver IT as an on-demand service. Founded in 1989, Citrix combines virtualization, networking, and cloud computing technologies into a full portfolio of products that enable virtual workstyles for users and virtual datacenters for IT. More than 230,000 organizations worldwide rely on Citrix to help them build simpler and more cost-effective IT environments. Citrix partners with over 10,000 companies in more than 100 countries. Annual revenue in 2009 was $1.61 billion.

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