

# Focus Solution Profile: Citrix XenServer

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## Abstract

With its 2007 acquisition of XenSource, Citrix Systems has expanded its vision to include server virtualization as a key enabler for providing cost-effective and efficient application delivery.

Citrix's history with server-based computing (SBC) and application delivery allows it to leverage its expertise to bring customers a broader range of end-to-end virtualization solutions that provide secure, cost-effective options for virtualizing desktops, applications and servers.

This Focus profile describes the Citrix XenServer solution, including Citrix history, how the company came to have a server virtualization solution, and the architecture of that solution. It describes technical features and differentiators as well as solution strengths and limitations. The profile concludes with a Focus analysis of Citrix XenServer.

## Vendor and Solution Overview

Founded in 1989, Citrix has been a pioneer in providing application delivery solutions. Citrix solutions control access to and delivery of applications to more than 200,000 organizations with 60 million end users with its XenApp (Presentation Server) solution.

In October 2007, Citrix acquired XenSource, the software company that led the development of the open source Xen hypervisor and productized it into the commercial XenServer product line. Now post-acquisition, Citrix remains committed to the open source efforts around the Xen hypervisor, with its architects and technologists continuing to lead the Open Source project.

Since the acquisition, Citrix has continued to add functionality to the XenSource product line, rebranding the entire product line as Citrix

XenServer and delivering its 4.1 release with enterprise management features.

XenServer is part of the Citrix Delivery Center solution family, which also includes XenDesktop, XenApp, NetScaler, and Workflow Studio. XenServer is available in several distinct editions, including XenServer Express Edition, Standard Edition, Enterprise Edition, and Platinum Edition, as well as various OEM editions, which are embedded by leading server manufacturers such as HP and Dell:

**Express Edition**, which is a free version to allow evaluations and proliferation to an unlimited number of servers

**Standard Edition**, which includes multi-server management and is cost-effective for small to medium-sized businesses that don't require a large deployment.

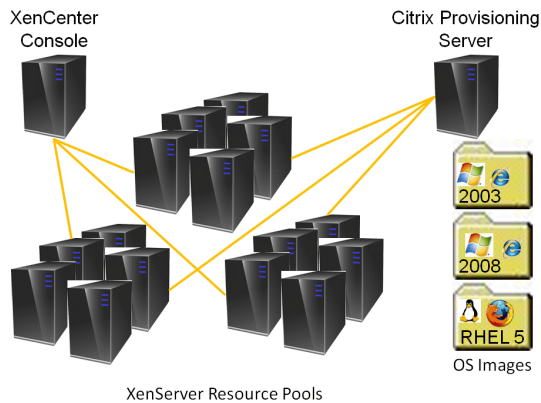
**Enterprise Edition**, which has broader management capabilities, such as aggregated pools and dynamic workload management for large deployments.

**Platinum Edition**, which includes XenServer's full complement of management tools for large deployments that need the flexibility that automation brings. Platinum Edition includes integrated single-image management, and provisioning and streaming for reduced management and storage requirements.

## Architecture

Citrix XenServer delivers and manages server virtualization for one or more physical servers, shown at a high level in Figure 1.

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**Figure 1: XenServer at a high level**

Generally, XenServer is implemented with some number of servers managed together to create resource pools. Each resource pool is clustered so that state for the entire pool is mirrored in every server. Each resource pool has access to shared storage to provide data access to all nodes in the pool. Shared storage is a critical requirement to support advanced capabilities like live relocation of virtual machines (XenMotion) or automatic start-up of a virtual machine on the most available, least impacted server.

Management of XenServer servers and resource pools is accomplished using the XenCenter management console, the graphical interface for XenServer. The XenCenter console communicates directly with the XenServer management services to provide monitoring, management, and administration of individual servers or resource pools. This gives administrators a single view of the entire XenServer infrastructure.

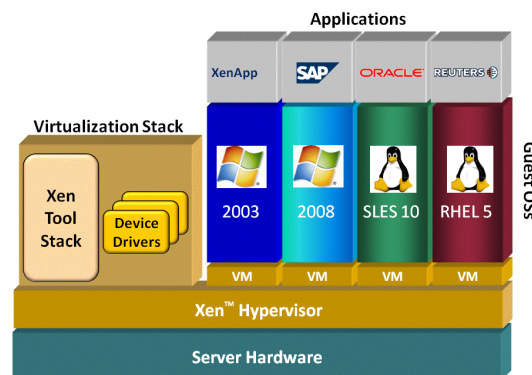
Additionally, XenServer Platinum Edition includes workload provisioning, which will automatically stream the server workload from a centrally-managed golden image to either a virtual machine or physical machine.

When the golden image is updated, each virtual or physical machine utilizing that image is

dynamically updated as well, reducing the number of system images the administrator has to manage and maintain to just the few supported operating system images.

The solution is also unique in that the same golden images can be used interchangeably to provision both physical and virtual servers. Most other virtualization products purely focus on virtual infrastructure.

At its core, XenServer utilizes the Xen open source hypervisor as the foundation for creating and managing virtual machines. Figure 2 shows a high-level architectural diagram of a single XenServer server.



**Figure 2: XenServer architecture**

The Xen hypervisor fully leverages the Intel VT and AMD-V hardware-assisted virtualization, providing high-performance virtualization. Additionally, XenServer adds value on top of the Xen hypervisor by including tools, APIs, and device drivers integrated above the virtualization stack, allowing the hypervisor to remain as small and efficient as possible.

XenServer's small, fast footprint makes embedding it into hardware (e.g., flash memory or other internal storage) trivial. Its small size also aids in enhanced performance and minimizes the attack surface, reducing the security exposure.

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### Technical Features

The XenServer technical features include:

#### **64-Bit Support**

The 64-bit hypervisor has simultaneous support for 32-bit and 64-bit operating systems and applications, up to eight virtual CPUs per guest operating system, and up to 128 GB of physical memory with 32 GB of memory per virtual machine. This provides support for more virtual machines than on a 32-bit only architecture.

#### **Guest Operating System Support**

Broad guest OS support includes support for both 32- and 64-bit editions of Windows and Linux (RedHat, Novell SUSE, Debian, and CentOS).

#### **Optimizing Workloads**

As part of the ongoing integration of XenServer across the Citrix product line, a range of optimization efforts for key workloads is underway, including specific optimization for virtualizing Citrix XenApp to improve its performance when running virtual.

#### **Resource Control**

Granular resource control enables administrators to grow, add, and delete virtual disks, adjust CPU and memory allocations at the VM level, plus adjust network switching and quality of service for each VM.

#### **High Performance**

XenServer provides excellent performance running both Linux and Windows guest operating systems, minimizing VM overhead, as compared to running natively, to around 4% with Linux and 6% with Windows.

#### **Open APIs and CLI**

Open command-line (CLI) and remoteable programming (API) interfaces with XenAPI and back-end storage repository (SR) API as well as a

software development kit, offering support for C, C++, Java, and several scripting languages.

#### **Live Migration of VMs**

XenMotion enables live migration of VMs from one system to another within a resource pool to balance workloads or move VMs off a server temporarily to perform server maintenance without application downtime.

#### **Standard Device Drivers**

XenServer provides standard hardware and drivers for easy implementation and broad hardware compatibility.

#### **Resource Pools**

XenServer offers resource pools, which allow the grouping of physical servers and shared storage for shared authentication, plus resource and configuration management supporting XenMotion (live migration) of VMs to any server in the pool.

#### **Unified Management**

XenCenter provides unified virtualization management of multiple servers and pools, including networking, storage, security, VM life cycle, performance monitoring, and resource allocation, all from a single console. Because XenCenter communicates with distributed Xen management services, it avoids the problem of a management console as a single point of failure.

#### **Citrix Storage Delivery Services**

XenServer provides flexible storage support, via its logical volume manager, of shared and direct-attached storage with volume and file-based access using the Microsoft VHD (virtual hard disk) format. XenServer fully integrates with Fibre Channel or iSCSI SANs and NAS-based devices.

Citrix Storage Delivery Services API enables native integration of storage capabilities, such

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as thin provisioning, data de-duplication, copy-on-write, and snapshots. Citrix and NetApp have jointly collaborated to deliver the first Citrix Delivery Services adapter for NetApp StoreVault, FAS, and V-series devices. Integrations with other leading storage vendors are currently planned, such as Symantec's Veritas Storage Foundation.

### Differentiators

XenServer has a number of capabilities that differentiate it from other solutions. One of XenServer's strongest differentiators is its ability to bridge workload management and provisioning across both physical and virtual servers. In particular, XenServer Platinum Edition allows administrators to define a few golden images that are used by all servers, physical or virtual.

Two key advantages include:

- **Enables highly scalable architecture** – Administrators are required to manage and maintain a few operating system images rather than one per server (virtual or physical). This allows administrators to manage more servers than they could prior to using XenServer Platinum Edition.
- **Reduces server OS management** – Rather than configuring and maintaining hundreds or even thousands of server operating systems, XenServer Platinum Edition allows IT to manage and maintain just one (or several, if necessary). Updates are applied only to the operating system golden image. The updated image is dynamically streamed to the appropriate server without further work on the administrator's part.

XenServer is currently the only server virtualization solution that offers this type of OS provisioning capability across both physical and virtual servers.

Citrix's strategy has always included a strong, shared partnership with Microsoft. Now, the two companies share a strategic relationship in server virtualization designed to ensure interoperability between the XenServer solution and the Microsoft Hyper-V solution.

### Strengths/Limitations

The Citrix/Xen team has put a great deal of work into minimizing complexity and providing the best possible scalability and performance available to virtual servers.

The combination of integrated Citrix products for which XenServer is a foundation provides users with a strong end-to-end solution for deploying and centrally managing all servers, desktops, and applications, using familiar tools.

The base Xen technology was a strong platform to start with, and the additional potential of both Citrix development resources and the Citrix channel hold great promise for the future of XenServer. Alternatively, XenServer to some extent, is playing catch-up in the server virtualization market when it comes to advanced management features.

### Focus Analysis

The continuing work in the open source community, as well as collaboration with Microsoft and other partners, such as NetApp and Symantec, through the use of open APIs, enables the growth of capabilities more quickly than if Citrix were to build it all itself.

As the foundation of the Citrix Xen-based offerings, XenServer is gaining recognition and support in the market. Aggressive schedules building additional capabilities as well as strong partnerships with key market forces have XenServer moving quickly to challenge VMware as the market leader. Focus sees the addition of XenServer as a strong addition to Citrix's solution portfolio, offering significant potential

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particularly for existing Citrix (XenApp) users looking to expand and integrate their use of server-based computing and virtualization.

### About Focus

**Focus** delivers research, analysis, and consulting, focused on systems, software, and storage. Focus areas include server, desktop, and application virtualization/streaming; systems, storage, and enterprise management (physical and virtual); high availability, disaster recovery, and business continuity; blade systems (server, workstation, and PC); storage, network, and I/O virtualization; and storage and storage networking (NAS, SAN, Fibre Channel, iSCSI).

### Focus Research Series: Desktop Delivery Alternatives

This profile is part of the Focus Research Series on Desktop Delivery Alternatives, offering insights into drivers, use cases, decision criteria, and considerations for desktop alternatives, including PC/ workstation blades, virtual clients, server-based computing/terminal services, application virtualization, and streaming. For information, go to [www.focusonsystems.com](http://www.focusonsystems.com).

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