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What Citrix XenServer Adds to Xen Virtualization

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In late 2008, Citrix released XenServer 5 with new and improved features. Just six months later, Citrix is rebranding XenServer 5 to include a free XenServer product and something called Citrix Essentials for XenServer. To get the full value of XenServer, understand how XenServer augments the open source Xen hypervisor.



Executive Summary

With XenServer now being offered at no-charge, Citrix hopes to dominate the emerging cloud computing market while continuing to challenge VMware. Ambitions aside, the capabilities that Citrix debuted in XenServer 5 certainly strengthened its position. New and improved features in the latest version include:

- » A built-in management console.
- » Advanced storage management APIs.
- » The ability to group virtual machines.
- » XenMotion (similar to VMware VMotion).

Citrix has positioned XenServer and the deluxe Citrix Essentials for XenServer as the only enterprise production-ready platform based on the Xen hypervisor. This note will look at what Citrix brings to the Xen party and how the new cost model can save the enterprise money in virtualization implementation.



Technology Point

In March 2009, Citrix announced new pricing for [XenServer](#) that makes the product free for all but the most high-end enterprise automation features. The announcement came only six months after Citrix unveiled its new and improved XenServer 5. The new XenServer and [Citrix Essentials for XenServer](#) are in essence XenServer 5 under the hood, only the pricing and packaging have changed.

XenServer is a platform for managing and optimizing virtual server infrastructures. Management, not basic virtual partitioning of a server, is where various vendors will differentiate the value of their offerings. Typically, the hypervisors are free and the management layer carries the licensing costs, however Citrix is altering that clear division by making much of the XenServer management stack free as well.

Citrix has positioned XenServer as a full-featured alternative to industry-leading VMware for enterprise production server consolidation. With the new pricing, Citrix hopes XenServer will also gain a foothold with cloud computing providers and others that already use the open source Xen hypervisor. Amazon, for example, uses the Xen hypervisor in its compute cloud services.

XenServer 5.5 Release

Citrix has been fast and furious in its releases of XenServer as it goes head-to-head with market leading VMware. In June 2009 yet another upgrade, XenServer 5.5, was released. For more information, refer to the ITA Premium research brief, "[XenServer 5.5: Keeping Up with Citrix's Latest Update.](#)"

What It Is & How It Works

To understand how XenServer competes as an enterprise virtualization platform, it is important to first understand the difference between XenServer and the Xen hypervisor. Developed as an open source software project beginning in 2002, Xen is the hypervisor at the heart of several different competing offerings including Citrix XenServer, Virtual Iron Enterprise, Sun xVM and most recently, Oracle VM.

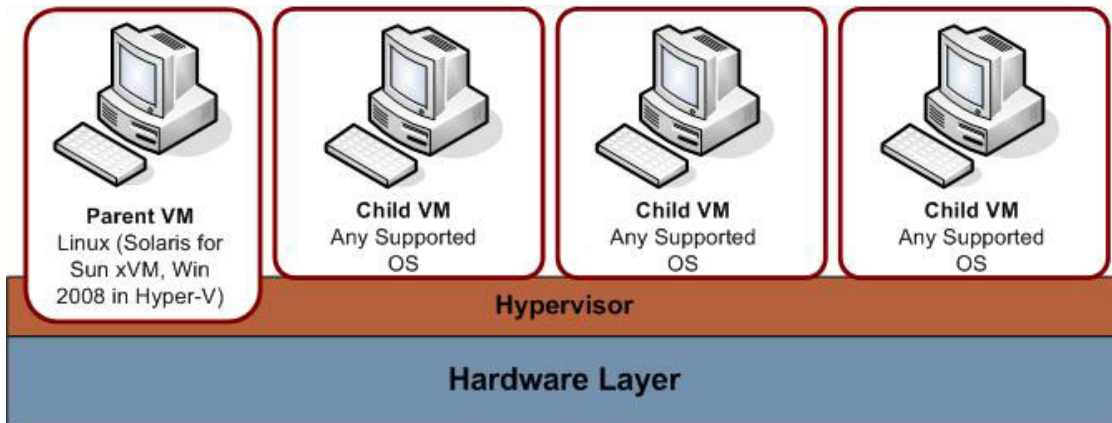
Originally focused on virtualizing open source operating systems such as Linux, Xen has more recently gained the ability to host Microsoft Windows virtual machines. This has broadened Xen's appeal beyond Linux, since Xen is included in a number of Linux distributions including RedHat and SUSE, and made it a clear competitor with VMware's ESX hypervisor. A third hypervisor competitor is Microsoft's Hyper-V.

Xen is a Type 1 or "bare metal" hypervisor. It does not require an underlying operating system but runs on the hardware. The Xen hypervisor typically has a parent virtual machine (VM) that acts as a management console (see Figure 1). The parent machine usually runs a Linux operating system, though Sun's version runs Sun Solaris as the parent and Microsoft's Hyper-V has a similar architecture and uses Windows 2008 as the parent.



Figure 1. Hypervisors Are Typically Managed Via a Parent Virtual Machine

Source: Info-Tech Research Group



Citrix became a major backer of the Xen hypervisor when it purchased XenSource in 2007 (see sidebar). For Citrix, “Xen” is a branding term which means “Virtual.” Citrix’s virtualization play, however, extends beyond the Xen hypervisor. Differentiation between virtualization offerings, and between Xen offerings, comes from the value added management features enabled by the parent console.

The Engine and the Car

Citrix uses an engine-and-auto analogy to explain the relationship between the hypervisor (the engine) and XenServer (the car). The engine provides the performance, and the car takes it places it can’t go on its own.

Using a similar analogy for the VMware world, ESX and ESXi hypervisors would be the engines while the Virtual Center manager and all the other management tools found in Virtual Infrastructure 3 would be the car.

Citrix Is Serious About Xen

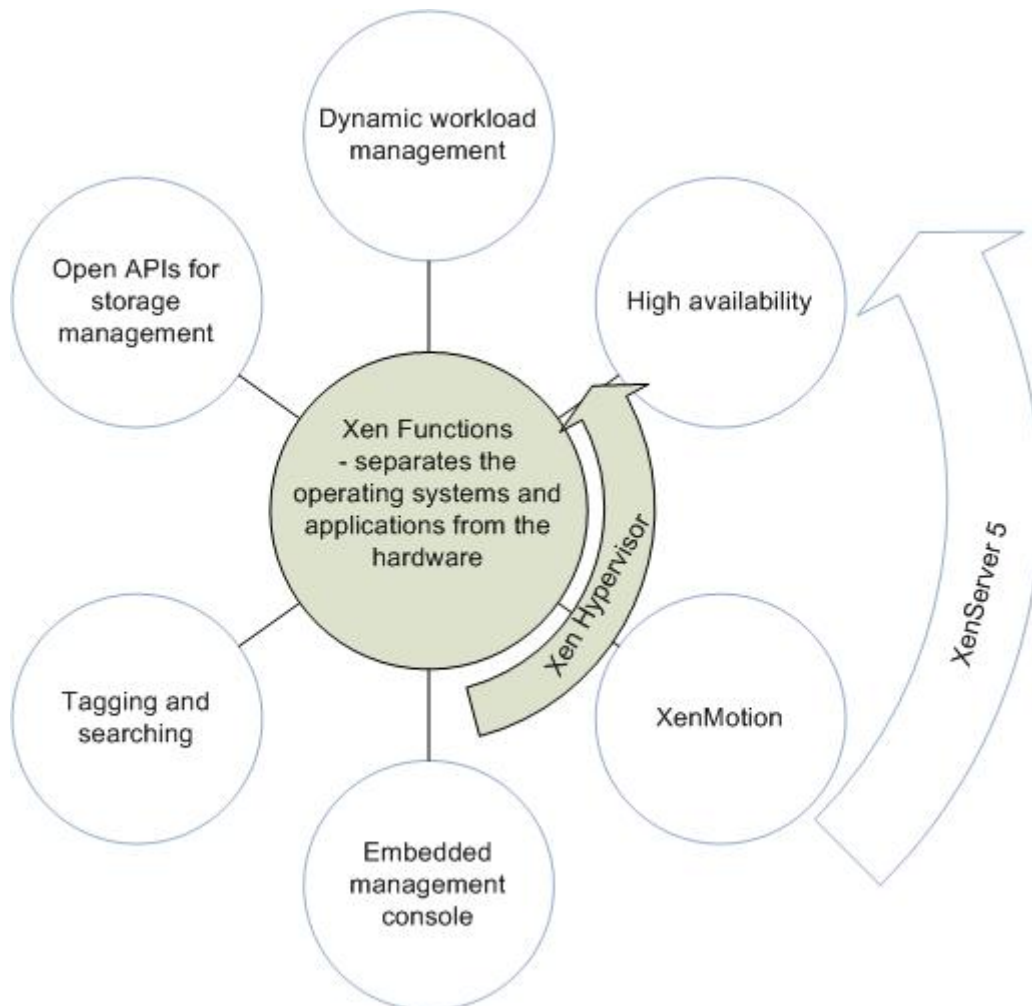
Citrix has made Xen a key marketing term since the XenSource acquisition, renaming many of its brands with the Xen moniker. For example, Citrix flagship application hosting server (Presentation Server) has now become XenApp. Citrix’s desktop virtualization product is called XenDesktop. For more information, see the ITA Premium research brief, “[XenApp Server: For Citrix, Xen Means Virtual.](#)”

Citrix investment in Xen, however, is more than just a branding exercise. XenServer is a fundamental part of Citrix product roadmap and several former employees of XenSource now have key positions within Citrix. The most visible example is Citrix Chief Technology Officer and virtualization evangelist [Simon Crosby](#), who was previously CTO of XenSource.



Figure 2. Xen Hypervisor and XenServer Functions

Source: Info-Tech Research Group



How the management layer features in Figure 2 work:

- » **Embedded Management.** Going beyond the command line, Citrix has a built-in graphical interface with available management functions that include performance monitoring and capacity planning tools. By comparison, with Hyper-V and VMware, you need to purchase additional management tools such as Microsoft's System Center Virtual Machine Manager (VMM) for this kind of functionality.



- » **XenMotion.** Similar to VMware's VMotion, XenMotion allows for patching and upgrading of servers without downtime or affecting end users. If Server A must undergo maintenance, XenMotion copies the memory and the machine state from Server A to Server B. Server A can then be updated, brought back up, and the VMs can be moved back. Part of this functionality is Citrix's maintenance mode, which remembers what VMs were moved and automatically restores them to the server once maintenance is complete.
- » **High Availability.** If a host server fails, the VMs are automatically restarted on another available server according to priority and workload. Additionally, if a management server fails, another server can take over. Citrix management is not the responsibility of one server but a pool of servers that share the load and circumvent the issue of a single point of failure.
- » **Dynamic Workload Management.** XenServer can manage workload streaming, according to resource availability and other factors, for both physical and virtual servers. This works both as new users log in or in situations where a server fails and the virtual instances have to be reassigned. The biggest advantage here is that it can do this with both virtual and physical machines.
- » **Storage Management APIs.** Xen doesn't have its own file system like VMware, but rather manages storage using the individual storage system's own management tools. Buyers will want to check whether their storage is supported. Both EqualLogic and NetApp have tie-ins to manage storage for functions such as snapshotting and replication.
- » **Tagging and Searching.** Administrators can add metadata to identify groups. This is especially useful for enterprises supporting a large number of machines, since IT can tag machines by group, application, and so on. For example, if a security update is available for Internet Explorer, the administrator can search for all machines tagged "IE" and push out the required update.

The New Pricing Model

With the release of XenServer 5, Citrix standardized four editions: Express, Standard, Enterprise, and Platinum (see Table 1). In the new pricing model, features that were available in the previous standard version, and some of the Enterprise edition features, are now free (see Table 2).

Table 1. XenServer 5 Editions and Prices

Source: Citrix

| XS-Version | Capabilities | US Price |
|------------|--------------------------------|----------------------|
| Platinum | » Dynamic Workload Management. | \$5000 per 3 servers |



Table 1. XenServer 5 Editions and Prices (Continued)

| XS-Version | Capabilities | US Price |
|------------|---|-------------------|
| Enterprise | » High Availability. » XenMotion. | \$3000 per server |
| Standard | » Multi-server management. » VLAN configuration. | \$900 per server |
| Express | » Single-server virtualization with up to two processors on a single host machine. » Unlimited memory and VMs. » OEM edition built into HP and Dell x86 servers with a license key upgrade. Other vendors will probably make it available soon. | Free |

In the free XenServer, Citrix has moved the bar dividing free from for-pay. Where free was previously limited to an express version that could only be used on a single two-processor server, the new XenServer can now manage virtual machines across an unlimited number of host servers. This management includes live migration of running servers for zero downtime management.

More advanced datacenter automation, as well as flexible and elastic virtual machine provisioning, are now part of the Essentials line. The superior potential of Essentials includes the ability to:

- » Test and develop the application and move it to production in a completely abstracted environment.
- » Manage the relationships between workloads that comprise a multi-component application.
- » Automate the scaling of computer resource capacities as workloads change.
- » Ensure high availability and rapid recovery of production workloads.



Table 2. XenServer and Citrix Essentials

Source: Info-Tech Research Group

| XS-Version | Capabilities | US Price |
|------------------------------|--|-------------------|
| Platinum | » Dynamic provisioning services (physical and virtual). » Automated lab management. | \$3000 per server |
| Citrix Essentials Enterprise | » Historical performance reporting. » E-mail alerting for performance and errors. » High availability. » Integrated storage management with StorageLink™. » Workflow orchestration. » Dynamic provisioning services (virtual only). | \$1500 per server |
| XenServer | » Native 64-bit Xen hypervisor. » Windows and Linux guests. » Unlimited servers, VMs, and CPUs. » XenCenter management console. » Multi-server management. » XenMotion live migration. | Free |

In addition to Essentials for XenServer, Citrix has also released a product called Essentials for Hyper-V. Taking the car and engine analogy a little further, Essentials for Hyper-V has the advanced management and automation features of XenServer, but has swapped the Xen Hypervisor engine with Hyper-V. It is priced the same as Essentials for XenServer.

Key Considerations

The price model changes to XenServer opens up considerable opportunity for the enterprise to save on virtualization. It is important, however, to consider which features are part of the free XenServer and which are part of Essentials. Table 3 looks at some of the key features of XenServer 5.



Table 3. Key Features of XenServer/Essentials

Source: Info-Tech Research Group

| Features | XenServer | Essentials |
|-----------------------|--------------------------------|--|
| Embedded Management | Yes | Yes |
| XenMotion | Yes | Yes |
| Storage Management | Integration with storage APIs. | Advanced storage resource management with Citrix StorageLink . |
| Workload Management | No | Yes |
| High Availability | No | Yes |
| Tagging and Searching | No | Yes |

Cost Saving Scenario

Consider a project to consolidate and manage 35 servers on five physical hosts. This 7:1 consolidation ratio would include:

- » A physical to virtual (P2V) migration of the server, as well as the creation and monitoring of virtual machines across all five physical hosts, administered from a single management console.
- » Live migration (non-disruptive movement of VMs from one physical host to another) to balance physical resource utilization across physical hosts, as well as for managing physical host maintenance with zero downtime.

Previously, Citrix XenServer 5 Enterprise Edition with XenMotion would be required for this example, at a cost of \$5,000 per server. The free XenServer can now be used at a cost savings of \$15,000 for five servers. In comparison, VMware Enterprise for those five servers would cost approximately \$25,000.

If the project required high availability and advanced storage management, Citrix Essentials for XenServer would be required at a cost of at least \$1,500 per physical host server. This would, however, still be \$10,500 cheaper than the previous XenServer 5 Enterprise Edition and \$17,500 cheaper than VMware.



Key Takeaways

VMware remains the leader in both market share and maturity of its advanced management features. However, Citrix made a significant upgrade to their virtualization offerings with XenServer 5 late in 2008. Now with the free XenServer and the lower-cost Essentials versions, Citrix will put significant pressure on VMware and pull ahead of other competitors in enterprise virtualization.

1. **Citrix is positioned as an enterprise-ready competitor for VMware.** According to Citrix, XenServer 5 went through over 130 enhancements since version 4, addressing many of the concerns enterprises had about deploying Citrix. Large enterprises are not the only ones who can take advantage of the current improvements. Enterprises of all sizes will reap the same benefits.
2. **Acceleration of VM adoption.** Citrix is hoping the removal of price barriers will encourage accelerated adoption of VMs for production server environments. This is particularly true among those with proven efficiency using Xen hypervisor for testing and development. Enterprises that are highly cost sensitive, or averse to the costs of VMware, will take a second look at Citrix.
3. **Opportunity for small enterprises.** Small enterprises have been an area of growth for server virtualization. With free XenServer, small enterprises can build and manage virtual server infrastructures at no additional cost for software management tools. VMware has SMB bundles and pricing, but these start in the \$1,000 per server range and don't include enterprise features like live migration (though they do include high availability which Citrix charges for in Essentials).
4. **Getting Citrix into the cloud.** Xen is the hypervisor of choice for many external cloud computing offerings. Typically these vendors use the free hypervisor and build their own management tools. By making XenServer free, Citrix hopes more cloud providers will also use XenServer tools and eventually also adopt Essentials. This will create opportunities for a federation of application provisioning between enterprise virtualized infrastructures using Xen, and external Xen-based cloud compute services.
5. **Select-an-engine.** Microsoft and Citrix have a longstanding alliance that continues with Citrix Essentials for Hyper-V, which combines the Hyper-V "engine" with the XenServer "car". For enterprises that have already made an investment in Hyper-V, Citrix brings advanced management and automation.

Bottom Line

In late 2008, Citrix released XenServer 5 with new and improved features. Just six months later, Citrix is rebranding XenServer 5 to include a free XenServer product and something called Citrix Essentials for XenServer. To get the significant value of XenServer, understand how XenServer augments the open source Xen hypervisor.



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