



Citrix and the Virtualization Juggernaut

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Management Summary

Server virtualization has become a key technology in enterprise IT infrastructure, providing versatility, scalability, mobility, and cost savings through use a variety of different strategies. The market has been dominated by *VMware* and *XenSource* in the server virtualization area, with Citrix commanding the application virtualization territory. While Microsoft has offered some virtualization solutions through its *Virtual PC*, *SoftGrid*, and *Terminal Services* products, it has generally taken a more passive role in this market. Apart from some rivalry between open source-based *XenSource* and proprietary *VMware*, all four companies generally have collaborated, with both *XenSource* and *VMware* working closely with Citrix and Microsoft through longstanding relationships.

However, as virtualization has become of increasing importance, and the benefits of a unified across-the-board strategy have become clear, this situation has changed. Citrix acquired *XenSource* in October 2007, expanding from its core application virtualization market into the adjacent markets of server and desktop virtualization with its new *XenServer* and *XenDesktop* product lines. Microsoft also began moving full-tilt into the virtualization space in 2008 with its new *Hyper-V* virtualization platform and increased promotion of its low-end products in this space, while at the same time extending its partnership with Citrix across all aspects of server, application, and desktop virtualization.

Although the Citrix collaboration with Microsoft may be part of a short-term Microsoft strategy to fend off *VMware* while it matures its own virtualization offerings, the result has been to weaken *VMware's* position – even though it remains dominant in the market. The spotlight has shifted to the Citrix strategy, where a new integrated suite of tested virtualization products is being rolled out. Citrix has now announced its game plan for how it will integrate *XenServer* and *XenDesktop* into its product line. Read on for the details.

Virtualization Technology

Virtualization is expected to be one of the cornerstones of next generation enterprise infrastructure, yet how it is done and what it is expected to accomplish still varies according to vendor strategy and specific requirements. There are three basic areas of virtualization, each yielding a different set of benefits. These are:

- Server virtualization
- Desktop virtualization
- Application virtualization

Server virtualization is the creation and provisioning of multiple virtual machines on a single server, making it possible to halt server proliferation, improve efficiency and manageability, and save money. Virtual servers have numerous

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advantages over physical servers, such as capability to be set up and taken down immediately, capability to consume resources that otherwise would be wasted, and ability to be moved immediately to other hardware in case of failure. Server virtualization is really at the core of virtualization technology, and there are a number of ways of going about it. With a hypervisor, virtualization is at the “bare metal” level, providing its own minimal runtime environment (without operating system), between the hardware and the supported virtual machine operating systems. A hosted approach provides a virtualization server on top of a standard operating system, which then runs virtual machines on a third level. Citrix *XenServer* and VMware *VI3* are good examples.

Desktop virtualization involves running a desktop operating system like *Windows Vista* on a centralized server in the datacenter and delivering it virtually to end users. Application virtualization products, like Citrix *XenApp* and Microsoft’s *Terminal Services* platform, can be used to virtualize an entire desktop if a large group of users share the same desktop (as in a large call center), but this is not generally appropriate for virtualizing desktops for mainstream office workers. Purpose-built desktop virtualization products like Citrix *XenDesktop* and VMware *VMD* are now coming on the scene to address this new growth market. Operations are also greatly enhanced by much greater bandwidths in networks and a considerable increase in processing power at both server and client ends. (Streaming multimedia applications across desktops still remains problematic in some situations, however.)

Application virtualization involves hosting an application on a central computer, and accessing it on a remote system as though it were

local. This has been the special province of Citrix. Virtualized applications provide central management, thin client access, and efficient resource usage.

Virtualization is now moving away from the initial goals as the technology matures and competition becomes fiercer. Original goals were to save money and improve flexibility through server consolidation, ease of deployment, quick disaster recovery, and rapid provisioning. The new demands are to support virtual machine relocation better, to balance workloads dynamically, and to enforce security policy, as well as to improve overall performance.

The Citrix Virtualization Suite

As part of its consolidation efforts, Citrix announced its *Citrix Delivery Center* product strategy last month. (See Exhibit 1, below.) Citrix has long defined its overall business as “application delivery”. While much of the industry today is focused on virtualization as a way to reduce server overhead, Citrix believes the ultimate value of virtualization is to make the entire end-to-end IT infrastructure more flexible. The Citrix Delivery Center product strategy addresses this challenge by helping customers transform static data centers into dynamic “delivery centers”, where applications and desktops are delivered on-demand to end users from a central location rather than installed and managed physically on each server and PC. The Citrix Delivery Center product family includes five primary components:

- *XenServer*
- *XenApp*
- *XenDesktop*
- *NetScaler* and
- *Workflow Studio*

Exhibit 1 – Citrix Delivery Center



Source: Citrix

XenServer is an enterprise class product for virtualizing application workloads on datacenter servers. Citrix is offering *XenServer Express Edition* as a free single-server product and features a product range up to *XenServer Enterprise Edition*, which is a completely-supported version suitable for use at the enterprise level. The latest *XenServer Platinum Edition* includes capabilities to address both virtual and physical servers and to provision application workloads dynamically across all servers. This represents a further step in the migration of virtualization technology to the infrastructure and infrastructure management core. It was launched officially at the end of January at *Citrix Summit 08* in Orlando. The latest release, *Citrix XenServer 4.1*, is now available, while the Platinum Edition version, supporting management of physical as well as virtual servers, will be available in the second quarter of 2008. Server vendors, including HP and Dell are now shipping platforms with XenServer integrated into the server itself.

XenApp (previously named *Citrix Presentation Server*) is an application virtualization solution that allows customers to centralize *Windows* applications and deliver them on demand to end users in any location, an approach that reduces costs and improves data security and regulatory compliance. XenApp virtualizes applications on the server side, extending Microsoft's Terminal Services technology, or streams them to the end user's machine (which might be ideal for mobile users). For many enterprises, XenApp has become a standard for delivering *Windows* applications.

XenDesktop is a complete *Windows* desktop virtualization system, touted as the first "comprehensive Virtual Desktop Infrastructure (VDI) system." It uses XenApp's high-speed ICA¹ virtual delivery protocol to improve the end-user experience.

NetScaler is an application networking system that delivers Web-based applications and accelerates application performance. Currently, it is deployed by corporate customers to deliver enterprise Web applications, as well as many of the largest consumer Web sites.

Citrix Workflow Studio also was recently announced and is designed to allow enterprises to orchestrate communications across multiple Citrix products, as well as third-party solutions.

The Citrix Delivery Center product family (as shown on the previous page) also includes a variety of supporting products, such as *Citrix Access Gateway*, *Citrix EdgeSight*, *Citrix Password Manager*, *Citrix Provisioning Server*, and *Citrix WANScaler*. The supporting products are also available as standalone products.

Xen and the Open Source Connection

Two of the *Citrix Delivery Center* product lines, *XenServer* and *XenDesktop*, use the open source Xen hypervisor as a key part of their architecture. If Xen is the "engine" built by the open source community then XenServer and XenDesktop are the proprietary "cars" that Citrix builds around that engine.

In addition to Citrix, key contributors to the Xen project include the leading processor, server and OS vendors, including Intel, AMD, HP, and IBM. This focus is reflected in the Xen paravirtualization architecture, which takes full advantage of the hardware assisted-virtualization capabilities available in Intel's VT and AMD's AMD-V processors.

Citrix is not the only company that uses the Xen engine in its products. Numerous operating system vendors, including Sun, Oracle, Red Hat, and Novell, use the Xen engine in their Linux distributions. The Xen engine is also used by standalone virtualization infrastructure vendors, such as Virtual Iron, that compete directly with Citrix XenServer and VMware VI3.

While the Xen engine offers some key advantages to Citrix, Citrix does not attempt to gain any revenue from the engine itself. Bottom line, the Xen-based technology completes Citrix's virtualization portfolio by adding a hypervisor with virtual machine management capabilities that can be applied to both the server and desktop arena. Citrix has recently also acquired Arden (now *Citrix Provisioning Server*), to provide OS provisioning capabilities and add to its capability to deploy a robust solution for both the server and desktop virtualization.

Citrix's commitment to the XenServer product range is demonstrated by more than 50 enhancements in the new XenServer release, as well as specific optimization for XenApp. Citrix has doubled the XenServer development team and continues to contribute actively to the open source Xen project.

¹ Independent Computing Architecture.

Competing Choices

Citrix historically has been aligned with Microsoft, and both XenServer and XenDesktop will be interoperable with Microsoft Windows, particularly with Microsoft *Windows Server Virtualization* (now *Hyper-V*). The alliance between Microsoft and Citrix has recently been renewed. Both companies view virtualization as an infrastructure component that is headed for commoditization, and are emphasizing upper level strategies, such as management, portability, and backup. This strategy differs from that of VMware, which remains the dominant player on the server side. VMware's approach is to emphasize creation of a fully virtualized infrastructure, where virtualization is ubiquitous rather than an add-on technology. Already, however, some commoditization has begun, started – somewhat ironically – by VMware itself, which offered a free version of its Server product in 2006. Like Citrix, VMware is also providing an embedded virtualization hypervisor (VMware *ESX Server 3i*) in servers from Dell, Fujitsu-Siemens, HP, and IBM; these servers should be available in April.

Competition between Citrix and VMware is likely to become increasingly fierce. In some respects, it is a struggle for the very soul of corporate infrastructure. Management and storage tools and technologies are now the most important areas of development, and Citrix's upcoming XenServer Platinum Edition, with management of both physical and virtual servers combined is an escalation of this struggle. Meanwhile, there is Microsoft to consider. Though late to the table for strong virtualization technologies, Microsoft has a vision of integration that could push the industry toward use of Microsoft management tools. Its new Hyper-V virtualization server for the 64-bit environment could also make waves, though it is still in beta. Consolidation of the Microsoft strategy could still take some time, and by then, there will have been further evolution in offerings from both Citrix and VMware.

Conclusion

Virtualization is becoming a key component of corporate infrastructure, and the media spotlight has suddenly turned to this area – though the technology has been available in some form since the earliest days of IT. Current market leaders are Citrix and VMware, both of which are offering complete product suites addressing

enterprise level virtualization requirements. Citrix's acquisition of XenSource was a key move in this space, because it brought together Citrix's highly-regarded application and desktop virtualization products with the well-known *XenServer* virtualization product line. The acquisition brings Citrix right up against VMware, in that both are providing a wide and complete array of virtualization offerings, and both have free versions to ensure trial use, as well as a suite of integrated management components to provide upper level services.

Citrix and VMware are also equally matched and equally capable in developing industry alliances, with Citrix exploiting its existing Microsoft relationship, and VMware exploiting its hardware industry alliances to ensure that the embedded version of its technology goes out the door with upcoming server products. VMware retains the advantage in terms of overall deployments on the server side – it is, after all, generally considered to have been the first in this product space. However, with the XenSource acquisition, Citrix is coming up fast, particularly as the next generation of virtualization emerges and the focus turns toward management issues and moves beyond the data center to the desktop, where Citrix has traditionally been strongest.

Now, you have choices to make, to meet the server virtualization needs of your enterprise. This is a good situation but requires close attention to your specific requirements.



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