TEST REPORT
Tolly.

Virtual Desktop Implementation and Maintenance:
VMware View 4.6 Premier vs. Citrix XenDesktop 5 Platinum

Executive Summary

Deploying server-hosted virtual desktops can provide significant benefits to IT organizations. By moving desktop computing environments from user desktops on physical PCs to virtual machines hosted on servers in the data center, companies can realize significant cost-of-ownership reductions associated with the ongoing support and maintenance of their end-user computing resources.

As Desktop Virtualization technology matures, the latest versions of VMware View and Citrix XenDesktop represent an evolution in the Virtual Desktop Infrastructure (VDI) solutions towards ease of management and workflow efficiency, while aiming to deliver a rich user experience that is closer to using a physical PC. VMware's PC over Internet Protocol (PCoIP) and Citrix's HDX technologies make advances towards delivering smoother multimedia experience comparable to a physical PC. While Citrix XenDesktop 5 introduced several improvements - such as Machine Creation Services (MCS) and Desktop Studio - for creating and managing virtual desktops, VMware View 4.6 continues to offer a significantly simpler management and administration workflow using a single management interface. In contrast XenDesktop 5 continues to require the use of multiple interfaces - Desktop Studio, Provisioning Services Console, Active Directory, etc.. Combining these usability advantages with the lower licensing costs for a 1000 user deployment, View 4.6 delivers savings in both acquisition and ongoing administration costs over XenDesktop 5.

The Bottom Line

VMware View 4.6 Premier:

1 Saves customers between 34% and 67% in licensing costs compared to Citrix XenDesktop 5 Platinum for a 1000 user deployment

2 Provides end-users a much more consistent multi-media user experience using PCoIP

3 Reduces management complexity by allowing the management of all virtual desktop administration through a single web-based GUI

4 Is much easier to upgrade from View 4.5 to View 4.6 compared to the effort to upgrade Citrix XenDesktop 4 to XenDesktop 5

5 Installs more rapidly with fewer steps and less manual intervention (6 steps for VMware View compared to 14 steps for Citrix XenDesktop)

Virtual Infrastructure Components
Comparison of Citrix and VMware Software Used in Testing

Function	VMware	Citrix
Virtual Desktop Management	VMware View Manager 4.6	Citrix XenDesktop Controller
Virtual Desktop Provisioning	VMware View Manager 4.6 Web Interface	Citrix XenDesktop Setup Wizard 5
Storage Optimization	VMware View Composer 2.6	Citrix Provisioning Server 5.6 SP1
Virtual Desktop Agent	VMware View Agent 4.6	Citrix Virtual Desktop Agent 5.0
Note: Both VMware View and Citrix XenDesktop components were tested as Virtual Machines running on VMware vSphere 4.1. Citrix products support Citrix XenServer, VMware vSphere and Microsoft Hyper-V as the underlying virtualization platform.		

Source: Tolly, March 2011

Table 1

Background & Findings

In this study, Tolly engineers evaluated the installation of the VMware View 4.6 Premier and Citrix XenDesktop 5 Platinum and compared the effort involved in day-to-day operations of administering a virtual desktop environment in a representative LAN. Engineers also compared the upgrade process for the VMware View 4.6 and Citrix XenDesktop 5 from VMware View 4.5 and Citrix XenDesktop 4, respectively.

Tests also focused on the multimedia performance of a WYSE R90LW thin client running a virtual desktop using PCoIP over VMware View 4.6, and a virtual desktop with Citrix HDX under XenDesktop 5. Finally, the licensing costs for a 1000 user deployment was compared for both solutions.

The goal of the test was to help prospective users of the VMware and Citrix solutions better understand the process of setting up and managing the respective desktop virtualization environments. Current release offerings were used for both solutions. Table 1 provides details of components and release levels for each solution.

The focus of the evaluation was on measuring the number of major steps required to deploy virtual desktops, instead of measuring the absolute number of clicks or time taken in the process. Furthermore, engineers noted whether a single management interface or multiple management interfaces had to be accessed to accomplish a given task.

Initial Deployment

Building the Underlying Virtualization Environment

As noted earlier, engineers utilized an existing virtualization environment based on VMware vSphere 4.1 as the starting point to install the virtual desktop solutions from both VMware and Citrix. The effort to build this base virtualization environment was considered beyond the scope of the test, and was not counted towards the effort to deploy either VMware or Citrix solutions.

Citrix XenDesktop supports deployment on a variety of virtualization platforms including Citrix XenServer, VMware vSphere and Microsoft Hyper-V. Engineers chose to use VMware vSphere in this test for operational efficiency of being able to use one virtualization platform to host both the VMware View and Citrix XenDesktop deployments for testing purposes.

Observations from Initial Deployment

VMware View 4.6

Engineers found the deployment process for the View 4.6 to be significantly simpler than the process required by the XenDesktop 5. The outline in Table 2 provides a visual comparison of the installation process for the View 4.6 and XenDesktop 5 solutions.

For View 4.6, the infrastructure component setup process required five major steps:

◐ Creation of the base virtual desktop VM with the VMware View Agent.

◐ Install View Composer services on the VMware vCenter server. View Composer allows use of linked-clone virtual machines as the source for virtual desktops, yielding storage efficiencies by reducing the number and size of VM images to be managed across the network.

◐ Create a server VM from the VM template running on Windows 2008 R2. Install the View Connection Server and specify an administrator to manage the View Connection Server.

◐ Create an SQL Server 2005 Express or Oracle Database Standard Edition for event logging. This step is optional.

◐ Provision new virtual desktops from the View Administrator console.

This process of deploying the initial infrastructure components of the View 4.6 has required the setup of three servers (domain controller with Active Directory, DNS and DHCP), and primarily involved configuration through two management interfaces (vSphere Client and the View Administrator console). Nearly all administrative tasks with deploying virtual desktops were carried out through a single Web-based management interface: the View Administrator console.

Citrix XenDesktop 5

On the other hand, the infrastructure component setup process for the XenDesktop solution was found to be considerably more complex and required more explicit manual configuration.

As shown in Table 2, XenDesktop 5 required 14 major steps during the initial deployment, including the manual configuration of Microsoft infrastructure components and the installation of non-Citrix applications/frameworks (Microsoft SQL Server Express 2008 and Microsoft .Net Framework 3.5 SP1).

In total, XenDesktop 5 required at least one extra server (running Citrix Provisioning Services) compared to the View 4.6, and required extensive interaction across six different management interfaces (vSphere Client, Desktop Studio, Desktop Director,

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Comparison of Workflow for VDI Infrastructure Component Setup

VMware View 4.6	Citrix XenDesktop 5
Install View Composer on the vCenter server	Create a server VM from the Windows 2008 R2 VM template, and install XenDesktop Server components on the server
Create a VM from the Windows 2008 R2 VM template, and install View Connection Server	Configure XenDesktop Controller with Desktop Studio
Configure View Connection Server by logging on to View management web interface	Create a server VM from the Windows 2008 R2 template
Create a SQL Server 2005 Express or Oracle Database Standard Edition for event database logging (optional)	Install Citrix Provisioning Services 5.6 SP1
	Install CTX128283 "XenDesktop 5 Setup Wizard with Provisioning Services 5.6"
Create the master Windows 7 VM from the Windows VM template, install VMware View Agent and take a snapshot	Configure the Provisioning Services Farm with Provisioning Services Configuration Wizard
Deploy new virtual desktops from View management Interface	Create a master Windows 7 VM from Windows 7 VM template and install XenDesktop Virtual Desktop Agent
● **No. of servers used: 3** (Domain Controller, vCenter, View Manager/View Connection Server)	Create, mount, format and unmount a vDisk in the Provisioning Server
	Create a device to associate the vDisk with the master Windows 7 VM
● **No. of management interfaces used: 2** (vSphere Client and View Management web interface)	Install Citrix Provisioning Services Imaging Wizard in the master Windows 7 VM
	Change the boot sequence of the master Windows 7 VM to boot from the network
	Run Citrix Provisioning Services Imaging Wizard to copy the hard drive of the master Windows 7 VM to the vDisk
	Create a diskless Windows 7 template
	Run XenDesktop Setup Wizard to create and deploy a catalog of streamed virtual desktops from the Windows 7 template and the vDisk
	● **No. of servers used: 4** (Domain Controller, vCenter, XenDesktop Controller, Provisioning Server) ● **No. of management interfaces used: 6** (vSphere Client, Desktop Studio, Desktop Director, Provisioning Services Console, Provisioning Services Configuration Wizard and Provisioning Services Imaging Wizard)

Source: Tolly, March 2011   Table 2

Provisioning Services Console and Provisioning Services Configuration Wizard, and Provisioning Services Imaging Wizard.)

While the workflow has been simplified in XenDesktop 5 compared to XenDesktop 4, engineers still felt that View 4.6 implemented a much more simplified and streamlined management workflow mostly through a single Web-based management

interface. Engineers noted that the multiple management interface paradigm of the XenDesktop solution presented a less integrated feel than the View solution.

While both solutions require a database to store configuration information, the View solution installs the database component as part of its base infrastructure that was installed prior to the start of the

deployment. While a database application was provided on the deployment media with the XenDesktop solution, the installation of the database was an additional manual step.

VMware View allows administrators to store the virtual machine disks on tiered storage, thereby optimizing storage for performance and high availability. For example, the

replica of a virtual desktop disk may be stored on the local, high-performance Solid State Drive (SSD) to deliver improved virtual desktop performance. In contrast, XenDesktop 5 stores the master disk image on each datastore, which makes it impossible to use a tiered storage model.

Virtual Desktop Provisioning

Engineers conducted several provisioning activities involving individual desktops and both storage-reduced (streamed/linked-clone) desktops and full-clone desktop pools.

Prior to beginning this test, engineers created the requisite Microsoft Windows 7 Enterprise image loaded with applications like Microsoft Office 2007, Adobe Acrobat Reader 9 and Mozilla Firefox 3.6, and the corresponding vendor's virtual desktop agent. These images would be specified for virtual desktops that were allocated 2 GB of virtual RAM and 1 virtual CPU. (See Test Environment section for full details of the physical and virtual environments.)

As with the initial deployment phase, engineers noted that VMware View 4.6 offered a more unified interface for carrying out the provisioning and administrative functions compared to XenDesktop 5.

In contrast, XenDesktop 5 offered administrators two ways of provisioning virtual desktops:

- Create catalogs of new pooled/dedicated virtual desktops or existing virtual or physical desktops using the Machine Creation Services (MCS) through the Citrix Desktop Studio

- Create streamed virtual desktops that load the operating system over the network using Provisioning Services (Console and Imaging Wizard)

Machine Creation Services (MCS) represented a welcome feature in XenDesktop 5 as it offered automated workflow options to create multiple virtual desktops using a wizard-based interface. However, the need to still use a completely different set of tools in the Provisioning Services to create the streamed desktops is a disadvantage and introduces management overhead compared to View 4.6 -- which did almost all provisioning activities using the View Administrator console.

Even though Citrix recommends using the Quick Deploy feature of MCS, engineers chose not to use this option due to its limitations such as restrictions on naming schemes for the virtual desktops, and the requirement for all the XenDesktop server-side components (Controller, Desktop Studio, the Web Interface, the Citrix License Server, and Microsoft SQL Server 2008 R2) to be installed on one server. (See http://support.citrix.com/proddocs/index.jsp?topic=/xendesktop-rho/cds-quick-deploy-rho.html)

These restrictions are acceptable in a limited-scale deployment like that of a proof-of-concept deployment in a lab, but are not practical in a real-world deployment scenario with hundreds or thousands of virtual desktops. Moreover, engineers also focused on deployment of streaming virtual desktops using the Provisioning Server. This is considerably more complicated than the wizard-based Machine Creation Services because a production environment that has a mix of hosted and streamed desktops mandates the use of the Provisioning Server. (See http://community.citrix.com/pages/viewpage.action?pageId=161743115).

The XenDesktop 5 solution required extensive manual interaction to create both individual virtual desktops and full-clone pools. For example, to prepare the master target device to serve as the source for the streamed virtual desktops, it was required to manually modify of its BIOS settings to allow for PXE boot over the network.

Similarly, deleting any virtual desktops or machine catalogs requires careful coordination across multiple management interfaces to make sure that all users are logged off the target desktops in a catalog, that all the target desktops are powered off, and that the virtual desktops are put into maintenance mode, etc. Having to jump between multiple interfaces increases the chance of human errors.

End-user Multimedia Experience Comparison

Engineers evaluated the quality and support for playback of various popular multimedia formats using a Wyse thin client across a LAN using several popular media player applications.

VMware PCoIP

VMware View 4.6 used the PCoIP technology that compresses, encrypts, encodes and transmits the display output of a virtual desktop from the data center to the endpoint client over standard IP network. Since PCoIP encrypts the video out of the virtual desktop at the pixel-level on the server-side, the end-user is assured playback of any media format and media player application supported on the virtual desktop.

Citrix HDX

Citrix XenDesktop 5 used HDX (High Definition User Experience) technology to deliver audio and video output of the virtual desktop to the endpoint client device over an IP network. HDX uses the processing power of the endpoint device to render the multimedia content by sending compressed multimedia information directly from the datacenter to the endpoint in its native format.

HDX MediaStream supports numerous multimedia formats including DIVX video, XVID video, MPEG4 V2 video, MPEG1 Layer3 audio, MPG video, WMV video, AC3 audio, WMA audio, and MP3 audio. Since HDX takes advantage of the processing power of

Multimedia File Types Tested

Media Type (Encoding Format)	File Format (File Extension)	Test File Name	Media Player Application	VMware View 4.6 with PCoIP	Citrix XenDesktop 5 with HDX MediaStream
DIVX Video	AVI, MPEG, MPG, ASF	X-Men - The Last Stand - Trailer.avi	Windows Media Player 12	Accelerated	Accelerated
MPEG-4 Video		Spider-Man 3 - Teaser Trailer.mp4	Windows Media Player 12	Accelerated	Accelerated
WMV	WMV	The_Magic_of_Flight_720.wmv	Windows Media Player 12	Accelerated	Accelerated
Flash	FLV	The Sorcerer_s Apprentice.flv	Real Player 14	Accelerated	Not Accelerated
Real Media	RM	Robotica_1080.rv	Real Player 14	Accelerated	Not Accelerated
QuickTime	MOV	Avatar.mov	Windows Media Player 12	Accelerated	Not Accelerated
Microsoft Silverlight	N/A	http://www.microsoft.com/silverlight/iis-smooth-streaming/demo/#/home	Mozilla Firefox 3.6	Accelerated	Not Accelerated
YouTube	N/A	http://www.youtube.com/watch?v=Ou6_MkIvKOo	Mozilla Firefox 3.6	Accelerated	Accelerated

Note:

Accelerated: Accelerated multimedia performance. Server-side acceleration for VMware PCoIP, and client-side acceleration for Citrix HDX.

Not Accelerated: Multimedia performance not accelerated. Fall back to unaccelerated server-side rendering.

Source: Tolly, March 2011   Table 3

the endpoint device, it is necessary to make sure that the server-side virtual machine and the endpoint device have matching multimedia player/codec configuration. This adds management overhead to ensure compatibility of the configuration of the codec on the virtual desktop, the server and the endpoint. In case of a configuration mismatch between the server-side and the endpoint, multimedia playback falls back to server-side rendering, thus losing the benefits of multimedia acceleration on the endpoint device, which is the key benefit of using HDX for multimedia playback.

Media Playback - User Experience

A pair of identical Wyse thin clients accessed the View 4.6 and XenDesktop 5 virtual desktops across a LAN.

Engineers observed that:

- The media playback experience with View 4.6 and PCoIP was more predictable, while with XenDesktop 5 and HDX, quality of playback depended on the file format being played and whether that media format is supported

for client-side rendering using the HDX MediaStream technology. Particularly, the QuickTime (.MOV) playback was not supported for client-side rendering (Multimedia Redirection, or MMR) and defaulted to server-side rendering, with a choppy video playback and audio sync issues.

- For media types that supported MMR over HDX, and using default configuration for HDX, the playback experience for a XenDesktop 5 virtual desktop varied depending on the native resolution of the media (high resolution video caused choppy playback and audio sync issues), and the client-side display resolution (windowed versus full-screen). This implied that the HDX configuration needed to be tweaked to deal with high resolution media.

For the same media files, on a View 4.6 virtual desktop with PCoIP, the playback quality was better, with a smoother video playback irrespective of the client-side display resolution, and no audio sync issues.

- Citrix technical documentation for HDX MediaStream for Flash content dictates a Windows-based endpoint device and low latency LAN-type network connection between the endpoint device and the XenDesktop Virtual Desktop Agent platform. (See http://support.citrix.com/proddocs/index.jsp?topic=/receiver-linux-blackfoot/linux-config-improving-multimedia.html). When these conditions are not met, the playback falls back to server-side rendering that is not optimal for rich multimedia experience.

- The overall quality of video playback is better with View 4.6 and PCoIP, compared to XenDesktop 5 and HDX. Full screen playback and navigation back and forth in the playback timeline was acceptable with View 4.6, while XenDesktop 5 exhibited choppy video playback and audio sync issues.

Upgrade/Migration From Prior Versions

Engineers compared the vendor provided documentation detailing the process of

upgrading from View 4.5 to View 4.6, and from XenDesktop 4 to XenDesktop 5. Updating the underlying virtualization environment (to VMware vSphere 4.1 and vCenter 4.1 from their earlier product versions) has been considered beyond the scope of this evaluation.

Engineers focused on the upgrade/migration process from VMware View 4.5 to View 4.6 and from Citrix XenDesktop 4 to XenDesktop 5 versions, as these were considered to represent the majority of deployments, and represented the last major release of the products widely deployed in the field.

Upgrade/migration instructions from earlier versions of the VMware and Citrix products were considered beyond the scope of this document, and the readers are encouraged to refer to the corresponding product upgrade/migration guides.

High-Level Overview of Upgrade/Migration Process

VMware View 4.5 to View 4.6	Citrix XenDesktop 4 to XenDesktop 5
Upgrade View Connection Server(s) from version 4.5 to 4.6	Set up a XenDesktop 5 site and upgrade Web Interface and XenServer to the latest versions
Upgrade View Composer from version 2.5 to 2.6	Update user devices with the latest version of Citrix Receiver
Upgrade the View agent on the base virtual machine	Upgrade virtual desktops to the XenDesktop 5 Virtual Desktop Agent
Upgrade View Composer Desktop Pools to use the upgraded base virtual machine	In XenDesktop 4, put the virtual desktops into maintenance mode
Upgrade View Client	Ensure you understand which data can be exported and imported, and how this applies to your own deployment
For a detailed description of the upgrade process, see the VMware View Upgrade guide at: https://www.vmware.com/pdf/view-46-upgrades.pdf	Export data and settings from your XenDesktop 4 farm to an XML file
	Edit the XML file so that it contains only the data and settings you want to import into your XenDesktop 5 site
	Import data and settings from the XML file to your XenDesktop 5 site
	Repeat steps 6 to 8 as many times as necessary. Alternatively, if the XenDesktop 4 farm is not changing very much during this time, you can keep the original exported XML file and just repeat steps 7 and 8 rather than repeating the export step
	Complete the post-migration tasks
	For a detailed description of the upgrade process, see the guide "Migrating to XenDesktop 5" at: http://support.citrix.com/proddocs/index.jsp?topic=/xendesktop-rho/cds-upgrade-wrapper-rho.html

Note:
- The above upgrade/migration process focuses on VMware View 4.5 to View 4.6 and from Citrix XenDesktop 4 to XenDesktop 5 versions, as these were considered to represent the majority of deployments, and represented the last major release of the products widely deployed in the field. Upgrade/migration instructions from earlier legacy versions of the VMware and Citrix products were considered beyond the scope of this evaluation, and the readers are encouraged to refer to the corresponding product upgrade/migration guides.
- Each upgrade step outlined above consists of multiple smaller actions, and the overall number of steps outlined above is not indicative of the relative ease or difficulty of the upgrade process. This table is provided only to provide a high-level overview of the upgrade/migration process for each solution.

Source: Tolly, March 2011   Table 4

Comparison of Licensing Cost For A 1000 User Deployment

Product ID	Description	Quantity	Unit Price	Aggregated Price
VU4-PR-100-C	VMware View 4 Premier Bundle 100 Pack (100 concurrent connections)	10	$20,198.84	$201,988.40
CEZ-MW2Z0000095	Citrix XenDesktop Platinum Edition (1 Named User/Device License) with Subscription Advantage	1000	$308.31	$308,310.00
CEZ-MW2Z0000095	Citrix XenDesktop Platinum Edition (1 Concurrent Connection License) with Subscription Advantage	1000	$616.65	$616,650.00
Cost Advantage for VMware View over Citrix XenDesktop with Named User/Device Licenses and Support				34%
Cost Advantage for VMware View over Citrix XenDesktop with Concurrent Connection Licenses and Support				67%

Note:
● The VMware View 4 Premier Bundle Kit includes vSphere 4 for Desktop, View Manager 4.x with View Client for Local Mode, View Composer, ThinApp (Packager, Client, WS), vShield Endpoint and vCenter Server Standard licensed for 100 desktop VMs.

Source: CDW.com, April-May 2011   Table 5

The salient steps to upgrade from VMware View 4.5 to View 4.6, and to migrate from Citrix XenDesktop 4 to XenDesktop 5 are shown in Table 4.

Maintenance Operations

VMware View 4.6

Virtualizing desktops helps reduce the maintenance costs associated with physical machines. Still, maintenance needs to occur in the virtual world as well when, for example, a service pack or a security update is issued for the desktop operating system.

For this test, engineers started with a base Windows 7 Enterprise installation on the master/base virtual desktop image. Then, engineers simulated software maintenance operations like installing an operating system update - installing the Service Pack 1 for Windows 7, in this case.

Initially a subset of the user desktops were updated – thus simulating a process where administrators may want to pilot a new update for a select group of users before rolling it out to their full user community.

Using VMware View Composer, network administrators can apply the software updates to the base virtual desktop image just like they would on a physical PC and then create a "snapshot" of that image with a one-click operation using the vSphere Client management interface.

The View solution gives organizations the flexibility to pilot the new software updates before making it generally available to all users. Using the same management interface that was utilized initially to create the virtual desktop pool, administrators can quickly assign a subset of users to the newly updated desktop.

Later, when the administrators feel a software update is ready for general deployment, all users in the pool can be updated by specifying the VMs to use the updated base image.

Depending on the urgency of the deployment of updates, the administrator can schedule rollout of high priority updates to the virtual desktops immediately, and release non-urgent updates at a scheduled

time. The administrator can send messages alerting the users of the update schedule and allow users to save important work prior to the application of updates.

It is important to note that since one virtual desktop pool can contain different versions of the base desktop image (in this case virtual desktops running Windows 7 Enterprise with and without Service Pack 1), a common set of management policies can still be applied to the entire pool.

Citrix XenDesktop 5

Citrix XenDesktop 5 follows an upgrade workflow that is similar to VMware View, where a catalog of virtual machines could be upgraded by applying the updates to the master/base VM for that catalog using the Citrix Desktop Studio. Once the updates have been applied to the base VM, administrators can decide when to roll out the updates:

● After the users log off, for non-urgent updates. Administrators may choose to send a message to the users informing

of upcoming update that would be applied after the user logs off.

- For critical updates, administrators can force the powered on virtual desktops to restart immediately by logging out all active users, or restart after a delay by sending a message to the active users about impending updates.

- Administrators can selectively deploy updates to a subset of all virtual desktops, thereby allowing phased roll out of updates across the network. The administrators can also revert back to an earlier version if something goes wrong.

To update streamed desktops using Citrix Provisioning Services, administrators can apply the desired updates to the associated vDisk, and specify a schedule for the update of the underlying vDisk for the target devices. The target devices pick up the updated vDisk image at next login.

Licensing Costs

Engineers examined the licensing costs for the VMware View 4.6 Premier and Citrix XenDesktop 5 Platinum editions, based on pricing from CDW.com, a leading online reseller of both VMware and Citrix products. VMware View licensing is based on the number of concurrent users, while Citrix XenDesktop offers licenses based on either the number of individual or named users/ devices, or based on the number of concurrent users. However, as shown in Table 5, concurrent user licensing for XenDesktop 5 Platinum is much more expensive than comparative licensing for View 4.6 Premier.

For a deployment for 1,000 virtual desktops, VMware View 4.6 solution cost up to 67% less than Citrix XenDesktop 5 solution for concurrent user licensing. VMware View 4.6 solution cost 34% less than Citrix XenDesktop 5 solution for named users/devices licensing assuming the concurrency rate for View to be 100%. In reality, the concurrency rate is typically much lower than 100%, so VMware

View saves customers even more than 34% on licensing cost in this case.

Test Environment

Physical Environments

Identical physical environments were built for the tests consisting of one physical server each. Both servers were of identical hardware configuration. Each server was running Microsoft Windows 2008 R2, and was outfitted with two quad-core Intel® Xeon® E5540 2.53 GHz 64-bit processors, 48 GB RAM, and up to 1 TB FC SAN for storage.

Common Virtual Infrastructure Environment

The underlying virtualization environment consisted of a cluster of two physical servers running VMware vSphere 4.1 hypervisor, a Fibre Channel (FC) SAN providing the storage for virtualized assets, and a set of template virtual machines (VMs) running Microsoft Windows Server 2008 R2 for server VMs and running Microsoft Windows 7 Enterprise for virtual desktop VMs. A server VM running Windows Server 2008 R2 was created and was configured as the domain controller for the test network domain. Active Directory, DNS and DHCP server roles were enabled on this server, and provided these services to both the VMware and Citrix virtual desktop deployments to be created later. Finally, engineers created a server VM and installed VMware Virtual Center (vCenter) to manage the virtual environment.

VMware View Virtual Environment

As shown in the Figure 1, the VMware View virtual environment consisted of a server VM running View Connection Server/View Manager and View Administrator Console.

The View Composer services are installed on the server VM running VMware vCenter, and the server VM acting as the domain controller provides the Active Directory, DNS and DHCP

services for the virtual machines within the View virtual environment.

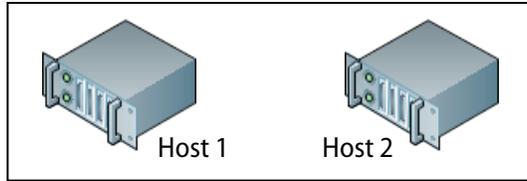### Citrix Virtual Environment

As shown in the Figure 1, the Citrix XenDesktop virtual environment consisted of a server VM acting as a XenDesktop controller, running the Citrix Desktop Studio (with Desktop Director and Machine Creation Services). Another server VM was used with Citrix Provisioning Services 5.6 SP1 to deploy streamed virtual desktops. The Active Directory, DNS and DHCP (Dynamic Host Configuration Protocol) services were provided by the virtual machine shared with the VMware View solution test bed. The server VM running VMware vCenter was used to manage the virtual environment assets in the Citrix virtual environment.
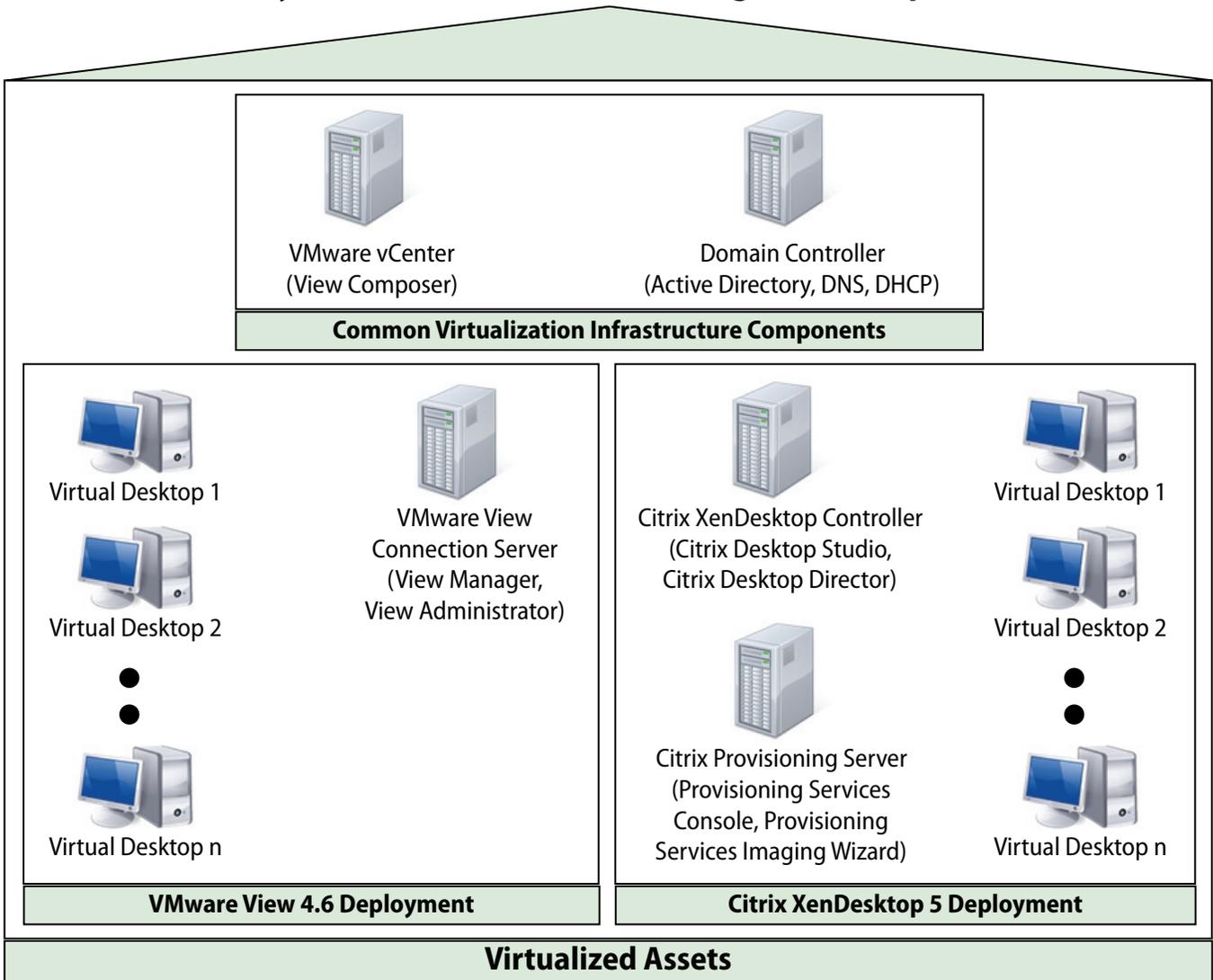
Virtual Desktop Configuration

All virtual desktop machines were configured identically for both vendors and consisted of the following software and virtual hardware components:

- 1 virtual CPU core, 2 GB RAM
- 20 GB Hard disk drive storage
- Microsoft Windows 7
- Microsoft Office 2007 (Full install)
- Adobe Acrobat Reader 9
- Mozilla Firefox 3.6.

Test Bed Topology

Host 1   Host 2

Two Physical Servers in a Cluster Running VMware vSphere 4.1

VMware vCenter
(View Composer)

Domain Controller
(Active Directory, DNS, DHCP)

Common Virtualization Infrastructure Components

Virtual Desktop 1

Virtual Desktop 2

Virtual Desktop n

VMware View
Connection Server
(View Manager,
View Administrator)

Citrix XenDesktop Controller
(Citrix Desktop Studio,
Citrix Desktop Director)

Citrix Provisioning Server
(Provisioning Services
Console, Provisioning
Services Imaging Wizard)

Virtual Desktop 1

Virtual Desktop 2

Virtual Desktop n

VMware View 4.6 Deployment

Citrix XenDesktop 5 Deployment

Virtualized Assets

Note:
- Physical servers equipped with dual Quad-core Intel Xeon E5540 CPUs at 2.53 GHz, 48 GB RAM and FC SAN with 1 TB storage.
- All virtual servers equipped with 1 virtual CPU, 4 GB RAM and running Microsoft Windows Server 2008 R2.
- All virtual desktops were equipped with 1 virtual CPU, 2 GB RAM and running Microsoft Windows 7 Enterprise.
- The virtual servers running VMware vCenter, and the AD, DHCP and DNS roles were shared by both VMware and Citrix virtual environments.
- Both VMware View and Citrix XenDesktop were deployed on an underlying virtualization infrastructure running on VMware vSphere 4.1.

Source: Tolly, March 2011   Figure 1

About Tolly…

The Tolly Group companies have been delivering world-class IT services for 20 years. Tolly is a leading global provider of third-party validation services for vendors of IT products, components and services.

You can reach the company via E-mail at sales@tolly.com, or via telephone at +1 561.391.5610.

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Interaction with Citrix Systems, Inc.

In accordance with our process for conducting comparative tests, The Tolly Group contacted Citrix Systems, Inc. to notify them of the evaluation and invite their participation. A management representative of Citrix Systems, Inc. reviewed the test plan. Citrix did not offer any comments on the test plan.

For more information on the Tolly Fair Testing Charter, visit:

http://www.tolly.com/FTC.aspx

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