Architecture Overview

Citrix XenDesktop 5.5 with VMware vSphere 5
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Introduction

Many organizations are looking for a better way to manage and deliver desktops to their end-users, and increasingly look to desktop virtualization as an alternative to traditional desktop deployment. When designing a desktop virtualization solution, IT organizations need to decide how to create an infrastructure pairing hypervisor technology with desktop delivery technology. With the release of XenDesktop 5.5 and VMware vSphere 5, Citrix Consulting Solutions is providing a first look at the high-level architecture of a XenDesktop 5.5 and vSphere 5 solution by showing how the two components fit together to create a desktop delivery solution that provides end users with key functionality such as:

- Through Citrix Receiver, IT organizations are able to provide users with access to their virtual desktop environment from any client, including Windows, Mac and Linux workstations and the latest iOS, Android, RIM and webOS tablets and smartphones.

- Citrix XenDesktop 5.5 release, including XenApp 6.5 provides the virtual desktop users with the best-in-class user experience through Citrix HDX technologies. Including over 150 new HDX features, Citrix XenDesktop 5.5 delivers high performance personal desktops and applications with all the flexibility, performance and user experience of a PC even over challenging network conditions.

The paper focuses on a component overview and setup considerations required to build such a solution, and incorporates technologies to deliver three types of virtual desktops; existing, pooled, and streamed, as highlighted in the Citrix FlexCast Hosted VDI Desktop model in Figure 1 (for more information regarding this and other Citrix FlexCast models, visit http://flexcast.citrix.com).

![Figure 1: FlexCast Hosted VDI Desktops](image-url)
XenDesktop 5.5 Architecture

In this first look architecture with XenDesktop 5.5 and vSphere 5, three virtual desktop models are considered; existing virtual desktops using standalone Windows 7 instances, pooled Windows 7 virtual desktops delivered through Machine Creation Services, and streamed Windows 7 virtual desktops delivered through Citrix Provisioning Server. XenDesktop core setup requires servers providing Desktop Delivery Controller, Web Interface and Citrix Licensing Server functionality. These functions may be delivered on a single vSphere virtual server for a Proof of Concept environment or on multiple servers for enterprise deployments that require fault tolerance and high availability. In order to provide streamed virtual desktops, a separate Citrix Provisioning Services server is also required. Both XenDesktop and Provisioning Services take advantage of a Microsoft SQL Server 2008 R2 database which is recommend to be provisioned on its own virtual machine or physical server. The following section describes the basic XenDesktop components in more detail.

Component Overview

- **Desktop Delivery Controller:** The Desktop Delivery Controller provides the link between the Web Interface and the XenDesktop site. The controllers enumerate resources for the users and direct user launch requests to the appropriate virtual desktop. It is recommended that at least two controllers be deployed per XenDesktop site to provide high availability. As the site grows, additional controllers may be required for scalability.

- **Web Interface:** The Web Interface provides user access into the XenDesktop environment. It accepts user credentials and passes them on to the XenDesktop site for authentication and enumeration. Once authenticated, Web Interface manages the initiation of the end user sessions to their virtual desktop. It is recommended that at least two Web Interface servers are deployed per data center for high availability. Ideally, Citrix NetScaler should be used to load balance traffic between the Web Interface servers.

- **Virtual Desktop Agent:** The Virtual Desktop Agent (VDA) is a software agent that resides on the virtual desktop and provides the communication interface between the XenDesktop infrastructure and the Windows desktop operating system.

- **SQL Database:** The Microsoft SQL database provides the foundation for the overall XenDesktop solution. All information pertaining to configuration, virtual desktops and current utilization is kept within the database. The SQL server is critical to the continuous operation of the XenDesktop site. If the database goes offline, no new users can connect to a virtual desktop but currently connected users will continue to function. The SQL database should be made highly available through the implementation of SQL mirroring or clustering.

- **Citrix Licensing Server:** The License Server is responsible for managing the licenses for all XenDesktop 5.5 components. Citrix Licensing Servers have a 30 day grace period which allows the system to function normally should the server become unavailable. Due to this grace period, redundancy in the License Server component is not required.
• **Citrix Receiver**: Citrix Receiver is easy-to-install client software that lets you access enterprise data, applications and desktops from any computing device including iPhones, Android-based smart phones, iPads, Windows Mobile devices, Blackberry, and Windows, Mac OS X, or Linux desktops.

• **HDX Technology**: HDX technology is a set of capabilities that delivers a “high definition” desktop virtualization user experience to end users for any application, device or network. By incorporating network and performance optimizations, hardware products, and advanced software algorithms, HDX technology unleashes the full power of virtualized applications and desktops. This enables enterprises to offer virtualized applications and desktops with a LAN like experience over a WAN connection.

Beyond the core XenDesktop configuration, additional features such as Citrix Access Gateway and Citrix Branch Repeater technologies can be added to provide additional security remote access and WAN optimization functionality. Figure 2 shows the overall layout of the XenDesktop delivery components.

For hosted virtual desktops in the Citrix FlexCast Hosted VDI model, there are three basic configurations; existing desktops, Machine Creation Services pooled desktops, and Provisioning Services streamed desktops.

• **Existing Desktops**: Existing desktops are single virtual desktop instances where each desktop is its own complete desktop environment with a unique copy of the desktop operating system. End users have full control to modify the desktop once installation has completed.
- **Machine Creation Services (MCS):** MCS provides a mechanism to thin-provision a virtual desktop from a master image in the hypervisor pool and utilize identity management functionality to overcome the security identity (SID) requirements typical with cloning. Machine Creation Services is managed by the XenDesktop Desktop Delivery Controllers and utilize the capabilities of the underlying hypervisor to clone and thin-provision the master image.

- **Provisioning Services:** Virtual Desktops delivered through Provisioning Services rely on network booting and streaming to deliver portions of the desktop image on an as-needed basis. Provisioning Services utilizes identity management functionality similar to Machine Creation Services. Additional server resources are required for Provisioning Services, which may be physical or virtual. Provisioning Services can stream to both virtual and physical desktops.

Citrix XenDesktop allows IT administrators to deliver multiple types of virtual desktops from the Citrix FlexCast Hosted VDI model on their VMware vSphere infrastructure. This allows organizations to use vSphere 5 with the power of XenDesktop to use the most appropriate desktop delivery mechanism to meet the end-user’s requirements, while taking advantage of the enhanced features in both XenDesktop 5.5 and vSphere 5.
vSphere 5 Architecture

Component Overview

When utilizing VMware vSphere 5 as the hypervisor for XenDesktop 5.5, the vSphere 5 components are built upon an infrastructure incorporating physical VMware ESXi 5 servers connected to local and shared storage as shown in the physical layout in Figure 3. Shared storage can be NFS, iSCSI or Fibre Channel SAN, as dictated by the enterprise.

![vSphere Storage Options](image)

VMware ESXi delivers the base hypervisor functions for the vSphere environment that hosts the virtual desktops. VMware Virtual Center (vCenter) server provides the infrastructure to manage multiple ESXi hypervisors as a single infrastructure cluster. The vCenter server allows administrators to configure resource clusters and manage storage and high availability functions across the environment. In a XenDesktop 5.5 configuration, VMware vCenter can be configured as a virtual machine running on the ESXi infrastructure, or a physical server as required based on high availability requirements. VMware vCenter requires a SQL database instance; either a standalone database using Microsoft SQL Express or a separate SQL server depending upon the size of the environment to be configured. XenDesktop and vCenter can share the same SQL server infrastructure.
Within the vCenter configuration, a cluster is created to provide a base hosting infrastructure to build the Citrix XenDesktop environment. The cluster supports the implementation of vSphere High-Availability and DRS (Distributed Resource Scheduling) features, when configured with shared storage between the two ESXi hosts in the environment. DRS enables the dynamic placement of virtual machines across ESXi hypervisors in the vSphere infrastructure. A shared storage infrastructure is implemented to allow for placement and movement of virtual machines between hosts in the vSphere cluster. VMware vSphere allows multiple types of shared storage to be configured. Using a shared storage infrastructure such as iSCSI with multiple datastores allows VMware Storage DRS to be implemented. Storage DRS is a new feature of VMware 5, which allows for dynamic placement and load-balancing of virtual machine files across a storage cluster. Figure 4 shows the placement of virtual machines across a host and storage infrastructure.

Figure 4: vSphere Virtual Machine Placement
Setup Considerations

This section of the whitepaper outlines the setup considerations that should be evaluated when considering a XenDesktop 5.5 on vSphere 5 solution. In general, setting up XenDesktop 5.5 on with vSphere 5 follows the same traditional guidelines for installing XenDesktop 5.5 on any hypervisor, but the following areas need to be specifically considered for XenDesktop 5.5 and vSphere 5 configurations:

Server Certificates

When configuring initial connectivity between XenDesktop and vSphere, HTTPS communication is required for secure communication between the XenDesktop Desktop Delivery Controller (DDC) and the vCenter server. The default certificates that are provided with vSphere do not support communication with the DDC. In order to properly configure and secure communication, administrators need to use certificates that are signed by a commercial Certificate Authority (CA) or self-signed certificates on the vCenter server systems and the XenDesktop DDC. While commercially signed certificates are generally recommended, self-signed certificates are acceptable for smaller environments or test-lab configurations. Certificates are installed on the VMware vCenter server and the XenDesktop DDC through the Certificate Manager console in Windows Server. When installing the certificate, it is important to ensure that the certificates are installed in the local computer store as well as the registry, as shown in Figure 5.

Figure 5: Certificate Manager

Storage Configurations

When deploying a XenDesktop infrastructure, consider implementing separate storage configurations for hosted virtual desktops and infrastructure services such as the XenDesktop Desktop Delivery Controller, Provisioning Services and SQL infrastructure. This will allow High
Availability and Dynamic Resource Scheduling settings in vSphere to be defined according to the requirements for the intended use.

**Setting Host Configurations**

In XenDesktop, host configurations for VMware vSphere 5 allow for the configuration of specific storage configurations, and multiple hosts may be setup pointing to the same vSphere infrastructure. IT Administrators need to ensure that the host configuration to be used with a given catalog contains the appropriate storage containing the virtual desktops or templates required to create the catalog (existing, pooled or streamed). An example is shown in Figure 6.

![Figure 6: XenDesktop Host Configuration](image)

**Creating Provisioning Services Target**

When creating a vDisk target for Provisioning Services, ensure that the XenDesktop 5.5 Virtual Desktop Agent is not installed until after the vDisk has been created. Run the Provisioning Services Imaging Wizard completely through the vCenter console for the virtual desktop and then install the XenDesktop 5.5 VDA before converting the image from Private to Shared image mode in the Provisioning Services console.

When delivering a streamed virtual desktop, a template virtual machine is required for the Provisioning Services XenDesktop Setup Wizard. This template virtual machine will be used to create the network bootable virtual machine targets in vCenter. It is important to ensure that the BIOS settings for the template virtual machines are configured to boot from the network first to allow Provisioning Services to stream the virtual desktop image, as shown in Figure 7.
If issues occur with Provisioning Server target devices becoming unresponsive after a restart, please reference the Provisioning Services Bootstrap Configuration with VMware vSphere 5 Citrix Knowledge Base article.

Installing VMware Tools and XenDesktop Virtual Desktop Agent (VDA)

During the installation of tools on the Windows 7 virtual desktop targets, either existing virtual machines, or master VMs for Machine Creation Services or Provisioning Services, it is important to install the VMware tools before installation of the XenDesktop VDA. Both VMware tools and the XenDesktop 5 VDA install a Windows Display Driver Model (WDDM) display driver. XenDesktop requires the Citrix WDDM driver to function, and installing the VMware tools after the VDA will remove the Citrix driver.

VMware ISO CD Storage

When creating master images for XenDesktop Machine Creation Services or Provisioning Services, ensure that any ISO CD images mounted from VMware ISO storage are un-mounted from the Windows 7 images. This remove any linkages to ISO storage in the pooled or streamed virtual machines.

Figure 7: Virtual Machine BIOS settings
Conclusion

Citrix XenDesktop 5.5 and VMware vSphere 5 products bring new features to market that can enhance the virtual desktop experience. Combining XenDesktop and the Citrix FlexCast capabilities with vSphere allows organizations using VMware technology at the hypervisor layer to deliver a robust virtual desktop environment with several desktop delivery mechanisms available to meet specific end user requirements. Citrix Consulting recommends testing vSphere 5 and XenDesktop with enterprise specific configurations before rolling out to a production environment.
Product Versions

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Revision History

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About Citrix

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