

Desktop virtualization for all - technical overview



Many organizations embarking on the desktop virtualization journey believe they need to follow the VDI model where each user receives a virtual machine hosted in the datacenter and running Microsoft® Windows® 7. VDI is a great option but not the only one. Organizations usually need to use a combination of approaches to meet the requirements of different users as well as IT. They need to identify what functionality users require as well as the technical differences between virtual desktop options to create their own desktop virtualization strategy. With Citrix® FlexCast™ delivery technology, Citrix® XenDesktop® combines application virtualization and operating system virtualization, enabling IT to quickly and securely deliver virtual desktops and applications to any user in the enterprise.

This paper discusses various options that FlexCast provides to help meet the computing requirements of every user type and guide organizations.

Desktop and application delivery methods

Desktop virtualization involves much more than creating a virtual machine in the datacenter to run Windows 7. There are, in fact, many different virtual desktop options, providing different capabilities based on unique user group requirements. At a high level, desktop virtualization is comprised of the following types of virtual desktops:

- Hosted Shared desktops: Many users have unique sessions running on the same shared operating system. Microsoft® Remote Desktop Services and Citrix® XenApp® are the most common examples of solutions that provide this option.
- Hosted VDI desktops: Windows 7, Windows Vista® or Windows XP® desktops run remotely within the datacenter and each user receives his or her own desktop operating system. Within the Hosted VDI desktop model are the following sub-categories:

- Existing: Virtual desktops are deployed manually with Sysprep, third-party tools or physical-to-virtual (P2V) migration. These desktops must be managed manually or with third-party desktop management tools.
- Physical: Desktops are deployed manually with Sysprep or third-party tools to a physical device within the datacenter, such as a blade PC. These desktops must be managed manually or with third-party desktop management tools. Remote PC is a variation of Physical desktop model that allows users to secure mobile access to their office-based PCs from any device running Citrix Receiver™. And with 3D workloads, IT can virtualize and centrally deliver 3D graphics-intensive applications and high-performing desktops using a graphics processing unit (GPU) for hardware acceleration to boost rendering performance.
- Pooled-Random: A single-image, managed virtual desktop is delivered from shared storage to users who are dynamically granted the use of this virtual desktop for the duration of their current session. Once the session ends, the desktop is refreshed and another user is granted access. Users can use any desktop in the pool.
- Pooled-Static: A single-image, managed virtual desktop is delivered from shared storage to users who are initially granted the use of a virtual desktop and retain the link to that desktop. Once the desktop session ends, the desktop is refreshed to the base image state. Once assigned, users will always be routed to the same virtual desktop.
- Dedicated: A single-image, created virtual desktop is delivered from shared storage to users who are initially granted the use of a virtual desktop and retain the link to that desktop. Any changes made by the user persist for the life of the virtual desktop, even across reboots. After the desktop is initially created, it must be maintained either manually or via third-party desktop management tools.
- Streamed: A single-image, managed virtual desktop is delivered as a network stream to users who are dynamically granted the use of a virtual desktop for the duration of their current session. Once the session ends, the desktop is refreshed and another user is granted access. Users can use any desktop in the pool.
- Streamed VHD: Windows 7, Windows Vista or Windows XP desktops run locally on the user's desktop computer. The single-image, managed virtual desktop is delivered as a network stream. Changes made during the session are discarded so a clean image is delivered upon next reboot.
- Local VM: Windows 7, Windows Vista or Windows XP desktops run locally within a hypervisor on the user's laptop. The complete virtual desktop image is delivered to the hypervisor to allow offline connectivity.

Table 1 provides a summary of the different models.

Layers	Hosted Shared Desktop	VDI: Existing	VDI: Physical	VDI: Pooled-Random	VDI: Pooled-Static	VDI-Dedicated	VDI-Streamed	Streamed VHD	Local VM
Virtualization Layer	Physical or Virtual (XenServer, Hyper-V or vSphere)	Virtual (XenServer, Hyper-V or vSphere)	Physical	Virtual (XenServer, Hyper-V or vSphere)	Virtual (XenServer, Hyper-V or vSphere)	Virtual (XenServer, Hyper-V or vSphere)	Physical or Virtual (XenServer, Hyper-V or vSphere)	Physical	Virtual (XenClient)
OS Layer	Installed or PVS	Installed	Installed	MCS	MCS	MCS (Creation only)	PVS	PVS	
Application Layer	IT provided	IT and user provided	IT and user provided	IT provided	IT provided	IT and user provided	IT provided	IT provided	IT and user provided
Transport Layer	HDX	HDX	HDX	HDX	HDX	HDX	HDX	Local	Local
Remote Access Layer	AG	AG	AG	AG	AG	AG	AG	GoToMyPC	GoToMyPC
Management Layer (Image-Desktop ratios)	1:1 (Installed) 1:Many (PVS)	1:1	1:1	1:Many	1:Many	1:Many (creation) 1:1 (after creation)	1:Many	1:Many	1:1

Table 1

Most organizations align their users with a subset of the desktop virtualization options to streamline deployment and support. The pathway for identifying and consolidating virtual desktop types is based on user requirements, technology and scalability.

Planning the virtual desktop delivery

When determining the most appropriate type of virtual desktop to use, organizations must determine which one best aligns with their user requirements and overall strategy. This involves understanding technical differentiators and user requirements.

Technical differentiators

Both XenApp and XenDesktop provide an excellent user experience based on Citrix® HDX® technology, which is a set of capabilities that deliver a “high definition” experience to end users of any application, on any device and over any network. However, due to the differences between them, many HDX features are slightly different, as shown in Table 2:

Criteria	XenDesktop	XenApp
HDX Broadcast	No major differences	
HDX MediaStream (server rendered)	Default server rendered content: 24fps (configurable to 30) Adaptive display Low latency audio path	Default server rendered content: 12fps (configurable to 30)
HDX MediaStream (Flash redirection)	No major differences	
HDX MediaStream (Windows Media redirection)	No major differences	
HDX Plug-n-Play	Generic USB support on the LAN in addition to all optimized virtual channels for device level redirection.	General support for Windows portable USB devices (standard keyboards, mice, printers, smartcards, etc). Optimized virtual channels for device-level redirection rather than USB port-level redirection, potentially limiting availability for certain USB devices.
HDX WAN Optimization	No major differences	
HDX Rich Graphics	HDX 3D Pro for deep GPU-based compression and OpenGL/DirectX acceleration (one GPU per user) Adaptive Display Microsoft RemoteFX support Aero Redirection	DirectX acceleration (shared GPU)
HDX 3D	GPU acceleration of DirectX and OpenGL One user per GPU Deep-level compression 3D SpaceMouse support	GPU acceleration of DirectX only Each GPU can be shared by multiple users Applications must be compatible with RDS
HDX SmartAccess	No major differences	
HDX RealTime	Low latency audio path UDP/RTP support for tolerance to network congestion and packet loss DSCP and WMM packet tagging	Softphone compatibility somewhat limited due to use of Windows Remote Desktop Services (formerly Terminal Services)
HDX Adaptive Orchestration	Adaptive Display	

Table 2

Note: An overview of HDX technologies can be found on the Citrix HDX site (<http://hdx.citrix.com/>).

In addition to the differences in their HDX technologies, a few other differences exist between XenDesktop and XenApp that can greatly impact the overall scope and scale of the solutions (Table 3).

Criteria	XenDesktop	XenApp
Scalability medium workload (8 core server)	50-75 users (desktops) on average	150-200 users on average
CPU/memory allocation	Extra resources required for each operating system and application executing.	CPU and memory savings by only having a single executing operating system for all users and shared memory for applications
IOPS requirements (Avg user workload)	10-12 IOPS per desktop	2-3 IOPS per user

Table 3

User requirements

User requirements play a pivotal role in determining the most appropriate type of virtual desktop for each individual or group. Table 4 provides a list of user requirements to assess and shows how they align with the type of virtual desktop

Criteria	Virtual Apps	Hosted Shared Desktop	VDI: Existing	VDI: Physical	VDI: Pooled-Random
User needs a desktop interface		X	X	X	X
User needs a Windows 7 desktop (look/feel)		X	X	X	X
User needs the Windows 7 Aero theme			X	X	X
User needs to customize profile settings (backgrounds, favorites, sounds, menus, etc)		X	X	X	X
User needs to administer their own desktop			X	X	X
User needs to install their own applications			X	X	
User needs to use standard USB devices (flash drives, webcams, etc)	X	X	X	X	X
User needs to use specialized USB devices (special keyboards, barcodes, etc)	A		X	X	X
User needs to use specialized graphics cards				X	
User needs to use specialized sound cards				X	
User needs to always have same MAC or IP address				X	
User needs to use VoIP	X	X	X	X	X
User needs to use dictation devices	X	X	X	X	X
User needs to work disconnected	X				
User needs to work across WAN links	X	X	X	X	X
User needs to work across LAN links	X	X	X	X	X
User needs a secured/locked-down desktop	X	X			
User needs to reboot the desktop			X	X	X
User needs to use the desktop as test environment			X	X	

Table 4

X = Functionality available for respective virtual desktop type.

A = Although some specialized USB devices will work on XenApp, each one must be tested to validate functionality.

B = To use specialized devices, they have to be part of the hardware compatibility list for Citrix XenClient®.

Criteria	VDI: Pooled-Static	VDI-Dedicated	VDI-Streamed	Streamed VHD	Local VM
User needs a desktop interface	X	X	X	X	X
User needs a Windows 7 desktop (look/feel)	X	X	X	X	X
User needs the Windows 7 Aero theme	X	X	X	X	X
User needs to customize profile settings (backgrounds, favorites, sounds, menus, etc)	X	X	X	X	X
User needs to administer their own desktop	X	X	X	X	X
User needs to install their own applications		X			X
User needs to use standard USB devices (flash drives, webcams, etc)	X	X	X	X	X
User needs to use specialized USB devices (special keyboards, barcodes, etc)	X	X	X	X	X
User needs to use specialized graphics cards			X	X	B
User needs to use specialized sound cards			X	X	B
User needs to always have same MAC or IP address	X	X		X	X
User needs to use VoIP	X	X	X	X	X
User needs to use dictation devices	X	X	X	X	X
User needs to work disconnected					X
User needs to work across WAN links	X	X	X		X
User needs to work across LAN links	X	X	X	X	X
User needs a secured/locked-down desktop					X
User needs to reboot the desktop	X	X	X	X	X
User needs to use the desktop as test environment		X			X

Table 4 Continued

X = Functionality available for respective virtual desktop type.

A = Although some specialized USB devices will work on XenApp, each one must be tested to validate functionality.

B = To use specialized devices, they have to be part of the hardware compatibility list for Citrix XenClient®.

Getting started

Desktop virtualization is quickly becoming one of the top IT strategies for many enterprises. With FlexCast delivery technology, XenDesktop can help IT deliver every type of virtual desktop and align them with the performance, security and flexibility requirements of each individual user or group. To learn more about FlexCast delivery technology and the benefits it can deliver in your organization, please visit www.citrix.com/xendesktop.



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