

Centralization Alone Is Not the Answer

Citrix XenDesktop is the desktop virtualization solution by Citrix. In this article, Ruben Spruijt discusses the advantages and disadvantages of desktop virtualization and the role that Citrix XenDesktop plays therein. What is the function of the Citrix Provisioning Server in virtualizing desktops?

Desktop virtualization is developing into a serious, interesting and effective desktop delivery platform. According to Ruben Citrix is at the forefront when it comes to the development and acceptance of this form of virtualization. "War of the Virtual Worlds Part II" has begun! Ruben gives us his vision of the virtual workstation 2010.

Application and Desktop Delivery

Application and desktop delivery is a process whose objective is to be able to offer applications independent of location and workstation so that the user can always work everywhere: onsite, offsite and offline. Citrix XenDesktop is a Virtual Desktop Infrastructure (VDI) solution. This solution ensures remote access to Windows XP or Vista desktops that are centrally implemented on virtual machines in the data center. Server virtualization solutions such as Microsoft Hyper-V, Citrix XenServer and VMware ESX Server form the infrastructure basis for the virtual (Xen)Desktops.

Xen Xen Xen

After the take-over of XenSource by Citrix it is "Xen, Xen, Xen" that makes the clock beat at Citrix. In the Citrix dictionary Xen is equal to "virtualization." XenServer virtualizes hardware, thanks to which desktops and servers are designed to be hardware-independent. XenDesktop virtualizes and provides desktops. Citrix XenApp virtualizes applications in two possible ways. Option one is called "server-side application virtualization." A nice name for the known and proven server based computing concept. The other type of application virtualization is

"client-side application virtualization." In this form, applications are quickly and very easily provided on a desktop, laptop or terminal server, whereby the application is implemented on the respective platform in an isolated environment.

What are the pros and cons of Citrix XenDesktop?

There are various advantages of XenDesktop (XD). I describe several of them here below:

User experience: Multimedia and graphically heavier applications must be provided by means of the ICA protocol with an acceptable user experience. By applying various SpeedScreen technologies, applications can even be used over a network connection with a low bandwidth and higher latency.

Safe access to applications: Users have safe and consistent access to applications with every type of connection, every device at every location, both within and outside of corporate networks. All information remains at the data center; only screen information is sent over the network.

Fast provision of desktops: With XenDesktop personal desktops can be distributed, retrieved, supported and maintained much more quickly than local

desktops. The XD desktop is available within several seconds.

Several operating systems in one XenDesktop environment: Personal desktops can be provided with a Windows XP or Vista operating system.

A determination as to which desktop is intended for which user is made depending on the set rules.

Application compatibility: Each Windows XP or Vista desktop is a complete stand-alone virtual workstation. There are two great advantages of providing applications via XenDesktop compared to Microsoft Terminal Services: Researching compatibility with Microsoft Terminal Services applications is not necessary and the number of applications that can be made centrally available via XenDesktop is higher compared to Microsoft Terminal Services.

User freedom: A XenDesktop solution offers the user Windows XP or Windows Vista. End-users can install applications and easily change configuration settings within their own workstation environment.

Real-time load-balancing: The virtual infrastructure platform monitors the use of system resources and assigns available sources to a number of desktops based on the rules that were set in advance by the ICT department. If the

resources are limited, extra capacity is freed up through migration of active desktops to another physical server. In combination with live migration the desktops are load-balanced in real time.

High availability (HA): HA provides high availability for each desktop, no matter the operating system or the underlying hardware configuration. The technical interpretation of HA can differ per hardware virtualization infrastructure.

Citrix XenDesktop Infrastructure

In order to get a good idea of how XenDesktop works it is important to know which components comprise the XenDesktop infrastructure. These are as follows:

- Virtual infrastructure platform
- Desktop Delivery Controller
- Provisioning Server
- Client components
- Management tools

Virtual Infrastructure Platform

The virtual infrastructure constitutes the necessary basis for XenDesktop. XenDesktop seamlessly integrates into VMware ESX, Microsoft Hyper-V and, of course, the Citrix XenServer hardware virtualization solutions. The virtual infrastructure ensures the provision of virtual machines, servers and desktops. Integration with the virtual infrastructure platform is necessary in order to make it possible to power on, power off, suspend and reset virtual machines from the XenDesktop infrastructure. Which virtual infrastructure platform for XenDesktop is the best for you depends on several factors, such as live migration, resource scheduling, high availability, fault tolerance, memory management, automation and disk management.

Desktop Delivery Controller

The XenDesktop Desktop Delivery Controller (DDC) is responsible for registering new virtual desktops and directs the requests for available systems. Users communicate indirectly via a web interface with the DDC or directly with the locally installed desktop receiver. Three different desktop groups can be used.

Pooled desktops, Assigned on First Use and Pre-Assigned. The DDC also provides time-based resource management. This means that a minimum number of desktops is available at a certain time. When it is no longer necessary to have this desktop available, they will be automatically deleted.

Virtual Desktop Agent

The VDA is the client component in the XenDesktop architecture. The VDA client is installed on the virtual machine or physical blade pc and adds the ICA Service to the workstation. The VDA client is supported on Windows XP and Vista and offers users direct access to the remote workstation via ICA. The ICA provides the VDA client software for:

- Universal printer driver, dynamic client drive mapping, multi-monitor support
- SpeedScreen technology
- Cleartype support, SmoothRoaming
- Session Reliability
- Communication with DDC and the virtual infrastructure platform.

ICA Client

The Citrix Program Neighborhood Client sets up and maintains the ICA connection to the remote desktop. The ICA client for XenDesktop, the desktop receiver, provides additional functionalities for XenDesktops such as: full-screen support, connection bar, USB mass storage device (dis)connection.

End-User Experience

Desktop appliances. This workstation, usually a thin client workstation, communicates directly with the Desktop Delivery Controller. After authorization, the Windows XP/Vista interface appears for the end-user. An ICA client is installed on the desktop appliance.

Unmanaged devices. The Citrix web interface provides users access to XenDesktop and XenApp options via a web portal. After authorization, the XenDesktop is available in a window or as a complete screen. A Citrix ICA client is required to obtain access to the desktop. This client is available for all common operating systems. Figures 1,2 and 3

illustrates the process for obtaining access to XenDesktop.



Figure 1, Citrix web interface

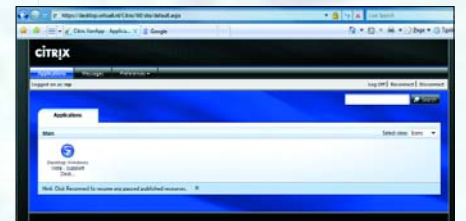


Figure 2, Citrix web interface



Figure 3, Windows Vista provided via XenDesktop

Provisioning Server

The Citrix Provisioning Server (PVS) is an important component of the XenDesktop infrastructure. XenDesktops start and work off of an image file provided centrally on the network. PVS ensures that the vDisk that is centrally saved is provided via the network. A Provisioning Server infrastructure is comprised of the following, among other things:

- Provisioning Streaming Server
- vDisk
- Streaming protocol.

The Citrix Provisioning Server is a services that is installed on a Windows server. This server is responsible for streaming and connecting vDisks to the PVS clients, whereby the client can be a physical/virtual desktop or server. The Provisioning Server requires a central SQL database, Citrix license server and network-related components (DHCP/PXE/TFTP). Several

Provisioning Servers ensure an infrastructure that has higher availability and is more scalable. One Provisioning Server can process about 500 simultaneous XenDesktop users.

vDisk

A Virtual Disk is an image with the operating system, the client-components and the desired applications. The so-called "golden image" is created on a reference machine and saved on the Provisioning Server as vDisks by means of snapshot technology. The vDisk is used in VHD, Virtual Hard Disk format, saved and can be used in two modes. The "private image mode" and the "standard image mode."

In the *private image mode* the server streams one vDisk to a specific client computer. The workstation is connected to the vDisk 1 to 1. Each workstation has its own private image and all read and write actions are sent to the vDisk file via the network.

In the *standard image mode* the server streams one vDisk to several client computers. The workstations are connected to one and the same read-only vDisk. All write actions to the vDisk are sent transparently to another location. This write cache can be saved on the local hard drive, the internal memory of the client computer or on a network share. The write cache is deleted after a restart of the (virtual) workstation. The result is a clean and stable workstation environment whereby the (virtual) workstation is 100% identical to the golden image.

Streaming protocol

In order to allow a PVS client computer to use a vDisk, the machine has to seek contact with the Provisioning Server via a removable storage device, DVD or via Pre-boot eXecution Environment (PXE). The Provisioning Server recognizes the client computer and considers the configuration in a central SQL database. The computer connects the vDisk and the boot process ensues. The streaming protocol provides functionality for the on-demand streaming

of operating system and applications, whereby maximum performance, stability and availability are realized. Figure 4 shows that a Windows XP machine is entirely started up in 18 seconds, and this in a proof of concept scenario.

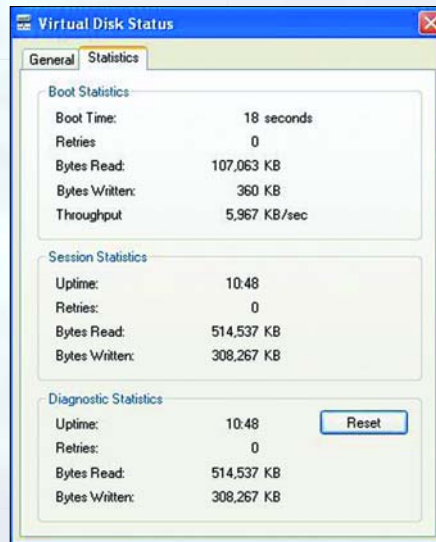


Figure 4, vDisk performance overview

PVS, Advantages and Points of Interest

PVS is an essential component in every VDI or server-based computing infrastructure. Various clients at small and midsize companies and within enterprises use PVS. There are various examples of companies that use PVS in a Microsoft Terminal Server and VMware VDI infrastructure.

Below are a few examples to help you get a good idea of using PVS with XenDesktop:

- Virtual desktops are 100% guaranteed identical.
- Provision of new virtual desktops is "on-the-fly."
- Highly manageable: Adjusting the "golden image" and rebooting virtual machines ensure that the modifications are implemented. If the modifications need to be undone, a new reboot is sufficient to restore the workstation. Rolling out security updates, service packs or a new operating system is truly a piece of cake.
- Save on (expensive) storage costs. One single vDisk can simultaneously provide an OS, clients and applications to thousands of virtual desktops. In

traditional VDI of Terminal Server environment, where each virtual machine has its own (20Gb) disk, PVS can save terabytes of expensive central storage costs.

Provisioning Server is a powerful OS streaming platform, but there are several points of interest:

- Currently PVS only works well if the client computers are available via a LAN. There is no solution for local provision via a WAN (<100 Mb).
- There is no "work offline" option.
- Pay close attention if the hardware is not identical. In a virtual desktop infrastructure this is not a problem, since the hardware is virtualized. In a physical workstation/server infrastructure this is a point of interest. By means of Provisioning Server Common Images technology it is possible to use one image whereby the hardware on the clients differs.
- Provisioning Server is an extra component in the ICT infrastructure. Despite the fact that this solution integrates with the XenDesktop infrastructure in a powerful, easy and direct manner, new (additional) components are added to the (complex) total solution.

In order to convert the "...wow, but does this really work?" feeling into "... it really works!" your own evaluation of the PVS solution is the perfect solution. After all, seeing is believing!

Citrix XenApp, Application Virtualization

Nowadays applications are no longer installed but are often provided and executed as a service on the XenDesktop platform. No modifications take place to the virtual machine. XenApp "client-side application virtualization" enables fast application delivery within the XenDesktop environment, whereby application conflicts amongst themselves are impossible. By using XenApp in a XenDesktop environment the "golden image" is very small and easily manageable. Depending on the function

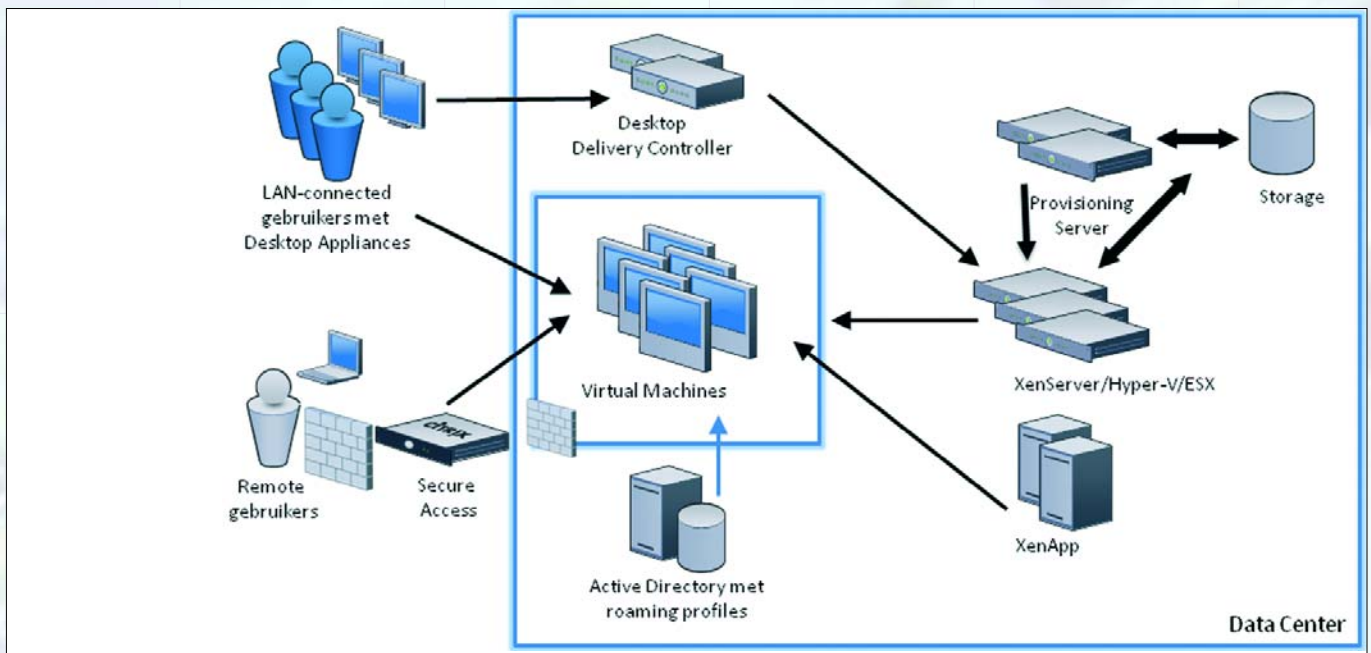


Figure 5, Citrix XenDesktop overview

(“role”) of the users, the required applications are literally made available with a snap of the fingers (depending on the application, maybe three).

Citrix XenDesktop Overview

All essential components in the XenDesktop architecture are described in this article. Figure 5 provides an overview of the various components.

The Virtual Workstation in the Year 2010

What will the virtual workstation look like in 2010? You don’t need a glass ball to get a good idea of the workstation of 2010. If you look at the needs of customers and what suppliers have to offer in the application and desktop delivery area, you easily could say that 1+1=2010.

1. Offering graphically heavy, multimedia and unified communications applications is no longer a challenge. By using new or optimized protocols such as Microsoft Calista, SPICE, Net2Display, Teradici, RGS and Citrix ICA+, offering the above-mentioned applications from the data center is no longer a challenge. Gigabit at the workstation is thus not a luxury.
2. OS streaming technology is an important link in manageably offering operating systems for virtual and physical desktops where one can work

both offline(!) as well as online. Citrix Provisioning Server, VHDsoft Xtreaming Technology and VMware Scalable Virtual Image will facilitate this.

3. In a tightly managed workstation environment, an end-user can independently install and use applications without business-critical applications being hindered in any way. Application virtualization will be further developed, making this functionality possible. Both end-users and ICT administrators are happy ;-)
4. The central workstation offered by VDI can use hardware independently, offline and offsite. Local resources are used at their maximum capacity for this execution – “bare metal,” in other words, whereby the user experience is optimal. Microsoft Enterprise Desktop Virtualization (MED-V), Citrix “Xen client” hypervisor and VMware “View” vClient will offer these functions.

The ideal virtual workstation in 2010 will consist of a combination of desktop virtualization, OS streaming, application virtualization and hypervisor technology. A part of this solution is already available and usable today.

Conclusion

Desktop virtualization is developing into a

serious, interesting and effective desktop delivery platform.

Citrix has a clear vision of the application and desktop delivery area. With XenApp, XenServer and Provisioning Server, Citrix has a total solution at its disposal in XenDesktop. There are various technologies where Citrix has the advantage compared to the competition; the ICA protocol and Provisioning Server are two examples. Citrix XenDesktop is not dependent on a certain virtualization solution. This ensures that it is easy to implement and to accept.

The current XenDesktop solution is still somewhat lacking in the area of graphically heavy applications and complete USB and SmartCard support. Offering virtualized desktops from the data center is still a new trend for people. VDI has a number of essential differences compared to Server Based Computing but also a great deal of similarities.

Do you want to see XenDesktop work in a live environment? It is possible to view XenDesktop from the end-user perspective in our solution showcase. Access is free and can be requested via www.virtuall.nl. Seeing is believing! My motto: “Virtualization is the way to go!”

About the Author

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