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Wintel Client Tier Virtualization Strategies for Deploying Cerner Millennium



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Introduction

Server virtualization technology has existed for many years and has been a viable alternative to deploying physical servers for several Millennium Wintel mid-tier solutions. Cerner provides a deployment strategies document describing the supported Wintel mid-tier solutions on [cerner.com](http://www.cerner.com) at the following URL:

<http://www.cerner.com/members/filedownload.asp?LibraryID=42827>

Virtualization of the Cerner Millennium client tier is not a new concept for deploying the Cerner Millennium user application layer. Today, most Cerner clients deploy the Cerner Millennium user applications (where most clinical user access occurs) as a Citrix XenApp or Terminal Server session connected (as a “published” application or “desktop” deployed to an access point device such as a thin client) from a shared server-based computing environment. This session based virtual execution of the Millennium user applications represents one of the many virtualization strategies in use today.

Cerner Millennium is also deployed as a traditional thick client (that is, a physical PC with a validated operating system and the Cerner Millennium user applications installed and running directly on the system) in certain scenarios where Millennium applications require performance, resources and capabilities that are not available via session-based virtual execution.

Recent advances in client tier virtualization technology have created additional viable strategies for deploying Cerner Millennium. Each deployment strategy has its own advantages and disadvantages. The purpose of this white paper is to describe Cerner-identified client tier virtualization deployment strategies and explain some of the challenges inherent in each one, as well as to provide a high level view of the advantages and disadvantages of these strategies.

Deployment Considerations

This section describes some of the deployment considerations associated with deploying Cerner Millennium on virtualized technology.

Cerner Millennium has a very large application footprint in terms of installed code size (> 5GB) and registry entries (>100,000). Cerner Millennium also has several key integration requirements with third party software applications. Finally, Cerner Millennium has unique “Location Based” application requirements when running in a session-based technology. All of these factors have the potential to cause deployment, workflow and performance issues.

In a Cerner Millennium thick client deployment, default settings are configured within the application to associate the specific PC with its current physical location within the healthcare facility for things like default back end printer selections, default patients lists, default pharmacy dispense locations and so forth. When Cerner Millennium is deployed over Citrix XenApp and Terminal Services virtualization technology, this is accomplished using Cerner’s proprietary “Location Based” solutions.

Cerner offers two “Location Based” solutions in support of these requirements for Terminal Server and Citrix XenApp deployments. The clinical user’s access point device is identified at logon and location specific settings are then provided to the Millennium applications for the connected user based on this identity.

Cerner’s standard “Location Based” solution provides this functionality for an initial connection from an access point device to a session, and the advanced version provides support for “roaming clinical users,” giving Cerner Millennium clinical users the ability to roam from access point device to access point device without requiring a new Citrix

XenApp session to be created (or new logon to Millennium) each time. Clinical users are reconnected to existing Citrix XenApp sessions, greatly improving their access time and productivity since the application's state is preserved and follows the user to each access point.

Client tier virtual desktop and virtual application technologies do not support Cerner "Location Based" functionality "out of the box." Cerner has developed custom solutions to enable "Location Based" functionality on some of the supported client tier virtual desktop and application virtualization technologies.

In some Cerner client use cases, "Location Based" functionality within Cerner Millennium may not be a current requirement; however, a Millennium client tier virtualization strategy should possess the ability to provide "Location Based" functionality to Cerner Millennium if it becomes necessary in the future.

Cerner Millennium Client Tier Virtualization

Client Tier Virtualization Definitions

The following general definitions describe client tier virtualization technology components. There is no industry-defined standard set of definitions across technology providers yet, as this market continues to evolve.

Desktop Virtualization – Physical desktops or thin clients connecting to a hosted virtual desktop on a virtualization platform.

Desktop Operating System Streaming – The provisioning of desktop operating systems using streaming technology. The operating system is not installed on the device, but rather is streamed from centralized storage and executes on the device leveraging local CPU, memory and hardware subsystems. Operating system streaming can be deployed to both physical and virtual machines.

Virtual Machine – A virtual machine is a tightly isolated software container that can run its own operating systems and applications as if it were a physical computer. A virtual machine behaves exactly like a physical computer and contains its own virtual (i.e., software-based) CPU, RAM hard disk and network interface card (NIC).

Virtual Desktop – A virtual machine running a desktop operating system.

Application Virtualization – Applications that are executed on physical or virtual computers as portable applications. Application virtualization encapsulates the applications from the OS and each other. Virtualized applications are not physically installed on the device from which they are executed.

Application Hosting – Applications that run within a Citrix XenApp or Terminal Services session on a server based computing platform.

Portable Application – An application that has been prepared to execute on a specific virtual application runtime layer.

Virtual Application Streaming – The process of delivering virtual applications to the computers from which they are executed. Application streaming can be deployed to both physical and virtual machines.

Client Tier Virtualization Strategies Overview

This section reviews the four Cerner-identified strategies listed in the table below. If there are multiple scenarios possible for a strategy, that is indicated as well. Please note that several more potential deployment strategies exist than are listed here.

Strategy	Overview	Recommended Technologies
Application Virtualization	Millennium streamed to physical desktop, virtual desktop or Citrix XenApp/Terminal Servers	VMware ThinApp
Desktop Virtualization	Millennium streamed or installed to virtual desktop	VMware View Citrix XenDesktop Sun Ray plus VMware View
Desktop Virtualization with Citrix Pass-through Client **	Virtual desktop with Millennium hosted on a Citrix XenApp server accessed using Citrix Pass-through Client technology	Citrix XenDesktop with Citrix XenApp Sun Ray plus VMware View with Citrix XenApp VMware View with Citrix XenApp
Local Streamed Desktops	Streamed desktop O/S with Millennium installed, streamed to desktop or hosted via Citrix XenApp	Citrix XenDesktop

** Current Cerner engineering statement regarding pass-through can be found at the following location:

<http://www.cerner.com/members/filedownload.asp?LibraryID=42826>

Application Virtualization

Application virtualization can be employed for physical desktops (traditional thick client PCs), streamed desktops, virtual desktops, or as a method to manage applications hosted in a Terminal Server or Citrix XenApp session. In this strategy, the application installation is “captured” and “packaged” on a separate device and deployed to other devices (desktops or Terminal Server/Citrix servers) via a network share.

Advantages

Virtual applications execute inside a runtime bubble/layer where registry and file access are typically isolated from the underlying operating system. This separation removes potential integration issues between conflicting applications that are required for each desktop, and allows multiple versions or instances of the same application to be executed on a device.

Version control and application patching time are reduced with application virtualization.

Another advantage of application virtualization is simplified application delivery. Applications are streamed to devices and not installed on the devices, which significantly reduces costs associated with installing and maintaining Millennium applications on desktops or Citrix XenApp/Terminal Servers. Additionally, client tier application updates can be done with zero downtime. Reducing downtime is a highly desirable goal, especially in healthcare environments.

Disadvantages

Application launch times and execution can take longer due to the overhead of the virtual runtime layer (CPU, Memory, Pagefile) that delivers the applications.

Application virtualization also introduces a new layer of complexity. The capturing and packaging process for “virtualizing” Cerner Millennium can be challenging. The level of difficulty in testing and creating a new package increases depending on what you package, how you package, and to what devices you deploy.

Application troubleshooting requires new skills and an understanding of the virtual application infrastructure being deployed.

Application virtualization (streaming applications to devices over LAN connections) increases overall network traffic/bandwidth requirements. This is more manageable in a virtual desktop environment but typically reduces the number of virtual machines per host resulting in a lower user density per virtual server host.

Desktop Virtualization

In this virtualization strategy, end user access devices connect to individual hosted virtual machine desktops running an installed version of Cerner Millennium via a remote protocol (e.g. ICA, RDP). The virtual machines are instantiated on physical virtual server infrastructure (hosts) in the data center. In a virtual desktop session, one user connects to one virtual machine desktop session - unlike a Terminal Server/Citrix session, where many desktop or “published” application sessions run concurrently.

Advantages:

Virtual desktops save significant time over deploying, operating, maintaining and supporting physical desktops running Cerner Millennium.

Virtual infrastructure technologies provide for dynamic load balancing of virtual desktops, potentially improving application performance for the clinical user.

Virtual desktops offer improved data security. Data and applications reside in the datacenter on secured virtual machines – and not on easily accessible PCs.

There are fewer application compatibility issues than with Terminal Server or Citrix deployments.

Finally, virtual desktops can be centrally managed, which allows rapid deployment of new desktops or updated/patched desktops.

Disadvantages:

Certain peripheral devices and the heavy graphic requirements of some Millennium applications are either currently unsupported or performance challenged due to the limitations of virtual technology. For example: today Cerner supports the Citrix ICA protocol implementation of Twain redirection for document scanning/imaging solutions and the bi-directional audio implementation for Cerner digital dictation solutions deployed via Citrix XenApp. Even with Citrix ICA protocol support, a physical PC over a LAN connection still offers better performance for these types of peripherals and graphic requirements than any virtual technology currently available. It is important to note that the physical PC must meet Cerner's recommended requirements.

IT workers need to learn additional skills related to deploying and managing virtual desktops.

Desktop Virtualization with Citrix Pass-through Client

This strategy is connecting to a virtual desktop via a remote protocol (e.g. ICA, RDP) and accessing Millennium hosted on a Citrix XenApp server via ICA protocol from the virtual desktop session. There are some use cases where this is a requirement, such as clients with a virtual desktop deployment connecting to Citrix XenApp applications hosted at another facility.

Advantages:

Ease of access for clinical users – clinical user access point devices are presented with a consistent desktop view for one single point of access to all of their required applications, including those applications published on Citrix servers.

This strategy represents the easiest integration of virtual desktops into environments that already have Millennium hosted via Citrix XenApp.

Disadvantages:

Pass-through adds an additional session (Citrix ICA) within a remote desktop session. This can potentially cause issues with peripheral support, session roaming and application screen refreshes. Visit the URL posted in the overview section of this document for Cerner engineering's current position on Citrix pass-through.

Local Streamed Desktops

A desktop operating system is streamed to the client access device over a LAN connection.

Advantages:

Desktop operating systems are managed centrally, improving consistency of the desktop for Millennium users. Potential issues regarding local failures of hard disks or corrupted operating systems or installed applications are removed. Any failures would be resolved by a reboot to a fresh copy of the streamed operating system.

Disadvantages:

Operating system streaming over LAN connections increases overall network traffic/bandwidth requirements. This is more manageable when the operating system is streamed to virtual desktops but typically reduces the number of virtual machines per host resulting in a lower user density per virtual server host.

IT workers need to learn additional skills related to deploying and managing virtual desktops and streamed operating systems.

Conclusions

Client tier virtualization is a viable strategy for deploying Cerner Millennium clinical user applications. There are advantages and disadvantages to each strategy. The best deployment strategy will depend on your environment, application mix and workflow requirements. These dependencies may reduce the number of strategies a client can choose to implement.

Cerner has field tested VMware View. Cerner supports VMware View, Sun's Thin Ray platform with VMware View and Citrix XenDesktop for deploying Millennium client tier virtualization. Cerner has developed "Location Awareness" capabilities to address the unique "Location Based" functionality requirements of Cerner Millennium for VMware View, Citrix XenDesktop and Sun's Thin Ray platform with VMware View. Desktop Virtualization for Millennium is part of the Instant Access suite of solutions offered by Cerner. Please contact your Cerner TSE for additional details about Instant Access for the virtual desktop.

References

Related Links

None at this time.

Document Revision History

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