



Streaming Execution Mode

Application Streaming with VMware® ThinApp™

INFORMATION GUIDE

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VMware ThinApp Streaming Execution Mode

VMware® ThinApp™ Streaming has a unique meaning that describes the execution, rather than the delivery, of an application. When a ThinApp packaged application is launched, only the necessary blocks of data are streamed into memory on the client for application execution. VMware ThinApp Streaming does not perform any 'caching' of the application locally or on the network, instead it only streams into memory what is needed at run-time to perform the application function. The application files are not stored on the local file system but rather in a central file share, thus saving a sizable footprint of storage on the local file system. The amount streamed varies by application usage and does not correlate to the application package size. The blocks are streamed based solely on the application's requests for files and registry. For example, a very large application package that contains a suite of applications, for example Microsoft Office 2007, may stream the same amount of data across the network as a small application that utilizes many different functions via DLLs and application files. This method of streaming blocks of data as needed makes use of centralized resources in terms of storage, but leverages local operating systems for application execution. The results are efficient use of network and storage resources with centralized administration and an end user experience with similar performance and functionality to a locally installed application.

Benefits of Streaming Execution Mode to IT Organizations

The primary benefit of *Streaming Execution* mode is the 'one-to-many' model of providing applications. This benefit provides IT organizations with increased application density with the simplicity of centralized administration and update of applications. Other benefits include:

- Streamlined provisioning by enabling IT to provide the end user access to the application by merely placing a Windows shortcut to the centrally stored application on the end users desktop or start menu. This can be done through multiple standard procedures leveraging group policy, folder redirection, or login scripts.
- Support for a wide variety of end user operating systems with no pre-requisites to install (client, component, agent or service) and no administrative rights required.
- No application delivery. The application packages are stored centrally in a read-only location and do not have to be delivered to the end user devices. There is no need to transfer application packages across a network or integrate with a deployment mechanism to distribute them.
- No local disk footprint is needed on the end user device because the applications are streamed into memory.
- For users that access applications from multiple devices the streamed model of execution provides a single point of administration and a consistent user experience across multiple devices.
- Controlled initial application configuration. Application packages are read only so end users or the helpdesk can easily allow for a re-launch of the application to return to the pre-configured state.

About This Guide

This information guide provides a detailed description of the VMware ThinApp Streaming Execution Mode for partners, resellers, and customers of VMware. It is intended to provide guidance on the requirements for utilizing virtualized applications by this method and to portray the benefits of this mode of deployment for IT organizations. Please see the [VMware ThinApp Users Manual](#) or the [VMware ThinApp Deployment Guide](#) for more detailed information on the specifics of implementation and further explanation.

VMware ThinApp Overview

VMware ThinApp uses its *Setup Capture* process to take the native application installation and create an application package. The application package includes application files and registry embedded in a single compressed executable file, which can be run on a variety of operating systems without installation. The application container has the native functionality to utilize block-based streaming with transparent decompression into memory for application execution. This native functionality is the *Streaming Execution* mode and can be used for any non-local file system. Applications can be executed from a user's desktop, a network path, or removable storage like a USB flash drive or CD-ROM. VMware ThinApp runs virtualized applications entirely in user mode where they are visible to the operating system as standard windows processes to maintain appropriate security context and yet provide the benefits of application isolation and portability. For the virtualized application, VMware ThinApp presents operating system resources and functions, allowing full functionality and a seamless user experience.

Choosing an Execution Mode

VMware ThinApp enables IT to determine the execution mode for virtualized applications. One option is the streaming mode of execution, and the second is deployed mode. IT organizations can adopt a hybrid approach to centrally manage a standard set of applications and also distribute others in deployed mode. IT can choose the appropriate execution mode for each application or deploy the same application in both modes. The same virtualized application packages can be used for either execution mode. There are two *Execution Modes* for providing virtualized applications to end users.

Streaming Execution mode allows the application to be centrally stored and accessed by multiple users. *Streaming Execution* mode is a one-to-many model, which provides centralized deployment and update of an application package to multiple end users for execution via a Windows desktop shortcut. The user must always have access to the central network location where the application resides.

Deployed Execution mode involves distributing the virtualized application packages to the end users system. The actual location of the package can be on the local file system or a USB device. In this distributed model, each client device receives and executes the package locally and therefore can run the application regardless of network connectivity. End user devices that are occasionally or always offline will require this deployed execution mode.

The remainder of this guide will describe the VMware ThinApp Streaming Execution Mode.

Step-by-Step Description of Streaming Execution Mode

The following section outlines the process of launching an application via the *Streaming Execution* mode. It assumes that you have placed the virtualized application package on a fileshare accessible to the end user via a windows shortcut. See [Figure 1](#).

1. When the user launches the application via the windows shortcut the application begins to stream the contents necessary for execution. The user sees a status bar, which shows them that the application is loading. The ThinApp runtime is the first component transferred and launches within milliseconds.
2. From this point the runtime will load the necessary application registry and files which are embedded in the application package and stored in 64k blocks by default. The actual transfer of the data occurs over standard windows file sharing mechanisms using Server Message Block protocol over ports 139 or 445 depending on the operating system versions in use.
3. The first block transfers will provide the application registry and then the actual application .exe, for example, `winword.exe` for Microsoft Word.
4. The block transfers of application files and registry are loaded directly into the Windows Disk Cache location which is a logical representation of memory in the local operating system. Because the blocks are transferred into memory they can be read and utilized for the application on a very rapid basis. If compression was used during the build process then the blocks will be decompressed into the disk cache. (See the next section for details on Using Compression with Streaming Execution Mode.)
5. As users make use of application functions, the runtime will make read requests for DLLs and other files from the centralized package and load them into memory as needed. When the application asks for files that it has already requested, then it reads them directly from the disk cache and does not need to retransfer them from the central location.
6. Virtualized applications also need to write dynamic application data and user setting information. These writes are redirected into a storage location defined by the administrator, called the *sandbox*. The *sandbox* is a user specific folder created for each virtualized application that holds run-time changes to the virtualized registry and files.

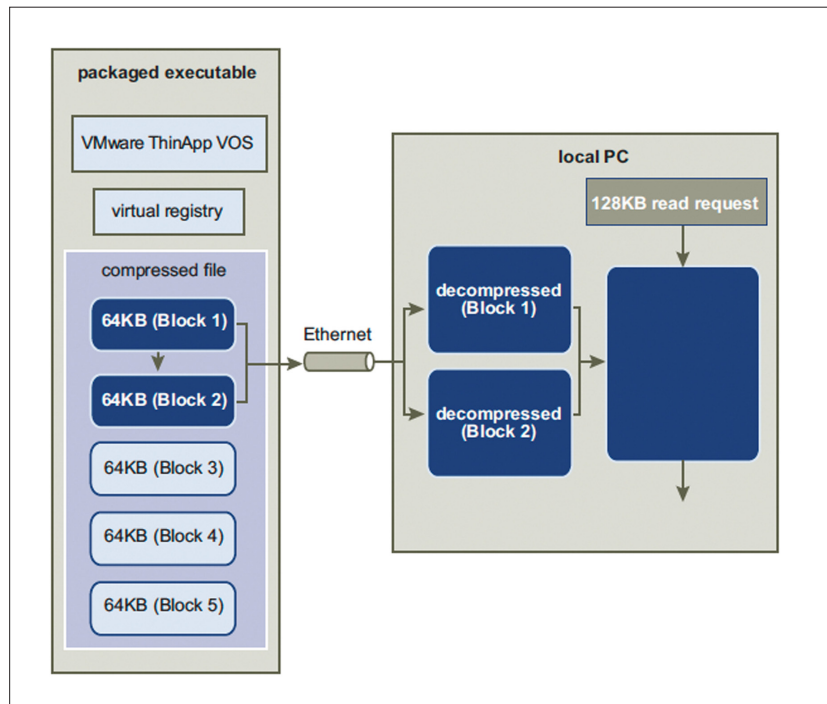


Figure 1

Use of the Windows Disk Cache

Subsequent launches of the application will read application files from the disk cache if available. However, the Windows disk cache is a volatile memory location which only stores the most recently used data and clears completely on a reboot. For this reason, the first launch of an application will take slightly longer than subsequent launches that can re-use data from the windows cache.

Using Compression with Streaming Execution Mode

VMware ThinApp provides the option of using compression to reduce the storage footprint of the application packages, whether they are deployed or hosted centrally for access via *Streamed Execution Mode*. Utilize this function by specifying the 'compression=fast' option during the build process. Existing application packages can be rebuilt with compression anytime by utilizing the project directories created during the setup capture process. When compression is turned on, the block size for storing the application package on disk can also be specified.

The 'BlockSize' parameter refers to the size of the containers for the applications files on disk created during the build process. ThinApp relies on the underlying network layers, specifically the Server Message Block protocol for the transport of the blocks to the end user. The default value with or without compression is 64K. The 'BlockSize' parameter can be increased to 128K, 256K, 512K, and 1M. When using compression, the block size specification reflects the size before compression. So the actual block size will be significantly less than the 64K because of the compression. While the amount necessary to stream over the network is reduced because it is compressed, there can be a performance penalty in the operating system due to the larger block sizes loaded into memory. While the quantity of data transferred across the network is greatly reduced (approximately 50%) there is slightly higher memory usage for an application and slightly longer launch times when larger block sizes are used.

Implementation of Streaming Execution Mode

Requirements

In order to launch the application, the user must have 'read' access to the central storage location of the application package that the windows shortcut references. This network connection must be continuously available for application launch and execution.

The client operating system should have adequate memory and CPU resources to run virtualized applications. Application packages are run as local windows processes so requirements for adequate performance are similar to that of a natively installed application.

Note: There is no requirement for local disk space, as virtualized applications do not utilize the local file system for storage.

Recommendations

The storage location that hosts the applications should be made highly available such that the physical uptime of either the host or storage device does not impact the environment. The use of any number of SAN, DFS, or file-replication technologies is sufficient to accomplish the objective of making the file share highly available and redundant.

The path through the network between the client device and the central network location should also be highly available and robust. The *Streaming Execution* mode utilizes standard SMB protocol to transfer the blocks of data to the end user system for execution, insure that no firewalls or core switch ACLs prevent file access. The amount of network traffic will vary based on the application and usage pattern, as such consider only medium to low latency environments for *Streaming Execution* mode.

Provisioning of Virtualized Applications Using Streaming Execution Mode

The process for provisioning a virtualized application in *Streaming Execution* mode is simply placing a windows shortcut on the start menu and/or the desktop of the end users system. While it is possible for a user to simply execute the application package from a remote file share, most implementations will prefer the use of a shortcut. Distribution of these shortcuts can be automated through the use of Active Directory group policy with folder redirection. In addition, the `Thinreg.exe` is a utility provided with the VMware ThinApp product to automate the registration of application shortcuts on the desktop, create file-type associations, and make entries in the Add/Remove programs applet of the Control Panel. `Thinreg.exe` can be run from a custom script, command line, or a login script to accomplish these functions.

Additional Resources

Some helpful references include the following:

VMware ThinApp Blog

VMware ThinApp employees regularly post and participate on the VMware ThinApp blog site
<http://blogs.vmware.com/thinapp/>

VMware ThinApp Product Documentation

http://www.vmware.com/support/pubs/thinapp_pubs.html

VMware ThinApp Deployment Guide

<http://www.vmware.com/resources/techresources/1098>

About The Author

Aaron Black is a Senior Technical Marketing Manager at VMware. In this role, his primary focus is to develop technical content to aid in the evaluation and implementation of VMware ThinApp technology. Aaron's background includes roles as a systems engineer and solutions consultant in the Technical Services organization. His previous positions include systems engineer with Citrix Systems, leading a technical corporate IT team at Sprint, and solutions design for customers of Choice Solutions, a platinum reseller of VMware products.

