



VMware® ThinApp™ Agentless Application Virtualization Overview

WHITE PAPER

LEGACY CONTENT: This paper contains valuable information, although some details are different for the current release of the product.

VMware defines application virtualization as the ability to deploy software without modifying the host computer or making any changes to the local operating system, file system, or registry. Using this virtualization technology, organizations can deploy custom and commercial software across the enterprise without installation conflicts, system changes, or any impact on stability or security.

Virtualized applications eliminate nearly all of the complexities and support issues associated with delivering and accessing traditional applications for both fat- and thin-client deployments. The time and regression testing required to successfully deliver applications and updates is shortened to hours instead of weeks. Virtualized applications from VMware ThinApp can be run without any modifications or additions to a PC, including administrative security permissions. Applications virtualized with ThinApp operate exclusively in user mode; therefore the host operating system and other applications are protected from potential corruption by installation modifications.

The Market for Virtualization Solutions

Despite highly publicized consolidated applications, the number of applications that businesses are supporting is growing. As they are stacked on top of each other, applications need to operate simultaneously and communicate seamlessly with each other. Over time, the systems supporting such a complex web of intertwined software become increasingly fragile, forcing the cost of software deployments to rise as more support and time is needed. IT staff face months of multi-application regression testing, end-user support, and downtime caused by unforeseen application conflicts. Traditionally, reliable and readily accessible software requires constant planning and a great deal of ongoing support. Forrester Research reports that companies typically spend more than \$500 per year, per desktop, just managing applications.

Enter Application Virtualization. According to Michael Rose, associate research analyst for enterprise virtualization software at IDC, "The market will increasingly implement virtualization in a growing set of use cases, in order to help customers create much more agile Service-Oriented Infrastructures (SOIs). Corporations are looking for virtualization solutions that are easily managed, reduce costs, and provide a stable, secure program that is easily implemented. VMware ThinApp is providing a dynamic solution to meet a range of user demands."

The Benefits of Virtualized Applications

Virtualizing applications ensures faster software deployment with a more seamless end-user experience:

- **Full portability:** Virtualized applications can stream from any network share without a local client or a backend server.
- **Increased efficiency of application deployments:** Agentless virtual applications enable administrators to confidently deploy or de-commission applications on the fly with little or no regression testing, even for the most secure desktops.
- **No runtime conflicts:** Deploying virtual applications reduces lengthy QA and regression testing.
- **Supportability:** Single application packages can be supported by any Windows platform. Virtualized applications can run without requiring any modification of administrative security permissions, which protects the host operating system from possibly corruptive installation modifications.

Why ThinApp?

VMware pioneered the concept of agentless and infrastructureless technology to plug into existing software delivery mechanisms such as Active Directory and PC Configuration Management Tools (MS SMS, BMC Configuration Management, LANDesk, Matrix42, Altiris, and many more). VMware ThinApp is uniquely different from other methods for virtual application deployment:

- ThinApp creates a true self-contained virtual application, and the strategy behind the technology addresses the problems of host integrity and end-user productivity.
- ThinApp provides remote and mobile users with their own familiar desktop application, regardless of physical location, ensuring the security and stability of desktops.
- ThinApp fully supports Windows 7 and makes migration easier by eliminating Limited User Account (LUA)-related errors and compatibility issues.

Following are some of the key features that make ThinApp the ideal solution for virtualizing desktop applications.

Application Isolation

Central to ThinApp is application isolation, which enables software delivery without changes to the file system and registry of the host computer. ThinApp not only allows previously incompatible versions of the same application to be co-located, but also allows them to run side-by-side. Other applications running on the same PC will not be aware of virtualized applications, so regression testing—a major cost of application deployment—is reduced dramatically. Many other virtualization solutions make registry and file system changes temporarily or permanently, so regression testing continues to be needed,

and application rollouts still can break other applications on the desktop. ThinApp file system and registry isolation prevent applications from being affected by other software installed on the same system. Two versions of the same application can appear to be installed and run from the same directory without conflict, even where virtual and non-virtual versions exist at the same location. VMware ThinApp also provides Windows side-by-side DLL isolation without having to redevelop applications or upgrade to another version of Windows.

Clean Architecture

Because VMware ThinApp requires no device drivers, it can run applications without administrator rights and requires zero changes to the PC—even if the user is running on a locked-down PC. Microsoft reports third-party device drivers cause over 80% of machine crashes, and a large number of new machine-wide vulnerabilities come from bugs in device drivers.

100% User-Mode Solution

VMware ThinApp is the only virtualization solution available that runs completely in user mode. This has many system stability, security, infrastructure, and ease-of-use benefits. Microsoft's "best practices" recommend user-mode solutions to reduce the scope and impact of security breaches. VMware ThinApp executes entirely in user mode with no kernel-mode code or device drivers. This enables seamless distribution to locked-down desktops.

Multiple Simultaneous Client Versions

VMware ThinApp is the only virtualization technology that supports multiple, concurrent running copies of an application on the same PC. This means you can package "Application A" using an older version of ThinApp and deploy it to 500 user desktops. Later, you can upgrade to a newer version of ThinApp to take advantage of its new features. In other words, you can deploy a new "Application B" using ThinApp without affecting previously deployed "Application A." This is especially critical when multiple divisions within a company want to use the technology independently and do not need to synchronize around a central version. Deploying a new application version or a major service pack to all PCs means that companies can afford to upgrade only once or twice a year at a significant cost. VMware ThinApp supports multiple, concurrent application versions, so organizations can have a very fast product release cycle. For this reason, VMware ThinApp customers can take advantage of new features immediately without affecting previously deployed applications.

Instant Portable Deployment (USB Flash / CD-ROM)

VMware ThinApp can easily convert standard applications like Microsoft Office into portable applications that can run from USB flash drives or CD-ROM. For USB deployments, ThinApp portable mode redirects application registry and file system changes intended for the host PC to files stored on the portable device.

Because VMware ThinApp has no device drivers and runs in Guest/Restricted user accounts, ThinApp portable applications can be used on kiosk PCs, even if they are locked down and do not permit any installation.

Active Directory Authentication

ThinApp allows packages to be tied to specific AD groups so unauthorized users cannot execute packages, even if they have a copy. Users can be added and removed from AD groups from a central location without modifying or updating individual packages that were deployed previously.

Security Group Policy Enforcement

ThinApp has no kernel-mode code, and so cannot violate machine Group Policy applied to user accounts. This makes virtualized packages safe to deploy in environments where security and stability are vital. ThinApp has no ability to give application-elevated permissions to devices on the machine, such as the real file system or registry, networking devices, printers, and so on.

Support for Guest User Accounts

Because ThinApp requires no device drivers, it can run applications in a guest user account without any previous installation. Many applications fail to run without administrator rights because they expect to be able to write to global locations like `HKEY_LOCAL_MACHINE` and `C:\Program Files`. Using sandbox technology, ThinApp makes applications believe they have the ability to make global changes when they are actually writing to user- and application-specific locations. This feature allows applications to run in security-restricted environments like Terminal Server and Windows 7. This also makes it possible to convert older applications to Windows 7 or multi-user applications.

Embedded Runtime in Packages

ThinApp accomplishes its zero footprint, agentless installation by embedding its entire runtime into each packaged executable. Because the runtime is very small (~400KB) and package data is stored in a compressed state, the overall disk footprint is usually two times smaller than traditional deployments of the same application without ThinApp.

Easy Windows Deployment

The impact of deploying virtualized applications is the same as deploying any normal application. In a Windows environment, the EXEs generated by ThinApp are simple, notepad-like applications that run without external dependencies. Deploying agentless virtualized applications does not effect other applications on the system.

Small, Lightweight, and Fast Solution

ThinApp is an application-level solution and does not use emulation. All processes are executed natively at full speed. Application packages can be loaded into memory in a few milliseconds (even over the network). In many cases, ThinApp loads applications faster than Windows. The entire runtime occupies ~400KB on disk and is embedded with each application, so there is no client to manage.

Setup Capture Packaging

ThinApp Setup Capture packaging technology makes conversion of traditional applications to virtual applications easy. Setup Capture takes two snapshots of a machine—before and after the target application's installation. ThinApp then generates a self-contained virtual EXE directly from these changes. With this fast, simple setup process, a virtualized copy of an application such as Firefox can be created and deployed in just five minutes.

Setup Capture supports multiple reboots during application installation and can run directly from a network share, enabling the capture of images on a totally clean machine. It uses a directory-based structure to store captured projects, allowing for easy browsing, search, editing, and modification using standard file system tools like Explorer and Windows search.

Because projects virtualized by ThinApp are simple directories with no absolute path information, they can be easily copied from computer to computer or hosted and compiled directly on network shares.

Compression

Virtualizing an application can reduce its storage footprint by more than 40 percent. ThinApp is the only solution to provide block-based streaming decompression directly into memory. As a result, compressed data does not need to be first decompressed to disk. New packages can be launched from a network share instantly, without any lengthy decompression steps. All the package data is decompressed at the block level, and blocks of application data are streamed as needed by the application. Only the startup data is required to run and is sent over the network at launch time. When packages are deployed to PC hard drives for offline use, the disk requirements are significantly reduced because package data remains compressed at all times.

Scripting

ThinApp allows VBS scripts to be embedded in an application package and executed prior to launch. Scripts can be used to configure the virtual environment on a local PC, check for execution rights, log usage, and more. ThinApp extends the VBS script runtime by exposing additional APIs and allowing for script callbacks at specific points in an application's lifecycle.

Virtual Services

For packages that require background services, ThinApp provides a virtual service control manager that starts and stops virtual services required by the application prior to launching. The application can communicate with virtual services as though they were physically installed on the machine.

Virtual Windows Loading

ThinApp allows DLLs and ActiveX controls to be loaded directly from compressed packages across network shares by emulating the entire Windows loader subsystem. The virtual Windows loader is responsible for performing side-by-side policy resolution, manifest processing, Windows search order emulation, and virtual DLL and EXE management. Virtual Windows loading enables the latest Microsoft products such as Office 2010 to run with file system changes.

Virtual COM and DCOM

ThinApp emulates the Windows COM and DCOM subsystems to allow applications to create and use virtual components without changes to the local PC's registry. It supports both in-process and out-of-process COM objects, enabling any variety of plug-ins and OLE objects to be used seamlessly.

Streaming

Using streaming, ThinApp can launch very large applications from any shared LAN resource within seconds. ThinApp can stream application code and data from a standard Windows fileserver or network share, without a client install or specialized servers, enabling application streaming with no infrastructure changes. Users can launch an application from a local shortcut, network share, URL, or email link. ThinApp uses the standard SMB protocol to stream applications over a LAN, so any Windows file share can instantly become a "streaming server." Embedded client technology means users can simply click on EXE files from network shares and the client will be loaded directly into memory. Active Directory can be used to limit application access to a specific set of users. Key points of ThinApp streaming setup are:

- Client is Windows (already installed)
- Server is any SMB share (already exists)
- Streams block-by-block
- Packages over 8GB in size can start instantly
- Streams from any source media
- Network shares and iSCSI
- Hard drive, USB flash, CD-ROM

Wide Platform Support

ThinApp supports a wide range of platforms and applications, including:

- Windows 32-bit platforms: NT, 2000, XP, XPE, 2003 Server, Vista, 7, 2008 Server
- Windows 64-bit platforms: XP, 2003 Server, Vista, 2008 Server, 2008 R2 Server, 7
- Terminal Server and Citrix
- 32-bit applications on 32-bit and 64-bit versions of Windows
- 16-bit applications running on 32-bit Windows
- Japanese applications captured and run on Japanese operating systems

Change Prevention

ThinApp redirects all changes intended for the host PC's file system and registry to a private-per-user sandbox. Sandboxes can be located on a network share so that application settings follow users as they move from machine to machine. Because all changes are separated from the host OS, broken machines can be replaced like light bulbs, with no impact on the user. For mobile users, sandboxes can be stored on local USB flash devices, preventing damage to the host PC or unauthorized storage of sensitive data on the host.

Use case: Deployment of SAP client to federally mandated locked-down desktops

For mobile users, VMware ThinApp turns a managed kiosk PC into a preconfigured workstation with any USB flash device. For Citrix and MS Terminal Server environments, VMware ensures system stability and limits security breaches by executing entirely in user mode with user-specific sandboxes.

This eliminates the need to grant administrator privileges to applications in cases where the original applications were improperly designed and write to global file system or registry locations.

Performance

The ThinApp runtime is extremely lightweight in terms of the disk space, RAM, and CPU required. It was designed to have minimal impact on application performance:

- **Lightweight on disk:** The ThinApp runtime, which is embedded into every application created with ThinApp, occupies ~400KB of disk space.
- **Lightweight in memory:** The runtime consumes a small amount of fixed RAM (<2MB).
- **Lightweight on the CPU:** Virtualized applications run all native code; no emulation or translation is used. There are no CPU performance penalties for real-time applications.
- **Lightweight on developers:** Applications virtualized using VMware ThinApp require no source code modification or recompilation.

Key Benefits for IT

Agentless application virtualization using ThinApp offers several benefits to IT organizations, including reduced TCO, improved security, support for instant migration to Windows 7 and later, optimal performance and scalability, and improved business agility.

- **Reduced TCO:** Service-Oriented Architecture (SOA) initiatives, outsourcing, consulting, sharing of information with partners, and the Internet have all lead IT managers to re-examine the fundamentals of the Application Service Provider (ASP) model. They must often manage access to applications from remote devices. With conventional software deployment, security and standardization are of concern. ThinApp reduces or eliminates the problems associated with installing applications to remote devices and allows the enterprise to maintain central control, thereby reducing the cost of desktop management. Additionally, IT staff can standardize applications use without having to standardize the end-user machine running the application.
- **Improved security:** Many industries enforce PC lockdown to meet legal and compliance regulations. The Pentagon estimates that prior to using ThinApp, 40 percent of the organization's applications would not run correctly on locked-down PCs. ThinApp enables applications to run in restricted user accounts on locked-down PCs with no system changes and without reducing the security policy. Furthermore, Microsoft security guidelines recommend purchasing user-mode solutions to reduce the potential and scope of security vulnerabilities. Because ThinApp operates entirely in user mode, device drivers cannot compromise machine security or cause system crashes.

- **Support for instant migration to Windows 7 and later:** The inevitable migration to Microsoft Windows 7 and later poses a huge challenge for IT departments. Many legacy applications are incompatible with new operating system versions and create an operational dilemma. ThinApp fully supports Windows 7 and makes migration easier by eliminating compatibility issues, side-by-side (SxS) application issues, and least-privileged user account (LUA) types of errors.
- **Better performance and scalability:** ThinApp has negligible resource requirements and zero runtime CPU overhead. It leverages existing desktop hardware and can turn existing LANs into Service-Oriented Architectures within hours. The unique streaming functionality of ThinApp allows applications to be instantly streamed to hundreds of desktops with no additional server infrastructure or hardware cost. Upgrades can be performed from a central location while the target applications are still running on the end-user's desktop. Unlike screen-scraping technologies used by Citrix and Terminal Server, ThinApp enables virtualized applications to run locally on desktops so they can be operated independently of network resources, using only the local devices and processing power.
- **Improved business agility:** ThinApp improves business agility by enabling new users to get online quickly. When companies engage in a new partnership, expansion, or merger, adding users takes minutes or hours with ThinApp, rather than weeks or months. Because ThinApp virtualized applications are centrally managed, they can be instantly updated and run from anywhere with isolated, per-user, per-application sandboxes and no impact on the host PC.

Additional Resources

For more information about VMware ThinApp, visit [VMware ThinApp: Application Virtualization Made Simple](#).

About VMware

VMware is the global leader in virtualization solutions from the desktop to the datacenter and on up to the cloud. Customers of all sizes rely on VMware to reduce capital and operating expenses, ensure business continuity, strengthen security, and go green.

Release Notes

Tina de Benedictis, Technical Marketing Manager, Enterprise Desktop, End User Computing, VMware, updated this paper.

