# Table of Contents

- Introduction .................................................. 3
- App Volumes in a Mixed XenDesktop and XenApp Environment .................... 3
- What Is App Volumes and How Does It Work?. ........................................ 4
- Opportunities Provided by App Volumes in a XenDesktop Environment .......... 5
- How Application Containers Work ................................................. 5
- How Writable Volumes Work ..................................................... 5
- How App Volumes Benefits a XenDesktop Environment ............................ 6
  - Generic Golden Image .......................................................... 6
  - Fewer Desktop Images ........................................................... 6
  - Storage Reduction .................................................................... 7
  - Preserves the User Experience ................................................... 7
  - Updating XenDesktop Versions Is Easier ......................................... 7
  - Application Conflicts Handled Efficiently ......................................... 8
- App Volumes Components in a XenDesktop Environment ........................... 9
- AppStack Delivery to XenDesktop Virtual Desktops ................................... 11
  - Main Architecture ..................................................................... 11
  - AppStack Delivery Workflow ..................................................... 12
- FAQs About App Volumes in a XenDesktop Implementation ........................ 14
- Summary .................................................................................. 16
- Author and Contributors .................................................................. 17
- Additional Resources ..................................................................... 18
Introduction

VMware App Volumes™ is a transformative virtualization solution that enables IT administrators to simplify application delivery and management in virtual desktop and published-application environments, such as View in VMware Horizon® 6, RDSH, and Citrix XenApp and Citrix XenDesktop. This paper discusses when and how App Volumes works in a Citrix XenDesktop environment.

To begin evaluating App Volumes for use in a XenDesktop environment, download a free trial of App Volumes.

App Volumes in a Mixed XenDesktop and XenApp Environment

App Volumes works well with both Citrix XenDesktop and Citrix XenApp, either individually or in a combined XenDesktop and XenApp implementation. The same AppStacks that attach to XenDesktop virtual desktops to deliver applications to users can also attach to XenApp servers to deliver applications. To learn more about using App Volumes in a XenApp environment, read Implementation Considerations for VMware App Volumes in a Citrix XenApp Environment. This paper focuses only on App Volumes in a XenDesktop environment.
What Is App Volumes and How Does It Work?

App Volumes is a container solution aimed at addressing the need for organizations to manage applications efficiently, effectively, and at scale. In the traditional application model, applications, data files, and settings are closely connected to the operating system. Because of this close connection, all changes made to an application might need to be replicated on multiple unique desktops throughout the organization, often requiring vast IT resources to do so. This is not the case with App Volumes.

App Volumes relieves this strain on IT resources and offers an alternative to per-virtual-machine management by locating applications above the OS. When organized into application management containers, specific applications can be delivered to unique groups of users. This arrangement leverages existing storage and networking services, reduces infrastructure strain and overhead, and simplifies application life cycle management.

![Real-Time App Model](image)

Figure 1: Real-Time Application Model

Figure 1 shows the App Volumes model, with application management containers above the desktop operating system. Applications, data, files, and settings are separate from the OS. App Volumes application containers are called AppStacks when in read-only mode, or writable volumes when in read-write mode. For more information about handling settings with VMware User Environment Manager™ in an App Volumes environment, see the blog post VMware User Environment Manager with VMware App Volumes.

When applications are disconnected from the OS, a single application or set of applications can be shared with many different virtual machines in a one-to-many relationship. Applications are enabled for specific users or desktops, which allows IT to control who gets access to which applications. And end users enjoy a persistent desktop experience in a nonpersistent environment.
Opportunities Provided by App Volumes in a XenDesktop Environment

The division between applications and the operating system allows for flexibility, as highlighted in these three examples:

• App Volumes application containers (AppStacks) can be used to provide exactly the applications required for specific functional groups, users, or machines within the organization, as the perfect fit for a precise business need. With operating system and applications kept separate, provisioning of applications to users, groups, or machines can occur in seconds, rather than in minutes or hours of time.

• A large number of virtual desktops with an identical base image can be flexibly provisioned with selected attached containers, with exactly the applications required by any individual, group, or machine, and in real time.

• Writable volumes provide each user with the ability to install their own applications, saved to a personal disk assigned to that user. Whichever desktop the user logs into, these applications are available.

This flexibility in a real-time model allows businesses to scale quickly with App Volumes. App Volumes provides the ability to make dynamic, real-time changes to applications in separate containers, as the enterprise requires them. With App Volumes handling all of the application work, IT can scale out the environment quickly by deploying more virtual machines. End users enjoy the persistent desktop experience while IT manages a nonpersistent architecture.

How Application Containers Work

App Volumes application containers, known as AppStacks, are created by the organization to follow the logic of business, providing business units or individuals with the specific applications they need. Applications in AppStacks are managed centrally through a single Web user interface but can be located in multiple datastores. Following a one-to-many delivery scheme, multiple different AppStacks can be assigned to a given user or desktop, or groups of users or desktops, providing each user or desktop with the applications required. As a user accesses their desktop, they seamlessly access the applications within the attached AppStacks.

How Writable Volumes Work

App Volumes writable volumes are single-user virtual disk storage spaces. The organization can allow users to install applications of their choice to their writable volumes, and these writable volumes attach to their XenDesktop virtual desktops. Although XenDesktop virtual desktops remain generic, user-installed applications (UIAs) on App Volumes writable volumes attach at login through administrative assignment. Changes made to the writable volume follow the user from desktop to desktop. The user experience is that of a unique, personal, persistent desktop, despite the fact that the virtual desktop is actually nonpersistent and therefore easy for IT to manage.

To see a writable volume used on a developer desktop, watch the video VMware App Volumes for Developer Desktops.
How App Volumes Benefits a XenDesktop Environment

App Volumes provides clear benefits in a Citrix XenDesktop environment. XenDesktop offers desktop virtualization, and App Volumes is a dynamic, rapid application delivery and management system.

With a combined solution, App Volumes runs on the back end of the XenDesktop implementation, delivering applications to XenDesktop virtual desktops at scale and in real time. Applications on App Volumes AppStacks function as if natively installed on XenDesktop virtual desktops. Applications can be delivered without interrupting users, while they are already logged in to their XenDesktop virtual desktops. Users access XenDesktop from any typical Citrix endpoint, such as a laptop, zero client, or thin client. In summary, App Volumes delivers applications to the XenDesktop virtual desktop without end-user awareness of App Volumes, but with significant operational benefit to enterprise IT.

App Volumes solves a number of significant problems for traditional XenDesktop implementations and saves time for IT staff. Following are the key ways that App Volumes enhances a XenDesktop implementation.

**Generic Golden Image**

App Volumes enables the creation of a generic and disposable XenDesktop virtual desktop golden image, an image that does not have applications specific to any business group on it. App Volumes handles the applications separately in AppStacks. Applications are provisioned to XenDesktop virtual desktops by attaching AppStacks to those desktops, as the business requires. By taking the generic XenDesktop virtual desktop golden image and using App Volumes to inject the necessary applications into it with AppStacks, that single generic golden image quickly becomes a Finance desktop, a Human Resources desktop, or a Development desktop.

With App Volumes in your XenDesktop environment, each XenDesktop virtual desktop is built identically. Instead of taking a virtual desktop offline due to planned maintenance or a catastrophic event, it can simply be destroyed and created again as new. Applications can be quickly removed from a broken virtual desktop or delivered to the new virtual desktop on AppStacks. As AppStacks attach, replacement XenDesktop virtual desktops take over for those removed. App Volumes saves valuable time and allows limited resources to be put to the best use. This optimized application delivery lowers the overall cost of your infrastructure.

App Volumes allows for high levels of XenDesktop environment customization. By using the same single generic golden image to build each virtual desktop, assigned AppStacks are easily altered to follow changing business requirements. And changes can be executed in real time. Now businesses with hundreds of XenDesktop virtual desktops are positioned to become more agile.

**Fewer Desktop Images**

In the traditional Citrix model, Citrix Provisioning Services (PVS) is used to manage virtual desktop images, with VMware vSphere® managing storage. Each XenDesktop virtual desktop is built from a template customized for the use case it supports and requires that the necessary applications be installed on it. By adding App Volumes to the XenDesktop environment, the virtual desktop and applications can be decoupled. App Volumes allows IT to store a single application file and deliver it across many XenDesktop virtual desktops.

IT then manages the XenDesktop virtual desktop from a single generic golden image that supports all use cases. Whether there is a major operating system or XenDesktop update, or a minor application update, IT deals with only the single XenDesktop virtual desktop image, or the single stored application, to deploy changes to all XenDesktop virtual desktops. Applications on AppStacks are handled completely separately from the virtual desktop OS.
Without the need for many redundant templates, IT has far fewer images to manage. Rather than changing the template itself to change what the user accesses, AppStacks quickly applied to or removed from a user's assignment alter what the user's desktop image will be. Administrators manage the entire application life cycle from provisioning to updating and retirement quickly and easily through App Volumes, saving significant IT time and resources.

Storage Reduction

By adding App Volumes to the XenDesktop environment, the operating system and the applications can be decoupled. App Volumes allows IT to store separate application files and deliver them across many XenDesktop virtual desktops. The sharing of AppStacks between multiple machines prevents the need to install duplicate copies of the same application on every single virtual desktop.

A large number of users can access a single AppStack simultaneously. Instead of installing Microsoft Office for each individual user, install a small number of copies. Share those copies to all users and store only the few copies installed. For additional information about storage reduction with App Volumes read the VMware App Volumes Technical FAQ white paper and the VMware App Volumes Deployment Guide.

Without the need for space to store each redundant virtual desktop image across every template, and the multiple application installations required on the XenDesktop virtual desktop, the enterprise reduces costs and increases storage capacity. For a detailed explanation of the cost savings inherent in using App Volumes in a VDI environment, read VMware App Volumes: the Lowest Capital and Operational Costs for Application Delivery and Management.

Note: App Volumes also works if the XenDesktop implementation is virtualized with Microsoft Hyper-V or XenServer using the App Volumes VHD In-Guest mode. In this case, storage impact might be different than with vSphere.

Preserves the User Experience

With App Volumes, IT staff members no longer need to perform redundant application installations and updates on multiple XenDesktop virtual desktops. Using a generic golden image and creating fewer desktop images reduces the burden on IT and keeps the end-user experience intact by allowing XenDesktop virtual desktops to behave as persistent desktops. With App Volumes and XenDesktop together, the end user has the same experience no matter which desktop the user connects to, providing a seamless end-user experience.

This separation of applications from desktops, reducing the number of desktop images and using automated installation of applications, creates something very much like a disposable desktop. With a disposable XenDesktop virtual desktop, if something goes wrong, IT simply removes the broken desktop and creates a new one. App Volumes brings the applications back in seconds, as soon as AppStacks are attached to the new virtual desktop, slashing the amount of time and skill level of IT personnel necessary to deal with such problems. More technical IT staff members become available to focus on more important issues.

Updating XenDesktop Versions Is Easier

How does App Volumes improve a XenDesktop environment when updating XenDesktop itself? In a persistent XenDesktop implementation, to migrate to a new version of XenDesktop, IT must reinstall each application and validate the golden image. With App Volumes in a XenDesktop environment, migration to a new XenDesktop version can occur more quickly because applications are offloaded to AppStacks. IT needs to update only the generic golden XenDesktop image and deploy it. There is no need to touch the applications—App Volumes attaches the necessary AppStacks and the applications are available as usual through the updated version of XenDesktop.
Application Conflicts Handled Efficiently

App Volumes and VMware ThinApp® work well together to solve the problem of application conflicts in a XenDesktop environment. ThinApp packaging isolates potentially conflicting applications from each other, allowing IT to place ThinApp packaged applications next to one another within a single AppStack. ThinApp packages, like traditional applications, are then deployed as part of the AppStack to XenDesktop virtual desktops. ThinApp packaged legacy applications from earlier versions of IE likewise become easy to use.

With App Volumes and ThinApp, applications are kept segregated from the OS and are therefore easily and cleanly installed or retired. App Volumes and ThinApp together bring efficient simplicity to the XenDesktop environment.

For more information about using App Volumes and ThinApp together, read VMware App Volumes and VMware ThinApp Combined: The Perfect Mix.
Implementation Considerations for VMware App Volumes in a Citrix XenDesktop Environment

App Volumes Components in a XenDesktop Environment

App Volumes enhances the existing XenDesktop infrastructure without requiring any substantial changes to it. The components of App Volumes in a XenDesktop environment include the App Volumes Manager, the App Volumes Agent, the AppStack, the App Volumes database, the Provisioning desktop, the VMware vCenter Server™, the XenDesktop endpoints, and the writable volume.

<table>
<thead>
<tr>
<th>COMPONENT ICON</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="App Volumes Manager" /></td>
<td><strong>App Volumes Manager</strong> – A Windows Server 2008 or 2012 system and the Web console for managing all administration and configuration of App Volumes and assignment of AppStacks and writable volumes. App Volumes Manager is also used as a broker for the App Volumes agents, for automated assignment of applications and writable volumes during desktop startup or user login.</td>
</tr>
<tr>
<td><img src="image2" alt="App Volumes Agent" /></td>
<td><strong>App Volumes Agent</strong> – Software installed on all XenDesktop virtual desktops where users receive AppStack and writable volume assignment. The agent runs as a service and uses a filter driver to handle application calls and file system redirects to AppStack and writable volume VMDKs. If the agent identifies that a disk is an AppStack, it delivers the application to the VM’s OS by applying registry and file system changes, creating shortcuts, registering protocols and objects, and merging everything about the application that exists within the AppStack into the OS, combining it to look like it is part of one big C: drive. Applications in the AppStack appear as if natively installed on the host VM. When detaching, the agent reverses the process and pulls the extra volume out of Windows so Windows no longer sees it, and the VM no longer has the VMDK attached.</td>
</tr>
<tr>
<td><img src="image3" alt="AppStack" /></td>
<td><strong>AppStack</strong> – A read-only volume containing any number of files, folders, and Windows applications. Multiple AppStacks can be mapped to an individual XenDesktop virtual desktop. An individual AppStack can also be mapped to many XenDesktop virtual desktops. Formatted as read-only VMDK files, AppStacks attach to virtual desktops as standard virtual disks. AppStacks work in a similar manner with hypervisors other than VMware vSphere.</td>
</tr>
<tr>
<td><img src="image4" alt="App Volumes database" /></td>
<td><strong>App Volumes database</strong> – A Microsoft SQL (production) or SQL Server Express (nonproduction) database that contains configuration information for AppStacks, writable volumes, users, machines, entitlements, and transactions.</td>
</tr>
<tr>
<td><img src="image5" alt="Provisioning Desktop" /></td>
<td><strong>Provisioning Desktop</strong> – A clean desktop virtual machine that includes the OS, necessary updates, and service packs, and has required core applications installed. This computer acts as a master device that is used to install new applications on the AppStack. The provisioning virtual machine must have the App Volumes Agent installed and configured to connect to the App Volumes Manager.</td>
</tr>
<tr>
<td><img src="image6" alt="vCenter Server" /></td>
<td><strong>vCenter Server</strong> – VMware vCenter Server provides centralized management of vSphere virtual infrastructures. App Volumes leverages vCenter for inventory information and operational connectivity to host, virtual machine, and storage resources within a deployed vSphere environment.</td>
</tr>
<tr>
<td>COMPONENT ICON</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td><strong>XenDesktop endpoints</strong> – In a combined App Volumes and XenDesktop environment, endpoints remain exactly as they have been set up within the XenDesktop implementation (desktop, thin client, or mobile device). End users are presented with the applications on a local device. They do not know that App Volumes is involved in the XenDesktop environment. In the background, App Volumes delivers applications to the XenDesktop virtual desktop where they run for the user. XenDesktop virtual desktops do not have to be members of the domain on which the App Volumes Manager server resides.</td>
</tr>
<tr>
<td></td>
<td><strong>Writable volume</strong> – A user-specific read-write volume where the user is allowed to preserve settings and licensing information and data, application files, and user-installed applications. Only one writable volume can attach at a time to a virtual desktop. The writable volume follows the user from device to device based on login information. This functionality is assigned and enabled for each user in the App Volumes Manager.</td>
</tr>
</tbody>
</table>

Table 1: App Volumes and XenDesktop Components
AppStack Delivery to XenDesktop Virtual Desktops

In the combined App Volumes and XenDesktop environment, AppStacks are used to deliver unique groupings of applications to specific users on their XenDesktop virtual desktops.

Main Architecture

In the traditional XenDesktop environment, a user logging in accesses the XenDesktop virtual desktop through Citrix Receiver on the endpoint. From there, the user connects directly to the Citrix Web Interface or StoreFront servers and then the virtual desktop. With App Volumes AppStacks, the user experience is the same as in a XenDesktop-only environment, although back-end components differ. Figure 3 shows what occurs in the background when applications are delivered to the user by AppStacks.

The user login remains the same in a combined solution as with XenDesktop alone. Installed on the XenDesktop virtual desktop are the OS, the XenDesktop Agent, and the App Volumes Agent. By the time the user completes login to XenDesktop, the App Volumes AppStacks and a writable volume assigned to that user or desktop have already completed attachment and the applications are being integrated into the XenDesktop virtual desktop to be ready for use. For details on App Volumes delivery of applications to the XenDesktop virtual desktop, see Figure 4.
AppStack Delivery Workflow

In a typical architecture, App Volumes integrates with XenDesktop virtual desktops to deliver the AppStack application containers and writable volumes after Active Directory has already begun validation of the user. The workflow is as follows:

1. In the data center the App Volumes Agent on the XenDesktop virtual machine starts upon user login. The agent communicates with the App Volumes Manager to assess whether there are AppStacks and a writable volume approved for the user.

2. The App Volumes Manager determines which AppStacks and writable volume are assigned to the user’s XenDesktop virtual desktop.

3. The App Volumes Manager sends any AppStack and writable volume VMDK mount commands to vCenter or ESXi and vSphere.
### Implementation Considerations for VMware App Volumes in a Citrix XenDesktop Environment

#### 4. VMware vCenter or ESXi attaches the AppStack and writable volume VMDKs to the specified XenDesktop virtual desktop in this order:

- **a.** If a writable volume is enabled for the user, it attaches first. Login is held until the writable volume attach is successful.
- **b.** Next, the first AppStack attaches. All remaining AppStacks are held until the first AppStack attach is complete.
- **c.** Then the login is released and any remaining AppStacks attach as login continues.
- **d.** If no AppStacks are approved for attach, the writable volume attaches and login is released.

#### 5. The App Volumes Agent sees that a volume has been mounted to the Windows OS. The agent checks to see if the data belongs to App Volumes. If it does, the agent takes over, merging, or registering, the volume into the Windows operating system. After the application merge with Windows is complete, application shortcuts, objects, and registry entries are available to the XenDesktop virtual desktop and user for proper execution of the application. The writable volume is available to hold user data. All profile information (including `ntuser.dat`) is accessible as soon as the writable volume attaches.

---

**Figure 4:** App Volumes Delivery of Applications and Writable Volume to the XenDesktop Virtual Desktop
FAQs About App Volumes in a XenDesktop Implementation

Q. What is the best approach to containerizing applications into AppStacks?

A. When using App Volumes for application delivery, AppStacks can be configured in several ways:

• An individual AppStack for each application
• An AppStack for each group of applications
• A single AppStack for all applications together

Grouping is done solely to simplify the delivery process and to ensure that application compatibilities are maintained between applications that work together, for example, Microsoft Office and Microsoft Office plug-ins.

This significantly eases the burden of managing the delivery of applications to many XenDesktop virtual desktops by allowing XenDesktop administrators to move AppStacks as needed to any virtual desktop or group of virtual desktops for load balancing and planned downtimes. It also allows for all XenDesktop virtual desktops to be identically configured in a logical manner with only the base applications and settings deemed necessary for everyone.

For details about designing AppStacks, read the paper VMware App Volumes Technical FAQ.

Q. What needs to be included in the provisioning machine base image?

A. The provisioning machine base image includes the virtual machine’s operating system and can also include some generic applications that all end users receive or that work best if on the base image. This image must be optimized for a virtual environment and must mirror the production image exactly. The image cannot be generated from a machine that was used for another purpose and then cleaned up to act as the provisioning machine. Rather it must be an image constructed from a fresh, previously unused machine. For more detail about best practices when creating a provisioning machine image, read the Best Practices section of the App Volumes Deployment Guide.

Q. Is there a way to automate certain tasks within App Volumes Manager?

A. Yes, with scripts it is possible to automate specific tasks within App Volumes Manager. For further detail read the VMware App Volumes Technical FAQ.

Q. Can App Volumes be used with VMware User Environment Manager for XenDesktop management?

A. Yes. App Volumes can be used for real-time application delivery to VDI environments, such as VMware Horizon 6 and XenDesktop, and published-application environments such as VMware Horizon 6 hosted applications, Microsoft Remote Desktop Services, and Citrix XenApp. VMware User Environment Manager can extend user-profile settings, including application settings, and policy management across those environments. To learn more, see VMware User Environment Manager. Both App Volumes and VMware User Environment Manager are available in the VMware Horizon Application Management™ Bundle—a bundle designed to optimize XenApp and XenDesktop environments.

Q. How does App Volumes differ from Citrix Personal Virtualization Disk (PVD)?

A. App Volumes writable volumes replaces PVD. Rather than connecting the virtual disk to both the user and virtual machine, writable volumes are quickly and easily enabled for the user, on any machine. As the user logs in to the system, a personal writable volume becomes available in real time. App Volumes delivers user-installed applications, department-installed applications, and profile information on the next login. No reboot is required.
Q. **Will App Volumes fit in my XenDesktop environment if I currently use Microsoft App-V to handle application conflicts?**

A. Yes, App-V is an application isolation system. App Volumes does not perform application isolation and complements App-V. App Volumes is a solution for high-speed application delivery.

VMware offers ThinApp for application isolation, an alternative to App-V, and ThinApp packages can be delivered via App Volumes. To learn more about ThinApp in combination with App Volumes read [VMware App Volumes and VMware ThinApp Combined: The Perfect Mix](#).

Q. **Does App Volumes affect any of the Citrix management constructs?**

A. No. With App Volumes you still manage your day-to-day operations with Citrix in the same way you have previously, and App Volumes optimizes the way you manage XenApp and XenDesktop environments.

Q. **How do I integrate App Volumes with vSphere?**

A. Adding App Volumes to the data center with vSphere is relatively easy. The vSphere and vCenter installation does not change. By adding App Volumes to the environment, IT alters only the storage required for AppStacks.

Q. **Which versions of XenDesktop does App Volumes support?**

A. App Volumes supports XenDesktop 5.x and 7.x.
Summary

This paper shows how VMware App Volumes can help optimize a Citrix XenDesktop virtual desktop environment. The paper discusses many of the benefits of using App Volumes, explains how App Volumes works, and offers points to consider during the planning steps of an App Volumes integration into a XenDesktop environment.

Using App Volumes and XenDesktop together gives organizations the agility to modify an existing application infrastructure quickly and efficiently. By separating applications from the virtual machine’s operating system, App Volumes allows IT to build generic XenDesktop virtual desktops and attach AppStacks to provide applications targeted to the individual desktop or user.
Author and Contributors

Debra Perrin Coltoff, Technical Writer in End-User-Computing Technical Marketing, VMware, wrote this paper.

Many thanks for contributions of content from

• Stéphane Asselin, Senior End-User-Computing Architect, End-User-Computing Technical Enablement, VMware
• Tina de Benedictis, Group Manager, Technical Marketing Content, End-User Computing, VMware
• Mark Ewert, Lead Technologist, End-User-Computing Competitive Marketing, VMware
• Dean Flaming, Senior Technical Marketing Manager, End-User-Computing Technical Enablement, VMware
• Jason Marshall, Product Line Manager, App Volumes Research and Development, VMware
• Sachin Sharma, Senior Product Marketing Manager, Desktop Product Marketing, VMware
• Dave Wooten, Consulting Editor, End-User Computing, VMware

To comment on this paper, contact the VMware End-User-Computing Technical Marketing and Enablement team at euc_tech_content_feedback@vmware.com.
Additional Resources

VMware App Volumes
- VMware App Volumes (formerly CloudVolumes)
- VMware App Volumes Deployment Guide
- Horizon & Storage Considerations
- App Volumes Helps OGL Reduce Storage Requirements by 7X across our Citrix Environment
- VMware App Volumes – What About Performance?
- VMware App Volumes: the Lowest Capital and Operational Costs for Application Delivery and Management
- VMware App Volumes Technical FAQ

VMware ThinApp
- VMware ThinApp
- VMware ThinApp Technical Resources

VMware App Volumes and Citrix XenApp Combined
App Volumes also works well with Citrix XenApp. For more information read
- VMware App Volumes—Just What Your Citrix XenApp Environment Has Been Missing
- Implementation Considerations for VMware App Volumes in a Citrix XenApp Environment

VMware App Volumes and VMware ThinApp Combined
App Volumes partners well with VMware ThinApp to minimize application conflict. For more information read
- VMware App Volumes and VMware ThinApp Combined: The Perfect Mix
- Using VMware App Volumes with ThinApp Packages
- Enhanced Management and Performance of VMware ThinApp Virtual Applications with CloudVolumes Shared VMDKs

XenApp on VMware vSphere
App Volumes partners well with VMware vSphere for server virtualization. To learn more read
- Citrix XenApp on VMware Best Practices Guide

VMware User Environment Manager
App Volumes works well with VMware User Environment Manager to manage the end-user experience and policy settings. To learn more read
- VMware User Environment Manager