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Insider's guide: Ensuring 100% app compatibility with XenApp

An overview of the process and resources for establishing application compatibility

This paper is intended to help businesses more fully realize the benefits of XenApp. It addresses misconceptions regarding XenApp and application compatibility. It also defines a deterministic process and identifies available resources to establish and confirm compatibility, and steadily migrate more applications to a XenApp-based delivery model.

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Introduction

Citrix, with over 230,000 customers, estimates that Citrix® XenApp™ delivers 20 million applications to 100 million users world wide. XenApp customers derive these benefits:

- The cost of application management is significantly reduced by centralizing applications
- Applications can be delivered instantly to users anywhere
- Security is improved by establishing centralized control and secure access to data and applications
- Application performance is enhanced, thereby reducing help desk load and increasing user productivity

Still, many IT departments have yet to take full advantage of XenApp. Although they use XenApp for delivery of one or more Windows® applications, some administrators continue to deploy, install and manage many others the old way. Often, this stems from past issues regarding application compatibility with XenApp. Administrators may also have concerns about whether certain applications will operate properly when delivered as a service.

This paper is intended to help businesses more fully realize the benefits of XenApp. It addresses misconceptions regarding XenApp and application compatibility. It also defines a deterministic process and identifies available resources to establish and confirm compatibility, and steadily migrate more applications to a XenApp-based delivery model.

Note: Many of you may be more familiar with XenApp by one of its earlier names, such as Citrix® MetaFrame™ or Citrix® Presentation Server™. For the purposes of this document, please consider the names MetaFrame, Presentation Server and XenApp to be equivalent and any version numbers (e.g., 4.0, 4.5, 5), even if used with the earlier product names, to represent the progression of the product line as a whole.

Common misconceptions

Many IT administrators believe that some or even many of their Windows applications are incompatible with XenApp because they may have experienced or learned of application compatibility issues in the past.

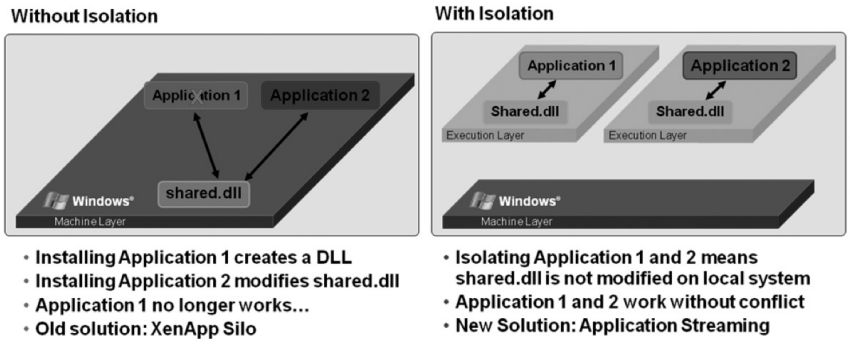
Most of these compatibility issues no longer exist. This shouldn't come as a surprise. Citrix engineers have made numerous application compatibility improvements to XenApp, related features have steadily been added, and independent software vendors are adhering to Microsoft® application certification requirements, which helps ensure Terminal Services compatibility.

Let's take a look at common misconceptions regarding application compatibility.

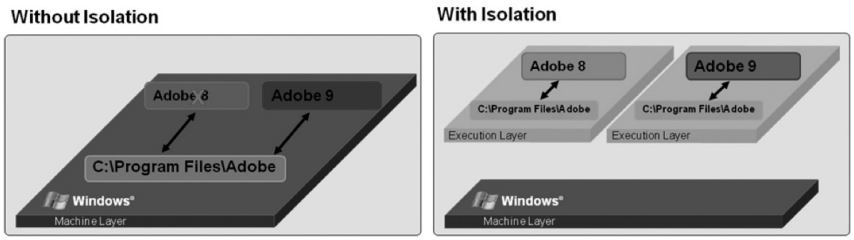
The most common misconceptions about application compatibility

The most common XenApp compatibility misconceptions include:

- **When two or more applications require different versions of same DLL from the C:\Windows\System directory, there is a compatibility clash.**
  In the past, these applications had to be installed on separate XenApp Servers. Starting with Windows 2000, Microsoft-certified applications have specific requirements that limit these issues. For non-certified applications, application virtualization and streaming can be used to effectively isolate applications, as shown below:



- **When multiple versions of an application must be published on the same XenApp server (e.g., multi-tenant service provider) there is contention over file resources.**
  In the past, these applications had to be installed on separate XenApp Servers. Now, using application virtualization technology (introduced in Version 4.5 in March 2007), isolation and streaming enable multiple versions of an application to be loaded onto a single XenApp server, as shown below:

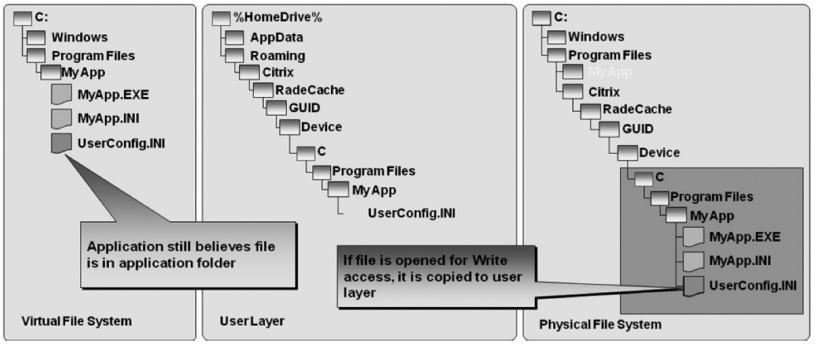


- Install Application 1
- Install new version
- Application 1 no longer works
- Application 2 might work
- Old solution: New XenApp Silo

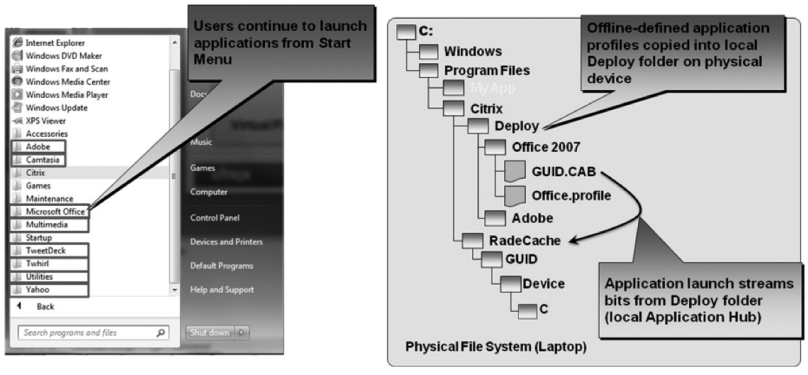
- Isolating Application 2 means shared.dll is not modified on local system
- Application 1 and 2 work without conflict
- New Solution: Application Streaming

In the case of Adobe® Acrobat® as shown above, both applications use the virtual path of C:\Program Files\Adobe, whereas the physical path differs.

- **When an application was not developed based on Terminal Services compatibility, it was difficult to publish with XenApp.** Now, if an application based on single-user access only has user registry settings stored in HKLM\Software or user-specific files stored in C:\Program Files or C:\Windows, application virtualization and streaming can address these issues by installing into an isolation environment, as shown below:



- **If users occasionally need to access applications from a laptop device when poor or no network connectivity exists, it is difficult to deliver applications via XenApp.** Now, by streaming applications to client devices (introduced in V4.5 in March 2007), applications can be configured to be available for offline operation.



Other compatibility misconceptions

The following table identifies several other misconceptions regarding XenApp compatibility and usability along with guidance on how to address them.

Misconception	Reality
Applications that require a unique IP address for licensing or for connectivity to a backend database cannot be published via XenApp.	The Virtual IP capability, first introduced with Presentation Server 4.0, enables an IP address to be assigned from a designated pool or passed from the client device.
Applications hard-coded to install using a non-standard path cannot be published on XenApp.	In many cases, application virtualization and streaming can be used to address the issue. However, if streaming does not resolve the issue, then the application will require modification. Third party application compatibility tools can be used to analyze the application and produce a report indicating what changes, if any, are required. For more details, visit www.citrix.com/appcompat.
Application performance is slow or unknown.	Application Performance Monitoring (Citrix® EdgeSight®, introduced in V5 in March 2007) can be used to create a synthetic session for testing and troubleshooting of application performance issues.
Applications must be hosted on XenApp servers that are logically near backend databases.	This is a best practice, not a requirement. Because communications between an application and backend database can be bursty, unsecured and uncompressed, Citrix recommends hosting them on XenApp servers that are logically near backend databases. Alternately, Citrix® NetScaler® or Citrix® Branch Repeater™ could be used to improve performance.
Applications that are CPU intensive will enable one or more users to usurp server resources, slowing down other users sessions.	By enabling CPU optimization, user access to server resources is allocated fairly, thus improving the user experience. In addition, XenApp 5 for Windows Server® 2008 includes Preferential Load Balancing, which allows administrators to allocate server resources based on preference settings.
All applications on a single XenApp server must be either hosted or streamed; both modes cannot be used on one XenApp server.	Applications can be published as either hosted or streamed applications; both hosted and streamed applications can co-exist. So long as applications are published using compatible settings (display, sound, etc.), session sharing is invoked by default.
An application that includes a driver or service cannot be made available to users via XenApp.	The application currently cannot be streamed, however, it can be run directly on XenApp as a hosted application.
Application streaming to client desktops can cause excessive licenses to be consumed while offline.	Starting with XenApp 5 Feature Pack, Windows client devices that have applications streamed do not consume a license. For more details, see www.citrix.com/xenapp.
Application streaming is not included with the Advanced Edition.	Starting with XenApp 5 Feature Pack, both streaming to server and Windows desktop are enabled with the Advanced edition. For more details, see www.citrix.com/xenapp.
Profiling applications is difficult and cumbersome.	Streaming Profiler 1.3.1 incorporates many fixes and upgrades that improve usability.
Applications streamed to the desktop cannot be accessed with a SmartCard.	XenApp plug-in for Streamed Apps 1.3 supports SmartCard functionality.
First access of a streamed application is lengthy.	Technology incorporated within the Streaming Profiler 1.3.1 and the XenApp plug-in for Streamed Apps 1.3 causes applications to be streamed faster. In addition, the RADEDEPLOY switch can be used to pre-deploy streamed applications to desktops and servers.
Mobile users of handheld devices and laptops cannot use streaming.	With dual-mode streaming configured, if an application cannot be launched on the client device, it can be streamed to a XenApp server for user access.
Third-party technology is required to isolate applications.	Application streaming is included with all XenApp editions. Citrix introduced application isolation with Presentation Server 4.0 and application streaming with Presentation Server 4.5.
Where applications aren't sociable, application silos are required.	Application streaming isolates applications from each other negating the need for extensive server silos.

Establishing application compatibility

To address application compatibility concerns more thoroughly, IT administrators are encouraged to conduct a formal evaluation process like the one depicted in Figure 1.

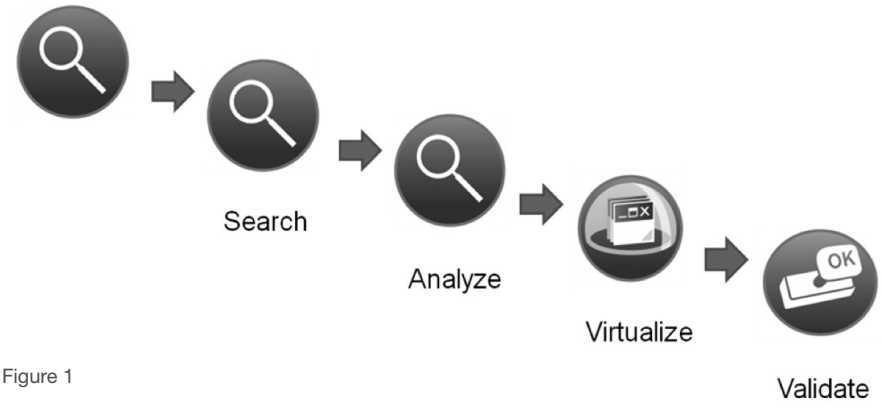


Figure 1

The goal of this process is to progressively establish successively greater levels of assurance of compatibility with XenApp, up to the point that the application is comprehensively tested under production-like conditions. Fully executing each of the steps may not be absolutely necessary, particularly if previous steps provide an acceptable degree of assurance. For example, using third-party tools to conduct a detailed analysis of an application would be overkill if the preceding search phase revealed sufficient evidence of other organizations having successfully deployed the application under conditions similar to those your organization plans to use.

The remaining sections of this document provide a detailed explanation of each step in the process. Associated best practices, tools and other helpful resources are also identified.

Step 1 – Inventory candidate applications

The first step of the process is to compile a prioritized list of applications to be migrated to XenApp. Ideally, IT administrators should establish and maintain an inventory of the organization's entire application portfolio. Many organizations have already done this to achieve and demonstrate regulatory compliance or as part of their broader IT management processes. If an updated inventory is not available, then consideration should be given to which of the organization's existing system management tools can be used to support this endeavor. Asset discovery, inventory and management tools are fairly common among larger IT organizations, and include packages such as Microsoft Systems Center Configuration Manager or the Altiris™ Total Management Suite from Symantec™.

With an inventory in hand, the next part of this step is to determine which applications represent the best candidates for migration to XenApp. Although XenApp can deliver almost all applications, best practice is to start with the most likely candidates. The criteria that should be applied include:

- Applications that are widely deployed
- Applications that are used by remote, home and offshore workers
- Applications that require frequent updates (or that are otherwise relatively expensive to maintain)
- Client-server applications with large clients or that exhibit high traffic between the client and server
- Applications that are known to conflict with other applications or previous versions of the same application
- Applications that involve sensitive data
- Applications that experience network performance problems

Applications that exhibit these characteristics to the greatest degree will be the ones that will yield the greatest gains by migration to XenApp.

Step 2 – Research compatibility status

The next step in the process is to filter the list of preliminary candidates on the basis of which are most likely to be compatible with XenApp and, therefore, are unlikely to encounter difficulties during or subsequent to the migration process. In this regard, the Citrix Ready & Community Verified online database is an invaluable resource (http://community.citrix.com/citrixready). By searching the database, administrators can quickly and easily determine which applications can successfully operate on XenApp.

The database specifies three levels of verification for applications running on XenApp.

- **Citrix verified** means the application has been tested and verified by Citrix to the criteria specified by the Citrix Ready Test Kit for XenApp. This level of verification provides assurance of a wide range of baseline functionality, including drive re-mapping, retention of user preferences, isolation mode, client-side printing and acceptable operation using network connections with different bandwidth and latency characteristics.
- **Partner verified** means that a Citrix partner(s) performed testing and verification in accordance with the Citrix Ready Test Kit, and that Citrix has confirmed the suitability of their approach and results.
- **Community** verified means that a member(s) of the Citrix community at large has implemented the application on XenApp.

Besides the verification level, search results will designate the applicable product versions, the platforms on which they have been implemented and whether the subject application was streamed to or actually installed on the platform. In most cases, additional helpful resources will also be provided. These include:

- *Digg* votes, which provide a measure of validation for community verified entrees.
- Community discussions regarding the migration process, which often incorporate resolutions for issues that were encountered and other tips and tricks to help ensure success.
- A listing of applicable Knowledge Center articles, which contain supplemental guidance, step-by-step implementation processes, best practices, performance assessments, sizing and scalability analyses, and other valuable information.

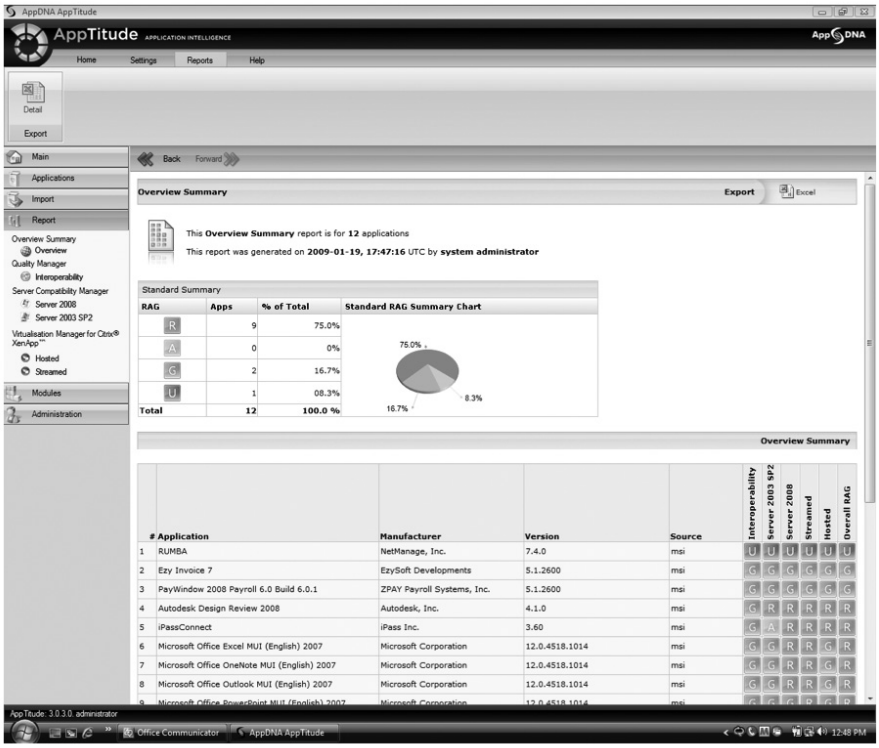
Organizations should consider exploring additional sources of compatibility information as well—especially if the Citrix Ready & Community Verified online database returns limited results. Checking with the ISV that developed a given application and searching the Web may prove fruitful. Conduct a direct search of the Citrix Knowledge Center just in case applicable materials have not been consistently linked to the database.

The outcome of this part of the exercise is further prioritization of the candidate list and aggregation of numerous resources that should help not only to improve the efficiency of deploying specific applications on XenApp but also to ensure that the end result is a highly effective implementation.

Step 3 – Analyze and remediate candidate applications

At this point in the process, there may still be a number of applications that require greater assurance regarding their compatibility with XenApp. For instance, the research collected during the previous step is unlikely to yield sufficient results for certain categories of applications, including ones that are very new, relatively uncommon, highly customized or custom developed. In these cases, administrators can elect to engage third-party tools to perform further analysis. Two such products are the AOK suite of tools from ChangeBASE Limited and AppTitude from AppDNA. In general, these products:

- Import one or more subject applications
- Decompose and analyze the subject applications by applying a proprietary rules engine or knowledge base
- Identify which applications can be migrated without issues, which require further testing, and which will fail and require remediation
- Create reports enumerating the errors triggered by each application
- Provide a combination of remediation advice and automatic fixes to resolve triggered errors
- May provide analysis for both directly installed and virtualized modes of implementation
- May conduct overlap analysis—that is, determine if installing a given application on a server will conflict with other applications already deployed on that server



The result is a highly automated, predictable approach for establishing application compatibility with XenApp. Employing these products, however, does not obviate the need to subsequently conduct comprehensive validation testing. These tools only establish the ability to install and run an application on XenApp; they do not attest to the correct execution of an application's functionality while operating on XenApp.

Step 4 – Installing and virtualizing an application

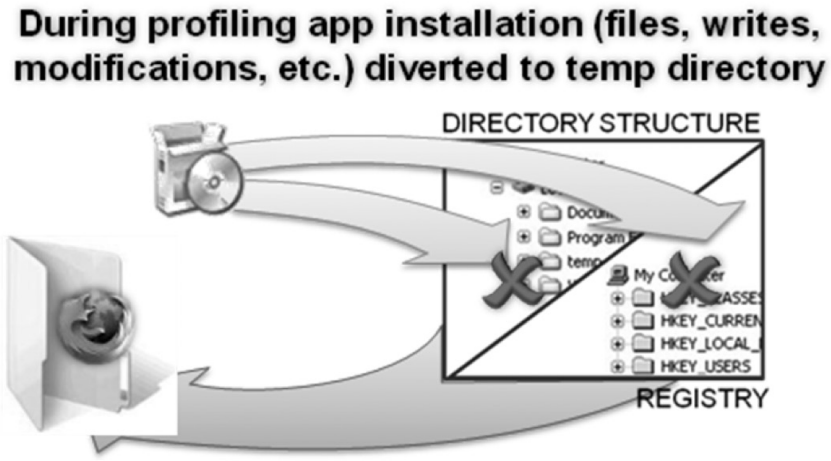
This step of the application compatibility process is about preparing the application for the validation and testing phase, which is step 5. This can be done in one of two ways: either by installing the application directly on a XenApp server, or by virtualizing it. Application virtualization (isolation and streaming) has some distinct advantages, which include:

- Reducing the effort required to maintain the associated application by enabling all updates to be made to a single image that is kept in a single, centralized location (i.e., the Application Hub)
- Establishing isolation for applications, a characteristic which reduces inter-application incompatibility, thereby cutting the need for costly server silos and supporting a higher density of applications per server
- Having applications available on-demand for dynamic download to user devices or XenApp servers as needed—for example, to facilitate impromptu remote operations or to spin-up additional capacity for a hosted application

Additional benefits are accrued for those instances where applications are streamed to Windows desktops. These include:

- Achieving optimal or balanced utilization of computing resources
- Elimination of client-side application compatibility issues
- Elimination of issues related to successfully accessing peripherals
- The ability to utilize applications when operating offline

To prepare an application for streaming, it must first be profiled. This is done by using the Citrix Streaming Profiler. At a high level, the process of profiling involves recording the installation of an application to determine and bundle all of the components, system resources and configuration settings required for the application to run in isolation on one or more target platforms. Upon completion of the profiling process, the resulting package—itself referred to as a profile—is saved to a Web server or file share called the Application Hub, after which it will need to published through the XenApp farm for the application to become accessible.



For more information on profiling and application streaming, users can refer to the following documents available at the Citrix Knowledge Center:

- "Application Streaming FAQs for Administrators" http://support.citrix.com/article/CTX118181
- "Enhancing the Security of Application Streaming for Desktops" http://support.citrix.com/article/CTX110304
- "Application Streaming Delivery and Profiling Best Practices" http://support.citrix.com/article/CTX118623

Application compatibility issues with isolation environments

One of the benefits of application streaming is that it establishes an isolation environment, a feature that significantly reduces the likelihood of encountering compatibility issues with other applications that are running on the same host. This technique, however, is not definitive. Depending on the characteristics of the application to be streamed, there may be some system resources that remain shared. Specifically, application compatibility issues may persist or an application may not currently be suitable for streaming if the subject application:

- Depends on a device or kernel driver to function
- Relies on a Windows service to function correctly (other than Microsoft Installer, MSI)
- Uses Windows messages (involving Windows class names or Windows names) as an inter process communication mechanism
- Uses registry or application objects that do not link to User32.dll (e.g., applications that do not have a Windows interface and only use the console)
- Depends on Distributed Component Object Model (DCOM) to function correctly

Further details on this topic can be obtained by reviewing Knowledge Center article CTX109254.

Step 5 – Validate operations and inter-application compatibility

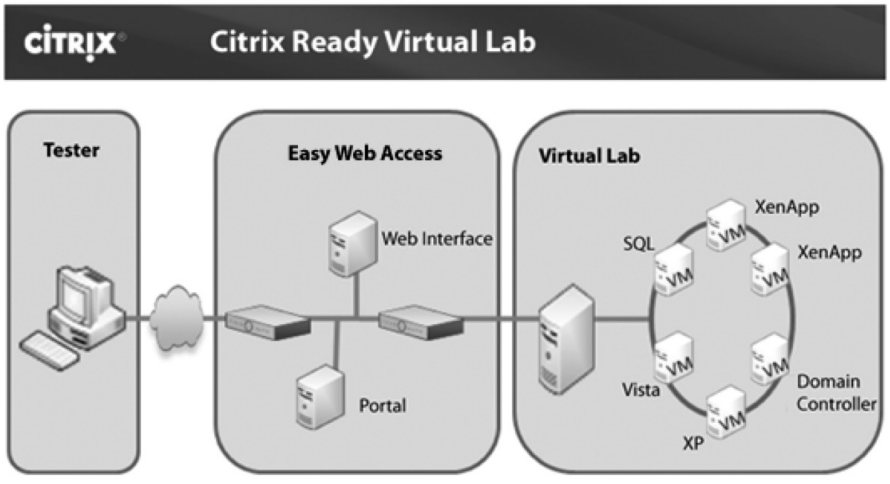
Ultimately, there is no substitute for testing an application's compatibility both in terms of operating on XenApp and of being able to co-exist with other applications. At this point, there are three basic options available to XenApp customers. Please note that these options are not mutually exclusive.

Option 1: Testing in the cloud

The first of these is to take advantage of XenApp in the cloud. Here, there are two services to choose from. First is the Citrix Ready Virtual Lab (see http://portal.citrixreadyvirtuallab.com/). This remotely accessible online lab environment is preconfigured and contains all of the components required for Citrix Ready verification testing, including:

- Microsoft Windows Server 2003 pre-installed with XenApp
- Windows XP and Vista® desktop environments to use as user test workstations
- Microsoft SQL Server® for applications that require a database
- A domain controller
- A SharePoint® portal environment with documentation and instructions for using the lab

By using the Virtual Lab, organizations can test basic compatibility of their applications running on XenApp and can exercise much, if not all, of each application's functionality. There are, however, limitations related to accounting for all of the specific conditions and components that constitute your actual production environment.



The other cloud option is to take advantage of the Citrix C3 Lab in the Amazon® EC2 environment
(see: http://aws.amazon.com/solutions/featured-partners/citrix/). The Citrix C3 Lab leverages Amazon Elastic Compute Cloud (Amazon EC2), Amazon Simple Storage Service (Amazon S3) and Citrix Cloud Center (C3) to provide a preconfigured environment for IT professionals to prototype cloud solutions

with no additional fees beyond the normal AWS usage charges. C3 Lab users will have access to the Citrix applications listed below, allowing them to test application compatibility and application staging, and gain overall experience of running Citrix solutions in AWS. To ensure users take full advantage of the C3 Lab, Citrix also provides C3 Lab Blueprints that walk users through the basic steps on how to start these Citrix applications in Amazon EC2.

The Development Amazon Machine Images (AMIs) Citrix provides includes:

- XenApp AMI
- Citrix® Access Gateway™ AMI
- XenApp plus Citrix Access Gateway AMI
- XenApp, Access Gateway and Branch Repeater AMI

If you are an existing Citrix customer, your licenses are valid when deployed on Amazon EC2, providing you the flexibility to create more complex deployments with your custom-built and licensed applications. A support forum is also available.

Option 2: Bring an Evaluation Virtual Machine into your lab

For a more accurate and thorough test scenario, users should consider obtaining and implementing a XenApp Evaluation Virtual Appliance in their own environment. The XenApp Evaluation Virtual Appliance, a pre-built, three-server, virtualized system, can be used to demonstrate and exercise all of the key features of the Platinum edition of XenApp, allowing full evaluation from both administrator and user perspectives for a period of 30 days. Moreover, because it is a pre-configured virtualized server solution, that which might take as many as several days to install can now be implemented in less than an hour.

Option 3: Use your own testing and staging environment

The third option has the potential to provide the greatest degree of accuracy and thoroughness. This entails using a dedicated and fully segregated staging environment for evaluating new applications and systems to execute a comprehensive test agenda that will definitively establish XenApp compatibility. What makes this option ideal is the ability to mock up XenApp implementations and reflect associated operating conditions exactly as they will occur in your production network.

Maximizing the value derived from testing is obviously an important objective. Best practices include the following:

- Use an environment that matches the production environment as closely as possible—being sure to account for all hardware and software components, as well as prevailing network conditions.
- Where feasible, leverage Citrix® XenServer™ virtualization technology to minimize required hardware investments. To the extent possible, maintain complete segregation between the testing and XenApp production environments (at least until the production phase of testing).
- Conduct scalability tests using the specific hardware and virtualization configurations that will be used in production. If licensed for XenApp Enterprise or Platinum, take advantage of Citrix load testing services.
- If licensed for XenApp Platinum, use Provisioning Services to facilitate efficient and accurate restoration to clean or baseline conditions.
- If licensed for XenApp Platinum, incorporate Application Performance Monitoring (EdgeSight) to provide application-related test data and to create synthetic sessions in order to explore what if scenarios.
- Document all facets of the test environment to account for all software, hardware and networking components and their specific configuration settings.
- Use test scenarios that comprehensively exercise the application's functionality—from both user and administrator perspectives—across the full spectrum of potential operating conditions.

Another best practice, when applicable, is to test whether there are compatibility issues with other applications that may be required to run on the same host. If co-existence problems are encountered, these may be resolved by isolating either or both of the involved applications. Otherwise, it may be necessary to resort to application segregation. This is where applications with sociability issues are segregated to dedicated XenApp servers, a process that is referred to as creating an application silo.

Conclusion

Lingering concerns regarding application compatibility represent one reason why many IT administrators continue to deploy, install and manage many of their Windows applications in a conventional manner—versus implementing them on XenApp and accruing its benefits of flexible delivery, stronger security, better performance and lower cost of management. This paper shows that many of the compatibility issues encountered in the past are no longer applicable. In addition, to further alleviate concerns—and thereby pave the way to obtaining greater returns from their XenApp investments—organizations can also take advantage of the application compatibility process and related resources detailed herein.

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About Citrix
Citrix Systems, Inc. (NASDAQ:CTXS) is the leading provider of virtualization, networking and software as a service technologies for more than 230,000 organizations worldwide. Its Citrix Delivery Center, Citrix Cloud Center (C3) and Citrix Online Services product families radically simplify computing for millions of users, delivering applications as an on-demand service to any user, in any location on any device. Citrix customers include the world's largest Internet companies, 99 percent of *Fortune* Global 500 enterprises, and hundreds of thousands of small businesses and prosumers worldwide. Citrix partners with over 10,000 companies worldwide in more than 100 countries. Founded in 1989, annual revenue in 2008 was $1.6 billion.

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