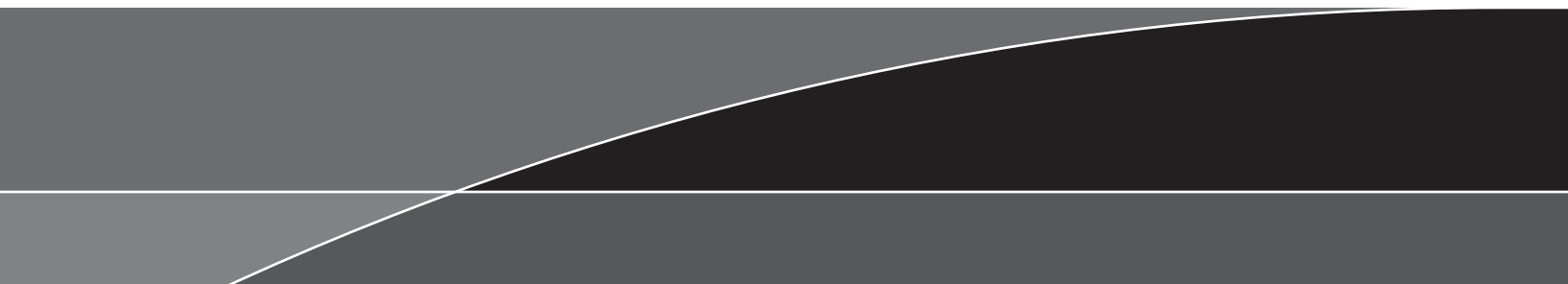




# Desktop Virtualization: Overcoming five real-world challenges



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# Executive summary

The business case for desktop virtualization is compelling, especially when a large or variable number of end-users work using similar OS and applications platforms. Organizations can unlock substantial improvements in operating costs, security, management effectiveness and business agility by mastering a few predictable challenge:

- User expectations for dramatic improvements in boot time, mobility, and support
- WAN latencies that can compromise desktop responsiveness
- Provisioning and patch management issues that can add data-center complexity
- Requirements for rapid scalability—up or down—to meet changes in demand
- Single-vendor lock-ins that compromise flexibility and cost-effectiveness

The Citrix XenApp™ virtualization platform assembles desktops dynamically from OS and application images, with additional customization to individual user requirements. XenApp delivers the technical and business performance needed to meet the challenge of real-world desktop virtualization.

## Introduction

Success with server virtualization is leading many firms to explore the next frontier—virtualizing employee desktops. The opportunities are significant, but so are the challenges, both technical and psychological.

This paper explores the most significant hurdles any desktop virtualization program needs to overcome—from solving overseas partners' network latency problems to getting the Mac® in the Graphics department on the Corporate accounting system. Staying focused on the ultimate goal—delivering core applications effectively to users—helps clarify the issues involved in desktop virtualization deployment.

## Desktop virtualization— the business case

In the past, companies tried to control desktop configuration and cost using a variety of policing methods, none of which ever really worked. Desktop virtualization promises to be much more effective. Instead of maintaining individual desktops—operating system and core applications—on thousands of PCs, IT would manage just a few desktop images in the datacenter. End users would share access to those master images over networks using a virtual display protocol.

In principle, the business case is compelling—Desktop virtualization helps companies manage:

- **Hardware costs**—on virtual desktops, unlike physical versions, OS and Application updates and revisions rarely require new hardware
- **Compliance and data security**—PCs running virtual desktops contain no data, so information remains secure even when hardware is lost or stolen

- **IT productivity**—virtualization lets IT solve client problems by the hundreds at the datacenter, not one at a time under desks
- **Growth**—new desktops are available instantly to new employees or partners anywhere in the world, for agility and performance at scale
- **Resilience**—central management and protection of virtual desktops and data helps them withstand disasters and recover quickly when they occur

## One goal—five challenges

Desktop virtualization solves some of IT’s most persistent problems. But it also moves PC maintenance into the datacenter, consolidates desktop storage, and places new demands on networks. These new challenges can be overcome by careful planning, selection of an experienced technology partner, and sustained focus on a single goal: to make applications and desktops in the new virtual environment more responsive than they ever were in the old, costly, unreliable physical environment.

With a decade’s experience delivering high-performance applications to remote clients and more than 200,000 current users of its XenApp application delivery system, Citrix Systems, Inc. has helped many organizations like yours identify and overcome the challenges of desktop virtualization. Here is how Citrix interprets and addresses the key challenges of desktop virtualization:

### 1. Improved user experience

This one is paramount. Users will accept virtual Desktops only if they outperform their current PCs. And they’ll apply their own performance criteria like these:

- **“Instant On”**—virtual desktops should boot much faster than a disk-resident OS, and respond as quickly as network bandwidth and latency will allow
- **Mobility**—desktops should be available from any location through compact, lightweight devices, so employees can travel light and be productive anywhere
- **Functionality**—employees expect the full up-to-date corporate desktop plus their own “personal” applications and customizations
- **Peripherals**—desktops must support USB devices, networking, printing, scanning and other functions that users value
- **Support**—virtualization should include applications to monitor performance, maintain service-level compliance, and quickly diagnose and resolve user issues

#### Value in use: positive personalization

Desktop virtualization initiatives often start with a single function or location, quickly building a reputation that can make or break an entire program. A retailer planning to virtualize desktops in its Accounting Department might start with Accounts Payable, for example. By assessing and addressing end-user requirements—especially for “personalization”—early in the process, IT can overcome end users’ perceptions of loss of control. Then, when Desktop virtualization delivers instant-on performance, more work-from-home days, fewer crashes, and faster problem resolution, it will be easy to prove that “my desktop” is an attractive alternative to “my PC.”—and get end-user buy-in from the next department in line for conversion.

Citrix XenApp separates the OS from applications, data, and user personalization assemblies desktops dynamically on demand. This not only simplifies management, but speeds users through the power-up cycle so they can get to work. And because applications stay resident when PCs go off-network or shut down, users can keep working and reboot even more quickly.

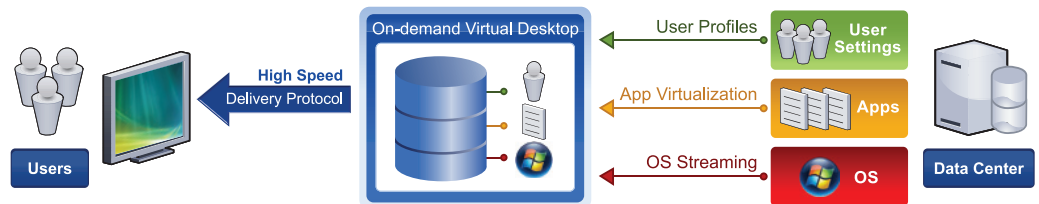


Figure 1. Citrix desktop delivery separates the core operating system from applications and user preferences, allowing user customization and operational flexibility while reducing the number of images that must be managed centrally

## 2. Network latency tolerance

Even Desktop delivery that works flawlessly in the lab may fail badly over Wide-Area Networks (WANs) where network latencies routinely exceed worst-case LAN limits. Failure modes include poor graphics rendition and slow mouse/keyboard response that cut productivity and frustrate users.

The proprietary Citrix “Independent Computing Architecture” (ICA®) protocol preserves client performance even for graphics-intensive applications operating over networks with significant latency. Any company-wide virtualization solution—especially when it involves offshoring of “live” back-office or call-center functions—should consider desktop virtualization solutions that perform to service quality standards, even in the face of high network latencies.

### Value in use: effectiveness offshore

The robustness of a virtualization solution in the face of high network latencies is a performance issue with serious business consequences. If latency-sensitive virtualization problems cut efficiency and service quality at a credit-card company’s India-based call center, for example, pressures will be strong to fix the problem fast. Too often, the “solution” is to shortcut network latency by moving key operations and data offshore. This not only complicates configuration and management, but exposes confidential customer databases to an uncertain risk environment. Such steps may diminish or reverse the gains originally expected from offshoring, and risk embarrassing disclosure of customers’ private information.

### 3. Effective provisioning and patch management

Centralizing desktop images along with their anti-virus signatures, patches, updates, and settings requires careful planning and management. Most enterprises build virtual desktops using 1 or 2 Windows® versions—Vista®, or XP® and Vista. But over time, service packs and patches create dozens of variations of these environments. Delivery and installation uncertainty complicate matters: unless all users receive and install updates successfully and immediately, some devices will be left in untried, untested or even unusable configurations. Central images of these “excess” versions waste storage, complicate discovery, diagnosis, and repair, and threaten the value of desktop virtualization.

The Citrix approach delivers applications and OS instances separately, reducing both the number of images to be maintained and the complexity of maintaining them. Adding an Electronic Software Delivery (ESD) solution to track client update status and manage delivery dramatically simplifies provisioning and patch management, especially compared with today's standards for physical systems.

#### **Value in use: “locked-in” management efficiency**

Management efficiency is a big part of the virtualization story. But just as virtual server sprawl can compromise server virtualization, proliferation of desktops can erode early gains from desktop virtualization. For example, if a University supports just the most recent three patch levels for each of two operating systems and four applications suites, the staff may need to manage as many as 72 [(3 x 2) x (3 x 4)] different desktop images on Day 1—and that's before the customization requests come rolling in. For management efficiency that lasts, desktop components should be separately manageable components, with as much automation of the management process as possible.

### 4. Agility and availability

Desktop virtualization is an ideal solution for the scale-up requirements of mergers, product launches, and global alliances, to manage business “spikes” in response to highly variable or seasonal demand, or to recover from a service interruption or regional disaster.

Citrix XenApp is scalable to every office-based knowledge worker—thousands of them—at near-zero incremental cost, following a consistent, repeatable process. Citrix uses an orchestration engine to automate new user setup, and automates provisioning of datacenter infrastructure to keep computing workloads level.

### Value in use: agility now

“Cloud computing” services know all about agility—their business model depends on virtualization to give customers near-instantaneous scalability from a single server instance to tens of thousands. Desktop virtualization brings that same level of responsiveness to almost any business. When a ticketing agency needs extra capacity to handle a sellout tour, it can put complete desktops—complete with OS and specialized applications—on thousands of employee or contractor desktops overnight, and still retain complete control over their proprietary processes and data, and their customers’ confidential personal and financial information.

## 5. Flexibility

As much as end-users expect performance, they demand customization—their personal stamp on their primary business tool. It may be a salesperson’s favorite time-management application, Macintosh® platforms for the Graphics Department, or a USB accessory one of the Senior Vice Presidents can’t do without.

IT needs flexibility just as much, and avoiding vendor lock-in is a major priority. Desktop virtualization should never restrict your company’s options in critical technologies like these:

- **Hypervisors** – hypervisor technology should support Microsoft’s VHD file format, for encapsulated virtual storage within a native host file system, and to support Microsoft Windows Server® with hypervisor-based virtualization technology.
- **Virtual storage** – many organizations will mix storage types and sources for flexible storage virtualization that makes full use of the advanced capabilities now offered by virtual storage vendors.
- **Desktop Appliances** – Some desktop virtualization solutions limit endpoint options, for example to Windows-based PCs. To maintain user, IT, and business flexibility, desktop delivery should support every major user-side OS (Windows, Linux®, Mac) and platform (PC, Thin Client).
- **Blade PCs** – Most desktop virtualization solutions do not take into account the requirement that some applications and users have for customized or dedicated PC hardware. The solution chosen must be able to address those users with the same infrastructure as those who can be served by virtual machine technology.

Infrastructure should adapt, not constrain—and virtualization infrastructure is no exception.

### Value in use: compatibility and choice

Virtualization is rarely a “green field” initiative—far more often, it’s an attempt to restore business discipline to an area where technologies and costs have become unmanageable. Therefore, compatibility with established technology roadmaps is an important concern. When an insurance company standardizes back-office operations on a few virtual desktops, it shouldn’t require radical changes to its storage, OS, or server platform strategies

Citrix dynamic provisioning supports a full range of platforms and applications—both its own solutions, and innovations from a community of third-party providers. Unlike monolithic take-it-or-leave-it solutions, Citrix XenApp protects companies against the costs and risks of single-source lock-ins. Flexibility extends all the way to the desktop, with automated profile management software that supports personalization of XenApp desktops, maintaining individual user settings through shutdown and reboot cycles.

## Conclusion

Desktop virtualization is a dramatic new way to connect users and applications. Citrix recommends a strategic view of the opportunity it presents, considering it as a part of an organization's application delivery strategy.

Citrix recommends that customers plan carefully to meet the predictable challenges of desktop virtualization. Your desktop virtualization solution should:

- Delight users with better boot time, access, performance, and support than before
- Tolerate WAN latency to deliver agility, economy and security half a world away—where you need them most
- Solve management problems, don't just move them—consolidate management with thoughtful, modular virtualization of applications and OS instances
- Standardize and automate rollouts for peak performance during critical events
- Stay flexible—open solutions have proven their value in servers, and now virtualization platforms—keep your options open

# Citrix Worldwide

## Worldwide headquarters

Citrix Systems, Inc.  
851 West Cypress Creek Road  
Fort Lauderdale, FL 33309  
USA  
T +1 800 393 1888  
T +1 954 267 3000

## Regional headquarters

### Americas

Citrix Silicon Valley  
4988 Great America Parkway  
Santa Clara, CA 95054  
USA  
T +1 408 790 8000

### Europe

Citrix Systems International GmbH  
Rheinweg 9  
8200 Schaffhausen  
Switzerland  
T +41 52 635 7700

### Asia Pacific

Citrix Systems Hong Kong Ltd.  
Suite 3201, 32nd Floor  
One International Finance Centre  
1 Harbour View Street  
Central  
Hong Kong  
T +852 2100 5000

### Citrix Online division

6500 Hollister Avenue  
Goleta, CA 93117  
USA  
T +1 805 690 6400

[www.citrix.com](http://www.citrix.com)

## About Citrix

Citrix Systems, Inc. (Nasdaq:CTXS) is the global leader and the most trusted name in application delivery. More than 215,000 organizations worldwide rely on Citrix to deliver any application to users anywhere with the best performance, highest security and lowest cost. Citrix customers include 100 percent of the *Fortune* 100 companies and 99 percent of the *Fortune* Global 500, as well as hundreds of thousands of small businesses and prosumers. Citrix has approximately 8,000 partners in more than 100 countries. Annual revenue in 2007 was \$1.4 billion.

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