

# Project Success Plan: Desktop Virtualization

A guide for converting your physical desktops to virtual machines (VMs).



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## In this e-guide:

Ever increasing demands for anytime, anywhere access to desktops and applications from various endpoints has disrupted the traditional PC refresh cycle – and IT pros have been scrambling to find strategies that enable them to minimize time consuming maintenance tasks, upgrade application performance and data availability, and improve end-user experience.

But what are your options? What tools are available? What challenges will you run into? Where do you begin? This comprehensive guide walks readers through the entire process of a migration to virtual desktops, from the initial phases of a VDI project through to the monitoring and management of fully deployed VMs.

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**What is Desktop Virtualization**

<http://searchvirtualdesktop.techtarget.com/definition/desktop-virtualization>

Desktop virtualization is the concept of isolating a logical operating system (OS) instance from the client that is used to access it.

There are several different conceptual models of desktop virtualization, which can broadly be divided into two categories based on whether or not the operating system instance is executed locally or remotely. It is important to note that not all forms of desktop virtualization involve the use of virtual machines (VMs).

Host-based forms of desktop virtualization require that users view and interact with their desktops over a network by using a remote display protocol. Because processing takes place in a data center, client devices can be thin clients, zero clients, smartphones, and tablets. Included in this category are:

Host-based virtual machines: Each user connects to an individual virtual machine that is hosted in a data center. The user may connect to the same VM every time, allowing personalization, (known as a persistent desktop) or be given a random VM from a pool (a non-persistent desktop). See also: virtual desktop infrastructure (VDI)

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Shared hosted: Users connect to either a shared desktop or simply individual applications that run on a server. Shared hosted is also known as remote desktop services or terminal services. See also: remote desktop services and terminal services.

Host-based physical machines or blades: The operating system runs directly on physical hardware located in a data center.

Client-based types of desktop virtualization require processing to occur on local hardware; the use of thin clients, zero clients, and mobile devices is not possible. These types of desktop virtualization include:

OS streaming: The operating system runs on local hardware, but boots to a remote disk image across the network. This is useful for groups of desktops that use the same disk image. OS streaming requires a constant network connection in order to function; local hardware consists of a fat-client with all of the features of a full desktop computer except for a hard drive.

Client-based virtual machines: A virtual machine runs on a fully-functional PC, with a hypervisor in place. Client-based virtual machines can be managed by regularly syncing the disk image with a server, but a constant network connection is not necessary in order for them to function.

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## Why consider a Desktop Virtualization project?

<http://searchvirtualdesktop.techtarget.com/tip/Four-desktop-virtualization-use-cases>

Knowing why you're deploying virtual desktops is the first step to success -- whether it's for better security, simplified management or BYOD support.

Desktop virtualization isn't right for every environment or every desktop, so let's review some of the places where it makes the most sense to virtualize.

As business owners demand a lower total cost of ownership, better security, greater mobility and a more agile IT infrastructure, the traditional desktop model is showing its age. The No. 1 reason that desktop virtualization projects fail is because IT professionals often launch these projects without identifying a clear business problem for which the technology is a solution. Fresh off the heels of success with server virtualization, systems administrators may believe that desktop virtualization is the next logical step in the enterprise IT lifecycle.

Virtual desktop infrastructure (VDI) hasn't replaced traditional desktops and laptops in the way that server virtualization has replaced physical servers, but most industry observers acknowledge that desktop virtualization use cases will remain complementary to traditional desktop and laptop delivery and management technologies. Rarely does it make sense for an organization to

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virtualize 100% of its desktops in the data center. Instead, you should view desktop virtualization as just part of a larger IT strategy to provide the highest value to the business.

To help you deploy virtual desktops for the right reasons, here are some examples of common desktop virtualization use cases.

## Disaster recovery

As business continuity and disaster recovery plans develop, companies increasingly rely on desktop virtualization to provide on-demand access at a failover site. Traditionally, businesses interested in disaster recovery would warehouse PC inventory at an alternate facility where users could come and work in the event that the primary location was unavailable

With virtualization, IT can provision thousands of desktops in a virtual environment, quickly providing access to applications in the event that worker access to primary endpoints is not possible.

In addition, virtual desktops and modern remote display protocols enable users to gain access to their desktops and applications remotely. Now that mobile devices provide nearly ubiquitous Internet access, workers expect to be able to connect to corporate systems anywhere, anytime via multiple consumer devices. This use case provides redundancy but raises other concerns.

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## Security

The increasing mobility of users and their devices makes it harder for IT departments to manage company desktops and laptops. Viruses and spyware have become more complex and difficult to detect.

Both physical and virtual machines still have the same Windows operating system, applications and network vulnerabilities. However, desktop virtualization can improve the security of data at rest. Company data on laptops or desktops is no longer stored in unsecured environments; it is now stored within the walls of the data center.

In addition, applications can be isolated by using multiple operating system instances or application virtualization isolation technologies. Separate virtual desktop environments can be used to access sensitive data, providing an additional layer of separation and security.

Nonpersistent desktops can revert the desktop operating system and applications back to a known-good state. IT-controlled virtual desktops in the data center can be more reliably updated with antivirus signature files, patches and updates. Data from desktops can be backed up or collected with electronic discovery systems.

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## Bring your own device

With bring your own device (BYOD), worker-owned devices are being brought into the enterprise, and some users prefer personal devices over corporate-provided ones. Desktop virtualization can provide an alternative path to accessing applications while relieving IT staffers from having to support the endpoints themselves. Subsidizing partial costs for users who choose to bring their own devices could reduce the capital expense of user laptops and desktops.

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## Management

Reducing the total cost of ownership of desktops and laptops is a key objective for IT departments. Traditional desktop and laptop management systems can add significant complexity and increase the cost of supporting users. Plus, managing those desktops and laptops can require numerous applications, including those for application deployment, inventory, OS management and antivirus protection. Virtualization makes it easier to centrally manage and support users' desktops. Plus, you have more control over app deployment, user access and other management tasks.



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**Key terms to understand**

**Virtual Desktop Infrastructure (VDI)**

<http://searchservirtualization.techtarget.com/definition/virtual-desktop-infrastructure-VDI>

Virtual desktop infrastructure (VDI) is the practice of hosting a desktop operating system within a virtual machine (VM) running on a centralized server. VDI is a variation on the client/server computing model, sometimes referred to as server-based computing. The term was coined by VMware Inc. Many organizations are turning to VDI as an alternative to the server-based computing model used by Citrix and Microsoft Terminal Services.

**Thin client (lean client)**

<http://searchnetworking.techtarget.com/definition/thin-client>

A thin client, sometimes called a lean client, is a low-cost, centrally-managed computer devoid of CD-ROM players, diskette drives, and expansion slots. The term derives from the fact that small computers in networks tend to be clients and not servers. Since the idea is to limit the capabilities of these computers to only essential applications, they tend to be purchased and remain "thin" in terms of the client applications they include. As software as a service (SaaS) gains popularity, it is expected that thin clients and blade PCs will replace desktop PCs in many work and educational environments. In general, they are not as vulnerable to malware attacks, have a longer life cycle, use less power and are less expensive to purchase.

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Thin client is also used to describe software applications that use the client-server model where the server performs all the processing.

### Fat client (thick client)

<http://whatis.techtarget.com/definition/fat-client-thick-client>

A fat client (sometimes called a thick client) is a networked computer with most resources installed locally, rather than distributed over a network as is the case with a thin client. Most PCs (personal computers), for example, are fat clients because they have their own hard drive, DVD drives, software applications and so on.

Fat clients are almost unanimously preferred by network users because they are very customizable and the user has more control over what programs are installed and specific system configuration. On the other hand, thin clients are more easily managed, are easier to protect from security risks, and offer lower maintenance and licensing costs.

A system that has some components and software installed but also uses resources distributed over a network is sometimes known as a rich client.

### Remote Desktop Services (RDS)

<http://searchvirtualdesktop.techtarget.com/definition/Remote-Desktop-Services-RDS>

Remote Desktop Services (RDS) is an umbrella term for features of Microsoft Windows Server that allow users to remotely access graphical desktops and Windows applications.

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RDS components include:

- **Remote Desktop Connection Broker:** The connection broker connects users with remote desktops. If a user loses connectivity to a remote desktop, the connection broker allows the user to reestablish the connection without losing the virtual desktop's state.
- **Remote Desktop Gateway:** This component allows for connectivity to virtual desktops and RemoteApp programs over the Internet.
- **Remote Desktop Licensing:** This component tracks license usage for your RDS deployment.
- **Remote Desktop Session Host:** The Session Host allows a server to host session-based desktops or RemoteApp programs.
- **Remote Desktop Virtualization Host:** This is the component that hosts virtual desktops.
- **Remote Desktop Web Access:** This component lets users access remote desktops or RemoteApp programs either through a Web browser or the Start menu.

Remote Desktop Services applications and desktops can be accessed from a variety of client devices, operating systems, and form factors, as well as HTML 5 browsers and Java clients. Users view and interact with Remote Desktop Services resources through a remote display protocol. Microsoft provides the Remote Desktop Protocol (RDP) with Windows, and third-party companies can also create their own protocols, examples of which are Citrix HDX and VMware PC-over-IP.

The richness of the user experience with Remote Desktop Services may be limited by network bandwidth or remote display protocol capabilities. However, there many benefits, including the centralized management of many operating system images, the ability to use inexpensive thin clients to access server-class hardware and increased security within the data center.

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**Comparing leading VDI vendors**

[http://pro.techtarget.com/expert-vdi-buyers-guide\\_lb-ma-content](http://pro.techtarget.com/expert-vdi-buyers-guide_lb-ma-content)

**Citrix XenDesktop 7**

Citrix XenDesktop 7 is an enterprise-class, secure VDI platform that delivers virtual desktops and apps. XenDesktop with FlexCast technology supports many different types of desktop-related services virtually, such as Windows apps for tablets and mobile devices, high-end graphics and centralized security for corporate laptops.

One capability that sets XenDesktop apart from others is that the platform supports a variety of hypervisors: Citrix XenServer, VMware ESXi and Microsoft Hyper-V, among others. The platform also supports 16-, 32- and 64-bit apps on Windows Server 2008 and 2012 R2, Windows XP, Vista, 7 and 8, as well as apps on Mac OS X, iOS and Android.

To support a mobile workforce, XenDesktop lets organizations roll out virtual desktops and apps to nearly any type of device, optimizing them for large and small screens, as well as touch. Users may select authorized apps from an enterprise app store, and WAN networking is optimized to limit latency and provide highly reliable connections.

XenDesktop 7 is available in Enterprise and Platinum editions. Customers can purchase XenDesktop 7 concurrent or perpetual licenses, or opt for a hosted

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desktop option that has a monthly subscription fee. A concurrent license for the Enterprise edition costs \$397; the user/device perpetual license with support costs \$4.

VMware Horizon 6 Enterprise edition (with View)

VMware Horizon 6 Enterprise edition, including the View desktop virtualization product, offers secure delivery of desktops, apps and online services through a unified workspace. The platform supports central image management for physical and virtual machines (VMs) running Windows XP through Windows 8.1, as well as devices operating on Windows, Mac OS or Linux. View is designed only to work on VMware's own hypervisor, ESXi.

The workspace enables administrators to deliver many different kinds of applications and services, including XenApp 5.0, apps hosted by Microsoft Remote Desktop Services (RDS), desktops hosted by Windows Server 2008 and 2012, software as a service applications and VMware ThinApp 5.0.

One of the most enticing features for enterprises is the platform's Blast technology, which provides optimized access over WAN and LAN connections. It also supports virtualized graphics, multimedia streaming and unified communications. With Blast, users get a consistent experience regardless of which device they're using.

With its suite of products for the mobile, cloud-enabled workplace, VMware's VDI platform takes things a step further than some other platforms. Horizon 6

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Enterprise is designed to support software-defined data center operations, allocating resources dynamically to support user workloads on demand, providing self-service options, and securing user computer resources.

Horizon 6 editions include Horizon View Standard, Horizon Advanced and Horizon Enterprise. Sold in 10-packs, Horizon Enterprise costs \$3,630 for a one-year Named User license (dedicated to specific users), or \$6,050 for a one-year Concurrent User license (virtual machines shared among users).

Microsoft VDI/Remote Desktop Services

Microsoft VDI is an enterprise-level virtual desktop and application delivery platform, based on Hyper-V, which requires the Windows Server Remote Desktop Services server role in Windows Server 2012. The platform supports user PCs (through the Remote Desktop Gateway component), personal and pooled virtual desktops, session-based desktops and RemoteApp programs.

Microsoft VDI provides a consistent, personalized user experience on a variety of devices running Windows or Windows RT, iOS, Mac OS X and Android.

The Deployment Wizard enables administrators to configure server roles and automate a Microsoft VDI rollout. To store and access VMs, administrators may use their choice of direct-attached, network-attached, clustered or storage area network (SAN) storage. A unified management console enables central management of server roles, users, VMs and much more.

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Typically, there are two licenses involved with a Microsoft VDI implementation: one for connecting to the virtual desktop infrastructure and another for accessing a virtual installation of the Windows client OS. If you use RDS to access the infrastructure, you must purchase an RDS client access license, either per device or per user. For accessing the Windows client OS, customers covered under Windows Client Software Assurance (SA) do not pay an additional charge for VDI. Without SA, however, customers must license each device through Windows Virtual Desktop Access (VDA) for \$100 per year, per device.

**Dell vWorkspace 8.0**

Originally created by Quest Software, vWorkspace is Dell's VDI platform aimed at the small to medium-size business but is also used by enterprise organizations.. Integrated with Microsoft Hyper-V, vWorkspace 8.0 enables organizations to virtualize applications, provide hosted VDI and deliver local VDI and Remote Desktop Services.

Dell vWorkspace provides fast provisioning, scalability, load balancing, diagnostics and integrated user-experience monitoring and reporting. The platform supports every major hypervisor and many different virtualization platforms, such as Microsoft Hyper-V, Parallels, VMware ESXi and Virtual Iron, as well as Windows desktop and server operating systems through Windows 8.1 and Windows Server 2012, respectively. VWorkspace supports devices running iOS, Android, Mac, Linux and Java.



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The platform provides high-quality audio and video using Microsoft Lync 2013 with the Lync VDI plug-in, and enables organizations to use direct-attached storage rather than a SAN.

Dell vWorkspace comes in two editions: Desktop and Premier. Desktop Edition supports hosted VDI and App-V, and costs about \$150 per concurrent user. Premier Edition supports hosted VDI, Remote Desktop Session Host (RDSH) and App-V, and costs about \$200 per concurrent user.

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## Evaluating products

<http://searchvirtualdesktop.techtarget.com/tip/Choosing-among-VDI-vendors-Know-your-needs>

Choosing a VDI product is no small task because you must take into account features, setup and maintenance, as well as licensing and ongoing support.

You must also determine which technologies your organization needs. Do you plan to provide stateless desktops? Deliver applications through a virtualization tool? Perhaps you're considering desktop as a service (DaaS).

Clearly, there are plenty of options, and gaining an understanding of the various virtual desktop infrastructure (VDI) vendors and tools will help you make the best possible choice.

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## The world of VDI

VDI provides a framework for hosting a desktop operating system within a virtual machine (VM) on a server. A user at an endpoint workstation accesses the VM over the network via a remote display protocol that allows the virtualized desktop to be rendered locally.

IT decision makers often turn to VDI because it promises to cut management and support costs by centralizing and simplifying administrative tasks while

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reducing the resources necessary to maintain individual PCs. User workstations require only a thin client to access their desktops.

But don't confuse VDI with Microsoft's Remote Desktop Services (Terminal Services prior to Windows Server 2008 R2). That provides only session-based access to a server, usually for multiple users.

With a VDI product, users connect to their own desktops and applications, similar to how they would at their local workstations.

## Selecting a VDI product

When choosing a VDI vendor or tool, you should consider a number of factors. For starters, the system you choose must support the necessary operating systems. On the VM side, most services can host Windows but often not Linux. Even within the Windows camp, some VDI products can handle XP and Vista, but others cannot. On the endpoint side, VDI tools generally support a larger range of OSES, including Windows, Mac OS, Linux and Unix. Many VDI products now support mobile endpoints, particularly iOS and Android devices.

There are also other factors you'll need to consider. For instance, your clients might require a display protocol other than Microsoft Remote Desktop Protocol. Or you might want to support Web-based access to the virtual desktops. How

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about support for Microsoft Hyper-V, bidirectional audio WAN or graphics processing unit virtualization?

The key, of course, is to determine exactly which features you must have. Setup and maintenance are the most important considerations, not only to ensure that implementation and ongoing administration are manageable, but also so you get exactly the environment you need. For example, you might plan to implement stateless desktops in which user settings do not persist. Or you might want to go with stateful desktops that save those settings. You might even decide to support both options.

Availability and reliability are also part of the equation. Unlike the traditional desktop model, if a server running multiple virtual desktops is sluggish or goes down, many users can feel the effects. To avoid slow performance or significant downtime, you might need to support capabilities such as load balancing or automatic backups. In addition, your change management strategies should account for how you'll be delivering your applications. For example, if you plan to use a desktop provisioning tool such as Unidesk, you'll have to verify that it will work with your VDI setup.

You should also determine the necessary infrastructure to support desktop virtualization. For instance, do you need both TCP/IP v4 and v6? What level of Active Directory integration do you require? Can you leave your existing infrastructure alone, or will VDI require a substantial investment in resources? And speaking of resources, look carefully at how licensing works. Offerings

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such as Microsoft VDI are notorious for their complex licensing structures. Be cognizant of the total potential cost, not just for the VDI deployment itself, but also for the OS, business apps and ongoing support.

Above all, understand the provider's financial well-being or lack thereof. When Pano Logic shut its doors in 2012, customers were left standing out in the cold.

## An abundance of VDI options

There is no shortage of options to choose from. Citrix XenDesktop and VMware Horizon View have emerged as the industry's top players, and both have a wide range of features. Microsoft VDI remains in the running, especially since the release of Windows Server 2012. But other products are worth considering, too. Dell vWorkspace, Virtual Bridges VERDE and Red Hat Enterprise Virtualization for Desktops are all credible alternatives and may be more affordable than VDI software from the top vendors.

The VDI market is dynamic, and new approaches to virtualizing desktops come online every day. For example, Citrix now offers VDI-in-a-Box, a pared-down tool for smaller businesses. Other providers are also responding to the changing industry. NComputing vSpace uses OS partitioning and virtualization to create virtual environments. Ericom AccessNow implements HTML5 streaming to deliver a browser-based desktop. And LISTEQ BoxedVDI applies a plug-and-play approach to its virtual desktops. Then there is DaaS, a cloud-based service

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that lets you offload many VDI headaches, such as provisioning, networking and load balancing. Desktone is perhaps the best-known of the current wave of DaaS providers, which also includes Nivio and dinCloud.

Again, change is the one constant in the industry. VMware bought Desktone, Dell acquired vWorkspace as part of Quest Software, and Oracle purchased its VDI technology from Sun but has since discontinued further development. Consolidation doesn't necessarily translate to success, nor does the inverse approach; just look at Pano Logic.

This all means that a wide range of virtualization options is available, but you need to be aware of the constantly shifting nature of VDI. So if you don't find what you want today, wait a few months and ask around. Before you do anything, however, make sure you know what you need. Implementing VDI software is a significant undertaking. Tread lightly, plan ahead and then proceed with caution.

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**Hardware**

<http://searchvirtualdesktop.techtarget.com/feature/VDI-hardware-comparison-Thin-vs-thick-vs-zero-clients>

When you deploy VDI, you need to figure out what hardware your virtual desktops will run on.

To host virtual desktops, you have a lot of choices: thin clients, zero clients and smart clients -- not to mention tablets and mobile devices. Thin clients and other slimmed-down devices rely on a network connection to a central server for full computing and don't do much processing on the hardware itself. Those differ from thick clients -- basically traditional PCs -- that handle all the functionality of a server on the desktop itself.

Understanding the benefits, challenges and cost implications of all these VDI hardware options will help you make the right choice. Let's get this straight:

**Thick clients**

It's possible to use thick clients for desktop virtualization, but many organizations don't because it doesn't cut down on overall hardware and requires all local software. If you use traditional PCs to connect to virtual desktops, you don't get many of the benefits of VDI, such as reduced power consumption, central management and increased security.

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How thick clients compare to thin

Since a thick client is basically a PC running thin client software, it is usually more costly than a thin client device. Plus, thick clients have hard drives and media ports, making them less secure than thin clients. Finally, thin clients tend to require less maintenance than thick ones, although thin client hardware problems can sometimes lead to having to replace the entire device.

Thin clients

With thin client hardware, virtual desktops are hosted in the data center and the thin client simply serves as a terminal to the back-end server. Thin clients are generally easy to install, make application access simpler, improve security and reduce hardware needs by allowing admins to repurpose old PCs.

What to look for in thin client devices

Thin clients are meant to be small and simple, so the more advanced features you add, the more expensive they get. As you choose thin client devices, consider whether you need capabilities such as 3-D, video conferencing and multi-monitor support. You should also take into account your remote display protocol and how much display processing your back end can supply.

Aside from being cheap and uncomplicated, thin clients should also offer centralized management. For instance, you can automatically apply profile policies to groups of thin clients with similar configurations. That tends to be



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easier than individual manual management. Plus, you want your VDI hardware to be simple enough for nonveteran IT staff or those at remote branch offices to be able to deploy.

## Zero clients

Zero clients are gaining ground in the VDI market because they're even slimmer and more cost-effective than thin clients. These are client devices that require no configuration and have nothing stored on them. Vendors including Dell Wyse, Fujitsu, Hewlett-Packard and Pano Logic offer zero client hardware.

### Pros and cons of zero clients

So what are the benefits of this kind of VDI hardware? First off, zero clients can be less expensive than thick and thin clients. Plus, they use less power and can simplify client device licensing.

Still, there's a catch: Vendors often market zero clients as requiring no management or maintenance, which isn't always true. Some products do require software or memory and other resources. In addition, zero clients tend to be proprietary, so organizations could run into vendor lock-in.

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## Other VDI hardware routes

But wait -- there are even more VDI hardware options. In today's mobile era, some people are starting to use tablets or smartphones to run virtual desktops.

### Using the iPad as a VDI client

With faster network speeds and improved screen resolution over the past few years, tablets are now up to the task of presenting a virtual desktop. Highly mobile workers and executives are good candidates for connecting to VDI via an iPad, for example. Still, remember that tablets don't offer a mouse and many Windows applications aren't conducive to a touch interface.

### Repurposing old PCs as VDI hardware

If you're thinking about deploying VDI -- and tablets are too high-tech for you at this point -- you might consider recycling old PCs to use as thin clients. That saves money, plus it's green. Just make sure your PC candidates aren't too old, or else they won't provide solid graphics performance and may be prone to failure.

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**Budgeting**

<http://searchvirtualdesktop.techtarget.com/tip/How-to-analyze-the-costs-of-a-virtual-desktop-deployment>

Although saving money isn't the best rationale for desktop virtualization, at some point, someone's going to ask you how much this whole thing is going to cost. So before you say that it doesn't matter, let's try to figure out what exactly this person is asking.

As you probably know, business costs are usually divided into two classifications: capital expenditures (Capex) and operating expenditures (Opex). Broadly defined, Capex includes onetime costs, and Opex covers ongoing costs. Capex includes buying software and hardware and the time and money it costs to implement and migrate from other technologies. Opex is usually just support and maintenance costs.

The first step to doing a cost analysis is to figure out whether you're going to look at Capex, Opex or both.

Entire books have been written about modeling the expenses of IT systems, and there are companies dedicated to analyzing expenses. Because there are so many different kinds of desktop virtualization, we can't do a proper expense analysis here. But we can look at some quick "back of the napkin"-style numbers to compare virtual and physical desktops.

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Most people believe that the Capex of implementing virtual desktops is about the same as that for physical desktops. In other words, if you spend about \$800 per desktop to buy and roll out traditional desktops, you can probably build a virtual desktop for about \$800 each.

These models assume that you'll reuse existing computers, maybe as thin clients or simpler terminals for accessing your newly built virtual desktop environment. So if you have 100 users who would otherwise get new desktops at \$800 each but you reuse existing machines instead, that frees up about \$80,000 to buy some nice VDI servers, software and consulting.

Opex is not nearly as simple to quantify as Capex for two reasons:

- There's no clear-cut way to figure out what's included in your Opex calculation.
- Before a project has been implemented, actual Opex is just a best-guess estimate anyway.

For example, will Opex calculations include soft costs such as "employee productivity gained by less downtime" or "user satisfaction?" Are your operating expenses based on dollar amounts you actually pay? Have you used the power savings of thin-client devices as part of your justification, even though the thin clients plug into users' cubicles whose power is not billed back to the IT department?

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Have you included everything in your cost models? For data center servers, have you based your power costs on their rated wattage, or have you included your data center's power usage effectiveness?

Of course, you can use any of these methods to nudge the cost analysis in the direction you want to prove that desktop virtualization is cheaper or that it is more expensive than traditional PCs. The mere fact that cost analysis is complex doesn't mean it should be ignored. It just means that you need to be more aware of what a cost analysis can and cannot be used for.

Unless your cost analysis can fit on the back of a napkin, it's probably crap. So go ahead and work out the basic numbers. Figure out your high-level stuff, and create a budget for the hardware and software you'll need for desktop virtualization. But beyond that, don't waste your time building a complex Excel model. There's a good chance that if you show it to someone, he won't believe it.

Just keep in mind why you're virtualizing desktops in the first place. If it's to save money, make sure you're really going to save money. And if it's for another reason, such as more redundancy or increased security, don't waste your time going nuts with return on investment (ROI) models.

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**Staffing skills**

**What are the options for VDI training, and who needs it?**

<http://searchvirtualdesktop.techtarget.com/answer/Why-you-need-VDI-training-and-how-to-go-about-it>

If your company is planning a transition to virtual desktop infrastructure, it's essential to provide proper VDI training to all IT staff in your organization who will design, deploy and maintain your environment.

If you are a systems administrator, start by educating upper management about the importance of proper VDI training for everyone involved. Virtual desktop infrastructure (VDI) requires a number of back-end hardware and software components to provide end users with the performance and computing experiences they expect.

Vendors have offered VDI training for some time, but the majority of that training (and related certifications) remains vendor-specific.

Microsoft, for instance, offers a VDI certification for technical specialists called the Microsoft IT Professional (MSITP)-Virtualization Administrator. The underlying training courses for the MSITP-Virtualization Administrator certification include server virtualization, desktop virtualization and virtualization

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administrator. All three of these classes and certification exams could be helpful for fledgling VDI administrators who expect to support Microsoft VDI software.

Citrix offers a bundled 30-hour online training course and certification focusing on its Xen product line. Citrix VDI training courses and certifications include the Certified Citrix Administrator (CCA) for XenDesktop 5, CCA for XenServer 5, CCA for XenApp 6 and NetScaler training.

These are just two examples of VDI training and certifications available. Other vendors offer similar training and certification opportunities. There is no vendor-agnostic VDI certification available, however, and there may never be. That's because of the tight linkage between VDI environments and the underlying proprietary infrastructures and technologies they use, which are not only tied to specific hypervisors (such as Microsoft's Hyper-V, VMware's vSphere or Citrix XenServer) but also to equally specific management, monitoring, deployment and configuration tools.

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## Taking the Microsoft certification path to VDI

<http://searchvirtualdesktop.techtarget.com/tip/Taking-the-Microsoft-certification-path-to-VDI>

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It's one thing for an organization to decide to deploy VDI, but it is quite another to effectively support it. One way to ensure that staff has the skills necessary to deploy, manage and support VDI is getting everyone certified.

The most appropriate certifications vary depending on which vendor's VDI offering you deploy. If you're implementing VDI on Windows Server, it's a good idea to get familiar with the Microsoft certification path. Even if you are using a different vendor's products, you'll learn what may be involved in the certification process.

When you choose a certification path, you must not only consider the vendor, but also the version. Microsoft, for example, made some major changes to its certifications following the release of Windows Server 2012.

## Windows Server 2008 R2

For a Windows Server 2008 R2 platform, Microsoft actually offers a VDI-specific certification track. There are two primary exams that will be the most helpful to virtualization administrators. These include:

- Exam 70-669: TS: Windows Server 2008 R2, Desktop Virtualization
- Exam 70-693: Pro: Windows Server 2008 R2, Virtualization Administrator



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If you are looking for formalized VDI training, Microsoft offers a five-day training course that is specific to VDI. The course is 10324A: Implementing and Managing Microsoft Desktop Virtualization.

## Windows Server 2012

Microsoft certifications do not include a virtualization-specific track for Windows Server 2012. Instead, virtualization is considered to be one of the operating system's core functions, and the certification path reflects this new philosophy. In fact, Microsoft's MCSE Desktop Infrastructure track seems ideally suited toward VDI deployments.

There are five exams required for those seeking the MCSE: Desktop Infrastructure certification:

- 70-410: Installing and Configuring Windows Server 2012
- 70-411: Administering Windows Server 2012
- 70-412: Configuring Advanced Windows Server 2012 Services
- 70-415: Implementing a Desktop Infrastructure
- 70-416 Implementing Desktop Application Environments

The first three exams are only loosely related to VDI, but there are a couple of benefits to taking them anyway. First, these exams cover the infrastructure components on which the VDI deployment will be based. Topics such as

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failover clustering and Hyper-V management are covered on the first three exams. Plus, passing these three exams means that you earn an MCSA certification for Windows Server 2012.

The last two exams in the series focus heavily on VDI. The fourth exam is all about the desktop infrastructure, and the fifth focuses on desktop applications.

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## The desktop operating system

Regardless of whether you are using a Microsoft VDI platform or something from a third party, it is a good idea for IT staff to take a desktop operating system-specific exam. This ensures that you will learn the various OS-specific nuances that you can tune to help it function efficiently in a VDI environment.

The primary exams that are available for Windows 7 include:

- 70-680: Windows 7, Configuring
- 70-685: Windows 7, Enterprise Desktop Support Technician

Those who wish to deploy Windows 8 in their VDI environments should consider these exams:

- 70-687: Configuring Windows 8
- 70-688: Managing and Maintaining Windows 8

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Earning advanced IT certifications takes a lot of work, but it can be extremely beneficial for administrators to get certified before deploying VDI. Doing so ensures that you are adequately prepared to deploy, manage and maintain both the virtual desktops and the underlying infrastructure.

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**Outsourcing**

<http://searchvirtualdesktop.techtarget.com/feature/XaaS-products-at-your-service>

Desktop as a service (DaaS) is a cloud service where the back-end infrastructure of VDI is hosted by a cloud service provider. It has a multi-tenancy architecture. The DaaS provider takes care of the responsibilities of data storage, backup, security and upgrades, and user data is copied to and from the virtual desktops when they log on and off.

**Pros:** Users can access hosted desktops from any device, location or network. Customers usually manage their own images, apps and security, but the provider manages the infrastructure. DaaS is a good alternative to VDI for small and midsize businesses that want to deliver virtual desktops to users, but can't afford the upfront and ongoing costs associated with doing VDI on-premises.

**Cons:** Licensing virtual desktops comes with headaches, but licensing them in the cloud is often even more complicated. Microsoft does not have a Service Provider License Agreement for Windows client OSes, so many organizations host Windows Server -based desktops in the cloud instead. This is a good way to get around the licensing concerns, but Server desktops can have application-compatibility problems.

**Market leaders:** Amazon WorkSpaces, VMware Horizon Air Desktops (formerly Horizon DaaS, formerly DeskTone) and Microsoft Azure RemoteApp.

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**Planning for deployment**

<http://searchvirtualdesktop.techtarget.com/essentialguide/Best-practices-guide-Making-VDI-deployment-magic>

**Best practices for VDI production deployment**

So, you've assessed your organization's needs, planned a strategy to meet management and end-user requirements, and selected the right tools to suit your existing infrastructure. Now you're ready to deploy VDI, but how do you start?

**How to stagger a VDI rollout**

Before you jump into a VDI production environment, begin with a proof of concept and make a plan to stagger your rollout -- starting with areas of the business that will benefit from virtual desktops the most.

**Transitioning from VDI pilot to production**

Once your VDI pilot is ready for production, do some IOPS calculations to ensure that your storage can handle the full VDI load. To keep things in check throughout the deployment, get some monitoring software and keep tabs on user satisfaction.

**Ten steps to deployment success**

Servers are the building blocks of your deployment, so make sure those are up to date and ready for the VDI workload. Plus, determine which remote display

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protocol is compatible with your environment and lock down the user endpoints.

**Don't forget to consider VDI applications**

As you deploy VDI, you need to take the applications into account. How often will you need to update and patch apps once your VDI deployment is in place? How will the licensing of those apps work in the new environment?

**Overcoming VDI deployment challenges**

Of course, a VDI deployment is never without its hang-ups. You might run into bandwidth restrictions, low storage capacity or an inability to scale. Learn some ways to break down these VDI deployment challenges and set your strategy straight.

**Top reasons a VDI deployment fails**

Some of the biggest reasons VDI fails is when administrators underestimate virtual desktop requirements, don't work as a team with networking and storage admins, or don't know why they're virtualizing in the first place.

**Why scaling up can break your deployment**

When you implement a VDI pilot project, you probably deploy a few virtual desktops and simplify the underlying infrastructure. But when you move to production, you can hit the ceiling of supported users pretty quickly. The problem is that buying hardware for future growth can be expensive.

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## Consider using converged infrastructure for VDI

Using a pre-bundled stack to host your virtual desktops can make it easier to scale the deployment when you need to. Plus, it provides simplicity for organizations that don't have the manpower to build a VDI environment from scratch.

## Watch out for VDI stall

Your desktop virtualization deployment can stall mid-step if you try to do too much at once. For instance, don't try to do an OS update or hypervisor switch at the same time you're implementing the new desktops.

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▣ **Calculating ROI**

<http://searchvirtualdesktop.techtarget.com/guides/Guide-to-calculating-ROI-from-VDI-Cost-analysis-budgeting-and-more>

Virtual desktop infrastructure can decrease hardware costs, increase end user productivity and mobility, and provide more flexibility for applications and operating systems. But to decide whether implementing virtual desktop infrastructure (VDI) will be worth the price tag, you need to determine the potential return on investment (ROI).

Numerous factors go into calculating VDI ROI, including the cost of virtualizing workloads, purchasing or repurposing hardware, adding storage or network resources, and training IT employees and end users. Implementing virtual desktops isn't necessarily a money-saving opportunity, but figuring out the possible ROI -- and when you might achieve it -- will help you plan your deployment.

There are many important questions to ask yourself before moving to VDI. You need to establish what types of users you have, what applications and OSes you'll use, whether you'll need remote and/or mobile access, and more. Start adding up your VDI costs and calculating return on investment from VDI with these seven questions.

<http://searchvirtualdesktop.techtarget.com/feature/Calculating-the-return-on-investment-from-VDI>

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1. Will the use case have local or remote users?

This affects hardware requirements. Will hardware need to be purchased or maintained at the local site, or will users use their home PCs?

2. Will the end devices (desktops, laptops, thin clients, etc.) be purchased or reused?

This also affects the purchase requirements for end devices.

3. Which operating system (OS) will be used?

The OS affects application compatibility. ROI can significantly be affected if applications can be virtualized and run on a newer OS without being recoded.

4. Does the organization have Microsoft Software Assurance or a Microsoft Enterprise Agreement?

This affects software licensing from Microsoft.

5. Are the users power users, typical users or light users?

This is affected by the number of backend servers, which in turn drives the hardware and software costs of the solution: The better the consolidation, the better the ROI.

6. Which applications will be used? Are they all licensed?

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This is where application virtualization can have a significant impact. If apps are found to be under-used, application virtualization can improve license management.

7. How large is the current desktop and application support staff? Are they looking to make changes?

The answers to these seven questions often times determine if a customer will achieve any type of ROI.

ROI has different meanings for each organization and it can be developed based on the following criteria:

- Software licensing
- Hardware purchase
- Hardware/Software maintenance
- Operations staffing (administrators and build teams)
- Support staffing

By taking the different ROI criteria and matching them with the answers to the above questions, you can determine where a customer might be able to get a decent return.

1. Will the use case have local or remote users?
  - a. Operating staffing
  - b. Support staffing

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- c. Hardware purchase
  - d. Maintenance
2. Will the end devices (desktops, laptops, thin clients, etc.) be purchased or re-used?
  - a. Hardware purchase
  - b. Maintenance
  - c. Support Staffing
3. Which OS will be used?
  - a. Software licensing
  - b. Maintenance
  - c. Operational staffing
  - d. Support staffing
4. Does the organization have Microsoft Software Assurance or a Microsoft Enterprise Agreement?
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7. How large is the current desktop and application support staff? Are they looking to make changes?
  - a. Operational staffing
  - b. Support staffing

A return on investment from VDI can be obtained -- but it takes work to realize these benefits. VDI implementation is not as simple as server virtualization: There are many more moving parts in VDI and it impacts the end-user community. Therefore, a great design, architecture and deployment plan are vital to obtaining a ROI.

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## Other costs to consider

### Control VDI storage costs with configuration planning

<http://searchvirtualstorage.techtarget.com/feature/Control-VDI-costs-for-storage-by-careful-configuration-planning>

To strike a balance between VDI costs and storage performance, you have to plan ahead. Virtual desktops come with different I/O and read/write requirements, so you have to decide whether your storage area network will perform as expected. To determine whether desktop virtualization will be worth

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the cost of storage, figure out your performance needs, how many IOPS you'll need and whether your VDI costs will be similar to physical desktop costs.

## Understanding VDI storage costs

<http://searchvirtualdesktop.techtarget.com/tip/Virtual-Desktop-Storage-Basics-The-hidden-costs-of-VDI-storage>

Before you virtualize all your desktops, consider reducing the extent of your deployment to lessen storage requirements and cut VDI costs. Thin provisioning, tiered storage and data deduplication can also help mitigate storage costs. Finally, take into account the hidden costs of VDI storage, such as manual desktop provisioning.

## Building the business case

This document should help you explore the feasibility of Desktop Virtualization. To help you organize your thoughts and compose a proper business case consider this outline,

<http://whatis.techtarget.com/definition/How-to-write-a-business-case-document>

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**Expert Tips and Advice**

**Best practices guide: Making VDI deployment magic**

It takes more than sleight of hand to make a VDI deployment go smoothly. Fortunately, there are lots of ways to ensure success: Pay attention to your applications, stagger your rollout and right-size your storage system, to name a few.

You may not be able to pull a rabbit out of a VDI server, but you can get on the right track with the resources in this guide. Plus, learn some tips from shops that have overcome some of the most common VDI deployment challenges.

<http://searchvirtualdesktop.techtarget.com/essentialguide/Best-practices-guide-Making-VDI-deployment-magic>

**Demystifying desktop virtualization technology**

When it comes to virtual desktop infrastructure, administrators have a lot of choices. You may have wondered about the differences between desktop virtualization technology and product options, remote display protocols or all the licenses out there. In this series, we tackle some of the biggest head-scratchers facing VDI admins to help you get things straight.



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Check back each month for the latest installment of the "Let's get this straight" series below. If you encounter something in your desktop virtualization travels that you want cleared up, write to us at

<http://searchvirtualdesktop.techtarget.com/essentialguide/Demystifying-desktop-virtualization-technology>

### Troubleshooting tips for VDI deployments

With so many moving parts in VDI deployments, it's easy for things to go wrong. Problems with remote connections, storage, management and latency can keep your to-do list full.

Fortunately, there are some easy ways to avoid common issues in virtual desktop infrastructure (VDI) environments in the first place. And if you made some missteps setting up your deployment that resulted in problems staring you in the face right now, never fear. We've got troubleshooting tips for some of the most common VDI woes.

<http://searchvirtualdesktop.techtarget.com/essentialguide/Troubleshooting-tips-for-VDI-deployments>

### Desktop virtualization market guide

The desktop virtualization market has changed a lot over the years, so IT professionals who looked at doing VDI in the past may be surprised by what's

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available now -- DaaS, hyperconverged infrastructure and perpetual product improvements have all helped change the virtualization landscape.

Because virtualization technology evolves so quickly, it can be difficult to keep up with trends and how they can affect your users: Will VDI adoption ever take off? Is desktop as a service (DaaS) right for you? Should you try to sell higher-ups on the value of hyperconverged infrastructure?

Instead of getting bogged down in all the marketing babble, check out this guide for the straight facts so you can get out of the weeds and into desktop virtualization.

<http://searchvirtualdesktop.techtarget.com/essentialguide/Desktop-virtualization-market-guide>

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