# unidesk

Test Plan: Executing a VDI Proof of Concept (POC)

Virtual Desktop Infrastructure (VDI) has clear advantages over physical PCs. But implementations can be overwhelming. With so many moving parts, where do you start? How can you be sure you're not overlooking critical success criteria? This VDI test plan accounts for all the details to ensure your project is a success.
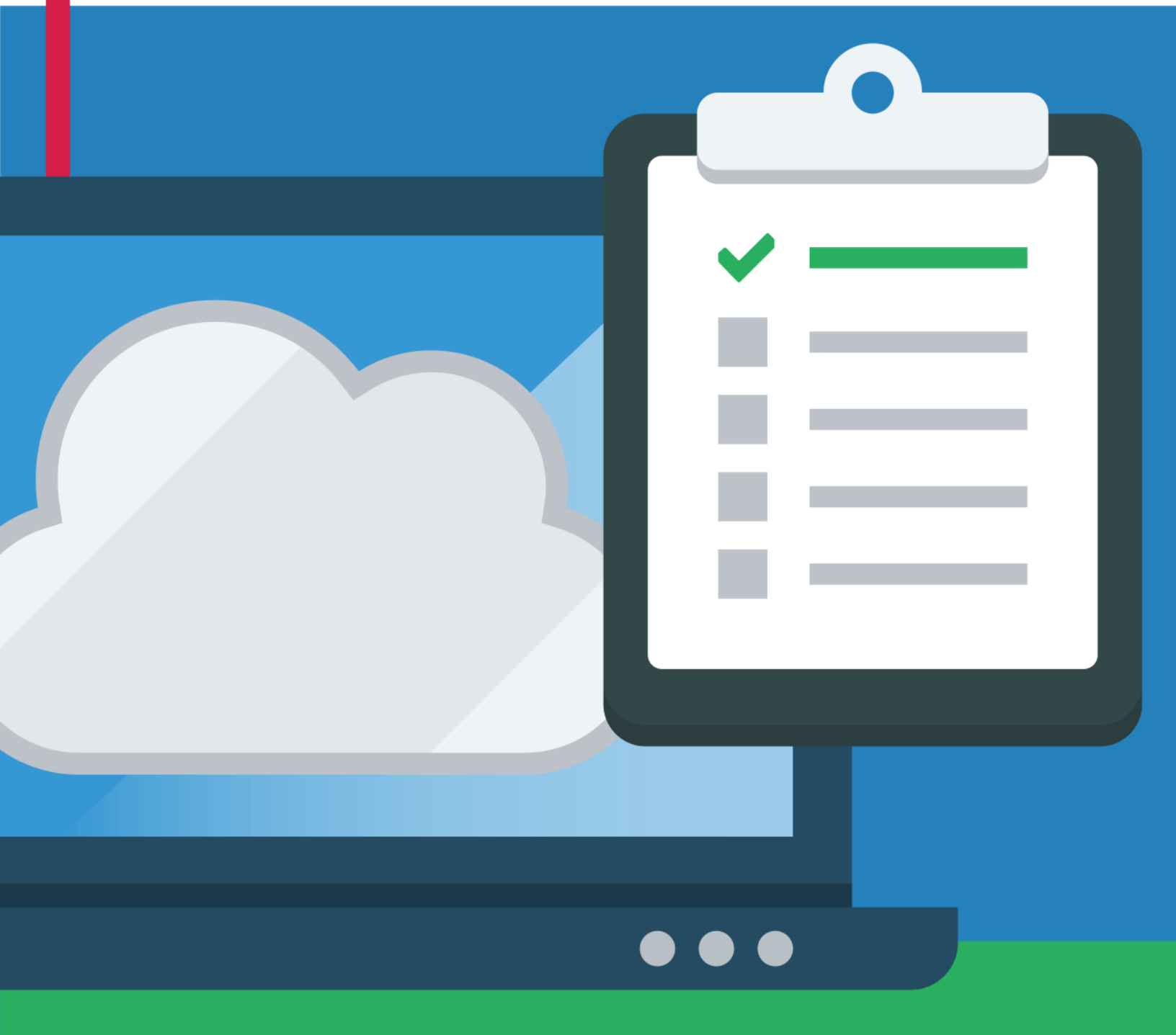
Introduction

Virtual Desktop Infrastructure (VDI), when implemented correctly, can provide clear advantages over physical PCs:

- **Mobility/BYOD** – End users can access Windows desktops and applications anywhere, anytime from any device, including thin clients, home PCs, smart phones, and pads.

- **Security** – Critical applications and data are moved from the edge into the data center, where they are more secure.

- **CapEx Savings** – Thin/zero clients have longer lifespans than PCs and laptops, enabling IT to get out of the device management business and avoid recurring 3-5 year PC refresh cycles. New Microsoft VDA licensing options and layering innovation for Hyper-V have significantly reduced the price of VDI to the point where it now costs less than new PCs.

- **Energy Savings** – Zero and thin clients use significantly less power than PCs and laptops.

- **Manageability and OpEx Savings** – Newer layering technology makes it far easier to package and deliver applications and apply Windows updates, compared to first-generation application virtualization technology, or the legacy agent-based software distribution tools used in physical PC environments.

- **Break/Fix Savings** – Virtual desktops don't have the physical hardware issues that PCs have. Non-persistent virtual desktops that are damaged by user configurations can be fixed in minutes by Level 1 support staff with a simple reboot. Persistent desktops managed by layering technology can be fixed just as easily by rolling back the Personalization layer to an earlier, "clean" snapshot, with the added advantage that users don't lose valuable work time redoing all of their customizations.

When implemented incorrectly, however, VDI can lead to cost overruns, unhappy end users, far more management complexity than exists with physical PCs, and, ultimately, project failure. Unfortunately, this has too often been the case. Why?

VDI Proof of Concept (POC) test plans are often incomplete, and fail to anticipate all of the use cases, desktop configurations, and requirements for full scale production. As a result, what seemed to work fine for 10 users becomes too hard to manage and too costly to implement for 200 users and beyond.

This white paper provides POC recommendations and a test plan to ensure that your VDI pilot takes into account everything you'll need for VDI production success. It also includes findings from Gartner and links to successful customer implementations in a variety of industries so you can learn from what others have done.

Audience

The intended audience for this white paper is VDI project leads, desktop administrators, field consultants, solution architects, and sales engineers who want to test or implement virtual desktop connectivity solutions such as [Citrix XenDesktop](#), [Microsoft VDI](#), or [VMware Horizon](#) and virtual desktop and application management software such as [Unidesk](#) on Microsoft Hyper-V or VMware vSphere virtual infrastructure.

1. Use Case Definition

A successful VDI POC starts with identifying the Use Cases that will be required for your implementation. A university may have "Economics 422 Lab," Biology 201 Lab," "Faculty," "Athletics," and "Registrar." A state or local government organization may have "Court," "Sheriff," "Health," "Emergency Management," "Highway," "Fire," "Corrections," and "Tax Collection." A manufacturing firm may have "Procurement," "Customer Support," "Manufacturing Floor Kiosks," "Marketing," "R&D", and "Sales."

When defining the use case it's important to collect as much information as possible about desktop requirements. Requirements for each use case can be generally divided between Service Level Requirements and Functional Requirements.

[State of Ohio Department of Developmental Disabilities](#) spent the time up front to document its many use cases, service level requirements, and functional requirements. The agency even ran two separate pilots – one with mock users and one with real users – to ensure that VDI would deliver the expected results. The outcome was an award-winning 1,400-desktop VDI implementation that has been yielding ROI since 2011.

[USF Health](#) has deployed more than 1,000 virtual desktops and is on track for virtualizing all 3,000 of its users. Performance, availability, application, and peripheral requirements for the institution's doctors, nurses, operating rooms, procedure rooms, teaching faculty, students, in-house developers, and administrative staff are all significantly different. The IT team ran a 100-user POC – with the IT staff and CIO as the first users – to make sure they got VDI right. Their reasoning: "If VDI could work for us power users in IT, it could work for anyone."

The following tables give you a starting point for capturing service level and functional requirements for your POC. As both organizations above proved, it's better to define and test fewer use cases in their entirety rather than to test small parts of many use cases.

Service Level Requirements

Requirement	Description	Options	Selection
Availability	Time Desktop is Up	% Value	99.90%
Operational RTO	Recovery Time for Desktop	Time Value	2 Hours
Operational RPO	Recovery Point for Desktop	Time Value	1 Day
DR RTO	Time to Recover Desktop From Disaster	Time Value	2 Days

DR RPO	Point at which Desktop Should be Recreated after Disaster	Time Value	2 Hours
Performance	Mixture of Graphics Intensity and Processor Utilization	Low/Medium/High (3D graphics such as AutoCAD = High; graphics editing such as Adobe Photoshop = Medium)	Low
Time to Provision Virtual Desktops	Create New Desktop	Time Value	1 Hour
Time to Reconfigure Virtual Desktop	Change Desktop Memory, CPU, Application, Windows	Time Value	1 Hour

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Functional Requirements

Requirement	Description	Options	Selection
Operating System	What OS is required for the virtual desktop	Windows 7, 8, 10, Server 2008/2012, 32 or 64-bit	Windows 7 32-bit
Bi-directional Audio	Allowing microphone input and speaker output	Yes/No	Yes
Phone System Integration	Runs agent to display information from the phone system	Yes/No	No
Web Portal	User can access virtual desktop via a web portal	Yes/No	Yes
Printing	Is printing required by	Yes/No	Yes
• Location-aware	Printers dynamically change based on location	Yes/No	No
USB Peripherals	Will USB devices at the users workstation be used	Yes/No	Yes
Graphic Intensity	Based on criteria below, what are the graphical computing requirements	Low/Med/High	Med
• HD Streaming		Yes/No (Yes=High)	No
• Streaming		Yes/No (Yes=High)	Yes

Media			
• Media Player		Yes/No (Yes=High)	Yes
• Flash Player		Yes/No (Yes=High)	Yes
• DirectX		Yes/No (Yes=Med)	Yes
• CAD		Yes/No (Yes=Med)	No
• PowerPoint		Yes/No (Yes=Med)	Yes
Streaming Media Frequently	How often is streaming media required?	Often/Sometimes /Seldom	Sometimes
Processor Utilization Expectation	What is the CPU requirement?	Low/Med/High (450 Mhz/900 Mhz/1350 Mhz)	Low
Client Drive Mapping	Do users require access to drives from client device?	Yes/No	Yes
CD/DVD Read Access	Do users require read access to local CD/DVD?	Yes/No	No
CD/DVD Write Access	Do users require write access to local CD/DVD?	Yes/No	No
Multi-Monitor	Do users require more than one display?	#/No	No
Web Camera	Do users require a web camera?	Yes/No	No

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2. Application Delivery

Application delivery is one of the most overlooked challenges in VDI implementations, and is rarely given enough focus during POCs. Many organizations underestimate the number of applications their users use on a daily basis, and the number of different desktop configurations required by each use case.

Application delivery considerations generally fall into the following categories:

- **Number of applications** – The total number of applications that need to be delivered.
- **Application interoperability** – Whether the application needs to communicate or integrate with other applications (Microsoft Word and web browser plug-ins being common examples).
- **Standard applications** – Whether the application is needed by all or a majority of users.
- **Departmental applications** – Whether the application is needed by a subset of users (often in the 5-50 user range).
- **One-off (or ad hoc) applications** – Whether the application is needed by just a handful of users (typically less than 5).
- **Update frequency** – How often the application needs to be patched or updated.
- **Isolation** – Whether the application needs to be isolated from other apps and from Windows (usually required to run multiple versions of the same app on the same desktop at the same time, e.g. Java Run Time).

Gartner has published a research note comparing the different methods of delivering applications in VDI to help you address these considerations. The Gartner blog "The Secret Bottleneck of VDI," which links to the report, and the customer comments at the end indicate that new application layering technology is best. However, other approaches may work for you.

Here is an overview of the different options.

Delivering Applications as Part of Your Windows Image

Many organizations take the shortcut of building apps into their Windows image to expedite their VDI POC. If your production environment will require a limited number of applications (less than 10 apps), few if any departmental or one-off applications (all desktops have similar configurations), and infrequent application patches and updates (once every 6-12 months), this may be a fine approach. Updating the Windows image every time an app needs updating should work for both your POC and your production deployment.

However, if you have a larger volume of applications (20+), numerous departmental and one-off applications, or high update frequencies, delivering apps as part of your Windows image will likely not work. Delivering applications independent of your Windows image will be required.

Delivering Applications with Isolation Technology

First-generation application virtualization tools like VMware ThinApp and Microsoft App-V excel at isolating applications. This approach packages apps in protective "bubbles," effectively hiding the running process from Windows and other apps. This is useful for running multiple versions of the same software (e.g. Java) on the same desktop.

According to the Gartner research note, however, this approach is not well-suited to deliver all apps: "*On the surface, application virtualization appears to be a great option for VDI application delivery; however, packaging difficulties, vendor support and interoperability concerns limit the effectiveness of the technology.*"

Make sure you consider these application virtualization challenges before deciding whether to use these tools in your POC:

1. **Isolating apps is resource-intensive and time-consuming.** The process of packaging applications with isolation technology requires significant time for desktop setup, sequencing, pre-scans, post-scans, scripting workarounds, Windows registry changes, and deployment. It's not unusual to spend an entire day virtualizing a single app. [City of Yuma, Arizona](#) found this to be the case in its VDI POC. After taking 2 weeks to virtualize 2 of its core applications, the city realized it needed an alternative solution.
2. **Not all apps can be isolated.** Even if you're an expert, there are many apps that cannot be virtualized with isolation tools. Apps with system services and boot time drivers (e.g. antivirus, printers, scanners, etc.), homegrown apps, and apps with complex Setup procedures often won't work. [Hamilton County, Indiana](#) found its VDI project stuck at 100 desktops for over a year with these issues. QuickBooks, Roxio DVD burner, Dymo label writer, Track-It! help desk, Odyssey court and justice software, and many other apps would not virtualize. Even outside consultants couldn't make them work.
3. **Isolated apps can't cross-communicate.** Process isolation is useful when you need to have multiple versions of the same app on the same desktop. But for most apps, not being able to share data, link to each other, and interoperate is a major problem. [Bernstein Shur,](#) like many law firms, uses 10-15 different plug-ins for Microsoft Word and Microsoft Outlook. The plug-ins change often, so they tried to virtualize them to make updates easier. Yet once the plug-ins were isolated, they could no longer communicate with Word and Outlook – the very apps for which they were designed. Bernstein Shur realized another solution was needed.

Delivering Applications with Virtual Disk Stacking Technology

Virtual disk stacking technologies like VMware App Volumes deliver applications to desktops when users logon. These tools enable administrators to create application "stacks" (AppStacks) that are stored as virtual disks (VMDKs).

The primary benefits of this approach are that the application packaging process is easy, some applications can be delivered to running VMs in real-time without a reboot, and the applications appear locally installed on each desktop. The look and feel of a local install enables applications that do not respond well to isolation to function as expected.

Here are the issues you should consider when determining whether to use virtual disk stacking for app delivery:

1. **Plan for multiple AppStack images.** AppStacks are groups of applications – not individual apps – that are assigned to users. No more than 5-7 AppStacks are typically recommended per VM. This means you'll need to create a matrix of user groups and their required applications to minimize the number of AppStack images you'll have to patch and update. Apps with dependencies (e.g. .NET, Office plug-ins, Crystal Reports) must be installed in the same AppStack if you want them to interoperate as expected – they won't be able to communicate across stacks. You'll need to factor this in as you build your matrix of users and AppStacks, and plan for some duplication.

2. **AppStacks impact login times.** When you assign AppStacks to a group of users, the virtual disks will be attached at user login (machine runtime). The number and size of AppStacks assigned to the user will impact login speed. It is not uncommon to see 5-10 seconds of login delay added for each AppStack that you assign.

3. **Not all applications function in AppStacks.** Stacking technologies like App Volumes virtualize above the OS. This means Windows itself, any application with deep Windows dependencies (e.g. Internet Explorer), and certain drivers or services will not function in an AppStack. Much like application virtualization, you won't know if an app will operate as expected until it is fully packaged, deployed and tested.

4. **Plan for apps in your gold image, and potentially many gold images.** To minimize duplication of apps in AppStacks and to account for applications that cannot be delivered in AppStacks, applications will still need to be built into your Windows gold image. You'll need to think about how many apps fall into this category and how many images you will need. You may find yourself patching and updating more and more Windows images as you scale from your POC.

5. **Include the third party infrastructure tools that will be required for production use.** Because App Volumes is a stand-alone tool that was acquired and added to VMware Horizon, third party tools like SQL clustering, storage replication, and load balancers may be required to create a resilient, scalable production environment. If these

management services are unavailable, AppStacks will not be attached to desktops at login.

6. **Make sure your Windows version, hypervisor, and connectivity solution are supported.** Stacking technologies like App Volumes are currently limited to Windows 7 and Windows Server 2008 R2 on VMware vSphere with VMware Horizon. Windows 8, Windows 10, and Windows Server 2012 R2 are not supported, nor are Hyper-V, Microsoft VDI, or Citrix XenDesktop.

Delivering Applications with Layering Technology

Layering technology from vendors like Unidesk virtualizes all of the components that make up a virtual desktop. Layering the entire desktop creates an imageless management model where Applications and Windows itself are simply assigned to any desktop or pool a modular fashion as shared, read-only virtual disks.

Virtualizing the entire desktop using layering technology allows for greater application compatibility (the OS and Application layers can be blended seamlessly) and simplifies overall management by reducing the number of tools and technologies that IT staff must be trained on for VDI management.

Layering overcomes many of the issues with stacking technologies:

1. **No stacks.** Up to 50 layers per VM are supported, enabling every app to exist in its own layer. Advanced file system and Windows registry merge technology ensures full interoperability between layers. Together, these capabilities eliminate the need to create stacks, package dependent apps in the same stack, map user groups and required applications to different stacks, and duplicate the same app in different stacks. Just layer the app or the Windows OS, assign it to any number of VMs, and go.
2. **No impact on login time.** Layering merges all layers into a composite C: drive for every VM before the VM boots. Because all of the layers are already present at machine runtime, there is no impact on login performance.
3. **No app compatibility limitations.** Layering virtualizes above the hypervisor (below, not above, the OS). This means that all apps can be delivered as layers, including system services, drivers, and complex applications with deep Windows dependencies.
4. **No images.** By virtualizing everything above the hypervisor, layering enables the Windows OS itself to be delivered as a virtual disk, just like any app. The need for images is eliminated, as is the need to create multiple images for different VM configurations (memory, CPU, etc.) and to account for apps that cannot function in AppStacks. Layering allows for true Imageless Management.

5. **No third party tools.** Unidesk layering has replication and load balancing built-in, enabling you to scale your POC into production simply by spinning up new virtual appliances.
6. **No support limitations.** Unidesk layering is open, supporting all flavors of Windows, vSphere and Hyper-V hypervisors, and Citrix XenDesktop, Microsoft RD Connection Broker, and VMware Horizon for connectivity.

In your POC, you should be able to easily layer most of your Standard and Departmental apps to prove that they can be centrally assigned, patched, and maintained by IT, and that they can cross-communicate where needed.

One-off applications that are only needed by a few users can be delivered as application layers or installed directly into the Personalization layer of each desktop. If the desktops are marked as persistent when you provision them with Unidesk, the Personalization layer will remain intact through logouts, reboots, and updates to the underlying app and OS layers.

If you mark the desktop as non-persistent, the Personalization layer will be reset (zeroed out) after each use.

Both persistent and non-persistent desktops can be created from the same OS and Application layers. Because all of the desktops on a single datastore share the same read-only layers, disk space requirements are greatly reduced. For example, 1,000 desktops may have 10 datastores, so instead of having 1,000 copies of Windows, Office, Firefox, etc., you would only have 10 of each layer. This is why most Unidesk customers opt for persistent desktops for their knowledge workers – all of the old reasons to use non-persistent desktops are no longer valid.

Delivering Applications with Traditional PC Management Tools

Some organizations look to leverage existing PC software distribution tools in VDI. However, agent-based PC configuration tools such as Microsoft SCCM and application publishing / server-based computing tools such as Citrix XenApp are often ill-suited for virtual desktops.

According to Gartner, agent-based tools "*reduce or eliminate many benefits of desktop virtualization by managing each desktop individually. These tools may also present noteworthy negative impacts to an organization's VDI environment, particularly as the environment scales to hundreds of desktops or more. Because these tools are typically not virtualization-aware, they treat virtual desktops identically to physical desktops, causing a variety of issues, such as:*

- *Application installation performance problems: Dozens or hundreds of virtual desktops may be instructed to install an application (or software update) simultaneously, and they will all contend for finite, shared infrastructure resources, commonly resulting in dramatic performance issues for end users.*

- *Long-term application management challenges: Once applications are installed directly into a virtual desktop's OS, the virtual desktop is effectively a unique point of management for the organization, eliminating many valuable dynamic and mass management benefits that are available with virtualization."*

Application publishing also has its issues: "*Apps that depend upon specific Windows OS features, registry entries and file locations are unsuited for delivery via traditional server-based computing (SBC). Limited interoperability between hosted applications as well as the time and expertise required to configure SBC servers are also problematic. For an organization that has not previously utilized SBC, the correct installation and configuration of the environment can be daunting.*"

Documenting Your Application Inventory and Application Requirements

Use this table to take inventory of your applications and document delivery considerations for each app. This will make it easy to determine which application delivery method is best for you.

Application	Standard	Dept.	One-Off	Interop	Update
Adobe Flash Player 11 ActiveX	Yes	No	No	Yes	6 months
Adobe Flash Player 11 ActiveX 64-bit	No	Yes	No	Yes	6 months
Adobe Flash Player 11 Plugin	No	Yes	No	Yes	6 months
Adobe Reader X (10.1.4)	Yes	No	No	Yes	6 months
Adobe Reader 9.4.0	No	Yes	No	Yes	6 months
Adobe Shockwave Player 11.6	No	Yes	No	Yes	6 months
AllMedia Grabber	No	No	Yes	No	9 months
Apple Application Support					
Atomic Alarm Clock 5.81					
Bullzip PDF Printer 7.2.0					
Centra Client					
Cisco Systems VPN Client 4.8.01.0300					
Cisco WebEx Meetings					
Citrix Desktop Receiver					
Citrix online plug-in - web					
Citrix HTML5 HDX Engine					

Citrix offline plug-in

Citrix online plug-in - web

Citrix XenApp Plugin for
Hosted Apps

Connector ID

CopySafe PDF

CopySafe Plugin

DAEMON Tools Lite

Dell Laser MFP 1815
Software Uninstall

Everything 1.2.1.371

FastStone Capture 5.2

Google Quick Search Box

GPL Ghostscript 8.61

GPL Ghostscript Fonts

GPL MPEG-1/2 DirectShow
Decoder Filter

GPL Ghostscript Lite 8.70

Greenshot

Growl for Windows

Growl Outlook Add-In

Icon Restore 1.0

Java DB 10.2.2.0

Java Platform, Enterprise
Edition 5 SDK

JavaFX 2.1.1

KB2600644_Mui_1033

KeePass Password Safe 2.13

Ken Test Application

Lotus Notes 8.5.1

Microsoft Document
Explorer 2008

Microsoft Dynamics CRM
2011 for Microsoft Office
Outlook

Microsoft Forefront Client

Security Antimalware Service

Microsoft Forefront Client Security State Assessment Service

Microsoft Forefront Endpoint Protection 2010

Microsoft Help Viewer 1.1

Microsoft IntelliPoint 8.1

Microsoft Lync 2010

Microsoft Lync Web App Plug-in

Microsoft Office Communicator 2007 R2

Microsoft Office Live Meeting 2007

Microsoft Office Professional Plus 2010

Microsoft Online Services Sign-in Assistant

Microsoft Operations Manager 2005 Agent

Microsoft Outlook Social Connector Provider for Facebook 64-bit

Microsoft Report Viewer Redistributable 2008 SP1

Microsoft Silverlight

Microsoft SQL Server 2008 R2 (64-bit)

Microsoft SQL Server VSS Writer

Microsoft User Experience Virtualization Agent

Microsoft Visio Professional 2010

Microsoft Visual Studio 2010 Premium - ENU

Mozilla Firefox 13.0.1 (x86)

Network Recording Player

Notepad++

QuickTime

SonicWALL Global VPN
Client

System Center Operations
Manager 2012 Agent

SysTrack Administrative
Tools

ThinApp Adobe Reader
8.2.0 (VMware ThinApp)

ThinApp Adobe Reader X

TweetDeck

Virtual Machine Planner

VirtualCloneDrive

VMware Tools

VMware View Agent

VMware View Client

VMware vSphere Client 5.0

WebEx

WebEx Productivity Tools

Windows Live ID Sign-in

Windows Media Format 11

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3. Image Management

Almost every IT organization's vision for VDI is one clean Windows master – the elusive "gold image" – for all virtual desktops. Yet, many VDI projects stall or fail due to large numbers of images that must be patched to stay current with Microsoft Windows hot fix and service pack releases.

The problem almost always starts in the POC. Busy IT staffs, as discussed in the previous section, narrow the POC scope to a handful of applications, and deliver the apps by building them into the Windows image. But this rarely translates to production deployments, when desktops need different sets of apps. Building every possible app into a single Windows image would force every app to be licensed for every user, which no organization can afford. Plus, the entire master image would have to be updated every time a single app needs updating.

It's no wonder that many organizations start creating different Windows images with different combinations of apps built-in. The image is no longer golden, and they're soon patching 10, 20, or more different images instead of one after they move to production.

Sunrise Health discovered this during the POC for its 3,000-user VDI project. The IT team reached out to sister healthcare regions to learn from their experiences, and found that image sprawl and high patching costs were major VDI problems. Sunrise Health made avoiding image sprawl a requirement for its POC. The IT team layered more than 70 different applications and the Windows 7 OS during its pilot to prove that image management issues would be addressed.

As Sunrise Health found, layering enables one clean golden Windows OS layer to be used for all desktops, since all applications can be quickly and easily packaged as separate application layers, and since physical VM settings (e.g. CPU, memory) are attributes of each desktop, not a gold image.

The following table helps you determine the number of OS layers your VDI implementation will require with layering technology.

Requirement	Number of OS Layers
Windows 7 32-bit	1
Windows 7 64-bit	0
Windows 8 32-bit	0
Windows 10 64-bit	0
Windows 10 32-bit	0
Windows 8 64-bit	0

Windows Server 2008 with Desktop Experience	0
Windows Server 2012 with Desktop Experience	0

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4. Storage Capacity and IOPS

The POC is a good opportunity to understand exactly how much storage capacity and IOPS your production VDI deployment will require.

Capacity: Full Clone Desktops

While creating thick-provisioned, full-sized clones is an easy way to get a VDI POC up and running, it rarely scales when you move into production. Using round numbers, if you allocate 20 GBs of storage for Windows itself, 15 GBs of storage for applications, and 5 GBs of storage for user customizations and data, you're looking at approximately 40 GBs per desktop.

You may be able to find 400 GBs on your SAN for a 10-desktop pilot. But a 500-desktop production implementation would require approximately 20 TBs. The high cost of SAN storage is why few customers implement full-sized virtual desktops.

Capacity: Cloned Desktops with Block-Based Image Sharing

VMware Linked Clones, Citrix Provisioning Server (PVS), and Citrix Machine Creation Services (MCS) are image sharing technologies that can be used to significantly reduce the amount of storage needed to implement VDI.

These block-based image sharing technologies build virtual desktops (clones) using the virtual disk of a single parent virtual machine. This dramatically reduces the time needed to set up new virtual machines, and the amount of disk space the clone uses.

When you factor in the delta disk which stores all changes or differences between the parent VM and the cloned desktop, the storage capacity savings offered by these technologies can range from 50-70% of a thick-provisioned, full sized desktop. A 500-desktop VDI implementation would then require only 6-10 TBs.

The drawback with these technologies is that they only work for non-persistent desktops. Delta disks are invalidated whenever the parent virtual machine is patched, which results in all user customizations – display settings, icons, application preferences, user-installed apps and plug-ins – to be lost. This is why a complex set of additional tools for user virtualization, profile management, application virtualization, and image management must be implemented with these technologies.

Capacity: Layered Desktops

With [layering technology](#), virtual desktops may be persistent or non-persistent. Yet, both types of desktops are as storage-efficient as non-persistent desktops provisioned with block-based image sharing technology.

Layered desktops are assigned to specific users or roles at first login. Desktops share a single instance of the Windows OS layer and all Application layers, so patches and updates are applied only once and storage utilization is greatly reduced.

PERSONAL DATA
PERSONAL APPS
DEPARTMENTAL APPS
CORPORATE APPS
WINDOWS
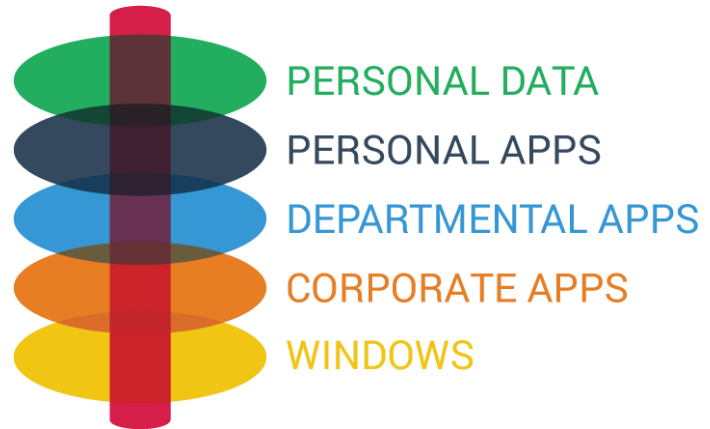
Because layering is based on file system and registry (C: drive) virtualization, all desktop customizations, including applications and plug-ins that are installed by IT administrators and end users, are sustained. Base layers can be patched as often as IT wants without affecting the upper layers.

With layering, the only difference between persistent and non-persistent desktops is whether the Personalization layer is reset after each use.   If a desktop is configured as persistent, the Personalization layer is left intact. If a desktop is configured as non-persistent, the Personalization layer is wiped clean. The decision of whether to deploy persistent and non-persistent desktops can now be based solely on use case, since both require minimal storage, and both are built using common layers that only need to be patched once.

The following table helps you estimate your storage requirements for your VDI POC and production implementation.

Desktop Components	Storage Capacity
OS Layer	16 GB
Application Layers (~50 apps)	200 GB
User Layer (per desktop, persistent-only)	5 GB
Boot Images (per desktop, for vSwap, pagefile, dump file)	4 GB
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500 full-sized desktops, assuming each desktop required 40 GBs of capacity, would normally require ~20 TB of storage capacity.

However, Unidesk stores OS and Application layers only once per datastore, eliminating redundant Windows OS and application storage. The following formula can be used to calculate Unidesk storage requirements: *((OS layer size + Application layers size) * (# of Desktop CachePoints + 1 Master CachePoint)) + (# of desktops * size of User layer) + (Boot images * # of desktops) = Total Space Required*

Plugging these numbers in, a 500 persistent desktop deployment would require: ((16+200)*7) + (500*5) + (500*4) = 6 TB, for an average of only 12 GB per desktop and a savings of 70% compared to full-sized desktops.

If you use layering technology with new storage arrays that provide in-line de-duplication and compression capabilities, storage reduction will be even more dramatic. [Egan Company](#), a building and construction firm in the Twin Cities region of Minnesota, is using Unidesk, VMware Horizon, and a flash-optimized storage array from Tegile for its growing VDI implementation. Unidesk's single instance storage of layers combined with Tegile's de-duplication and compression has reduced VDI storage capacity 90% at Egan, for an average of only 2.5 GB per persistent desktop.

IOPS: All Desktops

Insufficient I/O performance is another common cause of VDI project failure. What works well in your POC often doesn't work so well once the rotating disks in your old SAN array are being accessed by many production virtual desktops at the same time. Desktops will get more sluggish as I/O performance suffers. And users will start asking for their old PCs back.

[Kawasaki Motors Manufacturing USA](#), [Shannon Medical Center,](#) and [William Woods University](#) all discovered during their POCs that mechanical disks would not provide the IOPS necessary for production success. All three chose layering technology to simplify VDI management and reduce storage capacity requirements, along with flash-optimized storage arrays to deliver enough IOPS to ensure a high-performance user experience.

This [Easy-to-Use VDI IOPS Calculator](#) is a good resource to plan how many IOPS you will need for your VDI POC and production installs.

5. Personalization and Customization

Most users will expect a PC-like experience when you convert them to VDI. They will not be satisfied with a virtual desktop that does not sustain their settings and configurations between sessions. They will want to pick up immediately where they "left off," regardless of which device they are using for access.

You may also learn from your application inventory that you have a large number of application "one-offs" – apps that are used by only a few users. You may not want to bother virtualizing or layering these apps, and instead let them be directly installed as needed.

Persistent desktops are the best way to address both of these requirements. Persistent desktops that are provisioned with layering technology share a single Windows gold image layer and common application layers. As a result, the old concerns with persistent desktops in VDI – high storage consumption and inefficient Windows patching – are no longer relevant.

Colby-Sawyer College virtualized its faculty and staff desktops first. From their POC, they knew that persistent desktops would be needed to save the many one-off apps used by professors.

With solutions like Unidesk, the Personalization Layer leverages the native Windows Profile to retain all profile settings, eliminating the need for profile management tools. The Personalization Layer also captures all writes, including data and user-installed apps. By allocating a specific amount of space to each Personalization Layer, you can enable your end users to install their own one-off apps to ease the burden on IT, and still control how big each User Layer can be. Or, if you don't want to give out administrative rights to end users, you can have IT staff install one-off apps into the Personalization layer on behalf of the end user.

By configuring the Personalization Layer snapshot frequency, you can also enable your service desk to quickly repair desktops that are broken by a user modification. Level 1 service desk personnel can roll the Personalization Layer back to any previous snapshot for any desktop to quickly eradicate malware, viruses, DLL conflicts, or other problems, essentially "undoing" whatever damage the user may have caused.

The following table provides a way to test Personalization capabilities during your VDI POC.

Personalization Test for VDI POC
1. Have a user install Google Toolbar while using their desktop. Verify that it works with the web browser packaged and delivered as a layer by IT. Patch the Windows layer and the web browser layer and apply the new layer versions to the user's desktop. Verify that Google Toolbar is still there after the desktop is patched and rebooted.
2. Install a print driver for the user. Verify it can print. Patch the Windows layer and apply the new layer version to the user's desktop. Verify that the print driver is still present and printing works after the desktop is patched and rebooted.
3. Change the background of the desktop. Follow same steps as above.
4. Save files to the desktop. Follow same steps as above.
5. Configure the Personalization layer snapshot frequency. Make sure a snapshot has been taken. Install user-installed apps and create data. Restore the desktop to the earlier snapshot. Verify that the user-installed apps and data created after the snapshot are gone.

6. Working With Your End Users

It is extremely important to select the right user group for POC testing. Users should be as representative as possible for the chosen use cases. Users should also be friendly to IT, and willing to provide feedback. Here are a few techniques that smart IT teams are employing to ensure end user acceptance of VDI:

- **Arm influencers with "cool" mobile devices.** When [Sunrise Health](#) kicked off its VDI POC, the IT team gave Apple iPads to the opinion leaders in each department, and encouraged them to walk around and show off how they could access their desktops, X-rays, MRIs, and EMR app from any floor or wing. Soon, every worker wanted an iPad and a virtual desktop.
- **Educate them on the benefits.** Before [Bernstein Shur](#) started implementing VDI, the IT team gave demonstrations to the law firm's attorneys. They showed how virtual desktops would save their sessions, let them resume working from any device at the office, home, courts, or appointments, and give them 24x7 access to legal applications. For attorneys who are under pressure to maximize billable hours and respond quickly to clients, this was music to their ears.
- **Include them in the project.** Leading international car rental company [Auto Europe](#) ran focus groups with end user representatives from each department during their VDI planning stage. By making the user feel "heard," IT had their backing from the start.

At the end of your POC, conducting a survey with your end users is a good way to ensure VDI will meet their requirements. Here are some sample questions.

Sample POC Survey Questions
1. Was the login process and interaction with your virtual desktop intuitive? Did you experience any problems?
2. Was the performance of the applications on your virtual desktop adequate? Please explain your expectations for performance followed by your experience.
3. Was your desktop experience from home and other locations different from your experience at work? What were the differences?
4. Was the functionality and performance of printing adequate? Please explain your expectations for printing followed by your experience.
5. What if any issues did you experience during the POC? Was there anything missing compared to your physical PC?
6. Now that you understand how the virtual desktop works, how do you think it will help you? What do you see as the biggest benefits?

7. Making Sure VDI Can Be Managed by Desktop Staff

The last thing to test in your VDI POC is whether the IT staff that will be responsible for day-to-day VDI management can master the management tools.

Often, IT architects and server administrators deploy and manage the VDI POC. Then they find that when they go to production and try to turn daily VDI operations over to desktop administrators and helpdesk staff, the management tools are too complex.

If you expect your desktop people to manage your virtual desktops, be sure to involve them in the POC and give them day-to-day administrative responsibility. You may find that the 5-7 different tools that are included with Citrix XenDesktop or VMware Horizon can be mastered with enough education and training.

However, if you're like California Superior Court - Sacramento County, you will likely find that these tools are too complex. And, that you need an easy-to-use, single pane of glass management solution to empower your desktop people to manage VDI, realize the OpEx savings you hoped to achieve, and avoid having "desktop management" added to your server manager's or system architect's job description.

8. POC Test Plan

Following are sample test plans that summarize many of the requirements already discussed. Visit the [Unidesk Technical Training Center](#) for more details and instructions for each step.

Sample POC Test Plan for IT

1. Follow the POC checklist to setup POC environment

2. Install Unidesk and a broker such as Citrix XenDesktop, Microsoft RD Connection Broker, or VMware Horizon View

3. Prep your Gold Image using the Unidesk Unattend Builder and Optimization Builder (available in the [Unidesk Download Center](#))

4. Create the OS layer and provision your first test desktops.

5. Create an OS layer version and patch the OS. Assign the new layer version to a desktop and test to see if the patch "took."

6. Create Installation Machines for application layering.

7. Create App Layers for the applications defined in the POC. Assign them to desktops and make sure the applications run properly.

8. Create your first user desktops.

9. Add desktops to broker pools to test Citrix XenDesktop, Microsoft RDS, or VMware Horizon View integration.

10. Hold training sessions and have users use their desktops.

11. Create new application layers and assign them to user desktops. Update the OS layer and assign it to desktops. See if the users notice any changes to their personal "stuff."

12. Revert to earlier app and OS layer versions to verify mistakes can be undone.

13. Have your Level 1 help desk reset a user's Personalization layer to an earlier snapshot to verify that user mistakes can be undone.

14. Create templates with pre-selected combinations of layers. Use them to create desktops.

15. Change maintenance schedules. Verify that desktops are rebuilt when they are supposed to be.

Sample POC Test Plan for End Users

1. Work in the virtual desktop environment as much as possible.

2. Browse with different web browsers.

3. Use most common standard applications (e.g. Microsoft Office)

4. Use critical business/organizational applications.

5. Use graphics-intensive apps such as Adobe Creative Suite and CAD.

6. Open and save files with a USB flash drive and network shared drive.

7. Print to various network printers.

8. Access virtual desktop from home PC.

9. Access virtual desktop from BYOD device (iPad, Android).

10. Install an application and plug-in. Verify it persists between sessions.

11. Change profile settings (e.g. display settings, app preferences). Verify they persist between sessions.

Summary

You should now be equipped to implement a VDI Proof of Concept that will accurately reflect your requirements for full-scale VDI production success. If you found the customer examples to be helpful, more can be found at http://www.unidesk.com/customers/success-stories

If there is information you were looking for but didn't find, let us know by emailing us at info@unidesk.com