

The Future of Server Hosted Virtual Desktops

Contents

The Future of Server Hosted Virtual Desktops	3
The Technology behind the Solution	3
Floating Pool Architecture (Non-Persistent).....	4
Dedicated Pool with Shared Storage (Persistent).....	4
Dedicated Pool with Hybrid Storage the V3 Way	5
What V3 Offers	7
Why V3 VDI Solution is Superior to a DIY (Do-It-Yourself) Solution.....	8

The Future of Server Hosted Virtual Desktops

It's no secret that the IT industry has been somewhat lackluster in their support for replacing desktop units with virtual technology. The reasons for the tepid response range from poor performance, availability and lack of scale to inadequate management tools and the inability to deploy a VDI scenario that end users are satisfied with as a primary desktop environment.

What is less known but far more important is that there are new offerings in the marketplace that specifically address past concerns about Virtual Desktop Infrastructure (VDI). A V3 appliance solves the most critical issues with VDI and guarantees a high performing, scalable, high availability and secure Desktop Cloud Infrastructure specifically designed to deliver both floating pool and dedicated pool environments.

The Technology behind the Solution

To better understand how customers benefit from a V3 appliance solution, a deeper dive into the underlying technology of virtual desktop architectures will be beneficial for those considering a VDI deployment within their environment.

While there may be several VDI architectures in use across the entire spectrum of the virtualization market, there are a few that stand out as either popular implementations or as advanced "next generation" designs. There are basic components of VDI architectures that are prevalent in all VDI deployments that should be fully understood.

All virtual desktop environments have the five following core elements.

VDI Elements

1. Endpoint: The device (terminal, desktop, laptop, tablet, etc.) from which an end user accesses a virtual desktop device.
2. End User Network: The network that connects the end user terminal to the virtual desktop compute environment.
3. Compute: The device or environment that houses the compute resources of the desktop device. Compute is a virtualized environment.
4. Network: The network that connects the compute environment to the storage environment or other critical applications within the data center.
5. Storage: The device or environment that stores end user data, is accessed by the compute environment to deliver end user data and is a virtualized environment.

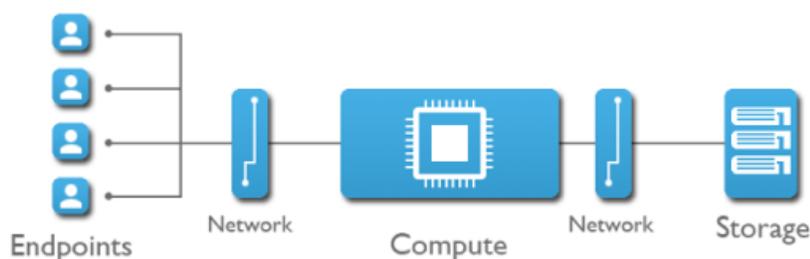


Figure 1. VDI Elements Defined

Various VDI architectures will leverage these elements in ways that promote specific benefits or strengths that will ultimately be exposed to end users of the architecture. This document will review the typical deployments of a non-persisted or persisted virtual desktop, review implementing a Floating Pool (Non-Persisted) or Dedicated Pool (Persisted) with Shared Storage, Dedicated Pool with Hybrid Storage architecture, and detail the benefits and challenges that they present to prospective customers.

Persistent Virtual Desktop: A persistent virtual desktop is one in which a user will be able to keep all the configurations and personalization they have created from session to session. Persistent desktops keep the user's profile and documents on a separate user disk, in order to keep the feel of a physical desktop or laptop computer. One of the key benefits to a persist virtual desktop is that it allows end users to use the endpoint best suited for them to compute how they want, when they want and where they want

while maintaining a consistent virtual environment that houses all of their critical applications and data. Unfortunately legacy VDI implementations have required significant investment in storage and have performed poorly from an end-user perspective.

Non-Persistent Virtual Desktop: A non-persistent virtual desktop is assigned from a pool of resources when a user logs in. That virtual machine obtains a user's roaming profile from a directory service in order to establish their personalized settings. The end user will then log into a virtual desktop in order to access applications and data; when the user signs off, that desktop is wiped clean. At the end of each session, that virtual desktop reverts back to its original state and any changes or work stored locally on the virtual machine will be erased. This is a common and supported model for legacy VDI implementations and is well suited for shift work, call centers or other environments where personalization is not necessary or desired and the nature of the work demanded is repetitive by design.

Floating Pool Architecture (Non-Persistent)

Environments that require little or no end user disk space or personal desktop customization often deploy floating pool architectures because of its high availability and simplicity. Such environments are often found in call centers, retail outlets or kiosks, patient bedside units etc...

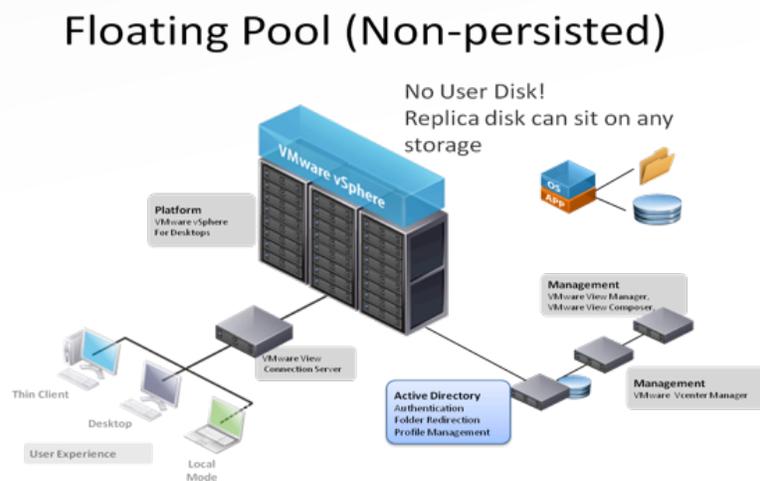


Figure 2. Floating Pool Architecture

The floating pool architecture is recognized by its emphasis on the compute platform (in this example it's the VMware vSphere component). The compute platform is designed to deliver a fresh desktop to each user every time they sign in. It is highly available but does not put an emphasis on performance or user integrity as there is no user "disk" or personal storage in this environment.

Dedicated Pool with Shared Storage (Persistent)

Historically, organizations that needed to move beyond the limitations of the floating pool architecture would often choose Dedicated Pool with Shared Storage in hopes that they could take advantage of the cost benefits of a VDI environment yet extend the architecture with additional capabilities that they deemed necessary. It promised the benefits of a personalized end user device with access to storage, all virtualized.

Dedicated Pool with Shared storage

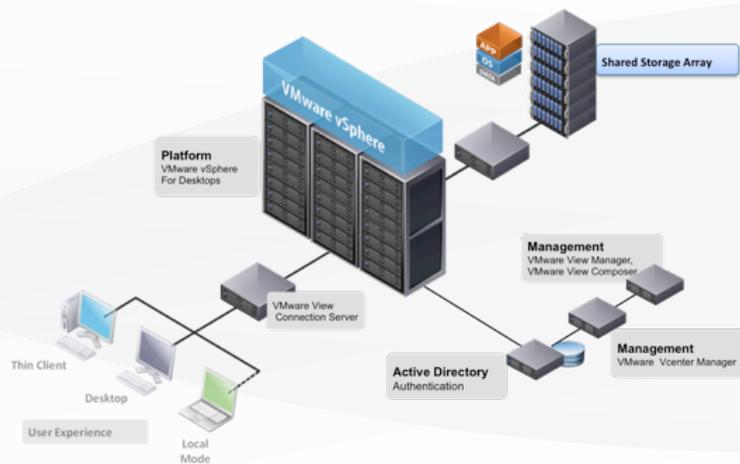


Figure 3. Dedicated pool with shared storage

Dedicated pool with shared storage offers end users a customized, persistent (always available) virtual device that includes disk space where they can save information. This architecture is designed for environments that require CPU and storage such as finance, accounting, engineering, R&D etc. The challenges with this design are numerous and ultimately have led to some disillusionment within the IT community. Performance is one of the biggest potential drawbacks to this architecture as information needed to run an operating system resides on a combination of the compute and storage technology and the network bandwidth that ties them together. The easiest way to think about this is to take a close look at a typical desktop or laptop computer. It has memory, CPU and disk storage all in the same box – the very same box that has the operating system and applications on it. As such, when a call to the OS or an application is made, the response from storage can be measured in nanoseconds and the result is a satisfactory end user experience. Dedicated pool with shared storage actually separates the CPU/memory component of a computer from the storage by placing a network between them. When the same call is made to the OS or application there is a vast difference in the time it takes for the response, which is measured in milliseconds. This is a complete order of magnitude SLOWER than how a computer is supposed to respond. Ultimately end users are generally not satisfied to use this as their primary computing environment and it has been generally panned by the industry.

Dedicated Pool with Hybrid Storage the V3 Way

After careful consideration of alternative VDI architectures, the V3 appliance was created to deliver advanced yet simplified server architecture identified as Dedicated Pool with Hybrid Storage that solves the most critical issues previously discussed. The highlights of this architecture can be primarily found in the compute element of the architecture with a purpose built appliance designed to house CPU, memory and storage for virtual desktop devices. By housing both of these elements together on a solid-state appliance the system delivers incredibly high performance, availability and scale in a persistent desktop cloud infrastructure. V3 appliances extend this capability with the ability to incorporate user data that exists on other storage devices without compromising the performance to the end user.



Figure 4. V3 virtual desktop architecture elements

V3 uses dedicated pools with hybrid storage architecture incorporates persistent end user desktop with the OS and applications on leading edge solid-state technology. This simplifies the VDI infrastructure and improves performance, availability and scale enormously. A V3 appliance can guarantee maximum performance and availability through their innovative V3 Desktop Cloud Orchestrator™ (V3 DCO) management solution.

V3 Desktop Cloud Infrastructure (Dedicated Pool with Hybrid Storage)

DCI Tenant Adherence

- Guaranteed Performance
- Guaranteed High Availability
- Guaranteed Utilization

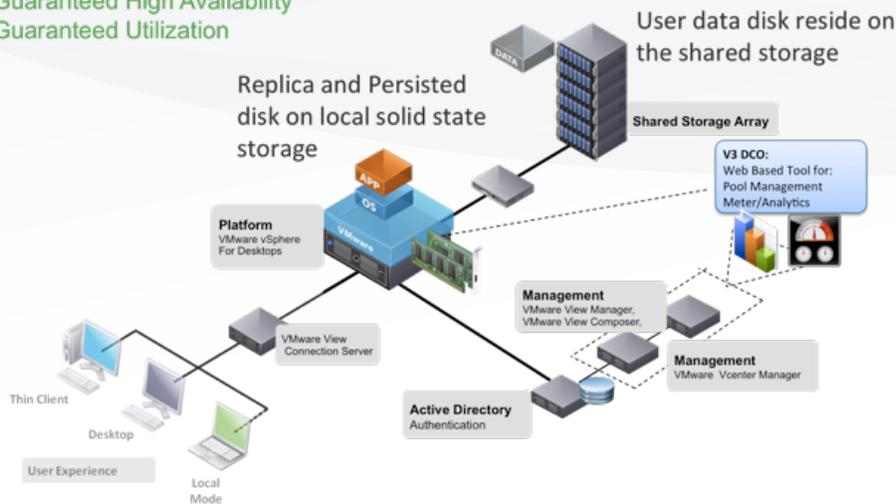


Figure 5. Dedicated pool with hybrid storage

V3 DCO is a management portal specifically designed with the desktop manager in mind. It is a console that allows the desktop manager to setup/configure and allocate virtual desktop pools quickly and easily. It provides powerful monitoring capabilities that give insight into how pools and desktops are being utilized so that the overall system reaches the efficiencies demanded by the organization. V3 Optimized Desktop Allocation™ (V3 ODA, a component delivered with V3 DCO) empowers organizations to locate desktops to the highest and most optimized location. V3 ODA reviews the resources of V3 Appliances in the environment and identifies the most appropriate available resource and reports that information directly to V3 DCO. V3 ODA is executed in the event of an appliance failure or manually if an administrator wishes to allocate additional resources to the virtual machines on an appliance. In addition, V3 ODA constantly monitors compute pool resources to ensure that all virtual desktops are both available and performing to their maximum potential. With V3 ODA organizations can, with confidence, know that virtual desktops deployed are outperforming their existing physical machines while providing highest availability according to the SLA of the managing organization. In this scenario, the end user needs only to reboot their terminal in order to continue their work.

V3 Deployment Benefits

- Increased performance over traditional desktop PCs (2-8x)
- Guaranteed utilization (# of desktops per V3 appliance)
- Guaranteed high availability (Auto appliance/desktop recovery)
- Guaranteed end user experience satisfaction

Persist

Consistent across to personalized desktop

↔

Non-Persist

New desktop with each login

Figure 6. V3 deployment benefits

The powerful combination of dedicated pool with hybrid storage, collocation of compute and storage of persistent desktop environments on advanced solid-state technology and the power of the V3 DCO virtual desktop management application enable the following tangible business benefits to customers who choose to deploy this revolutionary desktop cloud infrastructure. The result is astounding end user satisfaction.

Reduction of IT infrastructure cost: Customers have shown hard cost saving through the reduction of PCs at the desktop. A V3 implementation is considered a “Green” technology as it reduces the total number of desktop devices drawing power with a single solid-state appliance that lowers the cost and use of power significantly (see figure 7). In addition to hard costs, soft costs have also decreased by deploying V3 solutions. Cost of backup, risk mitigation costs and cost to ensure compliance can all be reduced when desktop units are replaced with V3 technology. One customer recently reported a 60% savings in IT management overhead due to their deployment of a V3 appliance.

Performance enhanced: End users of a V3 appliance are delighted with the performance and speed of their virtual desktop environment. V3 leverages a “hybrid” storage architecture that delivers performance that at a minimum is equal to a traditional desktop, and in most instances performance that is significantly higher than a traditional desktop. Internal benchmarking and direct customer feedback has shown increased desktop performance of 2 to 8 times faster than a traditional desktop PC.

Ultra high availability: V3 technology offers “dedicated” pools of memory and storage on a single appliance that allow for a highly available, persistent virtual desktop. If a virtual platform becomes compromised in any way, V3 Optimized Desktop Allocation management tools automatically rebuild an exact image on a redundant device with no loss of work and no more time loss than it takes to “reboot” a terminal at the end user’s desk.

Scalability: The V3 appliance is delivered in a scalable architecture that allows companies to expand the system seamlessly. V3 offers scalability into the tens of thousands of virtual desktop deployments.

Control of consumer product impact: A V3 deployment empowers organizations with the ability to control access to sensitive information while simultaneously allowing end users the flexibility to use the latest in consumer electronic equipment such as smart phones and tablets. The power of providing access to this high performance virtual desktop solution with a wide range of evolving intelligent devices delivers greater portability and flexibility to the work force without compromising access control or security initiatives.

What V3 Offers

V3 offers an innovative server appliance that hosts high-performance virtual desktops in a 2U form factor supporting 50-200 virtual desktops with guaranteed performance. These highly scalable appliances leverage V3 technologies, allowing our customers to easily scale from 50 to 10,000+.

Leveraging local PCIe-based solid state storage for working data, the V3 appliance is able to deliver virtual desktops that outperform physical desktops by 2-8 times (based on internal benchmarking and customer experiences within their IT environments.) A V3 solution only leverages expensive shared storage (SANs and NAS) for persistent user data.

Installation of the appliance is usually less than two hours (assuming an existing VMware infrastructure). The V3 appliance comes with ESXi pre-installed allowing it to function as an ESX host in a VMware ecosystem – you simply configure it, connect the network and deploy the desktop pools. With easy manageability and high scalability, V3 appliances accommodate the virtual desktop adoption curve, delivering virtual desktops to any end point, whether they are desktops, laptops, thin clients or tablets.

The V3 VDI solution increases productivity for both employees and IT staff alike. The simple distributed deployment combined with centralized desktop management significantly reduces the workload for IT staff. In fact, V3’s simplified VDI architecture enables so many efficiencies that V3 client Carol Finegan, CIO for EnergySolutions, was quoted saying, **“We look forward to being out of the IT Desktop Management Business!”** In addition, V3’s high-performance VDI provides a fast and optimal user experience for end-users, leaving happier and more productive employees. According to Carol, **“employees will actually enjoy using their virtual desktops because of the performance provided by V3 virtual desktops.”**

Cost Savings: Desktop Budget for a V3 Customer

200 Desktops	200 V3 Desktops
Annual Expense: \$258,000	Annual Expenses: \$171, 150
3-year desktop refresh cycle (600 total desktops)	Hardware: \$360
1/3 (200 desktops) are replaced every year	Software: \$230
\$1,200 expenses per desktop = \$240,00 annual cost	Thin clients: \$250
ENERGY: *	Total expense per virtual desktop: \$840 \$168,000 Annual cost
1 physical desktop uses 1000 kWh/year in power consumption 200 desktops = \$18,000	ENERGY:*
	1 V3 desktop uses 175 kWh/year in power consumption 200 V3 desktops = \$3,150

*calculations based on \$.09 per Kwh

Figure 7. Actual cost savings of existing V3 customer.

The V3 Server Appliance is the best and only virtual desktop host for:

- Organizations wanting to replace or extend their investment lifecycle of physical desktops with true replacement grade virtual desktops
- Managed Service Providers (MSPs) wanting to deliver services in a cost-effective and efficient manner
- Organizations that want to leverage “Bring Your Own Device” (BYOD) strategies to improve business continuity and end user productivity
- Organizations who wish to have better physical security of their data by housing all applications and application data in a secure data center

Why V3 VDI Solution is Superior to a DIY (Do-It-Yourself) Solution

Many organizations have tried to build their own homegrown VDI solution, however customers are finding the learning curve associated with building a Virtual Desktop infrastructure with servers that are designed for Server Infrastructure, is an expensive proposition, in both time and costs.

The following highlights several of the key advantages of using a V3 VDI solution, compared with the approach of a DIY VDI solution.

- **V3’s Superior Architecture is Optimized Using Solid-State Storage Located Close to the CPU. A V3 VDI solution is designed** and optimized to use solid-state storage near the CPU with dedicated pools. This combination allows a user’s desktop to be uniquely theirs, without sacrificing any performance, regardless of where they use their desktop, and regardless of the device.
- **V3’s Software is Customized for Performance and Availability.** V3 has very specific software to enable monitoring, performance and high availability. This custom software comprises the building blocks for the next generation of virtual desktops and strengthens the foundation for utility computing of virtual desktops. In contrast, the DIY solution patches together software that is not optimized for VDI and cannot deliver the same performance.
- **V3 Uses Only Controlled Consistent Hardware to Ensure Performance and Reliability.** The V3 hardware is contemporary, specific, and controlled/managed very closely by product managers and hardware partners looking to provide the highest performing VDI servers available. This results in consistent and reliable appliance performance for our customers.
- **V3 Uses Robust Solid-State Disk (SSD) Storage to Ensure Reliability and Longevity.** V3 uses Fusion IO drives that have a full 3-year warranty that is passed on to the customer. The Fusion IO 365GB solid-state storage can write up to 2.24TB a day sustained for 5 years, while the 785GB solid-state storage can write up to 6.17TB a day sustained for 5 years. The SSD can be read an unlimited number of times, as reads do not affect the longevity of the card. That’s a tremendous amount of data and time before the performance might begin to degrade or a drive might fail.

The highly reliable Fusion IO solid-state storage cards are a hybrid, combining the best-of-breed characteristics of multi-level cell (MLC) and single-level cell (SLC) flash memory including performance, longevity and capacity.

- **V3 VDI Solution Offers Simplified Scalability.** V3 has one of the most flexible scalability stories on the market! Because the V3 solution uses a hybrid of local and shared storage, it minimizes the need for expensive and complex backend infrastructure. Once an organization understands their environment and requirements, they can simply and easily scale out or up to meet their needs.

As the client's requirements change, scalability is achieved through the installation of additional appliances. This means adding capacity by just adding other appliances. Also, we can add different capacity-sized appliances, V3 offers almost limitless options for scaling.

On a larger scale, V3 provides performance, monitoring and management tools that allow for the configuration and intelligent distribution of thousands of virtual desktops across multiple appliances. Using a proposed building block of six V3 Appliances (along with supporting infrastructure), V3's solution can scale to hosting thousands of virtual desktops while ensuring unparalleled reliability, manageability and security.

- **V3 VDI Solution Supports Bring-Your-Own-Device (BYOD) Initiatives.** V3 offers a secure solution for satisfying the increasing demand for, "bring your own device to work." With V3's solution, corporate information remains securely warehoused in the data center, while authenticated employees can access the information from virtually any device. "Whether the employee is using a tablet, desktop or laptop at work or on travel, they will have a familiar and high response experience," according to EnergySolutions' CIO Carol Finegan.
- **V3 VDI Solution Supports Mobile Computing.** V3's solution provides employees with the freedom to securely access their desktops remotely from anywhere at any time with an Internet-enabled device.
- **Flexibility in Deployment.** V3 offers flexibility in:
 - how quickly you scale the deployment (number of desktops replaced) over time
 - selecting a deployment schedule based on desktop refresh cycles (to spend at cash flow rate)
 - selecting the best user group(s) for desktop virtualization (most receptive or easiest first)
 - Selecting which hardware to use and not having to buy it all at the same time. For example, companies have the option to:
 - retool an existing tower into a dumb terminal
 - re-purpose existing monitors, keyboards and mice
 - buy thin-clients, saving the difference in the cost of laptops and desktops
 - using a best-of-class combination of hardware and software. V3's solution is vendor-agnostic, with minor limitations.

The ROI of V3 Appliances

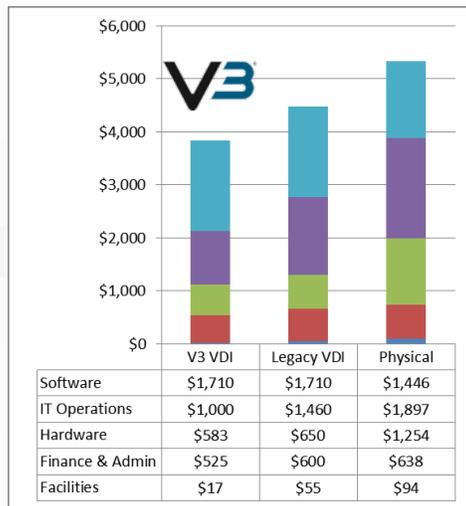


Figure 8

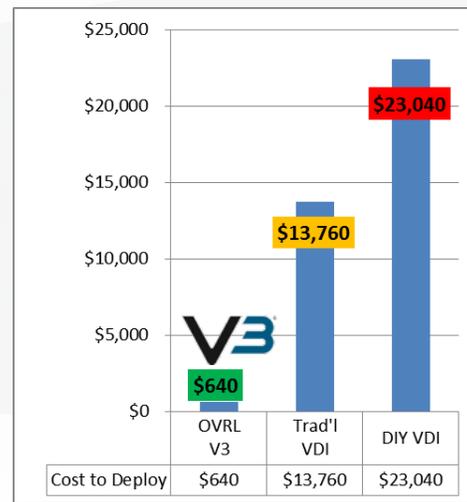


Figure 9

Conclusion

Figure 8 has an annual operating cost of under \$4,000. In contrast, legacy VDI annual costs exceed \$4,500 and physical desktop annual costs exceed \$5,000. Figure 9 shows that the cost to deploy a V3 appliance is significantly better than legacy VDI and far, far superior too a do-it-yourself VDI solution.

Figure 8 and Figure 9 demonstrates that V3 appliances have a significant annual savings per desktop compared with legacy VDI and physical desktop devices. V3 is the future of server hosted virtual desktops.

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