VMware Horizon with View Reference Implementation Case Study for Bank of Stockton

Bank of Stockton Increases Virtual Desktop Performance 15x, Improves Customer Service through Optimized VDI/Hybrid Storage Solution

TECHNICAL WHITE PAPER

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Introduction

This document provides a reference implementation case study for VMware® Horizon™ with View™ at the Bank of Stockton, a multi-branch, multi-division community bank based in Stockton, California. The case study represents a 200-user environment spread across 16 branches and divisions, powered by VMware ESX hosts and running on hybrid flash storage solution from Tegile, a VMware hardware partner.

The intended audience for this document is the technical decision-maker who is considering deploying Horizon with View across distributed locations. The Executive Summary and Business Drivers, Business Case, and Benefits sections of this document are also suitable for non-technical decision makers.

The purpose of this document is to illustrate how the technical solution provides tangible business benefits. The document includes an overview of business benefits and cost savings, along with an architectural overview of the deployed solution.

About VMware Reference Implementation Case Studies

A reference implementation case study shows how specific customers in a variety of locations and industry verticals have deployed and benefited from VMware Horizon with View. A reference implementation describes in detail the project approach, architecture, and business benefits at a real customer site, and provides lessons learned for that particular deployment. These implementations are often built on reference architectures validated by VMware.

While a reference implementation is often built on best practices, sometimes tradeoffs are made to meet project requirements or constraints. When a reader references these implementations, it is critical to understand where the architecture has deviated from best practices, and where improvements can be made. This is easily achieved by comparing a reference implementation to reference architecture documentation provided by VMware. For further information regarding this and other technical reference architectures, visit VMware Horizon with View Design resources on the VMware Web site.

This case study is intended to help customers—IT architects, consultants, and administrators—involved in the early phases of planning, design, and deployment of VMware Horizon with View solutions. The purpose is to provide an example of a successful architecture that represents specific industry vertical challenges met, and the benefits gained from the solution.

About VMware Horizon with View

VMware Horizon with View is a desktop virtualization solution that simplifies IT manageability and control while delivering the highest fidelity end-user experience across devices and networks. The VMware Horizon with View solution helps IT organizations automate desktop and application management, reduce costs, and increase data security by centralizing the desktop environment. This centralization results in greater end-user freedom and increased control for IT organizations. By encapsulating the operating systems, applications, and user data into isolated layers, IT organizations can deliver a modern desktop. IT organizations can then deliver dynamic, elastic desktop cloud services such as applications, unified communications, and 3D graphics for real-world productivity and greater business agility.

Unlike other desktop virtualization products, VMware Horizon with View is built on and tightly integrated with VMware vSphere®, the industry-leading virtualization platform, allowing customers to extend the value of VMware infrastructure and its enterprise-class features such as high availability, disaster recovery, and business continuity.

VMware Horizon with View delivers important features and enhancements that improve the performance, security, management, and flexibility of virtual desktops.

Support for VMware vSphere 5 leverages the latest functionality of the leading cloud infrastructure platform for highly available, scalable, and reliable desktop services.

For additional details and features available in VMware Horizon with View, see the release notes.

VMware Horizon with View Solution Components

Typical VMware Horizon with View deployments consist of several common components, shown in Figure 1, which represent a typical architecture. The solution includes VMware Horizon with View components as well as other components commonly integrated with View.
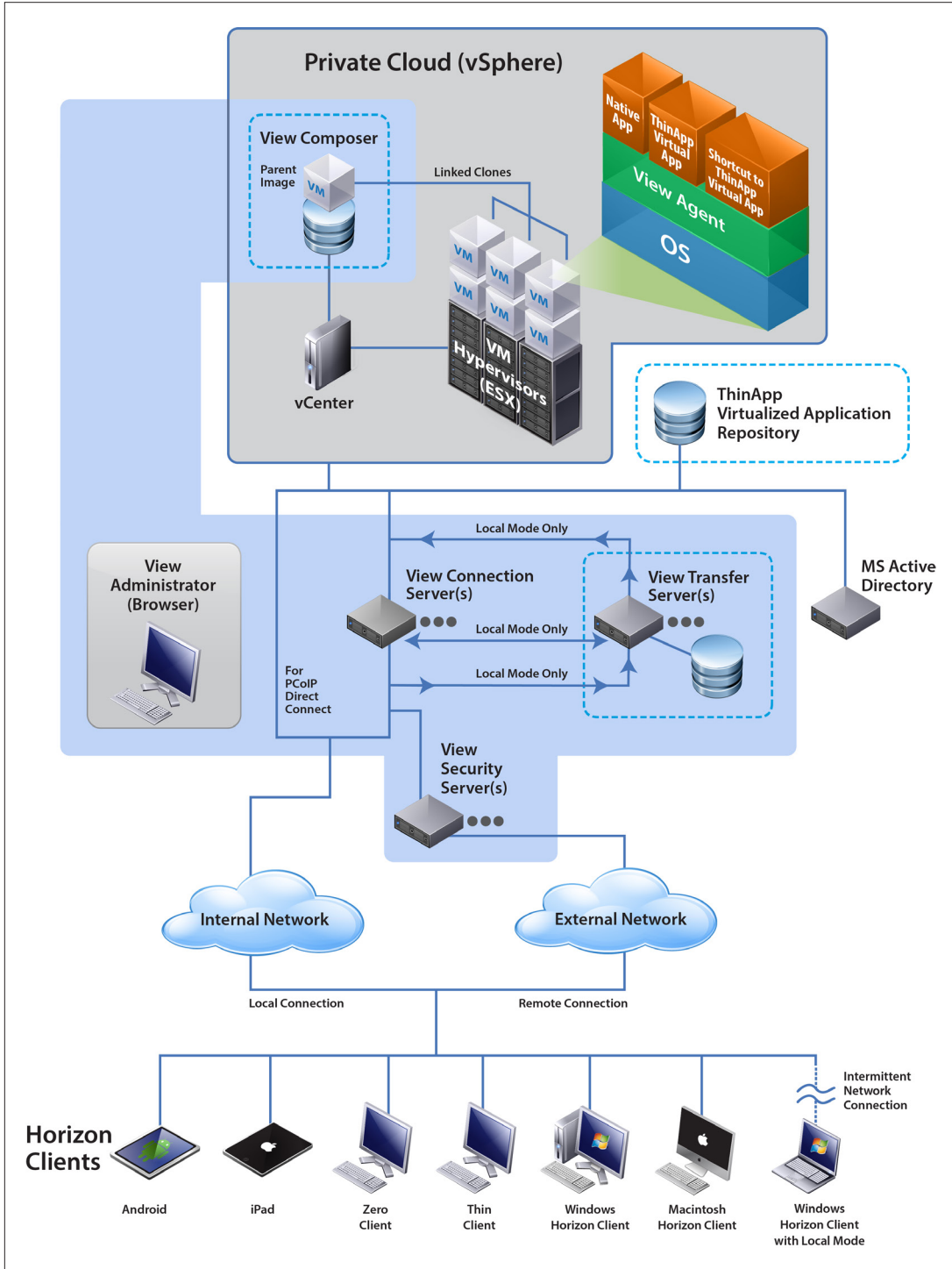

Figure 1: Horizon with View Solution Components.

Bank of Stockton Reference Implementation Overview

Founded 147 years ago near the gateway to California's gold country, the Bank of Stockton takes particular pride in its history of innovation and the level of service it provides to its customers. The bank's footprint now spans seven counties, and the bank operates 16 branches, employs 400 people, and manages assets of $2 billion. Primary service offerings include Internet banking, personal banking, business services, and wealth management.

In 2012, the Bank of Stockton initiated a transition to virtual desktop infrastructure (VDI) and decided to implement a VMware-based VDI solution based on its past experience working with VMware products and technologies. The next sections of this document provide additional details about the business motivations behind the deployment and the implementation itself.

Business Drivers, Business Case, and Benefits

As a service-oriented business with a long history of success and growth, the Bank of Stockton clearly understands the need for constant innovation.

"We have always been willing to try new things and invest in technologies that will benefit our customers," said Vincent Lo, Vice President, Network Application and Support. "We've been a leader in Internet banking and mobile banking, and we've also been an early adopter of technologies such as virtualization that can help us cut costs, use our infrastructure more efficiently, and provide better customer service."

In 2012, the Bank of Stockton applied that philosophy to the pursuit of a better desktop solution for its headquarters and branches.

Business Drivers

The Bank of Stockton saw an opportunity to extend the benefits of virtualization to its desktop infrastructure, and began evaluating multiple VDI solution options. Specifically, the bank had the following requirements:

- Replace the majority of its physical PCs with virtual desktops to cut costs while improving service

- Implement a consistently high-quality, predictable end-user experience across 16 branches

- Improve desktop security by moving sensitive data off the desktop and onto centralized infrastructure

- Maintain compliance with all relevant regulations and mandates

- Decrease the burden on administrators by eliminating the need to provide on-site support for technical issues or routine tasks such as software updates and changes

Business Case

The Bank of Stockton selected VMware Horizon with View as the software foundation for its VDI solution based on a thorough evaluation of multiple competitive products.

"Even though we had already had a positive experience with VMware and trusted VMware, we did our due diligence and talked to Microsoft, Citrix, and others," said Lo, "Frankly, [Microsoft] Virtual PC was out of the question—it simply was not an enterprise-class product. My team also evaluated Citrix, and in the end they recommended VMware Horizon with View. It was not a purely financial decision, despite the fact that cost savings was important to us. The decision was based on technical capabilities, the reputation of the vendor, price, roadmap, and several other factors. VMware simply had the best total package."

Mr. Lo said he was particularly impressed by the security features of the View solution. "We wanted to lock down the user workstations as much as possible," he said, "and View solved some of our most pressing security concerns." For example, with View all sensitive data is housed in the data center rather than the desktop; application software is isolated from the operating system; and PC software images are consolidated and access can be controlled more tightly. "With Thin Client our desktops no longer have any data on them, so we can enforce our security policies," said Lo.

Another key business advantage of the View solution was delivered by a technical capability: the Linked Clone feature. "We saw that the Linked Clone capability could help us conserve disk space and actually improve collaboration among our support people," said Lo, "and that translates to lower total cost and better support."

A linked clone is simply a copy of a virtual machine that continuously shares virtual disks with the parent virtual machine. This approach spaces disk space and allows multiple virtual machines to use the same software installation. In addition, linked clones can be created quickly, so it is easy to create a unique virtual machine for each task and share a virtual machine with other users, facilitating collaboration. For example, a support team can reproduce a bug in a virtual machine, and an engineer can quickly make a linked clone of that virtual machine to work on the bug.

Solving the Performance Challenges of VDI Rollout with a Hybrid Storage Solution

The Bank of Stockton deployed its Horizon with View solution on IBM BladeCenter servers and Cisco switches. Initially the solution performed as expected, but as more and more virtual desktops were brought online the performance began to bog down. This created an urgent need to address a core issue: Was the sluggish performance caused by a hardware problem or a software problem, and how could performance be accelerated?

Tegile Systems, a VMware partner and a leading provider of flash-driven storage arrays for virtual desktop environments, stepped in with a proposal. The Tegile account team believed it could solve the performance problems with a hybrid storage array featuring IntelliFlash™ technology with minimal interruption and very attractive price.

The Tegile hybrid storage solution could deliver better performance at a lower total cost in two ways. First, it could optimally combine extremely high-performance flash storage with lower-cost spinning disk media so that the highest-priority applications and data were served from flash. At the same time, less frequently accessed data is served from lower-cost spinning media. This would cut the total cost of storage while dramatically accelerating performance where it counted the most. For example, Tegile's hybrid approach would provide flash memory to accelerate desktop performance for predictable spikes during normal business hours, and use large-capacity hard disk drives (HDDs) to accommodate the growing number of large image files and content the Bank of Stockton currently maintained online. All of this intelligence (IntelliFlash™) is automatic and does not require any tuning, script writing, or scheduling by the administrators.

Second, Tegile's IntelliFlash™ technology could optimize the price/performance ratio of the storage array by delivering real-time inline deduplication and compression of data so that each array has a usable capacity far greater than its raw capacity.

When Tegile first contacted the Bank of Stockton with its proposal, the company was getting about 2,000 IOPS (Input/Output Operations Per Second) from its current VDI architecture. The Tegile team demonstrated that by incorporating a hybrid storage array and upgrading our core switch, the Bank of Stockton could increase the level of performance to 30,000 IOPS, and cut costs in the process.

"Tegile convinced us that we could stay with Horizon with View and accelerate performance with a hybrid storage array," said Lo, "and they were right. We implemented the hybrid array, and now performance is great. Our people can serve customers with full confidence that the desktop systems will support them, not create delays or problems."

What is it worth to the Bank of Stockton to have blazing-fast virtual desktops? "How do you put a dollar figure on the ability to serve customers instantly rather than in minutes or even hours?" asked Lo. "Customer service is at the heart of everything we do from a technology perspective, and now our technology is enabling us to deliver superior service at a lower cost."

Business Benefits

Since the initial VDI implementation in 2012, the Bank of Stockton has now deployed more than 200 virtual desktops via Horizon with View, and has achieved the following business benefits:

- **The ability to focus on customer service** – With fewer physical desktops to manage and faster performance from its virtual desktops, the Bank of Stockton is free to focus on giving customers the instant attention, information, and insights they come to the bank for.

- **Operational efficiency** – With View there is no longer any need to dispatch an administrator to fix desktop issues at remote sites. Virtually all service issues can be handled centrally, cutting costs and allowing administrators to focus on other tasks.

- **Stronger security** – View desktops keep sensitive data off the desktops and in the data center, so customers can be confident their privacy is protected and the business can be confident all data is completely protected in compliance with all relevant regulations.

- **Cost savings** – The VMware Horizon with View solution has helped the Bank of Stockton cut OpEx by increasing the productivity of administrators; and the Tegile hybrid storage solution has enabled the customer to cut CapEx by eliminating the need to purchase additional storage arrays to scale up storage capacity.

- **Higher employee satisfaction** – The user experience is now consistent—and consistently high-quality—across branches and divisions, so employees can get their jobs done faster with less frustration.

- **Confidence** – The Bank of Stockton can execute on its strategic priorities with complete confidence in its VDI solution and its vendor partners. The VDI solution is based on proven technology and backed by support from VMware, the virtualization leader, and the hybrid storage architecture from Tegile is validated by VMware.

Project Overview

The Bank of Stockton began evaluating VDI solutions in 2012 and selected VMware Horizon with View as the software foundation for the solution shortly thereafter. The first deployment occurred in February 2013, with the initial VDI clients running on IBM BladeCenter servers and Cisco switches. At first the solution performed as expected, but rapid expansion of the number of deployed workstations subsequently caused performance to bog down.

To resolve the performance issues, the Bank of Stockton replaced its existing Cisco switch with a more powerful Cisco Nexus 5000 Series switch, and implemented a hybrid storage solution from Tegile Systems based on the Tegile HA2300 array.

The Tegile HA2300 array employs in-line compression and de-duplication on SSD and hard-disk drive media throughout the array, allowing the Bank of Stockton to significantly reduce its acquisition and operational cost of storage. The array supports Fibre Channel and iSCSI block protocols, and both NFS and CIFS file protocols are available for NAS environments, allowing the Bank of Stockton to eliminate storage siloes. All protocols are supported concurrently, to each controller. The product also provides integrated thin snapshot, thin clones and remote replication functionality to shrink backup windows, and integrates with all major backup and site recovery software (VMware vCenter™ Site Recovery Manager™). Application-optimized templates accelerate the provisioning process and deliver individual virtual-machine-level monitoring of performance.

As a result of these improvements, performance rose from 2,000 IOPS to more than 30,000 IOPS, ensuring excellent performance for all of the bank's core applications on virtual desktops.

Today the Bank of Stockton has deployed more than 200 virtual desktops as part of the View implementation, and has virtualized about 95 percent of its servers.

VMware and Tegile Support

One of the key advantages of the VMware Horizon with View solution, according to Lo, was the high level of support provided both by VMware and Tegile Systems.

"We have a small administrative staff and they're responsible for keeping everything running reliably at 16 branches," said Lo. "With VMware and Tegile supporting us our staff can work with this technology without a massive training effort and without requiring us to bring in an army of consultants," he said. "The products themselves save us money, and the level of support we receive saves us more."

One example cited by Lo is the direct, instant technical support he gets from Tegile. "Our experience with storage vendors in the past was that you'd call with an issue, somebody would take notes, they'd pass those notes on to somebody else, and four hours later you'd get a call from an engineer who could actually help you. With Tegile, an actual engineer answers the phone, and we get the help we need right away. I'd have to say Tegile is one of the best vendors I've had the pleasure to deal with. We always get the support we need in minutes."

Lessons Learned

According to Mr. Lo, the VMware Horizon with View solution can very effectively deliver a wide spectrum of business benefits, but the following factors should be taken into account:

- **Make sure your hardware infrastructure can support your VDI goals.** Cost savings are important, but if your key server and storage systems are underpowered or incapable of scaling for the performance and capacity you'll need, issues are inevitable. When you're evaluating solution options, make sure you take into account the load your infrastructure will need to bear at peak times as well as off hours, and work closely with your vendors to ensure that your hardware is up to the task.

- **Don't neglect the importance of storage in overall VDI performance.** Performance is not all about high-powered servers and switches. The right storage system—deployed the right way and for the right tasks—can dramatically impact performance and improve the end-user experience. It pays to invest time and effort up front to understand the relationship between storage and application performance, and to ensure that you have the right storage solution for the job at hand. Great storage does not have to be expensive.

- **When evaluating VDI solutions, look a little further down the road.** Many vendors offer a VDI solution that may be effective for immediate requirements. However, as the use of VDI increases and the business expands, additional considerations may come into play, such as the need to dramatically expand deployments, increase capacity, and even incorporate new capabilities such as hybrid cloud for offloading application workloads or implementing a disaster recovery plan. Make sure prospective vendors can accommodate these and other evolving requirements without forcing you to radically overhaul your architecture, your infrastructure, or your business strategy.

Architecture Overview

The diagram below encapsulates the environment deployed by the Bank of Stockton. A total of more than 200 virtual desktops are now in production, with support for up to 250 Horizon with View virtual desktops. VMware ESX hosts support the servers and View clusters. Storage is provided by a Tegile HA2300 hybrid storage array. Connectivity is brought in through the Bank of Stockton firewall.
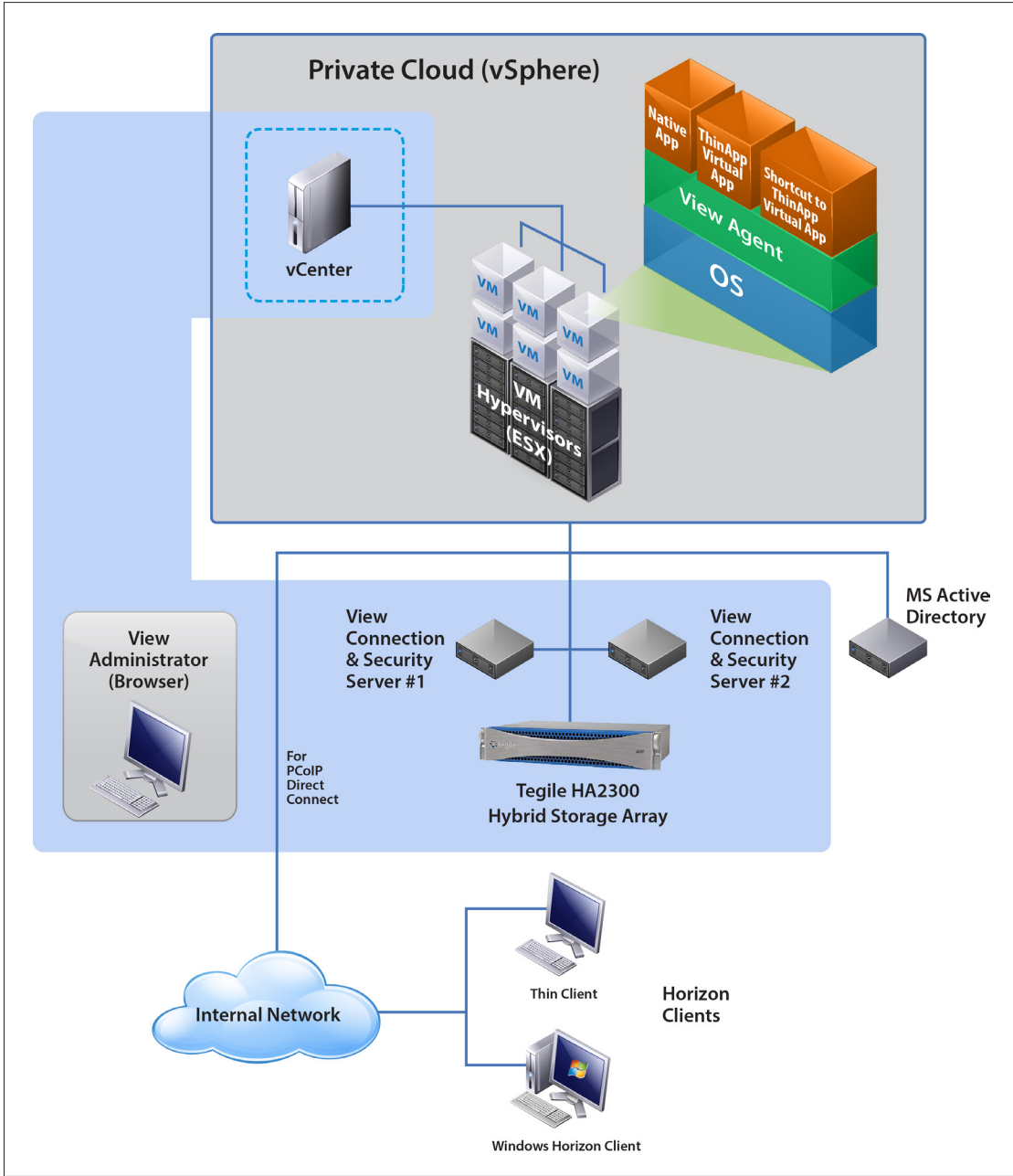

Figure 2: Solution Architecture Overview

Conclusion

The Bank of Stockton has a long history of innovation keenly focused on improving customer service. By implementing a VDI solution based on VMware Horizon with View and the Tegile hybrid storage array, the Bank of Stockton is now achieving exceptional business benefits, including:

• Faster, smarter customer service thanks to a 15x increase in IOPS performance

• Greater operational efficiency through online, centralized desktop support

• Tighter security by keeping sensitive data off the desktops and in the data center

• Substantial CapEx and OpEx savings without sacrificing desktop security, availability, or performance

• Higher employee satisfaction thanks to a consistent user experience across branches and divisions

• Peace of mind that comes from working with trusted partners with proven products and support

References

VMware Horizon with View

VMware vSphere

VMware Horizon with View Technical Resources

VMware Horizon with View Documentation

VMware vSphere Documentation

Additional Resources

For more information or to purchase VMware products, call 1-877-4VMWARE (outside North America dial +1-650-427-5000), or visit www.vmware.com/products, or search online for an authorized reseller. For detailed product specifications and system requirements, please refer to the VMware Horizon with View documentation.

About VMware

VMware, the global leader in virtualization and cloud infrastructure, delivers customer-proven solutions that accelerate IT by reducing complexity and enabling more flexible, agile service delivery. VMware enables enterprises to adopt a cloud model that addresses their unique business challenges. VMware's approach accelerates the transition to cloud computing while preserving existing investments and improving security and control. With more than 250,000 customers and 25,000 partners, VMware solutions help organizations of all sizes lower costs, increase business agility and ensure freedom of choice.

About Tegile Systems

Tegile Systems is a leading provider of intelligent flash storage arrays. Our mission is to accelerate the transformation of enterprise IT by changing the performance and economics of enterprise storage. Our flash storage arrays, with patented IntelliFlash™, architecture, deliver high I/O and low latency for business applications such as databases, server virtualization and virtual desktops. Our customers achieve business acceleration and unmatched storage capacity reduction.

Tegile is backed by premier venture capital firms August Capital and Meritech and strategic investors HGST and SanDisk. Follow us on Twitter @tegile or visit us at www.tegile.com.