VMWARE CASE STUDY

INDUSTRY
Financial Services

LOCATION
San Francisco, CA; Pittsburgh, PA; and Boston, MA

KEY CHALLENGES
- Rampant performance issues with remote end-user desktops
- Unusually high I/O requirements due to unique financial applications and corporate antivirus mandates
- Limited IT staff to service global workforce

SOLUTION
To improve the end-user experience and reduce employee complaints, GFMF deployed VMware Horizon View virtual desktops integrated with Tintri VMstore T540 virtual machine–aware storage devices.

BUSINESS BENEFITS
- Operational simplicity and straightforward management of the solution reduces burden on IT
- More than 90 percent increase in performance during antivirus scans
- Complaints of unacceptable performance eliminated almost entirely
- Performance isolation allows servers and desktops to be stored in the same datastore

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Global Financial Management Firm Implements Desktop Virtualization to Meet Needs for Centralized Management and Performance

In response to the desktop performance challenges of their widely dispersed workforce, a global financial management firm leveraged a VMware® Horizon View™ virtual desktop infrastructure (VDI) deployment with Tintri VMstore to meet end-user performance needs while reducing the burden on IT.

A 600-employee money management corporation, this global financial management firm (GFMF) has approximately $300 billion in assets under management and four datacenters around the world. GFMF's precise understanding of world markets, coupled with fundamentals-based and forward-looking analytical methods, are the foundation for tailored client solutions. GFMF's investment capabilities range from indexing to alternatives, with the infrastructure and skill to transact in all liquid classes and securities.

The Vision

In addition to the traditional wins with virtualizing server applications, GFMF greatly valued the management, performance, and availability advantages of virtual desktop infrastructure (VDI).

In particular, GFMF found it especially advantageous to provide remote access from India to virtual desktops residing in the U.S., thus providing each desktop with low-latency and high-bandwidth access to data and server applications. This ensured that the unpredictable latency characteristics of the network link to India (sometimes 300ms or more) only affected display and keyboard and mouse interaction rather than adversely impacting the running applications. GFMF also uses Cisco WAAS products for WAN optimization to improve the user experience for remote desktop access and other WAN applications.

GFMF has strict disaster recovery requirements, and uses Microsoft Windows and application-level replication software to offsite virtual machines, and physical servers to provide offsite recovery.

Another important consideration for GFMF is a corporate mandate that antivirus software run inside each guest operating system, which provides localized security but results in some performance inefficiencies and increased I/O demands.

Background and Challenges

GFMF is a financial management company with approximately $300 billion in assets under management. The IT staff for the organization comprises just 11 people, responsible for servicing approximately 600 employees. In addition to their offices in San Francisco, CA; Pittsburgh, PA; and Boston, MA, GFMF also has employees who work from their homes and a large contingent of employees who travel extensively.

The implementation of VMware Horizon View and Tintri VMstore makes GFMF's production environment approximately 80 percent virtualized, with four datacenters around the world. Almost all of the operational staff is based on the east coast of the U.S.

GFMF's primary applications perform financial modeling and involve intense computation with significant I/O requirements. Although most of the firm's employees are U.S. based, the application support staff resides mostly

VMWARE FOOTPRINT

- VMware Horizon View
- VMware vSphere ESXi 5.1 servers
- VMware vCenter™
- VMware View Composer™

APPLICATIONS VIRTUALIZED

- Financial modeling
- Accounting applications
- Trading applications

PLATFORM

- Tintri VMstore T540 storage devices

PARTNER

- Tintri

in India. GFMF's desktop applications as well as server applications have significant computation and I/O needs. GFMF's desktops are used to run and develop accounting applications and trading applications as well as for traditional office document creation, email, and Web browsers. Microsoft Outlook, which GFMF relies on to do financial modeling, is used in cached exchange mode.

GFMF's servers include many database servers varying in size from 30GB to over 1TB. Although some of these database servers have been virtualized, several others still run on dedicated servers. Individual virtual machines are configured with from one to seven virtual disks.

GFMF currently has approximately 350 virtual machines with 700 virtual disks running on one of their Tintri T540 VMstore arrays. Their other T540 is dedicated primarily to virtual machines providing disaster recovery copies of their applications. Roughly 300 of the virtual machines are desktops; the remainder are servers (including a *terminal services* style server providing desktops to some users). Desktops include a mix of manually provisioned, auto-provisioned, persistent, and non-persistent desktops as well as terminal service users. GFMF uses PCoIP, RDP, and RDSH for connectivity.

VDI Storage Implementation History

Prior to implementing Tintri storage, GFMF's IT administration staff would frequently receive user complaints such as, "I can't work" or "My machine's not working." Unfortunately, such complaints were rarely received directly, but rather through word of mouth up and down the management chain. The belief was that the complaints were due to performance issues, but these issues were difficult to troubleshoot due to the complexity of the environment and the lack of direct communication with the affected users while the problems were occurring.

GFMF is a heavy user of hard disk storage from a premier Fibre Channel enterprise storage array vendor. GFMF receives a significant discount from their vendor, and thus their cost per GB is very attractive.

GFMF first attempted to roll out their VDI program using Fibre Channel LUNs. Consultants they brought in for this effort predicted a slightly higher than average 20 to 50 IOPS per desktop requirement. However, measuring their existing environment revealed that GFMF desktops frequently consumed in excess of 200 IOPS per desktop. GFMF attributes their unusually high I/O requirements to the unique financial applications they are running as well as the in-guest antivirus scanning applications executed by each user.

Even during periods of moderate workloads, their desktops in aggregate generated approximately 5,000 or 6,000 IOPS (typically 40 MB/s to 50 MB/s). Periods of peak I/O, however (especially during antivirus scans), generated loads in excess of 22,000 IOPS. Their LUN-based Fibre Channel arrays, as configured, were simply unable to keep up with workload demands.

Initially GFMF decided to move to an NFS approach from their incumbent storage vendor, rather than use Fibre Channel LUNs for their storage. They greatly valued the simplicity an NFS approach would bring, but the cost per GB figures were alarming. GFMF thought the ideal solution would be an NFS file-server controller sitting in front of Fiber Channel disks (with low per GB cost) from their existing vendor. Unfortunately, the tremendous number of hard-disk storage shelves required to support their IOPS workload made this completely impractical from a cost perspective, and a non-starter on a physical-space basis as well.

As a next step, GFMF evaluated products from a number of well-established storage vendors as well as those from several emerging start-up vendors. Products they looked at included hard-disk-based storage arrays, pure NAND-flash storage products, gateway and caching products, and hybrid disk and flash arrays.

After narrowing the field, they brought in products from just three vendors to evaluate. After a fairly extensive evaluation, Tintri was selected as the storage of choice for all virtualized workloads, both server and desktop.

"My team needed to solve performance IOPS problems and they needed another project like a hole in the head. Tintri was easy to set up, deploy and manage. In fact we had the system up and running in 30 minutes and that was before the Tintri install rep had found parking in our datacenter. Our team just jumped in and got things rolling. Tintri is a tremendous problem solver and easy to use."

Chief Technology Officer,
Global Financial Management Firm

Business Results and Benefits

GFMF experienced success with their VDI project almost immediately after bringing in VMware Horizon View and the Tintri VMstore. The sheer operational simplicity of the solution was extremely welcome, and the available performance headroom provided with Tintri's VMstore arrays made managing the environment much more straightforward.

Virus scans now take less than an hour to complete, a tremendous improvement over the eleven or more hours scans would take previously. While the ESXi hosts are still heavily exercised during the scans, this 90+ percent increase in performance makes this corporate requirement much more acceptable.

GFMF also greatly values Tintri's performance isolation when used in conjunction with VMware Horizon View. Tintri allows both servers and desktops to be stored within the same datastore. In addition to the aggregate workloads presented by their desktops, the Tintri T540 simultaneously supports several server workloads, including an individual database server regularly generating in excess of 1,900 write IOPS and 2,400 read IOPS.

Most important, user complaints of unacceptable storage performance have been eliminated almost entirely. The marked improvement in end-user experience means users simply aren't complaining like they used to—a result that is gratifying to both management and IT.

Overview of Current Horizon View Deployment

GFMF has designed their Horizon View deployment around the concept of a stateless desktop block for 500 users as shown in Figure 1.

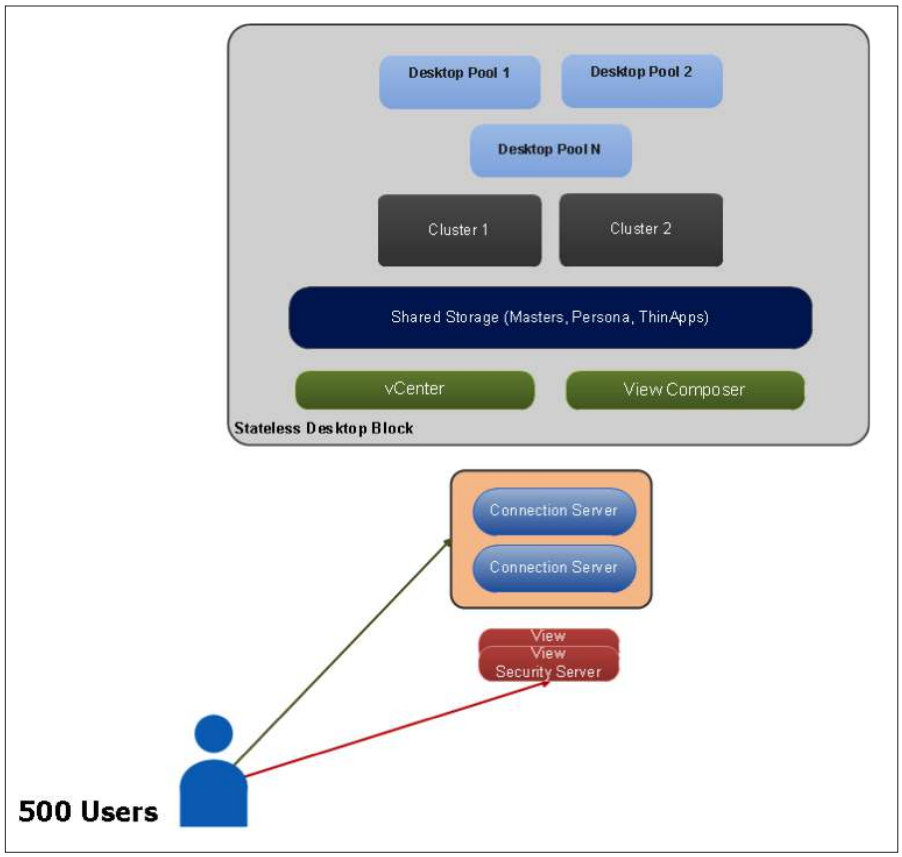

Figure 1: 500-User Stateless Desktop Block

For each of the 8-node clusters, GFMF uses HP servers featuring both AMD and Intel processors and HP FlexNet Networking. VMware vSphere® ESXi 5.1 is the hypervisor used for all virtualization.

Figure 2: Host Server Hardware

This logical diagram of GFMF's VDI architecture documents both the Horizon View and Tintri VMstore portions of the architecture.

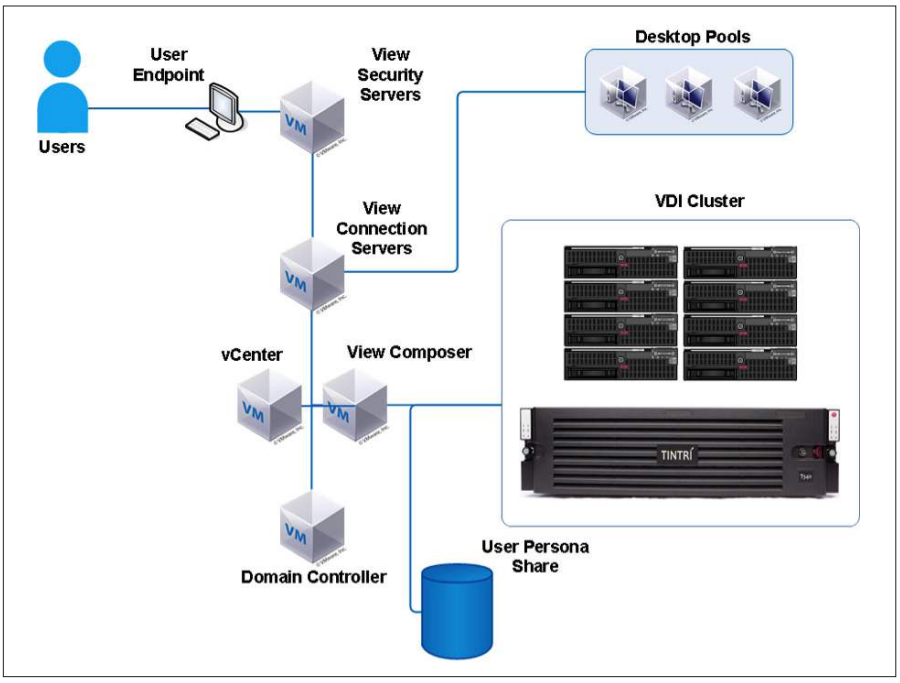

Figure 3: VDI Solution Architecture

The GFMF Horizon View deployment is broken down into clusters and storage pools on the Tintri VMstore.

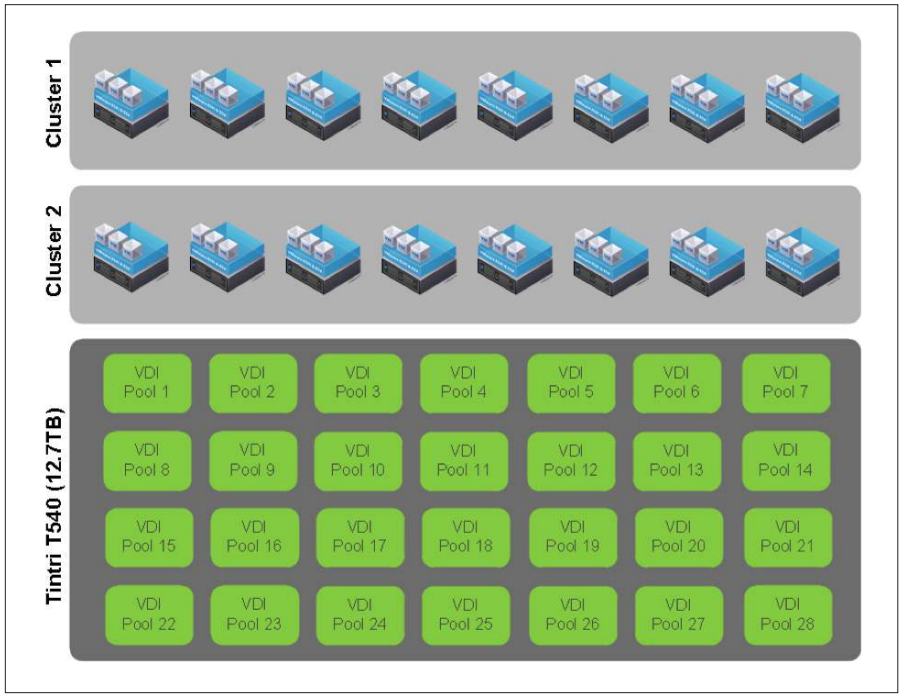

Figure 3: VDI Pool Storage

The Horizon View dashboard provides GFMF with actionable, real-time information on their VDI deployment.

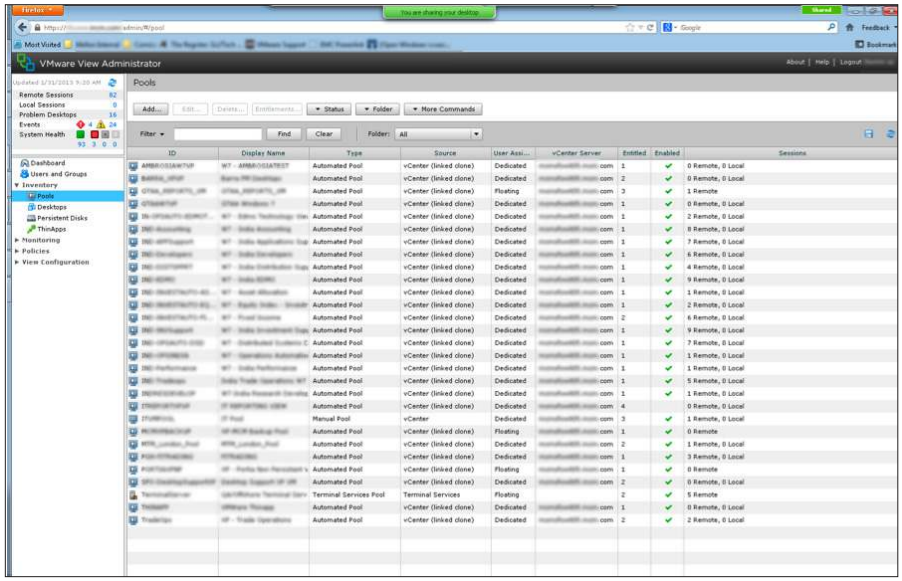

Figure 5: View Pool Details

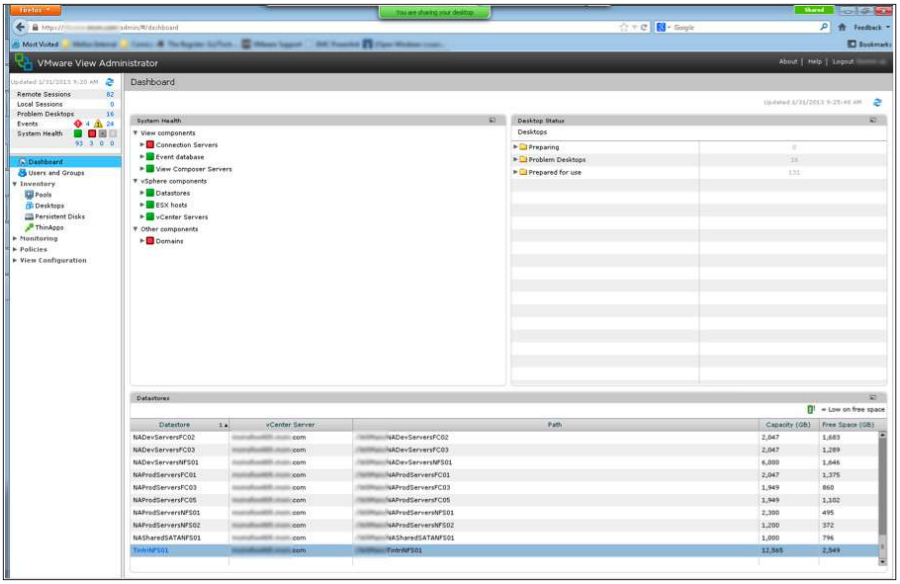

Figure 3: View Dashboard (Datastores)

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