

# Storage Virtualization RFI

## LUN is the Lonliest Number

<http://www.networkcomputing.com/article/printFullArticle.jhtml?articleID=21401458>

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Our two fictional merging companies were trying to create a unified virtualized infrastructure with a single logical unit number. One vendor's [VERITAS] comprehensive proposal peaked our interest.

When we reviewed storage virtualization offerings two years ago, the industry was near the peak of the hype cycle, with vendors painting SpectraColor pictures of storage paradise on Earth. Customers struggled to make sense of what had to be a mirage.

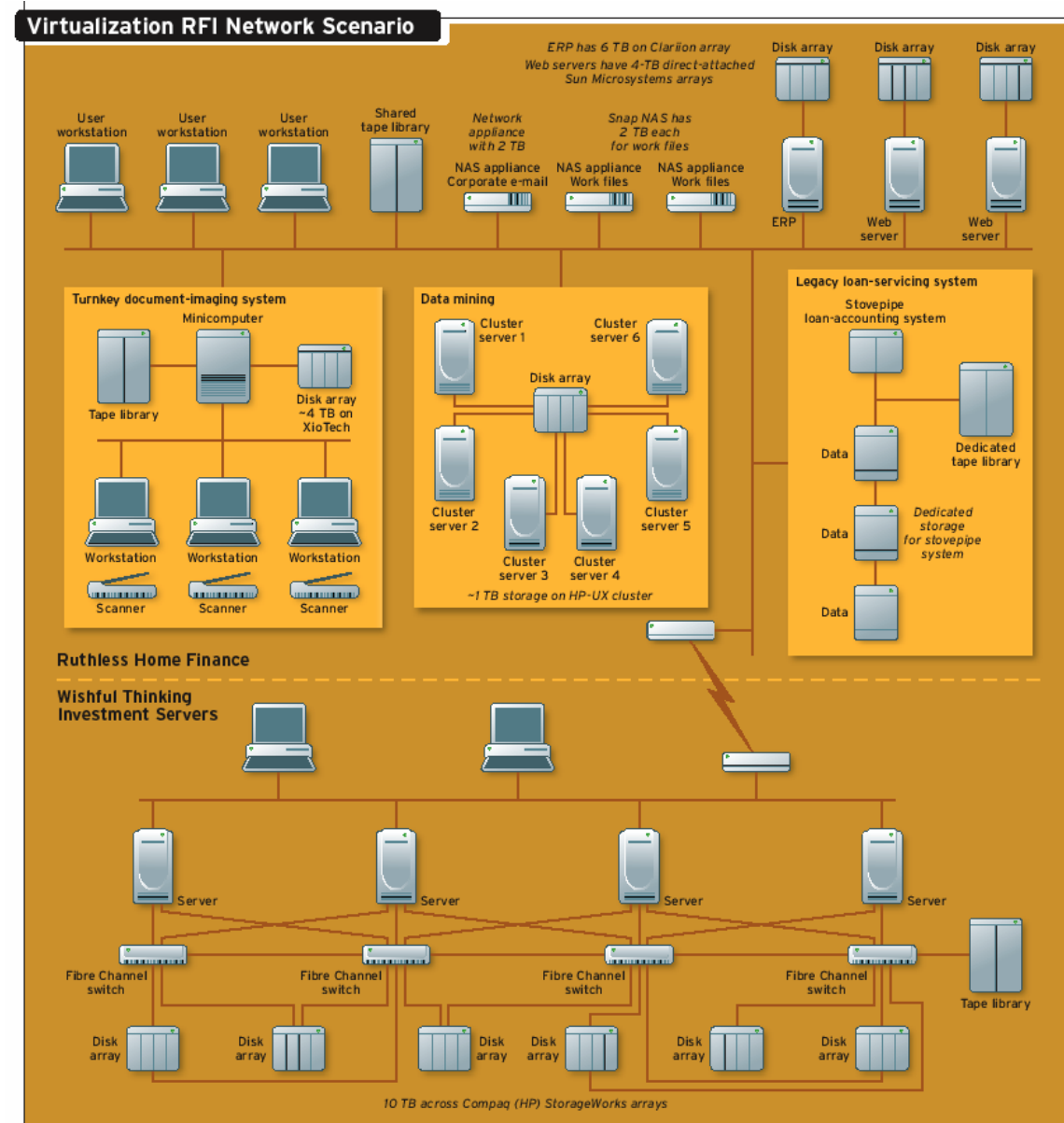
While calling virtualization a mirage may be a little harsh, in that review we didn't award an Editor's Choice. Our reasons were many, but primary was the immaturity of the products, coupled with the phantasmal nature of most of the benefit claims. Since then, the hype has died down, and we see storage virtualization for what it really is: an enabler. Storage virtualization is the layer that allows for easy data movement, which is a key requirement for ILM (information life-cycle management; see "ILM: Panacea or Proprietary Poison?").

Storage virtualization gets you away from specific device and LUN (logical unit number) management so you can concentrate on the data itself. When applied correctly, storage virtualization can be a boon to organizations with complex or capacious storage infrastructures.

This time around, our RFI involved a midsize mortgage company, Ruthless Home Finance (RHF), that had just bought a small financial-services company called Wishful Thinking Investments (WTI). The companies needed to manage a variety of systems, including a Hewlett-Packard SAN at WTI and a small EMC system, some other direct-attached storage and a few NAS devices at RHF (for details, see "RFI Scenario: Ruthless Home Finance,").

We sent our RFI to DataCore Software Corp., Hewlett-Packard, IBM, FalconStor Software, Softek, StoreAge Networking Technologies and Veritas Software Corp. Softek declined to participate, pointing to its recent management buyout and separation with Fujitsu. Datacore bowed out as well, citing a lack of resources. HP also declined.

## The Specifics



IBM, FalconStor, StoreAge and Veritas all recommended that RHF put its entire storage infrastructure on a Fibre Channel SAN both for reliability and to ease virtualization. Some vendors had recommendations about how to accomplish that, but one thing was clear: It had to be done.

We asked the vendors for an ROI analysis, and we found the responses surprisingly vague. Now, we'll admit that ROI means different things to different people. However, the generic benefits of virtualization and the ancillary benefits were, in our estimation, the same in each response. The main themes were increased uptime, better capacity utilization, snapshots, mirroring and easier storage-pool management. Note that the

pricing we used to evaluate the vendors doesn't include the necessary hardware to create a SAN at RHF, though most vendors included recommendations to address that issue.

### RFI Network Scenario

Other areas we looked at were capability, which we defined as the proposal's ability to work with and repurpose each storage hardware subsystem presented in the RFI proposal, as well as how much downtime the company would have to endure. We defined suitability as the ability to work with the software running RHF's and WTI's storage infrastructures, and easily manage and work with the OSs presented. Completeness rated our total high-level view of the proposed system, how much it would impact business practices and how all the parts of the proposal fit into the whole.

### Your Input Requested

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After our last try at reviewing storage virtualization systems, we were pleased and, frankly, surprised at the quality of all the vendor responses. We don't think any of them are unworkable, which sounds like damning by faint praise--but given the relative immaturity of this technology, it's a compliment.

We chose StoreAge as our Editor's Choice because of its relatively nonintrusive technology and the completeness of its response. Veritas lost by a hair--just 0.05 percent--mainly because StoreAge demonstrated a superior understanding of RHF's needs and provided a manageable implementation plan along with the data-protection services we requested. See our full RFI and vendor responses at the end of this article.

StoreAge provided the most comprehensive response to our RFI. Its proposal was cool and logical, offering helpful suggestions as to what RHF's overall strategy should be, both long and short term. We rarely had to wonder what it meant or how it intended to implement. StoreAge realizes that in some situations, such as the administrative NAS, it may be smarter to consolidate those functions onto the virtualized SAN later rather than sooner if the existing NAS devices are meeting their service-level commitments.

StoreAge uses what it terms a classic out-of-band approach. A thin client is loaded onto every server to provide virtualized storage, and the vendor's SVM (Storage Virtualization Management) appliance manages the network from outside the direct data path. StoreAge recommended that we use two appliances in a failover configuration to manage the virtualization but said the system will continue to run even if both management SVMs are unplugged--a neat feature at first glance. However, StoreAge later noted that the SVMs are the data movers for its MultiCopy and MultiMirror applications, and those won't function without the SVMs being operational. Making the SVMs the data movers does lighten the standard production servers' workloads, but it also dings up the idea that the SVMs are less important to the SAN than the in-band devices.

Support for RHF's legacy systems was excellent, with the exception of the NAS hardware. Essentially, StoreAge supported everything we asked it to, with the caveat that some of the direct-attached storage must be added to the SAN for support. The vendor said a phased implementation would be best, going so far as to recommend hardware to expand the SANs and provide the required level of data protection. In addition, it recommended inexpensive Nexsan arrays for data protection in both the RHF data center and WTI. Its data-protection proposal was familiar in terms of operations, as well as complete with respect to specific directions and hardware. StoreAge has tested its offerings for compatibility with both Legato and BakBone tape-backup software.

StoreAge also suggested some translative devices to put the tape drives directly on the Fibre Channel SAN for improved throughput. Throughout its proposal, StoreAge touted the virtues of its snapshot and replication software for data protection and swift restore. We found this data-protection strategy well-thought-out and more than adequate for RHF's needs.

### Vendors at a Glance

Virtualization VENDORS AT A GLANCE									
PUBLIC COMPANIES									
Company name (stock symbol)	Year founded	Market capitalization as of June 12 \$000	Current assets \$000	Current liabilities \$000	Revenue most recent quarter \$000	Revenue year earlier \$000	Net income \$000	R&D spending \$000	Key customers
FALCONSTOR SOFTWARE (FALC)	2000	\$298,690	\$43,790	\$6,080	\$5,259	\$3,679	\$(2,222)	Undisclosed	Humboldt University, McGuireWood, Skadden, Arps, Slate, Meagher & Flom, Southern Pacific Mortgages Ltd.
IBM CORP. (IBM)	1924	145,620,000	42,619,000	35,385,000	22,250,000	20,065,000	1,602,000	1,367,000	BT, St. Michael's Hospital, Watkins Motor Lines
VERITAS SOFTWARE CORP. (VRTSE)	1982	11,180	2,574,147	774,060	450,941	365,684	77,586	77,964	CNF Service Co., Morse Group Ltd., East Midlands Electricity
<small>Sources: Company reports, SEC filings, Hoovers.com, Yahoo.com</small>									
PRIVATE COMPANIES									
Company name	Year founded	Annual sales (est.) \$000	Employees	Amount raised \$000	Key investors	Key customers			
STOREAGE NETWORKING TECHNOLOGIES	1999	Undisclosed	75	\$28,000	Sequoia Capital, Benchmark Capital, Sevin Rosen Funds, Foundation Capital	Future Publishing, Malmö University Hospital, Seiko Epson, Venetian Hotel and Resort			
<small>Source: Company reports</small>									

The vendor's ROI information showed a clear understanding of StoreAge's software and value propositions without going overboard. However, we didn't see anything that set StoreAge apart from other vendors--it offered only the usual justifications for doing data protection and virtualization. We had hoped to see something more, considering the overall excellence of this response.

The total price of StoreAge's proposal was \$741,660, but that included a lot of hardware needed to update the storage infrastructure at both sites. The software with the SVM appliances came to \$353,600, one of the most expensive straight-storage proposals in our evaluation. Installation charges totalled \$16,000, and 24/7 support cost \$49,140 for the first year and \$131,049 for three years--all considerably more expensive than rivals, and three times what the venerable IBM charges!

StoreAge Networking Technologies, (949) 754-0640. [www.storeage.com](http://www.storeage.com)

Veritas sent us a thorough response. The vendor recommended a gradual approach for RHF, with a planning phase followed by near-term, intermediate and long-term strategies.

Initial planning involved examining service levels, best practices and business values; establishing prerequisites; and mitigating risk. The earliest and easiest problem areas can be targeted during this phase. Veritas said RHF can perform this analysis in-house, though the vendor is more than willing to help.

The near-term plan makes changes in RHF's physical infrastructure. This phase encompasses not only the expansion of network storage resources, but also the consolidation of applications, servers and other non-network storage. Veritas recommended, as did all the vendors, that all or most of the storage at RHF and WTI be consolidated onto a highly redundant SAN infrastructure.

The intermediate plan would enhance services to business units with a focus on automation, leaving storage administrators free to concentrate on their long-term strategy.

All of this struck us as vague at first, but then we realized it had to be that way. Without seeing the data gathered in the initial planning phase, it's difficult to be more specific, especially when it comes to the needs of business units.

Veritas was the only vendor to recommend an on-switch design for the majority of its proposal, which calls for a Cisco Systems MDS9509 Multilayer Director with VSFN (Veritas Storage Foundation for Networks) loaded onto 32-port Advanced Services Modules to provide virtualization services right at the switch. This puts virtualization in one of the most robust pieces of equipment in your data center, the director-class switch. Except for our NAS devices, Veritas supports every storage and server platform we listed in our RFI. Veritas suggested that this storage be moved to the SAN or simply left in place if the NAS devices are meeting the needs of the end users and the e-mail system. Veritas also suggested that RHF consider its StorageCentral for Network Appliance software to boost the efficiency of that storage.

The vendor recommended that RHF configure its network into two tiers, based on the capabilities of the storage. Faster, more robust storage should be used for critical applications, with the older, slower storage for less important or less frequently accessed files, like paid-off mortgage notes. That puts the direct-attached storage in the slower tier (Tier 1), and the XIOTech and EMC storage in the faster, more reliable one (Tier 2). VSFN includes a Quality of Storage Service feature that allows automated data movement between the tiers. The vendor also recommended that RHF use Veritas Storage Migrator to migrate files from the two storage tiers off to tape for long-term storage.

VSFN supports several backup-and-recovery options. These include multiple point-in-time copies, such as full snapshots, instant space-saving snapshots and file-system

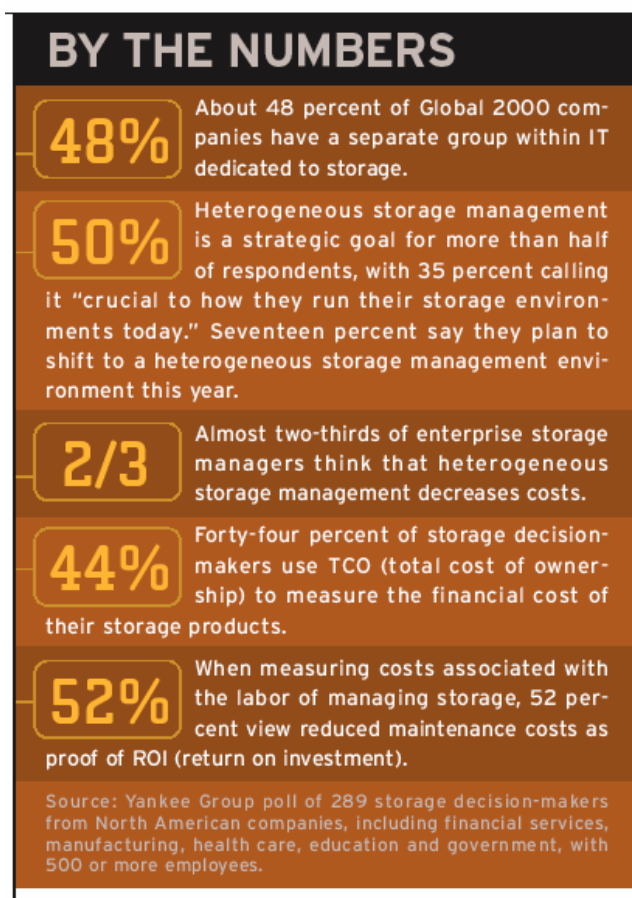
checkpoints. VSFN also keeps track of file changes and retains a full log that any backup vendor can access. Veritas supports RHF's Bakbone backup software and WTI's Legato software, but it wryly recommended changing to its own Netbackup product. Veritas Storage Migrator also supports both of the tape backup libraries indicated in the RFI.

On the security front, Veritas touts the security of Cisco's VSAN virtual fabric technology and said it integrates management of VSANs into VSFN. The Cisco director supports RADIUS authentication, SNMPv3, role-based access, SSH and SFTP, as well as Fibre Channel Security Protocol.

Veritas divided the projected ROI of the VSFN solution into five points:

1. increased storage utilization through disk pooling
2. reduced cost of disk with tiers of storage
3. reduced operating expenses with a common management framework
4. increased negotiating leverage with hardware vendors
5. reduced application downtime

#### By the Numbers



Veritas also provided some generic examples of ROI from a variety of customers that use its virtualization software. We found Veritas' ROI story to be pretty typical, but as reasonable as any in this review.

Veritas' pricing was relatively high, but not unreasonably so. The total cost was \$273,134, including 24/7 support for one year.

One interesting thing Veritas did in its proposal was to suggest regulating the rate of change of the merging of the two infrastructures based not only on business needs, but also on end users' degree of tolerance. Many good IT projects fail because end users don't understand the changes or find them frustrating. At the end of the day, Veritas put together a thoughtful and well-planned proposal--even if it did contain plugs for just about every other product in the vendor's portfolio.

Veritas Software Corp., (800) 327-2232, (650) 527-8000. [www.veritas.com](http://www.veritas.com)

IBM sent us a coherent proposal for RHF and was up front about the benefits and pitfalls of its offerings, which was refreshing. The star of the proposal was its SAN Volume Controller, which consists of a pair of redundant modified eServer x335 servers with 4 GB of memory and the SAN Volume Control software loaded, and an eServer x305 as a console.

One thing we liked was IBM's attention to detail. The package comes with Powerware UPS systems, a rackmount keyboard and mouse in a 1U drawer with a flat-panel LCD display, and appropriate Fibre Channel cabling. These are additions that most enterprises probably don't need, but they show that IBM took pains to ensure that this critical part of the storage infrastructure is protected.

The SVC uses a clustered approach to provide failover and a single point of management. Each pair of SVC controllers is called an I/O Group, and you can have a maximum of two I/O Groups with four nodes in any given cluster. IBM said it will deliver an enhancement of the SVC later this year to allow as many as eight nodes in four I/O Groups. A management card in each node monitors the data flow and determines the optimal data path.

We were disappointed, though not particularly surprised, with IBM's lack of support for diverse back-end storage. Of course, it supports all of its own storage options and those of a few of its competitors. For RHF, however, IBM's SVC was unable to support the Sun, HP and Xiotech storage systems, nor could it directly support our Snap or Network Appliance NAS systems. IBM's solution to the NAS problem was to install an IBM NAS Gateway 500 as an intermediary through which the SVC could manage the storage in the NAS devices. For the other direct-attached storage systems from Sun, HP and Xiotech, IBM recommended that we buy some of its SAN storage for replacements. Later in its response, it suggested that we could expand the EMC Clariion array, then migrate the data off the direct-attached systems and manage it with the SVC. While we're reluctant to lose our investment in the direct-attached storage, expanding the Clariion array is a much

more sensible solution than adding another brand of storage from IBM. The SVC supports both RHF's SAN and WTI's , easily virtualizing the volumes.

On the data-protection front, IBM offered its FlashCopy software for disk-to-disk copies; FlashCopy can be set to avoid application impact. IBM supports WTI's Legato software, but not the Bakbone software that RHF uses. As for security, IBM secures the SVC with Secure Shell and does not offer additional security beyond standard zoning and masking. While we don't doubt that the SVC, with its SSH environment, is secure, we were looking more to secure the volumes attached to the SVC.

Most of the ROI advantages the vendor listed could be had from any storage virtualization scheme. However, IBM did include quite a few real-customer ROI examples.

IBM's price came in at \$255,000, which isn't too bad. This figure includes license capacity for the three direct-attached systems but not the hardware to replace them or the equipment to put in front of the NAS devices. IBM also provided pricing for its FlashCopy application and software maintenance for three years. This is all supported by IBM's seasoned services division.

IBM, (800) IBM-4YOU, (914) 499-1900. [www.IBM.com/totalstorage](http://www.IBM.com/totalstorage)

FalconStor's RFI response talked a great deal about the benefits of virtualization and the many software features available with the company's IPStor software, but it was a bit short on implementation details.

The FalconStor system consists of two pairs of servers loaded with the IPStor software and configured in an active-active failover mode. The servers monitor each other via a heartbeat link. FalconStor also recommended some network-design elements on both the Ethernet and Fibre Channel side in the form of dual-path redundancy to ensure there's no single point of failure.

All the storage exists on the back end of the servers, and all clients (SAN Clients, in FalconStor parlance) are connected through IP.

FalconStor's price came in at \$136,000, one of the least expensive in this review. That price includes FalconStor's IPStor software, Zero Impact Backup, TimeMark software, BBMR agents, Active-Active Failover and 24/7 gold-level technical support. However, because IPStor is sold only through resellers, this RFI didn't include the hardware required to run the IPStor software. FalconStor estimates, and we agree, that the servers will run around \$6,000 per pair, not counting the cost of Fibre Channel ports, which run in the vicinity of \$1,000 each. We expect the hardware to add around \$20,000 to the quote, putting FalconStor at around \$156,000.

We didn't include an IP network map for FalconStor to evaluate, but we expect there would be a need for expanded capacity on the IP side to implement the IPStor system.

What wasn't perfectly clear was how all this would fit into RHF's current storage infrastructure. For example, FalconStor's IPStor platform can provide CIFS and NFS services to clients without requiring the purchase of a NAS platform. Although we find that functionality attractive, it doesn't tell us what it can actually do with the Snap and Network Appliance NAS devices RHF already has. We called FalconStor and found that if the NAS device storage can be removed and attached to the IPStor machines, it can be virtualized. This will require a complete data removal and restoration off the current NAS devices. Although we understand this is feasible, it means throwing out the NAS units and keeping only the storage itself--not the best option.

For the direct-connected storage on RHF's other systems, FalconStor recommended using its Bare Metal Recovery option for data protection, because it can't virtualize the direct-attached storage in place. The direct-attached storage could be attached to the FalconStor IPStor machines and then virtualized, but that would again require a complete data migration. FalconStor's other proposed option was to expand the existing SAN and migrate the data off the direct-attached disks. We would much rather virtualize the direct-attached storage in place and graduate to the SAN when necessary.

The two SAN systems can both be virtualized and replicated to each other for data security using FalconStor's IP-based replication software.

FalconStor had a very good data-protection story, in both security and compatibility with our chosen backup software. First, FalconStor recommended that we use its replication software between RHF and WTI to ensure that there were duplicate copies on both sites. FalconStor also partners with Bakbone, making it a natural fit for RHF's tape-backup strategy.

FalconStor offered us software called IPStor Virtual Tape Library Appliance for creating virtual tape drives--an interesting option. The vendor also suggested its Zero Impact Backups with LAN-free backup, where the backup-and-restore operations are done from the IPStor server on a snapshot of the data without impacting the servers. On the pure data-security front, FalconStor clients can't see data without being assigned access by the storage manager using the IPStor console, which prevents unauthorized users and groups from seeing sensitive information.

FalconStor's ROI story is a good one. IPStor could manage all our industry-standard hardware, with the exception of NAS devices. In addition, the IPStor application runs on industry-standard hardware, and if you're using Intel-based servers from a Tier 1 vendor, you'll probably have the luxury of being able to buy hardware of the same make as your current platform--just one server hardware neck to choke.

FalconStor offered quite a few options for presale evaluation, training and post-sale support. Engineers were standing by to help RHF evaluate its specific storage needs and make recommendations before the sale. Training can be done on-site or in a classroom environment, depending on customer needs. FalconStor also has a considerable online

database of product documentation and knowledge-base articles for the self-starter. Technical support is available via e-mail or phone 24/7/365 with a gold-level support contract.

FalconStor Software, (631) 777-5188. [www.falconstor.com](http://www.falconstor.com)

» MISSION: RHF is notorious for evicting late-paying customers, writing off the notes and reselling foreclosed properties for a tidy profit. It now plans to sell mortgage-backed securities to investors. To facilitate this, it bought financial-services firm Wishful Thinking Investments.

» RHF STORAGE INFRASTRUCTURE MIX: Sun Microsystems disk arrays, Snap NAS platforms, EMC Clariion storage array, direct-attached HP storage array, Network Appliance NAS, XioTech direct-attached storage array.

» WTI STORAGE INFRASTRUCTURE: 10 TB of Compaq/HP StorageWorks storage shared via a Fibre Channel fabric built from a cascade of 16-port Brocade FC switches.

» OBJECTIVE: Meld these two diverse storage infrastructures to automate capacity allocation and augment data security. Could virtualization be the key?

Ruthless Home Finance Co. has benefited from low interest rates and the refinancing boom. Now, the 100-year-old company has decided to go beyond simply holding its huge portfolio of home loans and tossing the occasional out-of-work homeowner onto the street, figuring it can make a pretty penny selling mortgage-backed securities to investors. Realizing that it needed an entrée into the world of securities sales, RHF purchased Wishful Thinking Investments, a small financial-services company.

However, this surge in new loans and the merger have strained RHF's IT infrastructure, particularly its storage. The company needs help and has money to spend on the right solution.

Key business processes and their storage infrastructure components are as follows:

» Mortgage applications are taken over the Web and stored in 4-TB Sun Microsystems disk arrays directly attached to Web servers. This is critical data; lack of availability for any length of time during the loan-qualification process would represent a significant loss.

» About 4 TB of internal work files used by loan underwriters and administrators is stored in private shares of SNAP network-attached storage arrays, protected by user PC logins.

» ERP (enterprise resource planning) is becoming a critical application for RHF. The ERP server has a dedicated storage array, an EMC Clariion, with approximately 6 TB of capacity.

» RHF's pride and joy is its data-mining operation, which lets it discern "value-added upgrades" to tack on to mortgage loans. Several full-time data-mining specialists (internally called "the loan sharks") work in a clustered computing environment against a common data mart situated on a shared direct-attached Hewlett-Packard storage array with about 1 TB of capacity. This data is regarded as critical.

» E-mail is hosted on a Network Appliance NAS that holds about 2 TB of e-mail, including spam and customer complaints, which are treated like spam. State and federal laws require that this data be retained for the life of the loan and that it be kept private and confidential unless the customer consents to its release. No one has any idea how to meet these requirements.

» A 4-TB XioTech direct-attached storage array supports the document-imaging crew, which scans and digitizes loan documents so the company will have an electronic copy. This data is retained online for six months, then gets backed up to tape and migrated with the original paper documents to Salt Mine Storage Co.

The newly acquired financial services company WTI uses a Fibre Channel fabric for all its data storage. About 10 TB of Compaq/HP StorageWorks storage is shared via a Fibre Channel fabric built from a cascade of small 16-port Brocade FC switches. RHF was attracted to WTI in part because of the expandability of FC SANs. However, the WTI SAN has reached its growth limit because of its dependence on small switches. No additional nodes may be added.

RHF's CTO has held off on implementing virtualization technology for several years because of negative press. Recently, however, she has been reading success stories and thinks a virtualized storage environment might be a way to manage RHF's, er, varied infrastructure more efficiently. Specifically, she wants to use virtualization to:

» Automate capacity allocation.

» Augment data security to satisfy pesky regulators.

» Improve data protection by automating data replication and providing easier access to disk and tape assets.

RHF has money to spend and is considering deploying a second SAN to handle e-mail, ERP and data mining. RHF considered an EMC system until problems surfaced regarding its ability to interoperate with the Compaq/HP SAN deployed at WTI. The IT manager wonders whether virtualization could enable the otherwise incompatible SANs to work together.

Our vendors had their work cut out for them, and they came through.

Our Original RFI: [http://i.cmpnet.com/nc/1511/graphics/1511f2\\_rfi\\_orig.pdf](http://i.cmpnet.com/nc/1511/graphics/1511f2_rfi_orig.pdf)

Vendor RFIs available Tuesday, June 8th.