Improving IT Operational Efficiency with a VMware vSphere Private Cloud on Lenovo Servers and Lenovo Storage S3200 SAN

Most organizations routinely utilize a server virtualization infrastructure to benefit from the massive cost savings achieved through resource consolidation. However, when faced with budget challenges, many companies put off capital expenditures; lengthening hardware life cycles and extending software licenses. But if transition to new technologies has been deferred too long, then the time comes when the IT environment has fallen behind the performance and cost-efficiency being offered by multiple vendors in the marketplace today. This has been especially true in recent years, as the performance of server processors has more than doubled each year, the emergence of flash technology and tiered software has dramatically increased storage performance and Private Clouds enable IT to manage the infrastructure as a holistic resource.

For a number of reasons, a buy and hold strategy can actually add costs to the datacenter, as systems age in place:

- Maintenance costs - Hardware maintenance costs rise over time, and performance lags behind more current offerings
- Energy costs - Energy efficiency is not as advanced in older models
- Security costs - Operating Systems (OS's) and applications fall behind the current versions available in the marketplace, and security may require frequent updates. If software is end of life, security patches may no longer be provided, leaving systems vulnerable.

This white paper describes a scenario characteristic of many small to medium (SMB) companies with an aging infrastructure. Typically, such organizations are budget constrained and with limited IT staff, yet charged with the mission of a technology refresh cycle, improving operational efficiency and constraining costs. This VMware vSphere Private Cloud deployed on Lenovo rack servers and S3200 SAN enables such a solution, providing rapid time to value at a very attractive price point.

Challenges

This scenario characterizes a typical SMB IT environment with a legacy infrastructure and considering a technology refresh. A leading heavy building materials company is using out-of-date VMware vSphere 4.1 supporting various versions of Windows Server, including Windows Server 2003. Microsoft is ending support for Windows Server 2003 and will no longer provide patches for security issues that develop on that OS. Some of the more complex workloads, such as business processing and databases remain unvirtualized. The building materials company is unable to increase their virtual servers because of the limits in their infrastructure

The aging IT architecture is currently running on legacy servers with an older Storage Area Network (SAN) array providing the centralized data store for VMware, applications and data.

The company recognizes that it is time for a technology refresh and is ready to upgrade. In addition to migrating affected applications from Windows Server 2003 to Windows Server 2012 R2, they would like to virtualize their business processing and database applications for a complete virtualization solution. The IT team would also like to implement a Private Cloud so that developers and some end users can provision their own virtual machines (VMs). In addition, management is considering a video surveillance solution at some of the building loading docks and entrances to reduce a growing theft issue. Requirements for the solution include:

- Virtualization – All applications to be virtualized and migrated to the new infrastructure via Physical-to-Virtual (P2V) program
- Centralized storage – A SAN will provide the data store for applications, centralized storage for the virtual solution and backup repository
- Tiered storage – Planned database virtualization application requires tiered SAN storage; a hybrid configuration of Solid State Disks (SSD) for data access and Hard Disk Drives (HDD) for data storage
- Ease of management - Solution must provide self-service provisioning and ease-of-management; no SAN administrator available
- Storage density – Available expansion for potential video surveillance storage
- Low cost of entry – Restricted budget
- High availability – Redundancy to provide business continuity
- Storage Snapshot – Copy live data prior to updates
- Scalable – Ability to accommodate capacity and performance as needed

Proposed System Architecture

A VMware vSphere Private Cloud deployed on Lenovo servers and storage is proposed to meet the solution requirements. This architecture provides a complete and scalable virtualization platform, with ease of management, redundant server topology, tiered storage on hybrid arrays and storage density. The configuration includes Lenovo x3550 M5 rack servers with iSCSI network connectivity and features the Lenovo Storage S3200 SAN, supplying the consolidated infrastructure to support a vSphere 6.0 Private Cloud. Figure 1 depicts the components of the solution.
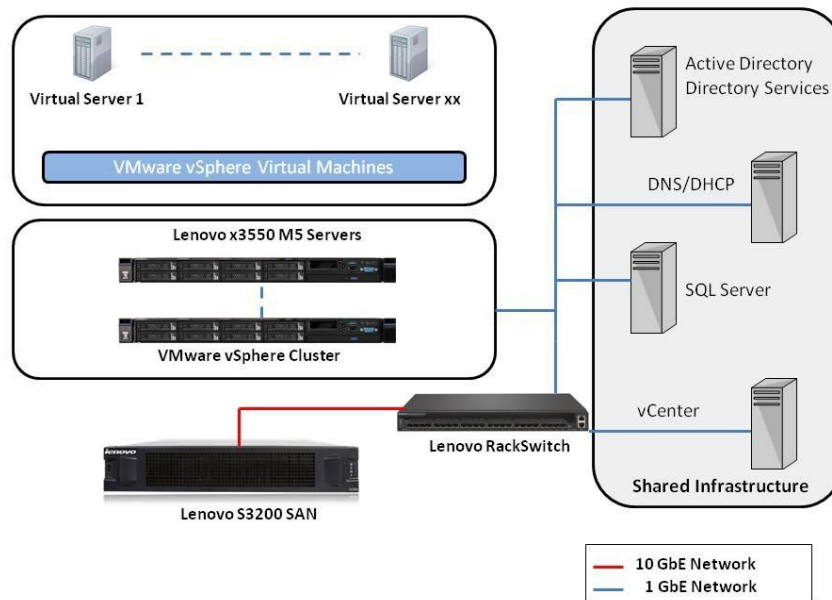
Figure 1 – Overview of Solution Architecture

All About Lenovo Storage S3200

The new Lenovo Storage S3200 is designed for simplicity, speed and scalability; and is positioned to provide excellent value and performance for a virtualized environment. The S3200 delivers a low cost, consolidated storage array solution to meet the needs of SMB business requirements with 8/16Gb Fibre Channel, 6/12Gb SAS, and 1Gb/ 10GbE iSCSI systems accommodating SAS, NL-SAS, Solid State Drives (SSDs) and Self-Encrypting Drives (SEDs)..

The S3200 offers industry-leading: Intelligent Real-Time Tiering (IRTT) with flash hybrid arrays. IRRT provides workload-aware intelligence, automatically migrating data to where it's needed – in real time. Hybrid arrays combine high-performing flash or Solid-State Drives (SSDs) with high-capacity Hard Disk Drives (HDDs). IRTT provides continuous background scanning for hot data every five seconds. Sophisticated algorithms immediately accelerate the most active storage blocks to flash with the most responsive performance. IRRT enables 83% cost savings over an All Flash Array (AFA) without impact to system performance.

Delivering up to 576TB of raw storage with ruggedized components, the S3200 is designed for 99.999% (five "9's") availability, protecting applications and data from downtime and enabling the always-on availability that users have come to expect for application access.

The Converged Network Controller (CNC) design of the S3200 makes the selection of iSCSI or Fibre Channel (FC) host connectivity as simple as attaching a pair of corresponding SFP or SFP+ transceivers or 10GbE SFP+ Direct-Attach Copper (DAC) cables to the SFP/SFP+ ports on the RAID controller. With the flexibility of the CNC, the S3200 supports hybrid iSCSI and FC connectivity at the same time. The S3200 supports up to 192 drives with seven external expansion enclosures; enabling easy expansion with hot-pluggable E1012 and E1024 expansion units. S3200 plug and play capability immediately recognizes and enables the expansion units. Table 1 provides an overview of S3200 features.

Industry-leading Intelligent Real Time Tiering

- **Hybrid Arrays (SSD/HDD)**
- **Data scan every 5 seconds**
- **Automatic hot data migration to SSD**
- **83% cost savings over All Flash Array**

Table 1 - S3200 Overview

Features (including software options)	Description
Form Factor	• S3200 controller enclosure: 2U rack mount • E1012 or E1024 drive expansion unit: 2U rack mount
Chassis Type	• 12 LFF drives • 24 SFF drives
Chassis Max	8 (1 Controller Unit + 7 Expansion Units) • E012 Expansion Unit • E1024 Expansion Unit
Drive Max	192
Drive Type	LFF/SFF
Maximum capacity	576TB (96x 6 TB NL SAS HDDs)
RAID levels	RAID 0, 1, 5, 6 and 10
Unique technology	• Real-time storage tiering • Battery-free Cache Protection • Synchronous low latency cache mirroring
Multiple drive types supported	• 7k/10k/15k/SAS • 2.5/3.5" form factors • SSD
Multiple protocols supported	• 8Gb/16Gb FC • 1/10Gb iSCSI • 6/12 Gb SAS • Hybrid 4x iSCSI + 4x FC
Performance highlights	• 120K Read IOPs • 6400 MBps Read • 5300 MBps Write
SSD Read Cache	Yes
Real-time HDD tiering	Yes
Cache	12G
Snapshot	128 base (Up to 1,024 optional)

Lenovo SAN Manager enables:

- **Automated Tiered Storage**
- **Storage Pooling**
- **Thin Provisioning**
- **Rapid Rebuilds**
- **Large LUNs**
- **SSD Read Cache**
- **Virtualized Snapshots**

All about Lenovo SAN Manager

The Lenovo SAN Manager User Interface provides intuitive setup and management of both S2200 and S3200 systems, enabling faster time to value. SAN Manager's ease of use precludes the need for a SAN administrator and enables generalized IT administrators to comfortably manage the S2200 and S3200.

Lenovo SAN Manager provides convenient out-of-band administration; including:
- Web Interface – Browser-based, no need for 3rd party plug-ins
- Command Line Interface – Including Telnet, SSH, USB
- HTTP Scripting Interface – Enables XML Content Encoding

Lenovo SAN Manager is freely provided with S2200/S3200 arrays and provides the following powerful features:

- Data Tiering – Policy based automatic data movement between performance layers
- Storage pooling – Automated pooling simplifies storage setup
- Rapid RAID Rebuild – Minimizes recovery time and risk factors with rapid data restoration
- Thin Provisioning / Over Commitment – Optimize efficiency with available space
- Large LUNs – Size of the volume is not limited by a traditional RAID set; up to 128TB
- Read caching – Accelerate workloads using flash technology
- Live Volume Snapshots – Point-in-time copies of live data with no need to restore and no performance degradation

Lenovo x3550 M5 server

Designed in a compact, versatile 1U two-socket rack server, the System x3550 M5 is the ideal platform for a virtualized workload. Integrated with up to two Intel E5-2600 v3 series CPUs with up to 1.5TB of TruDDR4 memory, the x3550 M5 enables organizations to increase the consolidation ratio of physical to virtual servers. The powerfulvipowerfulcapability of the x3550 M5 enables larger, more robust VMs, supporting previously hard to virtualize applications.

VMware vSphere 6.0

VMware vSphere 6.0 transforms the physical resources of a computer by virtualizing the CPU, RAM, hard disk and network controller. This transformation creates fully functional VMs that run isolated and encapsulated Oss and applications just like physical computers.

VMware vSphere 6.0 enables organizations to virtualize any application with confidence, provides high availability and simplifies the virtual data center. The result is a resilient, on-demand infrastructure that is the ideal foundation for any cloud environment. VMs support up to 128 virtual CPUs (vCPUs) and 4TB virtual RAM (vRAM), enabling support for the largest workload.

VMware vCenter

vCenter Server plays a central role in the management of ESXi hosts and VMs. Key features such as vMotion, Storage vMotion, vSphere Distributed Resource Scheduler (DRS), vSphere High Availability (HA) and vSphere Fault Tolerance (FT) are all enabled and made possible by vCenter Server. vCenter Server 6 introduces some fundamental architectural changes. The multitude of components that existed in vCenter Server 5.x has been consolidated to have only two components: vCenter Management Server and Platform Services Controller, formerly vCenter Server Single Sign-On (SSO).

Call to Action

Deploying a VMware vSphere Private Cloud on Lenovo servers and S3200 SAN is the ideal technology refresh solution. Combining the powerful memory and processor capabilities of the x3550 M5, intelligent storage tiering and capacity of the Lenovo Storage S3200 on a VMware vSphere Private Cloud improves operational efficiency at a competitive price point. For more information, visit www.lenovo.com or contact your Lenovo Business Partner.