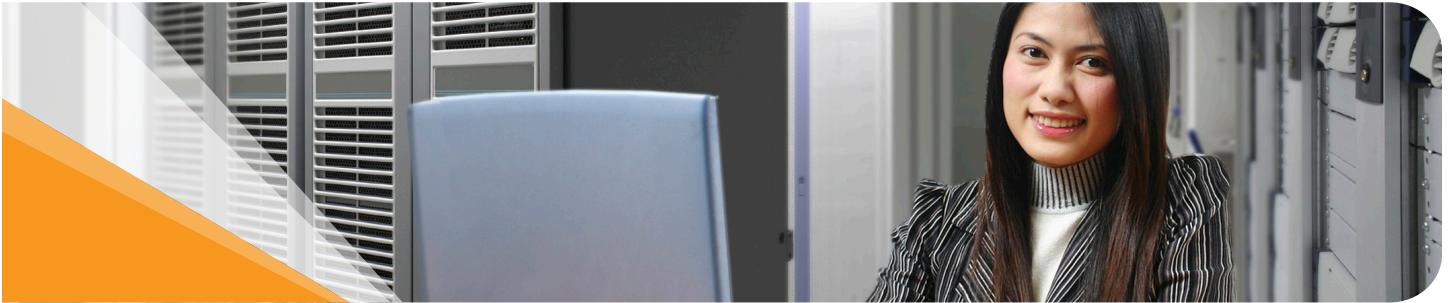LSI ™

Combining Storage and Server Virtualization

Integrating StoreAge SVM™ With VMware Can Provide Users With Comprehensive Storage And Server Virtualization

Executive Summary

Virtualization as a technology can offer tremendous benefits. It can also be deployed in several locations. For example, server virtualization, such as that offered by VMware can leverage the power behind a few large physical servers by creating hundreds of virtual machines. Storage virtualization can bring the original promise of SANs to reality, by creating large storage pools and then virtually allocating capacity, as-needed. By combining these two technologies, users recognize even greater value than what they would recognize by using them individually. To virtualize the data center, these two technologies are required. This paper describes some of the more common benefits that can be recognized by using the StoreAge SVM storage virtualization solution in combination with the VMware server virtualization technology.

1. Introduction

Combining server virtualization with storage virtualization creates new opportunities to leverage these technologies that are not available when they are used alone.

This white paper describes the powerful combination of StoreAge SVM storage virtualization product with VMware's server virtualization product. The rapid proliferation of server virtualization technologies and especially VMware, is due to the value of easily consolidating many servers and applications into a small amount of physical hardware. In this manner, it is possible to take tens – or even hundreds – of small physical servers and consolidate them into a few, easy to manage servers while maintaining the logical separation between each application.

This solution both dramatically reduces the necessary support and maintenance; it also creates new opportunities to leverage the power of the server and storage infrastructure. The combination of a storage virtualization technology, on the back-end of the server virtualization technology is one of those cases where the value of the full solution is much greater than the sum of the value of the individual components.

2. How StoreAge Storage Virtualization Can Enhance VMware

Easy Provisioning of Volumes to Virtual Machines

Server virtualization creates a dynamic environment where large numbers of virtual machines are applied to applications. Storage virtualization makes it very easy to allocate capacity to these servers and then re-allocate capacity as server's needs change.

In general, the value of storage virtualization grows with the number of servers being managed. When using VMware, even if there are only a few physical servers, those servers could run tens or even hundreds of "virtual" machines. Therefore, the ability to virtualize the storage to these virtual servers becomes very attractive. If a user has hundreds of virtual machines, where each server requires about ten volumes, the number of volumes required would be in the thousands. Having a SAN-based Volume Manager on the back-end of the server virtualization, allows users to quickly and efficiently create volumes for each of the virtual machines. It eliminates the need to deal with LUN management at the array level. Due to the fact that each volume is an independent volume (not DSK files), those volumes can be mirrored, replicated be the source of snapshots, and even mounted into standard servers without the VMware operating system – if needed.

StoreAge provides the flexibility to rapidly allocate capacity, and the ability to allocate thousands of volumes – as needed. Due to the fact that in a virtual environment it is very easy to add and remove virtual machines and applications, the environment becomes very dynamic. In other words, virtual machines are created, used and then reallocated or removed. This provides tremendous flexibility. However, in this highly dynamic environment, it is also important that the storage be provisioned and reallocated after use with the same simplicity as the virtual servers. Storage virtualization enables this flexibility.

Test Environments

The StoreAge SVM also offers storage services, such as snapshot, that can be used to reduce time required to stage, test and debug software applications.

StoreAge SVM™ supports low-capacity, point-in-time snapshots. Each of these snapshots is also readable and writable – without modifying the original data. This snapshot function enables the creation of multiple snapshot copies of every volume in the virtualized environment and then assigning those point-in-time copies to other virtual machines. In this way, it is possible to create very powerful test environments by just taking snapshot copies of the production data and then allocating them to virtual machines dedicated to testing. Having a virtual server environment allows the rapid creation of virtual servers for testing. With StoreAge SVM snapshot it is possible to create readable/writeable copies of the data in seconds and then provision them to virtual test servers.

Additionally, the StoreAge SVM snapshot function supports snapshots of snapshots. So, testers can not only be assigned real "live" data within seconds, but then can take snapshots of the data throughout the testing process. Should a multi-stage test fail at say, stage 13, the tester could go back to the snapshot taken at the beginning of the stage and run the test again. This eliminates the need to run all 12 previous tests again to get to the stage that the application failed. Additionally, since the real failure may have occurred earlier in the testing process, the user could go back to previous snapshots taken at each stage and view the data to determine the root cause of the failure.

All of these features significantly reduce the time needed for testing and increase the productivity of the testing team. Bringing a product to market quicker or isolating a software bug quicker can all improve the profitability of a company.

Enhanced Backup

Having in a virtual environment with hundreds of virtual machines can not only be an expensive backup proposition, but also a very complicated one. With StoreAge SVM snapshot function, it is possible to avoid the need to install backup agents on every virtual machine. The backup can be done by creating snapshot copies for every virtual server and then assigning the copies to a virtual

machine with the dedicated role of backup server. In this manner, the backup server is the only virtual machine that needs to have the backup software installed. When dealing with hundreds of virtual servers, this can reduce the cost of backup licenses considerably.

With capacity growing at exponential rates and processing hours becoming more and more important, backup windows are becoming non-existent. Simply stated, there is too much data to backup on off-hours. Snapshots can be used as the source for the backup process. Using this approach, the backup can take place at any time during the day, without taking the application offline. This creates a zero-window backup. For many users, this solves the "shrinking backup" window problem.

Snapshots can add another significant benefit to the overall backup strategy. It is possible to keep the point-in-time snapshots online for extended periods of time. If the data needs to be restored, it can be restored in seconds from a point-in-time snapshot rather than needing to go to the tape. The ability to recover from logical failures (e.g., accidental file deletion, viruses, data corruption) by simply loading a snapshot and accessing the data in seconds, rather than having to restore the data from tape can improve recovery times from hours to seconds.

Consolidation of Servers at the Disaster Recovery Site

Today, remote mirroring and disaster recovery is a requirement even for very small companies. This may be due to regulation, corporate policies or simply common sense. Large enterprises typically have the resources to spend on necessary communication lines, equipment, software and training for disaster recovery. However, small- and medium-sized businesses do not always have these resources, and therefore, leave the company exposed to regional disasters. This is another area where the combination of VMware and StoreAge SVM™ virtualization can enable an affordable solution for disaster recovery.

Statistically, over the life of remote mirror implementation, the most expensive component is the communication lines between the source and target locations. StoreAge SVM solution can remotely mirror using a snapshot-based technique, where only the differences between the snapshots are transmitted. This avoids the need for very expensive communication lines between the locations. It is possible to use T1 or T3 lines that often cost hundreds of dollars per month, rather than higher bandwidth lines that can cost tens of thousands of dollars per month.

A remote mirror is an insurance policy to make systems available should a regional disaster render your primary site unavailable. However, there is no need to dedicate resources until a failure occurs. VMware gives users the flexibility to assign a very small amount of resources to the remote site to simply accomplish the mirror. With the StoreAge SVM solution, those resources are minimal because we reduce the amount of data being transmitted to the remote site with our snapshot-based mirroring technique. Should a failure occur at the primary site, VMware could then be used to assign more virtual machines to support the production workload. Due to the fact that the remote servers are in "standby", waiting for a failure at the primary site, it is very appropriate use virtual servers rather than physical servers. Therefore, these remote resources can temporarily be used for other purposes (e.g., testing, etc.). Even if the primary site uses "physical" servers, it is possible to replicate the data between a physical production server and a virtual standby server.
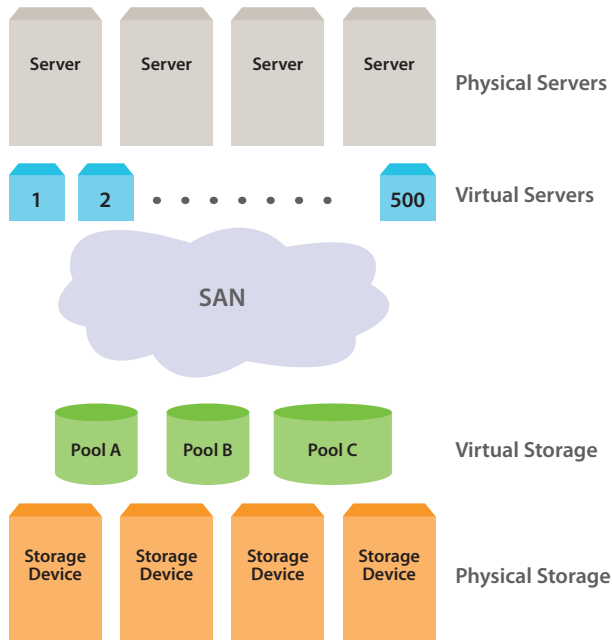
The powerful combination of StoreAge SVM software and the VMware software allows users to build a disaster recovery site at a fraction of the cost. While large enterprises use expensive communication lines (e.g., OC-3, OC-12), high-end arrays in both the local and remote sites and dedicate servers in the remote site, StoreAge/VMware allows the use of inexpensive communication lines, inexpensive storage arrays at the remote sites and the use of virtual servers instead of physical servers at the remote location.

Snapshots can also be used to enhance backup policies by reducing licenses necessary for the virtual machines, creating a zero-window backup and adding an additional layer of data protection

StoreAge SVM also offers a remote mirroring application that, when combined with VMware, can create a very cost-effective disaster recovery solution.

3. Topology

Essentially, server virtualization and storage virtualization work in a very similar way. They take the physical resources, pool them and then assign resources as needed to the applications. The benefits of virtualizing any resources are efficiency, utilization and ease of management. By combining the two solutions, a fully virtualized environment can be created, giving the user the flexibility to assign or re-assign resources as necessary.

Server **Server** **Server** **Server**	**Physical Servers**
1 **2** · · · · · · · **500**	**Virtual Servers**
SAN	
Pool A **Pool B** **Pool C**	**Virtual Storage**
Storage Device **Storage Device** **Storage Device** **Storage Device**	**Physical Storage**

Physical servers and physical storage are virtualized and assigned to the applications as needed

Summary

Virtualization technology is becoming more and more prominent in IT environments. Both server virtualization and storage virtualization offer unique benefits. However, it is not until the two technologies are combined that users truly recognize the full benefits of the solution. The ability to scale both server and storage resources as needed is a tremendous benefit. Additionally, the combination of the two technologies, create new opportunities for value that previously did not exist. StoreAge SVM™ and VMware when combined provide full resource virtualization to capitalize on these new benefits.

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