



# Improving IT Economics with Storage and Server Virtualization

Simplify operations and maximize efficiency with the HP StorageWorks SVSP

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## 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, MS Hyper-V, and others, 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, however, users realize even greater value than what they would by using them individually. To virtualize the data center, these two technologies are required. This paper describes the benefits that can be realized by using the HP Storage Works SAN Virtualization Services Platform or SVSP solution in combination with the server virtualization technology.

## Introduction

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

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This white paper describes the powerful combination of HP StorageWorks SVSP storage virtualization solution with server virtualization products to produce a more dynamic IT infrastructure that improves efficiencies and simplifies operations. The rapid proliferation of server virtualization technologies (especially VMware) is due to the value of easily consolidating many servers and applications, into a single physical device, allowing many instances to run on a common hardware platform. In this manner, it is possible to take tens—or even hundreds—of underutilized physical servers and consolidate them into a few easy-to-manage servers while maintaining the logical separation between each application.

Storage virtualization similarly makes it possible to consolidate many underutilized arrays into centrally-managed virtual storage pools that provide logically separate storage for many applications. A solution that combines both server and storage virtualization dramatically improves efficiency, simplifies operations, and reduces support and maintenance workloads while creating new opportunities to leverage the power of the server and storage infrastructure. The addition 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.

# Enabling and accelerating the benefits of Server Virtualization with the HP StorageWorks SVSP

## Easy provisioning of volumes to virtual machines

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Server virtualization creates a dynamic environment where large numbers of virtual machines are made available to applications. Storage virtualization makes it very easy to allocate capacity to these virtual machines and then re-allocate capacity as server's needs change. Thin provisioning improves storage efficiency by providing only the storage required, significantly improving storage utilization rates, and decreasing capital expenses

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In general, the value of storage virtualization grows with the number of servers being managed. When using server virtualization, 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 or rules-based scripts 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 or the multiplicity of tools that may come with use of heterogeneous storage. Since each volume is an independent volume (not a disk image file), they can be mirrored, replicated, be the source of snapshots, and even mounted into standard servers without the Hypervisor operating system—if needed.

HP StorageWorks SVSP provides the flexibility to rapidly allocate capacity and the ability to allocate large numbers 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 as needed. This provides tremendous application flexibility. However, in this highly dynamic environment, it is also important that the storage be provisioned and reallocated after use with the same mobility and simplicity as the virtual servers. Storage virtualization enables this flexibility.

Over provisioning is another significant challenge for virtual environments. The typical practice is to over provision storage for the physical servers, which drives down utilization rates and drives up capital expenses. The challenge increases significantly with the sprawl of virtual machines that follows the initial implementation of server virtualization. The SVSP provides a comprehensive set of data services that includes among others thin provisioning. With SVSP thin provisioning, virtual machines are allocated only the storage capacity needed in a just-in-time fashion (as opposed to the typical over provisioning) significantly optimizing the deployment of storage and reducing near-term capital investments.

## Improved efficiency for managing test environments

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The HP StorageWorks SVSP also offers storage data services, such as snapshot, that can be used to reduce time required to stage, test, and debug software applications, achieving greater productivity and efficiency

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HP StorageWorks SVSP supports low-capacity, point-in-time snapshots. Each of these snapshots is also readable and writable—without modifying the original data. This capability enables the creation of multiple snapshot copies of every volume in the virtualized environment and then allows assigning those point-in-time copies to other virtual machines. With such capabilities, it is possible to create very powerful application 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 HP StorageWorks SVSP snapshot it is possible to create readable/writeable copies of the data in seconds and then provision them to virtual test servers.

In addition, the HP StorageWorks SVSP snapshot function supports snapshots of snapshots. So, testers can not only be assigned real “live” data within seconds, but they can also 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, simplify testing processes, and increase the productivity of the testing team. Bringing a product to market quicker or isolating a software bug quicker can all significantly improve the profitability of a company.

## Enhancing and simplifying backup operations

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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

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Having a virtual environment with hundreds of virtual machines cannot only be an expensive backup proposition, but also a very complicated one. With HP StorageWorks SVSP 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 physical or 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 (for example, 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.

## Cost-effective Disaster Recovery Solutions

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HP StorageWorks SVSP also offers a remote mirroring application that, when combined with server virtualization, can create a very cost-effective disaster recovery solution.

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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 server virtualization and HP StorageWorks SVSP can enable an affordable solution for disaster recovery.

Statistically, over the life of a remote mirror implementation, the most expensive component is the communication lines between the source and target locations. HP StorageWorks SVSP 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 common (or readily available) and low-cost communication lines, rather than higher-bandwidth higher-cost lines.

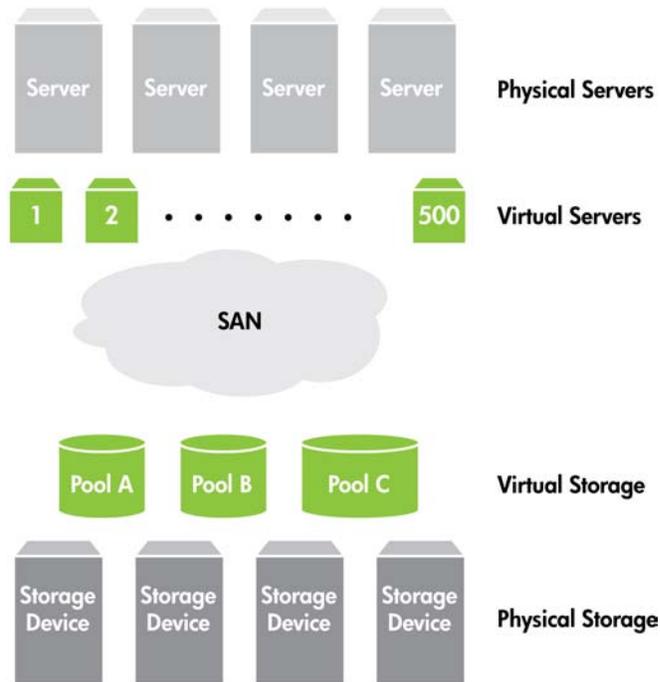
A remote mirror is an insurance policy to make systems available should a regional disaster render your primary site unavailable. However, there is no need to dedicate resources until a failure occurs. Hypervisors like VMware give users the flexibility to assign a very small amount of resources to the remote site to simply accomplish the mirror. With the HP StorageWorks SVSP 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 to use virtual servers rather than physical servers. Therefore, these remote resources can temporarily be used for other purposes (for example, testing, and more). 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 HP StorageWorks SVSP software and the server virtualization software allows users to build a disaster recovery site at a fraction of the cost. While large enterprises use very-high bandwidth communication lines and high-end arrays in both the local and remote sites, and dedicate servers in the remote site, HP StorageWorks SVSP/VMware for instance, allows the use of less expensive communication lines, and less expensive storage arrays at the remote sites, and the use of virtual servers instead of physical servers at the remote location.

## Sample 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 across the whole IT environment, driving significant benefits for the enterprise.

**Figure 1:** 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 realize 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 creates new opportunities for value that previously did not exist. HP StorageWorks SVSP and server virtualization when combined, provide full resource virtualization to capitalize on these new benefits.

## For more information

For more information on HP StorageWorks SAN Virtualization Services Platform (HP SVSP), please visit <http://www.hp.com/go/svsp>

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