White Paper

SGI® Virtualized Storage Migration Solution

Revolutionizing Enterprise Storage Management

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1.0 Introduction

Data is the lifeblood of the enterprise. With more business-critical information being generated, stored, mined, and analyzed than ever before, organizations are finding the need to provide access to current and legacy information around the clock. However, many enterprises are struggling to find ways to handle rapidly increasing volumes of data and deliver access to the right information at the right time to users — all while complying with data retention regulations, ensuring data availability, and staying within budget constraints.

Handling storage management and data protection gets harder as storage networks grow in size and complexity. Many small and mid-size organizations continue to utilize traditional storage management solutions that take a point-product approach to managing data. These array-based tools, volume managers, and libraries tend to work only with storage from a particular vendor or certain classes of devices, creating management complexity for IT organizations. Indeed, such solutions often force enterprises to manage devices from each vendor separately, and adopt architectural, maintenance, or cost-centered options that ultimately constrain the storage environment and keep it from operating at peak efficiency. As a result, organizations often over allocate resources to ensure data can be stored and retrieved quickly, resulting in large numbers of storage devices that are only partially utilized.

As companies look to take advantage of advancements in storage technologies and increase utilization rates, the ability to migrate data between new and existing storage systems becomes paramount. As data and applications move to new systems, it is important to ensure throughput and overall performance meet or exceed existing user expectations. Balancing workloads can work well, but often requires applications to be reassigned to higher performing storage devices that can be quickly overwhelmed.

Data migration and technology adoption strategies must also consider business priorities and data retention policies. Complying with new and emerging regulations and directives requires data maintenance, including robust archiving policies and data migration to secure media and off-site locations. In addition, reducing exposure and risk due to intrusions or accidental loss of data requires appropriate disaster recovery, replication, and backup policies. Unfortunately, typical storage network designs and tools limit IT organizations and make it difficult to provision storage, test new applications, ensure backup windows can be met, and create disaster recovery plans that provide 24x7 data availability and integrity.

1.1 Storage Virtualization—Enabling More Flexible Data Management

While traditional approaches to storage management can work well for smaller organizations, they cannot keep pace as storage volumes grow. As companies move data from device to device in order to upgrade systems, improve throughput, or support business priorities, existing storage management tools and techniques fall short. Data often cannot be moved without disruption to operations and application availability and performance, and data integrity can be put at risk as attempts to improve resource utilization burden devices. A new approach is needed, one that unlocks data services from the confines of individual vendor tools and creates a holistic methodology for managing diverse storage environments and user demands.

Several years ago, similar requirements were placed on applications, driving the need to find ways to consolidate applications onto fewer servers—and server virtualization took hold. Server virtualization hides the complexity of underlying operating systems, processors, and other hardware resources from users and applications. By partitioning and protecting computing resources, the right virtualization tools enable multiple, disparate operating systems and applications to run on a single server without interfering with one another. As a result, enterprises can share servers among users and applications without compromising application and server performance, or data and user security.

Building on the same concept, storage virtualization provides an abstraction layer that hides the physical characteristics of devices from applications. A powerful enabling technology, it provides a common way of allocating and managing disparate storage resources, as well as a consistent interface for storage applications that eliminates the need to learn a variety of storage-specific management tools. With this leap in storage management technology, enterprises can take advantage of advanced storage services such as pooling and provisioning, along with multi-level data protection tools like snapshot, volume copy, migration, and mirroring across devices from different vendors.

Storage virtualization promises to free resources and add flexibility to data and storage management efforts while reducing cost and increasing data center efficiency. With the ability to manage data and storage resources dynamically, storage virtualization can help improve storage system interoperability and simplify management tasks. As a result, using storage virtualization in SAN-based storage environments can help enterprises increase the return on investment (ROI) in IT infrastructures and eliminate inflexible data management practices in the data center.

1.2 Storage Migration—The Foundation of Storage Virtualization

The cornerstone of storage virtualization is storage migration. By implementing a solid storage migration environment designed with virtualization in mind, enterprises can lay the foundation for future efforts. A forward-thinking storage migration technology lets enterprises upgrade storage networks and keep data where it is most valuable to the business without undue complexity or burdensome maintenance. The determination of the importance of data can be based on a variety of factors, including:

- The importance of services that can be applied to the data
- How quickly the data must be made available to users
- The cost to store the data
- The impact to the organization if the data is lost
- The amount of time in which the data must be able to be recovered

Storage virtualization and migration technologies enable storage resources to be aggregated and used to maximum advantage. By matching data with the right type of media, enterprises can support quality of service levels and business priorities. Because pools of storage can be created with varying levels of quality of service, companies can place high value data on the most responsive storage and low value data on slower storage systems, resulting in better asset utilization, simplified management, and reduced total cost of ownership (TCO).

2.0 The SGI® Virtualized Storage Migration Solution

The SGI® Virtualized Storage Migration Solution is an intelligent, SAN-based storage virtualization platform that gives enterprises the ability to make decisions about data based on dynamic business events. Bringing together robust SGI storage systems, powerful storage virtualization technology, and expert SGI Professional Services, the solution can help organizations implement a seamless, incremental virtualized storage strategy and move from conventional storage solutions to a full virtualization methodology.

Designed to reduce the cost and complexity of storage management, the SGI Virtualized Storage Migration Solution uses a tiered storage architecture with storage pooling that maximizes resource utilization. SAN-wide migration across heterogeneous storage devices centralizes and simplifies online data migration across all servers and storage devices in the network. As a result, organizations can take advantage of heterogeneous storage virtualization, just-in-time provisioning, and data services at the storage network layer.

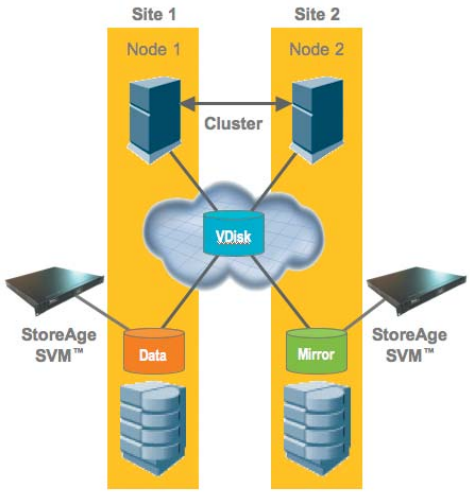

Figure 1. The SGI Virtualized Storage Migration Solution brings together innovative appliance technology, sophisticated software, and high-performance, scalable storage systems and services.

2.1 Built On Innovative Storage Solutions

No two companies have the same amount of data or place the same kinds of demands on distributed enterprise storage environments. As a result, flexible storage configuration and allocation is key to successful data migration efforts. At the heart of the SGI Virtualized Storage Migration Solution is a StoreAge™ SAN appliance that provides centralized virtual volume management and storage pooling across entire heterogeneous SAN domains. The fabric-based, fully redundant appliance consists of contol path modules (CPM) and data path modules (DPM) that run the StoreAge Storage Virtualization Management (StoreAge SVM™) software and aggregate available capacity into centrally managed storage pools. It allocates appropriately sized volumes to servers, and dynamically and granularly allocates additional capacity to servers on a just-in-time basis.

Based on powerful Dual Core Intel® Xeon® Processors providing great performance with energy efficiency, the StoreAge SVM features storage capacity and storage performance pooling across the entire SAN storage domain. Uniquely designed to virtualize storage off the data path, the StoreAge SVM does not impose any performance penalty and delivers a highly scalable and highly available SAN infrastructure, at levels not found with alternative approaches.

The StoreAge SVM provides centralized management for distributed enterprise storage, significantly reducing the Total Cost of Ownership. It is an ideal platform for SAN-aware Storage Applications such as Remote Mirroring, Snapshot and replication and a key enabler for business continuity strategies.

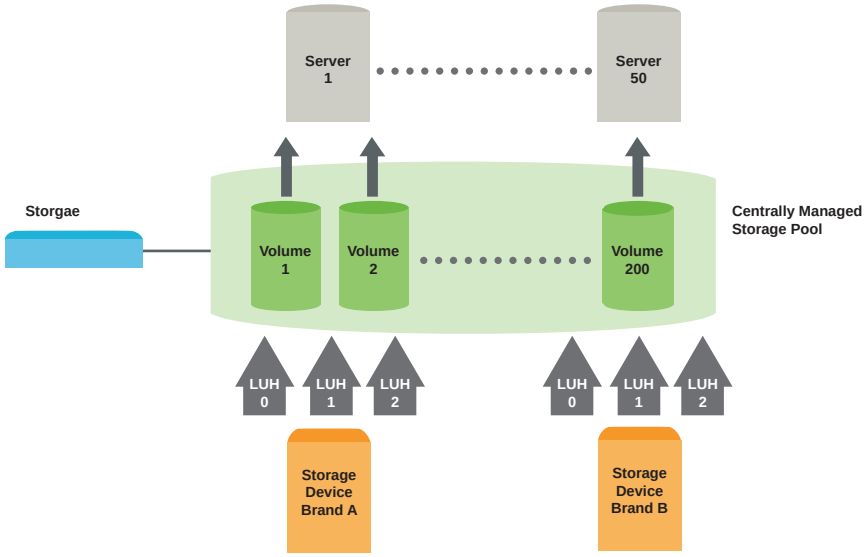

Figure 2. The SGI Virtualized Storage Migration Solution centralizes virtual volume management across heterogeneous SAN domains.

The SGI Virtualized Storage Migration Solution uses a virtualized storage environment to execute volume migrations. Once inserted into the storage network, the appliance handles all volume migration tasks. Because the appliance remains in the network after migrations take place, organizations can implement high-end data services and extended data management solutions across multiple systems on the SAN at less cost than traditional solutions – all while letting organizations continue to manage the environment and repeat the process for further data migrations or volume promotion and demotion when needed.

The centralized and simplified storage allocation and management features of the SGI Virtualized Storage Migration Solution let environments scale seamlessly as demand rises. In addition, key business continuity features are supported, including data snapshots, point-in-time and replicated copies, mirroring, and online data migration. Together, these capabilities help reduce the time needed to perform routine and repetitive tasks and enable online data recovery.

Changing the Way Virtualization is Done

The emergence of storage virtualization proved key to helping IT organizations regain control over storage environments. Early solutions—including in-band appliances situated between servers and storage, array-based features and host-based functions—facilitated virtualization efforts but often increased the management burden and failed to support the aggregation of resources from multiple vendors.

The SGI Virtualized Storage Migration Solution uses a new approach that moves management into storage networks—and is changing the way storage virtualization is done. With an innovative split-path architecture, the solution separates data transfer and control responsibilities in order to improve the performance and scalability of storage networks. Intelligent switches direct communication and data traffic and handle exception conditions, enabling the network-based virtualization solution to provide effective heterogeneous storage management and migration while alleviating the bottlenecks associated with traditional single-path implementations.

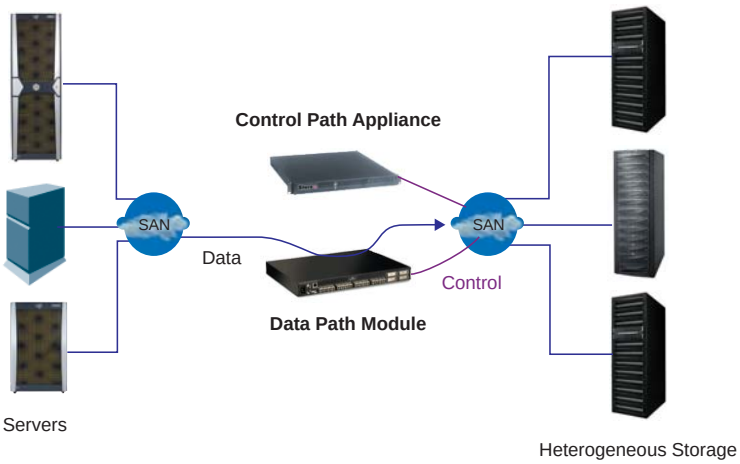

Figure 3. The SGI Virtualized Storage Migration Solution uses an innovative split-path architecture.

2.2 Enabling Enterprise-Class Storage Management Services

The SGI Virtualized Storage Migration Solution brings new storage service capabilities to enterprises that can help improve resource utilization, maximize uptime, and ensure business continuity.

Virtualize the Environment and Optimize Storage Resources

Today's SAN environments are growing at a phenomenal rate. To keep pace, many organizations use a variety of servers, operating systems, SAN components, and storage devices from a multitude of vendors—and manage these components separately. As a result, enterprises are often forced to allocate additional resources from a specific vendor when space is needed in order to integrate new devices with those housing related data. With the SGI Virtualized Storage Migration Solution, companies can make storage environments more flexible and able to adapt to rapid changes in demand, while maximizing resource utilization.

The SGI Virtualized Storage Migration Solution can help enterprises consolidate and aggregate storage resources and virtualize the environment incrementally. By adding the SGI appliance to the existing infrastructure, enterprises can virtualize storage resources across the SAN. Storage systems from different vendors can be pooled into a centralized environment that can be virtualized and managed as a single repository of available space. Users simply ask for space and the system can accommodate the request immediately from available volumes in the allocation pool. Data services remain unchanged, and users continue to work in a familiar environment.

- **SAN virtualization and dynamic allocation of storage resources**

  The SGI Virtualized Storage Migration Solution gives organizations with heterogeneous SAN storage infrastructures the flexibility to dynamically allocate resources. The solution offers a central management utility to migrate data at the block level regardless of the storage vendor. Now, the determination of what data to store where can be made at any time, enabling data to be moved between media types and access speeds as priorities change. As a result, companies can reduce costs by purchasing high-end storage only for data that has high value, and move data to more cost-effective storage when its value changes to avoid unnecessary expenses. When additional capacity is needed, new storage devices can be easily added to the virtualized pools and made available to users and applications automatically.

- **Ability to take advantage of a mix of devices and vendor offerings**

  The SGI Virtualized Storage Migration Solution give companies the ability to take advantage of storage offerings without the limitation of choosing one storage service provider. Unlike other solutions, the SGI Virtualized Storage Migration Solution lets organizations pool and provision resources and use snapshot, volume copy, migration, and mirroring techniques uniformly across any storage platform, regardless of vendor.

- **Migration between heterogeneous devices**

  Moving data from one device to another can prove challenging if similar sized devices or those from the same vendor must be used. The SGI Virtualized Storage Migration Solution enables the online, transparent migration of data from one storage device to another—regardless of vendor, underlying storage and media technology, or location. Migration tasks execute while production applications remain online and available to users, making the solution an excellent choice when migrating critical applications from older storage systems to newer platforms or when dynamic moves to high-performance storage are needed to meet business needs. By providing a minimally disruptive migration process, the solution avoids the impact and cost associated with lost access to applications and data. Original data remains intact throughout the migration process, ensuring data protection.

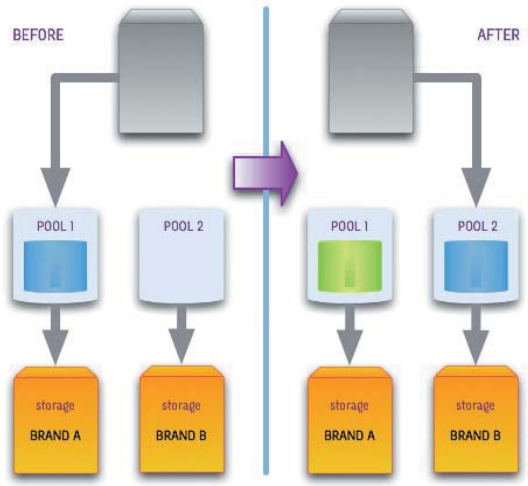

Figure 4. The SGI Virtualized Storage Migration Solution transparently migrates data between storage systems from different vendors.

Take Advantage of New Storage Advancements

Every organization must deal with technology upgrade and refresh initiatives. Today, most of these efforts cause disruption to data, applications and services, or result in a significant degradation in quality of service if migrations are not well planned. With the SGI Virtualized Storage Migration Solution, new storage technologies can be integrated into existing storage infrastructures in a timely manner. Because storage systems can be added easily on demand, enterprises no longer need to determine the size of the solution up front, or make decisions about where data is to be stored only when devices are added to the system. Instead, new devices and device types can be integrated into the SAN when needed or available, streamlining the technology refresh cycle.

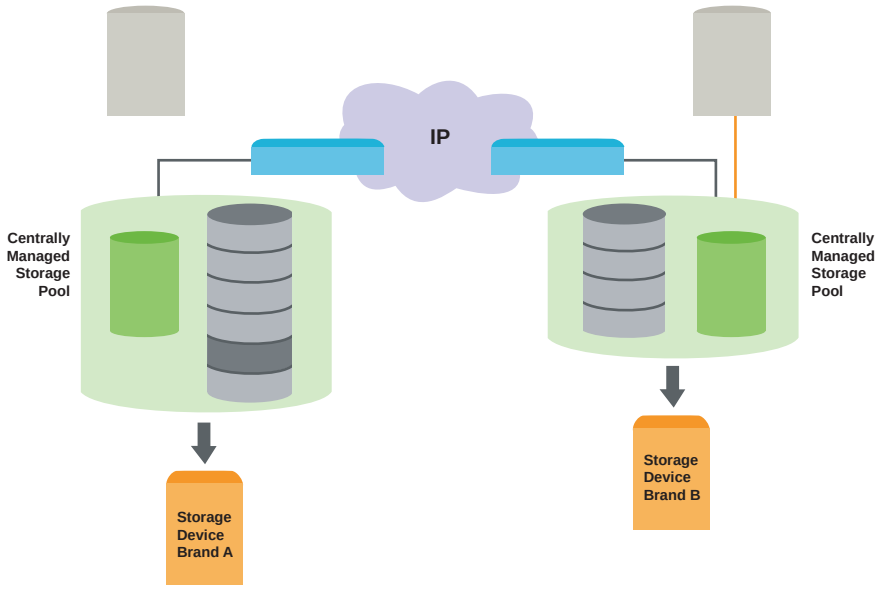

Figure 5. The SGI Virtualized Storage Migration Solution enables cost-effective disaster recovery.

Depend on Rapid Application Recovery and Ensure Business Continuity

As companies increasingly rely on stored data to make business decisions, minimizing the threat to valuable information due to hardware, software, or data center operational failures becomes paramount. While many high availability and redundancy options exist, they often require expensive add-on components that increase management complexity, and fail to recover data in needed timeframes. With the SGI Virtualized Storage Migration Solution, organizations can implement centralized data storage management and deploy disaster recovery sites that can support business continuity.

- By pooling and virtualizing all storage systems, enterprises can allocate and manage data for all recovery sites from a single location, simplifying storage allocation and administrative efforts.
- Data can be automatically replicated to recovery site locations, and data snapshots can be used to create backups that can be placed on archival storage or online systems for fast disaster recovery from planned or unplanned downtime.
- The ability to create instant, mirrored volumes helps ensure data availability and recovery. Synchronous and asynchronous local and remote mirroring (LAN, MAN, WAN) ensures data integrity at the disaster recovery site and eases the data recovery process, regardless of the amount of data or storage medium. Organizations can also fall back to the original data storage site, if needed.
- Smart copy and snapshot facilities support the creation of multiple physical, point-in-time copies of volumes—no matter what storage subsystems and SAN components are used. Each data copy is independently accessible and instantly available, enabling information to be repurposed without impacting the function of production servers. Business tasks, such as decision support, testing, and backup can continue uninterrupted while production data is updated.

Accelerate Product Development Cycles

Companies in a wide variety of industries face challenges in the development and manufacturing of advanced products. As products gain in sophistication, development groups are experiencing rapid growth in the type and amount of data generated during development cycles. With different products placing different demands on systems and generating varying amounts of data, manufacturers need solutions that enable the rapid addition of storage from any vendor into the SAN.

By implementing the SGI Virtualized Storage Migration Solution, organizations can add new servers and storage systems to existing SANs and better utilize available storage capacity. With a single mechanism for managing all storage within the SAN, volume sizes can be automatically expanded to ensure development groups do not run out of available disk space and ensure development efforts can continue uninterrupted.

2.3 Providing A Spectrum of Service Offerings

Moving to a virtualized storage environment can seem daunting. The SGI Virtualized Storage Migration Solution can help in all stages, from assessment through implementation and management.

SGI Data Migration Services

SGI Data Migration Services can help companies move to a centralized management model that is extensible to virtualized environments. SGI Professional Services Solutions Architects perform planning, migration, and validation services, helping enterprises, architect, acquire, and implement solutions. Once requirements are defined and an architectural assessment and

architecture design are determined, the appliance is introduced into the existing environment and storage resources are virtualized. A data migration plan is put in place, and hardware and software are provisioned. Data is migrated to the newly virtualized storage pools, and management tools are configured. Once the migration is complete, additional services can be implemented, including replication, instant read/write snapshot copies of migrating volumes, and more to enhance data protection.

SGI Implementation Services

SGI Professional Services offers enriched consulting services with a structured approach. Skilled SGI consultants are available to thoroughly analyze data center needs and use industry best practices to deliver business value. Three key consulting channels are available: Centralized Storage-Server Integration, Hybrid Computing, and Enterprise (Figure 6).

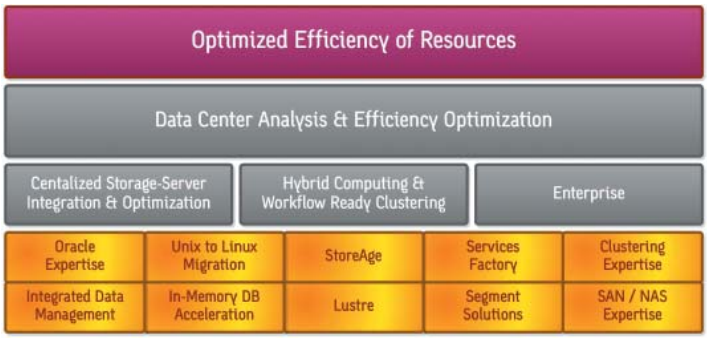

Figure 6. SGI Professional Services offers enriched consulting services.

With expert SGI Professional Services, SGI is in position to deliver services that can ease the move to virtualized storage infrastructures. Services aimed to support the SGI Virutalized Storage Migration Solution can help eliminate the complexity and risk often associated with traditional data migration approaches while applying certain methodologies as industry best practices.

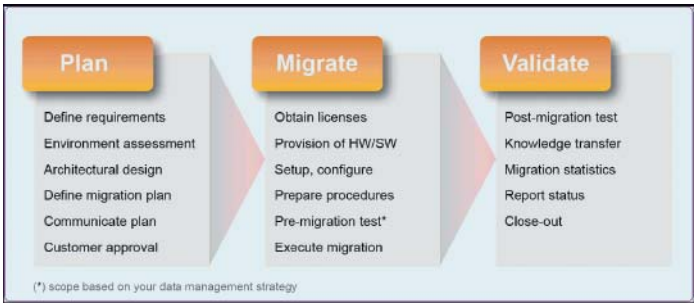

Figure 7. The SGI Virtualized Storage Migration Solution is implemented in three lifecycle stages.

Figure 7 illustrates the three lifecycle stages performed during the implementation of the SGI Virtualized Storage Migration Solution.

3.0 SGI's Continuing Commitment to Storage Innovation

With over 20 years of strong storage experience and alliances, SGI is a leader is data management solutions. Vast experience and decades of success in helping organizations conquer some of the most intense computational problems and sizeable data sets helps SGI understand how to architect solutions that support enterprise storage demands. Now, SGI brings together innovative storage appliances, intelligent software, and expert services to revolutionize data center virtualization efforts. With the SGI Virtualized Storage Migration Solution, enterprises can place value on business information and effectively tackle the stringent demands placed on storage area networks and broader infrastructure services without breaking IT budgets.

3.1 For More Information

For additional information on the SGI Virtualized Storage Migration Solution, please contact your local SGI representative or go to: http://www.sgi.com

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