Benefits of Fibre Channel (FC) SANs

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Executive Summary

As the volume and criticality of data grows, companies need efficient, scalable solutions for making data available to servers, applications and users across the enterprise. By providing a network of storage resources to servers, FC SANs uncouple storage from individual platforms, allowing data transfer among all nodes on the storage network. SANs offer a range of benefits such as improved backup and restore, enhanced business continuance and simplified consolidation that address the needs of today's data-intensive businesses. NetApp SAN solutions provide the highest productivity of people and the highest utilization of assets.

Table of Contents

Introduction

The growth of business data continues to explode along with the need to store it. Workers generate more and more e-mail messages and file attachments, users demand instant access to data like never before, IT managers install more storage-hungry applications, and aging paper-based data continues to be converted into digital form.

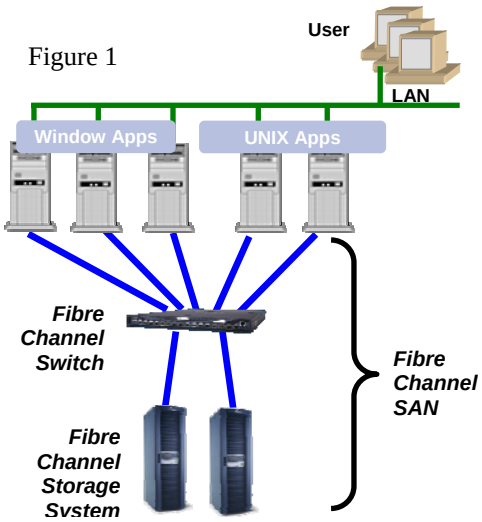
However, with IT managers facing flat or shrinking budgets, the pressing challenge for them is to do more with less - to squeeze the most data storage out of every IT dollar. To achieve this objective, they must start by assessing all data storage costs - those tied to initial equipment acquisition, as well as those for resource management, capacity use, heterogeneous support and most importantly, system downtime.

Traditionally, companies have accommodated storage needs with Direct Attach Storage (DAS) that links storage resources directly to associated servers or platforms. Direct Attached Storage represents the status quo in many organizations that aren't aware of the hidden costs or technology limitations related to this form of implementation:

- Difficult to Manage - Data is dispersed over many servers, which increases the personnel cost for supporting the organization with online configuration management and backup/restore capabilities.
- Limited Asset Utilization - Since each server owns the storage connected to it, DAS makes it almost impossible to share storage assets across multiple servers.
- Low Scalability - Server scalability is limited by the number of I/O buses supported and the SCSI bus maximum of 15 devices.
- Limited Distance - SCSI implementations typically have a 12-meter limit, which doesn't provide flexibility or let storage assets be located in secure locations in a facility or on a campus.

For nearly a decade Storage Area Networks (SANs) have become mainstays for companies looking to increase storage utilization and manageability, while reducing costs (see figure 1). Storage Area Networks represent a topology for connecting storage assets directly to the network and establishing a peer-to-peer server/storage implementation. SANs have historically been based on Fibre Channel and now also incorporate iSCSI as a method of server/storage communication. SANs solve multiple issues for large enterprises with data centers to remote offices, and meet the IT requirements of small-to-medium size environments.

Figure 1



For years adding storage meant buying additional servers, tape libraries, and disk enclosures to attach to the server - a costly and inefficient tactic that left large amounts of storage capacity and computing

power unused. Today, Fibre Channel SANs - high-speed networks that connect multiple storage devices so they can be accessed on all servers in a local area network (LAN) or wide area network (WAN) - have proven to:

- Improve backup and restore
- Enhance business continuance
- Increase high availability
- Facilitate storage consolidation

Improved Backup and Restore

As enterprise data becomes a much more valuable business asset, ensuring its stability and protection is more critical than ever. Many organizations have faced the challenge of having to back up more and more data even as backup windows have continued to shrink. Organizations have discovered that they cannot back up all their data as consistently or as cost-effectively as they would like.

Storage Area Networks (SANs) can accelerate and simplify the data backup and restore process. SANs are ideal for backup-intensive environments, especially when there are clearly defined areas for isolating backup workloads. The switched 4Gb full duplex capabilities of Fibre Channel fabrics can significantly improve backup and restore performance. Moreover, Fibre Channel is designed to transport large blocks of data with greater efficiency and reliability than IP-based networks. Two popular SAN-based backup and restore approaches are typically referred to as the "LAN-free" and "server-free" backup and restore models.

Removing the LAN from the backup and restore process provides a variety of advantages. SAN-attached tape drives and libraries can be implemented so that each server sends its own backup data directly to the shared tape resources instead of through the network to the backup server (see figure 2). Sophisticated backup and restore software applications still control the process, tracking the backup and restore data. The SAN enables bulk data transfer from each server to shared SAN storage, but the LAN is used only for meta data communication traffic between the servers. The result is a faster, scalable, and more reliable backup and restore solution with more effective utilization of storage, server, and LAN resources.

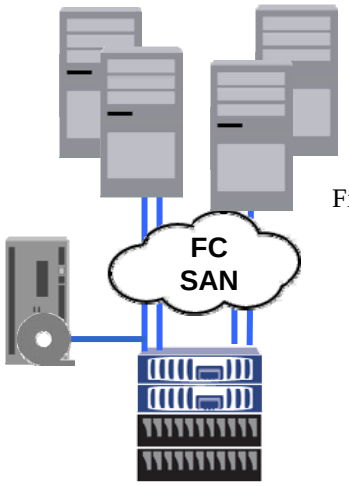


Figure 2

In the SAN-based server-free backup and restore model, data is transferred directly between storage devices (for example, from disk to tape) without using host servers. The server-free backup and restore model significantly reduces application host CPU cycles, thereby freeing up valuable CPU cycles to improve operating efficiency and enable higher workloads across the enterprise.

Enhanced Business Continuance

With the ability of SANs to integrate multiple storage devices and applications, SANs provide many high-availability options for organizations that need to support a wide range of business continuance activities in a cost-efficient manner. The distributed networked approach of SANs addresses the ability to recover data and quickly bring systems back online following a disaster. Without this level of protection even minutes of downtime can pose significant consequences to many types of organizations. To guard against downtime and to reduce business risk, a SAN solution would eliminate single points of failure, incorporate failover software, streamline data backup and recovery, and enable high-performance mirroring over great distances (see figure 3).

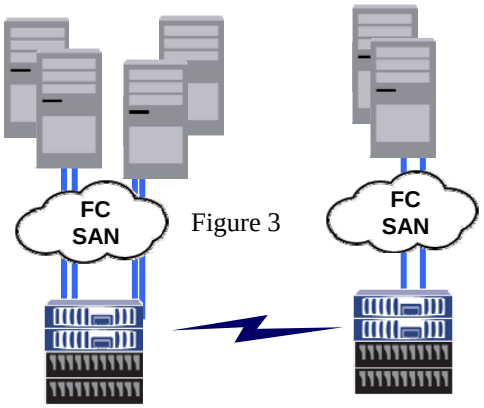


Figure 3

Data access over long distances is a key component of any business continuance solution. Native Fibre Channel technology provides extended distance connectivity of up to 120 km. This distance enables enterprise customers to maintain geographically separate disaster recovery facilities or mirroring operations. When used in large fabric configurations, SANs can utilize Wide Area Networks (WANs) or Metropolitan Area Networks (MANs) to cover even longer distances.

Increased High Availability

With the increase in the volume and criticality of corporate data and the importance of industry regulations, companies demand the highest possible system availability. In fact, incidents that were previously viewed as minor unplanned outages can now impact business operations severely. To address this requirement, SANs are designed to facilitate a high-availability environment that can help prevent system outages.

Some of the key availability benefits of SANs include built-in redundancy, dynamic failover protection, and automatic I/O rerouting capabilities. Flexible connectivity options enable the development of SANs that have no single points of failure. SANs provide hot-plugging capabilities that enable organizations to install, configure, and bring storage online without experiencing server downtime.

SANs can also support high-availability operations by enhancing clustering implementations (see figure 4). Clustering is typically used to ensure that applications continue to run in the event of a host server failure. Traditional, non-SAN clustered environments typically include two servers sharing disk storage. With SAN clustering, many more servers can share SAN-attached storage

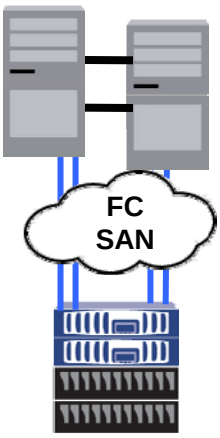


Figure 4

Facilitate Storage Consolidation

There are many technical and business advantages to consolidating servers and storage with SANs. A SAN infrastructure enables any-to-any connectivity between heterogeneous server and storage systems (see figure 5). This allows much more efficient use of storage and server resources by consolidating widely distributed or underutilized resources into centrally managed environments and provide the following benefits.

- Increased storage utilization
- Decreased storage capital expenditures by enabling the purchase of storage on an "as-needed" basis
- Increased administrative staff productivity - manage more storage with fewer personnel
- Reduced application downtime and minimized business impact for storage upgrades
- Simplified storage management with centralized storage and server platforms

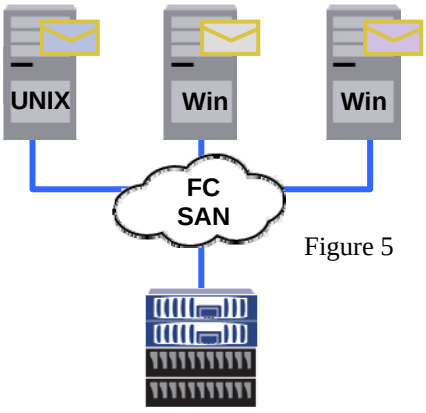


Figure 5

By enabling any-to-any server and storage connectivity via switches, SANs decouple dedicated devices and facilitate storage resource sharing. This cost-effective open systems approach enables SANs to help organizations grow their storage environments much more quickly because storage capacity can grow independent of server usage. This approach provides a high degree of efficiency in utilizing resources while simultaneously enabling growth without system disruptions and the selection of best-of-breed heterogeneous equipment.

NetApp FC SANs

NetApp provides a full range of proven Fibre Channel (FC) SAN solutions for environments with the most demanding performance and availability requirements. By coupling high-performance storage with unique data management software, NetApp delivers increased availability of critical data, simplification of complex data management environments, productivity improvements and lower storage costs.

. NetApp solutions deliver compelling customer value across thousands of deployments via:

- Easiest and efficient provisioning
- Superior business application uptime
- Affordable business continuity/DR
- Reduced total cost of ownership (TCO)
- Unique flexibility and investment protection with multiprotocol storage
- Guaranteed interoperability with leading host environments and robust professional services

Easiest and efficient provisioning

- Automation with zero downtime allows instant provisioning, dynamic reconfigurations and easy data restore
- Industry's most efficient use of disk space with the advanced thin-provisioning function of NetApp FlexVol
- Grow or shrink volumes nondisruptively and share disk spindles to increase I/O performance

Superior business application uptime

- Oracle, Microsoft SQL Server and Microsoft Exchange integrated management automates and simplifies backup, restore and failover with NetApp SnapManager and SnapDrive
- Quickly and accurately retrieve individual mailbox and email messages with NetApp Single Mailbox Recovery for Microsoft Exchange (SMBR) saving time and admin resources
- Routine downtime and performance degradation eliminated with application-aware backups

Affordable and flexible business continuity/disaster recovery

- Reduce backup administration by up to 50% with NetApp SnapVault, restore data in seconds with NetApp SnapRestore saving time and money
- Easy setup (no added resources), synch & asynch mirroring and mirroring to / from any NetApp system with NetApp SnapMirror
- Integrated high availability (HA) & disaster recovery with NetApp MetroCluster providing additional protection against site disasters for the price of HA

Reduced TCO:

- Increased capacity utilization through advanced virtualization capabilities
- Reduced administrative overhead through simplified processes for backup, recovery, provisioning, and other management tasks
- Reduced system costs by using SATA disks for production applications with NetApp RAID-DP™ (double parity)
- Fast backup and restores that save time and resources

Unique flexibility and investment protection with multiprotocol storage:

- Minimized complexity and cost with the ability to use multiple block and file protocols (FC, iSCSI, NFS, CIFS) to simultaneously access the same storage system
- Industry-leading unified storage environment for FC SANs, IP SANs (iSCSI), and NAS

Guaranteed interoperability with leading host environments and robust professional services:

- Broad support for Windows®, Solaris™, AIX, Linux®, HP-UX, VMware, and NetWare
- Robust options for native and 3rd party multipathing and clustering
- Comprehensive SAN professional services

In summary, NetApp FC SAN delivers significant cost-of-ownership savings with the easiest provisioning, superior business application uptime and affordable business continuity. NetApp provides:

- The highest productivity of people
- The highest utilization of assets
- Broad, unified and enterprise-class solutions

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