
Understanding the Financial Benefits of iSCSI and SANS

September 2007

Executive Summary

Storage Area Networks (SAN) and in particular iSCSI SANs offer a compelling argument for the reduction in the cost of data storage and the management of that storage. As an organisation's data grows, the organisation's reliance on that data grows hand in hand.

Without adequate data storage infrastructure, organisations become more vulnerable to catastrophic data loss which can lead to serious business interruption or business failure

By implementing a SAN, organisations decouple their storage from their servers allowing better utilization of their investment, reducing management overheads, improving backup and restore implementations and making their organisations less susceptible to catastrophic data loss.



iSCSI and SANS

A Look at the Financial Benefits:

Table of Contents

- SANs: (Storage Area Networks)** 4
 - SANS: What are they? 4
- What is the difference between SAN and NAS?** 4
 - What is the difference between Fibre Channel and iSCSI? 4
 - What are the main benefits of SANs? 5
- Cost Reduction**..... 6
 - Reduce the number of Hard Disks and RAID controllers: 6
 - A typical iSCSI SAN:..... 7
 - SANs decouple the Storage Management from the Server Management:..... 7
- The Cost of Failure!** 8
 - What happens when a server fails with direct attached storage? 8
 - An Alternative: The iSCSI SAN Solution..... 8
- Conclusion:** 9



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SANs: (Storage Area Networks)

SANS: What are they?

Traditionally PCs and Fileservers had their Hard Disks and other storage devices such as Tape Drives and CD ROM drives directly attached to the PC or Fileserver

With Storage Area Networking, devices such as Hard Disks and Disk Subsystems such as RAID systems are attached directly to the Network, allowing all devices to access the resource. In the earlier days of SANs, storage devices could only be attached by expensive Fibre Channel (FC). Now iSCSI had arrived, SANs are available to all sizes of organisations.

What is the difference between SAN and NAS?

NAS (Network Attached Storage) simply put, is just another server, it appears to other servers and workstations as a server with shared resources on the network just as other servers do.

A SAN device appears to the servers as Block Level I/O device i.e. like a Hard Disk; this means that SAN storage can do everything local storage can do. Certain applications such as a Database like Oracle and MS SQL and other applications like Exchange can only store their data on block level devices, so this means you cannot use a NAS to store your Exchange or Database Data.

Because a SAN is a block level device, it provides significantly better performance over a NAS Device.

What is the difference between Fibre Channel and iSCSI?

The main problem with Fibre Channel is expense, not only in having to install Fibre optic cables but the acquisition costs of Fibre Channel devices, this combined with IT Staff having to be retrained and the complications of managing a FC SAN has meant that this type of technology has only been available to the largest of organizations with the largest of IT budgets. Fibre Channel SANs can operate at 1, 2 or 4Gb/s.

A lower cost alternative to FC SANs was needed; in February 2003 iSCSI was ratified as a standard by the IETF (Internet Engineering Task Force), bringing all the benefits of SANs at significantly reduced costs. This was achieved because iSCSI SANs can use existing 'standard' gigabit Ethernet infrastructure of the type found in almost every environment without the need to re-cable and can take advantage of existing network hardware such as switches and routers. IT Staff already understand networking and do not need extensive retraining. iSCSI SANs can operate at up to 10Gb/s with the prospect of moving up to 100Gb/s in the future.

What are the main benefits of SANs?

- Scalability
- Fault Tolerance
- Manageability
- Reduced hardware costs
- Reduced storage management costs
- Significantly reduce Storage Underutilisation
- Improvements in Backup and Restore
- Provides an infrastructure that allows for High Availability and remote replication at block level
- Storage consolidation, a natural fit for virtualised environments such as VMware etc.

Cost Reduction

In a multi server environment that employs traditional DAS (Direct attached Storage) it is not untypical that each server will have its own RAID controller and multiple disks.

As more servers are deployed the more expensive components such as RAID controllers are replicated.

Reduce the number of Hard Disks and RAID controllers:

Consider the following hardware requirements for 5 servers using RAID 5 with a Hot Spare or RAID 6:

In a DAS environment each server has its own RAID controller; each RAID set has its own parity drives with a hot spare, or 2 parity drives with RAID 6. That is a total of 5 controllers and 10 drives used for protection.

In a SAN environment all of this storage can be provisioned on a single controller and only one disk is required for parity and one as a hot spare or 2nd parity drive in RAID 6.

With just 5 servers using DAS, you are buying 8 hard disks and 4 RAID controllers more than you need just to provide the same amount of storage.

As time goes on, IT managers begin to realise that the storage is not where they need it; one server will have excess capacity whilst another will be critically low. In some scenarios the overall storage between the servers meets the need; it is just in the wrong place.

By centralizing the storage, all servers can have access to a common pool of storage and be allocated as much or as little space as each server needs, so servers never have wasted space. When a server gets to a stage when it needs more space this can be allocated dynamically from the pool without the need to bring down the server. There is no business interruption.

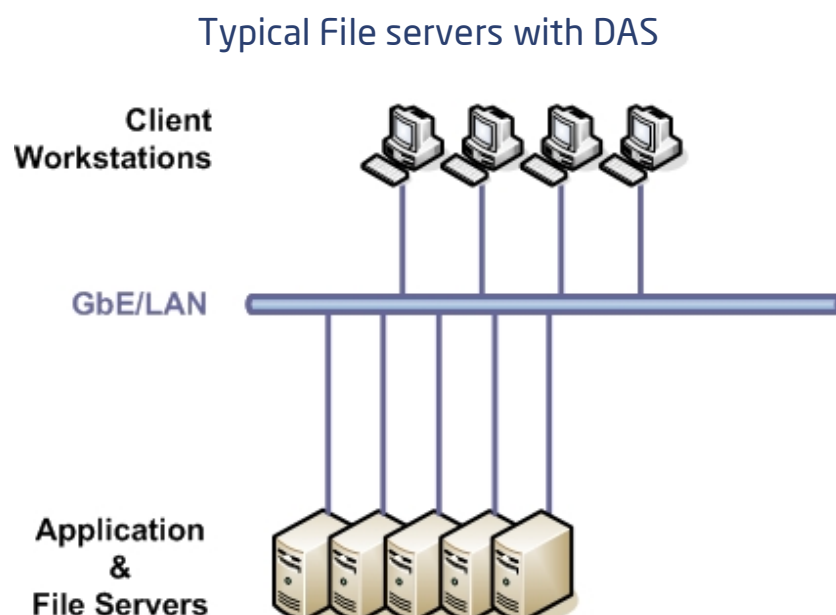


Fig.1 Typical Scenario where the storage is inside the servers

In the above example the cost of 8 Hard disks and 4 RAID controllers could pay for an iSCSI storage sub system, whilst still giving the same amount of storage capacity and the same level of RAID protection. As the system grows the savings become even greater. See below:

A typical iSCSI SAN:

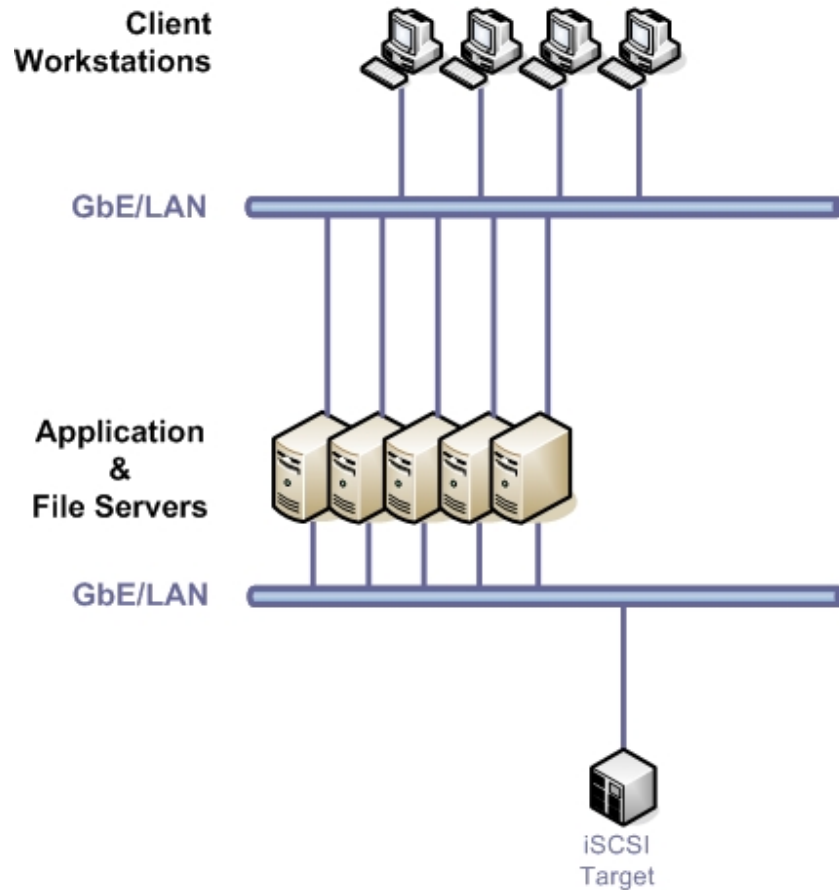


Fig. 2 The storage is available in a central pool on the iSCSI Target, all servers can have access

SANs decouple the Storage Management from the Server Management:

In a SAN environment the management of the storage is significantly reduced as the storage can now be managed independently of the servers. In addition IT support staff only have to understand 1 storage array rather than each storage system attached to each server.

Imagine the headache of having 20 servers all with their own storage arrays and trying to remember how to deal with a problem when it arises, Similarly 20 different systems have to be monitored individually, with a SAN only the SAN needs to be monitored.

The Cost of Failure!

SANs bring with them advanced features that are not normally associated with DAS (Direct Attached Storage) such as the ability to do Snapshots and Remote Mirroring of data.

What happens when a server fails with direct attached storage?

When a server fails with direct attached storage, in order to gain access to the data either the server has to be repaired or the direct attached storage has to be removed and installed on an alternate server. This often involves removing RAID controllers and then re-installing them on an alternate server if one is available and has a suitable bus and drivers.

The re-installation of direct attached storage means that in most instances the recipient server of the DAS solution will need to be brought down and then re-booted and drivers loaded in order to see the new storage, causing major disruption whilst the server is offline. **So now you have 2 Servers off line!**

Once you have the recipient server up again, hoping that the new driver you just installed didn't cause you any problems, all you have to do now is share the drive and present it to the network so everyone can get access.

This only a temporary fix and at some point the server would be repaired and the storage would need to be transferred back to its original server.

This is all assuming that you had a recipient server that can accommodate the controller and the server had enough slots available for all those hard disks!

Alternatively, you wait for an engineer to attend site to fix the problem, even with a 4 hour response and assuming the engineer has all the necessary parts, you are likely to be without that server for 5 hours or more.

An Alternative: The iSCSI SAN Solution.

In most SAN situations the iSCSI Storage device is plugged in to a switch, this means that all the servers have a connection to the storage pool available, but not necessarily access to the iSCSI Storage.

If you have a server go down in a SAN environment, all you have to do is simply go to another server and configure the iSCSI initiator software to see the iSCSI SAN storage device. This generally takes less than a couple of minutes and depending on how things are configured - i.e. if 'heartbeat' between two servers - failover could be automatic so need for manual redirection. No need to down the alternate server, no ripping it apart and compounding your problems with 2 servers off line.

Now all that is required is to share the drive and present it to the network so everyone can get access. Typically the whole process takes as little as 5 minutes.

Which approach would you prefer during a mission critical part of the day or on a Friday night?!

Conclusion:

It is estimated that cost of managing storage is 5 - 7 times the cost of the hardware.

Most organisations are cost conscious, but not all organisations look at the true TCO (Total Cost of Ownership) of hardware, more often just looking at the cost of the hardware, as that is all their budget has to consider.

One of the main reasons for this is because HR costs are not directly linked to CapEx (Capital Expenditure) budgets. Other factors that are often overlooked include the cost of resource outages, or downtime.

If you consider the example given in the "cost of failure" with a direct attached solution, the outage is likely to be a minimum of a couple of hours and more likely 5 or more, where as with the SAN it is likely to be only a few of minutes.

If just 100 people are reliant on your IT infrastructure and they are unable to work effectively during this time, then the likely loss in just HR to the business is 5hrs x 100 x salaries.

That is without taking in to consideration the additional impacts to the organisations, which could easily have a direct impact on a production environment, or consider a professional practice such as solicitors or accountants that bill out by the hour. Imagine the deadlines that could be missed and the costs associated.

Your customers - internal or external will not be interested in the excuses.

With a SAN deployment the data storage environment is easily managed and maintained as a separate entity, allowing for easy expansion and reducing the impact of hardware failure to any business or organisation.

If you would like to reduce your storage cost and provide your business with more resilience please contacts and we will be happy to discuss your individual circumstances and or arrange a demonstration.

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