Providing Cost-Effective IP-Connectivity To A Centrally Managed SAN

Connecting Multiple Hosts to A SAN Using
An iSCSI Router

StoreAge
networking technologies

The networking infrastructure for most organizations of any size typically consists of LAN/WAN networks based on the Ethernet protocol. Many organizations have hundreds, if not thousands, of workstations and servers that rely on Ethernet to access information. This information is usually stored on internal server hard drives, external direct attached storage (DAS), or in a storage area network (SAN).

SAN based storage provides the best combination of management, performance, applications and data protection. Unfortunately, the entry costs of a SAN can be high, and thus many IT organizations limit the use of their SANs to a relatively small number of highly critical servers. As a consequence, most servers in most organizations still rely on local or direct attached storage, which incur their own costs in terms of stranded capacity, complex backup procedures and less robust availability and management capabilities.

As a solution to this situation, integrating the advantages of a SAN with Ethernet networks can deliver substantial benefits to many customers, including lower total cost of ownership, centralized management and a broad array of applications designed to enhance data availability (such as replication and mirroring).

This integration is now possible with the introduction of iSCSI protocol. This solution leverages the proven and affordable 1Gb/s Ethernet technology, which allows connectivity to networks using simple and low cost NICs.

iSCSI is a storage protocol designed to transport block-level storage traffic over Internet Protocol (IP) networks, enabling businesses to cost-effectively network and consolidate their storage resources over widely deployed Ethernet infrastructures. iSCSI enables affordable SAN storage solutions for customers looking to consolidate and centrally manage storage for their distributed server environments.

This paper discusses how servers can use iSCSI in order to be cost-effectively added to a SAN, and how a SAN environment using StoreAge SVM can provide centralized management, improved application uptime and higher levels of data protection and availability.

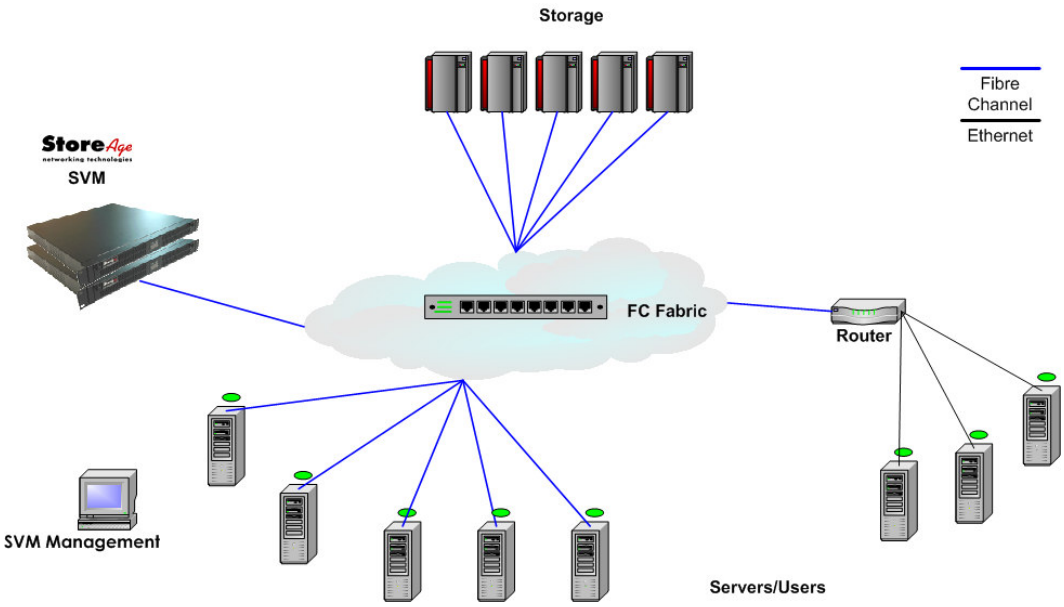
1. General

SVM operates in a heterogeneous SAN environment, which can include servers and storage devices from various vendors. Storage can be flexibly allocated to the servers and value-added storage applications using SVM. Managed via a web-based GUI, storage can be organized into stripe sets, storage pools, and then selectively allocated to one or more servers. The SVM appliance is connected to a Fibre Channel loop or switched fabric, and is capable of monitoring the status of physical devices connected to the SAN. The SVM manages storage off the data path, serving the volume maps to distributed virtualization agents. This design enables full utilization of SAN performance and provides superior scalability and reliability. SVM is a key enabler for advanced disaster recovery strategies and other enterprise storage applications, implemented above the virtualization layer.

StoreAge's SVM™ appliance, added to a SAN, provides centrally managed storage pooling, virtual volume allocations and uniform data movement/copy services for the entire SAN. SVM enables independent scalability, top performance, and high availability of all SAN resources. It brings substantial improvements to managing enterprise-class storage networks, reducing administration costs of the constantly growing amount of data and improving utilization of expensive storage resources. SVM also enables the implementation of advanced disaster recovery and back up applications.

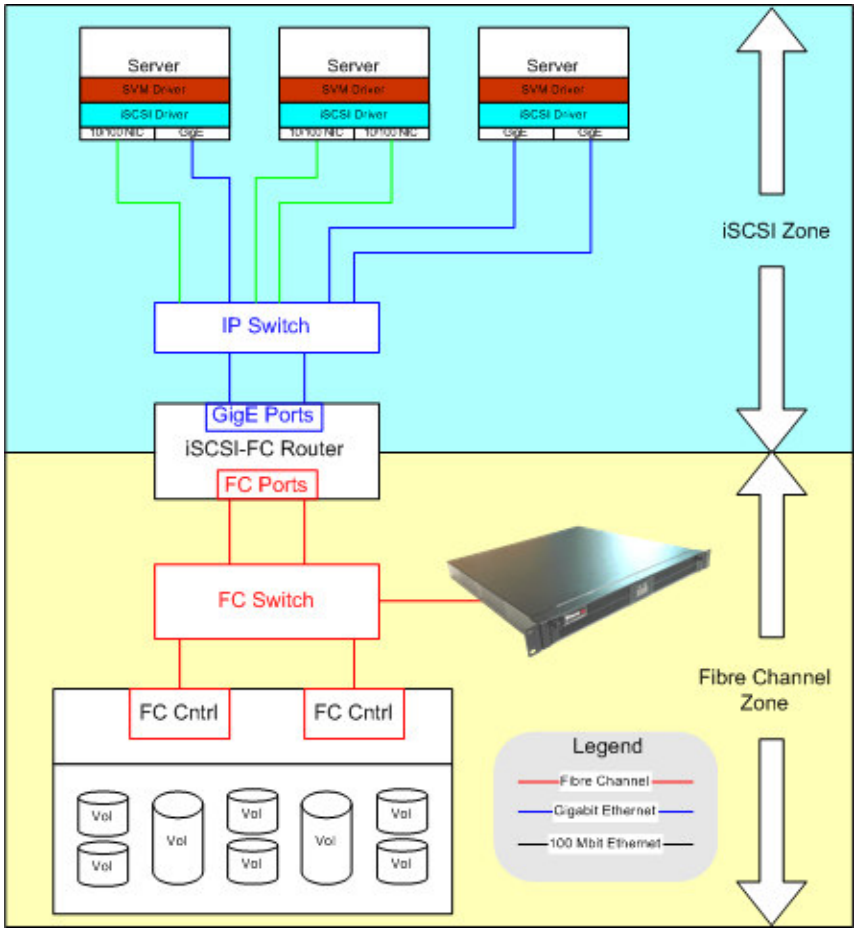
Until recently, all said above was limited to FC attached servers. Today, it is possible to connect IP based servers by using the iSCSI protocol, which enables direct, block-level access from servers to storage devices. The following diagram describes the topology:

SVM creates a vendor-neutral layer within the SAN that allows uniform services to be performed across all storage within a SAN, such as on-the-fly provisioning, data replication and data migration.
Servers may use a standard IP link to connect to storage devices.



The connection is enabled by a standard NIC card or a dedicated iSCSI HBA. The first option requires an iSCSI initiator driver that runs above the standard TCP/IP stack. The dedicated iSCSI HBA driver already includes initiator functionality. In both cases, the SVM driver is also installed to enable virtualization functionality. This configuration benefits from all the SVM-based advanced features mentioned above. SVM drivers communicate with SVM, and volumes are allocated to servers in the same manner as when connected via FC.

A detailed description of implementation, focusing on iSCSI-FC connectivity, is provided below:



iSCSI-FC router connects between iSCSI and FC zones, while translating I/O requests and replies.

iSCSI Routers of different vendors and models vary in number of IP and FC ports. The number of ports at each side may affect the overall router performance. However, the number of servers or storage devices is not affected, as they can be connected via IP/FC switches respectively.

2. How to Implement

The implementation process consists of four steps:

1. SVM installation
2. Servers installation
3. iSCSI router setup
4. Volumes provisioning

1. SVM Installation
The first step is a normal SVM installation. The first components connected are storage devices, FC switches and SVM appliances.
Once all components are connected and operational, SVM can aggregate the selected LUNs into storage pools and create volumes. The storage pools and volumes are created only after all components have been successfully installed.

2. Servers Installation
Assuming that the standard TCP/IP stack will be used for iSCSI connectivity (as is the case for most current machines), an iSCSI driver is the only component left to install. A 1GBE/s card will significantly improve overall performance, especially in large environments.
An iSCSI driver can be obtained from different vendors, e.g. Microsoft and Cisco.
A dedicated iSCSI card should be installed according to vendor's instructions, but it is presented as a FC or SCSI HBA.
Next, the SVM driver should be installed in each relevant server.

3. iSCSI Router Installation
It is recommended to connect SVM directly to an iSCSI router. However, due to the limited number of ports in iSCSI routers, servers should be connected via an external IP switch. This configuration maximizes the number of servers benefiting from centralized storage and the associated services.

The iSCSI router should be set in such a way that it creates a different WWN for every iSCSI initiator connected to it on the FC side. It also needs to show a separate iSCSI target for every FC target on the FC side, which most vendors provide.
Available iSCSI routers: Cisco SN5428, the Cisco iSCSI blade of the MDS switch as well the Nishan iSCSI to FC switch (now McData), and others.

4. Volumes Provisioning
Prior to creating volumes, the configuration should be checked for normal operation.
Please verify the following issues:

- A proper zoning is set in the switches and iSCSI router. iSCSI router should be able to access all relevant LUNs, as if it was a server.
- Proper LUN masking in the storage devices.
- All LUNs are accessible by the related servers.
  Note – At this point, no further actions should be carried out with regard to storage.
- Verify that SVM sees all relevant LUNs and all servers. Each LUN and server must have a unique name.

This will be followed by normal SVM operations – storage pool creation, volumes creation and assignment to servers.

3. Usages

The combined configuration described above can be used for:

- Multiple servers connected to centrally managed storage resources
- Snapshots
- Data migration
- Mirroring
- LAN-free and Server-free backup

All these functions can be executed using any iSCSI enabled server, using an inexpensive Ethernet NIC as opposed to a more expensive Fibre Channel HBA.

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