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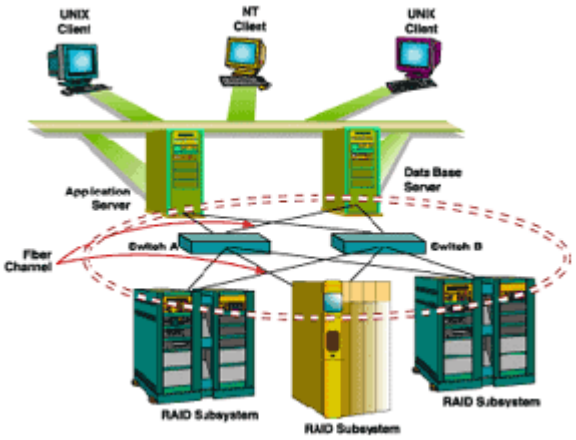
SAN Overview

Fulfilling a Demand
Storage Area Networks (SANs) are revolutionizing information storage and management in the same way that Local and Wide Area Networks (LANs/WANs) transformed information sharing across the enterprise. As storage capacity continues to grow at a dramatic annual growth rate, so do the demands for external storage under centralized management. To properly satisfy these demands, a minimum of features, including continuous data availability, resource sharing, system scaleability, and ease of management are all required.

Both SAN and Network Attached Storage (NAS) architectures are the current prime candidates used to fulfill these requirements. Although the main focus of this paper is to provide a general introduction to SAN, a comparison of SAN and NAS is also included.

Defining the Generic SAN
A typical SAN can be defined as a network containing at least two servers that have access to a storage pool through an interconnection with at least one hub or switch. It is necessary that the technologies used in this network are high-performance, high-reliability and scaleable in order to achieve that combination of the speed expected of a traditional storage environment, with the connectivity of networking.



With a successful implementation, a SAN enables fast, reliable access among servers and external or independent storage resources, and provides a network where storage resources appear generic and are shared by the servers, rather than being dedicated to any one server.

SAN Advantages

There are several, most-commonly discussed advantages that a SAN has over using a single network for all applications:

Centralized Storage

Since SAN resource management is centralized, physical storage devices are virtually isolated from what the client can see. This "big-picture" management results in better use of the disk and tape resources and allows more flexibility for distributing and reconfiguring resources.

Superior Connectivity

Every server on the network (or any storage device with enough intelligence) can address all of the (other) storage devices on the network, for distances up to 10 kilometers (with Fibre Channel support). Storage resources that may be scattered throughout a building, or several buildings, may be accessed for purposes of mirroring or clustering, etc.

LAN-Free & Server-Free Backup

By providing a separate channel for data, a SAN can offload backup traffic from the LAN. Backup can be performed outside of the LAN, with the data moving from the storage device to the server. The server then retransmits the data through the SAN to a SAN-connected library. This setup is referred to as LAN-free backup. Server-free backup is also possible, where the data is moved across the SAN from one storage device directly to another. The server initiates the backup command, but the data moves directly between the storage devices through the SAN, without further involving the server or the LAN.

Scaleability

By removing general-purpose traffic (end-user data such as e-mail, etc.) from the network, the SAN servers and storage devices can dedicate resources to managing and supporting only I/O traffic. Since ongoing operations are not affected, storage capacity can grow and storage performance can improve.

SAN vs. NAS

Both SAN and NAS technologies involve externalizing storage from the server and adding flexibility to network storage. With SAN technology, the storage devices all reside on their own networks, along with all of the flexibility and performance benefits associated with networking. NAS technology, however, involves the use of a networking interface for the storage devices, which make them each an active node on the existing network. Both technologies have their appropriate benefits, drawbacks, and applications.

One of the big differences between a SAN and a NAS is that NAS devices typically see storage as files; SANs usually see blocks of data. This difference is one of the major advantages of NAS configurations; allowing them to be easy to install and to also provide low-cost entry product configurations that use an already-available and proven technology.

SANs offer a high-bandwidth link capable of growing incrementally, making them especially well suited for transferring very large blocks of data. NAS networks, however, are known for bandwidths suited to efficiently move data in moderate-size segments. Whereas SAN delivers data reliably and in a predicted amount of time, NAS (and LANs) can retransmit data when the network is congested or fails.

Since NAS is file-oriented, it works well for document management applications, but it is not as ideal for database applications. By holding files for the network, a NAS is very flexible, although this same feature can cause the NAS to be inefficient at peak times if the network is slow. For these reasons, NAS devices are best suited for workgroups with high storage demands and in cluster server environments.

It is apparent that both architectures have their advantages, depending on the specific application. The main advantages of NAS relate to the way it allows use of existing networking infrastructures and the investment already made to the networking industry. Due to standardization and compatibility issues, SANs could possibly take a couple more years to offer a heterogeneous data-sharing environment on a widespread commercial basis. SAN and NAS are somewhat complementary technologies that are expected to coexist for some time, with several current NAS functions likely to eventually migrate to the SAN.

Summary

There is clearly a demand for external storage that is centrally managed and capable of performing with the benefits of the latest system technologies. Both SAN and NAS architectures can meet this demand, and both have their advantages for specific applications. Until SAN standardization and compatibility issues become stable, SAN and NAS, which are somewhat complementary configurations, are expected to coexist for some time.

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