

DAS, NAS or SAN: Choosing the Right Storage Technology for Your Organization

New Drivers in Information Storage

Data is unquestionably the lifeblood of today's digital organization. Storage solutions remain a top priority in IT budgets precisely because the integrity, availability and protection of data are vital to business productivity and success. But the role of information storage far exceeds day to day functions. Enterprises are also operating in an era of increased uncertainty. IT personnel find themselves assessing and planning for more potential risks than ever before, ranging from acts of terrorism to network security threats. A backup and disaster recovery plan is essential, and information storage solutions provide the basis for its execution.

Data backup and disaster recovery is essential to today's enterprises.

Businesses are also subject to a new wave of regulatory compliance legislation that directly affects the process of storing, managing and archiving data. This is especially true for the financial services and healthcare industries, which handle highly sensitive information and bear extra responsibility for maintaining data integrity and privacy.

New laws and government legislation are affecting the way that organizations store, manage and archive data.

Although the need for storage is evident, it is not always clear which solution is right for your organization. There are a variety of options available, the most prevalent being direct-attached storage (DAS), network-attached storage (NAS) and storage area networks (SAN). Choosing the right storage solution can be as personal and individual a decision as buying a home. There is no one right answer for everyone. Instead, it is important to focus on the specific needs and long-term business goals of your organization. Several key criteria to consider include:

The right storage solution should be customized to meet one's needs, goals and objectives. Determining factors such as capacity, performance, scalability, availability and reliability, data protection, available resources and budget concerns should be taken into consideration.

- Capacity - the amount and type of data (file level or block level) that needs to be stored and shared
- Performance - I/O and throughput requirements
- Scalability – Long-term data growth
- Availability and Reliability – how mission-critical are your applications?
- Data protection – Backup and recovery requirements
- IT staff and resources available
- Budget concerns

While one type of storage media is usually sufficient for smaller companies, large enterprises will often have a mixed storage environment, implementing different mediums for specific departments, workgroups and remote offices. In this paper, we will provide an overview of DAS, NAS and SAN to help you determine which solution, or combination of solutions, will best help you achieve your business goals.

The needs of large and small organizations differ, which will determine the type of storage media chosen.

DAS: Ideal for Local Data Sharing Requirements

Direct-attached storage, or DAS, is the most basic level of storage, in which storage devices are part of the host computer, as with drives, or directly connected to a single server, as with RAID arrays or tape libraries. Network workstations must therefore access the server in order to connect to the storage device. This is in contrast to networked storage such as NAS and SAN, which are connected to workstations and servers over a network. As the first widely popular storage model, DAS products still comprise a large majority of the installed base of storage systems in today's IT infrastructures.

Direct attached storage (DAS), in the form of independent drives, RAID arrays or tape libraries, is the most common storage architecture today.

Although the implementation of networked storage is growing at a faster rate than that of direct-attached storage, it is still a viable option by virtue of being simple to deploy and having a lower initial cost when compared to networked storage. When considering DAS, it is important to know what your data availability requirements are. In order for clients on the network to access the storage device in the DAS model, they must be able to access the server it is connected to. If the server is down or experiencing problems, it will have a direct impact on users' ability to store and access data. In addition to storing and retrieving files, the server also bears the load of processing applications such as e-mail and databases. Network bottlenecks and slowdowns in data availability may occur as server bandwidth is consumed by applications, especially if there is a lot of data being shared from workstation to workstation.

DAS is simple to implement and has the lowest initial cost in comparison to other storage solutions.

DAS is ideal for localized file sharing in environments with a single server or a few servers - for example, small businesses or departments and workgroups that do not need to share information over long distances or across an enterprise. Small companies traditionally utilize DAS for file serving and e-mail, while larger enterprises may leverage DAS in a mixed storage environment that likely includes NAS and SAN. DAS also offers ease of management and administration in this scenario, since it can be managed using the network operating system of the attached server. However, management complexity can escalate quickly with the addition of new servers, since storage for each server must be administered separately.

Although the uses for DAS vary from small to large businesses, it is ideal for localized file sharing in environments with a small number of servers.

From an economical perspective, the initial investment in direct-attached storage is cheaper. This is a great benefit for IT managers faced with shrinking budgets, who can quickly add storage capacity without the planning, expense, and greater complexity involved with networked storage. DAS can also serve as an interim solution for those planning to migrate to networked storage in the future. For organizations that anticipate rapid data growth, it is important to keep in mind that DAS is limited in its scalability. From both a cost efficiency and administration perspective, networked storage models are much more suited to high scalability requirements.

Even though DAS is less expensive to implement, it is limited in scalability, which makes a network storage solution ideal for higher scalability requirements.

Organizations that do eventually transition to networked storage can protect their investment in legacy DAS. One option is to place it on the network via bridge devices, which allows current storage resources to be used in a networked infrastructure without incurring the immediate costs of networked storage. Once the transition is made, DAS can still be used locally to store less critical data.

Cost effective bridge devices can protect an organization's investment by enabling the integration of legacy

NAS: File-Level Data Sharing Across the Enterprise

Networked storage was developed to address the challenges inherent in a server-based infrastructure such as direct-attached storage. Network-attached storage, or NAS, is a special purpose device, comprised of both hard disks and management software, which is 100% dedicated to serving files over a network. As discussed earlier, a server has the dual functions of file sharing and application serving in the DAS model, potentially causing network slowdowns. NAS relieves the server of storage and file serving responsibilities, and provides a lot more flexibility in data access by virtue of being independent.

With network-attached storage (NAS), the server still handles all of the processing of data but a NAS device delivers the data to the user

NAS is an ideal choice for organizations looking for a simple and cost-effective way to achieve fast data access for multiple clients at the file level. Implementers of NAS benefit from performance and productivity gains. First popularized as an entry-level or midrange solution, NAS still has its largest install base in the small to medium sized business sector. Yet the hallmarks of NAS - simplicity and value - are equally applicable for the enterprise market. Smaller companies find NAS to be a plug and play solution that is easy to install, deploy and manage, with or without IT staff at hand. Thanks to advances in disk drive technology, they also benefit from a lower cost of entry.

A NAS solution is cost effective and provides high performance and the ability for multiple clients to access data faster.

In recent years, NAS has developed more sophisticated functionality, leading to its growing adoption in enterprise departments and workgroups. It is not uncommon for NAS to go head to head with storage area networks in the purchasing decision, or become part of a NAS/SAN convergence scheme. High reliability features such as RAID and hot swappable drives and components are standard even in lower end NAS systems, while midrange offerings provide enterprise data protection features such as replication and mirroring for business continuance. NAS also makes sense for enterprises looking to consolidate their direct-attached storage resources for better utilization. Since resources cannot be shared beyond a single server in DAS, systems may be using as little as half of their full capacity. With NAS, the utilization rate is high since storage is shared across multiple servers.

NAS has developed more sophisticated functionality including high reliability features which result in a high utilization rate.

The perception of value in enterprise IT infrastructures has also shifted over the years. A business and ROI case must be made to justify technology investments. Considering the downsizing of IT budgets in recent years, this is no easy task. NAS is an attractive investment that provides tremendous value, considering that the main alternatives are adding new servers, which is an expensive proposition, or expanding the capacity of existing servers, a long and arduous process that is usually more trouble than it's worth. NAS systems can provide many terabytes of storage in high density form factors, making efficient use of data center space. As the volume of digital information continues to grow, organizations with high scalability requirements will find it much more cost-effective to expand upon NAS than DAS. Multiple NAS systems can also be centrally managed, conserving time and resources.

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Another important consideration for a medium sized business or large enterprise is heterogeneous data sharing. With DAS, each server is running its own operating platform, so there is no common storage in an environment that may include a mix of Windows, Mac and Linux workstations. NAS systems can integrate into any environment and serve files across all operating platforms. On the network, a NAS system appears like a native file server to each of its different clients. That means that

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files are saved on the NAS system, as well as retrieved from the NAS system, in their native file formats. NAS is also based on industry standard network protocols such as TCP/IP, FC and CIFS.

SANs: High Availability for Block-Level Data Transfer

A storage area network, or SAN, is a dedicated, high performance storage network that transfers data between servers and storage devices, separate from the local area network. With their high degree of sophistication, management complexity and cost, SANs are traditionally implemented for mission-critical applications in the enterprise space. In a SAN infrastructure, storage devices such as NAS, DAS, RAID arrays or tape libraries are connected to servers using Fibre Channel. Fibre Channel is a highly reliable, gigabit interconnect technology that enables simultaneous communication among workstations, mainframes, servers, data storage systems and other peripherals. Without the distance and bandwidth limitations of SCSI, Fibre Channel is ideal for moving large volumes of data across long distances quickly and reliably.

In contrast to DAS or NAS, which is optimized for data sharing at the file level, the strength of SANs lies in its ability to move large blocks of data. This is especially important for bandwidth-intensive applications such as database, imaging and transaction processing. The distributed architecture of a SAN also enables it to offer higher levels of performance and availability than any other storage medium today. By dynamically balancing loads across the network, SANs provide fast data transfer while reducing I/O latency and server workload. The benefit is that large numbers of users can simultaneously access data without creating bottlenecks on the local area network and servers.

SANs are the best way to ensure predictable performance and 24x7 data availability and reliability. The importance of this is obvious for companies that conduct business on the web and require high volume transaction processing. Another example would be contractors that are bound to service-level agreements (SLAs) and must maintain certain performance levels when delivering IT services. SANs have built in a wide variety of failover and fault tolerance features to ensure maximum uptime. They also offer excellent scalability for large enterprises that anticipate significant growth in information storage requirements. And unlike direct-attached storage, excess capacity in SANs can be pooled, resulting in a very high utilization of resources.

There has been much debate in recent times about choosing SAN or NAS in the purchasing decision, but the truth is that the two technologies can prove quite complementary. Today, SANs are increasingly implemented in conjunction with NAS. With SAN/NAS convergence, companies can consolidate block-level and file-level data on common arrays.

Even with all the benefits of SANs, several factors have slowed their adoption, including cost, management complexity and a lack of standardization. The backbone of a SAN is management software. A large investment is required to design, develop and deploy a SAN, which has limited its market to the enterprise space. A majority of the costs can be attributed to software, considering the complexity that is required to manage such a wide scope of devices. Additionally, a lack of standardization has resulted in interoperability concerns, where products from different hardware and software vendors may not work together as needed. Potential SAN customers are rightfully concerned about investment protection and many may choose to wait until standards become defined.

Storage Area Network (SAN) is a high-speed subnetwork of shared storage devices. A storage system is a device that contains nothing but a disk or disks for storing data.

SAN is ideal for bandwidth-intensive applications allowing large numbers of users to simultaneously access data without creating bottlenecks on the LAN and servers.

In relation to the other storage media, SANs provide the optimal utilization of resources, making it the best way to ensure predictable performance and 24x7 data reliability.

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Conclusion

With such a variety of information storage technologies available, what is the best way to determine which one is right for your organization? DAS, NAS and SAN all offer tremendous benefits, but each is best suited for a particular environment. Consider the nature of your data and applications. How critical and processing-intensive are they? What are your minimum acceptable levels of performance and availability? Is your information sharing environment localized, or must data be distributed across the enterprise? IT professionals must make a comprehensive assessment of current requirements while also keeping long-term business goals in mind.

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Like all industries, storage networking is in a constant state of change. It's easy to fall into the trap of choosing the emerging or disruptive storage technology at the time. But the best chance for success comes with choosing a solution that is cost-correct and provides long term investment protection for your organization. Digital assets will only continue to grow in the future. Make sure your storage infrastructure is conducive to cost-effective expansion and scalability. It is also important to implement technologies that are based on open industry standards, which will minimize interoperability concerns as you expand your network.

Ideally, organizations should choose a solution that is cost-correct and provides long term investment protection.

About Xtore

Xtore is a leading manufacturer of white box and custom storage systems for the OEM and solution provider markets. With over a decade of experience designing and manufacturing end-to-end storage solutions, Xtore is expert at providing customers with the storage technology they need, delivered 100% through the channel, to achieve long-term business goals. The company offers a wide variety of products including network-attached storage (NAS) and direct-attached storage (DAS) systems, fully customizable white box storage enclosures and custom OEM solutions. Xtore is privately held and headquartered in Los Angeles County, California, with additional business centers in Taiwan and Japan.

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