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NETWORK STORAGE AND ITS FUTURE

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ABSTRACT In the IT world storage becomes a serious issue. Information storage systems are the bedrock on which a modern company rests. Data has to be available to whoever needs it, whenever they need it, from wherever they may be. As a result, emphasis is beginning to shift from a processor centric view of the world towards a storage centric one. It is the information that holds the real value-the processing merely exposes it. Realizing this, model requires a storage system that can provide continuous, guaranteed accessibility to potentially vast quantities of shared information, with protection against both malicious attack and accidental failures, and scalability across a wide range of capacity and performance needs. Network based storage, combined with smart storage management, can provide it. This paper focuses on the proven approaches to network storage and their future.

i. Direct Attached Storage(DAS)
ii. Network Attached Storage(NAS)
iii. Storage Area Network(SAN)

1. INTRODUCTION

Computing is based on information. Information is the underlying resource on which all computing processes are based. Information is stored on storage media and is accessed by applications executing on a server. Often the information is a unique company asset. Information is created and acquired every second of every day. Information is the currency of business. To ensure that any business delivers the expected results, they must have access to accurate information, and without delay. The management and protection of business information is vital as well.

Fortunately" Network Storage" is becoming a common way to combat this problem.
A network storage system helps organize and save critical information created on a computer in an efficient and accessible manner .

First of all one has to know 'what is Network Storage' and some basic terminologies of it.

2. NETWORK STORAGE

In basic terms, **Network Storage** is simply about storing data using a method by which it can be made available to clients on the network.

Network storage is a generic term used to describe network based data storage, but there are many technologies within it which all go to make the magic happen.

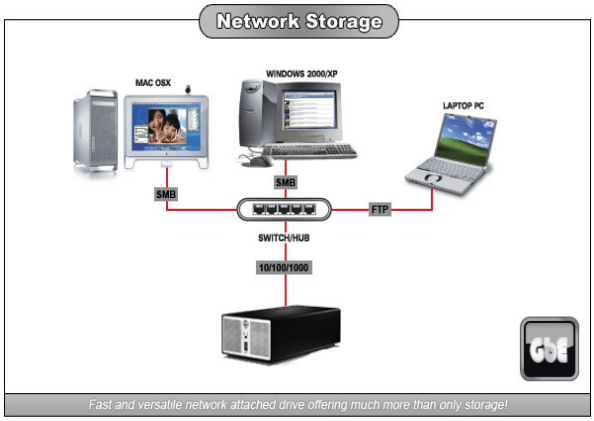

Fig1:Network Storage

EVOLUTION Over the years, the storage of data has evolved through various phases. This evolution has been driven partly by the changing ways in which we use technology and in part by the exponential increase in the volume of data we need to store. It has also been driven by new technologies, which allow us to store and manage data in a more effective manner. In the days of mainframes, data was stored physically separate from the actual processing unit, but was still only accessible through the processing units. As PC based servers became more commonplace, storage devices went **'inside the box'** or in external boxes that were connected directly to the system. Each of these approaches was valid in its time, but as our need to store increasing volumes of data and our need to make it more accessible grew, other alternatives

were needed. And network storage comes into play. The different technologies associated with Network Storage are described as followed.

2.1. DIRECT ATTACHED STORAGE

Storage solutions for small to medium size business (SMB) generally consist of two options

i. Direct Attached Storage
ii. Network attached Storage

Direct attached storage is the term used to describe a storage device that is directly attached to a host system.

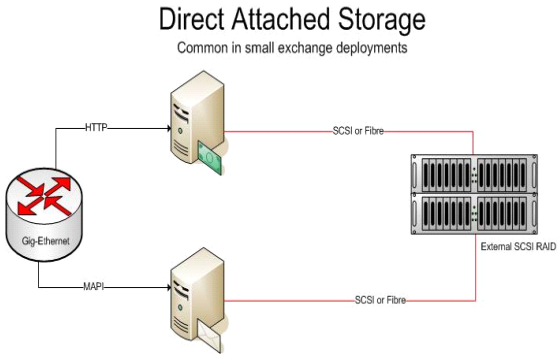

Fig2: Direct attached Storage

The simplest example of DAS is the internal hard drive of a server computer, though storage devices housed in an external box also is an example.

Fig3:DAS connected with client through LAN

Here In the above figure DAS is directly attached to server and the client is accessing the server through LAN. DAS is the peer-to-peer architecture resulting From the absence of switches in-between it and the servers.
DAS has several inherent limitations as described below.

i. STORAGE ADMINISTRATION

DAS box requires more storage administration. A DAS device typically needs a Host Bus Adapter(HBA) and significant configuration to work with the server.DAS solutions will have higher recurring administrative cost.

ii. OPERATIONAL DOWNTIME

Since the storage is attached directly to the network server, there is no way to get to the storage if the server is down for any reason. Bringing the server back and online and completing all necessary reconfiguration for it to work properly with the storage device can take hours.

iii. BUSINESS EFFICIENCY

If for SMB has business-critical data that is spread across multiple servers on the network then DAS is not a feasible one.DAS needs to be administered locally and individually, so it has a significant burden.

iv. SECURITY

DAS works in environments where scalability is not a big issue.

2.2. NETWORK ATTACHED STORAGE

i. Network Attached Storage or NAS, is a data storage mechanism that uses special devices connected directly to the network media. These devices are assigned an IP address and can then be accessed by clients via a server that acts as a gateway to the data or in some cases allows the device to be accessed directly by the clients without an intermediary. Benefit of the NAS is that in an environment with many servers running different operating systems, storage of data can be centralized, as can the security, management, and backup of the data.NAS access the data at **File-level**. It provides file-level interface to outside and block-level interface to storage subsystems.

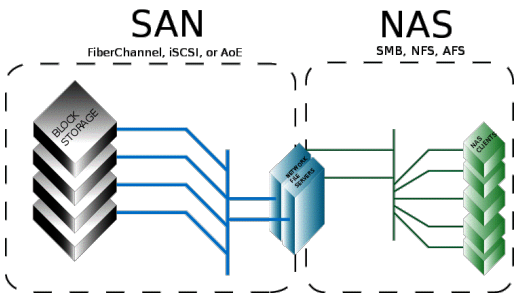

Fig4: Comparision between SAN and NAS

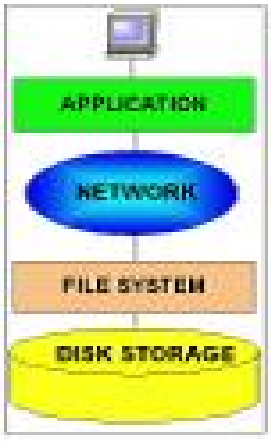

Fig5: Network Attached Storage

ii. **The features of NAS over DAS are**

It provides plug and play facility.NAS device is independent of network server. So Server Downtime doesn't affect it.It is less prone to failure than DAS.NAS offers higher reliability, greater ease of installation, performance and capability.

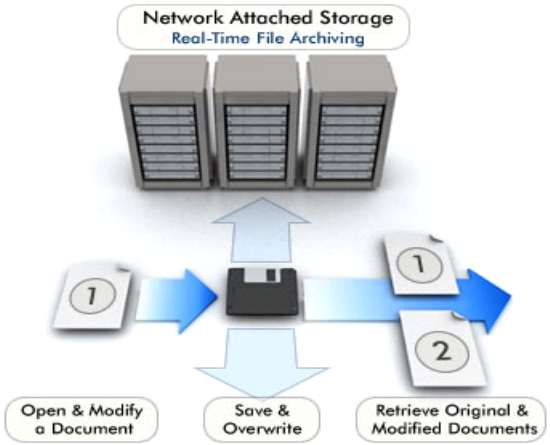

Fig6: Network Attached Storage

iii. NAS uses TCP/IP and IPX/SPX protocols for two clients to communicate and some file protocols such as SMB, CIFS, NCP, HTTP and NFS.

2.3 STORAGE AREA NETWORK:

i. A SAN is a network of storage devices that are connected to each other and to a server, or cluster of servers, which act as an access point to the SAN.SAN uses special switches to connect the devices. The switches are like normal Ethernet switches.

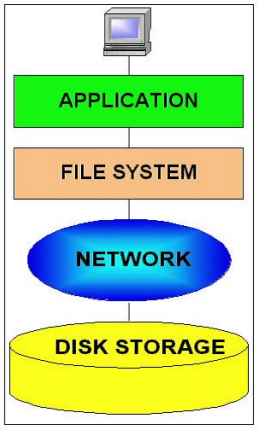

Fig7:Storage Area Network

ii. **Fiber Channel** is a technology used in SAN to interconnect storage devices allowing them to communicate at very high speeds. Fiber Channel also allows for devices to be connected over a much greater distance up to six miles. This allows devices in a SAN to be placed in the most appropriate physical location.

FIBRE CHANNEL

Fibre Channel is the predominant architecture upon which SAN implementations are built. Fiber Channel is an architecture used to carry IPI traffic, IP traffic, FICON traffic etc. Serial data transmission enables simpler cabling and connectors, and also routing of information through switched networks.
Reliable transmission of data with the ability to guarantee or confirm error free delivery of the data.
Flexibility in terms of the types of information which can be transported in frames (such as data, video and audio).
iii**. Security** is a major concern in case of SAN.

Access Control is performed by Authentication and Authorization.

Data Security is achieved by Data Integrity and Data Confidentiality.
Encryption is also another major of security and it involves different encryption mechanism schemes like DES, 3DES, AES etc.
Fibre Channel Authentication Protocol is used to protect the fibre channel.

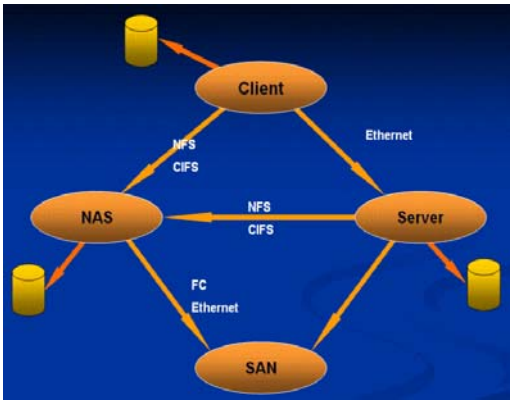

Fig8: Hybrid using NAS and SAN technologies.

BENEFITS

iv. SAN is Flexible. Other benefits include the ability to allow servers to boot from the SAN itself. It allows for a quick and easy replacement of faulty servers. SAN also tend to enable more effective **disaster recovery processes**. A SAN could span a distant location containing a secondary storage array.

3. SOME MORE IMPLEMENTATION AND EXAMPLE OF NETWORK STORAGE DEVICES

3.1 The **HP Storage Works X5000 Network Storage Gateways** add scalable file services and a file serving nodes to mid-range and enterprise customer SAN. The HP Storage Works X5000 Network Storage Gateways are file server nodes for Sanity provides uniform storage management.

3.2 Windows Powered NAS includes advanced availability features such as point-in-time data copies, replication and server clustering.


Fig9: Advanced feature of NAS

3.3**. Darknet** is another application of network storage.

Fig10: of some Network Storage Devices

4. FUTURE OF NETWORK STORAGE

Network storage pool accessibility using techniques such as **Cloud Storage**.
Individuals can use network storage as an extension or replacement of their directly attached drive.
Network Storage centralization can be achieved through **Virtualization**. Taking a technological leap to centralized virtual storage using converging technologies, moving towards more efficient and unified **Green technology** where data becomes available all the time.
Foe has emerged as the most recent building block component of the network storage technology, standardize by the T11 folks after two years of hard work. It is a piece of **Storage Virtualization**. Future Network Storage users are Wide-area high performance user, mobile/wireless users etc.

CONCLUSION:

Although **DAS** and **NAS** are available at nearly same price but **NAS** features a lower total cost of ownership than an equivalent DAS solution.NAS has superior performance,capabilities,higher reliability.**SAN** is also becoming a popular method of network storage due to the features of **Fibre channel** presents in terms of the number of storage nodes, ease of connectivity, and separation distance from the host servers. One of the key differences between NAS and SAN is the access method. Combining NAS and SAN features provides system architects the ability to balance data I/O for maximum efficiency.

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