



A Comparative Study between FC SAN and IP SAN

¹Dr A. Rajasekaran,

¹Associate Professor,
Dept of CSE,
SIMATS, Chennai.
shrisairaja@gmail.com

²Mr Nittala Datta Pavan
Kumar,

²UG scholar, Dept of ECE,
SCSVMV University,
Enathur, Kanchipuram.
dattanittala0606@gmail.com

³Mr Nishanth Kiruthivasan,

³UG scholar, Dept of ECE,
SCSVMV University,
Enathur, Kanchipuram.
nishvask@gmail.com

ABSTRACT:

This research paper offers a succinct explanation of storage networking and its prerequisites. Fibre Channel (FC) SAN and Internet Protocol (IP) SAN are two kinds of Storage Area Networks (SAN). We explore the IP SAN and FC SAN in this paper as well as how they compare to one another.

Keywords:- Internet Protocol (IP) Storage Area Network (SAN), Fibre Channel (FC) Storage Area Network, Internet Protocol (IP) Storage Area Network (SAN) vs. Fibre Channel (FC) Storage Area Network (SAN).

I. INTRODUCTION

Storage Area Network (SAN), as defined by the Storage Networking Industry Association, is primarily used to transport data between computer systems (SNIA). A network called a storage area network gives users access to connect two networks together. Because the Storage Area Network (SAN) has a management layer, which creates a link between the storage component and computer system, the data transfer is safe and reliable. The servers and storage devices are connected by a fast network called SAN. Beyond networks, one-to-one connections are possible with SAN. There are two different kinds of SANs: IP SAN and FC SAN.

Block-level data is sent over the network utilizing the Internet Small Computer System Interface (IP SAN) for Storage Area Networks (iSCSI).

A networking technique called Fiber Channel (FC) SAN is intended to facilitate extremely fast data transfer between computer systems and storage devices.

The only other choice for networked storage up to this point was the expensive, high-speed Fibre Channel SAN. Fibre Channel SAN provides a better throughput than IP SAN, although in some common scenarios, dedicated IP SANs with an iSCSI interface are a good alternative.

II. LITERATURE REVIEW

A. IP SAN:

The Internet Protocol, often known as IP SAN, is the most widely used type of worldwide telecommunications storage. This technology is easy to understand and utilise. IP technology is inexpensive. Many storage settings employ iSCSI, which is one of the practical and economical options in the IP SAN. For high-performance data storage, Direct Attached Storage (DAS) or a Fibre Channel (FC) Storage Area Network are required. As compared to Direct Attached Storage (DAS) or Fibre Channel Storage Area Network, IP Storage is now seen as being very cost-effective, simpler to operate, and less complicated (FC-

Instead of using the standard IP Network, IP SAN uses the Internet Small Computer System Interface (iSCSI) to transport the conventional high performance "block-level" storage data. Because IP Network Storage sought to provide centralized administration and control, remote mirroring, remote backup, and related applications are frequently found there.

These applications have no distance restrictions on IP networks. With IP Storage, maintaining numerous DAS systems in operation is simple and only requires a little amount of administration work.

Due to the rapid market acceptance of IP Network storage and the rising application obstacles, implementation and management storage are being abandoned. Intranasal technology was employed by IP Network storage to solve this issue. Many more applications use the Intransa IP Storage solution to benefit from the super high performance this technology offers. More than RAID secured storage, the Intransa IP Network storage solutions start at 3.75 terabytes (TB) and increase to 1000TB.

Merits:

IP-based storage is developing swiftly and is anticipated to provide advantages based on increases in throughput rates to fully interoperate storage components. SANs employed Gigabit Ethernet and other common IP networks for IP-based storage. A prominent recommendation for many IT groups is the use of Ethernet to build a SAN. Ethernet-based LANs have a strong industry standard. Most companies nowadays use IP and Ethernet networks, which is one of the benefits of IP-based storage networking. As a result, management and connectivity expenses for labor and equipment will be lower.

As Ethernet speeds expand more quickly than Fibre Channel speeds do, overall performance is enhanced. There are no distance restrictions for SAN, LAN, or WAN communication using IP. Due to recent connection developments, IP-based storage offers the door for recovery and remote backup over long distances. Fibre Channel and IP switches also alleviate



interoperability problems and enhance WAN communication. There are no distance restrictions with a Fibre Channel SAN because it uses IP for LAN, MAN, and WAN communication.

B. FC SAN:

Storage Area Network (SAN) solutions are based on essential designs like fibre channel. Data may be sent through Fibre Channel at incredibly fast rates. Data is sent at 16 Gbps and higher via recently developed systems. Most technical groups, dealers, and industry-wide standards bodies are accredited by Fibre Channel Standard. Fibre Channel architecture solutions on the market benefit from high speeds and excellent availability. Traffic including Intelligent Peripheral Interference (IPI) traffic, Fibre Channel Connection (FICON) traffic, Internet Protocol (IP) traffic, and Fibre Channel Protocol (FCP) SCSI traffic are all carried via a fibre channel network.

Traffic is also transported through Fibre Channel for the other protocols. The Fibre Channel Architecture is utilized by both FICON and FCP to carry traffic. With z/OS, the FICON protocol is utilized, and it will eventually substitute out the whole Enterprise System Connection (ESCON) Environment. Fiber Channel is a well-known and well-managed technology, with several companies producing FC segments for SANs.

Merits:

The Fibre Channel Network is a multi-layered network that is based on a series of American National Standard Institute (ANSI) standards. Its features and functions for data transmission over the network are defined by these standards. It contains the translations of many physical interfaces, such as cable lengths, signal strength, and distances. Data encoding and link controls, Shared Services, Data Delivery Regarding Frames, Protocol Interfaces, and Flow Control and Service Classes.

Useful in SANs with large IT User Bases. Framing, effectiveness, data communication, latency, routing control, and access control are all parts of communication and data overhead. Failure, Redundancy, and Availability. Topologies, speed, performance, distance, node connectivity, and cost are all flexible and scalable.

A. COMPARISION BETWEEN IP SAN AND FC SAN:

1) COST:

The iSCSI runs over the SCSI on a TCP/IP network. The deployment of such technology is made easier by extensive knowledge of and experience with IP networks. The common list price for the following components shows the cost variations between the IP SAN and Fibre Channel SAN topologies. The overall cost of the HBA, Switch, and drivers is covered in this table; it is a crucial factor.

NO.	Fibre Channel list price of tested	IP SAN list price of tested
1	\$1000 for the HBA (Host Bus Adaptor)	\$400 for the HBA (Host Bus Adaptor)
2	\$1000 for the switch (per port)	\$70-\$250 for the switch (per port)

3	Drivers included with HBA	Drivers free for Windows, NetApp and Linux
4	N/A for Network Interface Card (NIC)	\$50-\$100 for Network Interface Card (NIC)
5	Overall cost \$2000	Overall cost \$520-\$750

Table 1. Comparison on basis of cost

Above all components considering the lowest price range, the overall cost of iSCSI components is lower than that of Fibre Channel components. Fibre Channel is a higher-performance technology, but it is more costly, difficult to use, and demands special Fibre Channel knowledge.

2) PERFORMANCE:

According to a previous study done by other researchers, Microsoft's MS-Exchange server is a more capable tool for email, basic office correspondence, and work group planning. During the benchmarking test, a 20 GB database was made to represent the various mailboxes. It runs on a wide variety of tools and is mainly used as a component of both large and little hard work. The host was a server with four 7200 rpm ATA disc drives and a Pentium® Intel® four dual-processor (2 x 2.0 GHz) CPU.

The database was backed up for the Spectra Logic Spectra 20K sellotape library. Here, IP SAN and Fibre Channel SAN performance experiments were conducted using four Sony AIT-3 tape drives to see how each setup would balance and to identify any bottlenecks.

NO.	Fibre Channel Performance	IP SAN performance
1	DB Size is 20 GB	DB Size is 20 GB
2	Server performance- 2 x 2.0 GHz Pentium four, 7200 rpm ATA Disk Drives	Server performance- 2 x 2.0 GHz Pentium four, 7200 rpm ATA Disk Drives
3	RDBMS performance- MS-Exchange server 2000	RDBMS performance- MS-Exchange server 2000
4	(HBA) Host Bus Adaptor performance- Qlogic QLA-2200 (FC)	(HBA) Host Bus Adaptor performance- Intel PRO/1000 T IP (iSCSI)
5	Switch performance- Brocade Silkorm 3200, version 3.02	Switch performance- extreme summit 5i IP switch



6	Backup Hardware- four AIT-3 Tape drives (1 GB Fibre Channel, using G1 F-QIP), spectra 20 K	Backup Hardware- four AIT-3 Tape drives (1000 Base-T Ethernet, using G2 E-QIP), spectra 20 K
7	Backup Software- Veritas Backup Exec, version 9.0	Backup Software- Veritas Backup Exec, version 9.0

Table 2. Comparison on basis of performance

III. CONCLUSIONS

Storage networks are a logical complement to IP networks. IP-based storage networks will therefore be more prevalent and predictable than alternative technologies like Fibre Channel.

By aggregating storage, IP SAN can offer all the advantages of a more expensive FC SAN, including higher utilization, infinite scalability, offloading of storage traffic from the LAN, capacity consolidation across storage devices on the subnet, local or remote disaster recovery, snapshots, disk-to-disk backup, and failure. FC SANs, which are quite expensive, provide improved performance. IP SANs provide much lower performance at a lower price. IP SAN is becoming more and more popular when comparing price and performance.

Yet, IP SANs may have the same advantages as a Fibre Channel SAN without the expense, infrastructure difficulty, or distance restrictions. IP SANs would eventually replace Fibre Channel SAN; it was just a matter of time.

ACKNOWLEDGEMENT

I want to express my gratitude to all of my instructors, parents, and friends for believing in me and supporting me.

REFERENCES

- [1] Jaichandra.S, K.R. Prasannakumar, A Case Study on Different SAN Technologies – FC SAN and IP SAN, International Journal of Science, Engineering and Technology Research (IJSETR), Volume 4, Issue 6, June 2015.
- [2] Jon Tate, Pall Beck, Hector Hugo Ibarra, Shanmuganathan Kumaravel, Libor Miklas, *Introduction to Storage Area Networks*, IBM Redbooks, January 2016.
- [3] Raval, K.S., Suryawanshi, R.S., Naveenkumar, J. and Thakore, D.M., 2011. *The Anatomy of a Small-Scale Document Search Engine Tool: Incorporating a new Ranking Algorithm*. International Journal of Engineering Science and Technology, 1(3), pp.5802-5808.
- [4] Archana, R.C., Naveenkumar, J. and Patil, S.H., 2011. *Iris Image Pre-Processing And Minutiae Points Extraction*. International Journal of Computer Science and Information Security, 9(6), p.171.
- [5] Jayakumar, M.N., Zaeimfar, M.F., Joshi, M.M. and Joshi, S.D., 2014. INTERNATIONAL JOURNAL OF COMPUTER ENGINEERING & TECHNOLOGY (IJCET). Journal Impact Factor, 5(1), pp.46-51.
- [6] Naveenkumar, J. and Joshi, S.D., 2015. *Evaluation of Active Storage System Realized through MobilityRPC*.
- [7] Jayakumar, D.T. and Naveenkumar, R., 2012. SDjoshi,“. International Journal of Advanced Research in Computer Science and Software Engineering,” Int. J, 2(9), pp.62-70.
- [8] Jayakumar, N., Singh, S., Patil, S.H. and Joshi, S.D., *Evaluation Parameters of Infrastructure Resources Required for Integrating Parallel Computing Algorithm and Distributed File System*.
- [9] Jayakumar, N., Bhardwaj, T., Pant, K., Joshi, S.D. and Patil, S.H., *A Holistic Approach for Performance Analysis of Embedded Storage Array*.
- [10] Naveenkumar, J., Makwana, R., Joshi, S.D. and Thakore, D.M., 2015. *offloading compression and decompression logic closer to video files using remote procedure call*. Journal Impact Factor, 6(3), pp.37-45.
- [11] Naveenkumar, J., Makwana, R., Joshi, S.D. and Thakore, D.M., 2015. *Performance Impact Analysis of Application Implemented on Active Storage Framework*. International Journal, 5(2).
- [12] Salunkhe, R., Kadam, A.D., Jayakumar, N. and Thakore, B., *In Search of a Scalable File System State-of-the-art File Systems Review and Map view of new Scalable File system*.
- [13] Salunkhe, R., Kadam, A.D., Jayakumar, N. and Joshi, S., *Luster A Scalable Architecture File System: A Research Implementation on Active Storage Array Framework with Luster file System*.
- [14] Jayakumar, N., *Reducts and Discretization Concepts, tools for Predicting Student's Performance*.
- [15] Jayakumar, M.N., Zaeimfar, M.F., Joshi, M.M. and Joshi, S.D., 2014. INTERNATIONAL JOURNAL OF COMPUTER ENGINEERING & TECHNOLOGY (IJCET). Journal Impact Factor, 5(1), pp.46-51.
- [16] Kumar, N., Angral, S., and Sharma, R., 2014. *Integrating Intrusion Detection System with Network Monitoring*. International Journal of Scientific and Research Publications, 4, pp.1-4.
- [17] Namdeo, J. and Jayakumar, N., 2014. *Predicting Students Performance Using Data Mining Technique with Rough Set Theory Concepts*. International Journal, 2(2).
- [18] Naveenkumar, J., *Keyword Extraction through Applying Rules of Association and Threshold Values*. International Journal of Advanced Research in Computer and



- Communication Engineering (IJARCCE), ISSN, pp.2278-1021.
- [19] Kakamanshadi, G., Naveenkumar, J. and Patil, S.H., 2011. *A Method to Find Shortest Reliable Path by Hardware Testing and Software Implementation*. International Journal of Engineering Science and Technology (IJEST), ISSN, pp.0975-5462.
- [20] Naveenkumar, J., and Raval, K.S., *Clouds Explained Using Use-Case Scenarios*.
- [21] Naveenkumar J, S.D.J., 2015. *Evaluation of Active Storage System Realized Through Hadoop*. International Journal of Computer Science and Mobile Computing, 4(12), pp.67–73.
- [22] RishikeshSalunkhe, N.J., 2016. *Query Bound Application Offloading: Approach Towards Increase Performance of Big Data Computing*. Journal of Emerging Technologies and Innovative Research , 3(6), pp.188–191.
- [23] Sagar S lad s d Joshi, N.J., 2015. *Comparison study on Hadoop's HDFS with Lustre File System*. International Journal of Scientific Engineering and Applied Science , 1(8), pp.491–494.
- [24] Salunkhe, R. et al., 2015. *In Search of a Scalable File System State-of-the-art File Systems Review and Map view of the new Scalable Filesystem*. In international Conference on electrical, Electronics, and Optimization Techniques (ICEEOT) - 2016. pp. 1–8.
- [25] BVDUCOE, B.B., 2011. *Iris Image Pre-Processing and Minutiae Points Extraction*. International Journal of Computer Science & Information Security.
- [26] P. D. S. D. J. Naveenkumar J, “*Evaluation of Active Storage System Realized through MobilityRPC*,” *Int. J. Innov. Res. Comput. Commun. Eng.*, vol. 3, no. 11, pp. 11329–11335, 2015
- [27] N. Jayakumar, S. Singh, S. H. Patil, and S. D. Joshi, “*Evaluation Parameters of Infrastructure Resources Required for Integrating Parallel Computing Algorithm and Distributed File System*,” *IJSTE*, vol. 1, no. 12, pp. 251–254, 2015.
- [28] N. Jayakumar, T. Bhardwaj, K. Pant, S. D. Joshi, and S. H. Patil, “*A Holistic Approach for Performance Analysis of Embedded Storage Array*,” *Int. J. Sci. Technol. Eng.*, vol. 1, no. 12, pp. 247–250, 2015.
- [29] J. Naveenkumar, R. Makwana, S. D. Joshi, and D. M. Thakore, “*Performance Impact Analysis of Application Implemented on Active Storage Framework*,” *Int. J.*, vol. 5, no. 2, 2015.
- [30] N. Jayakumar, “*Reducts and Discretization Concepts, tools for Predicting Student's Performance*,” *Int. J. Eng. Sci. Innov. Technol.*, vol. 3, no. 2, pp. 7–15, 2014.
- [31] J. Namdeo and N. Jayakumar, “*Predicting Students Performance Using Data Mining Technique with Rough Set Theory Concepts*,” *Int. J. Adv. Res. Comput. Sci. Manag. Stud.*, vol. 2, no. 2, 2014.
- [32]. R. Salunkhe, A. D. Kadam, N. Jayakumar, and S. Joshi, “*Luster A Scalable Architecture File System: A Research Implementation on Active Storage Array Framework with Luster file System.*,” in *ICEEOT*, 2015.