



NCSA

QLogic Data Management and iSCSI Routing Products Boost Supercomputing Lab Productivity

Challenge

Maintain continuous data availability, even during SAN maintenance activities; reduce SAN costs by optimizing the use of expensive Fibre Channel connections at scientific research facility

Solution

Two QLogic® SANbox® 8202 Storage Services Platform routers and StoreAge® SVM™ (Storage Virtualization Manager) appliances enable non-disruptive data migration within a 60TB virtualized SAN; one QLogic SANbox 6140 Intelligent Storage Router enables low-bandwidth servers to connect to the SAN through inexpensive iSCSI connections

Benefit

Lab tests of a virtualized SAN showed how researchers could be more productive with uninterrupted access to critical applications, while other tests revealed how the organization could significantly cut SAN connection costs without sacrificing application performance

The National Center for Supercomputing Applications (NCSA) recently celebrated its 20th anniversary. This milestone marked some of the most groundbreaking developments in the world of computing—including the development of Mosaic, the first popular Internet browser, as well as the current use of 102 teraflop supercomputing in the TeraGrid for exciting new scientific research projects.

Besides having such advanced technology, the more mundane aspects of systems design—reliability and cost effectiveness—are also important to the success of NCSA. “Our reputation for performing extraordinary research helps us attract funding that might otherwise go to other research facilities,” said Andy Loftus, system engineer at the NCSA. “And to ensure that we use every dollar of funding to its greatest advantage, we are always looking for ways to operate more efficiently, reliably, and cost-effectively.”

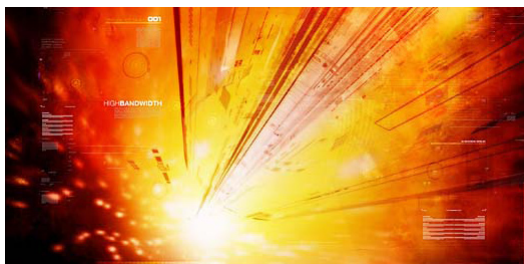
A Virtualized SAN Enables Non-Disruptive Data Migration

A recent presentation about storage virtualization, given by QLogic to the NCSA technical staff, led Loftus to investigate new ways of improving operations by reducing application downtime due to storage area network (SAN) maintenance. The visiting engineers showcased the QLogic SANbox 8202 Storage Services Platform (SSP), with extensive storage virtualization, management, and data protection capabilities. These possibilities intrigued Loftus, because the SANbox 8202 could help reduce application downtime when administrators perform maintenance on the SAN.

“In addition to preventing disruptions in research, the SANbox 8202 has the ability to non-disruptively consolidate SAN management tasks—which improves data protection and reduces the amount of time needed to keep information flowing,” Loftus said. “Most SANs with multiple storage arrays usually require separate management systems for each vendor-specific piece of hardware. The QLogic SSP consolidates these tasks into a single interface across all RAID platforms.”

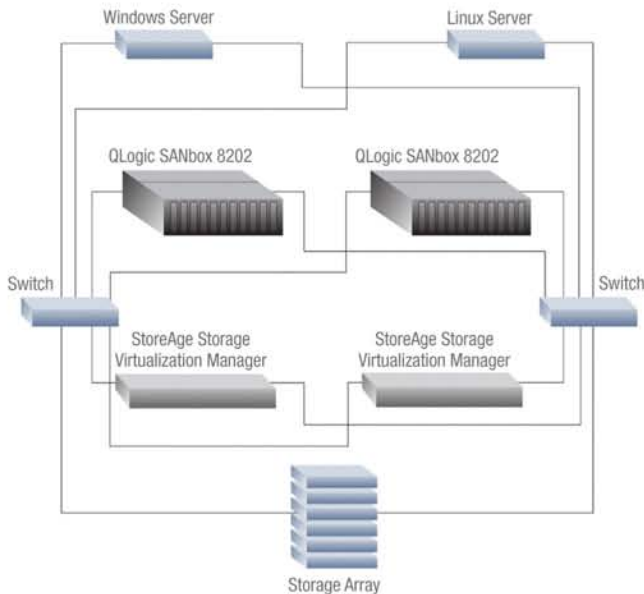
To evaluate the potential of the QLogic SSP in an NCSA SAN, Loftus installed two redundant 2Gbps SANbox 8202 storage management routers bundled with two StoreAge SVM appliances. The QLogic devices first identify the data to be migrated and then direct the appropriate storage devices in the SAN to conduct the migration. The test SAN also included a DataDirect Networks SANDataDirector storage array, Brocade® SilkWorm® switches, one server running Red Hat® Enterprise Linux® Advanced Server 4, and another server running Microsoft® Windows Server® 2003.

According to Loftus, installation and integration with the SAN fabric was rapid, thanks to the design of the QLogic SSP, which allows virtualized storage devices from all vendors to appear simply as another set of storage arrays to the SAN switches.



“Our tests proved that the QLogic approach to consolidated storage management and virtualization helps reduce application downtime during SAN maintenance. Additionally, QLogic intelligent storage routers are extraordinarily effective at reducing host connection costs for SANs using Fibre Channel arrays.”

— Andy Loftus, System Engineer, National Center for Supercomputing Applications



This illustration shows how the QLogic SANbox 8202 Storage Services Platform router and management appliance enable non-disruptive data migration within a 60TB virtual SAN at the NCSA. Connected to the SAN fabric via Fibre Channel switches, the QLogic devices present virtual storage to the hosts and redirect data traffic to the appropriate physical disk array. The StoreAge SVM appliance aids in defining and managing the virtual storage. Other components in the test SAN include a DataDirect Networks SANDataDirector 8500 storage array, Brocade SilkWorm switches, one server running Red Hat Enterprise Linux Advanced Server 4, and another server running Windows Server 2003.

Storage Virtualization Enables Planned Maintenance Without Downtime

The evaluation conducted by Loftus showed that administrators using the SANbox 8202 storage management routers could easily migrate data off physical drives without disrupting applications or slowing SAN performance. "We could then mirror and stripe data without worrying about impacting the attached servers," he said.

By improving uptime at NCSA, Loftus' team can help researchers gain more computer time for their research. "According to my test results, eliminating

application downtime with the SANbox 8202 storage management routers would allow researchers to continue accessing critical data during SAN maintenance windows. Storage administrator duties would be simplified by the ability to manipulate physical storage without affecting users," said Loftus.

QLogic Intelligent Storage Routers Cut SAN Connection Costs

Focusing on his second objective, Loftus used a 4TB test SAN to evaluate another QLogic product mentioned by the visiting engineers, which could improve SAN cost-effectiveness. "I was interested in evaluating the QLogic SANbox 6140 Intelligent Storage Router as a way to reduce the number of expensive Fibre Channel connections between servers and the SAN," Loftus said. "By using iSCSI over Ethernet links—which are typically fast enough for low-bandwidth applications—we could connect servers to the SAN fabric."

But the key question was whether application performance similar to HBA connections could be attained through Ethernet connections. To evaluate the QLogic SANbox 6140 Intelligent Storage Router, Loftus configured a 4TB test SAN with two attached servers—one running Linux and one running Windows. Storage was provided by a SANDataDirector disk array in a remote data center a block away from the test lab. An existing 10Gbps local area network linked the two locations. After evaluating the performance of low-bandwidth applications with hosts connected to the router via iSCSI HBAs, Loftus then repeated these tests using a software-only solution.

"Our test results showed that the SANbox 6140 is an ideal way to lower the cost of connecting low-bandwidth servers to a SAN fabric," Loftus said. "There were no significant performance differences between routing applications over iSCSI HBAs and iSCSI software-only host drivers. Since the average speed of applications tested was only 45MB/s—far below the capacity of either connection—we had more than enough bandwidth for programs such as word processing or e-mail."

Tiered Storage Management Makes Research More Productive

Providing continuous data availability in a SAN often requires the integration of several approaches. Loftus said, "Our tests of the SANbox 8202 and SANbox 6140 suggest that using both products in a tiered approach to SAN management can provide more uptime while also lowering the costs of data access. These features are critical for organizations like the NCSA where both IT performance and cost-effectiveness affect researcher productivity."



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