

► Challenge

- ITCOM needed to expand their infrastructure to support new services.
- ITCOM required a new storage architecture that allowed volume sharing for clustering, fault-tolerance for 24x7 services, flexibility, performance and simple management.
- They needed to use the existing Ethernet network, capitalize on the knowledge base of their personnel, and avoid expanding their staff.

► Solution

- iSCSI running over Gb Ethernet for the storage network architecture and in-band storage virtualization for volume management. The iSCSI Virtualization Switch from SANRAD was selected because it provided host iSCSI connectivity to diverse storage systems and offered in-band volume management thru virtualization.

► Benefits

- In-band volume virtualization provided clustered members with a shared volume and enabled simple volume configuration.
- The combination of windows-clustered servers, redundant active/active V-Switches with multiple connections to the servers, and multi-path connections between the V-Switches and the mirrored FC disk systems provide a highly available architecture.

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Pradip Patel, Manager of Transmission Systems
Engineering for ITCOM / ITCS



University of Michigan Unveils Virtualized iSCSI IP SAN

University of Michigan Information Technology Communications Services - or ITCOM - is part of the Information Technology Central Services Division (ITCS) of the University of Michigan. ITCOM provides mission critical services to students, faculty, and staff at the University's Ann Arbor, Flint, and Dearborn campuses.

ITCOM will be providing three new services within the University. ITCOM is currently testing a new messaging system that has the ability to combine voice, fax and email messages in a single service. Data storage services are also being developed for progressive on-campus departments like the School of Information and U-M Medical Center. Lastly, a network infrastructure expansion project is in the process of being deployed to include another university over 600 km away.

ITCOM needed to expand their infrastructure to support these new services. ITCOM installed over 30 high-end servers, many in dual-node clusters, to provide a new processing platform to support the new services. In addition to the new servers, ITCOM required a new storage architecture that allowed volume sharing for clustering, fault-tolerance for 24x7 services, in addition to flexibility, performance and simple management to provide storage services over the vast infrastructure. Moreover, they needed to use the existing Ethernet network, capitalize on the knowledge base of their personnel, and avoid expanding their staff.

The ITCOM team decided on iSCSI running over Gb Ethernet for the storage network architecture and in-band storage virtualization for volume management. The iSCSI Virtualization Switch from SANRAD was selected because it provided host iSCSI connectivity to diverse storage systems and offered in-band volume management thru virtualization.



SANRAD and ITCOM teamed to support ITCOM during the pilot phase and production implementation. The products were first systematically and commercially tested in the university (IT-COM) laboratory before heading into production. By using iSCSI drivers on campus computers and having the iSCSI V-Switch in the data centers, any campus server, server cluster, department desktop, student laptop or remote system connected to the University Ethernet network could read and write data to FC or SCSI storage systems located within the ITCOM data centers. In addition to access and protocol conversion, the V-Switch provided ITCOM administrators with a network centric volume management solution using in-band, block-level storage virtualization. This was an important combination because three major projects were enabled by iSCSI and Virtualization – SSP (Storage Service Provider) or just storage services, a new mission critical messaging system and a network expansion project.

“ITCOM has a state of the art iSCSI deployment for mission critical applications,” states Zophar Sante’, VP of Market Development for SANRAD. “It’s multiple applications being enabled by a single storage solution. This shows the power of iSCSI and virtualization when put into the hands of IT experts.”

“Virtualization was a critical feature for our SSP model,” commented Pradip Patel, Manager of Transmission Systems Engineering for ITCOM / ITCS. “We are a Telco and an SSP wrapped into one. As an SSP, we provide customized storage volumes with different capacity, performance, and redundancy properties. Every account and application is different and virtualization provided a key to giving our hosted applications exactly the type of storage they needed for each application. With iSCSI we can deliver storage services and data access to any department or person on the network.” The network architecture allowed ITCOM to become an efficient and reliable SSP.

“The new messaging service was another application that benefited from iSCSI and virtualization,” comments Mr. Patel. “The new messaging system utilizes three Window 2000 dual-node clusters connected using iSCSI to a failover pair of fault-tolerance iSCSI V-Switches. Close to a TeraByte of multi-pathed and mirrored FibreChannel disk provides voice mail storage space for the campus. The voice mail system is considered mission critical by the University. The configuration must be available 24x7 and comply with Telco specifications of less than 10 minutes of downtime per year or 99.999% availability. The combination of windows-clustered servers, redundant active/active V-Switches with multiple connections to the servers, and multi-path connections between the V-Switches and the mirrored FC disk systems provide a highly available architecture. In-band volume virtualization provided clustered members with a shared volume and enabled simple volume configuration, storage allocation and the addition of more disk drives without having to interrupt critical applications.”

In addition to storage servers and a new messaging system, the ITCOM, video network engineering was investigating expansion of the network infrastructure to another remote university. “Telephone, video and data networks are the doorway to accessing information crucial to participating in the educational community,” states Dan Hague, Senior Video Engineer for ITCOM. “We needed to find a way to expand our data and video network to encompass another university 600 km away. We installed iSCSI drivers on the remote servers and gave that university access, over an Internet 2 connection, to an iSCSI V-Switch located in the ITCOM labs.

This in turn was connected to the physical Fibre Channel storage systems that housed the video files that we wanted to share with the other school. We tested our video streaming application between ITCOM and the other university. We experienced performance of over 7000 packets per second.



The performance met our requirement for speed; it was faster than our direct attached SCSI drives,” continues Mr. Hague. “Another key to this solution for ITCOM was that we wanted to avoid custom host agents at all costs. Imagine the challenge and cost of maintaining host agents within a network this size and among thousands of systems.”

iSCSI is a standard IETF protocol, V-Switches perform in-band volume management and storage virtualization, so no host agents were needed. Everything is controlled from a single, network centric platform independent of the host systems.

Several high-end iSCSI V-Switches from SANRAD are in operation at University of Michigan ITCOM. More systems are planned as ITCOM continues to develop different applications and services using iSCSI and in-band storage virtualization.

