

► Challenge

To find a solution that is both faster than File Transfer Protocol (FTP) and more cost-effective than Fibre Channel that would allow large quantities of encoded digital video data to be transferred between the two universities.

► Solution

Equipping the video encoder with an iSCSI host bus adapter that implements the Microsoft iSCSI initiator and connects to the SANRAD iSCSI V-Switch.

► Benefits

- Faster transfer time compared to FTP
- Significant cost-savings over Fibre Channel
- Full availability and seamless management of stored information across standard Ethernet networks
- iSCSI V-Switch convergence of multiple functions provides all-in-one iSCSI storage networking solution

"I came to find out that nobody had ever done iSCSI that far, ever. Because of the Internet2 high bandwidth connections between our Universities, iSCSI implemented over hundreds of miles works."

Dan Hague, Senior Video Engineer
INFORMATION TECHNOLOGY CENTRAL SERVICES
AT THE UNIVERSITY OF MICHIGAN



Universities of Michigan and Indiana Build a High-Speed Storage Infrastructure with SANRAD

Joint Project Undertaken to Preserve Rare Ethnomusicological Video Research

Lester Monts, Ph.D., of the University of Michigan and Ruth Stone, Ph.D. from Indiana University in Bloomington have spent much of their careers collecting vast libraries of videotape documenting the musical and dance traditions of cultures from around the world, such as the Kpelle and Vai tribes of Liberia. Much of this irreplaceable video footage was in danger of being lost forever, succumbing to the degradation of video tape due to age.

These video documents are now in the process of being permanently preserved in digital format and made accessible to students and other researchers because of an innovative joint project undertaken by the two universities that leverages a high-speed storage infrastructure built around SANRAD's iSCSI V-Switch.

The Ethnomusicological Video for Instruction and Analysis (EVIA) Digital Archive project is a joint effort of Indiana University and the University of Michigan with a grant from the Andrew W. Mellon Foundation to establish a digital archive of ethnomusicological video for use by scholars and instructors. Ultimately, the EVIA Digital Archive intends to preserve video recordings and make them easily accessible for teaching and research, providing an alternative to physical archives whose unique materials are available only to people who travel to the archive location. The digital video files will include accompanying metadata containing annotations and analysis of video content by the scholars who made the recordings.



The most critical aspect of the project is the initial preservation phase, transferring the fragile analog video footage into a digital format that will then be used to create digital masters of the footage as well as multiple online digital copies of varying sizes and quality to make the archives easily accessible to students and researchers.

The initial phase of the project aims to digitize 150 hours of video compiled by Drs. Monts, Stone and other professors. The video digitizing, editing, annotating and cataloging will be done at the University of Michigan. The final digital files will be stored at Indiana University as part of the school's Massive Data Storage System. The EVIA video will complement IU's existing Archives of Traditional Music, the largest university-based ethnographic sound archives in the United States.

The digital conversion is handled by an off-the-shelf PC running Windows 2000 Server and equipped with an Argus Spectrum MPEG encoder from Vela Research. The analog video is encoded in high-quality MPEG 4.2.2 format at a continuous bit rate of 50 Mbps in a real-time process, so that an hour of video takes an hour to encode.

The original plan called for the Michigan team to capture the digital video files on the Windows server and then send those files to another location via File Transfer Protocol (FTP) for further editing and processing. That approach immediately presented some serious problems according to Dan Hague, Senior Video Engineer for Information Technology Central Services at the University of Michigan at the time of the project.

"It was difficult because this encoder only had a 6 gigabyte hard drive on it. So if we wanted to do the maximum quality possible with MPEG 4.2.2, the drive was too small," said Hague. "These professors have one- or two-hour tapes and I can't get enough hard drives at 50 Mbps into my encoder to make that work.

"Second, that's not what we wanted anyway. Why do two steps? After all, these are huge files, from 9 GB to 20 GB files depending on the length of the video, and we had to get that over to where it's going to be stored so that would have been a separate step. So when you try to move a 20 GB file over CIFS using Windows file transfer you might as well start the job and then go home because you're done for the day."

Implementing the iSCSI SAN with the SANRAD V-Switch solved the storage and file transfer problems in a single stroke. The Windows server hosting the Vela encoder is now equipped with an iSCSI host bus adapter that implements the Microsoft iSCSI initiator and connects to the SANRAD iSCSI V-Switch. The V-Switch has 2 terabytes of disk capacity attached on the SAN that is accessible to store video files once processed by the Vela encoder. Leveraging that SAN-based storage eliminates the need to FTP the digitally encoded video files to another location.

"With iSCSI as I'm encoding in real time, and this stuff is going to where it belongs in real time so I don't have to set up this file transfer to run all night and close up the room so no one messes up my transfer," said Hague. "As soon as that first video's done, I just stop it and put in the next video. The time savings really start to make a difference when you have 30 instructors' lifetime work to encode."

"When we originally put a different SANRAD V-Switch in the remote campus for a different purpose we allocated some of the storage for their use and actually it was the first time they could use it the way they intended," said Yariv Glaser, President of YaGUSA Technology and a consultant on the project. "The purpose of the other installation was not for the video, but network-wise since it was at the same place, we used that in order to have the server connect the Vela machine so it could encode directly into the storage. This was the first time they could do that at a high video rate. It was even faster than going to a local drive."



As part of the product evaluation, the U of M team was testing the SANRAD V-Switch and other iSCSI solutions with a series of Macintosh-based video encoding demonstrations, including a stress test with three concurrent sessions from FinalCut Pro 4 and iMovie sent to the iSCSI storage attached to the switch. "SANRAD was the only one we could encode," said Glaser. "This was the only robust iSCSI that we tried that worked."

SANRAD's innovative iSCSI V-Switch introduce all-in-one iSCSI storage networking, guaranteeing the full availability and seamless management of stored information across standard Ethernet networks, affording a complete storage continuity solution that is easy to deploy with excellent price/performance. iSCSI V Switch is a convergence of functions, which include protocol bridging, storage routing, switching, security, load-balancing, high availability and volume management within a single easy to manage platform designed to reduce the inherent complexity of storage networks. The V-Switch-based iSCSI SAN enabled the EVIA project to deploy a reliable, high-speed storage network that could meet the high-bandwidth requirements for digital video at a fraction of the cost a comparable performing Fibre Channel-based SAN.

When the digitizing and video annotation have been completed at the University of Michigan the digital video files will be permanently stored at the Indiana's Massive Data Storage System, a large-scale data center using IBM Shark storage arrays. Hague demonstrated this technology to IU about a year ago in Bloomington and they have since agreed to incorporate it into the EVIA project workflow.

"I came to find out that nobody had ever done iSCSI that far, ever," said Hague. "The vendors were talking about it as a data center replacement to pick up low-end to mid-range servers and never had an idea that you could reach between states. Because of the Internet2 high bandwidth connections between our Universities, iSCSI implemented over hundreds of miles works. With this test we further proved that connecting an iSCSI host anywhere across our 5 mile U of M Ann Arbor campus is a workable central storage solution."

In fact, campuses around the country are embracing the SANRAD I-SCSI V-Switch for its performance, value and high-availability architecture. The University of Michigan has previously installed multiple SANRAD units to create an iSCSI SAN with more than 18,000 users. The University of Alabama at Birmingham and the Department of Epidemiology and Biostatistics at the University of California San Francisco have installed iSCSI V-Switches to solve their storage problems.

The first phase of EVIA Digital Archive project with the first 150 hours of digital video files is scheduled for completion next year. If the project goes as expected, it will provide an ongoing repository to collect ethnomusicological videos from around the world, providing a rich research resource for the study of many cultures that are now extinct.