

CUSTOMER PROFILE



ECU reduces IT costs and energy consumption with EMC solutions

Today's universities are driven by intense demands for a broad range of information services, with expectations of five-nines (99.999 percent) availability, virtually unlimited infrastructure capacity, exceptional performance and high data security. East Carolina University (ECU) understands these rigorous requirements firsthand.

Founded in 1907 as a school for training teachers, ECU today is an emerging national research university with an enrollment of more than 24,000 students and 7,000 faculty and staff. ECU supplies the nation with some of its best educators, while also offering programs of high distinction in healthcare and the arts. A constituent institution of the University of North Carolina, ECU offers 104 bachelor's degree programs, 74 master's degree programs, four specialist degree programs, one first-professional M.D. program, and 17 doctoral programs in its professional colleges and schools.

Benefits

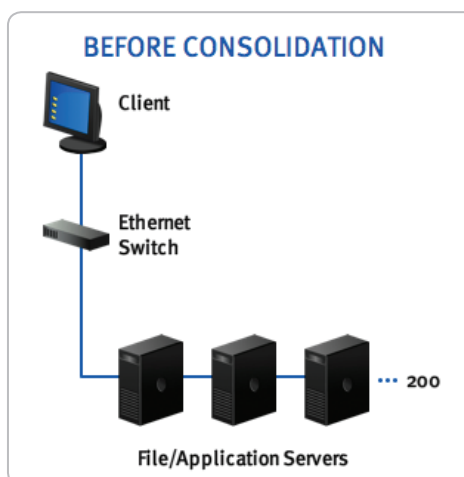
- Eliminated 156 servers and enabled \$1.8 million savings in reduced equipment overhead and cost avoidance
- Reduced power consumption by 660 megawatts per year.
- Recovered 1,200 sq. ft. of floor space with a total recovery expected to reach 3,000 sq. ft.
- Achieved recovery-point objectives of 10 minutes for NAS and zero for SAN environments
- Total site recovery of critical applications decreased from up to seven days to about one hour

Information growth demands major consolidation

At ECU, the volume of information used by faculty, staff, and students has doubled every year for the past three years, largely due to increased use of large video files for distance learning and more centralized management of data from departments across the university. Such growth created a challenge for ECU's IT organization to maintain sufficient capacity and be able to respond to ongoing requests for new services. Among the fastest growing areas in the infrastructure is file space allocated to individuals, as well as departmental folders for 200 academic and administrative departments. Popular university applications, such as Blackboard academic tools, web portals, Microsoft Exchange, Microsoft SQL Server, Microsoft SharePoint, and Oracle, also continued to grow dramatically.

As the number of Dell PowerEdge file servers grew to nearly 50 and Dell PowerEdge application servers soared to 150 (see Figure 1), ECU began working closely with EMC Corporation and its Global Services unit to design and implement a solution to consolidate and virtualize its entire information infrastructure.

Figure 1: Customer Infrastructure Before Consolidation



Challenges

- Increasing use of online applications, such as e-mail and distance learning, was driving rapid growth of storage and server environments.
- The university data center was running out of physical space and energy resources.
- The disaster recovery infrastructure was no longer meeting demand for more applications to be available 24x7.

EMC Solutions

- EMC Celerra network-attached storage (NAS) gateway to EMC CLARiiON CX3-80 SAN
- EMC Centera content-addressed storage
- EMC DiskXtender software
- EMC PowerPath software
- EMC Celerra Replicator software
- EMC MirrorView/S software
- EMC Centera Replicator software
- VMware ESX Server
- VMware High Availability (HA)
- VMware Distributed Resource Scheduler (DRS)
- VMware VMotion

NAS consolidates both Windows and UNIX data efficiently

ECU credited EMC® Global Services with recommending creative, proactive strategies for managing the rampant growth of the university's information services. One such approach was to solve a portion of ECU's energy shortage by consolidating its stand-alone file servers onto an EMC Celerra® NS80G NAS gateway solution.

The Celerra NS80G NAS gateway, which connects to storage resources on ECU's EMC CLARiiON® CX3-80 storage array, consolidates storage for CIFS and NFS file systems, enabling ECU to support both Windows and UNIX applications with a single NAS solution. ECU chose this gateway approach to utilize its CLARiiON investment more fully and to enable faster file access and greater capacity than possible with standard NAS.

Today, file servers, departmental folders, and course data for ECU's Blackboard online course delivery system are all efficiently run off the NAS solution while sharing storage resources on the CLARiiON for virtually limitless expansion with no need for individual servers.

Server virtualization results in further consolidation and savings

To further alleviate its energy crisis, ECU's strategy was to virtualize any other applications that could not be consolidated on NAS. The university engaged Dell Professional Services to conduct a VMware® assessment over a two-week period to identify applications best suited for virtualization. The assessment involved evaluating current application workloads and resource requirements, and determining which application workloads could be combined on physical systems without causing resource constraints. Based on this assessment, ECU selected its departmental application servers, web portals, SQL Servers, and departmental Oracle servers as the best choices for virtualization. ECU then implemented VMware ESX Server™ software to create virtual machines—fully functional systems capable of operating just like a physical computer—to run these applications.

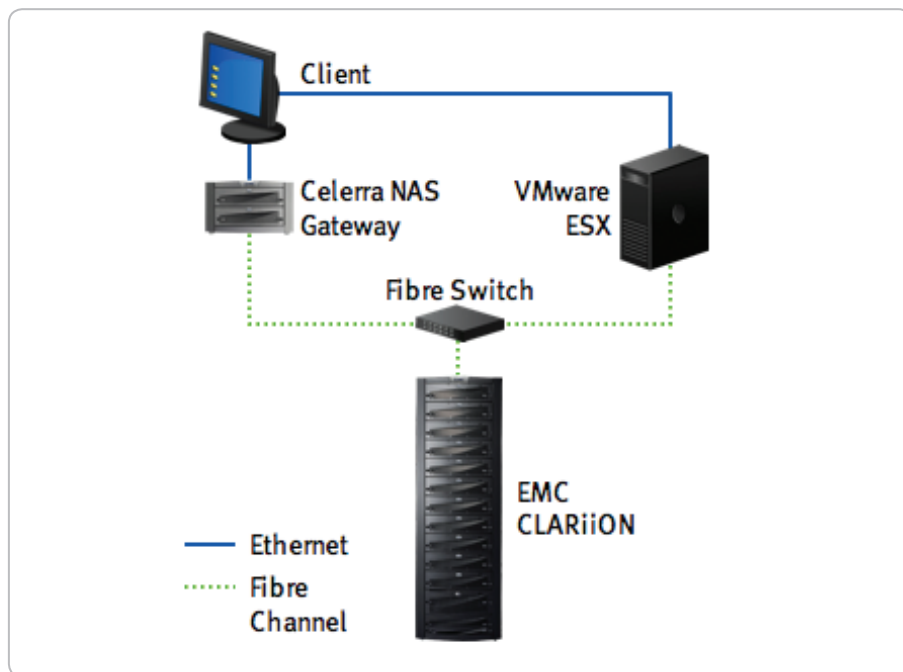
In addition, application servers that were not suited for the VMware environment, such as Microsoft Exchange which required too many physical resources to be virtualized, were converted to a boot-to-SAN model using Dell blade servers connected to the CLARiiON SAN. Supporting Exchange are four back-end servers running the Exchange database, along with three virtual machines that deliver Outlook and web access to Exchange. Another three virtual machines provide Internet connectivity and one virtual machine is used to connect GroupWise applications from the ECU School of Medicine.

Using this tiered model with VMware ESX Server and boot-to-SAN, all operating systems, applications, and data now reside on Fibre Channel disk on the CLARiiON SAN.

“As our IT infrastructure expanded, the available power in our data center was maxed out and we had no more room to grow. By consolidating file services and applications with EMC, we've seen huge savings in energy use and data center costs. Plus, we now have a more flexible and energy-efficient environment that enables us to grow securely and cost-effectively.”

Brent Zimmer
Systems Specialist, East Carolina University

Figure 2: Customer Infrastructure Before Consolidation



Combined consolidation and virtualization drive savings

EMC Global Services implemented ECU's NAS solution in less than 30 days. Internal staff then completed the data migration and virtualization of ECU's infrastructure over the course of six months. Combined, 186 servers were eliminated, resulting in total cost savings and avoidance exceeding \$1.8 million—over 18 percent of ECU's annual IT budget—along with a reduction in power consumption of more than 600 megawatts per year. (See Figure 3)

Figure 3: Customer Savings Due to EMC Consolidation and Virtualization



* Graphic represents ECU's application and file servers affected by EMC NAS consolidation and server virtualization solutions. ECU has a separate server environment that includes 70 Dell server blades configured for boot-to-SAN and 40 stand-alone servers that have not been consolidated.

Document archiving frees up space and provides security

Elsewhere in the university, paper documents were consuming valuable office space, filling over 2,000 file drawers and sapping staff time with a manual process of collecting, organizing, filing, and retrieving this information. All these paper records—mostly originals—were vulnerable to misfiling, theft, or even total destruction in the event of a fire or natural disaster—a situation that would be catastrophic to the business of the university.

To solve its paper problem, ECU first deployed SunGard Banner XtenderSolutions to scan and digitize paper documents and store actively used images on Fibre Channel disk on the CLARiiON SAN.

The university then worked with Sungard Banner technicians to implement an archiving solution employing EMC DiskXtender® software and the Celerra NS80G gateway. Sungard also assisted ECU in creating policies to automatically archive inactive images from premium Fibre Channel disk on the CLARiiON SAN onto less-costly ATA disk presented by the Celerra NS80G NAS gateway. Implementation of the DiskXtender software and configuration of the NAS archive was completed in two months.

“Our archiving is a very efficient and automatic process that we don’t even have to think about. The policies we’ve set with DiskXtender continually archive any documents that have not been active for 24 hours. As a result, we’ve been able to free up valuable Fibre Channel storage for more critical applications. University staff is also more productive because accessing archived images is easier and more reliable than searching for paper.”

**Leon Gipson,
BXS Administrator, East Carolina University**

ECU chose to archive document images on its NAS gateway as opposed to content-addressed storage because the NAS systems and storage capacity were in place to accommodate the archive immediately without the need to wait for procurement of other media. As ECU continues to refine its archive strategy, all document images eventually will be archived from the Celerra NAS to EMC Centera® using EMC Rainfinity® software.

Already, approximately 1,200 square feet of office space has been recovered. When the remaining backlog of paper documents is imaged and archived, the university expects to completely eliminate the 2,000 file drawers of paper and free up over 3,000 square feet of office space, providing much needed office space for university staff and avoiding the cost of leasing space elsewhere.

In addition, archiving document images provides much-needed security and protection for these critical personal and business records. Instead of being lost forever in the event of a fire or flood, these electronic images can now be recovered intact in less than one hour.

E-mail archiving accelerates backup, supports compliance

ECU relies heavily on Microsoft Exchange e-mail for everything from class assignments and research projects to admissions and finance. As the number of Exchange users grew to 50,000 and the volume of messages steadily increased, nightly backups from the university's former CLARiiON SAN to tape were taking four to five hours. In addition, recoveries required manually restoring data from 12 months of backup tapes. Because the daily backups on these tapes only reflected a single point in time, the potential remained for information loss. If a legal discovery were necessary, the time required to find and retrieve the desired e-mails was estimated to be 60-plus hours.

In consultations with EMC, ECU found the capabilities of EMC Centera content-addressed storage with Symantec Enterprise Vault software to be an ideal fit for archiving its exploding Exchange environment. Symantec also highly recommended EMC Centera as the archiving system of choice. EMC Global Services was engaged to implement the system and ECU has begun to automatically archive all inbound and outbound Exchange e-mails. When completely rolled out into full production, the new environment will retain only those e-mails 30 days old or less on the CLARiiON CX3-80, while all others will permanently and securely reside on the EMC Centera system.

Archiving e-mail onto EMC Centera is expected to reduce the production Exchange database from two terabytes to just 500 gigabytes. As a result, ECU estimates that backup time for Exchange will be cut from up to five hours today to under one hour when e-mail archiving is fully deployed. E-mail archiving will also support more effective compliance by speeding response to discovery requests from 60 hours of manually searching through tapes to an hour or less.

When both the document image and e-mail archiving solutions are fully deployed, the university expects to save up to three terabytes of production storage space.

“With PowerPath, if a server goes down, a new one can be replaced without users ever realizing there is a problem. In addition, if a path to one of the storage processors is lost, PowerPath will automatically transfer processing to the alternate path. The result is a reduction of downtime from days to less than an hour.”

**Garrett Killian
Systems Analyst, East Carolina University**

Multi-pathing for high application, data availability

ECU faced significant high-availability challenges for its Blackboard distance learning data, medical images, and numerous web, file, and database information, which originally resided on server-attached storage and was backed up to tape. If a server went down, it could take days to bring it back up by replacing the server, re-installing the operating system, and then uploading backup software and data from tape. In such a dynamic and information-centric environment as a university, ECU needed a much faster and less labor-intensive solution.

As a powerful foundation for high availability, ECU now stores its critical data on EMC CLARiiON storage—directly and through the Celerra NAS gateway. These systems deliver proven reliability to sustain demanding workloads around the clock with high-availability features such as hot-swap drives, RAID, and self-healing.

To maximize uptime for all boot-to-SAN devices, ECU implemented EMC PowerPath® software on the CLARiiON system. PowerPath allows the physical servers to see dual connections to both storage processors on the CLARiiON system. As a result, the boot-to-SAN devices can automatically switch from one storage processor to the other, maintaining high availability during upgrades and maintenance or in the event of a path failure. With PowerPath, ECU has reduced downtime due to hardware upgrades or failures from potentially days to less than one hour with no impact on end users.

High availability with virtual machines too

ECU is also utilizing VMware High Availability (HA) and VMware Distributed Resource Scheduling (DRS) software to further assure continuous productivity for students, faculty, and staff. With VMware HA, the virtual machines recognize multiple paths to each storage processor. If the university is performing an upgrade, VMware HA and VMware DRS will automatically switch to the alternate path. And if there is a problem with a physical server, VMware DRS can simply redirect processing to another available server and then re-register with the new server once it is installed, thus maintaining continuous uptime in the event a physical device requires maintenance or upgrading.

Because VMware DRS continuously load-balances, ECU is able to maintain optimal utilization of its physical resources. The end result is assured end-user productivity due to non-disruptive upgrades and device replacement.

In addition, ECU uses VMware VMotion™ to move running virtual machines from one physical server to another with no impact to end users. This capability allows the IT staff to perform server upgrades with zero downtime.

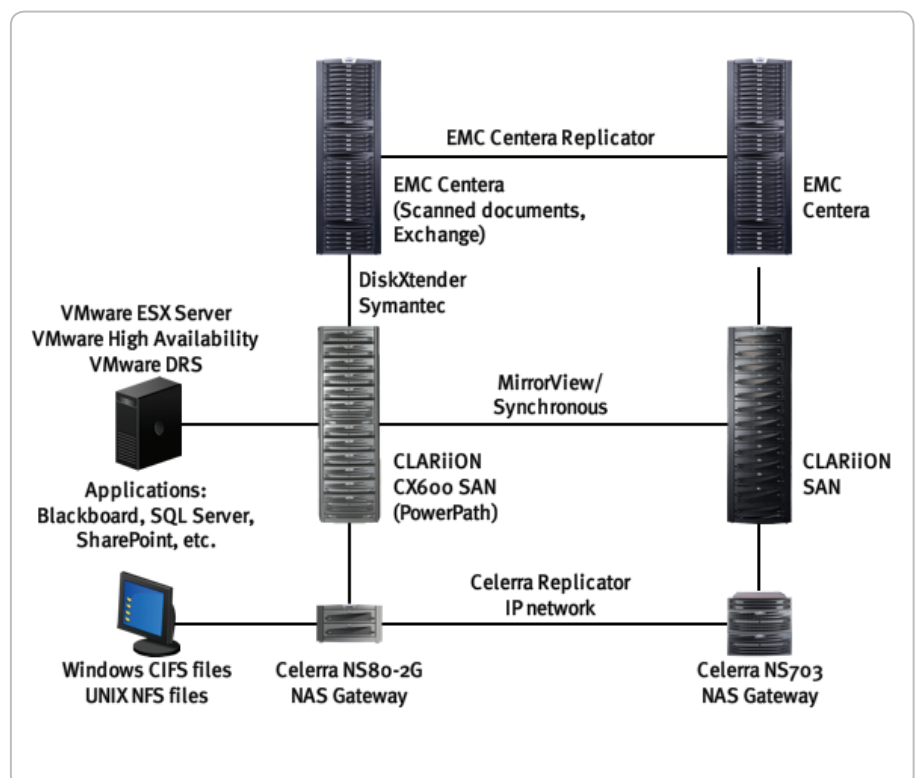
ECU also enhances the high availability of its VMware environment by taking advantage of the metaLUN feature of CLARiiON, which is used to dynamically expand data LUNs for applications running on virtual machines. ECU also uses the metaLUN feature to expand data LUNs for boot-to-SAN devices.

The metaLUN capability enables ECU to meet urgent needs for increased storage capacity without impacting user productivity. For example, when the IT staff received a call from the campus police department that they had run out of space for a critical dispatch application, the metaLUN was used to expand a data LUN on the CLARiiON and provide the additional space within five minutes.

Tiered business continuity for total site protection

With approximately 80 percent of ECU's information infrastructure on EMC SAN, NAS, and archive systems, it is essential that this information be securely protected with a comprehensive disaster recovery solution. To augment the device protection provided by PowerPath and VMware, the university engaged EMC Global Services to design and implement a comprehensive disaster recovery solution for total site protection. The solution replicates data and applications from the production SAN, NAS, and archive environments to a recovery site five miles away. (See Figure 4) Implementation of the disaster recovery solution by EMC Global Services was completed over a single weekend rather than the 30 days ECU had originally allotted.

Figure #4: Customer Tiered Business Continuity



Today, ECU replicates the Celerra NS80G NAS gateway to a remote Celerra NS NAS gateway over an IP network using Celerra Replicator software. Celerra Replicator enables ECU to replicate both its Windows CIFS files and UNIX NFS files over the same IP network. By replicating the Celerra NAS, the university ensures that important personal files and departmental information can be recovered quickly and never be more than 10 minutes out of sync with the production server.

ECU is also able to take advantage of the remote Celerra to perform non-disruptive upgrades. For example, when initially upgrading to the Celerra NS80G NAS gateway, the university used Celerra Replicator software to transfer full production activity from its old NAS system to the remote Celerra. Then, once the upgrade was complete, production was switched back to the new Celerra NS80G. As a result, ECU was able to migrate approximately 13 terabytes of data over the course of one week with less than two hours of total downtime.

In addition to replicating NAS, all data, virtual machines, and boot-to-SAN devices on the CLARiiON SAN are synchronously replicated to a second CLARiiON SAN at the recovery site using EMC MirrorView™/Synchronous (MirrorView/S) software. MirrorView/S provides continuous, realtime replication with zero data loss and very rapid recovery of critical applications and data in the event of a disaster.

The combination of the NAS and SAN replication solutions allows ECU to recover all of its critical applications from the disaster recovery site in approximately one hour, compared to as many as seven days it could take to recover from tape.

In addition, the EMC Centera archive is replicated to a second EMC Centera system at the remote site using EMC Centera Replicator software. By replicating its archive, the university ensures that Exchange data can be recovered in minutes to support ongoing campus productivity and time-critical legal discovery requests.

Through consolidation and virtualization of its information infrastructure, East Carolina University has relieved the strain on its over-taxed power and cooling resources, saved millions in energy and administrative costs, ensured high availability and disaster protection, and built a foundation for reliable, secure, cost-effective growth.



EMC Corporation
Hopkinton
Massachusetts
01748-9103
1-508-435-1000
In North America 1-866-464-7381
www.EMC.com