

The Business Value of Tape Storage

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Tape: The Viable, Reliable Storage

Cost, easy portability, long-term archiving, and low energy consumption are keeping tape storage alive and well.

BY ALAN RADDING

Tape storage will be here for years to come, and it is being used for more than just data backup. In a recent *Computerworld-Dell* study conducted by IDG Research, 65% of respondents reported using tape alone for backup, and 48% of the respondents reported using tape for long-term archiving, yet another important application for tape.

Results like this led International Data Corp. (IDC) to declare: “Long term, tape data storage will remain viable for backup, archive, and data protection applications ...” (*Worldwide Tape Drive 2008-2012, Forecast and Analysis*, Doc # 211980, May 2008, by Robert Amatruda). The report also stated, “We expect tape to be an integral component in tiered storage and compliance applications with WORM capabilities. Tape drives with native encryption offer increased security for customers wanting to use tape for long-term retention.”

Even where companies initially back up data to disk, tape continues to play a key role. “We back up to

disk for the speed, but ultimately we back up to tape. We have no plans to get rid of tape. It satisfies our needs for off-site disaster recovery,” says Darrell Stymiest, network services manager at UGL Unicco, a worldwide facilities management company in Newton, Mass.

Such combined disk-to-disk-to-tape (D2D2T) strategies are becoming increasingly popular. In the *Computerworld-Dell* study, 52% of respondents expect to implement D2D2T solutions within a year.

Among the features of tape considered to be the most important by survey respondents are high data capacity (88% rating capacity extremely or very important); automatic, unattended backups (88%); reduced downtime (83%); and quick restores (79%). The benefits delivered by tape technology, respondents report, are low cost (cited by 43% of respondents), security (38%), business continuance (33%), and increased capacity (31%).

Advances in disk drive technology and reductions in disk drive costs have been matched by advances in tape performance, new features like encryption built into the tape drive, increases in capacity, and lower costs, which lead industry analysts to continue to promote the business case for tape. “There are a lot of reasons customers are still using tape,” says Greg Schulz, senior analyst at StorageIO Group, a research and analysis firm based in Stillwater, Minn. Those reasons include the low cost of tape, its portability, and, most recently, its ability to lower storage energy costs.

New Storage Hierarchy

For IT managers, the question is not whether to use tape, but where and how to best use tape as part of a comprehensive, tiered storage architecture. In the modern storage architecture, tape plays a role not only in data backup, but also in long-term archiving and compliance. With its encryption abilities, tape also can address privacy and security concerns. In addition, tapes sitting on a shelf can store data for years, even decades, without burning a single kilowatt of energy.

The key to tape lies in understanding its place in the new storage hierarchy that is emerging. According to Shultz, the traditional storage hierarchy consisted of three tiers: Tier 1 for primary production storage, Tier 2 for secondary storage, and Tier 3 for backup, where tape fit in. The new storage hierarchy has five or even six tiers: Tier 0, which uses solid state disk (SSD) for mission-critical high IOPS applications; Tier 1, still for primary production storage; Tier 2, for secondary storage, which doesn't require costly high performance; Tier 3, which encompasses backup and disaster recovery; Tier 4, for short-term archiving; and Tier 5, for long-term archiving. Tape traditionally plays a role in Tier 3, but it increasingly plays a role in Tier 4 and, especially, Tier 5.

Tape for Archiving

"Long-term archiving is the primary reason any company should use tape these days," says Mike Karp, senior analyst at Enterprise Management Associates in Boulder, Colo. Companies are increasingly likely to use disk in conjunction

with tape for backup, but for long-term archiving needs, tape remains unbeatable.

The appeal of tape for long-term archiving is confirmed by the survey respondents: Two-thirds of respondents (65%) reported that they are currently using tape only. Looking ahead, usage of D2D2T for long-term archiving is projected to increase from 17% currently to 28%.

"We use tape for long-term backup and archiving. We use disk for short-term backup/restore. Tape is reliable and long-lived. We can put data on tape and it can stay there

We have no plans to get rid of tape. It satisfies our needs for off-site disaster recovery.

DARRELL STYMIEST
NETWORK SERVICES MANAGER,
UGL UNICCO

for 10 years, even longer," says Kim Mehring, Sandhills West Data Center manager at Sandhills Publishing, a trade publisher and application service provider based in Lincoln, Neb. (Sandhill's West Data Center is located in Phoenix.)

In a data archiving analysis, Wellesley, Mass.-based Clipper Group examined the total cost of ownership over a five-year period for the long-term storage of data in a tiered storage archiving environment, which compared D2D2T, a mixed disk and tape solution, to disk-to-disk-to-disk (D2D2D), a pure disk solution. After factoring in acquisition costs of equipment and

media, as well as electricity and data center floor space, Clipper Group found that the total cost of archiving solutions based on SATA disk, the least expensive disk, was up to 23 times more expensive than archiving solutions involving tape. Calculating energy costs for the competing approaches, the costs for disk jumped to 290 times that of tape.

Cost Advantage

Another reason companies stick with tape is cost, and it is not just for archiving situations. "Tape is always the winner anywhere cost trumps anything else," says Karp. No matter how the cost is figured, tape is less expensive. Add in the lower energy costs associated with tape and the attraction of tape based on cost only increases, as Clipper Group reported.

Price was the most important factor (65%) in buying decisions for tape media, according to the *Computerworld*-Dell study respondents. Price also loomed large when it came to selecting a tape backup hardware vendor, at 82%. Other criteria that ranked high for selecting a tape backup hardware vendor were product reliability (94%) and quality of services and warranty (84%).

Energy Savings

Beyond IT familiarity with tape, analysts point to other reasons why organizations will likely keep tape in their IT storage infrastructures. Energy savings, for example, is the most recent reason to stick with tape. "The economics of tape are pretty compelling, especially when you figure in the cost of power," Schulz says.

The reason is simple: In general, disks must be kept spinning regardless of whether the data is being accessed or not. An organization that archives data on disk for 10 years must keep that disk spinning the entire time, consuming energy every moment. With tape, the data is stored once on tape and parked on a shelf. From that point on, it requires no energy at all until it needs to be accessed, which for most archived data is never.

For example, in a 2006 study, the Clipper Group compared the cost of operating an automated linear tape open (LTO) tape library with the cost of running a SATA disk array to archive the same amount of data. The yearly energy cost for the tape library came to \$4,238. The energy cost for the SATA system was \$109,745. It cost more than 25 times more to power the disk system than the tape system at that time, and by now energy costs are considerably higher than in 2006. (Some caveats: The disk system provided fast, random access that tape could not. This analysis is most applicable to a long-term data archiving situation.)

Rise of Linear Tape Open

Although there are numerous tape formats on the market today, the three most common are LTO, digital linear tape (DLT), and digital audio tape (DAT). They differ mainly in terms of capacity, performance, and cost. LTO has emerged as the industry favorite with 52% of survey respondents planning to use it. On average, respondents are backing up 6.16TB of data.

“We started with LTO-1 years ago

and have moved up with LTO-2, LTO-3, and now we’ll go to LTO-4,” says Mehring. “It is cheaper for us to run LTO-3, but I expect the LTO-4 will read our LTO-3 data without any problem.” The LTO standards group is committed to backward compatibility for at least two generations past the most re-

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 **GREG SCHULZ**
SENIOR ANALYST,
STORAGEIO GROUP

cent generation, so Mehring will not encounter any compatibility issues.

UGL Unicco started with DAT, progressed to DLT, and finally went to LTO as its capacity needs grew. “We’re at LTO-4 now. It is backward compatible to two generations, which is enough for us. We wouldn’t restore data from DAT or DLT at this point anyway,” says Stymiest. The DAT and DLT data is far too outdated.

LTO-4, the current version, can store 800GB of data uncompressed. With compression, organizations can get over 1TB of data on each tape. LTO-5, which is already in development, promises to deliver greater performance and capacity. With compression, analysts expect it will exceed 2TB.

Fueling interest in LTO-4 is built-in data encryption. IT managers have seen the headlines about lost or misplaced tapes containing

confidential data. If the data were encrypted on the tape, a tape loss would be little more than a minor nuisance to an organization. “We’ll definitely use the encryption in the future,” says Mehring.

For some, encryption isn’t as much of an issue. For example, Liberty Savings Bank, in Wilmington, Ohio, backs up data from its two data centers to LTO-2 tape. It replicates data between data centers for backup and recovery in a D2D2T strategy. When the bank puts it on tape, for an extra layer of backup protection, the tapes are stored on-site since the data already is replicated to a separate site. “We encrypt all our laptops and email, but we don’t bother with encryption for tape. We don’t use couriers or anything like that. The tapes never leave our building,” says Bill Beal, vice president.

However, there are alternatives to tape. “SATA disk drives keep getting cheaper and now there are removable hard disks,” says Schulz. But he doesn’t see tape being replaced in the storage hierarchy any time soon.

It is more than the low cost that attracts companies to tape. For low energy consumption, long-term archiving, and easy portability organizations will keep turning to tape. But there is something else about tape, something intangible: “People really trust tape. For IT managers, tape provides a comfort zone. It is a known entity. They know what it can do. Many of their processes are based on tape, and their software works with tape and expects tape,” Schulz says. For all these reasons, tape will be around for years to come. ▶

Storage Mainstay

Tape offers many advantages as a storage option, despite its newer technology competitors.

Long shelf life, low cost, and easy portability are just a few of the numerous benefits. Writer Alan Radding spoke with Brett Roscoe, Dell senior manager, about the prospects of tape technology.

Q: Is disk technology about to replace tape?

Roscoe: Nobody is seriously predicting that. A few companies may have had frustrating experiences with tape and vowed to eliminate it, but that is unusual. Most will use tape alongside of disk in a multitier storage strategy. Tape is proven to be highly cost-effective for long-term archiving and disaster recovery. Many companies still rely on tape as their primary disaster recovery strategy. So no, disk is not likely to replace tape now or in the foreseeable future.

Q: What are some of the advantages of tape storage?

Roscoe: Portability is an obvious advantage. It is easy to send a tape off-site, which is a key component of any disaster recovery strategy—getting the backed-up data safely off-site. Low cost is another advantage. At under

\$1 per gigabyte tape is way ahead. And if you apply compression, the cost advantage gets even greater. Longevity is another advantage of tape. A typical SATA disk drive will exhibit failures as early as approximately five years. Most customers use RAID to protect against single drive failures, but this adds complexity and cost. Tape can have a shelf life of up to 30 years. That makes it ideal for long-term archiving.

Q: How should managers sort through all the various tape formats?

Roscoe: Yes, there are a number of formats like DAT and DLT. The industry, however, is really converging on LTO as the tape standard, and Dell has adopted LTO as its standard. LTO has done an excellent job ensuring backward compatibility. You can put an LTO tape from several years ago (up to two generations) into a new LTO drive and it will be able to read it.

Q: What role should tape play in today's storage infrastructure?

Roscoe: We recommend using a tiered storage strategy. Tape fits into the storage tiers that address several areas, from disaster recovery to long-term data storage. Tape can provide a primary disaster recovery solution for budget-conscious IT professionals. Larger or more sophisticated IT groups will utilize tape for long-term backup and archive once the data is no longer used by the production applications. Using a combination of disk and tape will allow IT departments to optimize recovery time with disk, while utilizing tape for reliable long-term storage. The best solution will depend on your IT needs.



Q: Suddenly tape is attracting attention for its low energy usage. How did this happen?

Roscoe: Data sitting on a tape consumes very little energy, especially compared to disk, which must be kept spinning in most applications. The Clipper Group has done a study that shows just how energy-efficient tape is. It is not just the reduced energy costs; tape is being viewed as a leading green technology.

Q: Everyone sees headlines about lost backup tapes potentially exposing the private data of thousands of people.

Disk is not likely to replace tape now or in the foreseeable future.

 **BRETT ROSCOE**
SENIOR MANAGER, DELL

What can be done about that?

Roscoe: This requires a combination of good processes for tape handling and transport and encryption. Software-based encryption has always been available. LTO-4 tape brings encryption to the hardware, to the tape

drive itself. With LTO-4 encryption, you can encrypt data at line speed.

Q: The industry continues to announce enhancements to tape technology. What can we expect in the future?

Roscoe: You will see significant improvements in capacity and performance. Today, LTO-4 stores 800GB native, over 1TB with compression. LTO-5 will store 1.6TB native. With compression it will go over 2TB. Continued R&D work on tape materials, film coatings, and new head development will keep tape ahead of the curve. ▶

Alan Radding is a technology writer in Newton, Mass.

Disk and Tape Square Off Again

Clipper Group study shows that tape remains king of the hill with LTO-4.

BY DAVID REINE
AND MIKE KAHN

The following article was excerpted from the February 13, 2008 issue of The Clipper Group's Clipper Notes bulletin. [Read the full bulletin online.](#)

Progress happens in many ways. At times, progress can be evolutionary, with technology advancing one step at a time, as we have seen in the development of the microprocessor, from Intel's 16-bit 8086 in 1978 to the 64-bit multicore CPUs of today. It can also be revolutionary, as with the invention of the cell phone that literally turned the business world upside down with mobile communications.

Sometimes, we can have a revolutionary new technology competing with the evolution of an older technology for the hearts, minds, and wallets of the business community. Both sides make claims as to the functional advantages of their solution as well as the additional costs associated with the new technology. The enterprise needs to determine the total cost of ownership (TCO) of both solutions and the impact on the bottom line before making a choice.

This very situation exists in today's midsized data center where new tech-

nologies are competing with tape, again, for the favors of an IT staff struggling to support a rapidly expanding storage base while protecting the assets of the enterprise. The purpose of this bulletin is to review these new storage technologies against the value of retaining, or upgrading, your current tape environment.

Focus on Backup and Archive

We chose backup and archive for two reasons. First, every business does it, or at least should! Second, it is an excellent example of a very large and growing storage requirement, from which many conclusions can be drawn.

For a tape library example, if you assume that the enterprise initially acquires a configuration with maximum tape automation and a minimal number of tape drives (i.e., more than enough room for later growth), then incremental costs for additional drives and media are largely linear. While this might front load, somewhat, the total cost of ownership for tape, it does show a very favorable payback over disk for long-term storage. Our finding is that for long-term storage over our five-year study period, the cost of disk is about 23 times that of tape, while the cost of energy for disk is about 290 times that of tape.

With the constant growth of data, backing up and, especially, recovering a modern data center has become a constant struggle between performance and cost, as the backup window continues to shrink while the volume of data continues to expand. The need to back up and recover storage in a 7x24x365 Internet-driven environment has forced the data center to look for innovative techniques, such as disk-to-disk (D2D) backup solutions, in order to keep the enterprise performance objectives viable. D2D, however, is not a replacement

for tape; it should be a complement to tape. The costs associated with a pure D2D scenario are simply too great for any midsized or larger business to consider using this technology to establish a comprehensive policy to save its entire data store for any extended length of time. Because of the urgency associated with short-term backup and recovery, D2D can make sense to retain some number of days' worth of backup data on disk.¹

Failure to recover quickly from a loss of data can cost the enterprise millions of dollars in lost revenue. Best business practices dictate that the enterprise retain weekly, monthly, quarterly, and end-of-year data for many months, or even years, in order to recover from a problem identified later or to retrieve critical information required by litigation or compliance. This may happen as part of normal audit procedures or due to seasonality or irregularity of a process or customer interaction.

Thus, the enterprise can justify a blended D2D2T (disk-to-disk-to-tape) environment on acquisition costs alone. When you include factors involved in determining the TCO, costs associated with maintenance, training, floor space, and energy consumption, the result is a no-brainer. Our study shows that tape continues to be the most economical solution for long-term storage requirements for the midsized data center. You even gain the additional ecological advantage of reusing tape media to help keep the environment green.

Methodology

To be fair, we chose to take a conservative position whenever there were options that could slant this analysis

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one way or the other. For example, we used the same capacity utilization rate for tape and disk. Previous studies have identified a significantly higher utilization factor for tape; in fact, by as much as 10% to 15%. If your data center has measured a lower rate for either disk or tape, then you can factor that into your analysis. We arbitrarily chose a seven-day window for the transition of quarterly backup data from disk to tape. For more details on our methodology, [view the full report online](#).

Conclusion

This study began as a marginal-cost analysis of disk and tape in a scenario for long-term storage of archived quarterly backups. We quickly realized that we had to consider the value that each architecture brings to the table. With D2D, the data center acquires the ability to meet every SLA with regard to its backup window and recovery time. The enterprise gets rapid access to all of its data for whatever period it measures. That comes with costs: the acquisition cost to deploy the D2D solution, the energy costs to power and cool the systems, and floor space costs.

With a D2D2T solution, the data center retains rapid access to the most re-

cent data, 13 weeks in this analysis, and nearline access to five years of historical data. The cost of the tape library is nominal when compared with the cost of the disk arrays necessary to support the environment. The cost of energy is negligible, compared with acquisition costs or the energy costs of an all-disk solution. In addition, with LTO-4 technology the data center acquires a solution with ancillary values of automatic compression, WORM capability, and an encryption option at the tape drive level, enhancing the security and reliability of the data.

As we look at the two architectures, there is no question as to the complementary value of disk and tape in a tiered D2D2T solution to help the enterprise address its performance, compliance, data protection, energy, and TCO objectives. All of one, or all of another, may not address all of the goals.² Furthermore, having data on tape, detached from the system, reduces the risk of accidental or intentional corruption. Moreover, tape is portable, enabling low-cost data protection strategies.

Tape is not dead. Far from it! Tape, especially with the reliability and speed of LTO-4 technology, continues to provide the fiscal responsibility and functional value that enterprises require in the 21st century. The data center needs to continue to consider tape as an integral component of any long-term storage architecture, and you need to focus on how much of your stored data really needs to be held in the disk cache.

To learn more about the details of this analysis and see how you can save significantly on your long-term storage costs by leveraging LTO-4 tape, [view the full report online](#). ▶

1. You still have to pay for the cost of the disk cache (itemized separately in the middle table of Exhibit 3 in the original report), but we have excluded these costs because they are the same in the disk and tape solutions and our focus is on the cost of long-term storage.

2. Unfortunately, the real world has more recovery requirements than can be addressed in any single analysis. We have assumed a standard of 13 weeks of online backups, which certainly made our analysis simpler. Your requirements definitely will vary, depending on the size of your data store and the number of weeks of data that your enterprise needs to retain in a disk cache for "rapid" recovery. This model can be applied to any environment, however, once a given set (or collection) of RTOs and RPOs is established.

Tape Storage: Room to Grow

Dell keeps fast-growing universities and businesses on a growth path with a comprehensive storage infrastructure and Dell Services support.

Do more with less. That seems to be the modus operandi of most IT organizations these days, especially for growing businesses. It can be quite a challenge when upgrading technology or developing a scalable architecture that can support increasing demands. And it's no different when it comes to making storage decisions. Storage options are aplenty, and each IT organization must weigh the pros and cons, as well as evaluate the return on investment.

Tape storage has been around for a long time, and it still offers many advantages over disk storage and other storage formats. Longevity and portability are key features, as well as energy efficiency, which is increasingly becoming a must-have for many businesses and IT organizations. Tape storage can be used for archiving, disaster recovery, and backup. It is still one of the more cost-effective tools for storage, and is easy to use. The following case studies offer insights into how tape

storage was adopted by fast-growing organizations with limited budgets using Dell hardware, Dell management software, and Dell Enterprise Support Service.

Architectural Upgrade

Studio Red Architects, an award-winning Houston-based architectural firm that specializes in performing arts theaters, religious facilities, retail locations, and entertainment projects, had a challenge: Aging systems threatened the reliability of the growing firm's messaging and collaboration platform, sapping productivity and leading to significant unnecessary costs.

As one of Houston's top 25 architectural firms, Studio Red Architects' one-person IT staff struggled to keep up with the demands created by the rapid growth of the business and a fast-paced, collaborative environment.

"We were unprepared for the amount of growth we were experiencing," says Dennis Chow, IT director at Studio Red. "Every time the system went down, it would interfere with communication and slow work down. That was unacceptable. One full day lost to downtime could cost us as much as \$25,000."

Although small in size with limited IT resources, Studio Red needed a stable and scalable server infrastructure that could support the increasing demands placed on its Exchange Server environment. Dell Infrastructure Consulting Services (ICS) played an important role in helping Studio Red develop a scalable architecture that would address the firm's current and

future needs. After arriving at the initial design, Dell Deployment Services worked with Chow to implement the new Exchange Server infrastructure.

In addition to its systems architecture, Studio Red also upgraded its data backup environment. Originally, Studio Red relied on a manual tape library that required constant attention. "I used to have to come into the office and switch tapes two or three times each night," he says.

To remedy the situation, Studio Red implemented a Dell PowerVault 124T tape autoloader to automate its backup process. To securely link its main and branch offices and provide server and client connectivity, Studio Red installed Dell PowerConnect 5224 switches. Chow says the switches allowed Studio Red to easily determine the appropriate levels of access to its network.

Dell has provided Studio Red with a stable messaging and collaboration platform that Chow feels will help the firm achieve its lofty business goals while managing rapid growth. And Dell provides Studio Red workers with a platform that allows them to go head-to-head with larger competitors.

"Our workers need access to stable messaging and collaboration tools if we are going to continue to grow and be successful," Chow says. "Thanks to Dell, we've achieved that."

Supporting Educational Success

Growth is also the mandate and challenge at Georgian College, in

Barrie, Ontario. The third-largest coeducational institution in Canada with 8,000 full-time students and 28,000 part-time students, Georgian College is adding new programs, and its international enrollment is increasing 20%.

The college's IT staff supports the growth in student enrollment while maintaining a rich suite of services

We needed high capacity, high performance, and reliability in our storage environment to handle data from many different sites, and we got it from the CX3-20 SAN.

 **DAVID JOHNSON**
DIRECTOR OF INFORMATION TECHNOLOGY, GEORGIAN COLLEGE

within a limited budget. "We have a mandate for 5% growth annually," says Steve Benoit, manager of network services at the college. "Our challenge is to bring in more students without increasing the budget."

As a result of these conditions, the college reevaluated arrangements with its technology vendors to ensure that its IT infrastructure can keep up with the demands of maintaining quality services and supporting expansion. "We needed to refresh our client-side IT infrastructure, and our current vendor's contract was coming to an end," says David Johnson, Georgian Col-

lege's director of information technology. Dell met all of the college's criteria for vendors.

To make the migration as smooth as possible, Georgian College engaged with Dell Infrastructure Consulting Services. "Dell ICS designed a plan for us that completely fit with the possibilities dictated by our academic schedule," explains Johnson.

Georgian College initially implemented new client and systems environments with Dell products. That positive experience led the college to approach Dell Infrastructure Consulting Services to design a revamped storage environment. "We talked with the Dell team about our storage plans, and they helped us draw up the design we wanted," Johnson says. "We came up with a single-vendor approach that allowed us to build a consolidated storage environment."

The college, with the help of Dell Deployment Services, installed a Dell/EMC CX3-20 storage area network (SAN) that could consolidate and back up data storage that was spread out in locations throughout the campus. "With a variety of servers distributed across all our sites, we were challenged as to how we would realize backup and maintain that data for our client machines at all the sites," Johnson explains. "The plan we are implementing now centralizes storage from direct-attached or local storage at the distributed sites to a central environment built around the SAN at the main location."

The new Dell SAN is supporting storage needs throughout the college, according to Johnson. "We needed high capacity, high perfor-

mance, and reliability in our storage environment to handle data from many different sites, and we got it from the CX3-20 SAN,” he says. The IT staff also deployed a Dell PowerVault ML6020 tape library to back up to disk across the network and then to tape. The new tape library has reduced the backup time and cut down on the need for operator intervention, Johnson says. “Before the installation of the Dell PowerVault ML6020, our backup windows took up to 13 hours with our old tape library.”

With direct-attached Fibre Channel linear tape open (LTO) tape drives, the new Dell tape library shortens backup times to below 2.5 hours, Johnson says. “The Dell PowerVault tape library is also reducing our overall management time with an easy-to-use management console, as well as features that track and analyze all logs and provide proactive notification and failure prediction.”

Dell Training provided the college’s IT staff with thorough training once the storage implementation was completed. “We took advantage of Dell training for the SAN product, which has been very important,” Johnson says.

With Dell’s product portfolio and Gold Enterprise support, Georgian College’s IT staff was able to build an upgraded technology platform that reduced costs and increased productivity. And thanks to its new IT infrastructure, the technical staff can turn its attention to initiatives that improve student services and foster increased enrollment.

“We are able to work on strategic programs at Georgian College that

will foster a new phase of growth,” Johnson says.

Empowering Education

At the University of Mary Hardin-Baylor, in Belton, Texas, the focus is on educational excellence. IT strategy is the key to driving the educational excellence and organizational efficiency, which is essential to the university’s continued success.

“We have restricted budgets,” explains Shawn Kung, director of information technology at UMHB. “So, to make us competitive with larger schools in the region, we have to find ways to deliver the services and functionality our students expect by cost-effectively implementing the latest technology on campus.”

In the past, UMHB relied on a variety of vendors to supply the components of its IT infrastructure, but in addition to the difficulty of managing a heterogeneous environment, Kung was often displeased with the quality of the product he was receiving. To rectify the problems associated with its heterogeneous environment, UMHB selected Dell to serve as its sole IT vendor.

Among the biggest benefits resulting from this decision has been Kung’s ability to rely heavily on Dell Services for design and implementation assistance across a number of projects. In addition to many other projects, Dell Services helped design an effective and scalable application architecture. Currently, the university uses approximately 55 Dell PowerEdge servers—including PowerEdge 6800, PowerEdge 2950, and PowerEdge 1950—with Intel® Xeon®

processors running the Microsoft Windows 2003 operating system.

For backup and archiving, UMHB deployed three Dell PowerVault 110T LTO-3 tape drives. “We use the PowerVault tape drives to archive all files in order to keep the server hard drives available,” Kung says. “About half of our servers back up to disk and then to tape, and the other half back up directly to tape—depending on the data we are archiving. Our Dell storage infrastructure is very flexible, so cost and data access needs can drive our archiving process.”

While storage products deliver on the needs of UMHB, Kung is particularly impressed by the ability of Dell to deliver a comprehensive storage infrastructure, as well as the support Dell Services provides for the infrastructure pre- and post-sale. “It really is one-stop shopping, and that makes life easy in a small IT department like ours,” he says.

To help ensure the long-term success of the IT infrastructure, UMHB selected support packages that matched the criticality of the particular environment. The university’s close relationship with Dell has reduced the burden on the IT department and allowed Kung to focus on strategic initiatives. “I can free up my staff so they can concentrate on other projects, and I can leave the hardware issues to Dell,” he says.

Ultimately, students and faculty benefit from the increased IT efficiencies Dell helps enable. “Dell is a true partner in our effort to make the educational experience the best it can be for students and teachers,” Kung says. ▀