SEVEN WAYS TO LOWER STORAGE TCO

WHITE PAPER | JANUARY 2008

compellent

EXECUTIVE SUMMARY

Organizations of all types and sizes are under pressure to boost efficiency, radically cut costs and reduce power consumption. When measured by total cost of ownership (TCO), traditional data storage solutions are inefficient and expensive to maintain, manage, and expand. That makes these traditional storage paradigms increasingly harder to justify. Compellent Storage Center —a highly integrated, feature-rich data storage solution—was designed to lower data storage TCO. Compellent's innovative storage platform helps organizations dramatically reduce both capital and operating expenses, while improving data availability and recovery. In fact, for every 10TB of storage capacity, Compellent Storage Center can save as much as $1.2 million in costs.

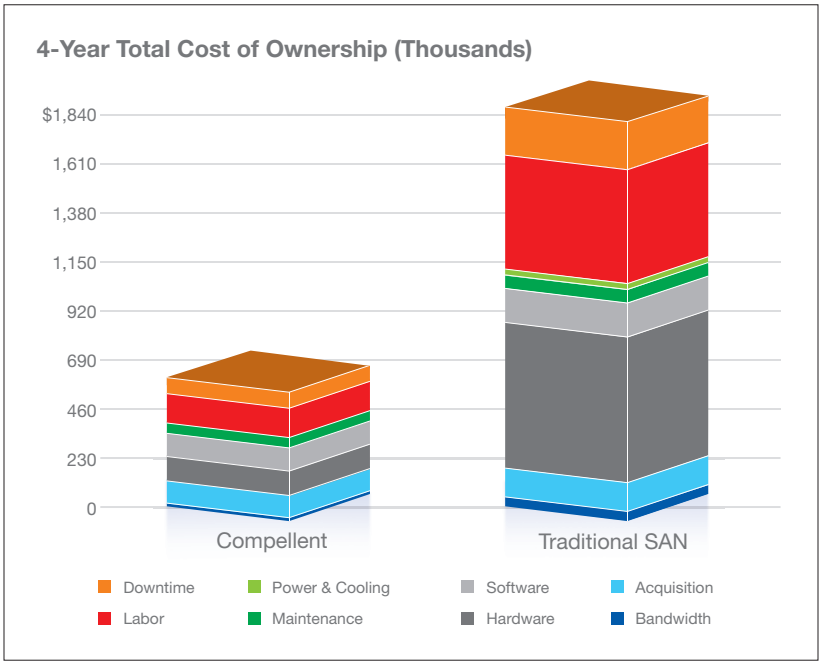

Figure 1: *Sample TCO Comparison.*

A SAN That Saves More Than Data

First there was a trickle, then a stream, and now there's an incessant flood of data that swamps servers, networks, and storage devices. If you're an IT manager or storage architect, the challenge is: How do you keep more data online longer? How do you make it all easily accessible? And, most important, how can you afford to build out your storage infrastructure fast enough to keep up?

According to Gartner, between 2005 and 2010, storage demand, as measured by terabyte capacity, is expected to increase by 69 percent annually. That pace of growth is taxing enterprises of all sizes in critical areas such as: staffing, training, disaster recovery, capacity management, power and cooling and regulatory compliance. This is where the conventional storage mindset—"another year, another 20TB"—begins to break down. Companies simply can't justify the huge capital and operational expenditures required to keep pace with storage demands.

Without a matching growth in IT budgets or staff, IT managers are turning away from traditional data storage solutions and considering more cost-effective solutions. These are data storage innovations that can be cost-justified to senior management, and can be managed without further overloading strained IT resources. To help evaluate these solutions, IT managers use TCO as a measure for storage hardware and software investment.

TCO, when making storage decisions, has three primary components:

- **Capital Expenses** such as hardware and software acquisition, and the accompanying installation and training. Capital expenses are often called CAPEX.
- **Operational Costs** which include admin labor, expansion hardware, licenses, maintenance, facilities, and utilities. These costs are frequently operational expenses, or OPEX.
- **Cost of Downtime** is lost revenue or lost opportunity due to downtime.

Reducing OPEX is also closely related to reducing environmental costs. A "green" storage solution that uses less power and requires less space, for example, has a smaller environmental and cost footprint in terms of power and cooling, emissions and building utilization.

Designed to Reduce Costs

TCO gives organizations a framework that balances the upfront, ongoing, and unexpected costs related to storage. Unfortunately most data storage solutions are built on the traditional paradigm of "more data means more expense" which creates spiraling storage costs. There is one solution, however, that was created from scratch to help reduce storage TCO—Compellent's Storage Center SAN.

With Compellent, the TCO math is: sophistication plus simplicity equals savings. A Compellent SAN is an integrated solution—a single architecture and a single interface—that includes a long list of features that reduce storage TCO. Features such as Dynamic Capacity, which eliminates the expense of allocated but unused disk space. And Data Progression, which reduces both the capital expense of costly high-performance drives, and the operating expenses of labor, power, cooling, and floor space. For any organization that's committed to building a "green" data center, Compellent's ultra-efficient disk utilization delivers a positive impact on both the environment and the bottom line.

Compellent fundamentally changes the data storage paradigm. Storage administrators no longer have to race to stay ahead of rapid storage demand by installing more devices and spending more money instead, Compellent offers a highly scalable enterprise-class SAN that helps you intelligently control demand, saving time, money, and data. Here's how:

#1. Save More By Allocating Less

Thin Provisioning with Compellent's Dynamic Capacity™

Five terabytes allocated for e-mail, 10TB for databases, another 10TB for finance and document storage. And that's just this year. Traditional storage provisioning forces you to buy and pre-allocate disk space based on your estimates of current and future needs. In a rapidly growing environment, that can add up to a significant capital expenditure for disk storage hardware—much of which will probably go unused.

While installed storage is increasing by up to 69 percent annually, companies use only 40–60 percent of that installed capacity, on average. So, out of the 5TB that's pre-allocated for e-mail, perhaps 2TB is actually used; the remainder is wasted, or "stranded" space. And that's wasted money, too. If you estimate that the cost of a Fibre Channel RAID is about $13.00 per GB, that unused 3TB of storage capacity is worth just under $40,000.

Compellent's Dynamic Capacity software makes Thin Provisioning a reality by completely separating storage allocation from actual utilization. With a few mouse clicks, you can allocate a virtual volume of any size with Compellent, but the storage space is not actually consumed until data is written by the application.

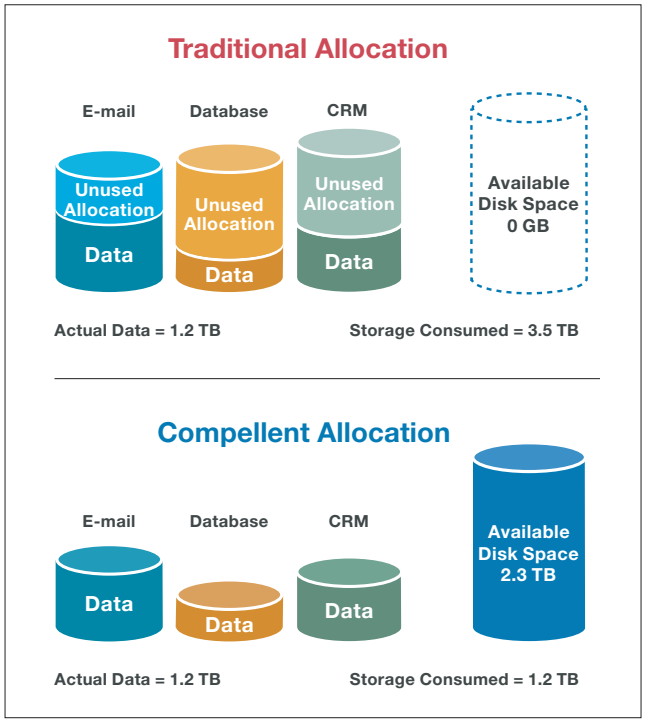

Figure 2: *Eliminate wasted storage capacity with Compellent's Thin Provisioning.*

The impact of Thin Provisioning on your storage TCO can be significant. Start with capital expenditures: Initial storage hardware costs are reduced simply because you require less physical storage. The efficiency of Thin Provisioning allows you to create more volumes for different applications, so more servers can share one Compellent Storage Center. More efficient utilization helps delay future storage purchases as well. Disks are added incrementally only when you need them, and you can base the amount of added capacity on actual disk utilization, instead of an upfront estimate of what will be needed including future growth. Since you can scale from 1TB to 500TB on the same Compellent platform, you can grow capacity without a forklift upgrade to a different model or product line.

Thin Provisioning also dramatically reduces operating expenses, especially labor costs. Fewer disks mean less administrative time assigned to storage management. With Compellent, for example, you can automate time-intensive capacity planning activities instead of manually tracking utilization. Fewer disks also reduces the environmental impact of your data center in the form of less power and cooling, and less floor space—all of which translates to lower OPEX.

There's no avoiding the constantly growing need for more data storage. The growth is the same whether you employ traditional storage provisioning or Thin Provisioning. The difference is how much you have to spend on storage to accommodate that growth.

MUNDER

Munder Capital Management is a registered investment advisor, managing over $37 billion in client assets. The team at Munder relies heavily on Compellent's Thin Provisioning to improve storage utilization. Because Thin Provisioning separates allocation and utilization, Munder has been able to recover up to 70 percent of the unused space previously allocated to boot and application volumes. By purchasing disks only when needed, Munder can buy storage on the fly and estimates this has cut total upfront storage expenditures by a third.

2. Achieve the Full Cost Benefits of ILM

Automated Tiered Storage with Compellent's Data Progression™

Here's the problem: Not all data has the same value, but in traditional SANs, it all resides on expensive storage. Why should a year-old e-mail message take up the same high-performance Fibre Channel disk space as this quarter's sales tracking? Typically, just 20 percent of stored data is active, while the other 80 percent is inactive–e-mail that hasn't been touched in 30 days, for example. An information lifecycle management (ILM) strategy would move that inactive 80 percent to a lower tier of slower, less expensive disks and free up valuable Tier 1 storage.

But implementing ILM can be costly and complicated. Manually moving data from one tier to another requires time-intensive, company-wide data classification efforts that never end. You can add ILM capabilities to a traditional SAN, but that adds the expense of buying, integrating, and managing the data migration software.

Compellent is the industry's only SAN that offers Automated Tiered Storage. Compellent's Data Progression software automatically classifies and migrates blocks of data to the preferred tier of storage based on frequency of use. By automating the data migration process, Data Progression offers tremendous savings in both CAPEX and OPEX.

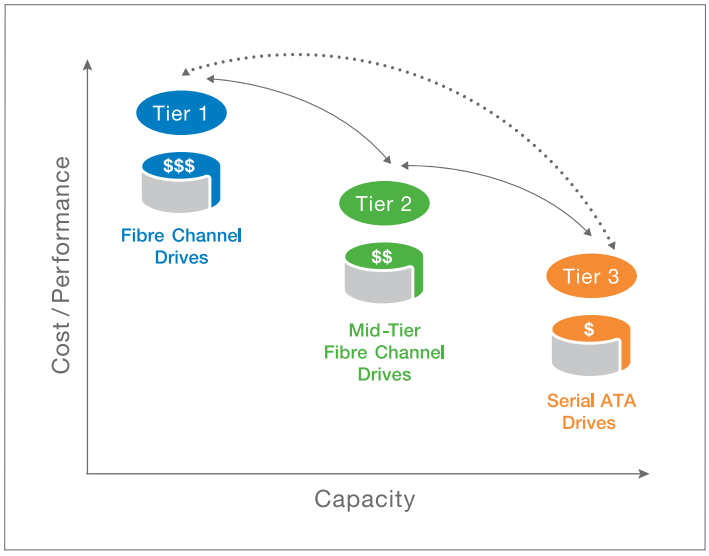

Figure 3: *Save time and money with Automated Tiered Storage.*

On the CAPEX side, Automated Tiered Storage dramatically reduces disk hardware expenditures. Comparing cost per gigabyte, Fibre Channel storage costs 6.4 times more than SATA and 11.5 times more when RAID overhead is included. Because of this cost differential, moving inactive data to lower-tier storage can dramatically reduce costs and provide significant increases in performance and reliability.

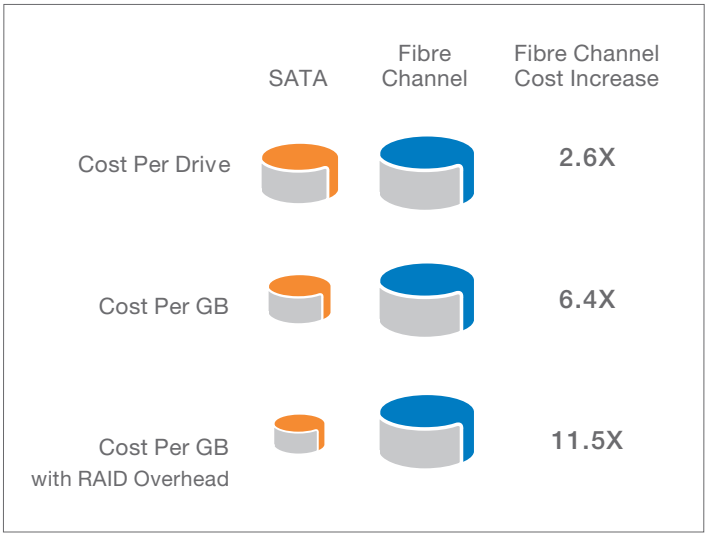

Figure 4: *Substantially lower costs by utilizing SATA drives for inactive data.*

OPEX savings are equally impressive. Since you can implement ILM in a single step, storage administrative time is significantly reduced. There's no labor-intensive data classification up front, nor manual movement of data between storage tiers. Data archiving costs are minimized and the expense and delays of tape archiving are eliminated. By moving inactive data to larger capacity, more energy-efficient drives, Automated Tiered Storage can also significantly reduce environmental costs.

#3. Provide Quick and Easy Recovery

Continuous Snapshots with Compellent's Data Instant Replay™

It's inevitable: Files are accidentally trashed. Data becomes corrupted. Drives fail. Nine out of ten companies report that they have had at least one event of data loss which had a direct impact on their business. The critical question is not if you'll lose data (you will), but how quickly you can recover from the loss. Rapid local data recovery is essential to continued business success. Making periodic copies of stored data—"snapshots"—is the most reliable way to recover from data loss. When a loss occurs, simply reload the most recent snapshot of data and continue on.

But because traditional storage systems allocate storage space inefficiently, these systems limit the number of snapshots per volume, typically to 10 or less. Worse yet, they require that the initial snapshot be a full mirror of the volume, which further reduces available capacity. The crunch on storage space limits the frequency of snapshots and, therefore, lengthens the periods during which no data protection occurs. It's no wonder that traditional storage solutions warn that taking snapshots will degrade system performance.

None of these restrictions apply to Compellent's Data Instant Replay software. Create and store a high number of snapshots, called Replays, that provide rapid recovery from data hazards and disruptions such as viruses, hardware failures, network and power outages, and human errors. In fact, with Data Instant Replay, you can recover any size volume to any server in less than 10 seconds.

Whitehall School District

Whitehall City School District in Ohio relies on technology to provide a well-rounded academic program that prepares students for the world of work or higher education. As is the case with many IT organizations, Whitehall's annual IT budget gets tighter each year so the IT staff is always looking for ways to accomplish more with less money.

With Compellent's Automated Tiered Storage, 85 percent of Whitehall's data has automatically migrated to lower cost drives. As a result, when it came time to add capacity, Whitehall only had to purchase less-costly SATA disk instead of expensive Fibre Channel drives. This delivered a 74 percent year over year reduction in disk drive expenditures.

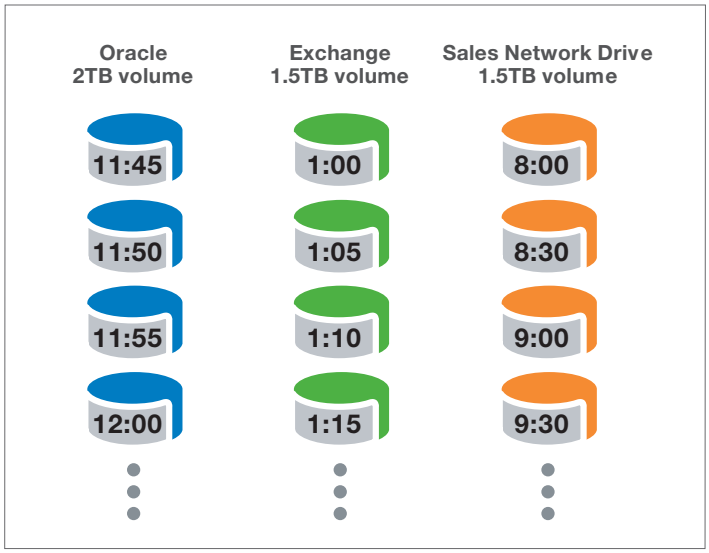

Figure 5: *Improve recovery with a high number of Replays.*

Data Instant Replay is another example of how Compellent's TCO-aware design yields operational benefits. Compellent doesn't require pre-allocation of disk space to store Replays, and each Replay takes less space than traditional snapshots, so storage efficiency is optimized. Data Instant Replay holds administrative costs to a minimum with an intuitive, wizard-based, point-and-click interface that allows storage administrators of all levels to set up and schedule Replays—and immediately recover data after a disruption occurs.

Data Instant Replay also eliminates the need for daily tape backups. Restoring data from tape fails an astounding 60 percent of the time, which makes instant recovery from a Replay far more preferable to tape retrieval. OPEX costs can quickly add up with tape backup–the cost of tapes, the extra labor required to handle them and transportation. When organizations contract with an outside backup service, the costs can be even greater.

#4. Save Your Budget and Your Business

Thin Replication with Compellent's Remote Instant Replay™

When disaster strikes, the future of your business depends on how quickly you can recover and resume normal operations. Business continuity is an imperative. Yet, one in three companies operate without a disaster recovery plan. Two in three companies admit that their DR plans have significant vulnerabilities. Why? Cost is a big factor. Replicating critical business data to remote sites (presumably out of harm's way) can generate large capital and operational expenditures. But how does that compare to the cost of downtime? How do you weigh storage costs against lost revenue and the financial impact on your employees?

Fortunately, the same Compellent technology that achieves cost savings for local data recovery can be applied to enterprise-wide disaster recovery. Powered by Compellent's Remote Instant Replay software, Thin Replication automatically replicates Replays between local and remote sites, providing business continuity at a fraction of the cost of other replication solutions. Continuous data availability is a reality with a high number of recovery points at multiple locations.

The TCO impact of Remote Instant Replay is similar to that of Data Instant Replay, with some additional savings. When setting up the remote sites, using lower-cost SATA drives reduces hardware

CAPEX, floor space, cooling and power costs. Since Remote Instant Replay performs IP replication natively the expensive Fibre Channel to IP converters required by other replication solutions are eliminated.

Administrative costs are minimized by a wizard-based interface that helps you configure remote replication with as few as six mouse clicks. You can verify successful remote replication online in just minutes (even while replication is still in progress) without risking disruption or data loss—and without complex and time-consuming disaster recovery tests.

One of the most significant costs associated with remote replication is bandwidth management. The inefficient snapshots of traditional replication require a significant allocation of bandwidth, very often a dedicated line in addition to regular enterprise networking. Compellent, however, lets you throttle bandwidth and determine when replication happens, so you can achieve static, predictable bandwidth usage without a dedicated line and without degrading other business processes.

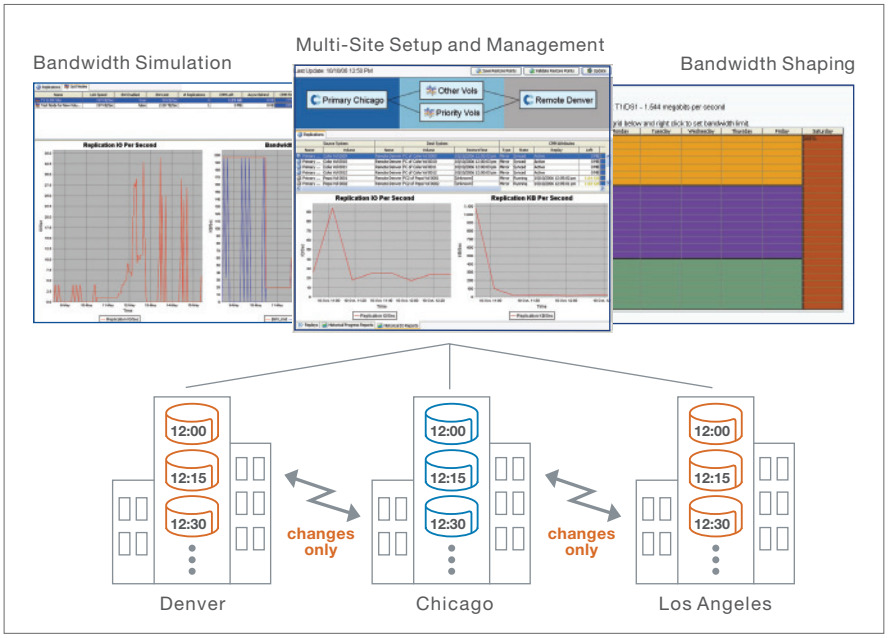

Figure 6: *Implement multi-site replication without the traditional cost or complexity.*

IT managers often calculate disaster recovery plans in terms of their Recovery Point Objective (RPO) and Recovery Time Objective (RTO). The recovery point reflects the frequency of backups, and recovery time is how long it takes to restore data using that snapshot. With traditional replication solutions, the limited number of snapshots reduces the number of recovery points (there's a longer interval between them) and inefficient snapshots increase recovery time. With Compellent's Remote Instant Replay, a high number of recovery points allows you to recover from any point in time to any location in just minutes, not hours.

	TRADITIONAL SAN	COMPELLENT SAN
Recovery interval (RPO)	3 hours	15 minutes
Recovery time (RTO)	1 hour	30 minutes
TOTAL TIME	**4 hours**	**45 minutes**
TOTAL COST (assuming downtime at $50k/hour)	**$200,000**	**$37,500**

#5. Manage Everything with a Single Interface

Administrative Cost Reductions with Compellent's Unified Console

Managing a traditional data storage solution is complicated and time-consuming. In fact, labor cost is often the single largest factor when analyzing storage TCO. For every dollar spent on storage infrastructure, companies spend four to eight dollars on storage management. This cost can take the form of manually tracking capacity, manually moving data between storage tiers, training to manage multiple administrative interfaces, or even a costly consulting engagement. For storage administrators, the cost factors are basically the administrator's salary and how much storage he or she can manage. Adding another 10TB or 20TB of capacity could mean adding another person, and that could be up to $75,000 a year.

Compellent's SAN is designed to help administrators manage more storage in less time. Recent analyst research found that 98 percent of Compellent customers spend less than three hours per week managing their SAN, with nearly half spending less than one hour per week. The majority of Compellent customers comfortably manage over 50TB per administrator, compared to only 10 percent of customers using traditional systems.

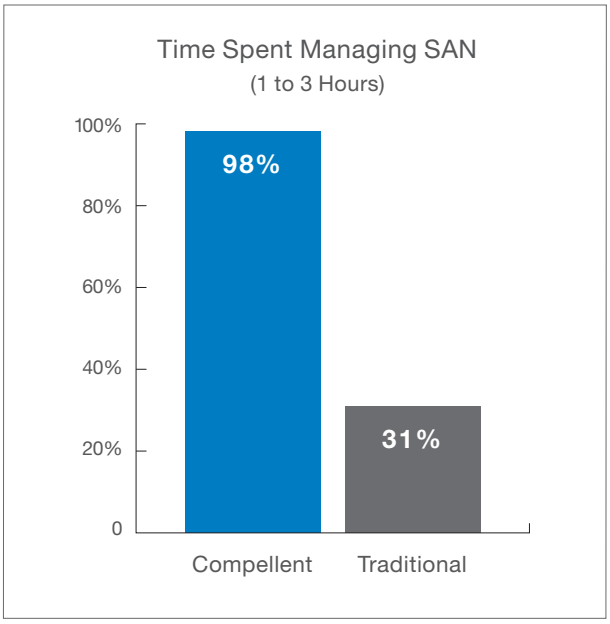

Figure 8: *Manage more storage in less time.*

How is this possible? Compellent's intuitive interface presents a complete view of your entire storage environment, both local and remote. Wizards guide storage administrators through advanced tasks, and there's a high degree of automation throughout Compellent's unique applications. Most tasks are accomplished through point-and-click commands. Need to create a new volume? Three clicks. Set up Boot from SAN? Six clicks. There's even a drag-and-drop graphical interface for adding new devices to a rack.

A telling example of how Compellent reduces labor costs is the long list of tasks a storage administrator can accomplish in less than 10 minutes each. Examples include: Add disk drives, provision storage, move data between different drive types, mount and use Replays, set up remote replication.

#6. Slash Server Costs

Boot from SAN with Compellent's Server Instant Replay™

Server management is always a challenge. It can take administrators several hours just to bring a new server online or restore a server that's gone down. Installing, patching, testing, deploying, provisioning, and recovering servers are all time- and resource-intensive tasks that pull administrators away from more strategic projects. And, taking servers offline for maintenance jeopardizes application availability throughout the enterprise.

There's a much simpler and cost-efficient way to manage servers: Compellent's Server Instant Replay software is a complete Boot from SAN solution that reduces capital expenditures and operating expenses (especially administrative time) while increasing server performance and availability. Booting servers from a centrally stored "gold" image on a Compellent SAN eliminates the need for servers with attached disks. IT managers can deploy diskless or blade servers to consolidate their server infrastructure, and save money on hardware, infrastructure, and on-site service contracts, plus related savings on power, cooling, and data center space.

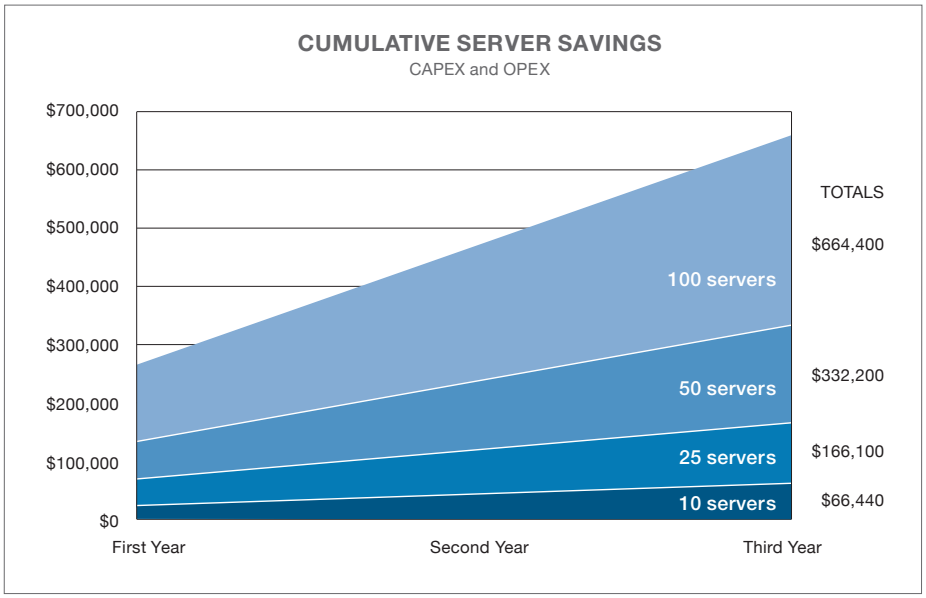

Figure 9: *Dramatically reduce the cost of owning, operating and managing every server attached to the Compellent SAN.*

Eliminating internal server disks doesn't take an equivalent amount of capacity away from the Compellent SAN. By using Thin Provisioning, an administrator can allocate a 30GB boot volume for each server, for example, but consume only 6GB of physical capacity. With Server Instant Replay's intuitive wizard, creating and mapping a boot volume takes just six mouse clicks. You can provision (or recover) a server in less than 15 minutes. If a server goes down, you can quickly boot a standby server to replace it—and the faulty server can receive less-expensive next-day maintenance instead of requiring costly two-hour response time.

#7. Grow a Green Data Center

Extend the Life of Your Data Center with Compellent's Energy Efficiency

The time has long passed when building an environmentally conscious data center could be dismissed as tree-hugging. From CIOs on down, IT organizations are recognizing that a "green" data center is also one that minimizes operating expenses. Unfortunately, many traditional data storage solutions are inherently wasteful in terms of disk utilization, the power and cooling they consume and the administration time they require. Those solutions must be replaced with something far more efficient.

Every facet of Compellent's architecture is designed for CAPEX and OPEX efficiency. Thin Provisioning and Virtualization provide highly efficient utilization of disk space. Boot from SAN provides similar efficiencies for server management. That means fewer drives, which translates into less power, less cooling and less floor space. And that means lower overall costs–in fact, using a combination of Compellent's energy-efficient features, companies can cut the cost of power and cooling by up to 93 percent compared to traditional storage systems.

According to the US Department of Energy, commercial electrical costs within the US as of June 2007 ranged from $.05/kWh to $.20/kWh. Assuming an average of $.10/kWh, the cost to power a traditional 20TB storage system, which would require 274 drives, could be as much as $26,370 over 5 years.

By comparison, a Compellent SAN with Thin Provisioning and Automated Tiered Storage might require only 21 disks and would consume only 429 watts of power—or 3,758 kWh—for a total cost of only $1,879 over 5 years.

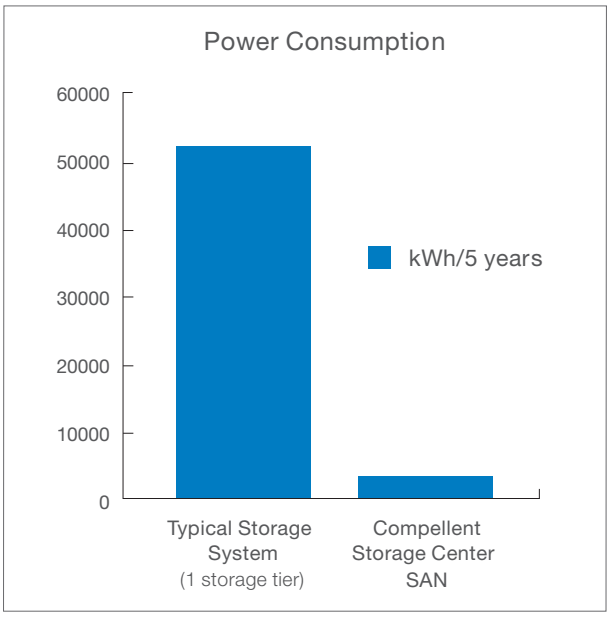

Figure 10: *Significantly lower the cost of power and cooling with ultra-efficient disk utilization.*

By providing ways to reduce the overall number of disk drives required and by incorporating more energy-efficient, high-capacity drives into a multi-tiered storage system, Compellent presents numerous green advantages. Compellent reduces not only power consumption but also greenhouse emissions. As your IT organization looks ahead to a next-generation data center, remember that reducing operating expenses and reducing your impact on the environment are closely linked—and Compellent delivers on both.

IT ALL ADDS UP: SEE FOR YOURSELF

Try Compellent's Online TCO Tool

The best way to see how Compellent reduces the total cost of ownership for data storage is to run the numbers yourself. Plug your current storage costs into Compellent's online TCO Tool and see how the Compellent SAN can: radically reduce the cost of storage; reduce operational expenses for labor, cooling, and power; and dramatically reduce the cost of downtime. A Compellent Business Partner can work with you on a more detailed TCO analysis.

For more information, visit **www.compellent.com/tco**

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