



## Converging Storage for the Mid-Market — Nimble Storage Simplifies the Mid-Sized Data Center

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### Management Summary

Basketball and hockey seasons are over; baseball is in full bloom. Balls and strikes, hits and outs can be found on your TV or on the Internet wherever you turn. The most exciting play in Baseball, the *Triple Play*, can be found wherever you look on YouTube. With the bases loaded and nobody out, trouble is just one pitch away, or not. If the batter hits the ball to just the right spot, the fielders can get three outs with just that one pitch – simply and efficiently. The *Triple Play* eliminates all of the worries for at least one inning. The *Triple Play* can also be found in the world of telecommunications. Your local Internet supplier is only too willing to package up your cable TV, your cellular phone, and your Internet connection. They will even send you one bill for all three services simplifying the billing process, perhaps even with a discount. This *Triple Play* enables you to acquire all three services from one vendor, simplifying the acquisition and installation process (*if you can find a good installer*). What could be better than that – easy deployment of services *and* a lower total cost of ownership (TCO).

Well, if you ask the CIO or IT Manager of any data center, they may tell you that if someone could simplify the acquisition of their storage requirements *and* lower the TCO of the IT infrastructure, they would be eternally grateful! Storage is exploding in every data center across the country. In fact, storage is doubling, in some locations, every 18 months, or so. This includes high-performance Tier-1 storage in support of mission-critical applications, requiring immediate response; high-capacity Tier-2 storage for data center backup/recovery and archiving needs; and also remote storage, to provide disaster recovery (DR) support in order to maintain business continuance. Each of these categories has its own performance characteristics, from drive speed to drive capacity to energy consumption. IT managers of high-end enterprise data centers would like to lower their TCO, but they are not as concerned about the deployment of their storage needs because they have a large enough IT staff with a variety of expertise to encompass just about any storage environment, whether Fibre Channel (FC), SAS, or iSCSI, to name three. The manager of the mid-sized data center is not so fortunate. He depends on one or two (or perhaps three) generalists to support an IT infrastructure covering servers, storage, and networking. The IT budget does not have the means to employ a FC expert, for example, just to administer to a FC SAN, along with a server admin and a networking guru. The IT staff needs to acquire systems that are pre-integrated to simplify the storage deployment, enabling the data center to bring applications on-line faster, making the enterprise more responsive, more nimble.

One new company has emerged to provide the data center of the mid-sized enterprise (MSE) with primary storage, backup and recovery, and DR in a single platform – Nimble Storage. Nimble Storage has integrated all of these features into a unique *triple play* of their own to simplify management *and* lower the TCO of storage for the MSE. To learn more about Nimble Storage, please read on.

### Mid-Sized Data Center Issues

Through *server* consolidation, the IT staff in

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enterprises of all sizes has simplified the physical management of existing IT resources throughout the datacenter, replacing under-utilized, under-performing servers with new, multi-core processors in multi-socket systems. This has enabled the data center to reduce the server count by a factor of up to 10:1, helping to lower the TCO of the infrastructure. The flexibility of these servers enables the improvement of server utilization through the virtualization of the server environment with hypervisors, such as *Hyper-V*, *VMware*, and *Xen-Server*. **By virtualizing multiple mission-critical and business-critical applications within a single physical server, the datacenter not only improves server utilization but also increases the demand for more efficient primary storage and backup technology from the virtualized environment to the storage network.** This increases the need for a reliable, affordable storage array with higher IOPS capability, scalable capacity, and the energy efficiency necessary to meet today's unique demands from a growing enterprise, keeping in mind the higher performance requirements of tomorrow. In addition, the IT staff needs to reduce the TCO of storage in order to meet budgetary limitations.

*Management complexity* and *waste* contribute to an increase in the TCO of the data center, due to costs and daily headaches of separate devices to support Tier-1, Tier-2, and DR data, and the daily data flows between these devices. To avoid this, the architectural infrastructure of the data center needs to change – especially through the simplification of the backup and recovery scenario.

As data ages, the need to access it usually decreases. *Mission-critical* (Tier-1) applications typically have a requirement for instantaneous access to storage. Therefore, the IT staff tends to store this information on the fastest, most reliable media available. As you might suspect, this is also the most expensive media in open systems storage arrays, and not always affordable. The data for *business-critical* applications, such as email and data warehouse, do not necessarily have to be on Tier-1 drives. This secondary data can be on Tier-2 drives. Applications such as backups, can clearly utilize the high capacity, low-cost characteristics of SATA drives. However, due to the long-term nature of this data, there is a requirement to minimize the amount of duplicate data being replicated.

Some enterprises, mid-sized and smaller, are looking to the skies for relief. Not from the heavens, but from *The Clouds*. Unfortunately, for every advantage that cloud storage might provide, there may be a disadvantage that could be overwhelming to the mid-sized enterprise. *What if their*

*cloud services failed?* A mid-sized business would be brought to its knees, or possibly its grave, if it lost access to its critical data. The IT staff needs to have that control in their own data center; however, they need that capability within the limitations of a limited IT staff and budget.

The data center of the mid-sized enterprise faces the same issues as those of the largest enterprise, simply on a reduced scale, with potentially, a more significant effect, due to those limited resources. Let's take a look at the specific issues that the staff faces every day.

- **Storage is growing faster than the IT infrastructure can handle.** With up to a 100% growth rate approximately every 18 months, the IT staff needs to find additional capacity for primary storage data in support of mission-critical applications, along with additional Tier-2 capacity for business-critical solutions such as email. A third tier also exists in support of backup and recovery applications and for the archiving of critical data in conformance with industry rules and governmental regulations. Furthermore, the staff needs to find storage that is easy to deploy and simple to manage.
- **Primary and secondary storage is just too expensive.** The IT staff has to control the capital expenditures (CapEx) to remain within budget limitations. New mission-critical and productivity applications need high-performance storage, with a very high IOPS (I/Os per second) rating, to support the database and ERP applications, which are the backbone of the enterprise. Tier-2 storage also is growing so fast that it too is putting a serious dent in the IT budget.
- **Days are limited to 24 hours!** This is not as ridiculous as it sounds. As data continues to grow, seemingly without limit, the IT staff needs to find enough time to backup this information in case of data corruption or loss. Traditional backup processes are now reaching the limit of the backup window capabilities and existing recovery processes are becoming outdated. The recovery point objective (RPO) and the recovery time objective (RTO) need to be met in order to provide the business with continuity.
- **The complexity of deployment and administration grows proportionately** as the data center continues to buy an assortment of dedicated storage appliances for primary and secondary storage, as well as storage in support of DR sites. The mid-sized enterprise simply does not have the resources necessary to continue down this path. Controls have to be instituted on operational expenses (OpEx) to ensure that the data center lives within its means.

- **Many DR solutions are inadequate in terms of resource utilization.** Remote sites connected via a WAN do not have the bandwidth necessary to implement a timely restoration of applications and data to ensure business continuance.

In order to provide an economical and simplified storage solution to resolve these issues, Nimble Storage has developed a line of unified, or converged, storage platforms, the *CS Series* family, that can economically consolidate and virtualize both primary and secondary data for the mid-sized data center. In addition, it can also provide the necessary resources for disaster recovery within the same framework.

### Who is Nimble Storage?

You may be asking: *Who is Nimble Storage and why should I invest the future of my business in them?* In fact, Nimble Storage is a startup storage company, based in San Jose, with big ambitions and significant backing to see the company through to profitability. It was founded in 2008 by an executive team that had developed storage solutions at several major vendors, including Data Domain and Network Appliance. Its goal is to provide the mid-sized enterprise<sup>1</sup> with an affordable, high-performant, and scalable storage array, using iSCSI technology to converge both Tier-1 and Tier-2 storage requirements, along with disaster recovery, in a single platform. This platform was designed to replace the heterogeneous complexity that was proliferating throughout the humble facilities found in these data centers.

Nimble Storage came out of stealth last July with an appliance that targeted businesses looking for options to replace their complex heterogeneous environment with a homogeneous alternative, cutting their TCO while simplifying deployment and management. It focused in on clients with a small IT staff who are looking for a storage alternative to established primary and backup vendors. These data centers are attempting to lower TCO while increasing performance and capacity, seemingly a mutually exclusive task. To accomplish this, Nimble Storage has delivered the CS-Series, based upon Nimble Storage's innovative *Cache-Accelerated Sequential Layout (CASL)* architecture and their own innovative *Nimble Protection Manager*. With a customer base in excess of 100 in less than one year, it appears that they are on the road to success.

### The Nimble Storage CS-Series

The CS-Series makes the mid-sized data center

more robust, yet simplified, while lowering the TCO and improving the reliability of disk storage. The CS-Series – the *CS220*, *CS220G*, *CS240*, and *CS240G* – combines a primary storage architecture with high-efficiency backup and DR capabilities in order to simplify both the storage infrastructure and the backup and disaster recovery processes. In addition, the newly announced *CS210* provides the same functionality in an entry-level version, which is more suitable from a cost and configuration perspective for smaller IT environments. The CS-Series is configured with SATA storage, along with solid-state disk, to improve TCO in high-performance and high-capacity environments, with built-in data deduplication<sup>2</sup>. See Exhibit 1, on the next page, for a complete list of CS-Series benefits.

The key to the CS-Series efficiency is its CASL architecture. CASL compresses data into variable-sized blocks, combining them into full stripes, writing to both disk and cache sequentially, including random writes. This enables a real-time (2-4 times) data compression with no added latency. Instant backups and restores are enabled by Nimble Storage's highly-efficient snapshots. This is where the CS-Series gains an edge in storage utilization and performance against its competitors, by being enabled to be tuned for different applications, supporting multiple compression algorithms. CASL automatically tracks hot data blocks and instantly responds to workload changes. It also enables the CS-Series to store additional metadata, such as checksums, to detect bit errors. Several weeks (typically three months) of compressed, incremental snapshots can be stored on disk at pre-configured intervals to meet enterprise RPO and RTO needs. These snapshots have no application performance impact. Also, CASL eliminates the need for separate disk-based backups and time-consuming backup management.

The CASL cache implementation combines DRAM cache on both controllers with flash cache from SSDs shared by both controllers to enable the flash cache to failover if one controller fails. A copy of active (hot) data is held in flash memory, enabling fast reads, while all data is stored in cost-effective, high-capacity disks. The use of nonvolatile RAM, coupled with a sequential data layout, accelerates write performance, while the CS-Series cache management improves read performance. CASL also improves data protection.

The CS-Series packs many of the features that the data center would normally find in higher-priced arrays, such as thin provisioning, efficient snapshots, in-line data compression, a flexible rep-

<sup>1</sup> The mid-sized enterprise typically has between 200 and several thousand users and between 10TB and 50TB of data.

<sup>2</sup> Up to a 20 times reduction in backup data stored.

### Exhibit 1 — CS-Series Benefits

- **Flash-Accelerated Primary Storage** – Intelligent flash memory management and application-optimized performance increases I/O performance and reduces latency making the CS-Series ideal for demanding primary storage applications;
- **High-Density Drives and Capacity Optimization** – enable cost-effective data retention for up to 90 days; backups and recoveries can be performed in seconds;
- **Application-Integrated Data Protection** – The Nimble Protection Manager supports application-consistent backups residing on Nimble arrays; enables an instant restore from any available backup, accelerating and simplifying application recovery;
- **Fast Offsite Disaster Recovery** – Nimble Storage enables a highly-efficient replication to an offsite Nimble array, significantly faster than a typical SAN replication;
- **Simplified Management** – An intuitive user interface eliminates the complexity of managing separate storage, backup, and disaster recovery devices;
- **Superior Reliability** – Nimble arrays feature fully redundant hardware components, plus high-availability software and support features such as high-performance dual-parity RAID, comprehensive checksums, proactive data scrubbing, “phone” home, and hardware monitoring; and
- **Lower TCO** – With no high-RPM drives or separate disk-based backup devices, Nimble arrays lower infrastructure costs, energy consumption, and rack-space requirements.

Source: Nimble Storage

lication architecture, and data protection policies, into a RAID-6 array. Even if half of the raw capacity is configured for compressed primary data, the CS-Series can still support up to 90 days of snapshots for backup.

The CS-Series combines 24GB of memory with up to 640 GB raw, or 1.3TB usable, assuming 2x compression, of multi-level cell (MLC) flash, using either 80GB or 160GB SSDs, depending on the model, along with 12 bays for either 1TB or 2TB SATA drives, into a compact 3U chassis in order to increase the number of IOPS available to mission- and business-critical applications.<sup>3</sup> All CS-Series arrays come with dual, hot-swappable controllers and power supplies with mirrored NVRAM. Nimble Storage arrays also come with either six GbE ports or two 10GbE and two GbE ports<sup>4</sup>. All CS-Series arrays are configured with the built-in Nimble Protection Manager to provide converged management for all application data re-

<sup>3</sup> With 50% compression, a CS210 has up to 8TB of usable capacity, while the CS220 has 16TB and the CS240 has 32TB.

<sup>4</sup> The CS210 has 4 GbE ports.

siding on Nimble arrays, including primary storage, backups, and DR. This enables the IT staff to manage snapshot backups, clones, and remote replication. A 12TB system costs about \$58K, while the 24TB configuration sells for \$88K, at list. The CS210 has an entry-level price of \$38K. All models come with a 5-year warranty.

The CS-Series array competes directly with the *EqualLogic* system from Dell and *LeftHand* arrays from HP, as well as products from NetApp, for the storage dollars of rapidly-growing mid-sized enterprises. However, unlike its established rivals, Nimble Storage has no legacy products to protect. It can innovate without concern for the impact on existing product investments. It could start from the ground up, taking a fresh look at the needs of these data centers. And that is exactly what it has done, with a disruptive price/performance model!

A single 3U CS240 with 18TB of effective primary capacity and 60-90 days of backup capacity can replace a 14U stack of three Dell EqualLogic arrays (with high RPM SAS drives) backed up by an EMC *Data Domain* array, which would offer about 19TB of effective primary capacity and similar backup capacity, along with 7,500 IOPS of performance. The CS240 delivers similar storage and backup capacity, but over 12,000 IOPS at less than 25% of the cost of the comparable Dell solution. In addition, the Nimble Storage configuration requires less than one-fourth of the energy required by the Dell solution and about one-third of the management resources, further reducing TCO, and reducing backup time from hours to seconds.

### Conclusion

With the CS-Series, Nimble Storage has changed the storage paradigm in the data center, creating an efficient enterprise storage solution for the mid-sized business that successfully combines high performance with scalability. Furthermore, their arrays with high-performance flash and low-cost SATA drives, can be deployed and managed easily while controlling the total cost of ownership, providing real value to the mid-sized data center, enabling it to be both performant and nimble within their own IT infrastructure.

Mid-sized enterprises evaluating new, innovative iSCSI storage solutions in order to converge primary storage, backup, and disaster recovery into a single platform, can virtualize their IT infrastructure with low-cost SATA drives. These enterprises should consider the CS-Series as a viable alternative to reduce complexity and lower their TCO.



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