Dot Hill Stretches Capacity Limit on 2U Storage — Introducing the 24TB Disk Array

Analyst: David Reine

Management Summary

In a direct attempt to boost the production levels of American cars and trucks, as well as a direct attempt to boost the economy across the country, the U.S. government has launched a new program commonly called "Cash for Clunkers". The effects of this program will be widespread. With huge rebates on new cars, salesmen are being kept busy putting Americans in new, more fuel-efficient automobiles and factories are being turned back on to replace depleted inventories. As more and more "clunkers" are taken off the roads, the fuel efficiency of the average American driver will go up, with aging gas-guzzlers being replaced with smaller cars powered by more modern combustion engines and hybrid power plants, improving the MPG rating and also lowering exhaust emissions at the same time. In addition to helping the economy, we are also helping to improve the environment.

At the same time, enterprises across the country are attempting to cope with restricted IT budgets, a limited supply of energy, and a continuing surge in the volume of data that needs to be stored, and preserved, while at the same time, attempting to run a data center IT infrastructure that is becoming increasingly complex and dependent on a growing staff of administrators required to manage the environment. The budgetary problem is not limited to the acquisition of new servers and storage, however. The total cost of ownership (TCO) of the IT infrastructure is becoming a far more serious problem for the enterprise financial officers. Elements such as maintenance, energy, floor space, and software licensing have become major culprits to the bottom line. The data center is not only impacted by the cost of the energy, but it is also restricted by the amount of energy available to it. Something has to be done to reshape the IT environment before the data center literally runs out of energy and the enterprise is forced to build a new center to handle the increasing workload. With the introduction of new microprocessors from companies like AMD and Intel, we have seen a change to the server paradigm from companies such as Dell, HP, and IBM, with consolidation and virtualization of mission- and business-critical servers leading the way. However, what about storage? What can be done to improve the capacity of data arrays and lower the energy burden?

One company that has recognized this problem, and is attempting to do something about it, is Dot Hill. With the announcement and shipment of 2TB disk drives from Western Digital, Dot Hill will be able to deliver 24TB of raw storage in a single 2U rack-mountable chassis. Not only will this address increasing capacity issues in the data center, but these arrays will also be able to address the growing energy efficiency problem by reducing power usage by 60% when compared to 1TB drives. With scalability to 112TB, Dot Hill will be able to maximize data center space and reduce costs for power and cooling. To learn more about how Dot Hill's family of RAID Arrays and data protection software can increase the capacity and performance of your data center, please read on.

Storage Issues in Today's Data Center

Is your data center in crisis mode? Not some other data center, *your data center*. Server proliferation, along with the attached storage, is destroying your IT budget and draining the energy out of the wall as fast as your utility company can provide it. You have made the decision to consolidate your servers with the latest multi-socket, multi-core servers, but that does not help the storage dilemmas. With data doubling in capacity every 12 to 18 months, the IT budget for storage will soon be insufficient to meet enterprise requirements. Capital costs are not the only issue, as the cost for storage, on a per TB basis, has been coming down. The costs associated with energy, reliability and overhead, however, are another matter.

As storage capacity rises, the number of devices rises, proportionately. The reliability and the availability of any physical device may be the same, or even improve, but the overall expectation for any disk farm is that the data center will experience more failures. It is not a question of "if a disk device will fail", **it is the realization that multiple disks will fail.** Today, arrays are offered with 1TB SATA disks. In order to protect enterprise data, the IT staff has implemented any number of safety nets, including the implementation of RAID technology to ensure the integrity of your data. As disk devices increase in capacity, the requirement for improved reliability becomes more urgent.

In addition to the impact on reliability is the effect of uncontrolled data growth on overhead and services. What are the costs for these today? What can you expect tomorrow? The costs for floor space, administration, maintenance, and energy continue to rise at an alarming rate. At the current rate of growth, in five years, you could be managing six-to-eight times as much data. Does the enterprise have enough floor space available in the data center to support that growth? Will the enterprise have to build a new data center at significant cost, i.e., millions of dollars? How many new administrators will you have to bring onboard to manage it? What will be the impact on the maintenance budget to support the added devices? Moreover, **will the local public utility even be able to supply the data center with enough energy to keep all of those drives spinning and cool**, let alone having the data

center try to budget for it? Depending on where your data center is located, you could be paying anywhere from $.05 per KWh to $.18 per KWh, *today*. If the projected price of gasoline is any indicator, your energy costs could triple in the years to come. Even though capital expenses are going down, operational expenses are going up even more. The data center will be forced to do even more with even less. In five years, **how much storage will you have?** What will be the cost of break-fix services? What will be the cost of the impact of the outage on the ability of the enterprise to respond to customers and partners?

Another area of concern is scalability and the protection of the data center's storage investment. What is the scalability of your existing storage solution? If it cannot grow to meet tomorrow's needs, you must plan today to replace it with a solution that can.

The data center needs to improve the reliability, performance, and ease of use of their storage with a scalable solution that will meet the long-term requirements of the enterprise, both from a budgetary and energy standpoint. The IT staff needs to deploy an innovative solution in the realm of storage, to the same extent that they have with server technology. One company that believes in the need for storage innovation is Dot Hill. Teaming up with Western Digital (WD), Dot Hill has been providing innovative storage solutions for the enterprise data center for over two decades. With WD's recent announcement of a 2TB disk device, Dot Hill has announced the availability of an energy-efficient 2U enclosure that will support up to 24TB of capacity.

Western Digital's High Capacity Drive

Western Digital (WD) has combined the performance improvements achieved in their award-winning RE3 hard drives with advanced power management technology to deliver the 2TB WD RE4-GP hard drive – a faster, greener solution for enterprise data centers. Under the banner of GreenPower Technology, WD has created a family of environmentally responsible storage devices that deliver the high capacity and high performance required by any enterprise.

With a motivation of environmental sustainability, Western Digital creates disk devices that simply consume less electricity. To that end, WD has designed eco-friendly hard drives

with active power management to monitor workload and automatically invoke idle mode whenever possible to reduce unnecessary power consumption further. In addition, WD has made a commitment to support Energy Star 4.0 compliance, incorporating the latest innovations in engineering technology. WD developed the WD RE4-GP to bring more energy efficient hard drive options to enterprise data centers with a corporate concern about the environment.

As hard drive capacities increase, the power required to run these drives increases as well. Currently available 1TB hard drives have a typical power consumption rating greater than 13.5 watts. WD has designed the first 3.5-inch hard drives that deliver power savings as the primary attribute. A green drive from WD yields an average drive power savings of 4-5 watts over a standard drive, while maintaining solid performance. That power savings equates to reducing CO_2 emission by up to 60 kilograms per drive per year – the equivalent of taking your car off the road for 14 days each year. Their new 2TB device makes it possible for energy-conscious data centers to deploy systems with higher capacities and the right balance of system performance, ensured reliability, and energy conservation. See Exhibit 1, at the right, for the key features of the WD RE4-GP.

The RE4-GP is ideal for enterprise data centers, web service providers, commercial grade surveillance systems and any organization requiring huge amounts of storage with limited budget and power allotment. The WD RE4-GP will lower total cost of ownership (TCO) as the data center may realize up to $10 savings per drive per year in electricity costs (U.S.). A large data center with 10,000 drives could realize up to $100,000 in saving per year.

Dot Hill's Storage Solution

Having the availability of a high-capacity disk device is great, but that is not the only factor that you need to reduce the complexity that abounds in today's data center environment. Dot Hill's *2000 Series* – offered through OEMs, and soon through Dot Hill channel resellers, is based on their highly modular *R/Evolution Architecture*, and, specifically, the *2730* and *2730T* entry-level storage arrays – can be SAN-connected or support up to four direct-connect hosts and provide a 24TB 2U

Exhibit 1 – RE4-GP Key Features

- **Faster** – With a 64 MB cache, dual processors, and increased areal density it yields twice the processing power results, up to s 25% performance improvement over the previous generation.

- **Higher Capacity** – WD employs Perpendicular Magnetic Recording (PMR) technology to achieve greater areal density.

- **Higher reliability** – With an MTBF of 1.2 million hours, these drives have the highest available reliability rating on a high-capacity drive.

- **Greener** – Improvements in WD's power-conserving technologies – *IntelliSeek*, *IntelliPark*, and *IntelliPower* – deliver improved power consumption over the previous generation of RE-GP drives.

- **IntelliSeek** – Calculates the optimum seek speed to lower unnecessary power consumption, noise, and vibration.

- **IntelliPark** – Delivers lower power consumption by automatically unloading recording heads during idle to reduce aerodynamic drag, and by disengaging read/write channel electronics.

- **IntelliPower** – A fine-tuned balance of spin speed, transfer rate, and caching algorithms designed to deliver both significant power savings and solid performance. These drives consume less current during start up allowing more drives to spin up simultaneously, resulting in faster system readiness.

- **Improved rotary vibration tolerance** – Optimized drive mechanics, system characterization, and process validation yield the highest performance in high vibration environments.

- *StableTrac* – Secures the motor shaft at both ends to reduce system-induced vibration and stabilize platters for accurate tracking, during read and write operations.

- **Rotary Acceleration Feed Forward (RAFF)** – Optimizes operation and performance when the drives are used in vibration-prone multi-drive systems such as rack mounted servers.

Source: Western Digital

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platform for up to 12 WD RE4-GP drives, scalable to 112TB over 56 drives within the base RAID array plus four additional disk enclosures. The 2730T, or Turbo, is a high-performance system for I/O intensive operations with 150,000 IOPS, 50% higher than the standard 2730 model, and a throughput of 1,110MB/s, making it ideal for database, online transaction processing, and business analytics applications.

Configurable as either a RAID array or a JBOD, the 2730 is implemented with 4GB external Fibre Channel interfaces and a 3GB internal SAS interface, the 2730 has the capability to mix SAS, SATA, and SSD technology within a single disk enclosure, providing a tiered storage environment for information life-cycle management (ILM). The controller is packaged with up to 1GB of low latency cache mirroring (*SimulCache*), which is backed up with battery-free super capacitors.

The 2730 includes a complete set of high availability features, including redundant hot-swap controllers, disks, power supplies, and fans. The array has automatic failover, multi-path support, hot-standby sparing, and dual power cords. The 2730 comes with a standard three-year hardware warranty.

The Dot Hill 2730 Series supports RAID levels 0, 1, 3, 5, 6, 10, and 50 and supports an optional complete data management solution with *AssuredSnap* and *AssuredCopy* services. AssuredSnap and AssuredCopy protect against the accidental or malicious loss or corruption of data by allowing point in time snapshots to be taken and utilized for backups and recovery exercises, while AssuredCopy also provides protection against complete RAID group or volume disk failure. It has the ability to create full volume copies or backups of disk volumes with the ability to restore whole volumes, folders, or individual files quickly. The 2730 comes with 16 built-in AssuredSnap snapshots, which can be scheduled to meet the data center's data protection requirements. There is an option for an additional 64 snapshots and for providing more frequent backups for business-critical applications, such as Microsoft *Exchange*.

Conclusion

Configured with the highest capacity drives available, Dot Hill arrays are also the most energy-efficient with the 2TB WD RE4-GP drives, demonstrating up to a 60% reduction in power usage over that used by traditional 1TB drive technology. With up to 112TB of storage in a single rack, the Dot Hill 2000 Series provides the density that any application may require and any enterprise needs today to free up valuable floor space. Any enterprise that is trying to increase performance and capacity, while at the same time controlling its total cost of ownership, should give serious consideration to the Dot Hill 2730 and 2730T RAID arrays.

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