



EMC Rolls Out Fully Automated Storage Tiering and Other Storage Enhancements

Analyst: Michael Fisch

EMC Upgrades Storage Platforms

EMC recently announced a major upgrade to its *Symmetrix V-Max* high-end storage, *CLARiiON CX4* midrange storage, and *Celerra NS* unified storage platforms. It includes both software and hardware enhancements.

The most significant new feature in all three platforms is *Fully Automated Storage Tiering*, or *FAST*, which automates the task of allocating and reallocating data onto tiered storage. To put it in perspective, tiered storage is a brilliant idea that has existed in practice for a while now, though it is still being perfected. It starts with the fact that not all data is equal. Data has different performance and availability requirements, based on the application to which it belongs, its age, and other factors. The concept behind tiered storage is to place data into different price/performance tiers to strike a balance between performance and cost. The goal is to put the right data in the right place at the right time, and thereby give an organization precisely the storage service levels it requires at the lowest cost. Tiered storage avoids the extremes of over-provisioning and spending too much, or under-provisioning and causing the productivity losses due to slow or unavailable IT applications. It is about making the most of finite resources, an idea that resonates with the modern emphasis on conservation and green technologies.

EMC announced FAST for Symmetrix V-Max, CLARiiON CX4, and Celerra NS. While there are differences of implementation between the three platforms, all versions of FAST automatically analyze data and move it to the optimal storage tier based on user-defined policies. In this bulletin, we will focus on enhancements to the Symmetrix V-Max high-end storage platform.

FAST for Symmetrix V-Max

Even prior to this announcement, the Symmetrix V-Max offered multiple tiers of storage:

- Enterprise Flash Drives (EFD) with 30 times more IOPS than FC drives for ultra-fast performance, as well as significantly lower energy consumption
- Fibre Channel (FC) drives for fast performance
- SATA drives for low-cost, high-capacity storage
- RAID 1, 10, 5, and 6 for various degrees of data protection and redundancy
- Local and remote replication with *TimeFinder* and *SRDF*, also for protection and redundancy

It also had a feature called *Virtual LUN* that moves data transparently within the Symmetrix V-Max system. Virtual LUN moves multiple LUNs and volumes concurrently, between different drive and RAID types, without disrupting replication processes or host access to data.

IN THIS ISSUE

➤ EMC Upgrades Storage Platforms	1
➤ FAST for Symmetrix V-Max.....	1
➤ Conclusion	3

FAST adds automation to this tiered storage foundation. Specifically, FAST periodically analyzes workloads, identifies hot and cold LUNs (i.e., highly active and less active), and automatically moves LUN data to balance performance across a tiered storage environment. It provides a wizard-driven interface for storage administrators to establish FAST policies, as follows.

1. Define storage tiers based on performance characteristics like drive and RAID type.
2. Apply policies to applications. For instance, a messaging application might use 10% EFD, 40% FC, and 50% SATA drives.
3. Define the day and time window for analyzing LUN workloads. This can be during off-hours.
4. Define day and time window for moving data. This can be during off-hours and can be automatic or based on administrator approval.

Using FAST in a tiered environment lowers upfront acquisition costs, long-run operating costs, and improves performance – all at the same time. Typically, technologies that reduce long-run costs require a larger investment up front, but not so with FAST. In an example provided by EMC, switching from a two-engine V-Max with all FC drives to a system of equivalent capacity with a mix of EFD, FC, and SATA drives with FAST can reduce acquisition costs by 20% and operating costs by 43% (over a 3-year period, due to reduced power consumption and management). Additionally, it reduces the physical footprint and boosts performance. *What is not to like?*

Some worry that a new automated feature like FAST might inadvertently cause problems, like the “Cylon” robots in *Battlestar Galactica* that turn on their creators and try to exterminate the human race. Storage administrators are used to controlling where data resides, and it is understandable that some would not like to see data moving around on its own. However, the risks in losing some control are minimal. In fact, administrators control FAST policies and can require their consent before data is moved (perhaps moving to automatic mode later after the feature has proven itself). In addition, the upside of automated storage tiering is significant – reduced costs and power consumption with faster and more-consistent performance delivered to appli-

cations.

This version of FAST applies to data at the LUN level and only to standard (i.e., “thick”) LUNs, not virtual (i.e., thin) LUNs. Support for virtual LUNs, as well as sub-LUN level granularity, is expected in a future release.

New Volume Provisioning Capabilities

The Symmetrix V-Max has added to its provisioning capabilities in this release. Now, it can replicate data from thick to thin volumes “sparsely,” only replicating host written tracks and reducing capacity requirements and TCO. These two types of volumes are structured quite differently, so copying data between them involves translation. A thick volume presents exactly the amount of space that it contains, whereas a thin volume presents more space to host servers than it contains and allocates physical capacity as it is actually consumed. Thin volumes are more space-efficient. This new thick-to-thin replication feature makes it easier to transition into virtual volumes.

Another feature is the space reclamation of “zero space” or blank spaces. Organizations now are able to reclaim Virtual Provisioning extents (768 KB) that contain all zeros after migrating from standard volumes to thin volumes, freeing up the capacity for other purposes and reducing TCO.

When a pool of virtual capacity is grown or shrunk, *Automated Pool Rebalancing* rebalances data across all drives to optimize performance. Performance is a function of the number of drives in a pool, but only if the data is striped across all drives to leverage each drive’s incremental performance. Automated Pool Rebalancing also helps reduce TCO, because IT organizations can add capacity to a “thin pool” in smaller increments.

Physical Enhancements

This upgrade includes several physical enhancements to the Symmetrix V-Max. The number of drives supported in a 2-engine Symmetrix V-Max configuration increased from 480 to 1,200, and the number supported in a 4-engine configuration doubled from 1,200 to 2,400. These higher-capacity configurations provide a lower net cost/GB. It supports 8 Gbit/s Fibre Channel, FICON, and SRDF connections, as well as high-performance FICON for mainframe connectivity (i.e., *zHPF*). Symmetrix V-Max is

the first storage array to support 8 Gbit/s FICON connectivity in the mainframe environment. A single-phase power option is available for data centers that lack three-phase power. It supports 10K RPM 4 Gbit/s FC drives at 600 GB, 450 GB, and 300 GB capacities.

Other Software Enhancements

For virtualized environments, *Symmetrix Management Console (SMC)* and *Solutions Enabler* are available as a “Virtual Appliance” for VMware environments. This capability makes it easier to integrate SMC and Solutions Enabler into VMware environments. Additionally, *Symmetrix Performance Analyzer v2.0* supports real-time views, volume level diagnostics, and support for FAST.

Conclusion

This is a solid upgrade for the Symmetrix V-Max, and FAST is a breakthrough capability with worthwhile benefits. It enables enterprises to lower storage acquisition and operating costs while boosting performance.

Ten years from now automated storage tiering will be commonplace, even in block-level storage, much like networked storage has become commonplace over the prior decade. The benefits are too great for it not to be. With FAST, EMC is taking its customers on a natural progression into the future.



About The Clipper Group, Inc.

The Clipper Group, Inc., is an independent consulting firm specializing in acquisition decisions and strategic advice regarding complex, enterprise-class information technologies. Our team of industry professionals averages more than 25 years of real-world experience. A team of staff consultants augments our capabilities, with significant experience across a broad spectrum of applications and environments.

- ***The Clipper Group can be reached at 781-235-0085 and found on the web at www.clipper.com.***

About the Author

Michael Fisch is Director of Storage and Networking for The Clipper Group. He brings over twelve years of experience in the computer industry working in sales, market analysis and positioning, and engineering. Mr. Fisch worked at EMC Corporation as a marketing program manager focused on service providers and as a competitive market analyst. Before that, he worked in international channel development, manufacturing, and technical support at Extended Systems, Inc. Mr. Fisch earned an MBA from Babson College and a Bachelor's degree in electrical engineering from the University of Idaho.

- ***Reach Michael Fisch via e-mail at mike.fisch@clipper.com.***

Regarding Trademarks and Service Marks

The Clipper Group Navigator, The Clipper Group Explorer, The Clipper Group Observer, The Clipper Group Captain's Log, The Clipper Group Voyager, Clipper Notes, and "*clipper.com*" are trademarks of The Clipper Group, Inc., and the clipper ship drawings, "*Navigating Information Technology Horizons*", and "*teraproductivity*" are service marks of The Clipper Group, Inc. The Clipper Group, Inc., reserves all rights regarding its trademarks and service marks. All other trademarks, etc., belong to their respective owners.

Disclosure

Officers and/or employees of The Clipper Group may own as individuals, directly or indirectly, shares in one or more companies discussed in this bulletin. Company policy prohibits any officer or employee from holding more than one percent of the outstanding shares of any company covered by The Clipper Group. The Clipper Group, Inc., has no such equity holdings.

Regarding the Information in this Issue

The Clipper Group believes the information included in this report to be accurate. Data has been received from a variety of sources, which we believe to be reliable, including manufacturers, distributors, or users of the products discussed herein. The Clipper Group, Inc., cannot be held responsible for any consequential damages resulting from the application of information or opinions contained in this report.