

DATA PROTECTION DESIGNED FOR FLASH

Better Together: HPE 3PAR StoreServ Storage and StoreOnce Backup

JUNE 2016



Flash technology has burst on the IT scene within the past few years with a vengeance. Initially seen simply as a replacement for HDDs, flash now is triggering IT and business to rethink a lot of practices that have been well established for decades. One of those is data protection. Do you protect data the same way when it is sitting on flash as you did when HDDs ruled the day? How do you take into account that at raw cost/capacity levels, flash is still more expensive than HDDs? Do data deduplication and compression technologies change how you work with flash? Does the fact that flash technology is injected most often to alleviate severe application performance issues require you to rethink how you should protect, manage, and move this data?

These questions apply across the board when flash is injected into storage arrays but even more so when you consider all-flash arrays (AFAs), which are often associated with the most mission-critical applications an enterprise possesses. The expectations for application service levels and data protection recovery time objectives (RTOs) and recovery point objectives (RPOs) are vastly different in these environments. Given this, are existing data protection tools adequate? Or is there a better way to utilize these expensive assets and yet achieve far superior results? The short answer is yes to both.

In this Opinion piece we will focus on answering these questions broadly through the data protection lens. We will then look at a specific case of how data protection can be designed with flash in mind by considering the combination of flash-optimized HPE 3PAR StoreServ Storage, HPE StoreOnce System backup appliances, and HPE Recovery Management Central (RMC) software. These elements combine to produce an exceptional solution that meets the stringent application service requirements and data protection RTOs and RPOs that one finds in flash storage environments while keeping costs in check.

FLASH CHANGES EVERYTHING

If it wasn't evident when flash first came on the scene a few years ago, it is now clear that flash technology is not simply a replacement for spinning media. Smart introduction of flash changes everything for a business, not just for IT. When application response time improves by a factor of 5X or 10X, and business results are produced in minutes and hours rather than days or weeks, business decisions can be made at speeds unheard of before. As a result, business processes and operations can change for significantly better responses to the competition and to speed time to market for new products and services. A business becomes more agile. Such is the power of flash.

When viewed in the context of flash, the possibilities are even greater. AFAs allow IT to further consolidate applications, as mixed workloads can receive all the resources they individually need without impacting each other. This often leads IT to use flash arrays to support one or more mission-critical applications alongside several business-critical or non-critical applications.

Flash also impacts power and cooling and space usage favorably. These and other benefits of flash are well understood by now and we will not dwell on them here. What is not well understood, however, is that with flash and particularly AFAs, you can have so much riding on your storage (all your eggs in

one basket) that you have to completely rethink application availability and data protection as a result. Now that the bar is set so much higher across so many dimensions, the user expects “instant” recovery if something goes wrong. Even IT expects (and should expect) backup and recovery speeds to match those of flash. In a way, it is a rethink of all IT. But the impact is greatest on the data protection/app availability side. Can we continue to apply traditional methods to protecting application data and uptime? Sure we can. But the mismatch would negate a lot of benefits of flash. Before we look at an elegant solution to this problem, let’s describe the new requirements for app availability and data protection in this new world of flash and the AFA.

NEW REQUIREMENTS FOR APP AVAILABILITY AND DATA PROTECTION

Backups Need to be Near Instantaneous

In the flash-centric data center, it is no longer acceptable to perform the full and incremental backups of yesteryear. Those are too slow and they sap application performance. They also require a lot of additional hardware and software. Once a certain piece of data has been protected, it should not have to be backed up again—ever.

Backups Need to be More Frequent

In the world of mission-critical applications, weekly full backups and daily incremental backups are totally unacceptable. Flash-based applications require RPOs to be in minutes.

Backups Cannot Impact Application Performance

This is obvious since application performance is king in the world of flash, but achieving it with traditional data protection methods is not easy, if even possible. Backups simply need to disappear in the background and not leave any visible scar.

Backups Need to be Application-Consistent

The flash data center is all about application availability and service levels. So whatever backup solution is used, it must produce application-consistent backups. Otherwise, what is made up for in speed of backup is lost in unacceptably long RTOs that impact app availability. Ideally, the new data protection paradigm should allow for both application- and crash-consistent backups for a wide variety of applications.

Backups Need to be Capacity-Efficient

Flash costs are still a multiple of HDD costs on a raw capacity basis. This means flash media needs to be used as wisely as possible. Capacity optimization techniques take on a new meaning in the context of flash.

Backups Need to Minimize Data Movement

Large data movement saps throughput, if nothing else. An ideal backup solution minimizes data movement to preserve throughput and compute resources for application serving.

Recovery Needs to be Near Instantaneous

Gone are the days when backup administrators were called up to recover a simple file and it took a week to run recovery jobs using traditional backup software. Today recovery needs to be “near” instantaneous, measured in seconds or minutes, period. Flash has raised the standard of expectation to a point that anything else is unacceptable.

Recovery Should be at the Highest Level of Granularity

If all one needs is a VMDK recovered (or a single VM or file within a VMDK), one should not have to recover a LUN or a volume. Ditto for a database object.

Administrators Need to be Able to Schedule Backups and Perform Recovery Without Involving the Storage and/or Backup Admin

There was a time when all data backups and recovery were done by the backup administrator. Today, this responsibility is shifting to application and VM administrators. In particular, as the industry moves towards VM-centricity, where the center of the universe is a VM and not a LUN (VVOLs is a move in this direction), the VM admin needs to be able to handle most data protection jobs without getting the storage and/or the backup admin involved. This allows the latter to focus on more strategic storage issues, such as infrastructural updates. But a VM admin is not a storage expert. That means the product should ideally be easy enough for an IT generalist.

Flash Simplicity Needs to Extend to all Aspects of Data Protection

Flash simplifies things. No more microscopic fine-tuning of LUNs and volumes. No more short stroking of HDDs to get the right IOPs for an application. No more racks full of wasted storage capacity. No more degradation in performance during rebuilds, etc. This simplicity and efficiency needs to extend to data protection as well. In fact, data protection needs to essentially disappear in the background. Once set, it should simply become a part of the landscape.

Flash Resources Are Precious, so Data Protection Must Behave Accordingly

This is obvious, but not always achievable with traditional data protection products. All capacity optimization technologies such as data deduplication, compression, thin provisioning, thin cloning, etc. need to be brought to bear to get maximum value out of a precious resource.

DATA PROTECTION DESIGNED WITH FLASH IN MIND

With these requirements as a basis, now let's consider what application availability and data protection designed for flash really looks like by considering the solution that HPE offers for its flagship 3PAR StoreServ Storage all-flash and converged flash arrays.

THE SOLUTION

HPE's answer to the changing requirements introduced by flash is a solution based on the concept of "flat backup". This concept is applied to its HPE 3PAR StoreServ flash arrays using HPE StoreOnce physical or virtual appliances and HPE Recovery Manager Central software with Express Protect, a feature specially designed to manage the interaction between the flash array and data protection appliance.

This solution breaks the traditional thinking that backup software and media servers are required to protect and recover data. The solution uses sophisticated snapshot technology already built into the 3PAR StoreServ product line to store a relatively small number of snapshots in the flash array itself (to conserve precious flash capacity) and relocate snapshot data to StoreOnce for longer, lower-cost retention. After the initial snapshot is created and snapshot data is moved over to StoreOnce as a backup object (using all the power of inline data deduplication and other features built into StoreOnce), all future snapshots use differential snapshot technology to only move the differences to StoreOnce.

This snapshot data is used by StoreOnce to create a full synthetic backup that is deduplicated for greater capacity optimization. This allows the most recent snapshots to remain within the 3PAR StoreServ array for fastest recovery while still maintaining "full" backups within StoreOnce that can be used for recovering older copies of files or objects, for instance, or to recover a full volume to the primary (or another) 3PAR StoreServ array.

This flat backup solution—which HPE calls Express Protect—carries benefits that are many fold:

- Since application- or crash-consistent snapshot technology is already built into 3PAR StoreServ and has been proven to only minimally impact application performance, snapshots can be taken at short intervals, which in turn means very short RPOs.
- Since only a few snapshots are kept on the array, flash capacity is used preciously but without giving up on any aspects of data protection. Hundreds or thousands of snapshots worth of data can be kept on cost-effective StoreOnce media with the benefit of using capacity optimization techniques such as dedupe.
- Using differential snapshot technology, the movement of data between 3PAR StoreServ and StoreOnce is minimized.
- Keeping complete synthetic backups on StoreOnce means recovery is nearly instantaneous. Hence the traditional concept of “recovery” all but disappears, as there is really no “recovery”, per se. The snapshot can simply be mounted and used.
- Individual files or objects can be recovered instantly, taking RTOs down to minutes.
- Any snapshot can be used without destroying other snapshots.
- For those customers who prefer to replicate snapshot data to another location for DR purposes, they can do so StoreOnce-to-StoreOnce without impacting application speed or availability.
- The elimination of backup software and media servers have implications on licensing fees and, as a minimum, inject simplicity into the IT infrastructure, which already has too many moving parts.

In essence, this simple solution lets flash do what it does best: keep application response time within SLAs; and it lets StoreOnce do what it does best: cost-effectively store data to protect against corruption, user errors, or other disasters that may impact applications served by the 3PAR StoreServ array. Express Protect essentially transforms data protection into a background activity that protects application performance and availability rather than impacting it.

The third critical piece of this solution is the Recovery Manager Central software designed for VMware vSphere (RMC-V). This software can be managed from VMware vCenter and enables the setting of snapshot policy for the 3PAR StoreServ array and backup policy for StoreOnce. Using this software, a VM admin can create snapshots and perform recoveries without leaving the VMware vCenter console. Data protection simply becomes a tool in the VM admin’s toolkit. Other similar solutions for other application areas are forthcoming, according to HPE.

Express Protect is the secret sauce that enables HPE to “flatten” backup and is responsible for coordinating data movement between 3PAR StoreServ and StoreOnce in the most efficient way possible for greater simplicity, protection, recovery speed, and application availability. Clearly, this solution relies heavily on snapshot technology. Were it not for the sophisticated “Copy on Write” snapshot technology already built into 3PAR StoreServ Storage (enabling rapid fire snapshots to be taken with minimal impact on application performance) and the many capacity optimizing technologies surrounding it, a solution such as this would not be possible.

HOW THE SOLUTION MEETS THE REQUIREMENTS

With this backdrop, one can quickly look at the list of requirements shown above and discover that the solution meets 100% of them:

- Backups are 17X faster and recovery is 5X faster than using traditional methods, according to HPE’s internal testing

- 3PAR StoreServ holds the most recent snapshots only, preserving precious flash capacity for primary storage, while the less expensive HDD media stores data for potentially a very large number of older snapshots to provide extended protection.
- Traditional backup software is no longer required, saving on licensing fees and simplifying the IT infrastructure.
- The VM admin can perform most day-to-day data protection tasks without invoking the storage or backup admin.
- The focus shifts entirely to application SLAs and most flash resources are applied to preserving them.

Flat backup is simply a new way of thinking about data protection, particularly in the realm of AFAs. But it is only possible if a vendor has all the pieces necessary to make it work. The net result is excellent use of flash media with a microscopic focus on application availability and SLAs, and excellent use of secondary media to achieve RTOs and RPOs measured in minutes. This combination results in simplification and reduced CapEx and OpEx over traditional solutions.

TANEJA GROUP OPINION

Data protection has been a thorn in IT's side now for decades. While it is true that several technologies have finally uplifted data protection from the "same old, same old", and much has happened to improve backup and recovery speeds over the past few years, data protection still needs a complete "rethink", particularly now that flash has gone mainstream. The discussion is more about application availability than data protection per se. While there are several other paradigm shifting technologies vying for this, what HPE has done with Express Protect is nothing short of spectacular. It has fundamentally made data protection an extension of the array and of application availability. Obviously, HPE has been working on these technology components for a while, but the required set has finally come together to deliver a full solution.

But anything dramatic in our conservative industry takes time to understand, absorb, and validate before putting it into production. The fact that these individual pieces are all tried and true for several years means its uptake can be faster than usual. The market is already familiar with the strength of 3PAR StoreServ and StoreOnce technologies. It is the judicious use of the two together, enabled by Express Protect, that makes this a unique solution ideal for flash.

And for those customers who want to revert back to the traditional way of doing data protection, nothing is lost. In fact, for those customers who need tape support or a distinct archiving solution, traditional data protection products would be needed, regardless. And that is totally fine. But even in that situation, this solution might still be viable for very fast and easy backups and restores.

Lest we forget, this is an HPE-only solution. In other words, if you want to support five different types of arrays from three different vendors with one data protection product, Express Protect will not do it for you today, as it is currently only supported with 3PAR StoreServ in VMware environments. And as we saw above, it is done for the right reason: 3PAR StoreServ is the flagship flash storage offering from HPE. That is where the need for maximum application availability and most efficient use of capacity resources exists. And this is where the impact of this solution will be most visible. HPE has stated plans to extend this solution over time, since the concept is universal and flat backup is here to stay. But 3PAR StoreServ and VMware is where the action currently is.

Our view is that, even if you were not using an all-flash 3PAR StoreServ array but rather a converged version, flat backup has relevance and should be investigated. Anything that brings simplicity to the world of data protection has to be heralded since as an industry we are all sick of spending more time protecting data (with little assurance of recoverability) than we do in analyzing data for value. This HPE solution is a strong step in the right direction, and a boon for application availability.

HPE Part # **4AA6-0962ENW**

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