The Data Protection Playbook for All-Flash, Cloud-Ready Storage

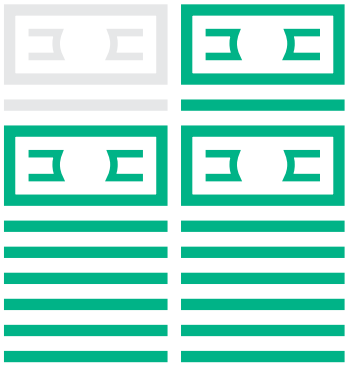
Key considerations for flash-optimized cloud data protection

Flash is the new normal

The all-flash data center is here

The move to the all-flash data center has been one of the biggest shifts in the storage industry over the past several years. Unlike most technology transitions, this has happened faster than anyone would have forecasted. We have quickly moved from a time when flash was exclusively a tier-one media for extreme performance to where the price of flash has reached that of spinning disk. We are now on the cusp of a third wave where flash is the default deployment for business apps.

80%



"All-flash arrays are **dominating primary storage** spend in the enterprise, driving over 80% of that revenue in 2017."[1]

The future of data protection is flash-integrated and cloud-ready

Converged backup solutions maximize performance and efficiency

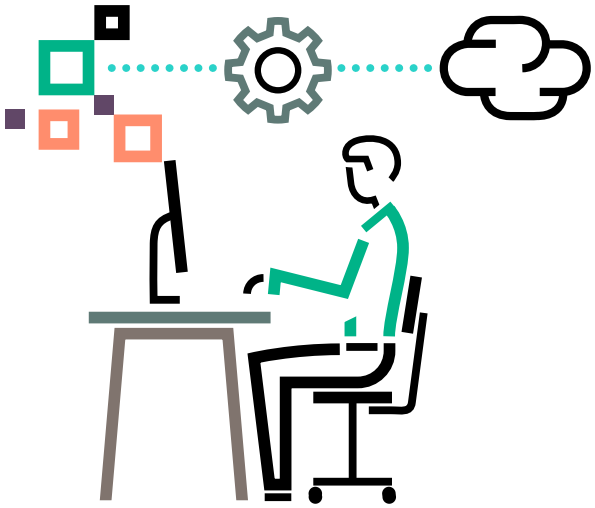
As **all-flash storage** moves into the mainstream for enterprise data centers, this raises the question: Can existing data protection schemes withstand the demands of an all-flash primary storage environment?

[1] Eric Burgener, IDC storage research director, IDC MarketScape: Worldwide All-Flash Array 2017 Vendor Assessment

Global business and always-on availability requirements mean you can't tolerate downtime. Add to that the cascading impact of failure in a virtual world, where a single hardware failure can take down multiple virtual servers and applications. The risk to your business, along with the operational costs of managing that risk, can be staggering.

Most enterprise environments have primary storage arrays and backup appliances based on disparate storage architectures with no integration, requiring backup solutions that are expensive to buy and complex to manage, and that degrade the performance of the production servers you're trying to protect. Those are problems you just can't afford in a high-performance environment.

Flash-integrated, cloud-ready backup solutions **extend the performance** of flash storage.



The alternative is a converged solution that integrates primary flash storage and backup appliances via a simple software management solution, resulting in common data services and automation between devices for seamless data movement. Data protection becomes a function of primary storage, eliminating the need for additional backup infrastructures (media servers) and management (third-party backup applications). This makes protecting your data less intrusive on application processing, simpler to manage, and faster to complete.

Removing complexity leaves you with a backup process that can provide fully automated protection of your primary storage arrays, managed directly from your hypervisor or application interface. Data moves natively from primary storage to backup as scheduled by the business application owner, without the need for media servers or complex backup software.

Protect your data with cloud-ready defense

Backup and disaster recovery are leading use cases for **cloud storage** today, predominantly due to the operational agility, efficiency, and Opex pricing models that cloud storage provides. However, the perceived economic benefits of storing data in the public cloud can be devalued by the ongoing costs that quickly add up when you are charged for every gigabyte sent, stored, and retrieved. Reducing the amount of data you are sending to the cloud—while seamlessly integrating with your existing data protection workflows and ensuring data security—is key to optimizing your cloud investment.

Evaluating data protection optimized for the future: Five key considerations

Improving data backup and recovery is always cited as one of the highest IT priorities by enterprises and midmarket organizations. If you're like most businesses, you want to improve efficiency and reduce the cost of data backup and recovery. How do you future-proof your investment in data protection to continue to support your migration toward flash storage?

As you shop for a data protection solution for your flash environment, keep the following five important considerations in mind.

Consideration No. 1

Optimize for all-flash data centers

Make the most of your flash investment

The primary lure of **flash storage** is performance, with hundreds of thousands or even millions of IOPS at sub-millisecond latency. Achieving this requires a storage infrastructure that's optimized for flash.

Start with a flash storage solution that offers tier-one data services and enterprise-class resiliency to defend against the top causes of application outages. Flash-integrated, cloud-ready backup solutions deliver a robust set of features that allow you to extend the performance of your flash storage environment. These include:

- High availability
- Global deduplication
- Data compression
- Data encryption
- Non-intrusive, application-consistent backups
- Capacity for thousands of concurrent backup streams
- Flexible deployment options
- Concurrent mix of Ethernet and Fibre Channel networking protocols
- Virtual-appliance capability
- Scale-up and scale-out capacity to petabyte-scale
- Programmable interface (RESTful API SDK) to enable plug-ins that support your application/database of choice
- Hypervisor integration with VMware® (run directly from your hypervisor)
- Self-service via familiar native tools that empower database, VM, and storage admins to easily and efficiently protect their applications
- Automated, intelligent storage tiering that helps orchestrate the optimal balance between performance and cost—from on-premises arrays to the public cloud

> Every element, from network bandwidth to data protection, must be designed to take advantage of the performance characteristics of your flash arrays.

The right backup solution will also help you get more from your flash array by offloading snapshot data to a cost-effective deduplicating storage appliance. This not only frees up capacity on your flash array, but lets you retain more snapshots for longer periods, enabling more frequent recovery point objectives (RPOs) and reducing the risk of data loss.

Consideration No. 2

Provide full protection

Combine snapshots with backups for best-practice data protection

When it comes to best-practice data protection, no single snapshot or backup technology can provide a complete solution. Snapshots and backups have different, yet complementary roles to play for availability, backup, and disaster recovery.

Traditional backup server processes provide reliable "off-box" recovery and retention, but they can also impact application performance and usually happen only once per day. Data typically flows through the application and backup server, impacting application performance and adding complexity and cost to data protection.

A snapshot sitting in primary storage is **not a true backup** until the data has been copied to protection storage.

In high-availability virtual environments, snapshots are typically your first line of defense against data loss. Snapshots offer fast, non-disruptive, point-in-time copies of data, enabling you to meet tight RPOs and minimal recovery time objectives (RTOs).

Snapshots also have limitations, including limited retention times and vulnerability to corruption. Since snapshots reside on the same storage system as your data, they are at risk if your storage system fails. Snapshots alone cannot provide the level of protection you need.

Array-based replication provides the redundancy that enables rapid recovery from hardware platform outages or a site outage. However, replication will not provide comprehensive protection against file loss or file corruption, as errors, deletions, and corruptions affecting the primary copy can be replicated to a second site.

To be fully protected, you need to copy your data to protection storage. This protects your applications against file loss or application corruption beyond your oldest snapshot and protects your applications against storage platform outages or accidental deletion. The best solutions will offer the ability to create application-consistent backups of leading business applications. Look for a solution that creates fully independent backup volumes that can be restored at the volume level in the event of a disaster.

The most effective approach to protecting data on your flash arrays for both the short and long term is to combine the near-instant, non-intrusive availability of snapshots with the reliable recovery and cost-effective retention of backups, delivered in an application-aware, flash-integrated backup solution.

Consideration No. 3

Meet performance objectives

The performance benefits of flash should extend to backup and recovery

Flash is all about enhanced service-level agreements (SLAs). The expectation of performance shouldn't stop with your apps. Your flash solution should accelerate your backups and restores too, and it should minimize the impact of backups on your applications. Anything less and you'll fail to realize the full benefits of flash.

Flash-integrated backup provides the technologies to meet the most demanding **RPO and RTO requirements.**

The demands of mobile applications and always-on availability are pushing you toward more aggressive data protection SLAs. Flash-integrated backup should provide the technologies to meet the most demanding RPO and RTO requirements:

- Snapshot technology that creates application-consistent, point-in-time backups, eliminating the need for backup windows
- Differential technology that ensures only changed blocks are sent to backup—a fraction of the data typically copied with traditional backup
- Deduplication technology that reduces your backup storage requirement by 20 times on average, enabling more granularity while using fewer resources
- Express Protect copy technology that stores different snapshots as synthetic full backups, speeding application recovery

In a flash-integrated backup solution, data bypasses your application and media servers and goes directly to your protection storage via a virtual machine. This reduces the impact of backup on your applications, which helps support the performance goals of your flash deployment. It also means that less bandwidth is needed to move the data, freeing capacity for your applications.

Integration with leading software solutions, including mainstream business infrastructure applications and backup solutions, simplifies management and gives your application owners greater control.

Application recovery with flash-integrated backup is incredibly fast. Unlike traditional backup software that changes the format of the backed-up data, snapshot-based backups keep the disk-based format, dramatically changing the concept of recovery.

Data simply needs to be moved from backup to primary storage where it can be mounted and used immediately, reducing RTOs to seconds or minutes. This applies equally to applications running in a physical environment or on VMs.

Consideration No. 4

Control costs

Backup and recovery solutions should be inexpensive, efficient, and simple to use

In the all-flash data center, capacity efficiency is the key to controlling storage costs. Deduplication and data compaction technologies like thin provisioning and granular allocation increase efficiency.

Techniques like adaptive sparing, systemwide striping, and write optimization balance loads across your storage arrays, preventing write hotspots and preserving your storage media. These capabilities reduce primary and backup storage costs and should be basic table stakes for your storage vendors.

If you have multiple, different, or incompatible backup hardware and applications across your enterprise, there's a high probability you're wasting capacity. A flash-integrated backup solution will reduce data protection silos across the enterprise, while a consistent approach will reduce the costs of storing data copies. With its ability to move snapshots from primary to backup storage and create synthetic differential copies, a flash-integrated backup solution makes more flash storage available for production data while reducing the amount of backup storage required for copies, further reducing costs.

Flash-integrated backup is **incredibly fast**. Data simply needs to be moved from backup to primary storage where it can be used almost immediately, reducing RTOs to seconds or minutes.

In a flash-integrated backup solution, data bypasses your application and media servers and goes directly to your protection storage. Bypassing the media server and associated software also means greater simplicity and lower cost.

Management of your backup and restore processes should come from a single console, preferably your storage hypervisor. This empowers DBAs and storage admins to easily and efficiently control end-to-end protection for their applications, from the data center to the cloud, using familiar native tools. Backups and restores should be easy to set up and should run automatically, reducing operating costs and freeing up IT resources for more strategic activities.

Consideration No. 5

Cloud-ready data protection

Cloud-aware performance and simplicity define the future for your data center

No matter how far along you are in adopting a cloud strategy, your data center isn't going anywhere any time soon. You're going to need to maintain and manage your on-premises infrastructure for many years to come, and from a data protection perspective, this means you still need to deliver on increasingly tight backup windows and recovery SLAs for your business-critical applications. Therefore, it makes sense to optimize your on-premises storage infrastructure for the cloud model. But what are the key attributes to consider in selecting cloud-ready data protection infrastructure? Focus on simplicity, efficiency, and security—and make sure these operate the same way in and out of the cloud.

Here's how that translates into specific capabilities.

Built for the cloud

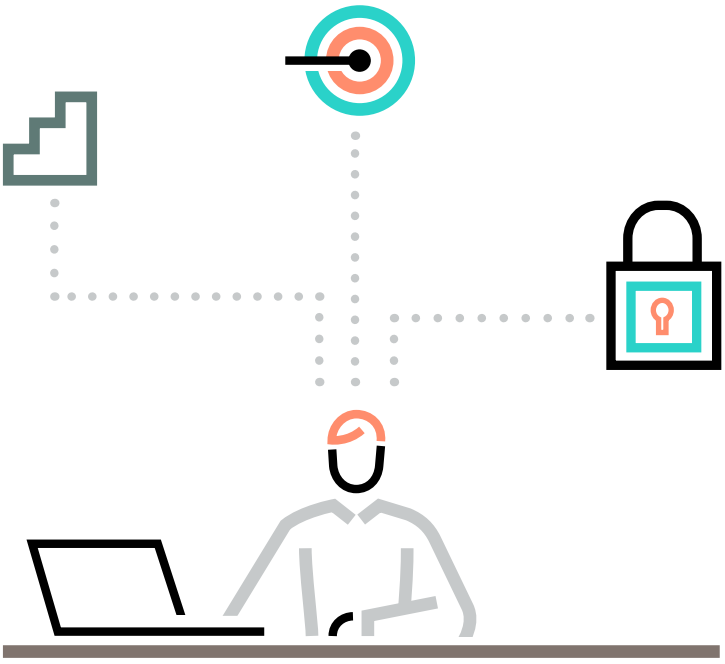
Cloud-ready data protection infrastructure must simplify working with cloud services. It needs to natively cloud-enable your backup and enterprise applications and let you seamlessly move backup data to the cloud of your choice, with no separate cloud gateway or virtual appliance required.

It should also orchestrate the optimal balance between performance and cost with automated, intelligent, multi-tiered data protection—from on-premises arrays to the public cloud. This will let you easily leverage the benefits of the cloud for archive or disaster recovery, while continuing to use your on-premises infrastructure for fast, reliable operational recovery.

Making "cents" of cloud backup

The perceived economic benefits of protecting data in the public cloud can be devalued by the ongoing costs that quickly add up when you are charged for every gigabyte sent, stored, and retrieved. The actual cost of using the cloud for data storage can creep up on you: Backing up 10 terabytes of data to Amazon Web Services (AWS) S3 object storage with 30-day retention over six years at .025 cents per gigabyte will cost more than half a million dollars. And an often-ignored expense is the connection to AWS itself: You will need an expensive 3 gigabit dedicated link to ensure you meet your backup window.

Reducing the amount of data you are sending to the public cloud is key to optimizing your cloud investment. By deploying highly efficient deduplicated data transfer, you can send, store, and retrieve only unique data. This can reduce time, cost, and network bandwidth for **cloud storage** by more than 20 times compared with standard public cloud services.



Simplicity, efficiency, and security are key attributes to focus on when selecting cloud-ready data protection infrastructure.

Cloud-ready disaster recovery

Cloud-ready disaster recovery should let you mitigate the risk of downtime while avoiding the cost and complexity of building and maintaining a secondary site and ensuring the security and data protection required. Your DR plan must protect against site loss by recovering self-describing backup data from the cloud to any local or cloud-based backup system, anywhere in the world. And it needs to ensure secure transmission and storage in the cloud with in-flight and at-rest encryption and data immutability.

The bottom line

Make the most of your investment

Your data protection solution should offer a way to protect all of your primary data, retain it for the long term, and derive business value from it. A flash-integrated, cloud-ready backup solution gives you the most from your migration to flash. The right solution will:

- Protect application uptime from the full spectrum of threats
- Provide global deduplication
- Shield applications from performance impact due to backups
- Support more frequent RPOs (including zero-data-loss RPOs)
- Accelerate recovery to meet shorter RTOs
- Simplify backup and recovery processes and data copy management
- Maximize flash investments by boosting flash-capacity efficiency
- Deliver simple, economical, and secure backup to the cloud

A flash-integrated, cloud-ready backup solution is critical for getting the most from flash storage.

Additional resources

Data Protection Storage

Hewlett Packard
Enterprise

4AA5-9726ENW, May 2018, Rev. 1

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