

HYBRID CLOUD

START MOVING FROM CONCEPT TO REALITY

There's little doubt that enterprise IT organizations view hybrid cloud as the optimal environment for the future. For example, the market research firm IDC predicts that more than 65% of them will commit to hybrid cloud before 2016¹. This rapid adoption is being driven by companies seeking to transform into agile, digital-first businesses that can turn on a dime when it comes to launching and scaling new product and service offerings.

The challenge for IT is to be able to securely manage data across different clouds as easily and seamlessly as consumers can manage data across personal devices and services, such as those offered by Apple. However, in the case of Apple, the products and services have been designed to operate within an ecosystem that is rigorously controlled by a single company. The reality is that most enterprise IT environments encompass a diverse mix of legacy systems, outsourced services, and private and public clouds that were never designed to work together.

WEAVING HYBRID ASSETS TOGETHER

The ideal hybrid cloud is an IT environment where everything can be managed under a single canopy and data can flow freely to where it's needed the most. But performance characteristics vary across platforms; the cost and methods for moving data are likely to be unique to each vendor or service provider; and different clouds may offer different application services and use different data storage models.



For example, enterprise applications that run on-premises rely on a variety of data interfaces, protocols, and formats that have evolved over time and are required by the application architectures. Cloud services, on the other hand, often use relatively new data formats based on a RESTful architecture, such as Amazon Web Services' popular S3 API, or the Swift object protocol developed by the OpenStack community. This type of mismatch between legacy and cloud-native applications presents a significant obstacle for companies that want to migrate their existing workloads to the cloud.

"CIOs are being tasked to take maximum advantage of the cloud, but to do so they must contend with applications and data that are being distributed across a growing number of incompatible cloud services," says Tom Shields, director of strategic marketing at NetApp.

¹ IDC FutureScape: Worldwide Cloud 2015 Predictions, December 2014
Doc #253476, <http://www.idc.com/getdoc.jsp?containerId=253476>



Ironically, enterprises risk recreating “data center sprawl,” but across a more diverse and virtualized environment than they currently manage, and at a scale they have not previously experienced.

NetApp helps IT organizations build a data fabric for the hybrid cloud that seamlessly connects resources and allows data management, movement, and protection across internal and external cloud services. A data fabric built on NetApp technology is a software-defined approach based on the industry’s most widely adopted storage operating system, which provides a consistent data format, an efficient data transport, and a variety of data protection options for integrating with the hybrid cloud.

NetApp provides a unified architecture so that data management remains consistent across cloud services. This helps eliminate silos by enabling data to flow as applications are moved, whether from legacy platforms to cloud services with nearly unlimited scale, or from the public cloud back to IT-managed, private cloud environments.

LEVERAGE THE CLOUD WITHOUT SACRIFICING SECURITY OR CONTROL

Despite the emergence of new standards and open source options, connecting disparate data centers, remote offices, and clouds into a cohesive, integrated data management environment presents a major challenge for most IT organizations.

“The broad-based industry adoption of OpenStack APIs and open source container management technologies such as Docker in 2015 makes

multi-cloud integration and workload portability more feasible than in the past, but the imperative is for an overarching management regime that allows automated, policy-based access to all required IT resources, whether at a provider site or in the corporate datacenter,” according to IDC².

A data fabric provides the overarching data management component for storage services and makes it possible to readily move data to and from hyperscale clouds such as Amazon Web Services (AWS), as well as provision and move workloads and data between cloud resources.

For example, a large Asia Pacific-based financial organization wanted to utilize AWS as soon as it became available in the region, but using native cloud storage simply wasn’t an option for all of its workloads for two reasons: 1) Many applications would need to be rewritten to run on AWS; 2) As the custodian of personal information on behalf of various business partners, it was contractually required to maintain physical control over some of the data.

Instead, the company provisioned a hybrid environment using NetApp Private Storage for Cloud so that the physical data storage systems could be deployed directly adjacent to an AWS location, but not actually reside in the AWS cloud. By deploying a data fabric over a secure network, the company was able to maintain the required data governance, save money by exiting an entire data center, and take advantage of the economics and elasticity of virtual servers in the cloud. Moreover, it has now begun to deploy virtual cloud-based storage systems from NetApp that

²IDC FutureScape: Worldwide Cloud 2015 Predictions, December 2014
Doc #253476, <http://www.idc.com/getdoc.jsp?containerId=253476>

support the data interfaces required by its existing applications, making it faster and easier to move legacy workloads to the AWS cloud in the future.

“Data fabric enables organizations to efficiently transition workloads to the cloud when it makes sense, such as consolidating data centers, managing the life cycle of application data, or protecting data in a more cost-effective way than can be achieved on-premises,” says Shields.

PROTECT YOUR DATA IN A HYBRID ENVIRONMENT

Since cloud first became a viable option, the issue of security has been the foremost concern among CIOs, and it has caused many to be too tentative in adoption. With a data fabric, a single management interface enables IT administrators to use policy engines to enforce service level objectives for data availability and data protection across the hybrid cloud. A single control plane that monitors and controls the flow of data throughout the cloud enables IT organizations to maintain stewardship of their data regardless of where it is stored.



Consistent management across a data fabric makes it possible to employ efficient data transfers for cloud-based backup and recovery, disaster recovery (DR), and archiving. It also enables flexible multi-datacenter replication configurations so that organizations can protect data consistently and cost-effectively, utilizing the diverse resources available in a hybrid cloud.

A data fabric provided much-needed relief to a technology-focused proprietary trading firm experiencing rapid growth. Stringent regulatory requirements had caused the IT team to spend an increasing amount of time backing up systems and storing trading logs, e-mail, and other communications. Not only did it require the dedicated effort of an IT specialist each month to manage the tape-based backups, but restore operations required multiple people to be involved for days at a time.

By using a combination of NetApp cloud-integrated storage and AWS Glacier storage services, the trading firm was able to meet its security requirements, eliminate its tape management service, and benefit from low-cost cloud storage. As a result, backups have been automated, restore operations are quick and painless, and the IT team has been freed up for higher priority projects.

One of the world’s largest HR services firms is also leveraging a data fabric to manage data services across a hybrid cloud, in this case, for disaster recovery. Its IT team had been searching for a solution that could leverage the AWS cloud for DR while maintaining the high levels of application performance achieved when running the applications on-premises. In addition, the entire process needed to be automated to ensure a fast and predictable failover from the primary site to a secondary site in the cloud.

By deploying NetApp all-flash storage arrays, the firm was able to use a single interface to manage the data on its high performance, on-premises storage systems and then automatically failover to a cloud-based storage system running at AWS in case of a disaster. This was made possible by the ability to deploy a secure, software-defined, virtual NetApp storage system in the cloud that runs the same software and delivers the same service levels as those in the data center, a unique capability of a data fabric built on NetApp technology.

RESPOND FASTER TO CUSTOMERS

A data fabric can also enable businesses to respond to customers faster by accelerating IT cycle times from development and testing through to production. New applications can be rapidly prototyped in the public cloud and then moved across the fabric to the platforms that best fit business requirements for performance and security. Existing applications can be migrated to or from the cloud, and the application data can be seamlessly moved across cloud platforms as requirements dictate.

One example comes from a company that has developed a new platform to help businesses leverage the Internet of Things (IoT). This multinational firm is providing its customers with connectivity, monitoring, management, and big data analytics, which enables them to design new services for a converged physical and digital world, such as options for “pay-as-you-drive” car insurance, and the remote monitoring of engine performance in passenger cars based on real-time data streams.

Creating these new services requires a highly scalable platform that can collect information from billions of devices while offering flexible deployment options for different target markets and customers. The company built its IoT platform by creating a fabric that delivers a variety of data services across multiple clouds, including: an OpenStack-based private cloud; a hybrid environment based on NetApp Private Storage solutions for both AWS and IBM SoftLayer; and cloud-based NetApp storage arrays running at AWS.

Delivering the right level of application performance across hybrid cloud resources is a crucial element when aligning IT assets to the needs of the business. A data fabric can transform how companies manage, secure, protect, and move data in the cloud, and enables them to quickly take advantage of new developments, such as flash storage, converged infrastructure, and a host of new cloud services and software technologies.

HYBRID CLOUD IS THE NEW IT ECOSYSTEM

Hybrid cloud promises the agility, economics and performance that enterprises are seeking in order to achieve the best business outcomes. However, no one vendor or service provider can deliver the ultimate hybrid cloud, nor would IT organizations want to be locked into a single-source solution. Because of this, one of the key goals for hybrid clouds is the portability to switch from one provider to another as needs and circumstances change.

NetApp has fostered an ecosystem of solutions and services to provide IT organizations with a wide range of choices as they build out their own data fabrics. “We already work with hundreds of partners that deliver cloud services based on NetApp technology,” says Shields. “Now we’re taking it a step further. For example, our customers can spin-up virtual storage arrays in the cloud using a credit card, or they can choose to rent CPU time in the cloud and connect with one of our secure, private storage options outside of the cloud. In both cases, a single management console enables them to easily and efficiently move their application data across cloud services.”

In a fast-changing business environment, IT needs to move quickly and with greater scale than ever before, while balancing risk and costs. The cloud provides IT with an opportunity to speed innovation and opens new possibilities for driving business transformation. NetApp’s vision for the future of data management enables IT leaders to build a foundation for the hybrid cloud today, and then use it to connect with a variety of services in the public cloud based on their business needs.

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Transform Your Enterprise More Quickly with NetApp and AWS



The Race to Cloud

Cloud computing offers cost-effective and flexible IT to the enterprise. But public cloud services can bring challenges of their own, driving many enterprises to seek a balance through hybrid cloud solutions that combine cloud and on-premises resources.

5x AWS has 5x more deployed cloud infrastructure than its next 14 competitors combined²

74% of enterprises have a hybrid cloud strategy¹



Overcome Roadblocks

Data sovereignty and fluid data movement remain critical enterprise requirements for cloud adoption. To take full advantage of the public cloud, organizations must maintain choice and control. What if you could lower risk and simplify data management across the hybrid cloud?

78% of CIOs believe that seamless data management across multiple clouds is a top priority³



Accelerate Business Transformation

NetApp has a vision for a Data Fabric that gives enterprises the freedom to innovate more quickly without risk or constraint. We are making the Data Fabric real today with a line of solutions for AWS that can help you bring the efficiency and elasticity of the AWS cloud to more of your workloads. NetApp solutions for AWS help you manage, secure, protect, and move your data across cloud and on-premises environments.

Accelerate
Innovate more quickly and be more responsive

Optimize
Move data to the right place at the right time for business impact

Control
Maximize manageability, security, and availability

1. <http://www.rightscale.com/blog/cloud-industry-insights/cloud-computing-trends-2014-state-cloud-survey>.
2. <http://www.smartsheet.com/blog/6-jaw-dropping-stats-from-aws-reinvent>.
3. <http://www.netapp.com/us/media/wp-data-fabric.pdf>.

Consider New Workloads for the Cloud

Expand your hybrid cloud options by teaming with the leaders in cloud and enterprise data management. Choose from a line of solutions that will help you speed migration to the cloud for high-performance business applications and run backup, archive, and elastic workloads more efficiently.



Gain additional flexibility and control for:

New Application Development

Analytics

Enterprise Applications

Scientific Compute

Backup & Recovery

Where Do You Want to Go Today?

Gain the freedom of choice and the power of control. NetApp and Amazon Web Services bring you a portfolio of hybrid cloud solutions to help you embrace the efficiency and flexibility of cloud computing without risk.

Dynamic Workloads

Cloud ONTAP

Enhance cloud storage with the power of enterprise data management

NetApp Private Storage (NPS) for AWS

Gain cloud compute benefits for workloads that demand performance, scale, availability, or control

Backup and Archiving

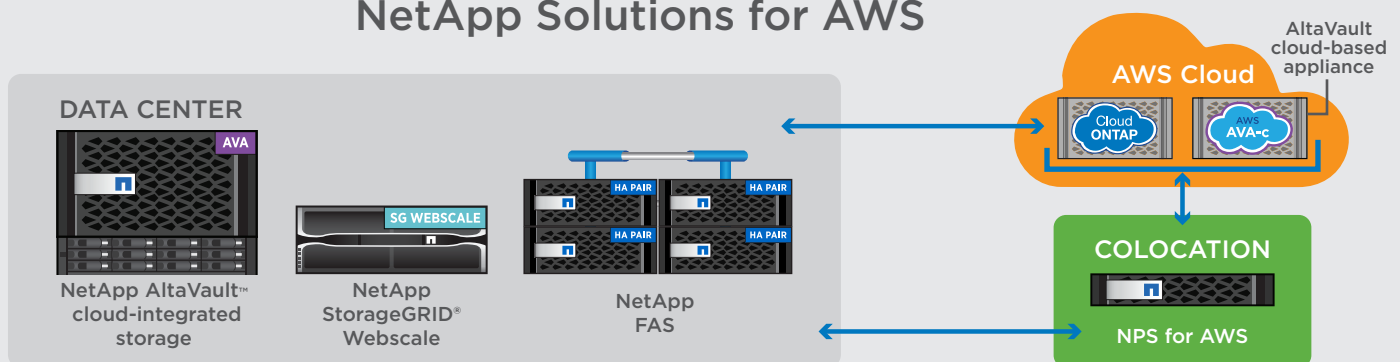
AltaVault

Solve backup and archive headaches with cloud-integrated storage

StorageGRID Webscale

Store large amounts of data reliably and cost-effectively across locations and decades

NetApp Solutions for AWS



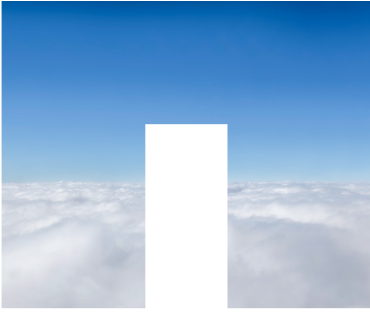
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SOLUTION BRIEF

NetApp Solutions for Amazon Web Services

Key Benefits

Accelerate

Innovate more quickly and be more responsive with a line of storage and data management solutions for AWS

Optimize

Choose the right NetApp and AWS resources for efficiency and business impact

Control

Maximize your data stewardship while using AWS cloud

The Challenge

The pace of change in business and IT is relentless—to stay on top, today's leaders must modernize IT to gain agility. For many executives, instant, elastic, and affordable resources from Amazon Web Services (AWS) have become too attractive to ignore. Some companies have even instituted AWS and cloud mandates for their IT organizations.

The use of cloud can transform an enterprise. But to realize the full benefits, the organization must be confident that the transformation comes without increasing complexity and risk. How should IT store, manage, and protect data while it uses the cloud? How do you integrate the cloud with on-premises environments? How can you overcome these challenges without endless planning sessions that ruin cloud agility?

The Solution: Transform Your Enterprise Faster with NetApp and AWS

NetApp partners with AWS to bring you a flexible line of hybrid cloud solutions that help meet business objectives in a changing world. Whether you're considering AWS to meet a cloud-first mandate, extend existing workloads to the cloud, or match resources to utilization and reduce costs, NetApp can help you in the following ways.

Accelerate innovation, time to market, and your cloud on-ramp

- **Use AWS for more apps and workloads.** Run backup, archival, and elastic workloads more efficiently across a hybrid cloud.
- **Move to the cloud faster with lower costs and risks.** Get started quickly with a pay-as-you-go offering from the AWS Marketplace; it's easy to upgrade or downsize as your business needs and requirements change.
- **Save time and minimize training for IT staff.** Use the same proven data management tools for AWS, hybrid cloud, and on-premises storage.

Optimize your resources for efficiency and business impact

- **Reduce costs and save time.** Store and move less data during your cloud transformation and on an ongoing basis, thanks to NetApp® storage efficiency features such as compression and deduplication.
- **Move data where it has the most value and achieve optimal cost.** Select the right AWS and NetApp infrastructure and then quickly move, manage, or sync data between the cloud and on-premises storage.

Maximize data stewardship

- **Broaden your security, compliance, and sovereignty capabilities** by combining NetApp and AWS.
- **Control your data** with cloud native, hybrid cloud, and on-premises data storage solutions for AWS.
- **Encrypt data** at rest or in motion to or from the cloud.

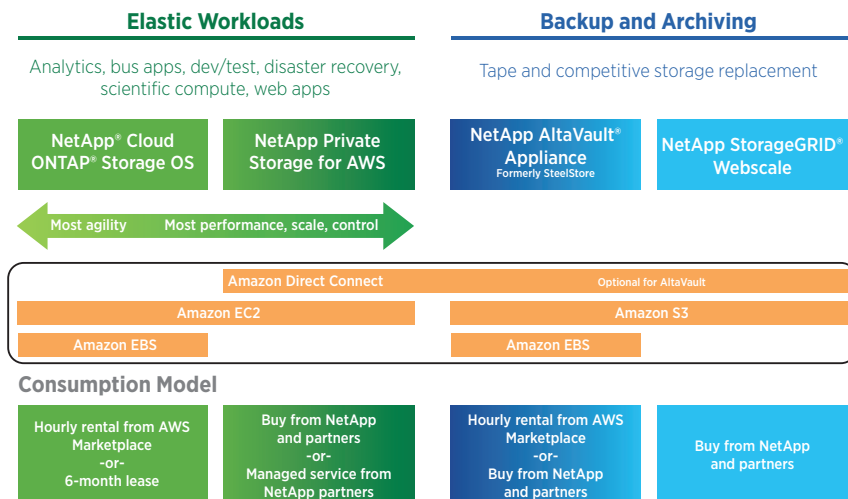


Figure 1) NetApp solutions for AWS.

Run Elastic Workloads on NetApp and AWS

NetApp offers two options for organizations that need primary file storage for elastic workloads, such as business and web apps, development and testing, analytics, scientific computing, and production workloads or disaster recovery (DR).

Get started quickly with NetApp Cloud ONTAP

It can be difficult to justify a capex purchase for a new project. For superior agility, store your data in AWS cloud with the NetApp Cloud ONTAP® storage operating system. You can leverage the speed and flexibility of AWS for your compute and storage needs and to get up and running quickly.

Enhance cloud storage with the power of enterprise data management

NetApp data management and storage efficiency enhance service levels, save time for IT, and reduce storage and management costs. For example, with Cloud ONTAP, you can:

- Save up to 90% on storage capacity with NetApp space-efficiency technologies.
- Run traditional enterprise apps written for file storage and NAS in the cloud, without rewriting them.
- Provide better multiregional business continuity and DR at a lower cost.
- Pay for what you need, when you need it.

Get your storage environment running in minutes

Just point and click to deploy Cloud ONTAP from the AWS Marketplace. It's easy when you use OnCommand® Cloud Manager, a free cloud storage management environment from NetApp. You will receive an enterprise storage system with the NetApp clustered Data ONTAP® operating system running on top of Amazon Elastic Block Store (EBS) cloud storage with Amazon Elastic Cloud Compute (EC2).

Gain cloud compute benefits for demanding apps and workloads with NetApp Private Storage (NPS) for Amazon Web Services (AWS)

Many enterprise apps and workloads demand extremely high performance, scale, availability, or control. You may be required by law or by company policies to meet the strictest possible compliance, privacy, security, or sovereignty requirements. This doesn't mean that these apps and workloads have to stay on premises.

NPS for AWS puts your data “next to” AWS cloud in tier 1 data centers such as Equinix, eircom, and e-shelter with connectivity provided by AWS Direct Connect—a secure, dedicated, high-speed connection that outperforms the Internet.

By combining dedicated enterprise storage with AWS cloud compute, you get the benefits of both with fewer tradeoffs. Your AWS compute feels local while your data is protected. NPS for AWS lets you do the following.

Use Amazon EC2 without sacrificing performance, availability, or control

- Cut compute costs for variable workloads that require hundreds of thousands of input/output operations per second.
- Achieve the same high availability and comparable performance to that received with NetApp storage on premises¹.
- Connect to new clouds any time, without moving your data².

Meet the strictest data compliance, privacy, and sovereignty requirements

- Maximize data stewardship by owning your storage, or use an opex-only managed service from a NetApp partner.
- Make data sovereignty a nonissue by knowing where your data resides at all times.
- Gain superior physical security from our tier 1 data center partners to meet the strictest requirements.

1. Clustered Data ONTAP software and NetApp storage in a hybrid cloud architecture offer performance comparable to that received on premises.

2. NPS for AWS is a member of the multicloud NetApp Private Storage for Cloud family, and is designed for multicloud connectivity. To attain full multicloud potential, NPS for AWS must reside in an Equinix IBX Data Centre and be connected to the Equinix Cloud Exchange.

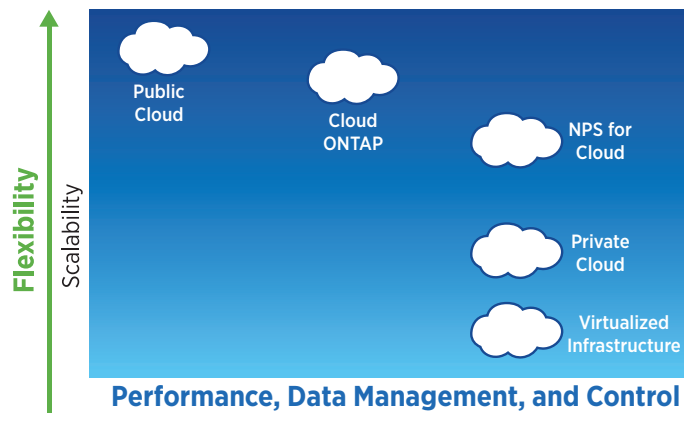


Figure 2) Public clouds offer flexibility. Private clouds offer control. NetApp solutions for AWS are designed to offer both with fewer tradeoffs.

Gain superior disaster recovery and multiregion business continuity at a lower cost

With Cloud ONTAP or NPS for AWS for DR, you can:

- Obtain and pay for redundant servers in remote locations only when you really need them.
- Achieve multiregion continuity and DR with little management from IT. Easily sync data between the cloud and on-premises storage and across regions.
- Maximize your ROI. Popular secondary uses for DR systems include development, testing, sandboxes, reporting, and training.

Combine Cloud ONTAP and NPS for AWS

Start with Cloud ONTAP. You can easily upgrade to a larger, bring-your-own-license (BYOL) version of Cloud ONTAP for enterprises, or deploy to NPS for AWS or NetApp storage on premises as your projects grow and mature.

NetApp Solutions for Efficient Backup, Recovery, and Archiving

As storage grows, companies struggle with the rising cost of protecting data on premises. Traditional solutions are slow, expensive, and risky, and they fail to provide the service levels that end users expect or the simplicity that IT needs. Other challenges include:

- Disparate, siloed archives require more active management and time from IT staff.
- Organizations that rely on tape risk losing media in transport, risk increasing downtime and losing data, and have limited ability to test their solutions.
- Bandwidth costs and constraints become even more acute as data grows.

Highly scalable, low-cost, reliable cloud backup and archival solutions scale as you grow and are an optimal replacement for outdated systems. Yet native cloud storage doesn't offer the best recovery time or recovery point objectives, the lowest costs, or

the instant recovery that end users expect. And it doesn't offer the simplified management that organizations need to scale. As a result, many organizations still miss backup and recovery windows and struggle to manage exponential data growth and costs. NetApp solutions are designed to fill this gap.

Back up and archive with NetApp AltaVault

NetApp AltaVault® cloud-integrated storage enables customers to securely back up data to Amazon Simple Storage Service (S3) and Glacier—at up to 90% lower cost than with on-premises solutions. Choose the AltaVault offering that's right for you: physical, virtual, or cloud-based appliances.

Get started quickly by choosing one of the AltaVault cloud-based appliances on AWS Marketplace. For under two dollars an hour, you can protect up to 2.4PB.

NetApp AltaVault: efficient, open, secure, and simple

- Reduce data volumes by up to 90% with 30:1 data-reduction ratios thanks to NetApp deduplication and compression.
- Enjoy affordable cloud backups, yet restore in minutes.
- Simplify management. AltaVault integrates with your existing storage and backup software, automatically sends data to Amazon S3 and Glacier, and takes you from zero to protected in less than 30 minutes.
- Secure data at all times—in flight, in the cloud, and on premises.

Archive with NetApp StorageGRID Webscale

Business and compliance requirements of some organizations mandate that data outlive the underlying storage infrastructure. NetApp StorageGRID® Webscale is an optimal solution for organizations that want to simplify management and reduce costs for long-term archives of unstructured and web data. In addition, StorageGRID Webscale is compatible with S3 protocols, enabling fluid data movement between AWS S3 and on-premises storage.

NetApp Solutions for AWS

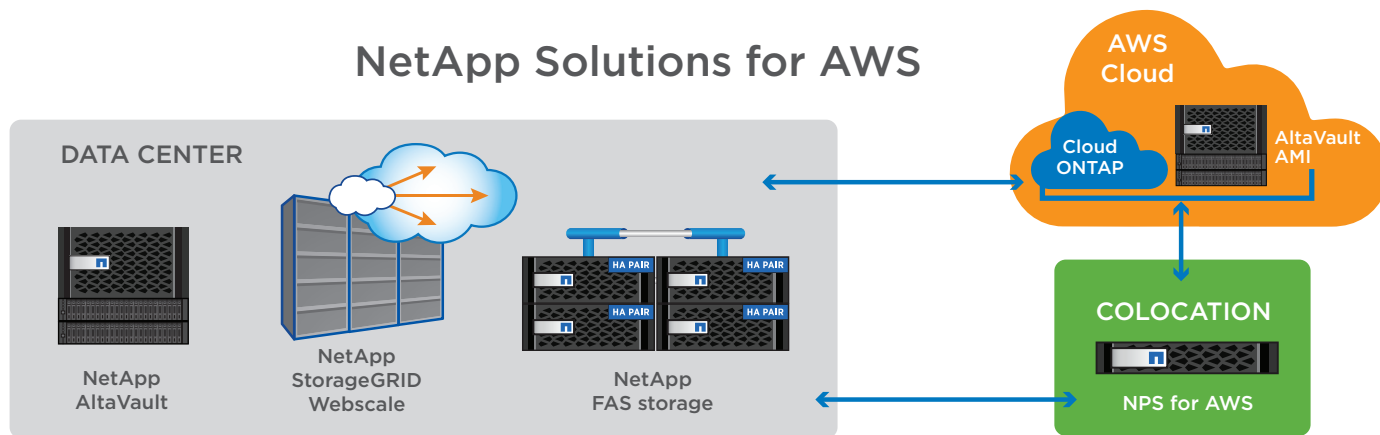


Figure 3) NetApp Solutions for AWS.

StorageGRID Webscale: simple, efficient, durable, and flexible

The massively scalable, globally distributed StorageGRID Webscale object storage solution lets you store large amounts of data reliably and cost effectively across locations and decades. Best of all, it simplifies management so that you can free up IT staff to focus on more strategic initiatives. StorageGRID Webscale enables you to:

- Leverage the S3 protocol and tier and access data across on-premises storage and Amazon S3.
- Replace disparate archives with a single software-defined solution that manages heterogeneous storage, including NetApp, Amazon S3, and third-party storage.
- Automatically optimize data location based on your requirements for cost, performance, durability, and availability.

Run apps created for Amazon S3 on premises. If you want to explore alternative cost models, you can use StorageGRID Webscale to run cloud-native applications written for S3 on premises.

Combine AltaVault and StorageGRID Webscale

For durable, cost-effective private cloud archives at web scale, use the AltaVault appliance to send data to StorageGRID Webscale with an option to seamlessly tier to Amazon S3.

Try Our Solutions for Free

Start with a test drive and experience for yourself the value of our solutions.

Learn more about a one-hour test drive of Cloud ONTAP or NetApp Private Storage for AWS from the AWS Test Drive Program: bit.ly/ntap-testdrive.

Longer evaluations are available from NetApp Hybrid Cloud Labs or the AWS Marketplace. NetApp storage and software are provided for free. Bring your AWS account to cover the cost of AWS resources that you use. Get more information:

- Cloud ONTAP: bit.ly/Explore_CloudONTAP
- NPS for AWS: bit.ly/POC_lab
- AltaVault: www.netapp.com/AltaVaultTrial

Where to Buy

- NetApp Cloud ONTAP and AltaVault cloud-based appliances are available on the AWS Marketplace: bit.ly/NetApp_AWS_Market.
- For all other solutions, contact a NetApp partner to purchase.

About NetApp and AWS

By combining NetApp and AWS, you get best-in-class solutions from two industry leaders. Learn more about our partnership and joint solutions at bit.ly/NetApp-AWS.

AWS is the highly reliable, scalable, low-cost cloud infrastructure platform that is the foundation and backbone of the global Amazon.com retail business. In addition, this infrastructure powers hundreds of thousands of businesses in 190 countries worldwide.

Leading organizations worldwide count on NetApp for software, systems, and services to manage and store their data. Customers value our teamwork, expertise, and passion for helping them succeed now and into the future.