Reference Architecture: Cloud Volumes Service for AWS for Storage Heavy Workloads on VMware Cloud

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Abstract

This reference architecture provides a brief overview of storage heavy workloads on VMware Cloud using CVS for AWS as external storage.

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Introduction

VMware cloud is currently the only option for on-premises VMware users, which leaves customers looking to move to the cloud with somewhat limited options to lower costs through native storage options, particularly for storage-heavy workloads. However, by integrating NetApp®'s fully managed storage solution with VMware Cloud deployments, customers can push the boundaries of their cloud storage while cutting costs. VMware, AWS, and NetApp offer a faster, less expensive cloud solution supportive of VMware deployments that equips customers with external storage that's fully managed and high-performance with advanced data protection features.

This architecture piece provides a brief overview and reference architecture of storage heavy workloads for a VMware Cloud environment. It encompasses the benefits of running storage heavy workloads on Cloud Volumes Service (CVS) and AWS.

Customer Problem

VMware cloud customers have to increase the number of hosts to increase required storage capacity; in the process, the customer has to bear the increased cost of compute in VMware Cloud. In the instance of a storage heavy workload, the customer doesn't have add compute capacity to get more storage.

Customer Value of CVS

NetApp Cloud Volumes Service helps to solve VMware Cloud users' difficulty with storage-heavy workloads by providing storage as external storage with the help of managed service provider Rackspace. Leveraging AWS, VMware Cloud, Cloud Volumes Service with fully managed service by Rackspace, the solution allows the customers to attach NFS storage as native datastores without adding compute costs. Rackspace acts as a host that manages the entire solution for the end customer. For enterprise organizations, this service provides a familiar and proven environment with VMware virtualization, and NetApp cloud data services. Users benefit by lowering their storage costs.

What are Some Other Key Values of CVS?

High performance

With consistently high performance of **over 460 MB/sec,** Cloud Volumes Service provides shared persistent storage with high throughput and low latency. It easily meets the demands of large HPC workloads, with SLAs that guarantee performance.

Increased resilience with snapshot copies

You can easily create a snapshot of an HPC database using NetApp® Snapshot™ technology.

Snapshots act as logical backups. They're point-in-time representations of your data, with a rapid revert function that allows you to restore your database without downtime. You create snapshots manually or schedule the creation of snapshots using the Cloud Volumes Service API or graphical user interface (GUI); rapid revert is only available from the API.

Snapshots are fast, plentiful, and nondisruptive. A snapshot simply manipulates block pointers, creating a "frozen" read-only view of a volume that enables your applications to access older versions of files and directory hierarchies without special programming. They do not make full copies, but rather record new writes (incremental). Snapshot creation takes only a few seconds (typically less than 1 second) regardless of the size of the volume or the level of activity within the environment. Since they are read-only, incremental copies, you only pay for the space consumed by new data written.

Speed up time to market: spin up cloud volumes in seconds with Instant Copy

Most organizations need multiple copies of data for testing and development. HPC landscapes are littered with system copies for variety of uses; creating and refreshing those copies is cumbersome. Typically, creating copies of HPC landscapes is a time-consuming and tedious process. Cloud Volumes Service for AWS allows you to instantly copy volumes, drastically improving the process of copying, backing up, and reverting. The process takes seconds, which ultimately leads to quicker time to market.

Data durability

With Cloud Volumes Service, data is protected not just against multiple drive failures, but also against numerous storage media errors that can harm your data durability and your data integrity. And with 99.9999999% durability—based on the experience of over 300,000 customers—you don't have to worry that your data is going to disappear, which is underpinned by the product's SLA.

High availability

Built on industry leading hardware and software, NetApp Cloud Volumes Service offers four 9s (99.99%) of availability enabled by architectural features, such as redundant network paths, failover, and advanced data protection.

Because NetApp Cloud Volumes Service for AWS sits centrally in relation to each of the Availability Zones within an Amazon Web Services (AWS) region, your service is unaffected by Availability Zone outages. You can access your data from any Availability Zone within the region without having to replicate content. This availability is covered by CVS's SLA.

Security and encryption

NetApp Cloud Volumes Service uses at-rest encryption, relying on the XTS-AES 256-bit encryption algorithm. CVS encrypts your data without compromising your storage application performance. NetApp manages and rotates encryption keys for you, thus, this single-source solution can increase your organization's overall compliance with industry and government regulations without compromising your user experience.

Average cost savings of around 70%

When you use CVS for AWS, you control your cloud performance by dynamically adjusting service levels. If you need to increase performance, you can increase the allocation (for example, 10TB provides 160MB/s) and/or choose a higher service level.

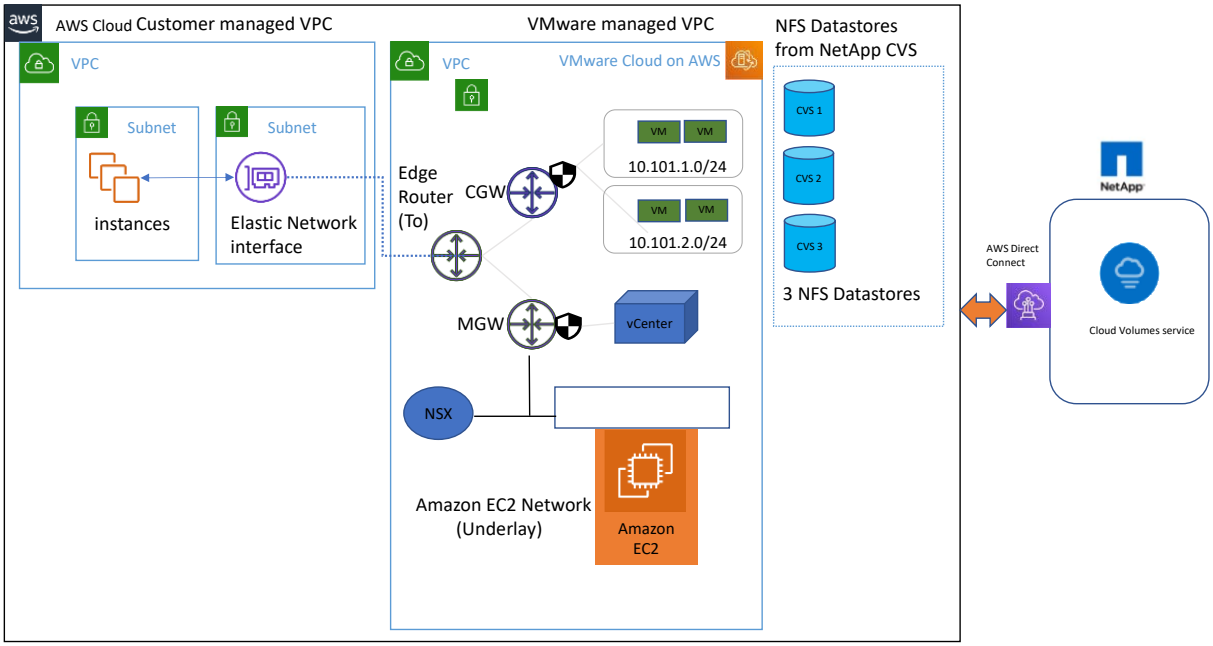
- The Standard service level offers very economical cloud storage, at just $0.10 per gigabyte per month. It enables throughput up to 16MB/s for each terabyte allocated. This level is ideal as a low-cost solution for infrequently accessed data.
- The Premium service level delivers a good mix of cost and performance. At a cost of $0.20 per gigabyte per month, it offers 4x the performance of the Standard level, with 64MB/s for each terabyte allocated. This is a good fit for many applications where data capacity and performance needs are balanced.
- The Extreme service level provides the highest performance. At a cost of $0.30 per gigbytes per month, it enables up to 128MB/s for each terabyte allocated, and cloud volumes can scale to deliver several GB/s for reads and writes. Extreme is the best fit for high-performance workloads.

One of the unique features of NetApp Cloud Volumes Service for AWS is the capability to change performance on-the-fly. For example, if you need to have the Extreme performance tier for two hours a day and Standard performance for the rest, Cloud Volumes Service for [AWS can use API calls or a scheduler in Linux to facilitate that process](#).

General Architecture for a VMware Cloud + AWS + NetApp CVS Deployment

Rackspace Managed VMware Cloud on AWS NetApp External Storage:

Rackspace Managed VMware Cloud on AWS NetApp external storage



In the architecture diagram, you can see that the external datastores are configured with NetApp Cloud Volumes Service for AWS. With the combination of backups, snapshot copies, and right-sized

throughput, you can easily host your storage heavy workloads in the cloud with maximum data protection and nine 9s of data durability. Through NetApp's advanced data management capabilities, this solution is straightforward to set up. And with support and management through Rackspace, VMware Cloud users are able to expand storage without incurring huge costs.

The VMware application is configured on an Amazon EC2 instance.

- Three different volumes are used as the dedicated storage for the datastores.
- The datastore volume(s) can be provisioned using the standard, Premium or Extreme service class because that classes.
- Dataset volume is backed up and restored from the backups rather than creating an individual volume.
- Cloud Backup Service backs data up to the S3 cloud.
- For more details on the configuration details, please refer the below link
    - Cloud Backup Service

The key components of the solution include:

- VMware cloud on AWS.
- Software defined data center.
- Amazon EC2 instances.
- NetApp Cloud Volumes Service as external datastores for VMware cloud.

The Cost Benefits of Rackspace Managed VMware Cloud on AWS NetApp External Storage

Users can save up to 40% on storage costs for their storage-heavy workloads using Rackspace Managed VMware Cloud on AWS with NetApp Cloud Services.

Cloud Volumes Service is the lowest cost, highest quality solution for database hosting in the cloud. You can save a significant amount of time and money by changing performance levels on demand in CVS for AWS; other cloud storage solutions recommend that you configure performance and capacity to meet peak requirements, which means peak prices. The performance requirements are rarely consistent—in contrast, these workloads require a system that's adaptable, agile.

NetApp Cloud Volumes Service provides APIs to change performance on the fly, or users can interface the service with a scheduler such as cron in Linux. That saves a lot of money.

Tier	IOPS (4k blocks)	Throughput	Price
Standard	4,000/TB	16MBps/TB	$0.10/GB
Premium	16,000/TB	64MBps/TB	$0.20/GB
Extreme	32,000/TB	128MBps/TB	$0.30/GB

For example, let's say that you're using Cloud Volumes Service and configured a volume at the Standard performance level ($0.10/GB). If you realize that you need more performance, you can update the volume with an API call or scheduler and the change happens in seconds—it's nondisruptive to clients. It's just as easy to revert to the lower performance tier. So instead of continually paying for peak performance, you only incur added costs for the time you used the higher performance tier.

Think about it like this: If you have a performance intensive workload at certain times (such as online sales transactions on Black Friday, UBER, or Lyft during weekend peak times), you may need a volume to perform at the Extreme level for 30TB at $.030/GB, but only during those peak periods. If you were to run at this level all the time it would cost $9000/month. But with Cloud Volumes Service for AWS, when the intensive task finishes, you can quickly drop down to the Standard performance level for 160MB/s (16MB/s x 10TB) and meet the I/O needs for off-peak loads at a significantly lower cost. This performance level costs $1,000 per month (10TB at $0.10/GB). The cost savings vary, but if you run the processing intensive workload for 20% of the time and adjust the Service level, you can usually save about $6,400 each month.

Note that the formula we used to calculate savings is: $9000 – (($9000*0.2) +($1000*0.8)) = $6,400, which **equals savings of more than 70%.**

Additionally, Cloud Volumes Service for AWS provides savings from:

- Space efficient snapshot copies, which only incur costs for unique data used in snapshots. This single 4KB copy is enough to protect all the data that is to be held in the snapshot the process very quick and extremely space efficient, regardless of whether your volume is a few megabytes in size or hundreds of terabytes.
- High performance storage that enables you to use fewer compute instances, which saves time and results in lower EC2 costs.
- Support for both NFS and SMB, which enables a dataset to be shared between Linux and Windows instances.
    - Alternative solutions require an expensive and slow data copy between multiple volumes.

For more details, check out our blog on Cloud Volumes Service APIs.

Rackspace Differentiation for VMware Cloud on AWS

Rackspace accelerates the value customers are able to achieve from VMC on AWS as part of our hybrid-cloud portfolio. Our certified architects and engineers streamline and simplify building, migrating, operating, and optimizing VMC on AWS with their deep cross-platform expertise. We provide a consolidated billing and flexible payment options, a single source for 24x7x365 support with dedicated account teams, and access to proactive monitoring and troubleshooting across multiple clouds, eliminating the need to manage AWS and VMware Cloud on AWS accounts directly.

Rackspace is currently offering a 30-day no risk proof of concept trial for its Managed VMware Cloud on AWS offering to help customers accelerate the value they are able to achieve with hybrid-cloud.

For more details Please refer the below link:
https://blog.rackspace.com/reduce-costs-of-vmware-cloud-on-aws-for-storage-heavy-workloads