Dell EMC Unity Cloud Edition with VMware Cloud on AWS

Abstract

This white paper discusses Dell EMC™ Unity Cloud Edition and Cloud Tiering Appliance running within VMware® Cloud on Amazon Web Services® (AWS) and describes the benefits to native cloud or hybrid-cloud deployments.

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Revisions

Date	Description
August 2018	Initial release
April 2019	Updated to new template
August 2019	Added Unity Cloud Edition HA Dual-SP considerations

Acknowledgements

This paper was produced by the following members of the Dell EMC storage engineering team:

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Executive summary

This white paper examines the use cases, solution details, and design considerations for using Dell EMC™ Unity Cloud Edition and the Cloud Tiering appliances in the VMware® Cloud on Amazon Web Services® (AWS). Whether using Dell EMC Unity Cloud Edition for file services and Cloud Tiering with Amazon S3 together or independently, VMware Cloud on AWS provides native cloud or hybrid-cloud configurations to enhance existing vSphere environments and extend disaster-recovery capabilities.

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1 Enabling business agility in the public cloud

As customers select a cloud-operating model to support their applications, elasticity and scalability of public clouds and enterprise file capabilities such as tiering, quotas, and snapshots are top requirements. Customers are also looking to leverage the cloud for file synchronization and disaster recovery operations.

Dell EMC Unity Cloud Edition addresses these requirements with support for VMware Cloud on AWS. Dell EMC Unity Cloud Edition can be easily deployed in a VMware Cloud SDDC (Software-Defined Data Center) to provide native file services such as NFS and SMB. Dell EMC Unity Cloud Edition also enables disaster recovery between on premise deployed Dell EMC Unity systems and VMware Cloud-based appliances. Unity Cloud Edition HA provides dual-SP (storage processor) capabilities for high availability.
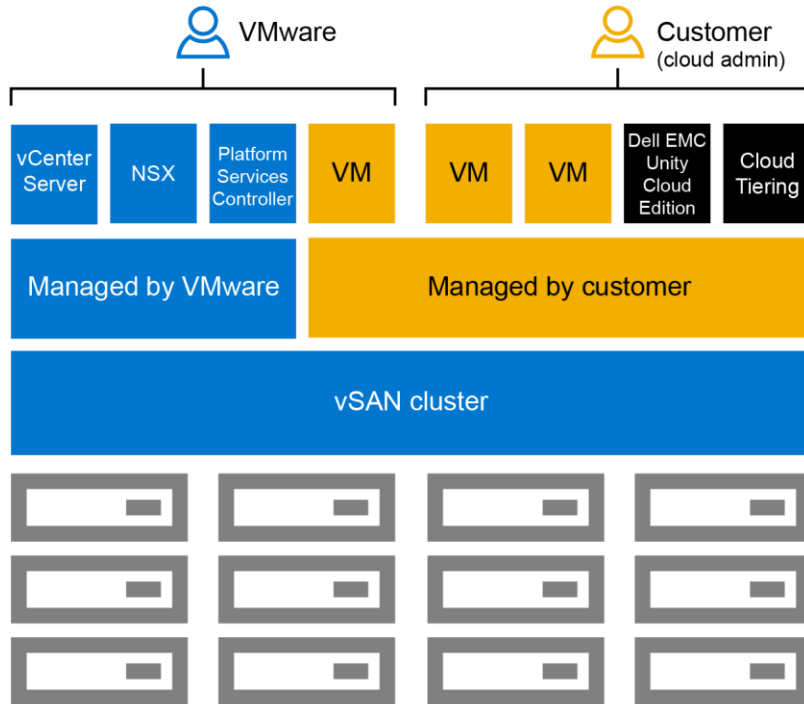

Figure 1   VMware Cloud on AWS architecture

Since Dell EMC Unity Cloud Edition and Cloud Tiering appliance (CTA) are designed for VMware ESXi®, they are well suited to run within the VMware Cloud (VMC) on Amazon Web Services (AWS). Administrators can log into their cloud vCenter® instance and deploy the OVA/OVF packages just as they would with their local or on-premises environment. This allows for very flexible usage of Dell EMC Unity Cloud Edition to augment a local array to provide file services to applications in the cloud, for DR, or to allow CTA direct communications with Amazon S3 storage.

1.1 Enterprise file capabilities

Dell EMC Unity Cloud Edition provides the enterprise file capabilities of the Dell EMC Unity family within a VMware Cloud SDDC. Enterprise Capabilities such as snapshots, quotas, and tiering are delivered with a common Dell EMC Unity experience. With Dell EMC Unity Cloud Edition, file services are consumed within each Customer SDDC, so there is no need for an external file appliance or file service. Existing Dell EMC Unity customers can now leverage Dell EMC Unity Cloud Edition as part of their cloud strategy with the flexibility of VMware Cloud.

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1.2 VMware Cloud on AWS

VMware Cloud on AWS (VMC) is a unique offering that allows customers to take advantage of Amazon AWS infrastructure and services, with the additional key benefit of providing customers a uniform ESXi hypervisor experience at both of their sites.

Once the first SDDC has been deployed, virtual private networking (VPN) connections effectively extend the on-premises customer environment into the cloud, allowing administrators to manage environments seamlessly.
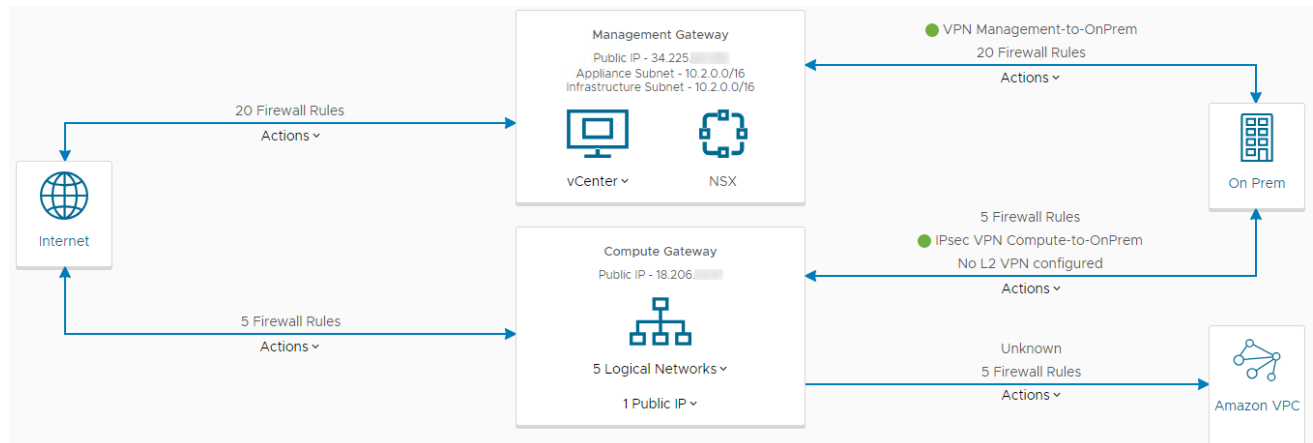

Figure 2   SDDC networking system diagram

To understand the SDDC networking, it is important to know that the SDDC is divided into two main resource pools (see Figure 1). The first resource pool is reserved for management resources such as vCenter, NSX Controllers, NSX Manager, and the ESXi hosts themselves. VMware controls these resources with special permissions to prevent customers from making modifications that could have adverse reactions on the environment. The second resource pool is the Compute pool; this is where customers place their virtual machines to run workloads.

As shown in Figure 2, both the Management and Compute resources are behind VMware NSX Edge gateways. When initially setting up the SDDC, customers typically establish two L3 IPsec VPN tunnels. One for access to the management network, and one for compute network. This is what connects their on-premises networks with the SDDC.

The VMware Cloud on AWS Getting Started guide has instructions on how to configure the recommended on-premises VPN settings, to establish these connections.

Once the VPN connections, and associated firewall rules have been created, Dell EMC Unity Cloud Edition can be deployed into the workload domain. A single-node Dell EMC Unity Cloud Edition can be deployed through the VMware Cloud Marketplace, while the Unity Cloud Edition HA (dual-node) is deployed with the deployment utility from a Windows or Linux virtual machine within the environment. If data tiering services are required, the Cloud Tiering Appliance (CTA) may be subsequently deployed using the VMC vSphere Web Client.

Note: Establishing secure VPN tunnels to the VMC SDDC is important for proper communications between Dell EMC Unity arrays and Dell EMC Unity Cloud Edition. Without the tunneled IP communications links, functions such as replication, will not operate properly.

1.3 Dell EMC Unity Cloud Edition

Dell EMC Unity Cloud Edition is a virtualized storage appliance that has a rich feature set, comparable to the rest of the Dell EMC Unity family. Because of its ease of use and quick deployment time, this makes Dell EMC Unity Cloud Edition the ideal candidate for test/dev environments or production deployment into VMC.
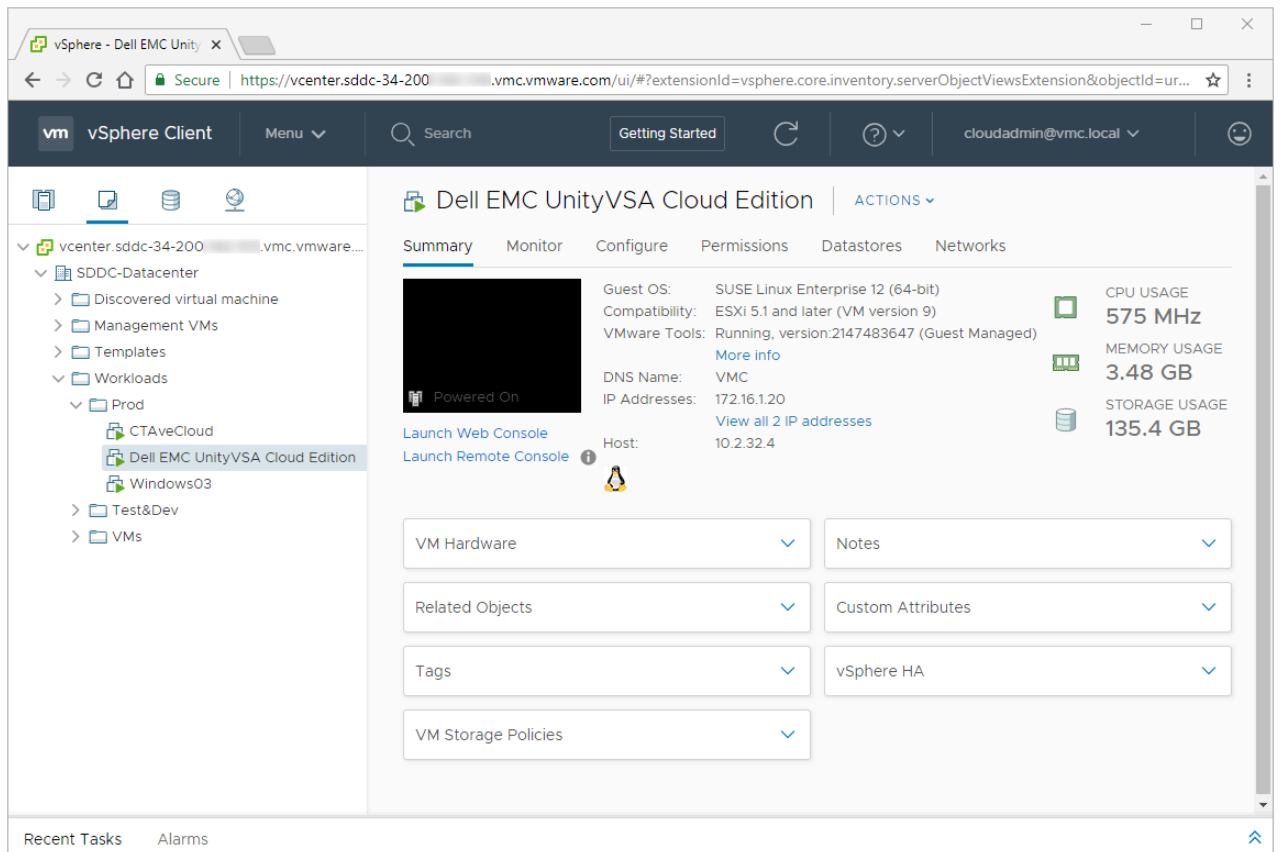
Figure 3   VMware Cloud vSphere Client showing Dell EMC Unity Cloud Edition virtual machine

1.4 Cloud tiering

Dell EMC Cloud Tiering Appliance is a virtual machine that can automatically move data between Dell EMC Unity and cloud storage providers. It can be installed on-premises or in the VMware Cloud for additional flexibility. Administrator-defined criteria control the transfer of files or block snapshots to the cloud storage destination for archival purposes, or optionally for recovery.
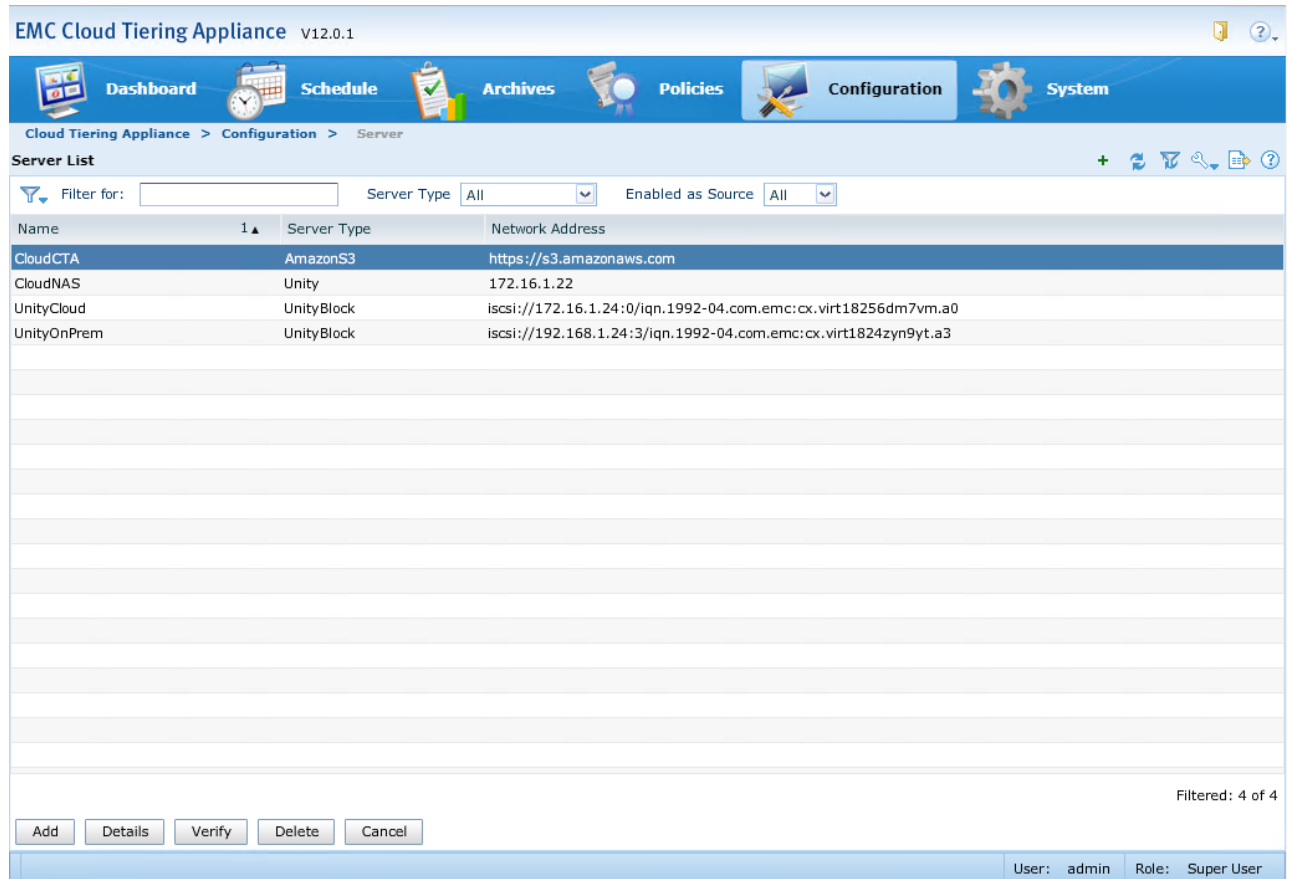
Figure 4   Dell EMC CTA running within VMware Cloud on AWS

2   Solution detail

Using Dell EMC Unity Cloud Edition opens the door to new ways to present files, protect data, and archive data.

Figure 5   Solution networking overview diagram

2.1   File services

A key benefit of Dell EMC Unity Cloud Edition is the ability to provide NAS services to the cloud. For customers that need file services, and desire a purpose-built software defined NAS appliance, the appliance deployment is very easy. With the ability to add multiple NAS servers, QoS, and multiprotocol support, the capabilities of the appliance are very powerful when combined with snapshots, and replication.

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Figure 6   Dell EMC Unity Cloud Edition NAS protocol configuration screen

Some potential uses of Dell EMC Unity Cloud Edition in the VMC SDDC are:

- SMB shares to Windows servers for unstructured data storage

  – User directories
  – Departmental shares

- NFS mount points to Linux servers for unstructured data storage

  – User directories
  – Hosting content for a web server farm

2.2   Cloud synchronization and disaster recovery

Dell EMC Unity Cloud Edition or Dell EMC UnityVSA virtual appliances can be located on-premises, in the SDDC, or in branch office locations, making excellent targets for replication and protecting data. The VPN tunnel is the true enabler in this solution as it allows for bidirectional network connectivity between sites. This section describes advantages of the bidirectional replication strategies.

2.2.1   Replication from on premises to VMware Cloud

Since there is an encrypted IP tunnel between sites, replication of file and block data is as simple as configuring firewall rules, creating a replication connection, then configuring the replication of a file or block resource.
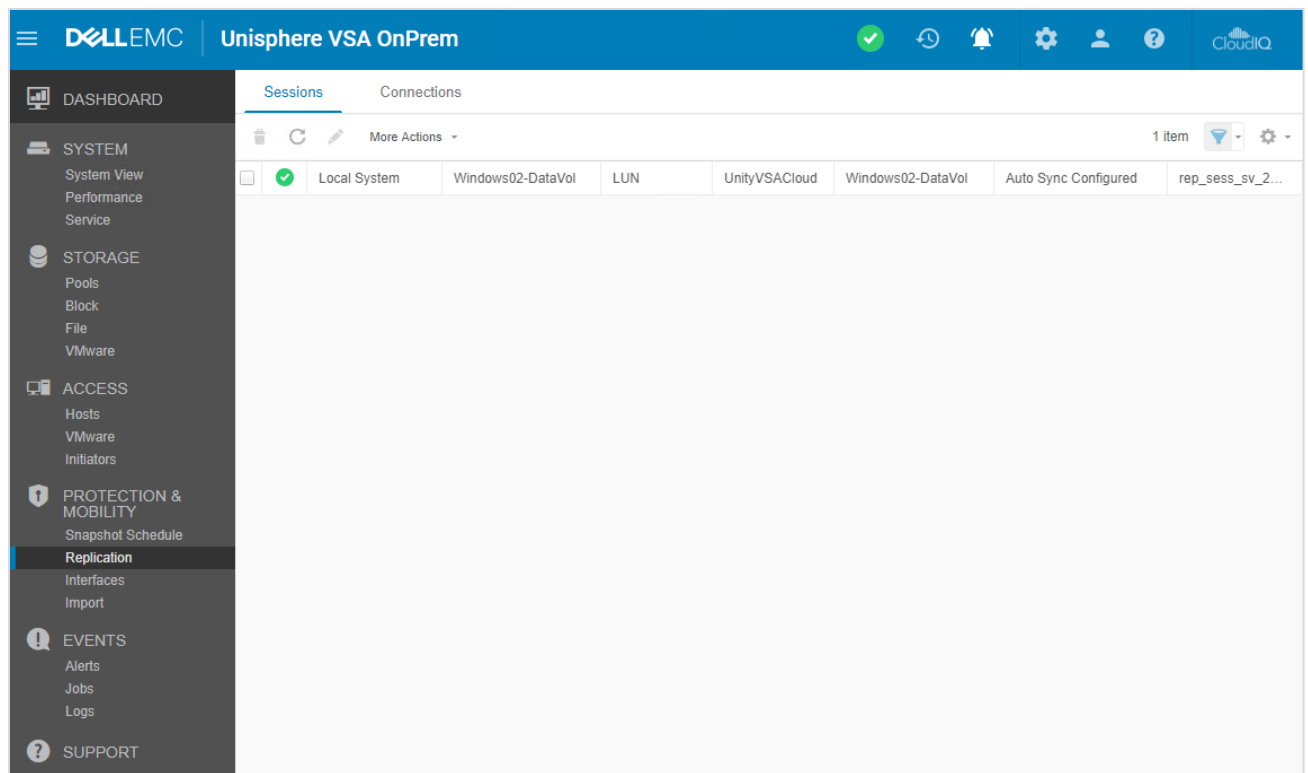
Figure 7   Dell EMC UnityVSA on-premises replication connections screen

For customers that already own a Dell EMC Unity array, a key benefit is taking advantage of the native replication capabilities to Dell EMC Unity Cloud Edition running in the SDDC. Replicating data into the VMware Cloud opens many DR options due to the IP networking advantages of NFS, SMB, and iSCSI.

- When Dell EMC Unity Cloud Edition is configured for either NFS, SMB or iSCSI, recovered data can be presented to other virtual machines residing in the cloud.

   - A block-based Windows Server volume snapshot can be presented to almost any Windows server running the Microsoft iSCSI Initiator.
   - The same applies for NFS mount points to Linux based operating systems.

- Disparate snapshot schedules can enhance protections.

   - The snapshot retention policy may only need to be a week at the primary site, but can be kept around for a month or more in the cloud given enough disk capacity.

- Replication can be used bi-directionally.

   - In the event of data loss in the on-premises data center, the Dell EMC Unity Cloud Edition appliance residing in VMC can replicate data back to the original array, or in the event of a complete array loss, to its replacement.

- Replicating in a spoke and hub configuration

   - Replicating data from remote offices to a centralized location only requires an internet connection and a firewall capable of establishing the VPN connection into the VMC SDDC.

2.2.2 Replication from VMware Cloud to on premises

The opposite scenario holds true for companies that have their core business applications residing in the cloud, or need hybrid-cloud capabilities.
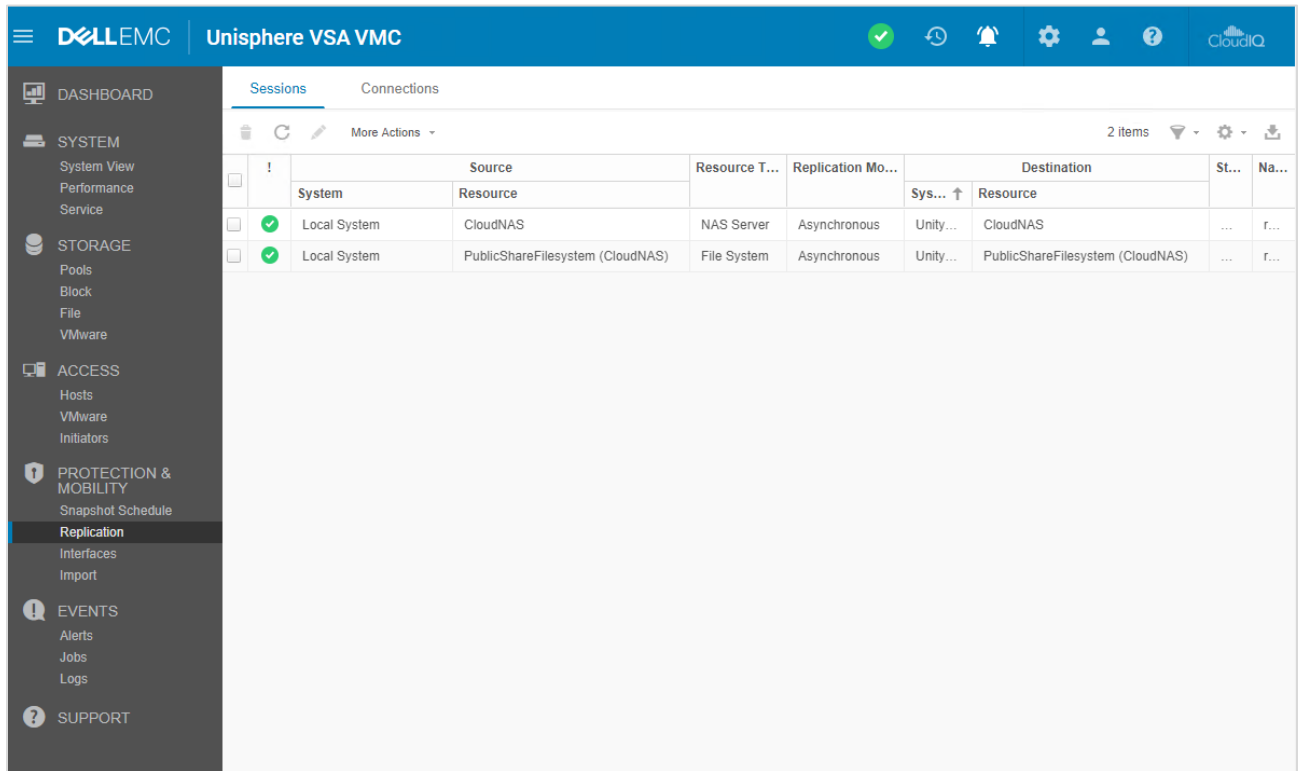

Figure 8   Dell EMC Unity Cloud Edition replication screen

There are a couple of example scenarios of where this would be beneficial.

- Cloud applications that require SMB or NFS shares

  Using Dell EMC Unity Cloud Edition provides feature rich file capabilities in the SDDC (for example snapshots, quotas, multiprotocol support, storage tiering, and cloud tiering). This saves the administrative hassle of having to custom build a solution. In addition, built-in replication capabilities help to quickly and easily protect the data, by transferring it to a remote location.

- Replicating block or file data from cloud to on-premises.

  If there is a cloud native application running in VMC, the on-premises Dell EMC Unity array can be used as the replication target for backing up application data.

2.3 Tiering to Amazon S3

With Amazon services adjacent to the SDDC in the cloud, simple configuration steps allow direct connections to services such as Amazon S3 or EC2 over the higher throughput Elastic Network Interfaces (ENI). With CTA running within the VMware Cloud, and the VPN tunnel providing connectivity back to the on-premises cluster, this allows tiering from Dell EMC Unity appliances (physical or virtual) from either site.
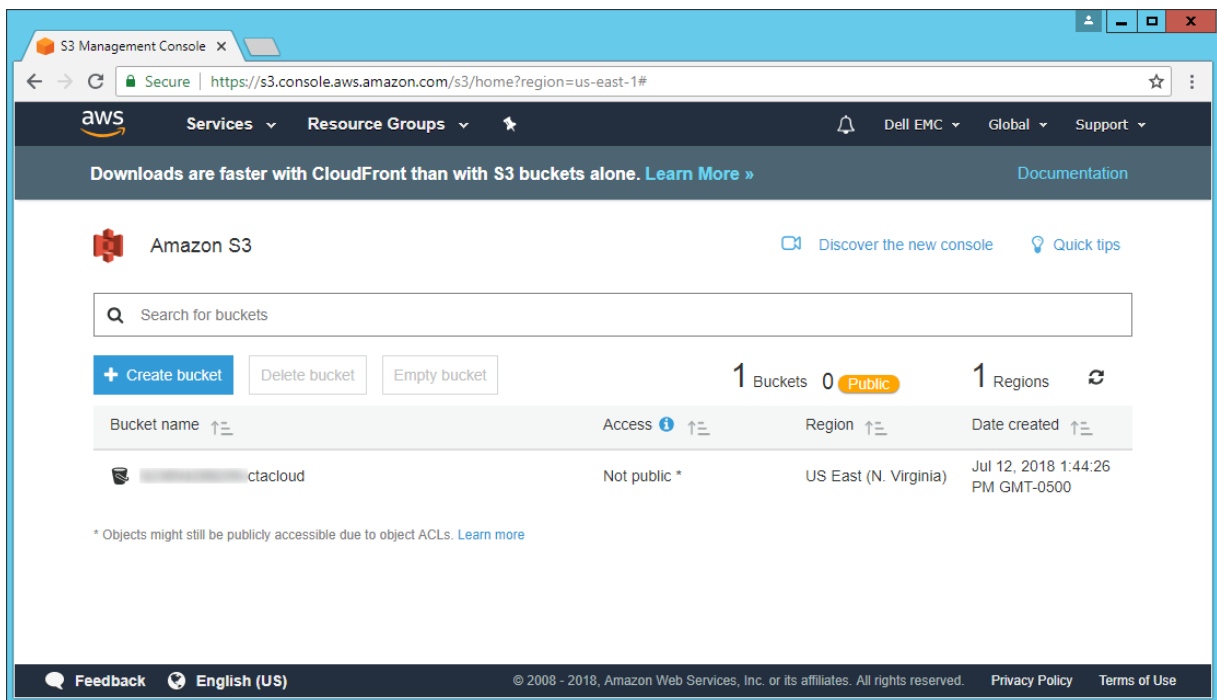
Figure 9   Amazon S3 bucket configuration screen

In addition, to provide greater disaster protection for the tiered data, the Amazon S3 bucket can be created in a different geographic AWS region. For example, if the SDDC is located in the US East (N. Virginia) region, the S3 bucket can be created in the US West (Oregon) region for greater protection against regionalized outages or natural disasters.

While CTA is primarily used for archiving snapshots and files to the cloud, it is also a great benefit as a recovery tool. CTA running in the VMC SDDC can restore file data back to the source file system, and restore snapshot data back to the on-premises data center, the cloud, or a remote office. All that is required is network connectivity.

3 Design considerations

As with any solution, there are technical aspects that need attention. Deploying Dell EMC Unity Cloud Edition or the Cloud Tiering appliance within VMware Cloud on AWS has considerations that need to be known before and during implementation.

3.1 File services

When using Dell EMC Unity Cloud Edition to provide file services to virtual machines in the SDDC, here are things to keep in mind.

- Put supporting services in place before the appliance setup

    – DNS needs to be in place for file services to function
    – Verify that authentication services such as Active Directory, Kerberos, LDAP or NIS are functional before enabling the NAS Server on Dell EMC Unity Cloud Edition.

- If desired, Dell EMC Unity Cloud Edition can use separate virtual disks to isolate a NAS server into its own storage pool.

    Since multiple NAS servers can be created within a single appliance, separate virtual disks can help to govern vSAN capacity usage.

- File services can be isolated using firewall rules and additional logical networks within the Compute SDDC section.

    In addition, the appliance's virtual NICs can be placed in separate logical networks for further isolation and protection.

- When providing mount points or file shares to servers or applications in the cloud, keep in mind that when deploying an appliance with only a single storage processor (SP), a reboot typically requires a planned maintenance window to accommodate the outage. For high availability, a Unity Cloud Edition HA Dual-SP installation is required.

3.2 Dell EMC Unity Cloud Edition

When implementing the Dell EMC Unity Cloud Edition appliance in the VMC SDDC, there are some key points to consider.

- Identify an NTP time synchronization source.

    – If firewall rules will not be opened to allow NTP to public sources such as ntp.org or time.gov, an internal host or virtual machine must be configured to provide it.

        > Accurate timekeeping between Dell EMC Unity storage systems is required for services such as replication and SMB.

- After deploying the Dell EMC Unity Cloud Edition to the SDDC cluster, it is recommended to add a virtual disk to the virtual machine for the storage pool before powering it on for the first time.

    – Within the vSphere cluster, vSAN provides virtual machine storage in the form of a single large datastore named **WorkloadDatastore**. Since the datastore is backed by flash for high speed

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access, only a single virtual disk added to the virtual machine is usually needed for initial configuration.

- The VMC vSphere cluster hosts do not support VMware Fault Tolerance (FT) to protect Dell EMC Unity Cloud Edition or CTA from unexpected host outages.

  - A Unity Cloud Edition HA Dual-SP deployment is required for high availability, since a single-SP appliance reboot or host outage will cause the services to become unavailable.
  - However, vSphere high Availability (HA) is enabled on the SDDC cluster to ensure high levels of uptime. If a virtual appliance is running on an ESXi host that fails, HA will restart the VM on another host in the cluster.

- Virtual disks are all stored on, and protected by vSAN.

  - Deduplication and compression is enabled by default.
  - Storage I/O Control is not supported.

3.3   Cloud synchronization and disaster recovery

When using the SDDC for cloud synchronization or disaster recovery purposes, here are some key considerations.

- The Dell EMC Unity Cloud Edition appliance cannot present block or file resources to the VMC ESXi cluster hosts.

  - Management and Compute networks cannot be bridged such that the Dell EMC Unity Cloud Edition appliance has IP connectivity to the ESXi hosts.
  - Customers cannot add VMkernel adapters to VMC ESXi hosts due to read-only permissions on the ESXi host distributed vSwitch.
  - VMFS datastores replicated to the VMC Dell EMC Unity Cloud Edition appliance cannot be presented to the ESXi hosts in the SDDC cluster.

- Since Dell EMC Unity Cloud Edition cannot be used with a VMware Site Recovery Manager Storage Replication Adapter (SRA) in the VMC SDDC, customers should use the existing VMC site recovery service offering for recovering virtual machines into the cloud.
- When using vCenter Hybrid Linked Mode (HLM), virtual machines can even be VMotioned from the local infrastructure into the VMC software-defined data center (SDDC).

  - Authentication services, such as Active Directory (AD), are required for HLM configuration.
  - Configuring an L2 VPN on the Compute gateway is required for VMotion.

3.4 Tiering to Amazon S3

When running the Cloud Tiering appliance in the VMware Cloud, here are some additional considerations.

- DNS is required before CTA can be installed and configured
- VMC cannot import virtual machines with compressed disks

    – When receiving the error "OVF Package with compressed disks is currently not supported for OVF import", the virtual machine must be repackaged using the *VMware Open Virtualization Format Tool* available for download from <u>vmware.com</u>.
    – Example command: **ovftool.exe ctave-12.x.x-xx.x86_64.ova ctave-12.x.x-xx.x86_64-NEW.ova** where **x.x-xx** represents the version number of the build being installed.

- When configuring the connectivity to Amazon S3, instructions to setup the connection can be found in the VMware Docs web site:

    – <u>When using ENI: Access an S3 Bucket Using an S3 Endpoint</u>
    – <u>When using the internet: Access an S3 Bucket Using the Internet Gateway</u>

4   Conclusion

This paper presented how VMware Cloud on AWS offers incredible flexibility to customer environments when using Dell EMC Unity Cloud Edition or the CTA for disaster recovery, file services, and/or data tiering. When using the Dell EMC Unity family appliances for replication and file services it enables customers to bridge their existing infrastructure to their cloud presence, and the CTA further extends the ability to access cloud resources for long term archival or recovery.

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A   References and additional resources

Dell.com/support is focused on meeting customer needs with proven services and support.

Storage technical documents and videos provide expertise that helps to ensure customer success on Dell EMC storage platforms.

A.1   Related resources

The following resources can be found online:

- Dell EMC Unity: Introduction to the Platform

  https://www.emc.com/collateral/white-papers/h15084-dell-emc-unity-introduction-to-the-platform.pdf

- Dell EMC UnityVSA Cloud Edition

  https://www.emc.com/collateral/white-papers/h15092-dell-emc-unity-vsa.pdf

- Dell EMC Unity: Best Practices Guide

  https://www.emc.com/collateral/white-papers/h15093-dell-emc-unity-best-practices-guide.pdf

- Dell EMC Unity: Cloud Tiering Appliance (CTA)

  https://www.emc.com/collateral/white-papers/h16376-dell-emc-unity-cloud-tiering-appliance.pdf

- VMware Cloud on AWS Getting Started

  https://docs.vmware.com/en/VMware-Cloud-on-AWS/services/vmc-on-aws-getting-started.pdf

- Managing Virtual Machines in VMware Cloud on AWS

  https://docs.vmware.com/en/VMware-Cloud-on-AWS/services/vmc-aws-manage-vms.pdf

- VMware Open Virtualization Format Tool 4.0.0

  https://my.vmware.com/web/vmware/details?downloadGroup=OVFTOOL400&productId=353

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