TR 4942: Migrate Workloads to FSx ONTAP datastore using VMware HCX

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TR 4942: Migrate Workloads to FSx ONTAP datastore using VMware HCX

A common use case for VMware Cloud (VMC) on Amazon Web Services (AWS), with its supplemental NFS datastore on Amazon FSx ONTAP, is the migration of VMware workloads. VMware HCX is a preferred option and provides various migration methods to move on-premises virtual machines (VMs) and their data, running on any VMware supported datastores, to VMC datastores, which includes supplemental NFS datastores on FSx ONTAP.

Overview: Migrating virtual machines with VMware HCX, FSx ONTAP supplemental datastores, and VMware Cloud

VMware HCX is primarily a mobility platform that is designed to simplify workload migration, workload rebalancing, and business continuity across clouds. It is included as part of VMware Cloud on AWS and offers many ways to migrate workloads and can be used for disaster recovery (DR) operations.

This document provides step-by-step guidance for deploying and configuring VMware HCX, including all its main components, on-premises and on the cloud data center side, which enables various VM migration mechanisms.

For more information, see VMware HCX User Guide and Install Checklist B - HCX with a VMware Cloud on AWS SDDC Destination Environment.

High-level steps

This list provides the high-level steps to install and configure VMware HCX:

1. Activate HCX for the VMC software-defined data center (SDDC) through VMware Cloud Services Console.
2. Download and deploy the HCX Connector OVA installer in the on-premises vCenter Server.
3. Activate HCX with a license key.
4. Pair on-premises VMware HCX Connector with VMC HCX Cloud Manager.
5. Configure the network profile, compute profile, and service mesh.
6. (Optional) Perform Network Extension to extend the network and avoid re-IP.
7. Validate the appliance status and ensure that migration is possible.
8. Migrate the VM workloads.

Prerequisites

Before you begin, make sure the following prerequisites are met. For more information, see Preparing for Installation. After the prerequisites are in place, including connectivity, configure and activate HCX by generating a license key from the VMware HCX Console at VMC. After HCX is activated, the vCenter Plug- in is deployed and can be accessed by using the vCenter Console for management.

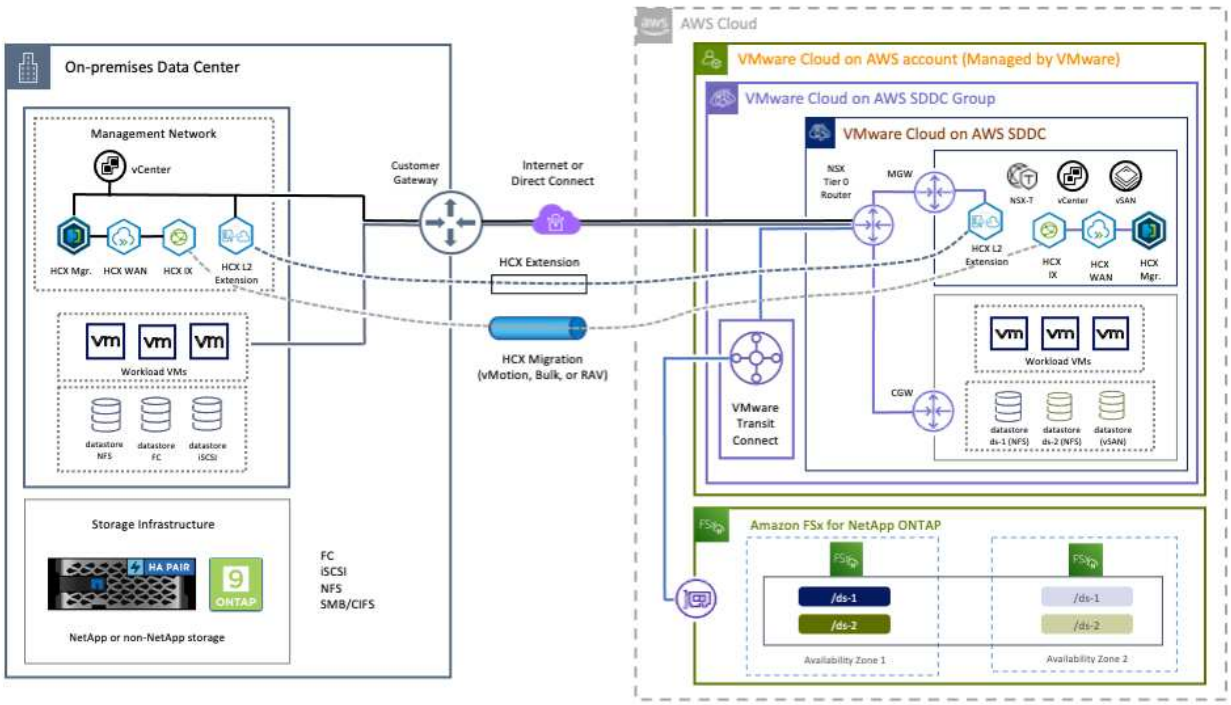
The following installation steps must be completed before proceeding with HCX activation and deployment:

1. Use an existing VMC SDDC or create a new SDDC following this NetApp link or this VMware link.
2. The network path from the on-premises vCenter environment to the VMC SDDC must support migration of VMs by using vMotion.
3. Make sure the required firewall rules and ports are allowed for vMotion traffic between the on-premises vCenter Server and the SDDC vCenter.
4. The FSx ONTAP NFS volume should be mounted as a supplemental datastore in the VMC SDDC. To attach the NFS datastores to the appropriate cluster, follow the steps outlined in this NetApp link or this VMware link.

High Level Architecture

For testing purposes, the on-premises lab environment used for this validation was connected through a site-to-site VPN to AWS VPC, which allowed on-premises connectivity to AWS and to VMware cloud SDDC through External transit gateway. HCX migration and network extension traffic flows over the internet between on-premises and VMware cloud destination SDDC. This architecture can be modified to use Direct Connect private virtual interfaces.

The following image depicts the high-level architecture.



Solution Deployment

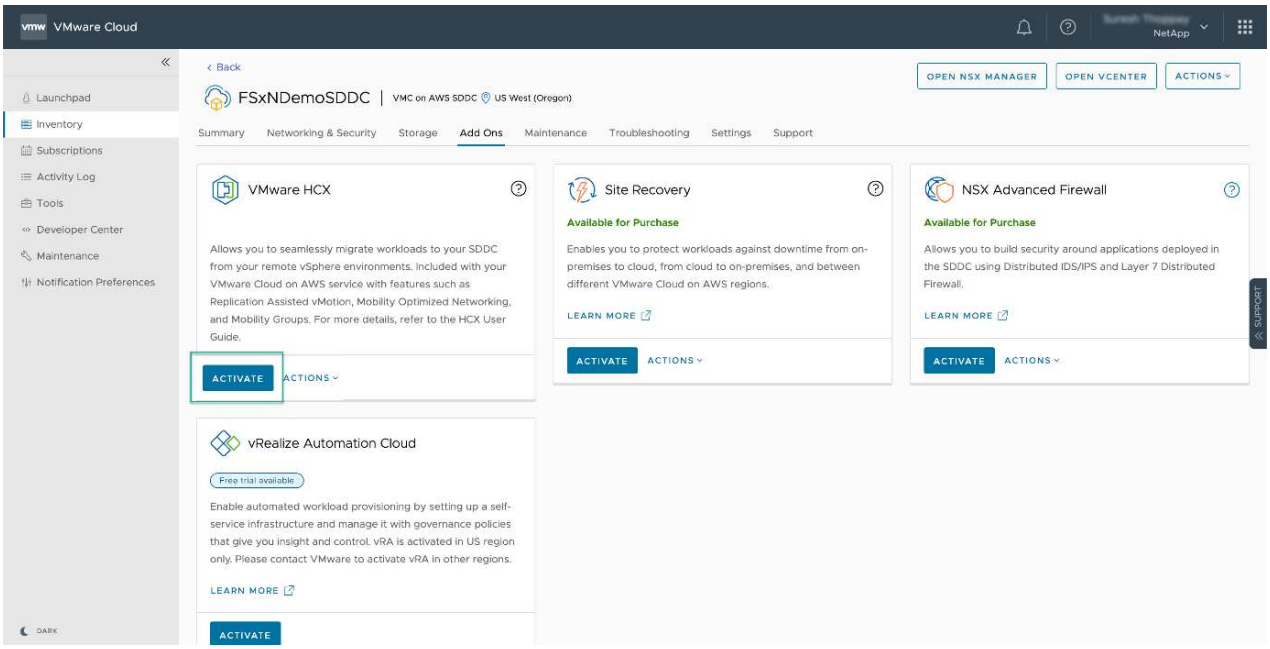
Follow the series of steps to complete the deployment of this solution:

Step 1: Activate HCX through VMC SDDC using the Add-ons option

To perform the installation, complete the following steps:

1. Log in to the VMC Console at vmc.vmware.com and access Inventory.
2. To select the appropriate SDDC and access Add- ons, click View Details on SDDC and select the Add Ons tab.
3. Click Activate for VMware HCX.

   This step takes up to 25 minutes to complete.

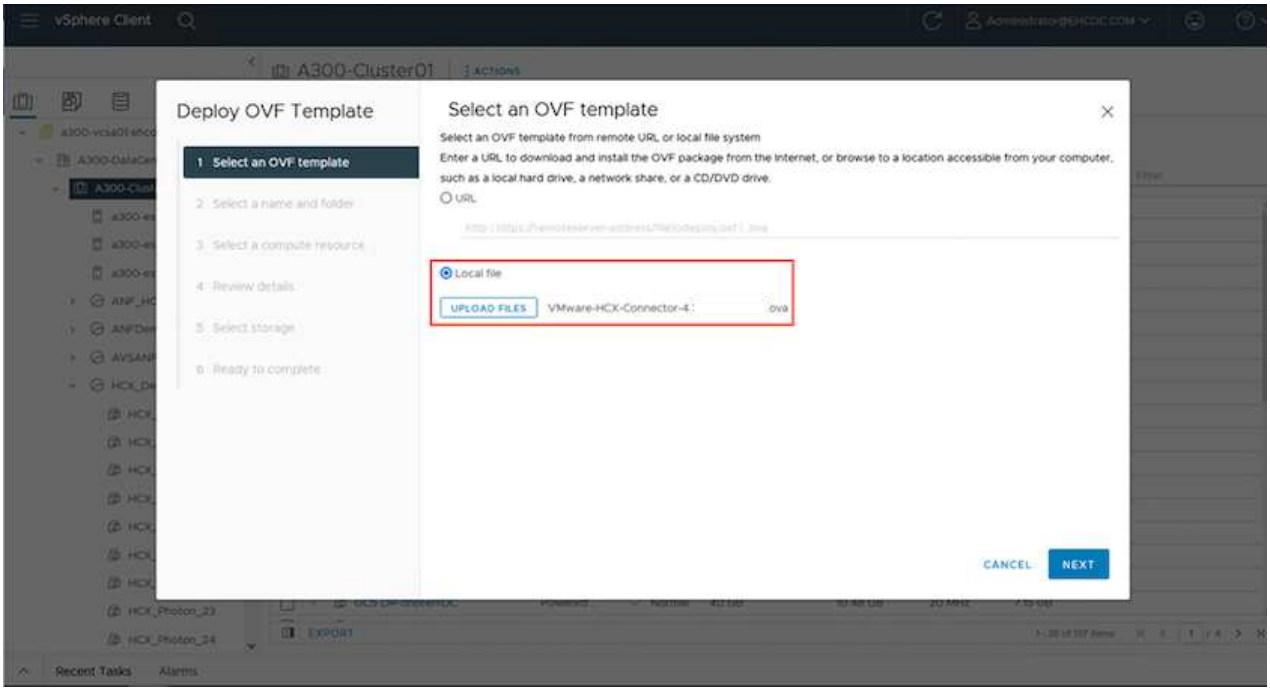


4. After the deployment is complete, validate the deployment by confirming that HCX Manager and its associated plug-ins are available in vCenter Console.
5. Create the appropriate Management Gateway firewalls to open the ports necessary to access HCX Cloud Manager.HCX Cloud Manager is now ready for HCX operations.

Step 2: Deploy the installer OVA in the on-premises vCenter Server

For the on-premises Connector to communicate with the HCX Manager in VMC, make sure that the appropriate firewall ports are open in the on-premises environment.

1. From the VMC Console, navigate to the HCX Dashboard, go to Administration, and select the Systems Update tab. Click Request a Download Link for the HCX Connector OVA image.
2. With the HCX Connector downloaded, deploy the OVA in the on-premises vCenter Server. Right- click vSphere Cluster and select the Deploy OVF Template option.

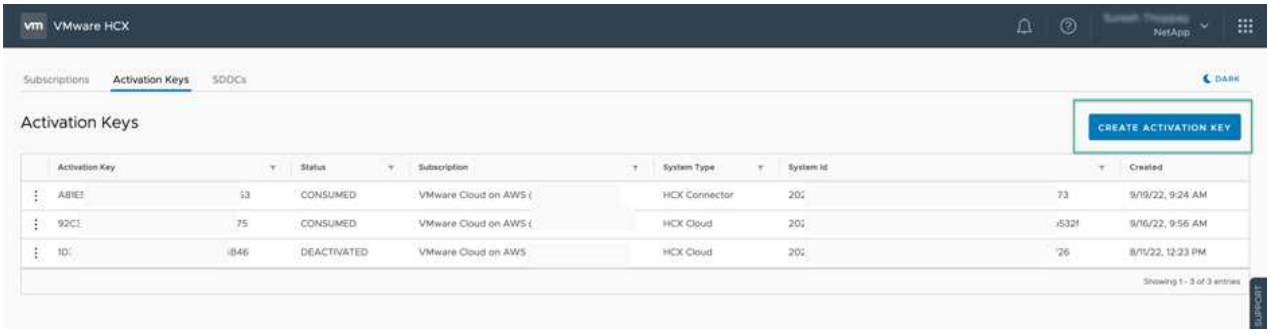


3. Enter the required information in the Deploy OVF Template wizard, click Next and then Finish to deploy the VMware HCX Connector OVA.
4. Power on the virtual appliance manually.For step- by- step instructions, go to VMware HCX User Guide.

Step 3: Activate HCX Connector with the license key

After you deploy the VMware HCX Connector OVA on-premises and start the appliance, complete the following steps to activate HCX Connector. Generate the license key from the VMware HCX Console at VMC and input the license during the VMware HCX Connector setup.

1. From the VMware Cloud Console, go to Inventory, select the SDDC, and click View Details. From the Add Ons tab, in the VMware HCX tile, click Open HCX.
2. From the Activation Keys tab, click Create Activation Key. Select the System Type as HCX Connector and click Confirm to generate the key. Copy the activation key.



> A separate key is required for each HCX Connector deployed on-premises.

3. Log in to the on-premises VMware HCX Connector at "`https://hcxconnectorIP:9443`" using administrator credentials.

> Use the password defined during the OVA deployment.

4. In the Licensing section, enter the activation key copied from step 2 and click Activate.

> The on-premises HCX Connector must have internet access for the activation to complete successfully.

5. Under Datacenter Location, provide the desired location for installing the VMware HCX Manager on-premises. Click Continue.
6. Under System Name, update the name and click Continue.
7. Select Yes and then Continue.
8. Under Connect Your vCenter, provide the IP address or fully qualified domain name (FQDN) and the credentials for the vCenter Server and click Continue.

> Use the FQDN to avoid communication issues later.

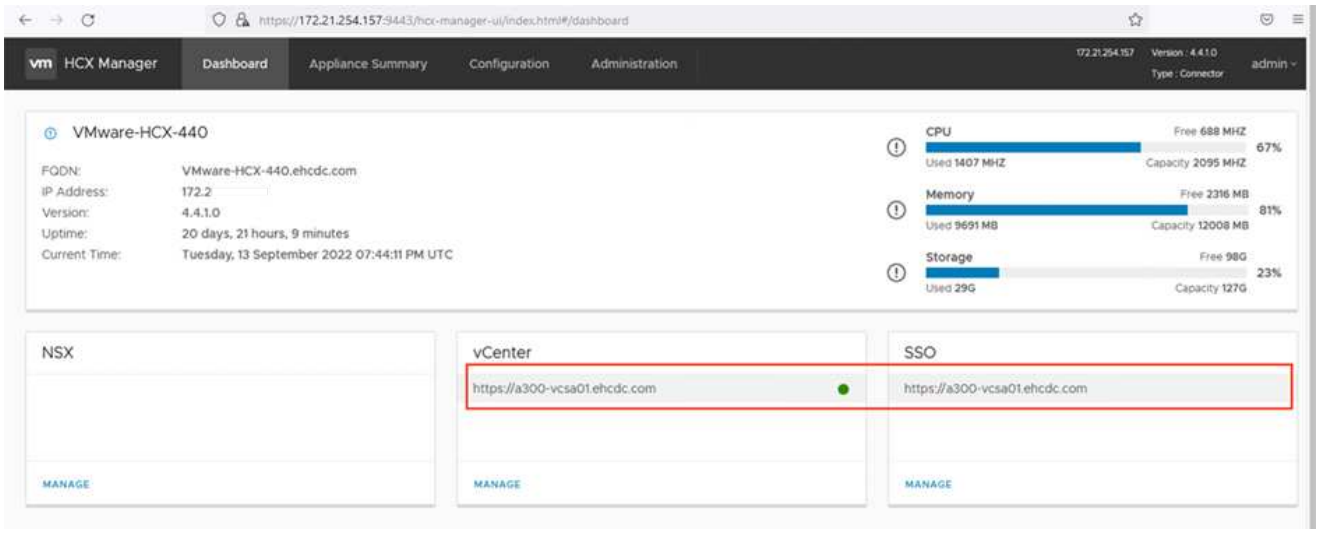
9. Under Configure SSO/PSC, provide the Platform Services Controller's FQDN or IP address and click Continue.

> Enter the vCenter Server's IP address or FQDN.

10. Verify that the information is entered correctly and click Restart.
11. After complete, the vCenter Server is displayed as green. Both the vCenter Server and SSO must

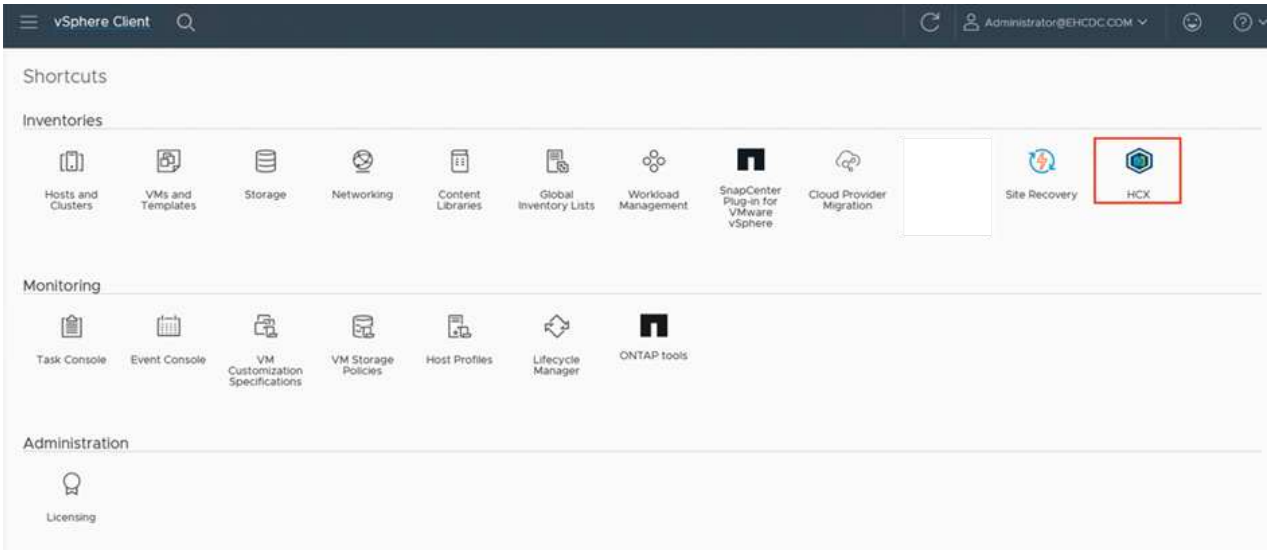
have the correct configuration parameters, which should be the same as the previous page.

This process should take approximately 10–20 minutes and for the plug-in to be added to the vCenter Server.

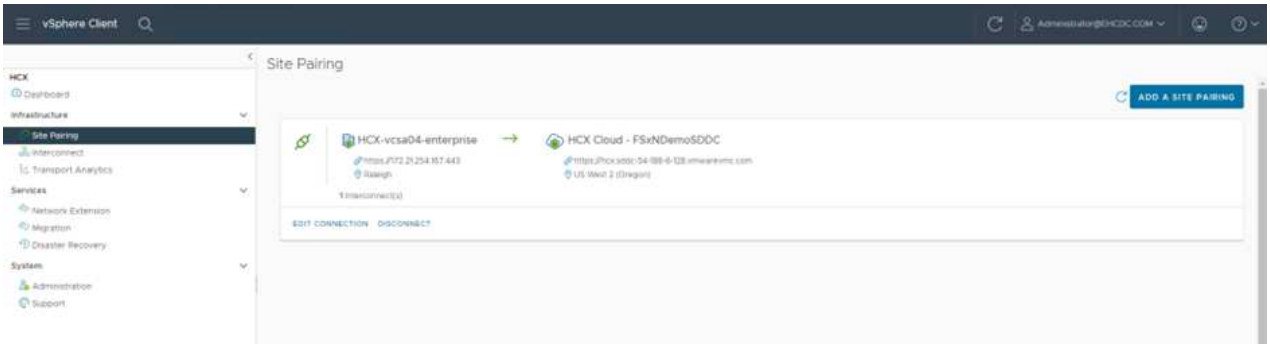


Step 4: Pair on-premises VMware HCX Connector with VMC HCX Cloud Manager

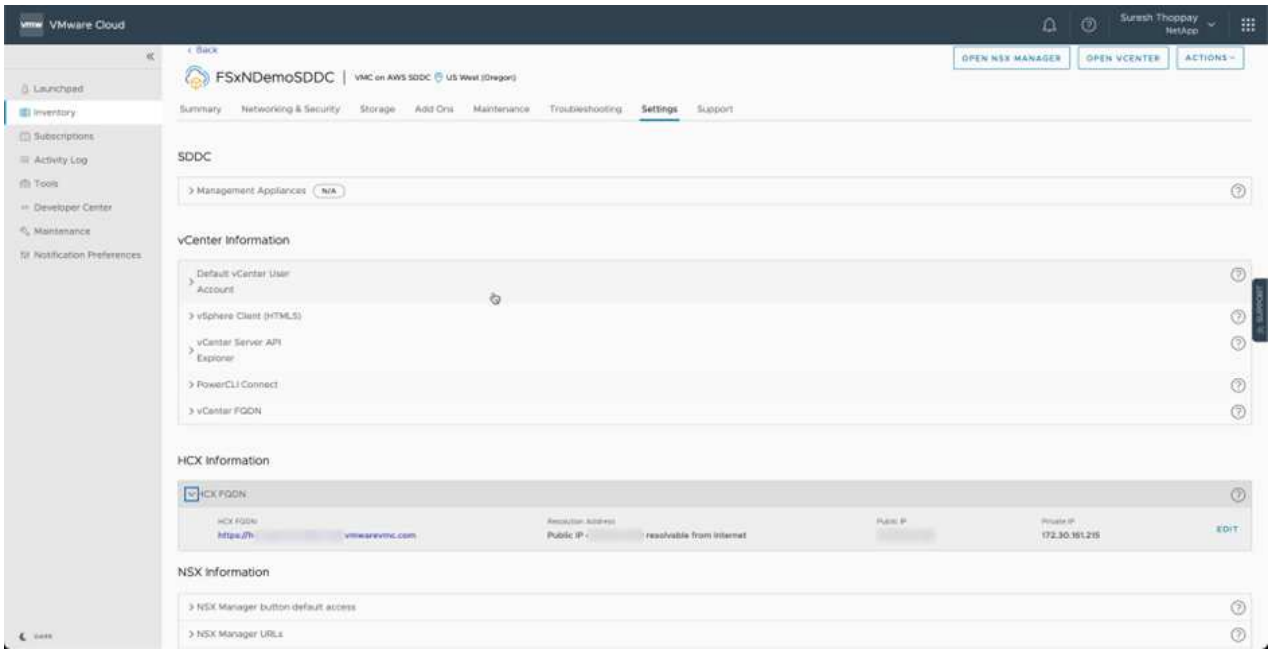
1. To create a site pair between the on-premises vCenter Server and the VMC SDDC, log in to the on-premises vCenter Server and access the HCX vSphere Web Client Plug- in.

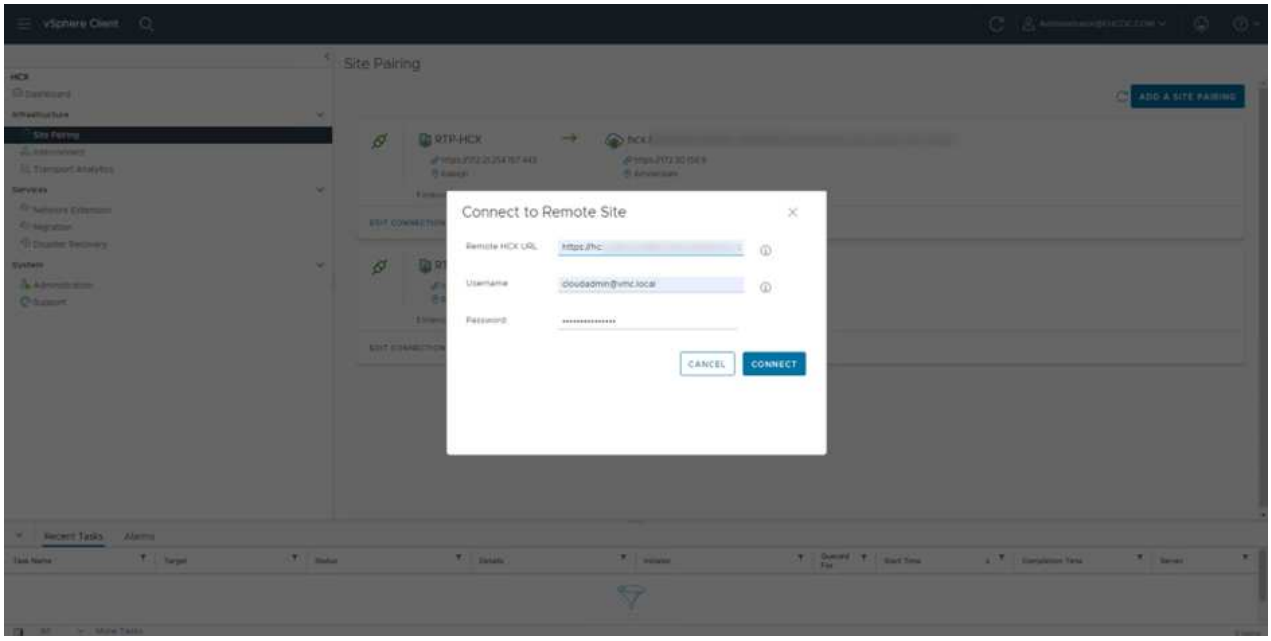


2. Under Infrastructure, click Add a Site Pairing. To authenticate the remote site, enter the VMC HCX Cloud Manager URL or IP address and the credentials for the CloudAdmin role.



HCX information can be retrieved from the SDDC Settings page.





3. To initiate the site pairing, click Connect.

> VMware HCX Connector must be able to communicate with the HCX Cloud Manager IP over port 443.

4. After the pairing is created, the newly configured site pairing is available on the HCX Dashboard.

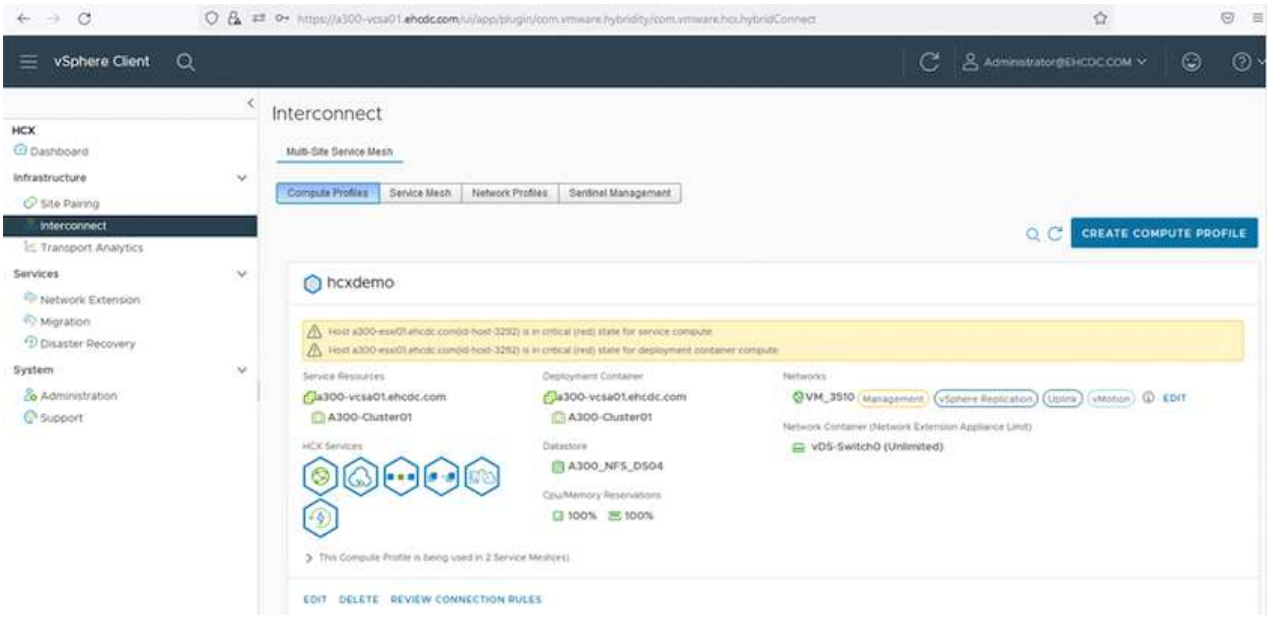
Step 5: Configure the network profile, compute profile, and service mesh

The VMware HCX Interconnect (HCX-IX) appliance provides secure tunnel capabilities over the internet and private connections to the target site that enable replication and vMotion-based capabilities. The interconnect provides encryption, traffic engineering, and an SD-WAN. To create the HCI-IX Interconnect Appliance, complete the following steps:

1. Under Infrastructure, select Interconnect > Multi-Site Service Mesh > Compute Profiles > Create Compute Profile.

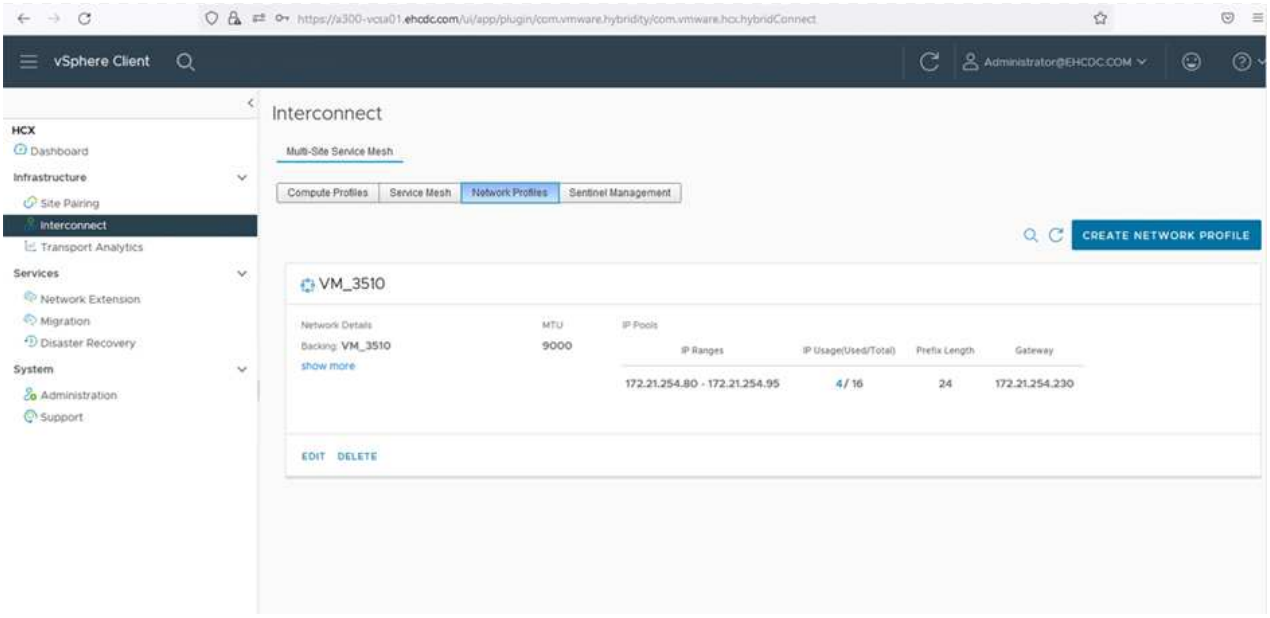
   Compute profiles contain the compute, storage, and network deployment parameters required to deploy an interconnect virtual appliance. They also specify which portion of the VMware data center will be accessible to the HCX service.

   For detailed instructions, see Creating a Compute Profile.



2. After the compute profile is created, create the network profile by selecting Multi-Site Service Mesh > Network Profiles > Create Network Profile.
3. The network profile defines a range of IP address and networks that will be used by HCX for its virtual appliances.

   This will require two or more IP address. These IP addresses will be assigned from the management network to virtual appliances.

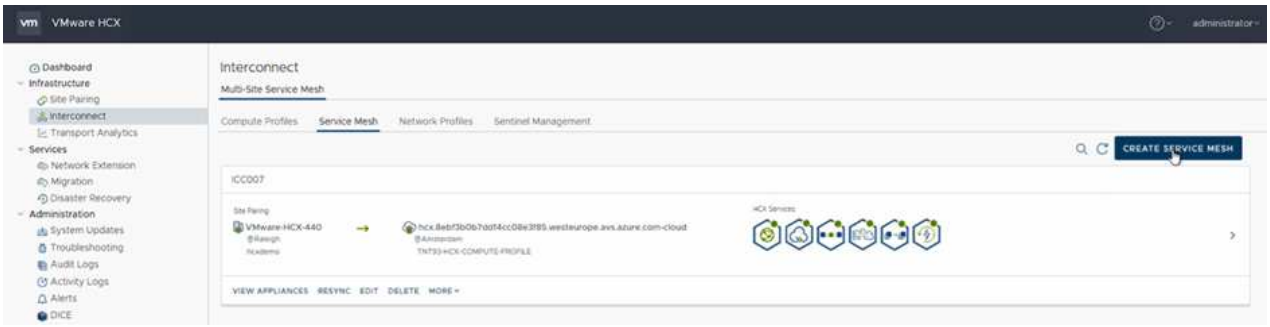


For detailed instructions, see Creating a Network Profile.

> If you are connecting with an SD-WAN over the internet, you have to reserve public IPs under the Networking and Security section.

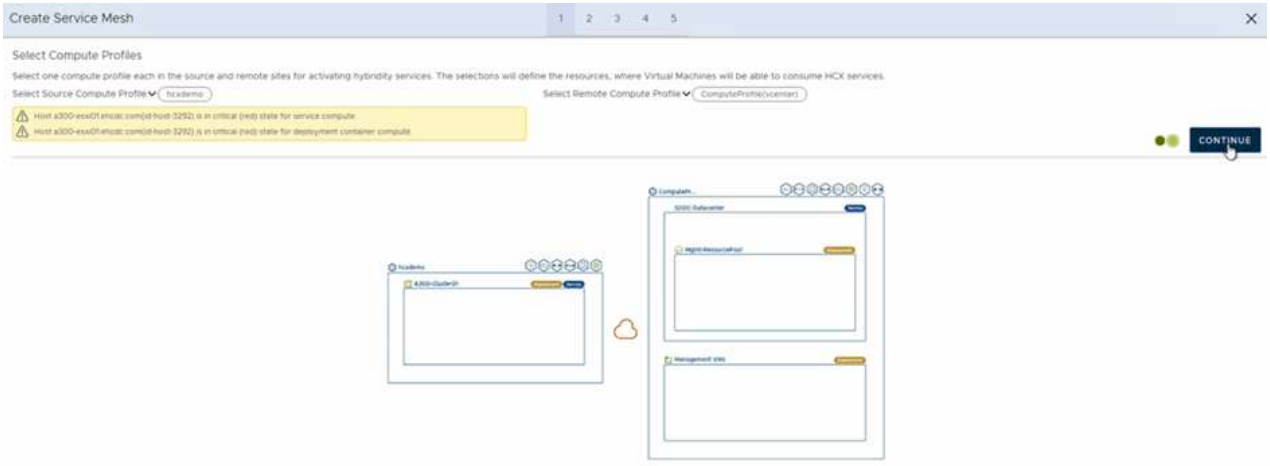
4. To create a service mesh, select the Service Mesh tab within the Interconnect option and select on-premises and VMC SDDC sites.

   The service mesh establishes a local and remote compute and network profile pair.

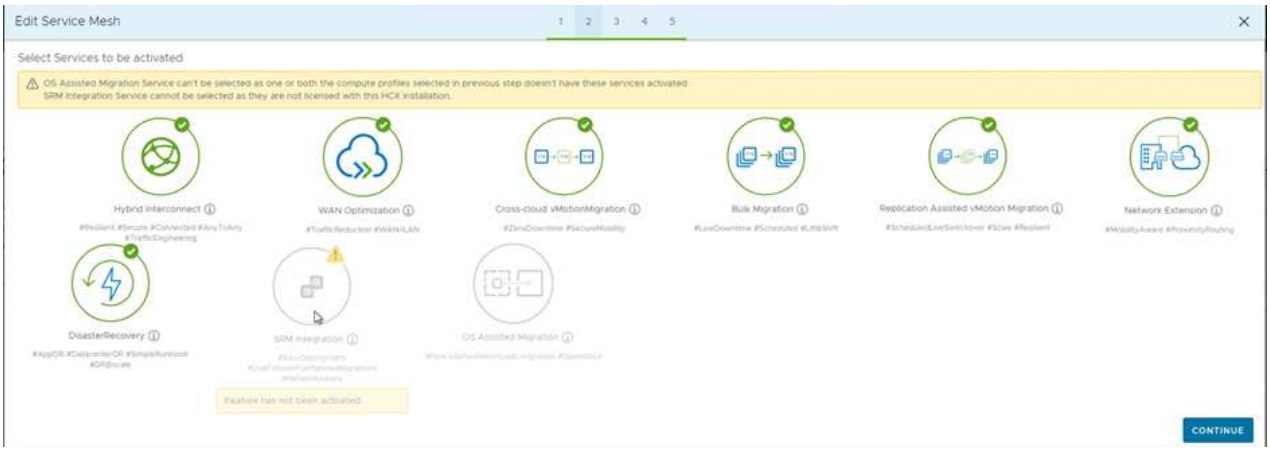


> Part of this process involves deploying HCX appliances that will be automatically configured on both the source and target sites, creating a secure transport fabric.

5. Select the source and remote compute profiles and click Continue.

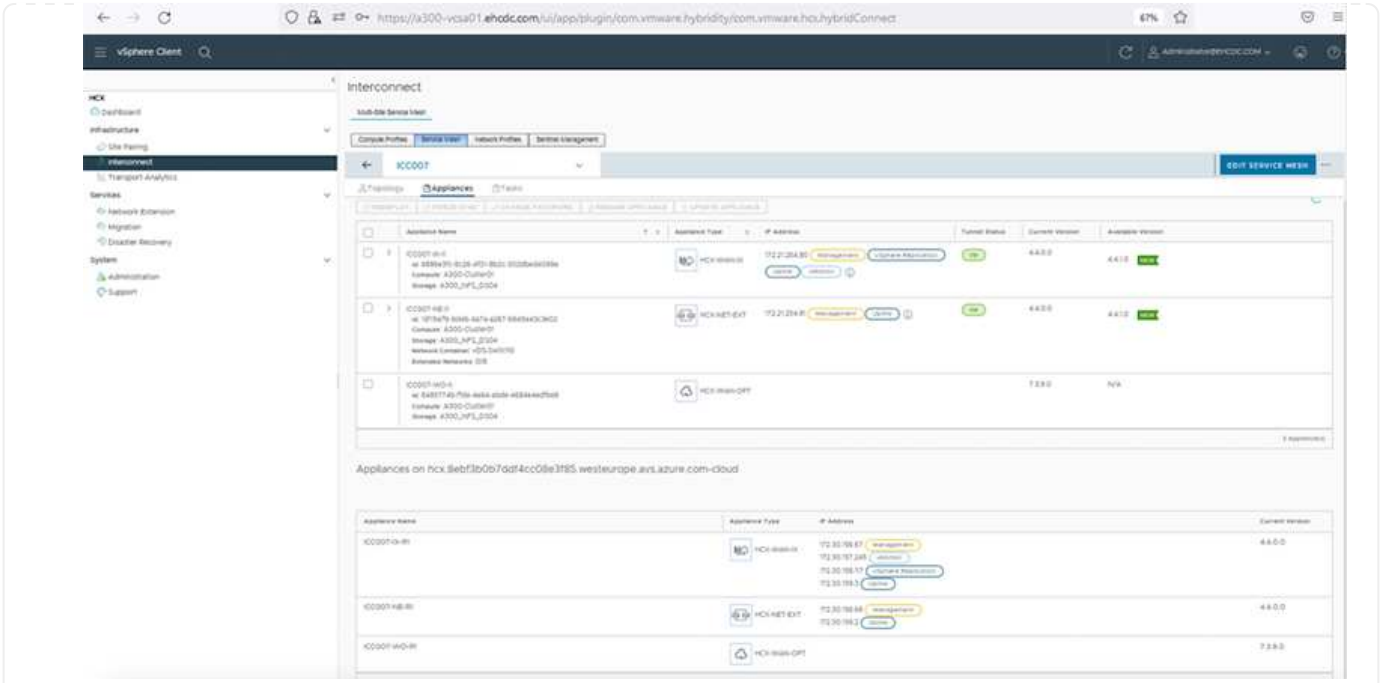


6. Select the service to be activated and click Continue.



An HCX Enterprise license is required for Replication Assisted vMotion Migration, SRM Integration, and OS Assisted Migration.

7. Create a name for the service mesh and click Finish to begin the creation process. The deployment should take approximately 30 minutes to complete. After the service mesh is configured, the virtual infrastructure and networking required to migrate the workload VMs has been created.


vSphere Client
Interconnect
ICC007
EDIT SERVICE MESH
Appliances
Appliances on hcx.8ebf3b0b7ddf4cc08e3f85.westeurope.avs.azure.com-cloud

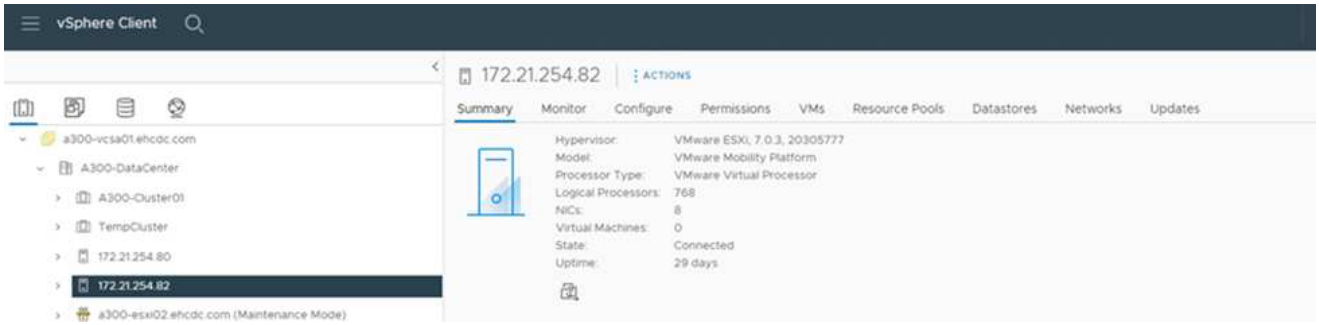
Step 6: Migrating Workloads

HCX provides bidirectional migration services between two or more distinct environments such as on-premises and VMC SDDCs. Application workloads can be migrated to and from HCX activated sites using a variety of migration technologies such as HCX bulk migration, HCX vMotion, HCX Cold migration, HCX Replication Assisted vMotion (available with HCX Enterprise edition), and HCX OS Assisted Migration (available with HCX Enterprise edition).

To learn more about available HCX migration technologies, see VMware HCX Migration Types

The HCX-IX appliance uses the Mobility Agent service to perform vMotion, Cold, and Replication Assisted vMotion (RAV) migrations.

The HCX-IX appliance adds the Mobility Agent service as a host object in the vCenter Server. The processor, memory, storage and networking resources displayed on this object do not represent actual consumption on the physical hypervisor hosting the IX appliance.

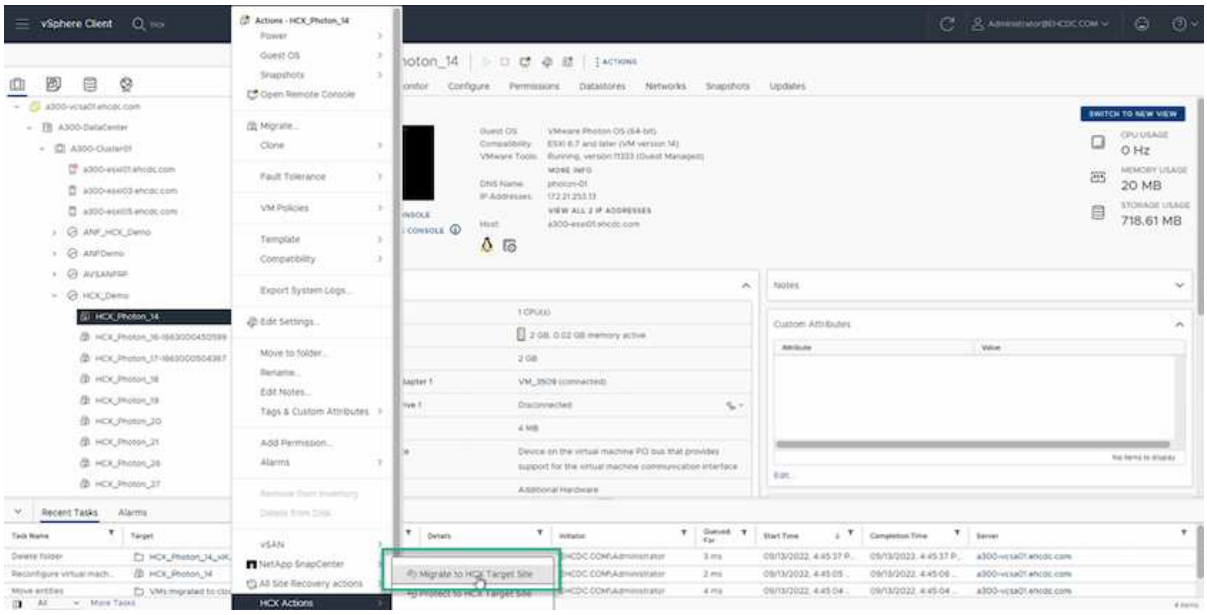


VMware HCX vMotion

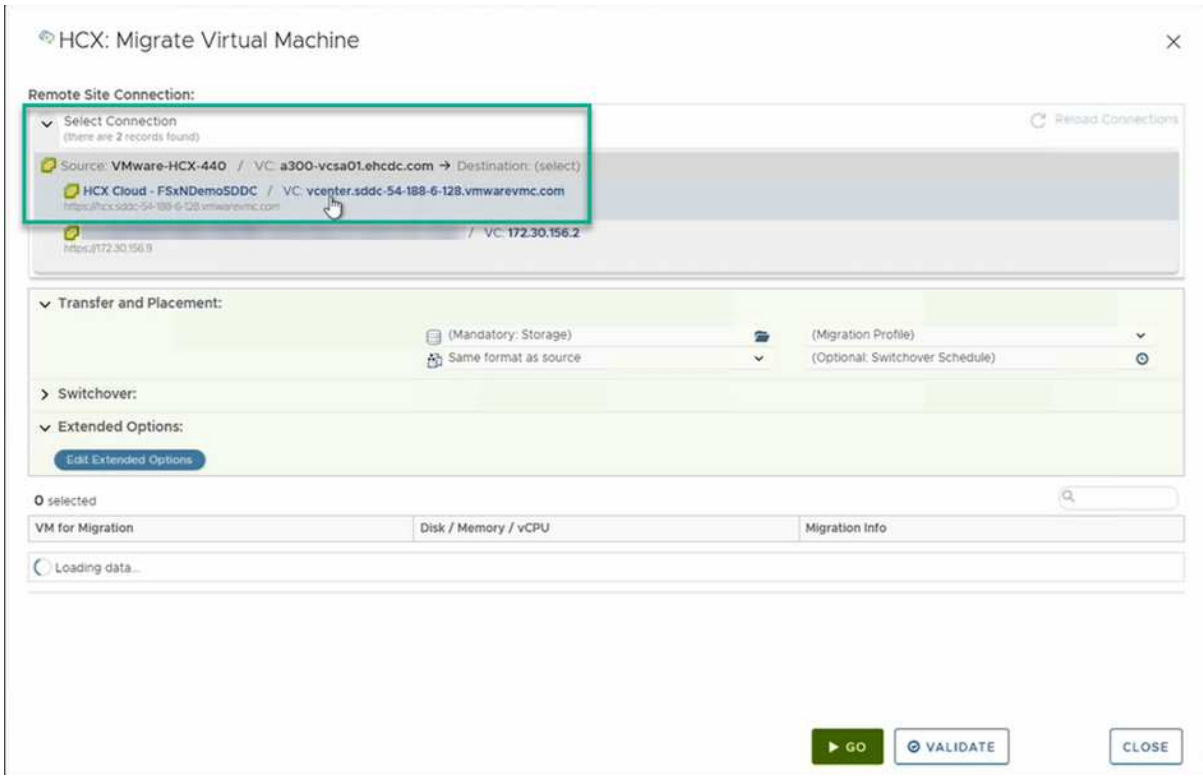
This section describes the HCX vMotion mechanism. This migration technology uses the VMware vMotion protocol to migrate a VM to VMC SDDC. The vMotion migration option is used for migrating the VM state of a single VM at a time. There is no service interruption during this migration method.

Network Extension should be in place (for the port group in which the VM is attached) in order to migrate the VM without the need to make an IP address change.

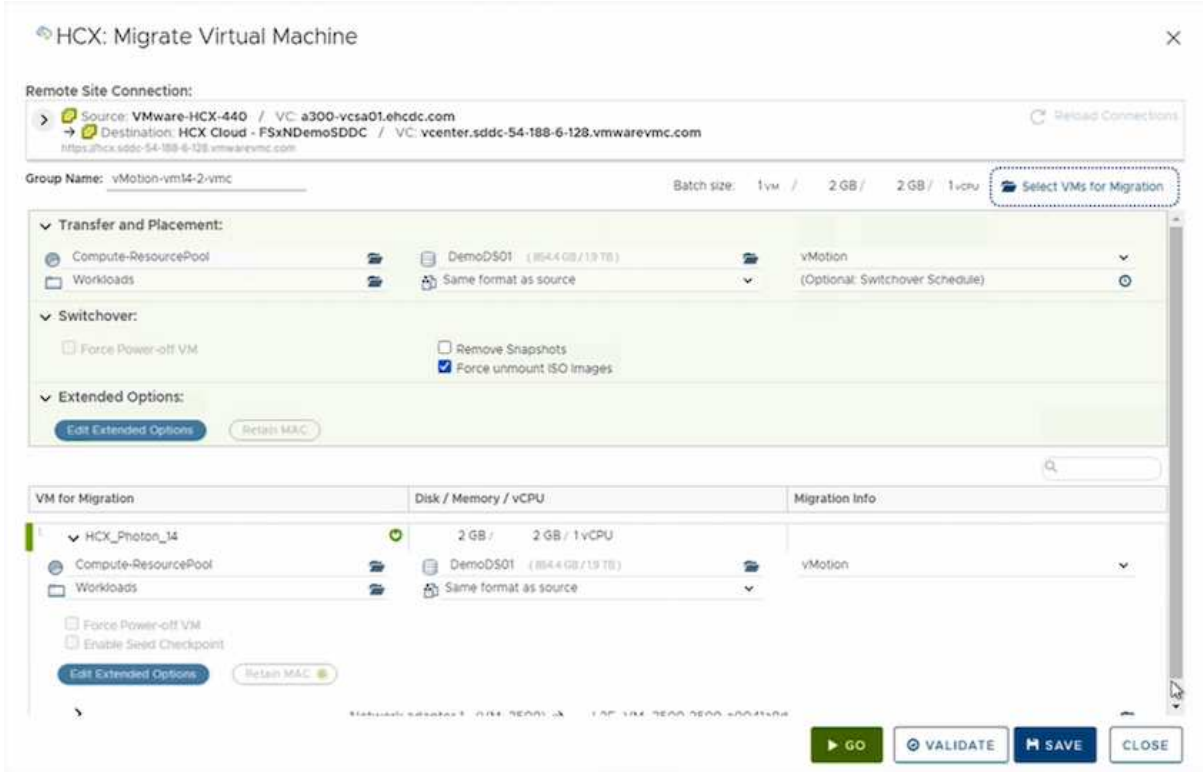
1. From the on-premises vSphere client, go to Inventory, right- click on the VM to be migrated, and select HCX Actions > Migrate to HCX Target Site.



2. In the Migrate Virtual Machine wizard, select the Remote Site Connection (target VMC SDDC).



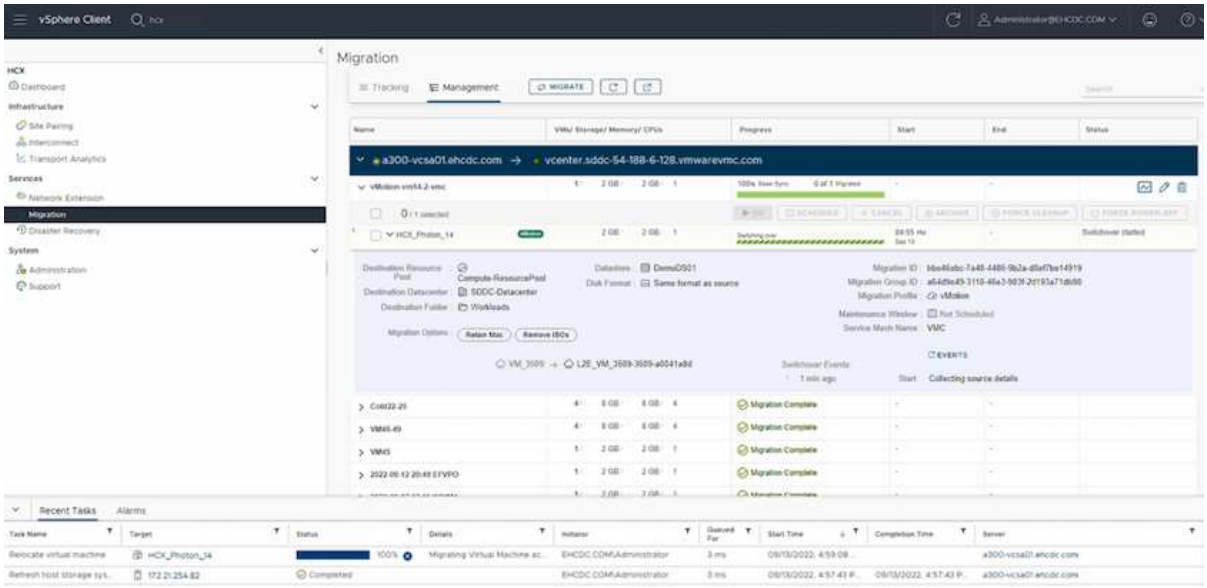
3. Add a group name and under Transfer and Placement, update the mandatory fields (Cluster, Storage, and Destination Network), Click Validate.



4. After the validation checks are complete, click Go to initiate the migration.

The vMotion transfer captures the VM active memory, its execution state, its IP address, and its MAC address. For more information about the requirements and limitations of HCX vMotion, see Understanding VMware HCX vMotion and Cold Migration.

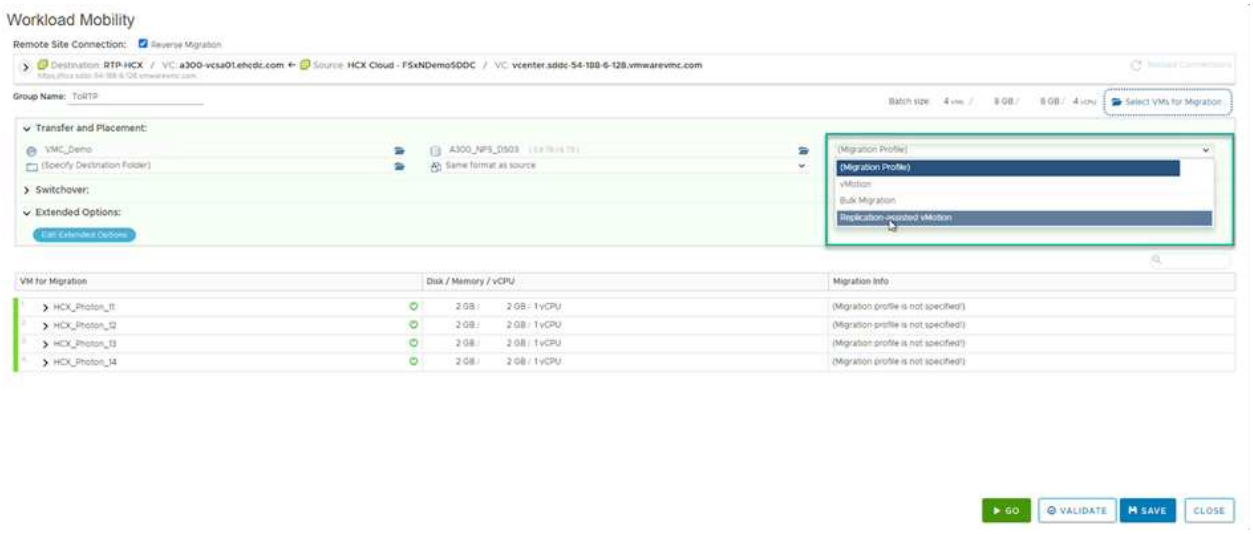
5. You can monitor the progress and completion of the vMotion from the HCX > Migration dashboard.



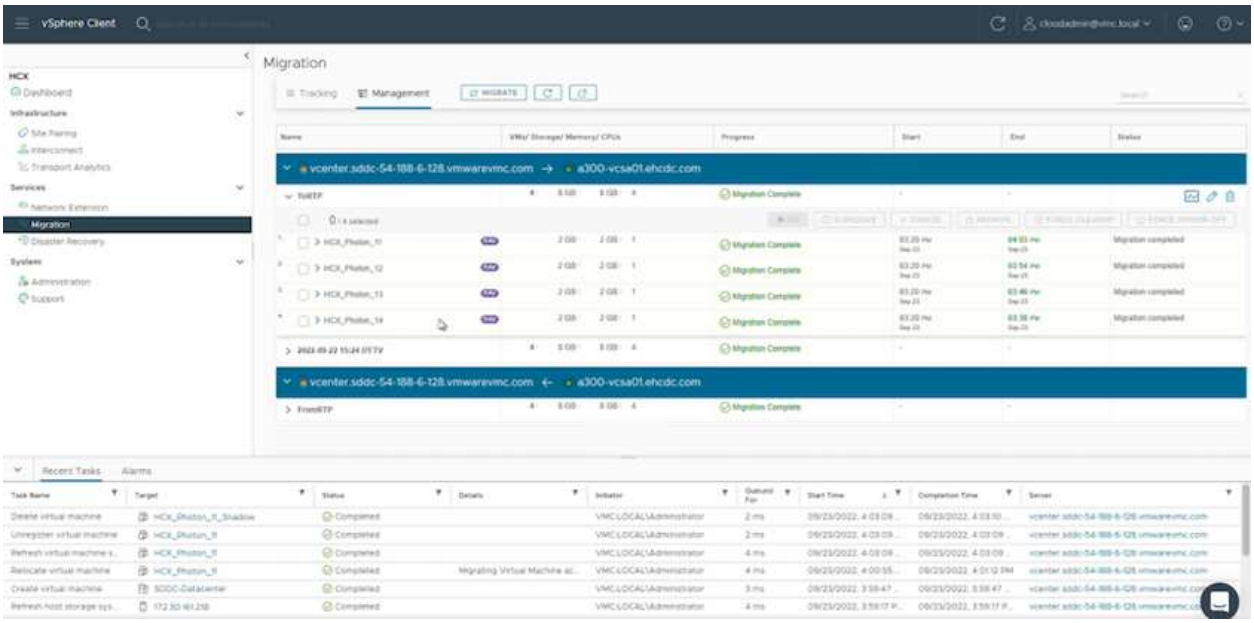
VMware Replication Assisted vMotion

As you might have noticed from VMware documentation, VMware HCX Replication Assisted vMotion (RAV) combines the benefits of bulk migration and vMotion. Bulk migration uses vSphere Replication to migrate multiple VMs in parallel—the VM gets rebooted during switchover. HCX vMotion migrates with no downtime, but it is performed serially one VM at a time in a replication group. RAV replicates the VM in parallel and keeps it in sync until the switchover window. During the switchover process, it migrates one VM at a time with no downtime for the VM.

The following screenshot show the migration profile as Replication Assisted vMotion.



The duration of the replication might be longer compared to the vMotion of a small number of VMs. With RAV, only sync the deltas and include the memory contents. The following is a screenshot of the migration status—it shows how the start time of the migration is the same and the end time is different for each VM.



For additional information about the HCX migration options and on how to migrate workloads from on-premises to VMware Cloud on AWS using HCX, see the VMware HCX User Guide.

VMware HCX vMotion requires 100Mbps or higher throughput capability.

The target VMC FSx ONTAP datastore must have sufficient space to accommodate the migration.

Conclusion

Whether you are targeting all-cloud or hybrid cloud and data residing on any type/vendor storage in on-premises, Amazon FSx ONTAP along with HCX provide excellent options to deploy and migrate the workloads while reducing the TCO by making the data requirements seamless to the application layer. Whatever the use case, choose VMC along with FSx ONTAP datastore for rapid realization of cloud benefits, consistent infrastructure, and operations across on-premises and multiple clouds, bidirectional portability of workloads, and enterprise-grade capacity and performance. It is the same familiar process and procedures used to connect the storage and migrate VMs using VMware vSphere replication, VMware vMotion or even NFC copy.

Takeaways

The key points of this document include:

- You can now use Amazon FSx ONTAP as a datastore with VMC SDDC.
- You can easily migrate data from any on-premises datacenter to VMC running with FSx ONTAP datastore
- You can easily grow and shrink the FSx ONTAP datastore to meet the capacity and performance requirements during migration activity.

Where to find additional information

To learn more about the information described in this document, refer to the following website links:

- VMware Cloud documentation

  https://docs.vmware.com/en/VMware-Cloud-on-AWS/

- Amazon FSx ONTAP documentation

  https://docs.aws.amazon.com/fsx/latest/ONTAPGuide

  VMware HCX User Guide

- https://techdocs.broadcom.com/us/en/vmware-cis/hcx/vmware-hcx/4-10/vmware-hcx-user-guide-4-10.html

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