

Migrating Legacy and Non-vSphere Workloads to VMware Cloud Director

Using vCenter Converter and VMware Cloud Director Availability

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Use Case

Many organizations still run at least a piece of their infrastructure on old physical servers or legacy/non-VMware virtualization in their data centers. The maintenance and day-to-day operations become a more significant challenge every day because of the old hardware and hypervisors being out of support.

Because of that, these organizations look for possible solutions to deal with it by investing minimal time and money. One of the many options is to migrate these workloads to a modern and up-to-date virtualization platform.

It makes such migrations an essential part of the Cloud Providers' offerings so they can be competitive and deliver a valuable service to their tenants.

VMware Cloud Director Availability already offers a migration option for legacy vSphere workloads running on vSphere 5.5U3, 6.0U2, and 6.0U3. [\[Read more\]](#)

Several other tools provide migration capabilities from legacy or non-vSphere sources, but they are usually expensive or have quite a few limitations when it comes to VMware Cloud Director clouds being the destination.

Note: VCPP partners are charged **0 points** per migrated workload using VMware Cloud Director Availability.

Purpose

This whitepaper aims to present a simple and cost-effective way for VCPP partners to offer a native migration path for non-vSphere or legacy vSphere workloads to their VMware Cloud Director clouds.

The suggested solution is entirely based on VMware tools and does not require any 3rd party products or licenses.

VMware Products in Scope

Product	Purpose
vCenter Converter Standalone	Convert and migrate the VMs from the source non-vSphere or Legacy vSphere to an intermediate vSphere
vSphere	Intermediate for the migration process. Destination for the vCenter Converter Standalone conversions and a source for the VMware Cloud Director Availability migrations to VMware Cloud Director
VMware Cloud Director Availability	Migrations from the intermediate vSphere to the destination VMware Cloud Director cloud under the desired organization
VMware Cloud Director	The destination cloud

Please note that the following products need to run interoperable versions:

- vCenter Converter Standalone with Intermediate site vSphere
- VMware Cloud Director Availability with Intermediate site vSphere and Destination site VMware Cloud Director

To understand more about the supported versions, please refer to the [VMware Interoperability Matrix](#).

Scenarios

There are several possibilities when offering a workload migration service from non-vSphere or legacy vSphere sources:

- As a self-service fully operated by the tenant
- As a fully managed service by the provider
- As a mixed service – part of the operations handled by the tenant and the rest by the Cloud Provider

Limitations

With Converter Standalone, you can convert physical machines, legacy VMware, and Hyper-V virtual machines. Since there are several specifics about each machine type, you can find more information about each of the supported sources [here](#).

You can install Converter Standalone components only on Windows operating systems. Converter Standalone supports Windows and Linux operating systems as sources for powered-on-machine conversions and virtual-machine conversions. You cannot reconfigure Linux distributions.

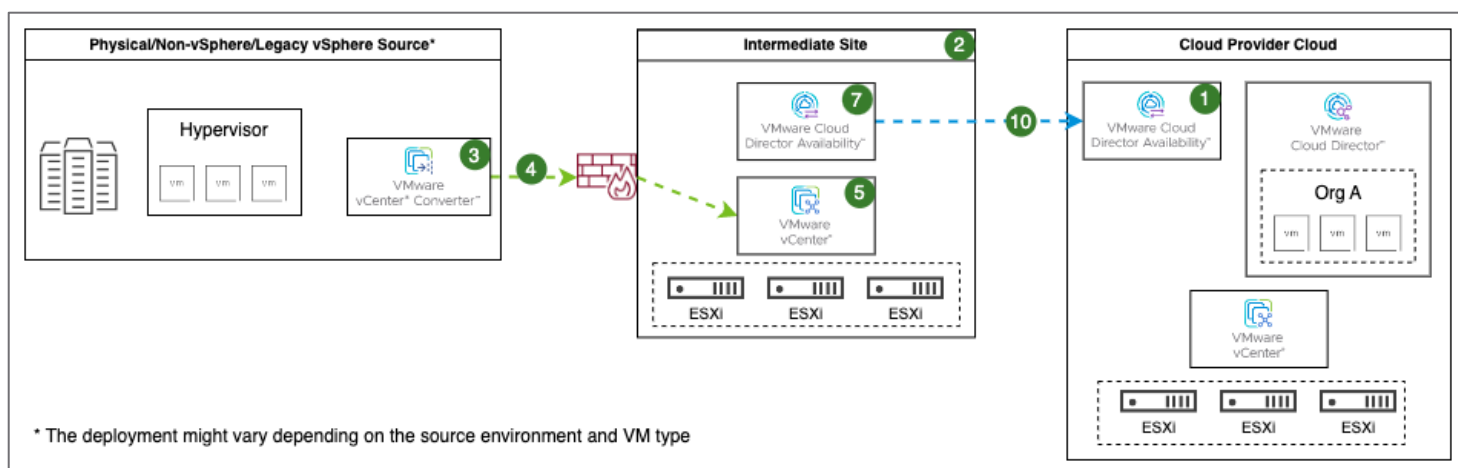
You can find more about the supported Operating Systems [here](#).

For any conversion limitations, please check [here](#).

Considerations

To apply any Guest Customization properties on the migrated VM at the destination site, VMware tools need to be installed before the migration to the tenant organization is initiated. It can be done prior to starting the process while the VM is running at the source or after it is converted at the intermediate site.

Flow



The steps are as follows:

1. Prepare the destination cloud if it doesn't have VMware Cloud Director Availability running.
2. Deploy and configure the intermediate site.
3. Deploy vCenter Converter Standalone and its components accordingly at the source site.
4. Convert a VM/physical machine to the intermediate site.
5. Verify all the properties (GuestOS type, version, SCSI controller, etc.) are correctly populated through the vSphere UI.
6. (Optional) Power on the VM if needed.
7. Configure the migration using VMware Cloud Director Availability.
8. (Optional) If the VM is powered off, perform a manual sync.
9. (Optional) Configure the Recovery settings - Network configuration (Re-IP), Guest Customization.
10. Initiate the migration.

The non-optional steps are marked with their numbers on the diagram.

Destination Site

Since the intended destination for the converted workloads is VMware Cloud Director, the presumption is that the VMware Cloud Director cloud (including its organization structure) is already in place. If, for some reason, it is not, please follow the [VMware Cloud Director documentation](#) to set it up properly.

The first mandatory requirement is to have all the VMware Cloud Director Availability appliances deployed and configured at the VMware Cloud Director cloud.

You can refer to the [VMware Cloud Director Availability Reference Architecture](#) and [documentation](#) for specific suggestions and instructions on how to do it.

The cloud site is ready for migrations when VMware Cloud Director Availability is ready, and its Service Endpoint address is accessible.

Intermediate Site

The intermediate site can be deployed and managed by the Cloud Provider or by the tenants in their data center. Which option is more suitable must be determined based on several factors such as cost, available hardware, workload criticality, etc.

The site must run vSphere 6.7U3¹, 7.0, 7.0U1, 7.0U2, or 7.0U3. There must be at least one existing user with the following [permissions](#) required by vCenter Converter Standalone.

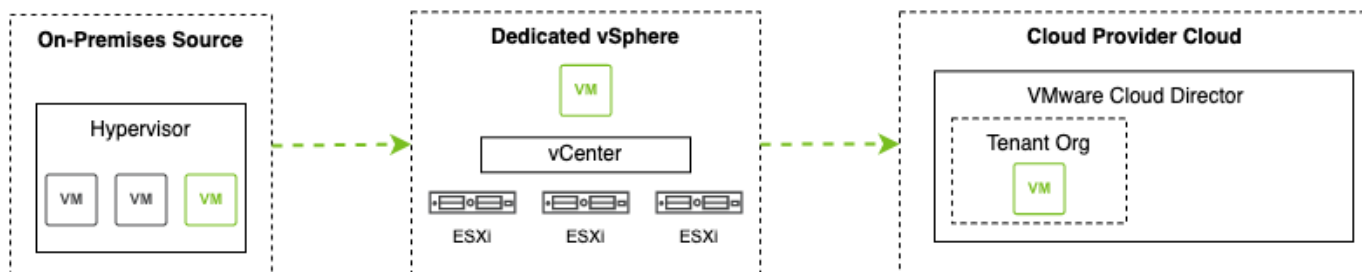
One of the following vSphere licenses should be applied:

- vSphere Evaluation license (if the migration is accomplished within 60 days of provisioning the vSphere intermediate site)
- vSphere Essentials Plus
- vSphere Standard
- vSphere Enterprise
- vSphere Enterprise Plus
- vSphere Desktop

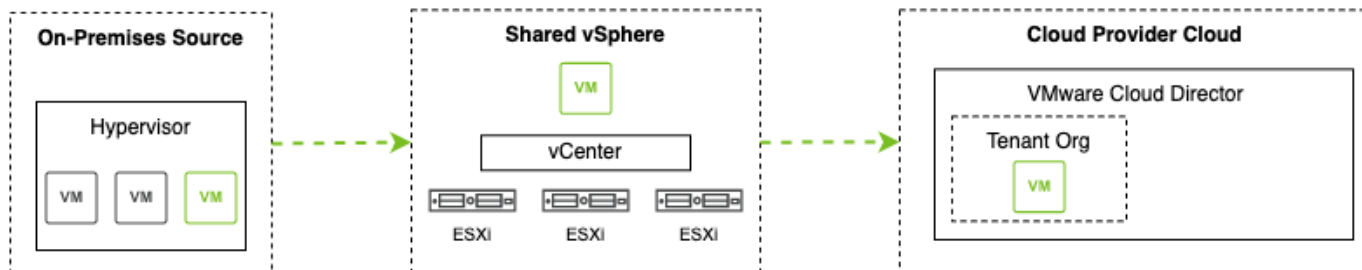
The vCenter address must be accessible from the vCenter Converter Standalone machine.

There are two possible options for the deployment of the Intermediate vSphere environment:

1. A dedicated vSphere per tenant with a VMware Cloud Director Availability On-Premises to Cloud Director Replication appliance paired to the tenant Organization in the VMware Cloud Director cloud. It can also be a vSphere environment running at the tenant's infrastructure and managed by them.



2. A shared vSphere with a VMware Cloud Director Availability On-Premises to Cloud Director Replication appliance per tenant paired to the tenant Organization in the VMware Cloud Director cloud.



Option #1 is suitable when the Cloud Provider offers the migration as a **self-service** or a **mixed service**. Then the tenants can control the whole process or just part of it. For example, the deployment and operation of the vCenter Converter Standalone. Options #2 is suitable when the Cloud Provider offers a **managed service** because limiting the visibility of tenants only to their resources in a shared vSphere environment might be challenging.

¹ vSphere 6.7U3 is already past End of General Support

Tip: To optimize the cost accumulated to the Cloud Provider by running the Intermediate site, the converted VMs can remain **powered off and instantly be migrated to the cloud** (Cold Migration). It will require a **manual sync** after the migration is configured but will allow even a deployment with less compute resources for the Intermediate vSphere environment. It can also utilize a slower but cheaper storage solution (NFS, for example). However, these deployment decisions should be made only after considering the number of workloads that will be migrated. Also, this approach might lead to a **higher downtime** period for the converted workload.

Deployment steps

These steps must be followed to get the intermediate site ready to accommodate the converted VMs.

1. Deploy and prepare the vSphere infrastructure according to the chosen design (configure networking, storage, etc.). [VMware Cloud Foundation](#) can be used for automating the deployment process.
2. Deploy the VMware Cloud Director Availability On-Premises to Cloud Director Replication appliance following the steps provided in the [documentation](#).
3. Run the initial setup wizard of the newly deployed appliance to pair it with the destination cloud. Use the VMware Cloud Director Availability **Service Endpoint address** and Organization administrator credentials (depending on the design, the credentials should be for a tenant or system Organization).
4. Create a user for vCenter Converter Standalone with at least these [permissions](#).
5. Perform all the network configurations necessary to make the vCenter accessible from the tenant site.

Tip: During the initial setup wizard, consider enabling the **Allow access from Cloud** setting, which will let you configure the migration from the cloud site.

Source Site

Because of the various sources supported by vCenter Converter Standalone (see [Limitations](#) for more information) and each has different requirements, there is no recommended architecture for the source site.

The most suitable conversion approach should be determined by the machine (virtual or physical) owner according to its compliance with the vCenter Converter Standalone requirements and limitations.

For example, it is possible to convert a Hyper-V VM using two methods:

- Powered-off virtual machine conversion
- Powered-on machine conversion

A decision must be made based on the Guest OS distribution, its compatibility with vCenter Converter Standalone, and some other factors, such as downtime, the need to modify the network configuration, etc.

In case any configuration changes to the Guest OS are required during the migration (such as network reconfiguration, computer name change, etc.), then VMware tools will be mandatory to be installed. Please refer to the [Considerations](#) section for more information on what is needed.

Automation

Several steps can be automated to reduce the amount of manual work.

1. Shipping the binaries and silent installation of VMware tools. ([Link for Windows](#) & [Link for Linux](#))
2. Intermediate site deployment through VMware Cloud Foundation. ([Link](#))
3. OVF Tool to deploy the VMware Cloud Director Availability On-Premises to Cloud Director Replication appliance at the Intermediate site. ([Link](#))
4. Install vCenter Converter Standalone through command-line. ([Link](#))

Example

In this example, we used Hyper-V running on Windows Server 2016 Standard as a source hypervisor.

The vCenter Converter Standalone is installed on the same host where the Hyper-V service is running.

The intermediate vSphere is dedicated and the VMware Cloud Director Availability On-Premises to Cloud Director Replication appliance is paired using the Organization Administrator credentials of the ACME tenant Organization. (Option [#1](#))

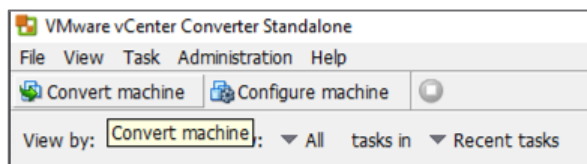
The VM that is migrated is a powered-off CentOS 7 (64bit) VM.

Convert a VM using vCenter Converter Standalone

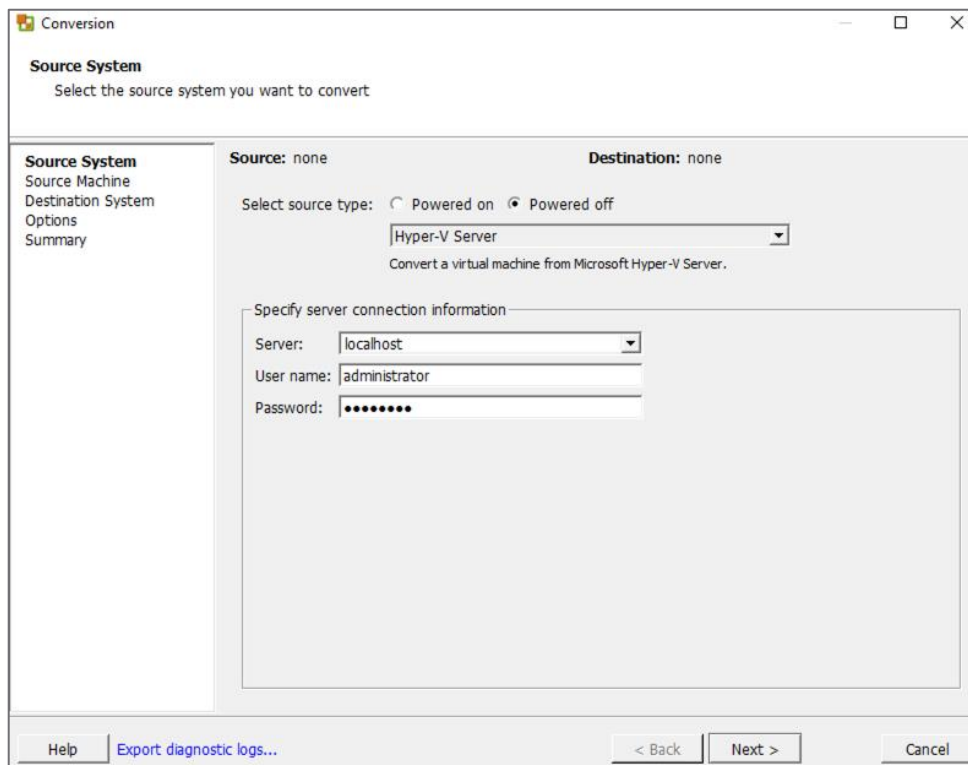
1. Open vCenter Converter Standalone and connect to the local server.



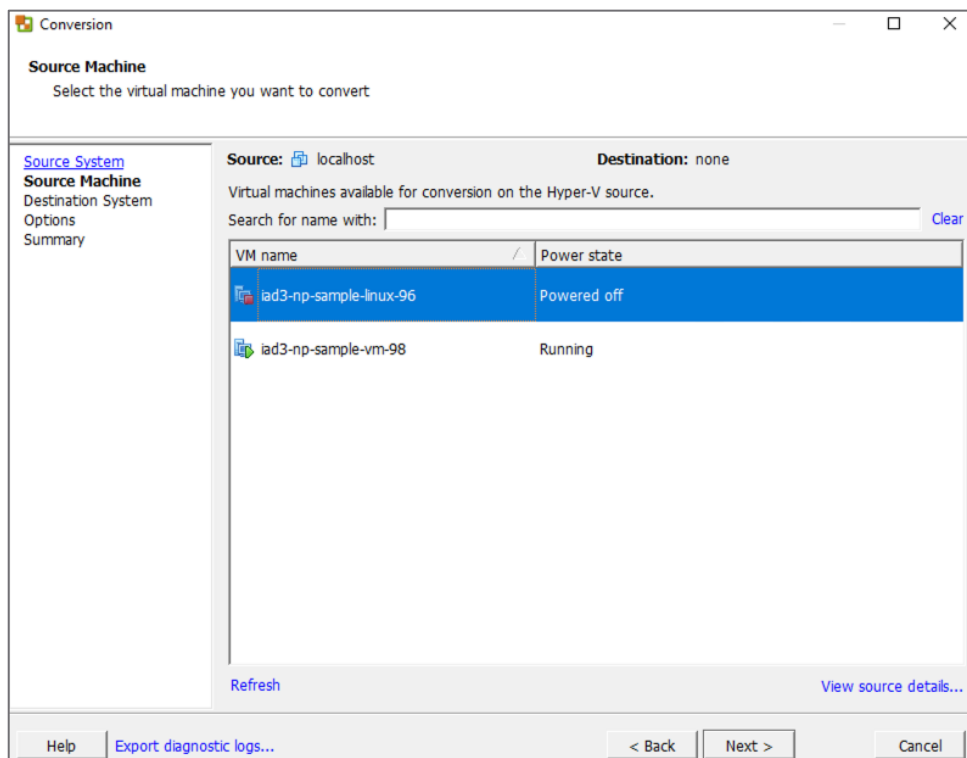
2. Select **Convert machine**.



3. Chose the source type. In this case it is a powered off VM hosted at Hyper-V. Provide the Hyper-V details.



4. Select the VM.



Conversion

Source Machine
Select the virtual machine you want to convert

[Source System](#)
Source Machine
Destination System
Options
Summary

Source: localhost **Destination:** none

Virtual machines available for conversion on the Hyper-V source.

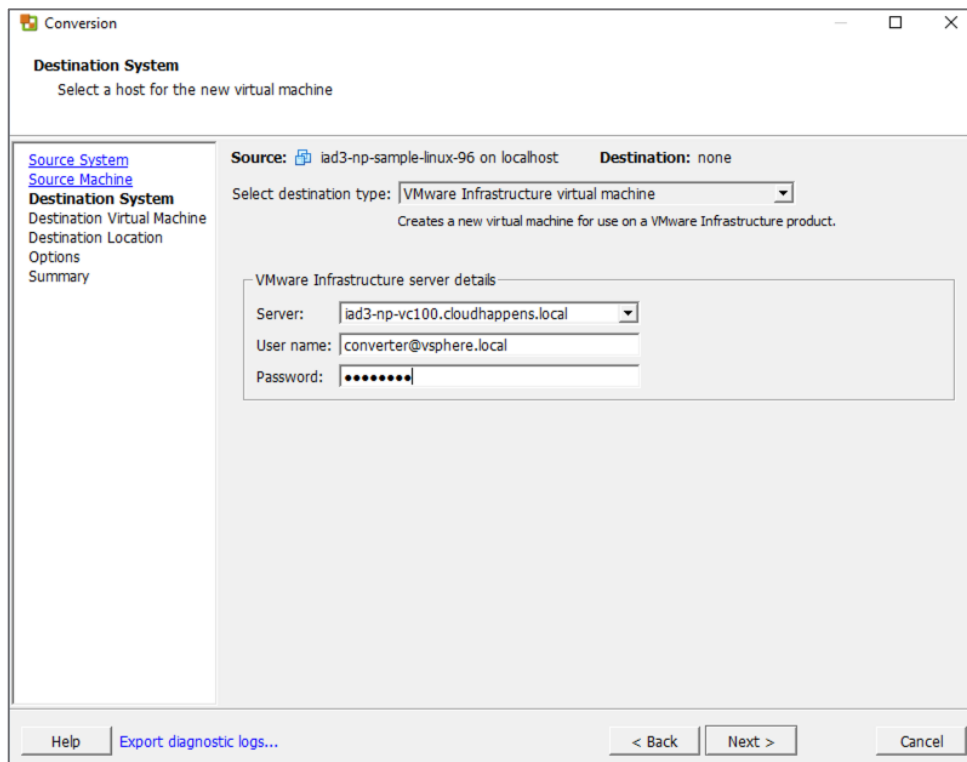
Search for name with: [Clear](#)

VM name	Power state
iad3-np-sample-linux-96	Powered off
iad3-np-sample-vm-98	Running

[Refresh](#) [View source details...](#)

[Help](#) [Export diagnostic logs...](#) [< Back](#) [Next >](#) [Cancel](#)

5. Provide the intermediate vCenter details – URL and credentials.



Conversion

Destination System
Select a host for the new virtual machine

[Source System](#)
[Source Machine](#)
Destination System
Destination Virtual Machine
Destination Location
Options
Summary

Source: iad3-np-sample-linux-96 on localhost **Destination:** none

Select destination type: [Clear](#)

Creates a new virtual machine for use on a VMware Infrastructure product.

VMware Infrastructure server details

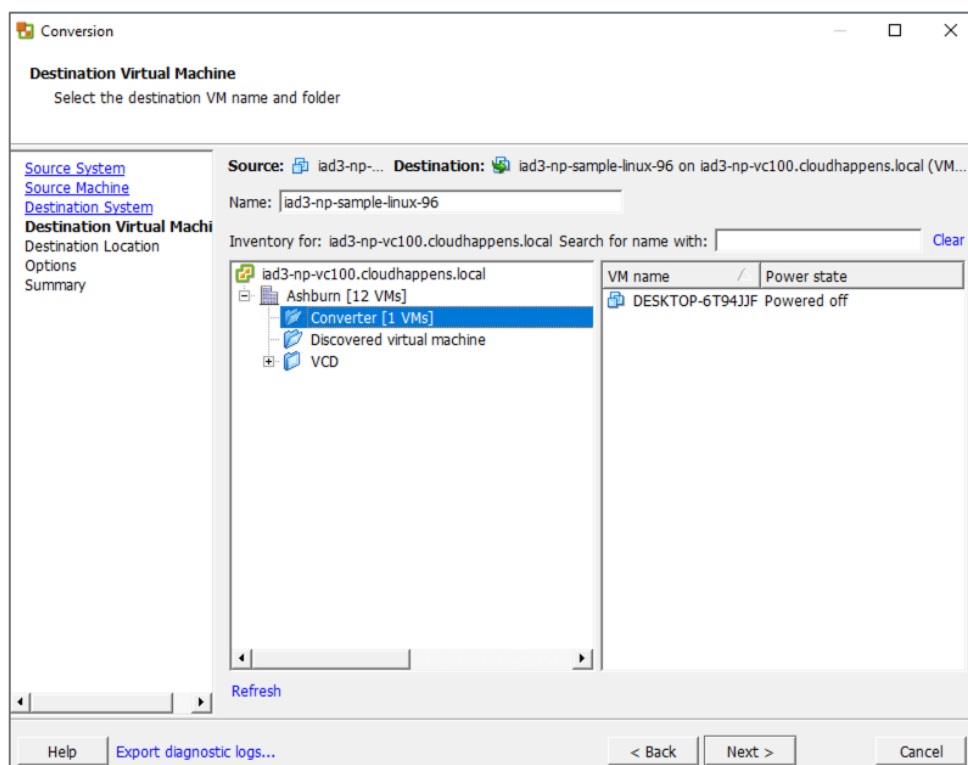
Server:

User name:

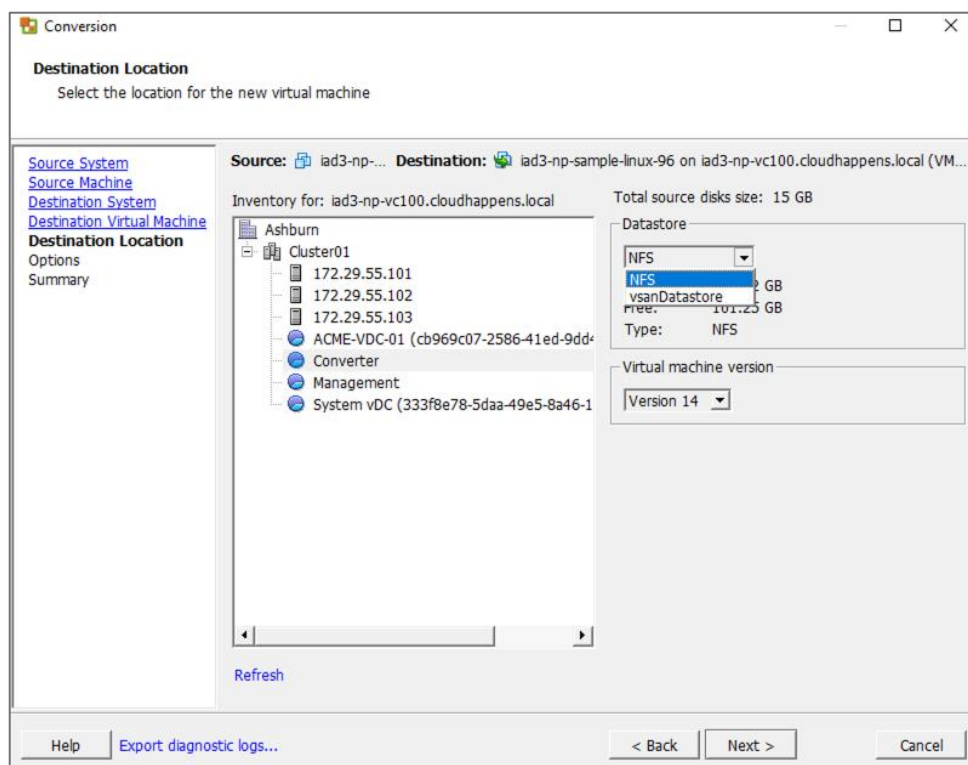
Password:

[Help](#) [Export diagnostic logs...](#) [< Back](#) [Next >](#) [Cancel](#)

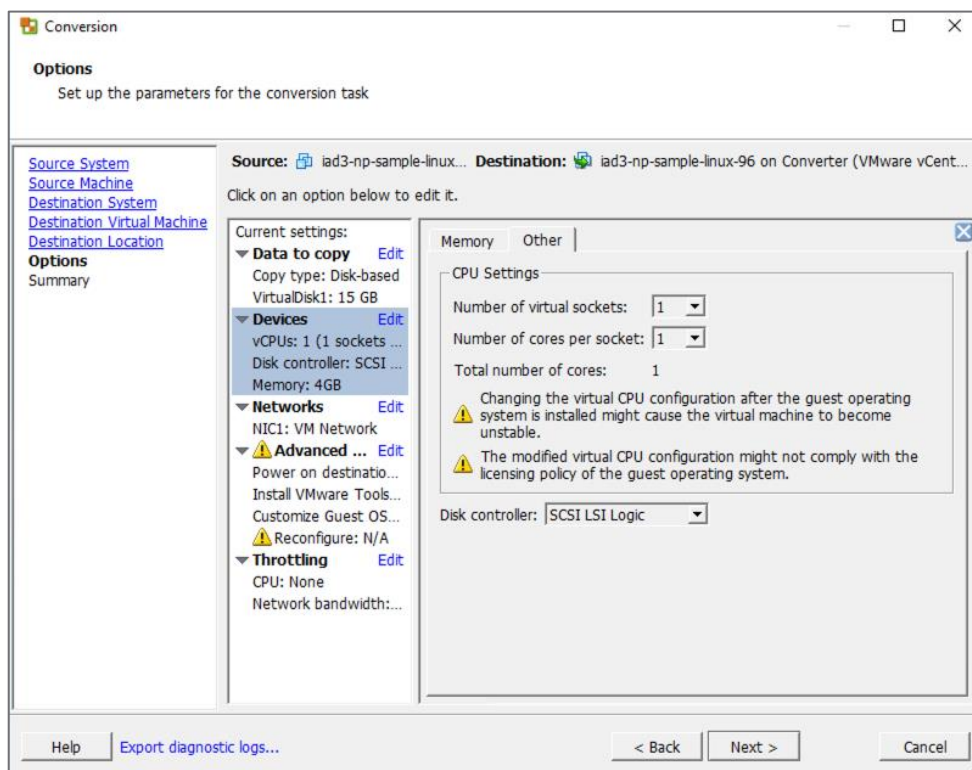
- Choose the destination folder where the VM will be placed.



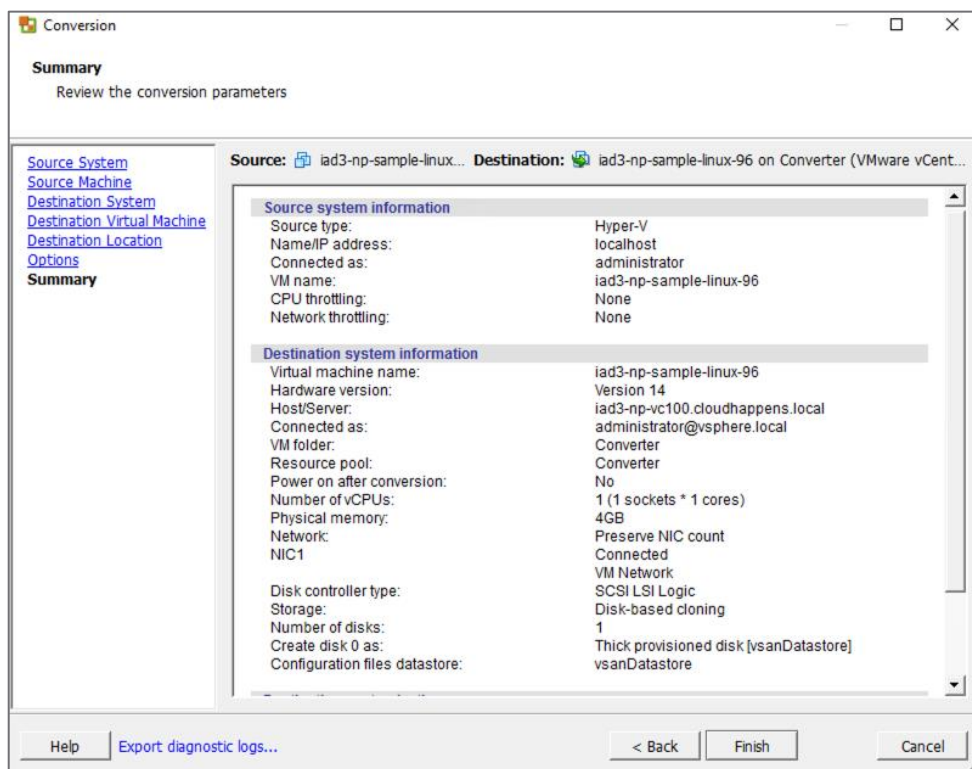
- Specify the Resource pool, Datastore and Hardware version.



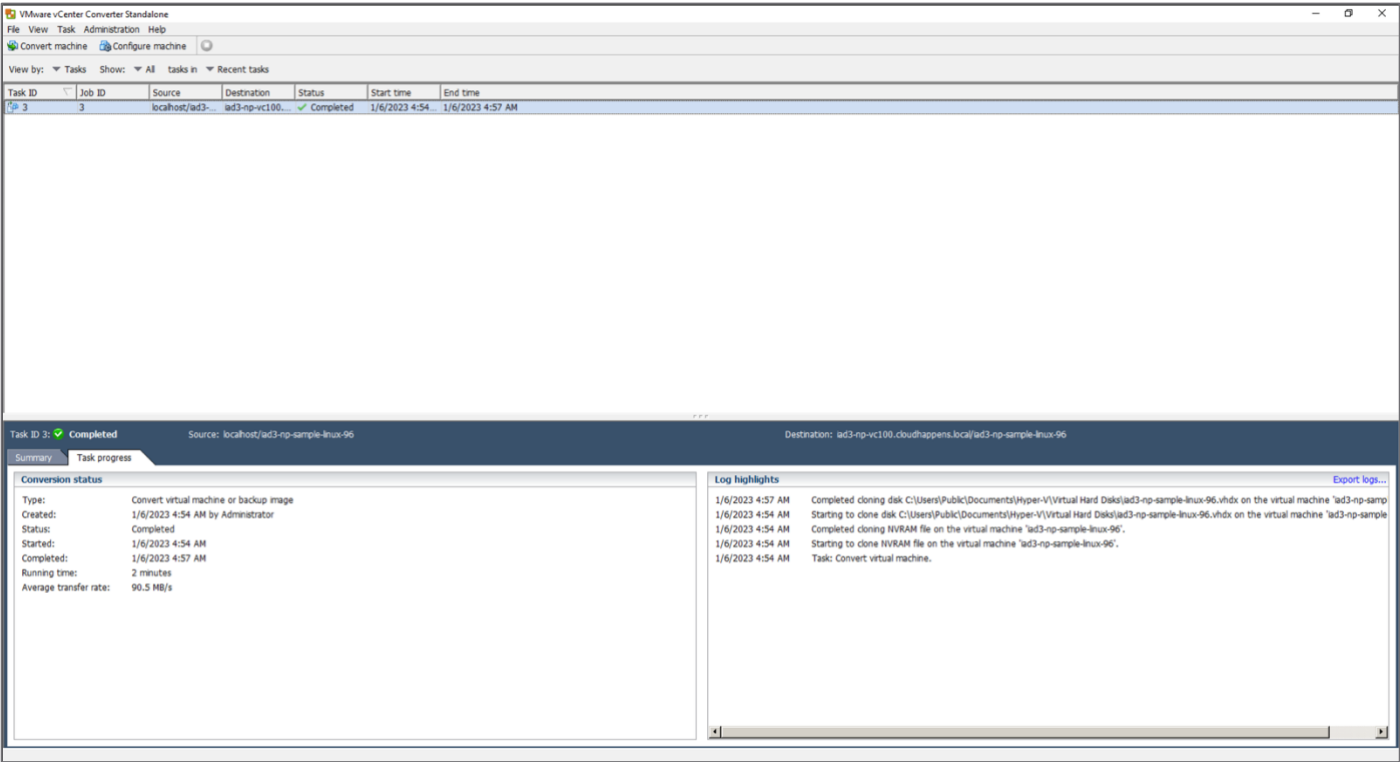
8. Configure the Disk controller and any other settings that might need to be changed. If other source type is used, some GuestOS customization options like installing VMware Tools might be available.



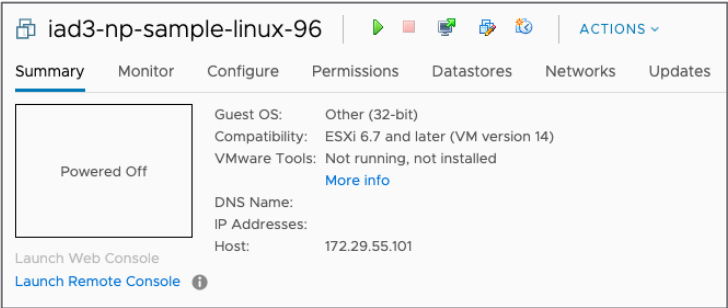
9. Finalize the wizard and start the conversion.



10. Monitor the conversion status.



11. Once completed, navigate to the intermediate vCenter UI and verify the VM details. Perform any necessary changes. In this case I had to manually update the GuestOS and GuestOS version as they appeared as Other.



Migrate a converted VM using VMware Cloud Director Availability

1. Open the VMware Cloud Director Availability UI and click on **New migration**. It can be done through the VMware Cloud Director Availability Plug-in for vSphere, VMware Cloud Director Plug-in for VMware Cloud Director or directly through the VMware Cloud Director Availability portal. In this case we use the vSphere Plug-in.
2. Select the VM(s) to be migrated.

New Outgoing Migration

- 1 Source VMs
- 2 Destination VDC and Storage policy
- 3 Settings
- 4 Ready to complete

Source VMs

Select VMs to replicate from: **IAD3-NP-VC100.CLOUDHAPPENS.LOCAL**

☐ Group VMs to a single vApp

<input type="checkbox"/>	VM	CPU	Memory	Disk capacity
<input type="checkbox"/>	IAD3-NP-NSXV104	4	16.00 GB	60.00 GB
<input checked="" type="checkbox"/>	IAD3-NP-sample-linux-96	1	4.00 GB	15.00 GB
<input type="checkbox"/>	IAD3-NP-vcd105	2	12.00 GB	112.00 GB
<input type="checkbox"/>	IAD3-NP-vcda-110	8	8.00 GB	10.00 GB
<input type="checkbox"/>	IAD3-NP-vcda-120	8	8.00 GB	10.00 GB
<input type="checkbox"/>	IAD3-NP-vcda-mgmt-107	2	4.00 GB	10.00 GB
<input type="checkbox"/>	IAD3-NP-vcda-on-prem-97	8	4.00 GB	10.00 GB

☒ 1 **DESELECT ALL** Items per page 20 1 - 19 of 19 results

One or more of the selected VMs are powered off. The replication traffic will not start until the VMs are powered on or the user synchronizes the replication manually.

CANCEL NEXT

3. Choose the destination VDC and Storage policy.

New Outgoing Migration

- 1 Source VMs
- 2 Destination VDC and Storage policy
- 3 Settings
- 4 Ready to complete

Destination VDC and Storage policy

Select a virtual data center from London-Cloud to be used as replication target: REFRESH

<input type="checkbox"/>	Name	Used CPU	Used memory	Used storage	VMs	Quota	Ongoing replications
<input checked="" type="checkbox"/>	ACME-...	0 M	0.00 B	48.08 GB	1	Unlimited	0

Items per page 20 1 - 1 of 1 results

Storage policy

Select the new storage policy placement for the recovered VMs

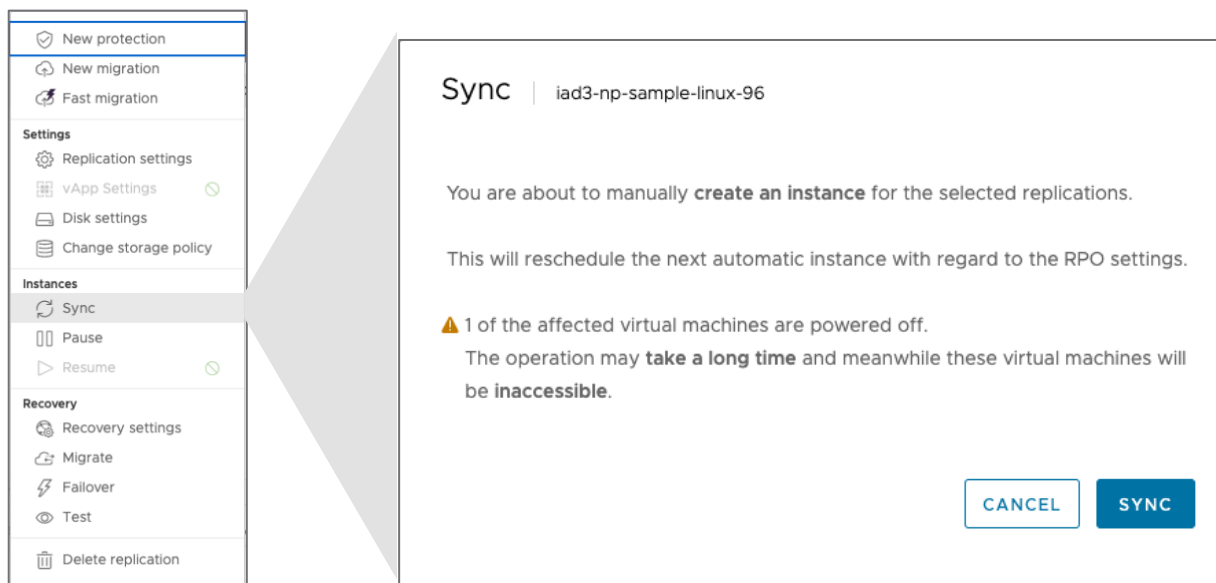
<input type="radio"/>	Name	Encryption capability	Used	Limit
<input checked="" type="radio"/>	vSAN Default Storage Policy	No	48.08 GB	Unlimited
<input type="radio"/>	VM Encryption Policy	Yes	0.00 B	Unlimited
<input type="radio"/>	Any	No	0.00 B	Unlimited

Items per page 20 1 - 3 of 3 results

CANCEL BACK NEXT

4. Specify any additional settings if needed and finalize the Migration configuration.

- Monitor the progress. If the VM is powered off, perform a manual Sync when the migration is ready.



The screenshot shows the VMware Cloud Director interface. On the left, a sidebar menu lists various actions: New protection, New migration, Fast migration, Settings (Replication settings, vApp Settings, Disk settings, Change storage policy), Instances (Sync, Pause, Resume), and Recovery (Recovery settings, Migrate, Failover, Test, Delete replication). The 'Sync' option under 'Instances' is highlighted. A large dialog box titled 'Sync | iad3-np-sample-linux-96' is displayed. The dialog contains the following text:

Sync | iad3-np-sample-linux-96

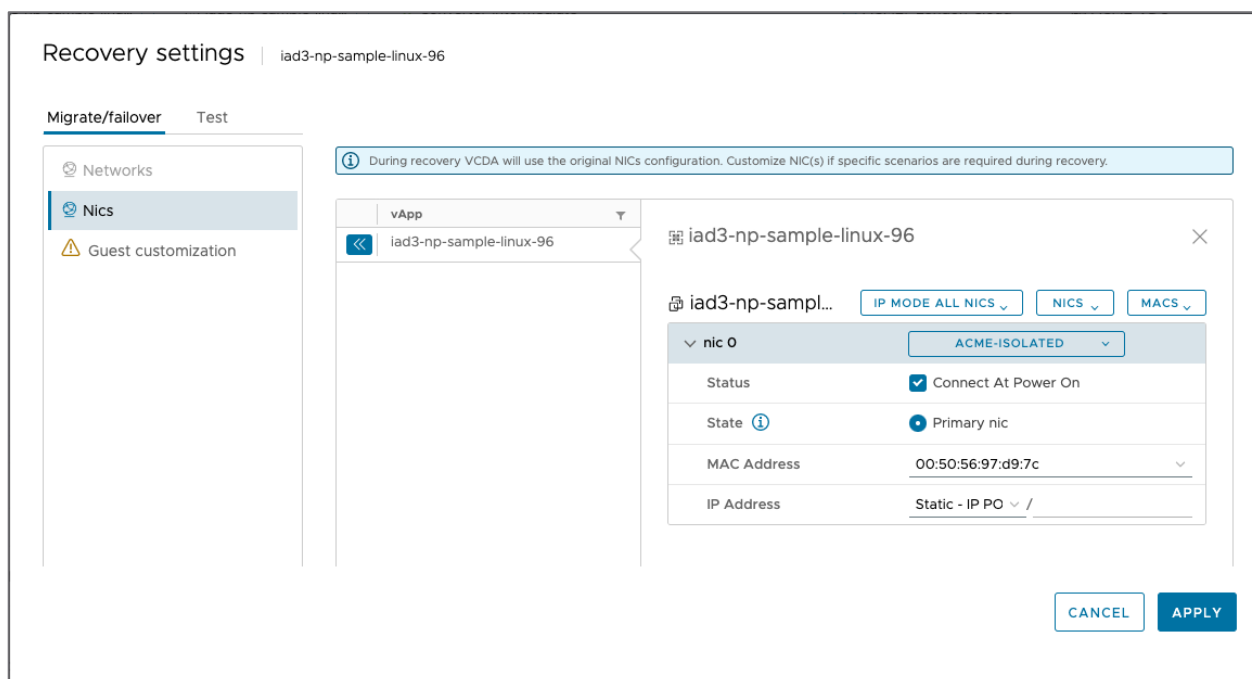
You are about to manually **create an instance** for the selected replications.

This will reschedule the next automatic instance with regard to the RPO settings.

⚠ 1 of the affected virtual machines are powered off.
The operation may **take a long time** and meanwhile these virtual machines will be **inaccessible**.

At the bottom of the dialog are two buttons: 'CANCEL' and 'SYNC'.

- While the synchronization is performed, configure the Recovery settings if needed. In this example, we change the network adapter configuration and the computer name.



The screenshot shows the 'Recovery settings' dialog for 'iad3-np-sample-linux-96'. The dialog has two tabs: 'Migrate/failover' and 'Test'. The 'Migrate/failover' tab is active. On the left, a sidebar menu lists 'Networks', 'Nics', and 'Guest customization'. The 'Nics' option is highlighted. A warning message at the top states: 'During recovery VCDa will use the original NICs configuration. Customize NIC(s) if specific scenarios are required during recovery.' The main area shows a list of vApps with 'iad3-np-sample-linux-96' selected. To the right, the configuration for 'iad3-np-sample-linux-96' is displayed. It includes a dropdown for 'IP MODE ALL NICs', buttons for 'NICs' and 'MACS', and a table for 'nic 0'.

nic 0	
Status	<input checked="" type="checkbox"/> Connect At Power On
State	Primary nic
MAC Address	00:50:56:97:d9:7c
IP Address	Static - IP PO /

At the bottom of the dialog are two buttons: 'CANCEL' and 'APPLY'.

Recovery settings

iad3-np-sample-linux-96

Migrate/failover

Test

Networks

Nics

Guest customization

The computer name and network settings configured for the VMs are applied to its Guest OS when the VM is powered on.
Some of the VMs below require Guest Customization enablement due to NICs configuration.

GUEST CUSTOMIZATIONS

iad3-np-sample-linux-96

Activated

Use source settings

General

Guest customization

Activated

Computer name

lon5-np-sample-linux

Change SID

Deactivated

> Password Reset

> Join Domain (Applicable for Windows VMs)

7. After making sure the manual/initial synchronization is completed, start the Migration by clicking **Migrate**. You can also test the migration prior to migrating the VM.

Migrate

1 Migrate Settings

2 Ready To Complete

Migrate Settings

Select configuration for the recovered VMs

Power settings

☒ Power on recovered VMs

Network Settings

☒ Apply preconfigured network settings on migrate

☐ Connect all VMs to network

VDC compute and sizing policies

Select a VM placement and sizing policy to be applied to the recovered virtual machine.

VDC VM placement policy None

VDC VM sizing policy None

The selected settings will be used during the recovery operation without changing the current policy settings of the replication.

All source VMs will be powered-off after successful recovery.

CANCEL

NEXT

8. Monitor the migration status.

Outgoing Replications

VM	vApp	SLA profile	RPO	Recovery state	Replication type	Overall health	Last changed
iad3-np-sample-linux-96	iad3-np-sample-linux-96	N/A	24 h	Failed-Over	Migration	Green	1/6/2023, 3:43:52 PM

Details

iad3-np-sample-linux-96

- RPO: 24 h
- Retention policy: Keep latest instance only
- Compression: Activated
- Quiescing: Deactivated
- Overall health: Green
- Optimized reverse: 1/13/23, 3:44 PM

Converter-Intermediate Source

- VM: iad3-np-sample-linux-96
- vApp: iad3-np-sample-linux-96
- Replication state: Healthy

London-Cloud Destination

- Organization: ACME
- VDC: ACME-VDC
- Latest instance: None
- Recovery state: Failed-Over
- Recovered VM: iad3-np-sample-linux-96
- Recovered vApp: iad3-np-sample-linux-96
- Storage policy: vSAN Default Storage Policy
- VM placement policy: None

9. If it finishes successfully, the migrated VM will appear under the destination Organization resources in VMware Cloud Director.

Virtual Machines

Find by: Name | ADVANCED FILTERING

2 Virtual Machines | Expired: No | Clear all filters

NEW VM

iad3-np-sample-linux-96

Powered on

VM Console

Summary lease: 8 days (Suspended) | Created On: 01/06/2023, 03:44:41 PM | Owner: admin

vApp: iad3-np-sample-linux-96 | OS: Other (32-bit)

CPU: 1 | Storage: 19 GB | Memory: 4 GB | Networks: 1

ACTIONS | **DETAILS**

DESKTOP-6T94JJF

Suspended

VM Console

Summary lease: 21 days (Marked as expired) | Created On: 12/23/2022, 03:30:02 PM | Owner: system

vApp: DESKTOP-6T94JJF | OS: Microsoft Windows 10 (64-bit)

CPU: 1 | Storage: 48.08 GB | Memory: 7.31 GB | Networks: 1

ACTIONS | **DETAILS**

2 Virtual Machines

10. The migration is completed! Make sure the VM is running properly, and all the desired settings are in place.

Summary

Even though the flow requires multiple manual steps, most are trivial and require no special knowledge. Following the documentation is sufficient for the successful completion of the tasks. Still, some of them can be automated to reduce the amount of manual work.

The combination of vCenter Converter Standalone and VMware Cloud Director Availability is a practical and efficient solution for migrating workloads from legacy or non-vSphere environments to VMware Cloud Director clouds with minimal effort. It can take just a few hours to successfully migrate and power-on a workload in the VMware Cloud Director cloud.

The cost-effectiveness of this solution is also a fact that should be considered (0 points per migration).

Update History

Revision	Description
Feb 2023	Initial version.



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All other marks and names mentioned herein may be trademarks of their respective companies. Item No: vmw-wp-tech-temp-a4-word-101-proof 6/20