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-vSphere 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

<table>
<thead>
<tr>
<th>Product</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>vCenter Converter Standalone</td>
<td>Convert and migrate the VMs from the source non-vSphere or Legacy vSphere to an intermediate vSphere</td>
</tr>
<tr>
<td>vSphere</td>
<td>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</td>
</tr>
<tr>
<td>VMware Cloud Director Availability</td>
<td>Migrations from the intermediate vSphere to the destination VMware Cloud Director cloud under the desired organization</td>
</tr>
<tr>
<td>VMware Cloud Director</td>
<td>The destination cloud</td>
</tr>
</tbody>
</table>

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.
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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 6.7U3, 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.

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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.

5. Provide the intermediate vCenter details – URL and credentials.
6. Choose the destination folder where the VM will be placed.

7. 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.

3. Choose the destination VDC and Storage policy.

4. Specify any additional settings if needed and finalize the Migration configuration.
5. Monitor the progress. If the VM is powered off, perform a manual Sync when the migration is ready.

![Sync](image)

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 is powered off.

The operation may take a long time and meanwhile these virtual machines will be inaccessible.

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

![Recovery settings](image)
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.
8. Monitor the migration status.

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

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

<table>
<thead>
<tr>
<th>Revision</th>
<th>Description</th>
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<tbody>
<tr>
<td>Feb 2023</td>
<td>Initial version.</td>
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