



C2C Image Transformation

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1 Introduction

CliQr® CloudCenter™ is a hybrid cloud management platform that enables enterprises to move, manage and govern applications on public, private, and physical cloud computing infrastructures.

CloudCenter enables on-boarding and migration of existing and new applications through Application Profiles. Most enterprises today take advantage of multiple cloud environments – public, private, physical, and hybrid clouds. Once created, an Application Profile enables the enterprise user to launch the application on any CliQr-supported public, private, or physical cloud.

Details about Application Profiles and methodologies for on-boarding applications can be found in our “CloudCenter Application Migration Methods” document. Additional details about CloudCenter features and architecture are available in other documents.

CloudCenter Application Profiles support complex application types such as multi-tier web application topologies where individual services in an application topology can be image-based. CloudCenter users can point to existing virtual machine (VM) images available on a cloud using CloudCenter Application Profiles. These can be shared images such as publicly available marketplace images available on a particular cloud provider or user-created custom images on a private or public cloud.

In order to enable an Application Profile to work on clouds other than where the VM Images referenced by an Application Profile exist, CloudCenter provides a unique Cloud-to-Cloud (C2C) Image Transformation capability that generates equivalent VM images on those other clouds. This allows for complete portability of an Application Profile that references custom VM images on any CliQr-supported cloud.

This document provides details on how CliQr’s patent-pending C2C Image Transformation works. The document also covers cloud types that are currently supported for this feature, and limitations (Section 6).

2 The Image Transformation Problem: Incompatible Image Formats

Different clouds use different and often incompatible image formats. Based on differing hypervisors and other internal technology choices, both private and public cloud platforms

make it nearly impossible to reuse images across different providers.

In addition to the problem of different clouds using different underlying virtualization technologies, image formats on different clouds may also contain differing hypervisor and cloud-specific configurations that are required to make the image “workable” on that cloud. For example, a VMware image may need a matched version of VMware tools as the underlying hypervisor (ESX host), but an AWS-based image may need a Xen driver and also a cloud-init daemon for bootstrapping the image.

Earlier approaches to solving this problem required creating different equivalent images for each target cloud manually. Such an approach is not scalable.

Traditional virtual-to-virtual (V2V) image transformation approaches can be used to expedite this process. However such approaches still require manually updating such images with cloud- or hypervisor-specific settings once the transformation is completed. Every cloud is different, and determining what to update in an image and how to do it can be an arduous and difficult task.

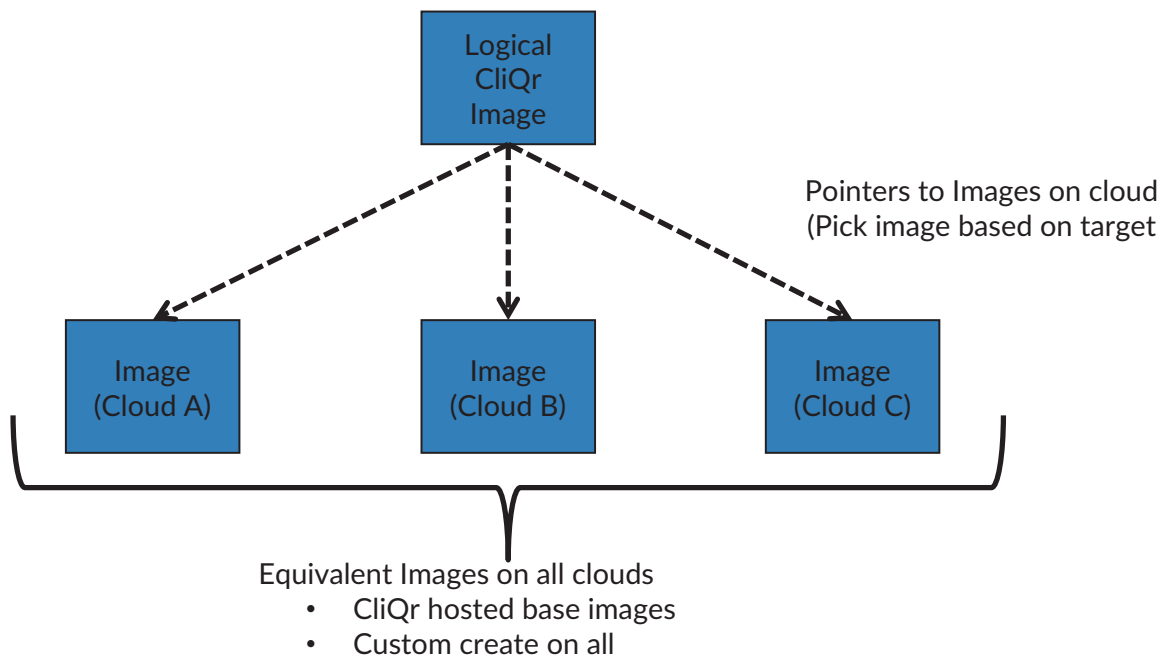
Beyond a single image, most real-world applications are multi-tier, multi-image applications that require additional infrastructure provisioning and application configuration beyond the image instantiation so that the different application tiers can communicate with each other properly. This requires further orchestration.

3 CliQr’s Application Profiles and Image Library

CliQr’s CloudCenter Application Profiles support images transformed manually or through traditional V2V approaches. CliQr provides an image library where a “logical” image entry can point to different actual images on different clouds.

CliQr’s Application Profiles can reference such logical images, and at orchestration time, CliQr CloudSmart Orchestrator™ will choose the correct actual image based on the chosen target deployment cloud.

However, even with a logical image library, the problem remains that such images have to be manually created or generated on different clouds while taking care of equivalence between such images.

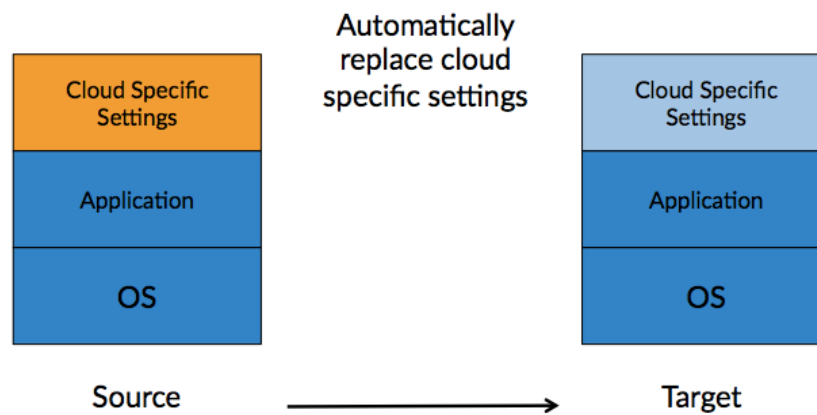


4 CliQr's Solution: Abstracting Image Differences

CliQr provides patent-pending automated cloud-to-cloud Image Transformation across public and private clouds. This Image Transformation automatically generates equivalent VM images on target clouds from a source cloud image.

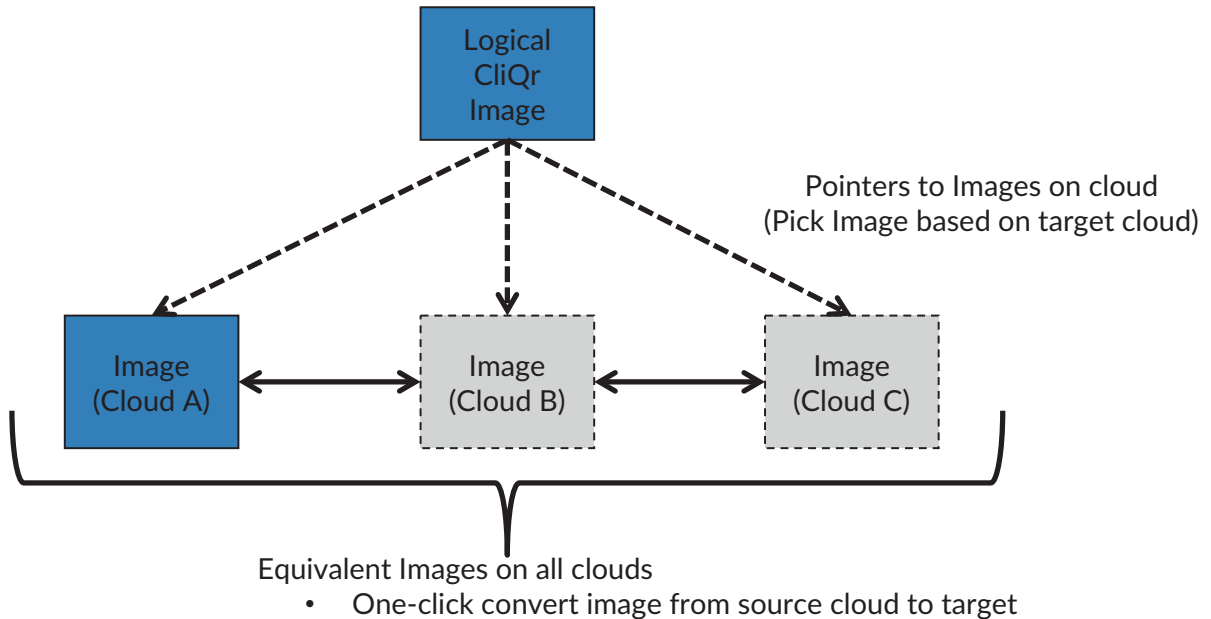
CliQr's Image Transformation takes care of cloud- and hypervisor-specific differences in images that must be configured correctly to ensure that target images are “workable” and can be properly instantiated.

The key to making this approach possible is the ability to isolate the portions of the images that are different from platform to platform. All images are comprised of three basic parts: the operating system, the applications installed, and cloud-specific settings. CliQr has devised a method for abstracting the cloud-specific differences in cloud images so that they can be replaced with appropriate cloud-specific settings.



This technique allows CliQr to transform an image from any source platform to any target platform.

As part of CloudCenter's image library, CloudCenter also automatically maps the logical image to the transformed images on target clouds.



5 Use Case: Perfect for High Volume Lift-and-Shift

Coupled with the ability of CliQr Application Profiles to easily configure application tiers to communicate with one another, this Image Transformation solution makes it possible to mass lift-and-shift VM images from one cloud to another and configure multi-image applications through CliQr Application Profiles.

It is important to note that CliQr's approach retains the images in their native formats. Other cloud migration vendors often offer container-based approaches, where they rely on proprietary image formats that lock organizations into their solutions for the long term and still don't solve the multi-tier configuration and orchestration problem. Some of these approaches may also introduce significant performance overhead because they insert another run-time translation layer on top of the native hypervisor.

The images that result from the CliQr Image Transformation process all retain their native formats. Multi-tier, multi-image applications with the complex topologies typical of most enterprise applications can be described in a CliQr Application Profile.

CliQr CloudCenter takes care of orchestrating the entire application deployment, including the provisioning of compute, storage and networking resources and the laying down of the application images in the right sequence. CliQr can also retain the VM's IP address on the target environment so that it's exactly the same as the source cloud environment, ensuring that there is no need for any change in application configuration on the target environment.

Details on Application Profiles and methodologies for on-boarding applications can be found in our "CloudCenter Application Migration Methods" document.

6 Current Support and Limitations

C2C Image Transformation is currently supported on the following cloud families:

Supported Sources:

- Amazon Web Service (EC2)
- VMware vSphere (5.0, 5.5)

Supported Targets:

- Amazon Web Service (EC2)
- Google Compute Platform

- VMware vSphere (5.0, 5.5)
- VMware vCloud Director (5.5, 5.6)
- OpenStack (IceHouse, Havana, Grizzly)

Supported OS types include:

- Ubuntu 12.04
- CentOS 6
- RHEL 6
- SuSE 11
- Windows 2008, 2008 R2
- Windows 2012, 2012 R2

Other Limitations:

- Image Transformation currently only handles single disk, multi-partition images. Multi-disk is not currently supported.
- Cloud providers may have limited bandwidth to support uploading of multiple images concurrently. It is recommended to do no more than 5 transformations concurrently at any given time.

Other Requirements:

- A CloudSmart Orchestrator™ needs to be deployed on every source and target cloud environment.
- Launch permissions are required on source image before transformation can begin.



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