



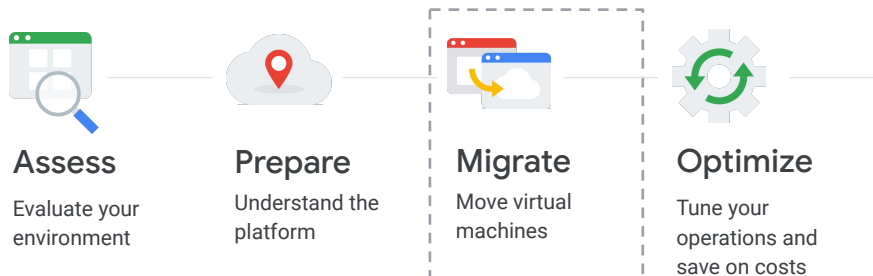
Migrate for Compute Engine

Tad Einstein



Welcome to the Migrate for Compute Engine module, where we will introduce how to use the Google Cloud's virtual machine migration tool.

Google's VM migration process



So far in the course, you've learned how to discover your source environment and find eligible virtual machines to migrate to the cloud. You then learned the fundamentals of the destination environment, Google Cloud. Building on top of that foundational knowledge, I will introduce how to migrate virtual machines from your source environment to Google Cloud.



Learn how to...

Understand Migrate for Compute Engine's architecture

Install Migrate for Compute Engine in your source environment

Understand the migration process

Use special features

Migrate groups of VMs

In this module, you will learn about Migrate for Compute Engine architecture, how to install it in your source environment, the migration process, and using special features like running a test clone and migrating groups of VMs.



Agenda

Migrate for Compute Engine

Migration Technical Architecture

Installation Process

Migration Process

Lab: Migrating to Compute Engine

Additional Features

Migration Wave

Migrating from VMware

The lessons in this module cover the Migrate for Compute Engine main features - including the migration technical architecture, installation process, migration process, and some additional features.

There is a lesson that covers migration waves - and how to use them to migrate multiple VMs.

And finally, there is a lesson that covers how to migrate from VMware. There are some additional features available when migrating from VMware using Migrate for Compute Engine 5 - and these features are covered in the lesson. Let's begin.

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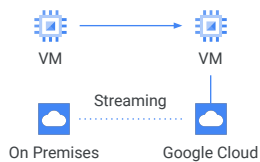
Migrating from VMware

In this module, you will learn about the Migrate for Compute Engine main features.

Migrate for Compute Engine



Minimal Downtime



With Migrate for Compute Engine's real-time streaming, stateful workloads begin running in the cloud within minutes, instead of days or weeks. Applications begin running in Google Cloud after just a few minutes, so there's negligible downtime. Meanwhile, remaining data transfers seamlessly in the background — in a way that is completely transparent to end users. This helps maintain SLAs, while keeping maintenance windows short and predictable.

Migrate for Compute Engine



Reduce Risk

Built-in testing makes it fast and easy to validate before you migrate, and fast rollbacks to on-premises provide a safety net when the unexpected happens.

Migrate for Compute Engine



Rightsize
Recommendations

Lastly, When you are ready to migrate your virtual machine, Migrate for Compute Engine provides you with data-driven rightsizing recommendations to optimize both cost and performance. Since you pay for what you allocate in the cloud rather than what you use, choosing the right size for your virtual machine can save you from over provisioning and therefore optimize your spend.

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Migrate for Compute Engine

[Migration Technical Architecture](#)

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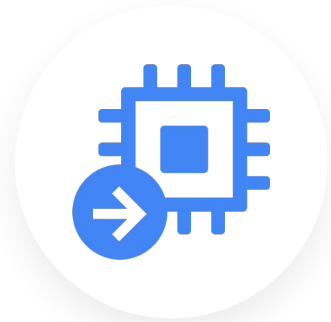
Migration Wave

Migrating from VMware

In this lesson, we will cover the main components of Migrate for Compute Engine and how they work together.

Migrate for Compute Engine

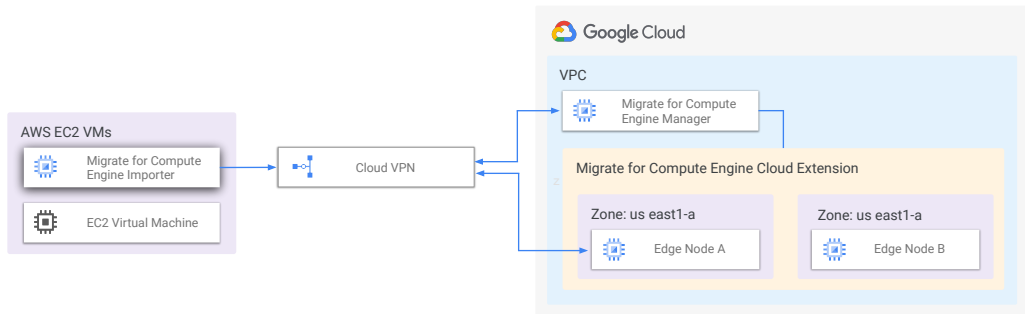
- AWS and Azure use a similar migration architecture (Migrate for Compute Engine 4.x).
- VMware uses a different migration architecture (Migrate for Compute Engine 5.x).
 - VMware migrations and the VMware migration architecture are covered in the last part of this lecture.



AWS and Azure use a similar migration architecture. To migrate from AWS or Azure, use Migrate for Compute Engine 4.x. The first part of this lecture covers migration from AWS and Azure.

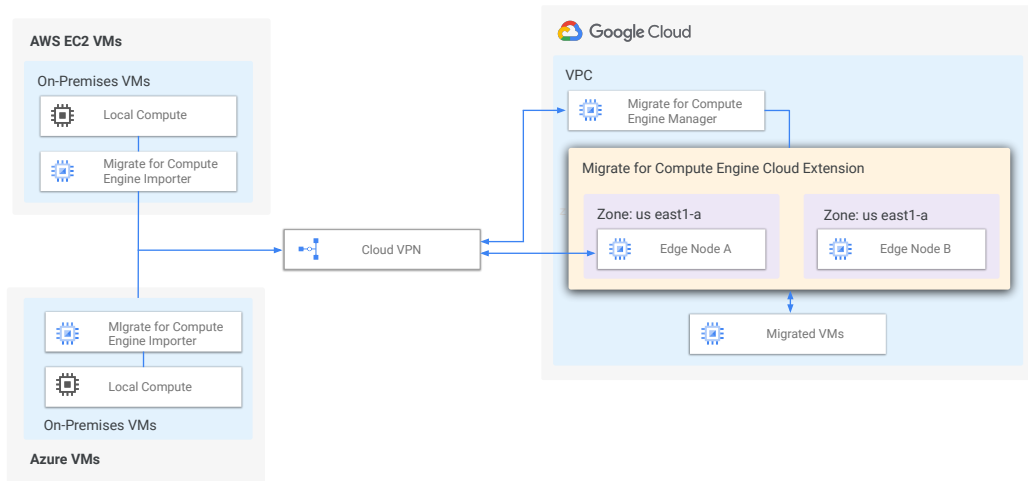
To migrate from VMware, you can use Migrate for Compute Engine 5.x, which offers some additional features. The last part of this lecture covers migration from VMware.

AWS Importer



If your source environment is AWS, a Migrate for Compute Engine Importer virtual machine will be installed automatically in your AWS cloud environment, which provides the same functionality as the Backend on premises. Everytime a migration is initiated, the Manager creates an Importer in your AWS environment to stream the source virtual machine disk to Google Cloud over a secure connection. When the migration is completed, the Importer is deleted.

Cloud Extension



The receiving end of the Importer from AWS or the Backend from your on premises infrastructure is the Cloud Extension. The Cloud Extension is hosted in Google Cloud. It helps to create a highly optimized data streaming and caching layer for the VMs which are being migrated to the Cloud, thus reducing downtime to minutes. The Cloud Extension is composed of a pair of Cloud Edge nodes for redundancy, one in each zone. They serve data to the migrated virtual machine over an iSCSI interface.

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Migrating from VMware

In this video, you will learn how to install Migrate for Compute Engine in Google Cloud and your source environment, either on-premises or in AWS.

1 Setup VPN + Network tags

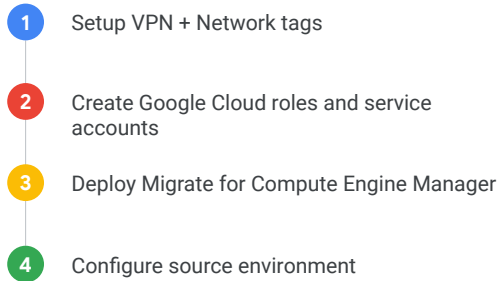
To deploy Migrate for Compute Engine 4.x infrastructure, you will need to go through a few steps. Migrate for Compute Engine uses a secure VPN tunnel or Interconnect to connect your source environment and requires specific networking rules to be set up before migrations can begin.

- 1 Setup VPN + Network tags
- 2 Create Google Cloud roles and service accounts

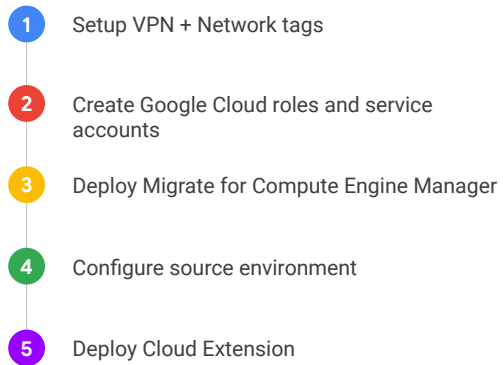
After the network is set up, you'll need to create Google Cloud roles and service accounts that Migrate for Compute Engine can use to create Google Cloud resources and manage the Cloud Storage API. Migrate for Compute Engine includes a Cloud Shell script for making these changes.

- 1 Setup VPN + Network tags
- 2 Create Google Cloud roles and service accounts
- 3 Deploy Migrate for Compute Engine Manager

Once your Google Cloud project is configured properly, you can deploy the Migrate for Compute Engine Manager from the Google Cloud's Marketplace in just a few clicks.

- 
- 1 Setup VPN + Network tags
 - 2 Create Google Cloud roles and service accounts
 - 3 Deploy Migrate for Compute Engine Manager
 - 4 Configure source environment

You then deploy the appropriate appliance based on your source environment: a backend on vSphere if you are migrating virtual machines from on premises, or an importer if you are migrating from AWS.

- 
- 1 Setup VPN + Network tags
 - 2 Create Google Cloud roles and service accounts
 - 3 Deploy Migrate for Compute Engine Manager
 - 4 Configure source environment
 - 5 Deploy Cloud Extension

And to complete the process, you deploy a Cloud Extension back at the destination environment.

Demo

Installing Migrate for Compute
Engine on AWS

Tad Einstein



In this demo, you will learn how to install the Migrate for Compute Engine's infrastructure components on Google Cloud and AWS.

[Presenter]

Once you install all the components, you'll be ready to start migrating virtual machines.



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Now that you have learned how to install Migrate for Compute Engine, I will introduce the migration process from your on-premises or AWS environments to Google Cloud using Migrate for Compute Engine version 4.x.

Migration phases

Full Migration

- Run in Cloud: Moves compute to the cloud; stream storage from on-premises.



After installing Migrate for Compute Engine in your source environment and Google Cloud, you can start the migration process, which is composed of 3 main phases. I'll go over the whole process briefly now, and then go into more details on each step.

The first phase is called 'Full Migration.' Migrate for Compute Engine will execute 3 sub steps:

Run-in-Cloud sub-step.

The process starts by turning off the source virtual machine and creating an image. If you migrate a Windows machine, the process will perform relevant adaptations to the cloud environment automatically. For linux OS, an rpm package must be installed manually in advance.

When the image is ready for the cloud, it will be streamed to the Cloud Extension and boot within a few minutes. Migrate for Compute Engine then streams any data on demand when the migrated virtual machine needs it.

Migration phases

Full Migration

- Run in Cloud: Moves compute to the cloud; stream storage from on-premises.
- Storage Migration: Moves storage to the cloud (in the background).

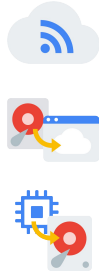


The Storage Migration sub-step proactively migrates the full data to the cloud so that streaming is no longer necessary.

Migration phases

Full Migration

- Run in Cloud: Moves compute to the cloud; stream storage from on-premises.
- Storage Migration: Moves storage to the cloud (in the background).
- Prepare to Detach: Prepares to disconnect from the on-premises VM.



When storage migration is completed, Migrate for Compute Engine prepares to detach, which copies all the cached data from the previous operations to a native Compute Engine persistent disk.

It's important to note that you can manually go through each of these phases, but we recommend automatically executing them sequentially by choosing Full Migration.

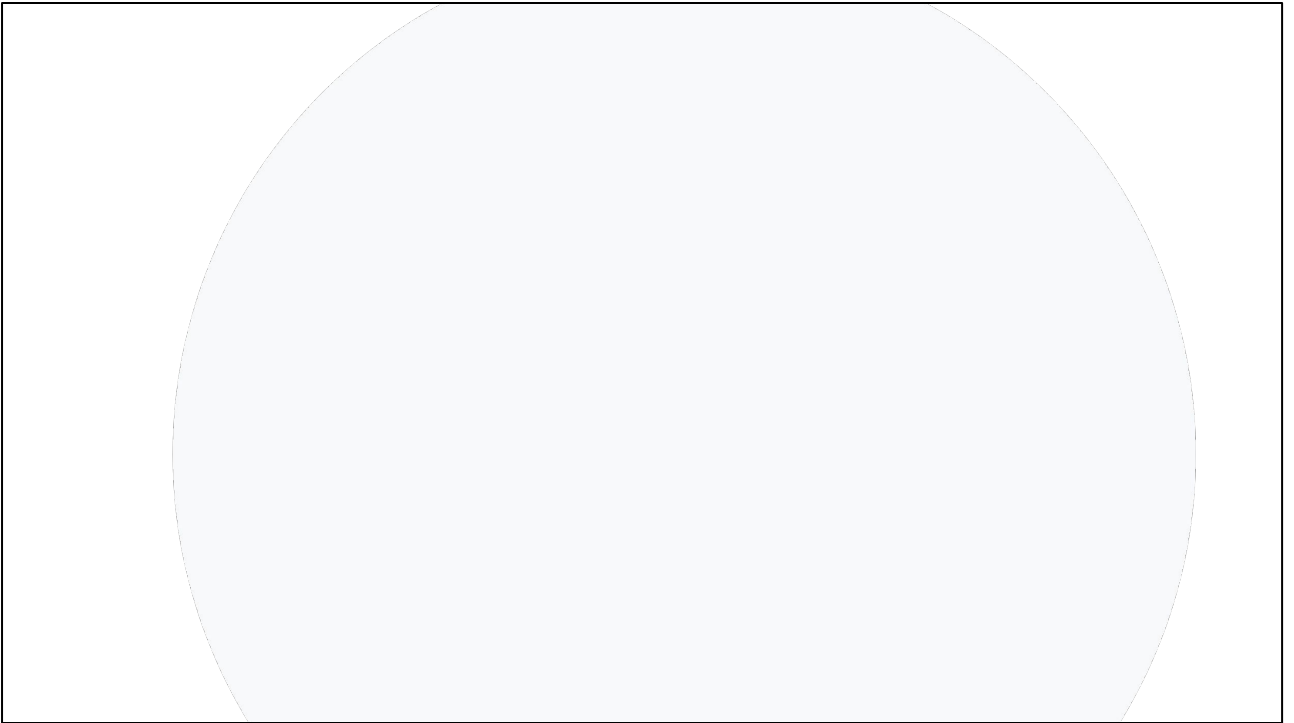
Migration phases

1. Detach: Attaches the native disks to the cloud instance.
2. Clean up: Marks the VM as unmanaged by Migrate for Compute Engine and removes cloud storage objects



Full migration is just the first out of 3 steps. After full migration is completed, all read and writes from the migrated virtual machine still goes through the Cloud Extension to not interrupt the migrated machine's operation.

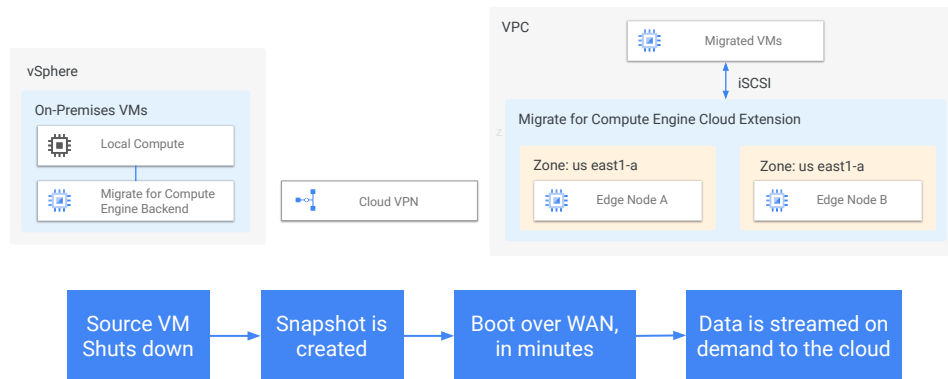
When you are ready to fully detach from the cloud extension, which involves brief downtime, you can initiate the Detach step. It moves the remaining data on the cloud extension to the native persistent disk and then shuts down the migrated virtual machine so it can boot natively and securely from its persistent disk, thus becoming fully independent.



Lastly, a cleanup will mark the VM as unmanaged by Migrate from Compute Engine and removes migration artifacts.

Let's go over these steps one by one in more detail.

Full Migration: Run-in-Cloud sub step

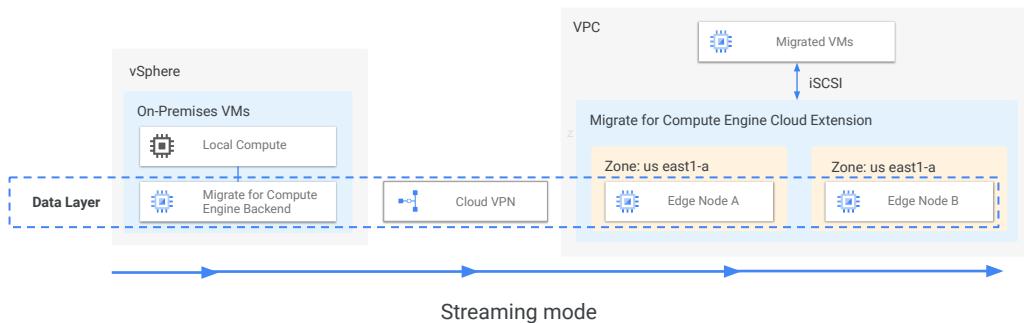


When you decide to start a full migration, the first step is called 'Run-in-Cloud.'

During that process, Migrate for Compute Engine will shut down your source virtual machine and create a snapshot of its disk. The platform will then prepare your virtual machine to run in the cloud and boot the source disk on a Google Compute Engine virtual machine. As the migrated destination machine starts in Google Cloud, data from the source virtual machine will be streamed and cached at the Cloud Extension Edge Node. All communication traverses through a secure and optimized VPN or interconnect tunnel.

Startup time for the migrated virtual machine is usually under 10 minutes.

Data caching and streaming

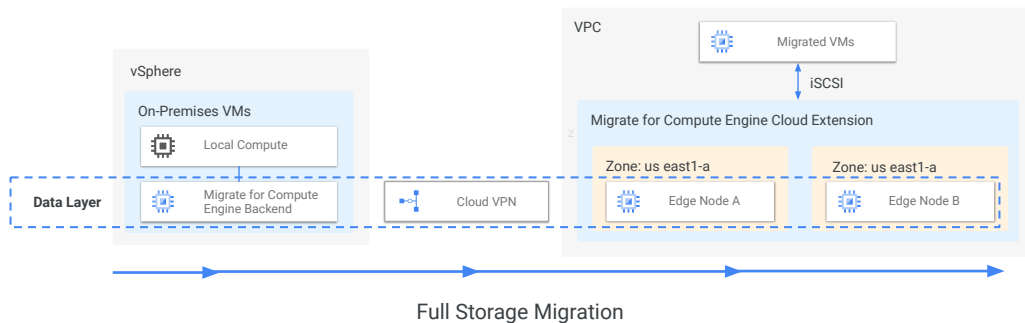


During the migration phase, the Migrate for Compute Engine Backend creates a connection with the Cloud Extension Edge Nodes, which together form a highly optimized and transparent data layer. In 'Run-in-Cloud' mode, data from the backend will be streamed on demand and cached at the Edge Node.

The Edge Node serves the data to the migrated virtual machine seamlessly. Write operations are saved in the Edge Node and asynchronously committed back to on-premises in case you need to roll back.

The data layer utilizes caching technology that predicts and streams storage as needed, and the connection benefits from WAN optimizations to ensure optimal performance.

Storage Migration

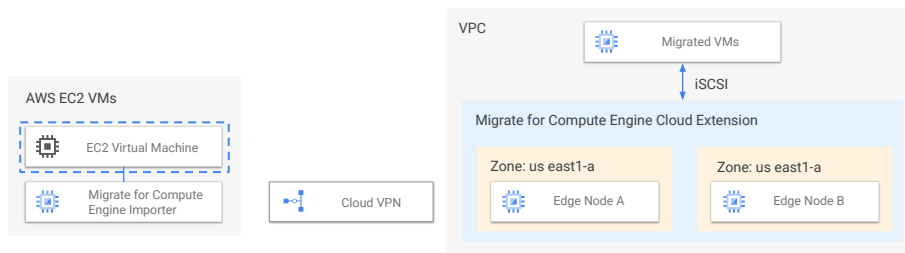


After the streaming mode is stable and the destination machine is fully operational, it's time for the data migration step.

When an on-premises VM is running in Google Cloud, storage is streamed in order to reduce downtime, and storage blocks are only transferred and cached on Google Cloud when needed.

The next step is called 'storage migration,' which transfers the data in full to the Edge Nodes while the migrated virtual machine is still running in the background. The process is completely transparent to the migrated virtual machine, which remains fully operational from the moment it started.

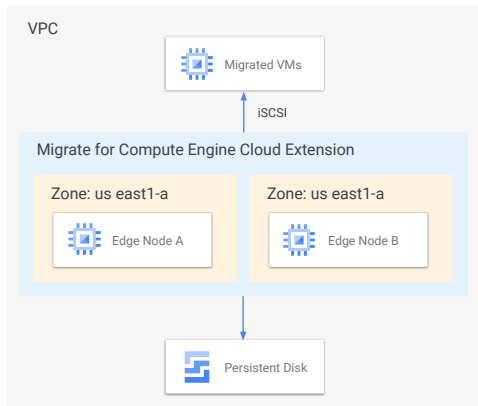
AWS Migration



If you are migrating from AWS, the process is quite similar except for a few details.

When you initiate the 'Run-in-Cloud' phase, Migrate for Compute Engine creates a new virtual machine, called an Importer, in your AWS environment, which facilitates the data streaming process within the destination environment in Google Cloud. Once your data is migrated in full to Google Cloud, you will delete the Migrate for Compute Engine Importer virtual machine on AWS because it is no longer needed to stream or transfer your data.

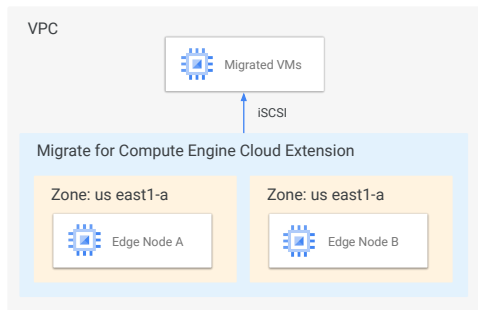
Prepare to Detach



When the data is fully migrated to the Edge Nodes, the next step is to prepare to detach the migrated virtual machine. Until now, the migrated virtual machine's data was served from the Edge Nodes which handled the streaming and migration, which is an efficient intermittent state that minimizes downtime and mitigates risk. Now that all the data is cached in the Edge Node, a prepare to detach phase will save the data to a native Compute Engine persistent disk so that the migrated virtual machine can function independently.

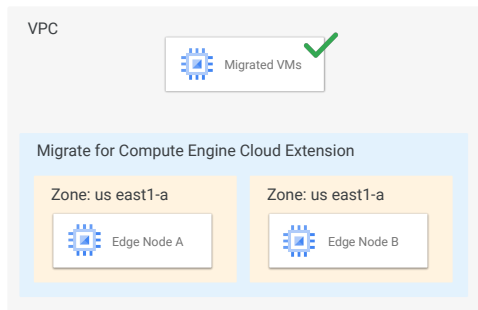
Read and write operations are still being saved and cached at the Edge Nodes in order to keep the migrated virtual machine running smoothly, and you can still roll back the migration to on-premises if you need to.

Detach



The detach phase is initiated manually and incurs a brief downtime while the virtual machine is shut down and last writes are being synced to the persistent disk. Then, the persistent disk detach from the cloud extension and attach to the virtual machine, and a native boot from it is initiated. At this point, the virtual machine runs independently and data is read and written from the native persistent storage.

Cleanup



The last manual step is Cleanup, which Marks the VM as unmanaged by Migrate for Compute Engine and removes migration artifacts from the Edge Nodes.

Demo

Migrating from AWS to
Google Cloud

Tad Einstein



In this demo, you will learn how to migrate a virtual machine from AWS to Google Cloud

Lab Intro

Migrating to Compute Engine



Now that you have learned how to migrate virtual machines from your source environment to Google Cloud, let's apply the migration process in a lab.

In this lab, you use Migrate for Compute Engine to migrate a VM instance (EC2) that exists on AWS to Google Cloud. This will be a "lift and shift" operation. When completed, the VM instance that was running on AWS will be running on Google Cloud.

Lab Solution

Migrating to Compute Engine

Chris Lupone



In this lab you utilized a Terraform script to deploy an AWS instance. You then configured Compute Engine Manager (formerly Velostrata) to migrate your AWS instance to a Google Cloud VM.

You can stay for a lab walkthrough, but remember that Google Cloud's user interface can change, so your environment might look slightly different.



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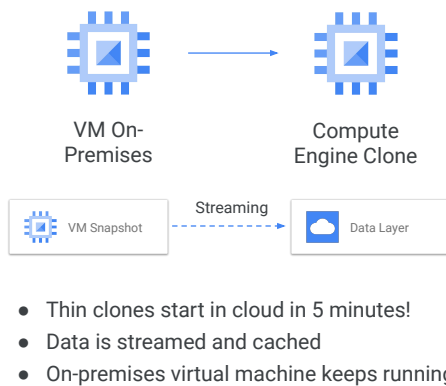
[Additional Features](#)

Migration Wave

Migrating from VMware

In this video, you will learn about other features Migrate for Compute Engine supports, like test clones and offline migration.

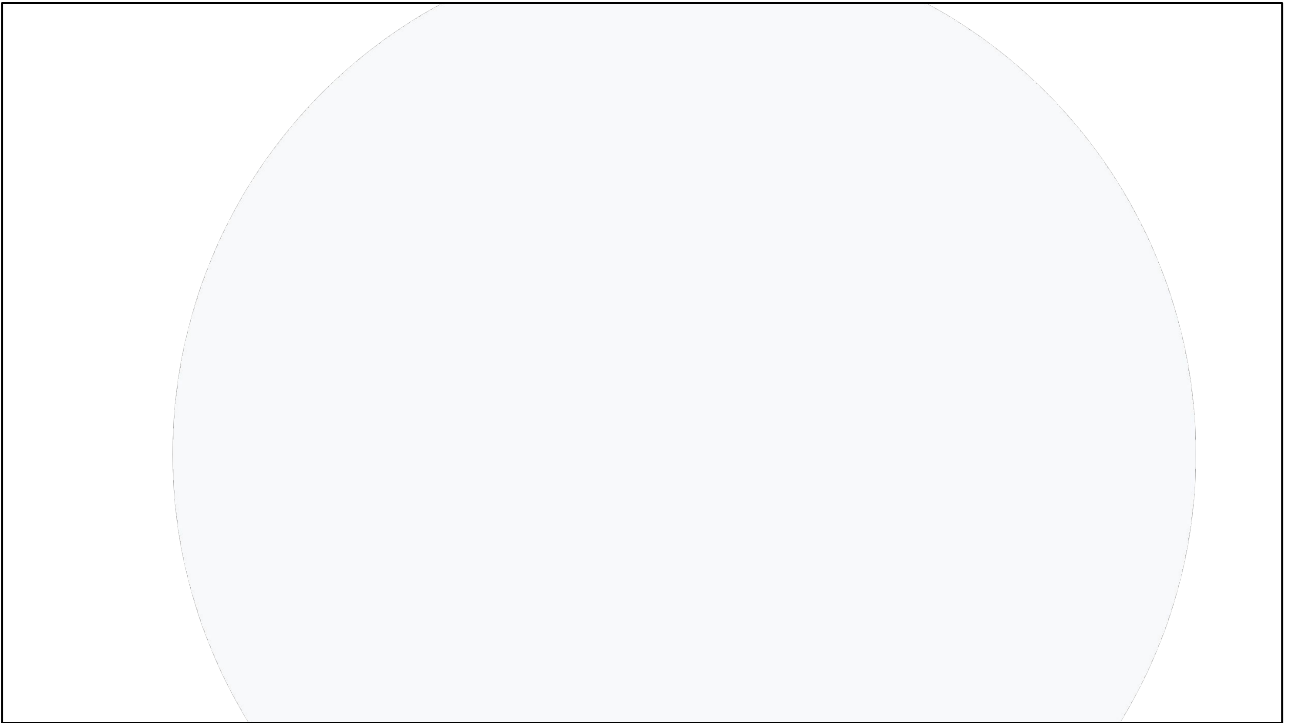
Test clone (Optional)



Testing your applications in the cloud before you officially migrate them is an important way to save time and mitigate mitigation risk. It gives enterprises the opportunity to easily see how applications perform in the cloud and to make the appropriate adjustments before going live.

Creating a test clone is completely optional, but we recommend testing virtual machines before putting them in production. Unlike the migration process, test clones leave the on-premises VM running and create an identical clone of that machine from a snapshot of the source virtual machine. That image begins to transfer to the source environment, Google Cloud.

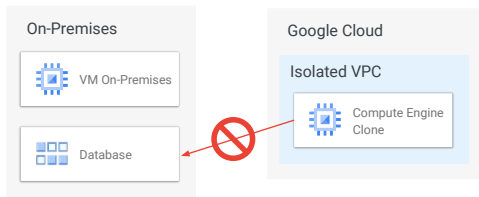
Thanks to its streaming technology, Migrate for Compute Engine starts a thin clone in the cloud within about 5 minutes. The machine's data is streamed over a secure connection to a highly optimized cache.



There are a few points to be aware of. First, each VM can have a maximum of one test clone at a time.

Second, Windows virtual machines are automatically configured to run in the cloud, but linux-based virtual machines needs to have an rpm package manually installed.

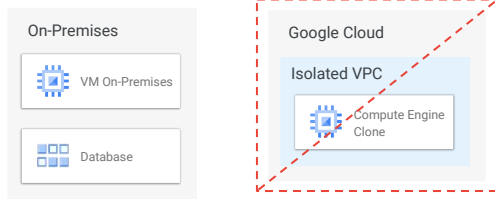
Test clone isolation (Optional)



In addition, the test clone virtual machine is created in write-isolation storage mode. That means that changes in the cloud-based clone storage are not written back to on-premises storage. It's important to remember that test clones are exact copies of your source workload, including any credentials, data, and state it is using. And both of them are running at the same time!

We recommend that you use test clones in an isolated VPC or subnet to avoid conflicts or race conditions with other services such as Active Directory, DNS, and shared repositories.

Test Clone Isolation (Optional)

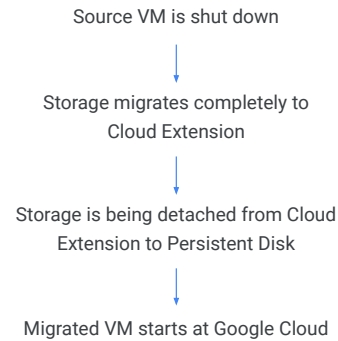


After testing your workload with a test clone, you should delete it. Deleting the test clone removes it from Google Cloud.

Note that deleting the test clone has no impact whatsoever on your live system or data. No changes made to data in the test clone are written back to your live system.

Offline migration

- Enables you to migrate workloads with (typically) legacy operating systems that are not currently supported by Migrate for Compute Engine.
- Can also be used for “storage-only migration.”



With offline migration, Migrate for Compute Engine enables you to migrate workloads running on vSphere with operating systems that are not currently supported by Migrate for Compute Engine's streaming technology. These are typically legacy operating systems.

During the offline migration process, all storage migrates to the cloud before the VM starts on Compute Engine. The source virtual machine will first shut down, and storage will be migrated completely, detached, and cleaned up before the VM starts in Google Cloud. Since data cannot be streamed, the downtime is measurably longer and depends on the connection and amount of data that needs to be transferred.

Offline migration



Offline migration can also be used for “storage-only migration.” Legacy VMs can be migrated to the cloud with offline migration, even when unsupported in Compute Engine. Administrators can then reattach a data disk to a newer and supported cloud instance to retrieve data from it.



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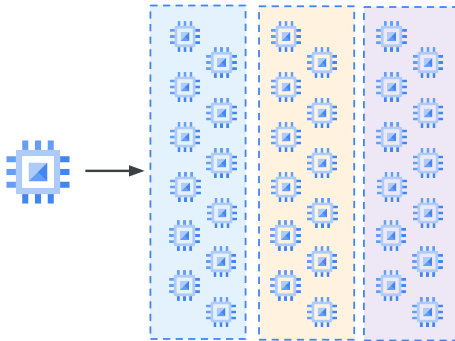
Additional Features

[Migration Wave](#)

Migrating from VMware

In this video, you will learn how to migrate more than one virtual machine at a time, using a feature called a Migration Wave.

Migration waves



So far in this module you've learned how to migrate a single virtual machine. Enterprise cloud migration projects often include moving hundreds or thousands of application workloads from on-premises or other clouds into Google Cloud. Migrating the entirety of your data center at once is challenging, if not impossible. It's important to assess your workloads and batch them into different migration groups.

One of the main decision drivers of a migration group is often related to application affinity, where certain systems must maintain specific latencies between each other. In those types of scenarios, you will want to migrate these applications as one migration group, called a migration wave. A migration wave is a way of organizing the systems you want to move into batches that make your migration strategy more manageable.

Choosing the first migration wave

1 Business Criticality

Now that you understand why we leverage Migration Waves, let's discuss how we go about choosing which systems to group together for your first Migration Wave.

One of the most important considerations to think about when choosing systems for the first wave is to focus on the business criticality of the individual workload. We recommend choosing workloads and underlying systems that are the least business-critical. These workloads will give you the opportunity to get comfortable with your migration process while minimizing risk early on in the migration.

Choosing the first migration wave

- 1 Business Criticality
- 2 Lifecycle Environment

Another recommendation would be to migrate your application development or test environment first.

Choosing the first migration wave

- 1 Business Criticality
- 2 Lifecycle Environment
- 3 Uptime Sensitivity

You will also want to consider your applications' Service Level Agreements and uptime requirements. Workloads that can experience interruption and downtime without major business impact or batch processes are also excellent migration workloads for the First Wave.

Choosing the first migration wave

- 1 Business Criticality
- 2 Lifecycle Environment
- 3 Uptime Sensitivity
- 4 Licensing and Compliance

Another point that is important to consider is your workloads' licensing and compliance requirements. A good first mover is either a workload that is developed in-house or one whose licensing requirements support running in a cloud environment. Low compliance complexities are another indicator of a strong First Wave candidate.

Choosing the first migration wave

- 1 Business Criticality
- 2 Lifecycle Environment
- 3 Uptime Sensitivity
- 4 Licensing and Compliance
- 5 Dependencies

Lastly, when choosing your First Wave candidates, you want to select workloads that have fewer system and network-to-network dependencies. By taking this approach, you minimize your migration scope and reduce technical complexities.

Migration wave components



Wave

A construct for batch migration of VMs



A wave is a high-level construct that represents a migration batch. When you migrate a large number of machines, you will do it in batches, which makes sense in terms of interdependency and other technical requirements.

Migration wave components



Runbook

The spec file describing the source VM in the wave along with Target specification per each VM.

When creating a wave, you are providing a runbook spec file.

You can replace the runbook assigned to the wave at any time.

Wave

A construct for batch migration of VMs

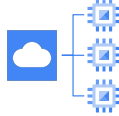
A runbook is a CSV file that specifies the VMs to be included in a wave and the configuration of target VMs. It describes the source VM, defines properties for the target VM and networks, and also contains other metadata.

Migration wave components



Wave jobs

On each wave you initiate migration jobs (Full Migration, Detach, Cleanup). These migration jobs are being run on all the VMS specified in the runbook assigned to the wave.



Runbook

The spec file describing the source VM in the wave along with Target specification per each VM.

When creating a wave, you are providing a runbook spec file.

You can replace the runbook assigned to the wave at any time.



Wave

A construct for batch migration of VMs



A job is the migration operation that Migrate for Compute Engine performs on the list of VMs in the runbook. Migration operations include creating test clones, full migration, and detaching, the same operations you've learned about previously in this module.

Demo

Migration Waves

Tad Einstein



In this demo, you will learn how to migrate multiple virtual machines from VMware's vsphere to Google Cloud leveraging migration waves.



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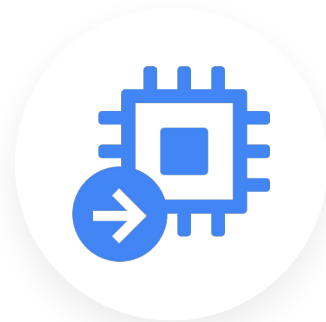
Migration Wave

[Migrating from VMware](#)

In this lesson, you learn how to migrate from VMware, using Migrate for Compute Engine 5.x. The migration process is a bit different than what you learned earlier for AWS and Azure.

Migrate for Compute Engine (MFCE) 5

- The latest version of MFCE 5 offers a simpler, more powerful way of migrating VMware VMs.
- MFCE 5 is a managed service.
 - There is no longer deploy a Google Marketplace app to deploy.
 - Instead, enable the Compute for Migrate Engine API.
- There are not as many details to manage directly.
- Configuration is done within Cloud Console.
- Migration of multiple VMs initiated and managed within Cloud Console.



Migrate for Compute Engine (MFCE) 5 makes migrations of VMware VMs simpler to install, configure, and manage.

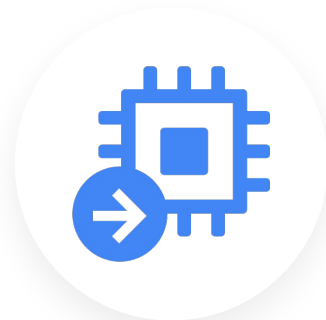
MFCE is implemented as managed service. There is no Google Marketplace app to deploy. The feature is directly integrated with Cloud Console.

In MFCE 5, there are not as many details to manage directly - and those details are mostly managed within Cloud Console. VM migration is initiated in Cloud Console - not on the migration source. The migration source sends environment information to Google Cloud - including VMs available to migrate.

Using MFCE 5, you can use Cloud Console to migrate multiple VMs. All aspects of this migration are managed within Cloud Console.

Migrate for Compute Engine (MFCE) 5

- Migration is done using replication, not streaming.
 - No more Cloud Extensions/edge nodes.
 - No agent is needed on the migrated VMs (agentless migration).
- Minimal connectivity requirements from the migration source.
 - Migrations can be performed over HTTPS, using port 443, to access Google Cloud APIs.
 - Cloud VPN or Cloud Interconnect are no longer required (but still supported).



Migration is done using replication, not streaming. There are no more Cloud Extensions to install. Processing previously done by the edge nodes - configured by the Cloud Extensions - is now done using preconfigured components within Google Cloud. The migration is agentless.

Migrations no longer require Cloud VPN or Cloud Interconnect. Migration can now be run on the public internet. It is done over HTTPS, using port 443, to access Google Cloud APIs.

Caveats

- MFCE 5 is available only for VMware VMs.
 - For VMs on other platforms, continue to use MFCE 4.x.
 - MFCE 4.x can exist in parallel with MFCE 5.
- MFCE 5 is available from selected regions.
 - The VPC network used for migration must be in a region supported by MFCE 5.
 - Additional supported regions are continually being added.

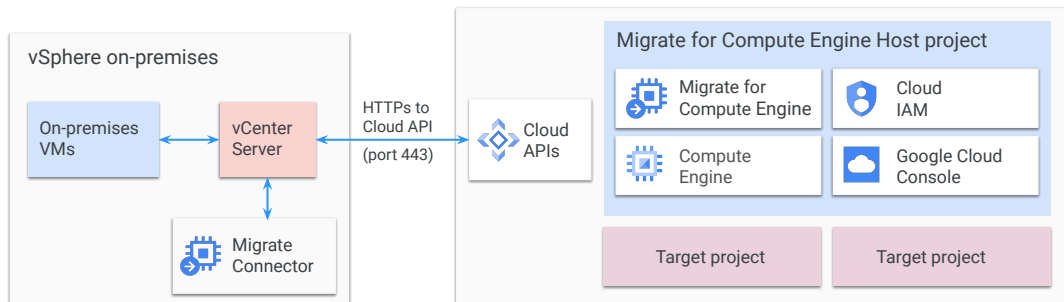
Currently, MFCE 5 is available only for VMware VMs. To migrate VMs from other platforms - such as on AWS or Azure - use MFCE 4.x. MFCE 4.x can be used in parallel with MFCE 5.

MFCE 5 is available only from selected regions. The VPC network used for migration must be in a supported region. The list of available regions will expand over time. For a list of currently available regions, refer to the link in the Course Resources.

<https://cloud.google.com/migrate/compute-engine/docs/5.0/resources/locations>.

Architecture

- **Migrate Connector:** Facilitates agentless VM data replication to Google Cloud.
- **Host project:**
 - Migrate service API is enabled.
 - Use Cloud Console to interact with project components.
- **Target project:** Contain landing zones for migrated VMs.



The **Migrate Connector** in MFCE 5 replaces the Migrate for Compute Engine On-Premises Backend from MFCE 4.x. Like the Migrate for Compute Engine On-Premises Backend in MFCE 4.x, the Migrate Connector is installed in VMware vSphere using an OVA file. The Migrate Connector sends information from the VMware environment to Google Cloud. The information is then available for use in Cloud Console for migrations. In the lab, you learn how to configure vSphere to work with MFCE, install the OVF file, and register the Migrate Connector. Except for installing the Migrate Connector in VMware vSphere, all other migration tasks are done from Google Cloud.

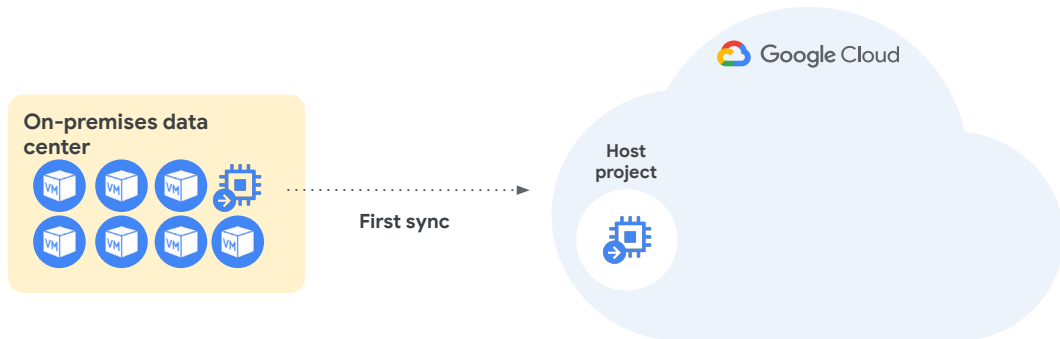
In the **Migrate for Compute Engine host project**, you enable the Migrate for Compute Engine API. Migrations are configured and managed from the host project, using Google Cloud Console.

You configure migrations to put virtual machines in a target project. The target project is the landing zone for new VMs. You can have multiple target projects or even no target project. If you do not specify a target project, the host project becomes the landing zone. In other words, after migration, you will find the new virtual machines in the host project.

Migration: From start to finish

Start replication

- No disruption to the on-premises VM.
- Initial first sync is followed by periodic replication.



When you replicate a VM to Google Cloud, there is no disruption to the on-premises VM. It continues to run while the replication occurs. Migrate for Compute Engine creates the initial VMware snapshot of the source VM data disks and replicates the snapshot data to Google Cloud. Depending on the amount of disk data on the source VM, the first replication can take minutes or hours to complete.

The first replication does not automatically result in the creation of a cloned VM in Google Cloud. It replicates data that can be used to build a test clone. Building a test clone is an optional, separate step. You'll learn more about building a test clone in a moment.

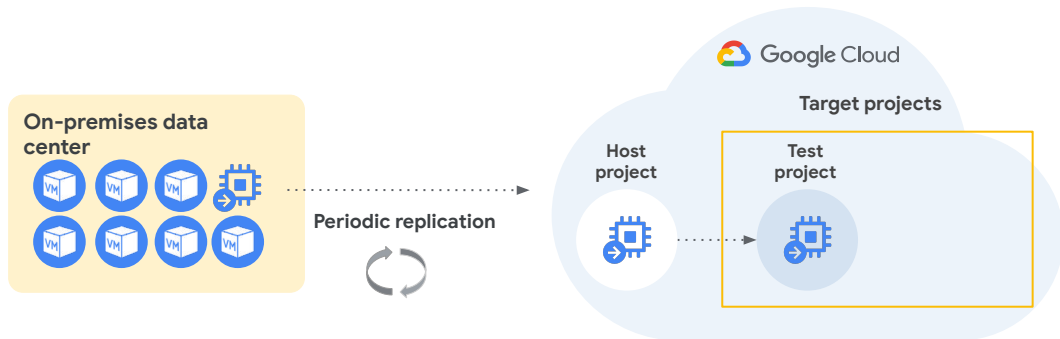
After the initial VM replication is complete, there are subsequent periodic replications. These periodic replications keep the VM data in the Cloud in sync with the VM data in the on-premises environment. Periodic replications are incremental. The frequency of the periodic replications can be configured in Google Cloud.

At any point after the initial replication, you can build a test clone of the migrated VM.

Migration: From start to finish

(Optional) Create test clone

- Validate source VM clone in the Google Cloud before cutting over (optional).
- The VM OS is seamlessly adapted to Google Cloud.



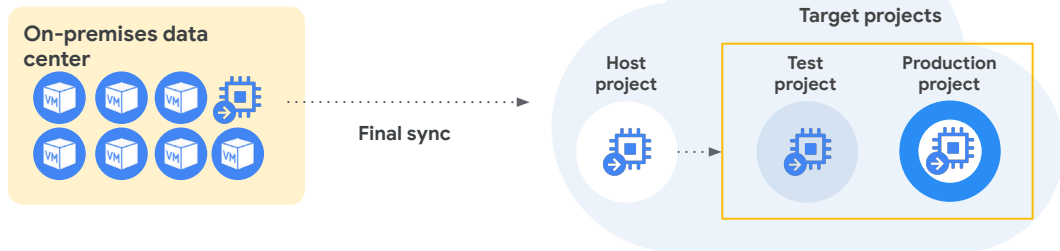
To ensure that VM was migrated correctly, you can build a test clone in Google Cloud. Building a test clone can be done fairly quickly. After the cloned VM has been started, you can run any desired tests to make sure the VM was created correctly and performs as expected.

Building a test clone is optional. However, it is a best practice to perform testing before deploying a migrated VM to production. The test-clone Compute Engine instance is created from the most recently completed replication step.

Migration: From start to finish

Cut over to the cloud

- Cut over to Google Cloud in the scheduled maintenance window.
- Source VM is powered off.
- Final sync of VM data to Google Cloud is completed.
- Migrated VM OS is adapted to Google Cloud.

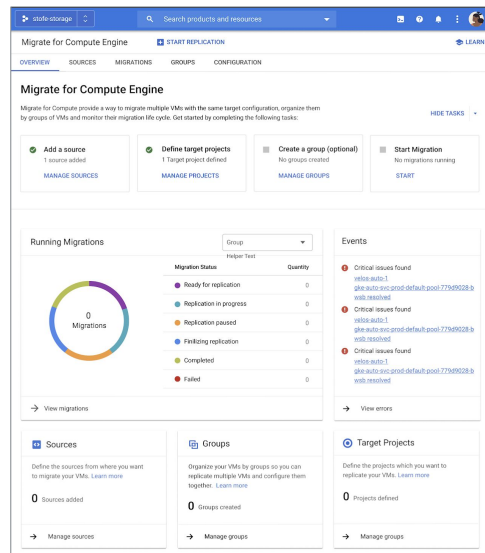


When the migration is complete and you are satisfied that it worked, you can cut over to Google Cloud. Cutting over to Google Cloud powers off the source VM in VMware. A final data synchronization from the source VM to the migrated VM in Google Cloud is completed, and the migrated VM operating system is adapted to Google Cloud.

Single Pane of Glass

Use Google Cloud Console to:

- Perform migrations of single VMs or groups of VMs.
- Create test clones.
- Cut over to Google Cloud.
- View statistics for:
 - Migrations in progress
 - Past migrations

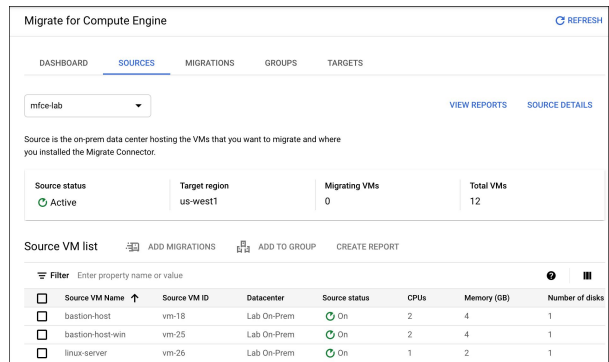


Cloud Console enables you to manage and view migration information from a central location. You can perform migration of single VMs or groups of VMs, create test clones, delete the source VM in VMware, and cut over to the VM running in Google Cloud. You can also view statistics for past migrations and migrations in progress.

In other words, in MFCE 5, you use Cloud Console for virtually all of your migration tasks.

The Migrate Connector

- Use VMware to install and configure the Migrate Connector.
- Each Migrate Connector installed becomes a migration source.
- In Cloud Console, you can select which Migration source to use.



Although you use Cloud Console for virtually all of your migration tasks, you still install and configure the Migrate Connector in one or more VMware deployments.

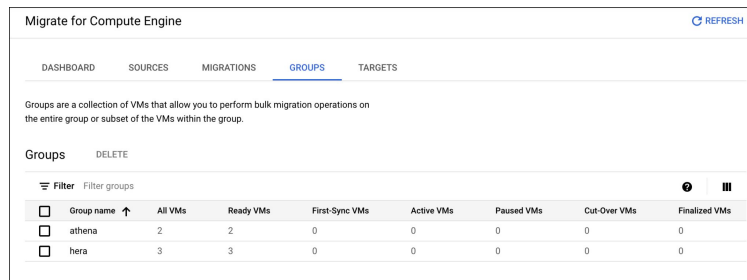
Each installed Migrate Connector becomes a migration source.

After successfully installing a Migrate Connector, you can see its associated migration source - and all of the VMs in that VMware deployment - in Cloud Console.

In Cloud Console, you select which migration source to use. By switching migration source, you switch which VMware deployment to use for migrations. Thus, with multiple migration sources, you can migrate VMs from multiple VMware deployments into Google Cloud.

Migrating groups of VMs

- Create a group containing one or more VMs.
- Groups provide flexibility in working with multiple VMs.
- Actions can be performed on an entire group or on selected VMs within the group.
- Migrate, test clone, and cut over multiple VMs at once.



Migrate for Compute Engine

DASHBOARD SOURCES MIGRATIONS **GROUPS** TARGETS

Groups are a collection of VMs that allow you to perform bulk migration operations on the entire group or subset of the VMs within the group.

Groups DELETE

Filter Filter groups

<input type="checkbox"/>	Group name ↑	All VMs	Ready VMs	First-Sync VMs	Active VMs	Paused VMs	Cut-Over VMs	Finalized VMs
<input type="checkbox"/>	athena	2	2	0	0	0	0	0
<input type="checkbox"/>	hera	3	3	0	0	0	0	0

Using Google Cloud Console, you can create a group and associate it with one or more VMs. Groups provide flexibility and ease in working with multiple VMs. Instead of performing an action on a single VM, you can perform an action on the VMs in a group. For example, in Cloud Console, you can navigate to a group, select its VMs, and then perform a migration, test clone, or a cutover. The action executes on all the selected VMs within the group. To perform an action on a subset of VMs within a group, select the VMs that comprise the subset and then select the desired action. Also note that you can move VMs from one group to another. Using groups makes it easier to deal with large numbers of VMs.

Demo

Installing Migrate for Compute
Engine on vSphere

Chris Lupone



In this demo, you will learn how to install the Migrate for Compute Engine's infrastructure components on Google Cloud and vSphere.

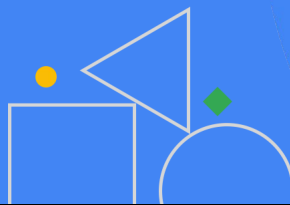
[Presenter]

Once you install all the components, you'll be ready to start migrating virtual machines.

Demo

Migrating from vSphere to
Google Cloud

Chris Lupone



In this demo, you will learn how to migrate a virtual machine from on-premises to Google Cloud



Migrate for Compute Engine - Review

In this module, you learned about Migrate for Compute Engine architecture, including how to install it in your source environment, the migration process, and special features like running a test clone. You then learned how to use migration waves to organize the systems you want to move into batches. This makes your migration strategy more manageable and allows you to migrate a large number of machines at once.

In the next module, we will show you how to create a Cloud Identity account to manage the user account lifecycle, and sync users from your on-premises environment to the cloud. In addition, we'll share some best practices on how to structure your resource hierarchy as your cloud footprint grows in size. We will also discuss how to centrally manage a single network across multiple projects, known as Shared VPC. Lastly, we'll show you how to manage an identity provider across environments.

Move on to the next module to learn more.