MIGRATION PLAYBOOK · SERVERS AND CLOUD

How to migrate VMware virtual machines to Google Cloud

Google gives you two routes off on-premises vSphere: convert VMs to Compute Engine instances with Migrate to Virtual Machines, or keep them on VMware in Google Cloud VMware Engine and move them with HCX. Both replicate while the source keeps running.

Updated 4 Nov 2026 4 phases 7 detailed steps 6 official sources

START HERE

How do you migrate VMware virtual machines to Google Cloud?

SHORT ANSWER

This moves virtual machines from your VMware servers into Google Cloud. Most organisations convert them into Google Compute Engine VMs with Google's Migrate to Virtual Machines service: a small appliance in vSphere copies each VM's disks while it keeps running, you test a copy, then switch over with a short outage.

- **Recommended route:** Migrate to Virtual Machines to Compute Engine, in waves of related VMs
- **Order:** Group VMs that talk to each other into waves, connect networks first, and test-clone before every cut-over.
- **4 phases:** Assess and plan waves, Prepare Google Cloud and connect, Replicate and test and Cut over and finalize.
- **You're done when:** Every VM in scope runs as a Compute Engine instance or in VMware Engine, with owner sign-off.

If you need to keep running VMware for now, Google Cloud VMware Engine gives you a VMware environment in Google Cloud and HCX moves VMs into it unchanged.

RECOMMENDED ROUTE

Migrate to Virtual Machines to Compute Engine, in waves of related VMs

VMs keep running while data replicates, you can test without touching the source, and each cut-over is a short planned outage.

▼ **Other options and when to use them**

- **Google Cloud VMware Engine with HCX**
  : You need to leave VMs on VMware for now, keep IP addresses with network extension, or move fast before a hardware or licence deadline.
- **Rebuild on new VMs or managed services**
  : Old operating systems or apps you were going to replace anyway.

TOOLS FOR THIS PLAN

Not sure which route?
Answer 5 quick questions

Are you ready?
22-question readiness check

Plan your dates
Dated countdown you can add to your calendar

Compare options
Hypervisors compared

Check your DNS
MX, SPF, DKIM and DMARC lookup

New to the jargon?
Plain-English migration glossary

ORDER TO MIGRATE IN, AND WHY

Group VMs that talk to each other into waves, connect networks first, and test-clone before every cut-over.

1. **Inventory and wave plan**
   VMs that depend on each other should move together to avoid slow links between sites.
2. **Google Cloud project, network and connectivity**
   The connector and migrated VMs need a VPC and a route back to on-premises.
3. **Migrate Connector installed and source registered**
   It reads VM disks from vSphere and sends them to Google Cloud.
4. **Replication started for the first wave**
   The first full copy can take hours, so start well before cut-over.
5. **Test-clone and app testing**
   Finds driver, network and licence issues without touching the source VM.

6 Cut-over, checks, then finalize

Finalize deletes replication data, so run it only once you are sure.

SETTINGS CHECKLIST: DECIDE THESE BEFORE YOU COPY

Built-in and third-party tools treat these differently. Tick each one off once you have decided.

Download this checklist (Excel)

- [ ] **Which route**

  Convert to Compute Engine or keep VMware in Google Cloud VMware Engine.

  ▼ How each tool handles it

Built-in method	Migrate to Virtual Machines: moves vSphere VMs to Compute Engine instances. Google Cloud VMware Engine: a VMware private cloud where HCX runs cold, bulk and vMotion migrations and can extend Layer 2 networks.

  Tip: Use VMware Engine as a stepping stone if you cannot change IP addresses or operating systems yet.

  Google Cloud VMware Engine: Migrating VMware VMs using VMware HCX

- [ ] **Supported versions**

  Whether your vSphere is supported by the Migrate Connector.

  ▼ How each tool handles it

Built-in method	Migrate to Virtual Machines: vCenter 6.0, 6.5, 6.7, 7.0 and 8.0; ESXi 5.5 to 8.0.

  Tip: Check the guest operating system is supported on Compute Engine too, before you plan the wave.

  Google Cloud: Prepare a VMware source for migration

- [ ] **Network access for the connector**

  How the Migrate Connector reaches vCenter, ESXi and Google Cloud.

  ▼ How each tool handles it

Built-in method	Migrate to Virtual Machines: TCP 443 and 902 to vCenter, TCP 902 to ESXi, TCP 443 to Google Cloud APIs over the internet, Cloud VPN or Cloud Interconnect, plus DNS. Allow *.googleapis.com and gcr.io.

Tip: Large estates replicate faster over Cloud Interconnect; check bandwidth against total disk size.

Google Cloud: Prepare a VMware source for migration

- [ ] **vCenter account**

Which permissions the connector user gets.

▼ How each tool handles it

Built-in method	Migrate to Virtual Machines: Global.DisableMethods and Global.EnableMethods at the root with propagation; at VM level, change tracking, power off, read-only disk access, VM download and snapshot management.

Tip: Create a dedicated vCenter user so you can remove it after the project.

Google Cloud: Prepare a VMware source for migration

- [ ] **Rollback plan**

How you return to the source VM if the new one fails.

▼ How each tool handles it

Built-in method	Migrate to Virtual Machines: rollback is manual. Redirect traffic and restart the source VM; data written on the Compute Engine instance is not copied back.

Tip: Keep the source VM powered off, not deleted, until the app owner signs off.

Google Cloud: VM migration process

THE PLAN, PHASE BY PHASE

1 Assess and plan waves — Weeks 1 to 2

List VMs with operating system, size and dependencies.

Choose Compute Engine or

VMware Engine per group.

Group VMs into waves.

> **Watch out:** Some operating systems are not supported on Compute Engine.
>
> **WAYS AROUND IT**
>
> - Use Google Cloud VMware Engine for those VMs, or upgrade first.

Show the detailed steps (1) →

2 Prepare Google Cloud and connect Weeks 2 to 3

Create the project and VPC, and enable the VM Migration API.

Connect on-premises with Cloud VPN or Cloud Interconnect.

Create the vCenter user

and install the Migrate Connector.

> **Watch out:** The connector service account is limited to 19 sources.
>
> **WAYS AROUND IT**
>
> - Use another service account for larger numbers of vCenters.

Show the detailed steps (2) →

3 Replicate and test

Weeks 3 to 4

Add the wave's VMs as migrations and start replication.

Set target details: project, machine type and network.

Test-clone into an isolated network and test the apps.

Watch out: A test-clone is a snapshot; later changes are not in it.

WAYS AROUND IT

- Run a new test-clone after fixing target settings.

Show the detailed steps (2) →

4 Cut over and finalize

Per wave

Cut over in a change window; the source VM shuts down.

Point DNS and firewall rules at the new instance and test.

Finalize once the app owner signs off.

Watch out: Replication storage is charged until finalize.

WAYS AROUND IT

- Finalize promptly after sign-off, and delete test-clone instances.

Turn this phase into dated tasks with the cutover planner

Check your DNS records before and after the change

Show the detailed steps (2) →

✓ You are finished when

- Every VM in scope runs as a Compute Engine instance or in VMware Engine, with owner sign-off.
- Migrations are finalized and test-clone instances deleted.
- Backups and monitoring are set up for the new instances.
- Source VMs are deleted after the agreed fallback period.

CLICK BY CLICK

What does each step involve?

Open a part when you reach it in the plan. Each step says where to go, what to do and what you should see.

About this migration

What it covers, limits at a glance —

Migrate to Virtual Machines copies vSphere VM disks to Google Cloud in the background while the VMs keep running, lets you start test copies, then shuts the source down and creates a Compute Engine instance at cut-over. Google Cloud VMware Engine is the alternative: a VMware private cloud in Google Cloud, where HCX moves VMs without converting them.
This playbook covers choosing between them, setting up the Migrate Connector, testing and cut-over. Weighing other clouds or hypervisors? See VMware alternatives.

CONVERT TO COMPUTE ENGINE
Migrate to Virtual Machines, with the Migrate Connector in vSphere

KEEP VMWARE
Google Cloud VMware Engine, moving VMs with HCX

SUPPORTED VCENTER
6.0 to 8.0 (Migrate to Virtual Machines)

REPLICATION
Full copy, then changed blocks every two hours by default

DOWNTIME
At cut-over, when the source VM is shut down

ROLLBACK
Manual: restart the source VM

1 What do you need before you migrate VMware virtual machines to Google Cloud?

Need	Details	Where to get it
Google Cloud project with the VM Migration API enabled	vmmigration.googleapis.com	Google Cloud console > APIs & Services
User to register the connector	roles/iam.serviceAccountKeyAdmin, roles/iam.serviceAccountCreator and roles/vmmigration.admin	Google Cloud console > IAM
vCenter user for the connector	Global and VM-level permissions listed in Google's source guide	vSphere Client
Network path	Cloud VPN or Cloud Interconnect, or internet access to Google Cloud APIs	Your network team
VM inventory	Operating system, size, dependencies and owner	The application inventory template

2 Choose the target and plan waves

1 step

1

Decide per group of VMs

Where: Your inventory spreadsheet

Mark each VM for Compute Engine, Google Cloud VMware Engine, rebuild or retire. Group VMs that depend on each other into the same wave in the wave plan.

✓ **You should see:** A wave plan with owners and change windows.

3 Register vSphere as a source

2 steps

1

Enable the API

Where: Cloud Shell or a terminal with the gcloud CLI

Enable the VM Migration API on the host project.

```
gcloud services enable vmmigration.googleapis.com
```

✓ **You should see:** The API shows as enabled.

2

Install the Migrate Connector

Where: vSphere Client, then the connector console

Create the vCenter user, deploy the Migrate Connector appliance in vSphere as described in Google's guide, and register it with your project and region.

✓ **You should see:** The source appears on the Sources tab with status Active.

4 Replicate and test-clone

2 steps

1

Add VMs and start replication

Where: Google Cloud console > Migrate to Virtual Machines > Sources, then Migrations

On **Sources**, select the VMs and click **Add Migrations** > **VM Migration**. On **Migrations**, select them and click **Migration** > **Start Replication**.

✓ **You should see:** Status shows Active, with the first cycle percentage climbing.

2

Set target details and test-clone

Where: Migrations > select a VM

Set project, machine type and network. Then click **Cut-Over and Test-Clone** > **Test-Clone**, using an isolated network so the copy cannot clash with the source.

✓ **You should see:** Test-Clone/Cut-Over status shows Succeeded and the test instance runs.

5 Cut over and finalize

2 steps

1

Cut over

Where: Migrations > Cut-Over and Test-Clone > Cut-Over

In the change window, run the cut-over. Google shuts down the source VM, runs a final replication and creates the instance. Follow your cutover runsheet for DNS and firewall changes.

✓ **You should see:** The cut-over job completes and the new instance answers on its new address.

2

Finalize

Where: Migrations > select the VM > Finalize

After sign-off, finalize to delete replication data. Delete any test-clone instances separately.

✓ **You should see:** The migration state shows Finalized.

WORTH KNOWING

What can go wrong, and how do you avoid it?

The detail behind the plan: options compared, and what experienced engineers check first. Tap any item.

Compare all the ways to do this 3 options −

Migrate to Virtual Machines

MEDIUM EFFORT

Best for: Converting vSphere VMs into Compute Engine instances

- + Source runs during replication
- + Test-clones before cut-over
- + Google-managed service
- – Downtime at cut-over
- – Manual rollback

Read more →

Google Cloud VMware Engine with HCX

MEDIUM EFFORT

Best for: Keeping VMs on VMware, or moving without changing IP addresses

- + No conversion
- + Cold, bulk and vMotion migrations
- + Layer 2 network extension
- – You still run VMware
- – Needs HCX set up on both sides

Read more →

Rebuild

HIGH EFFORT

Best for: Old systems you planned to replace

- + Clean start
- – Most effort per app

OUR ADVICE

Default to Migrate to Virtual Machines. Use VMware Engine for groups that cannot be converted or re-addressed yet, and plan their move to Compute Engine later.

Cut-over means downtime

USER IMPACT –

Cut-over shuts down the source VM, completes a final replication and then creates the instance.

WHAT TO DO

Schedule each wave in a change window and tell users.

Google Cloud: VM migration process

Rollback is manual

REDUCES RISK –

Google states rollback is not automated, and data written on the new instance is not copied back.

WHAT TO DO

Keep source VMs, and write the rollback steps in the rollback plan.

Google Cloud: VM migration process

Replication storage costs until finalize

COST LEVER

Replication storage is charged until the finalize phase, and test-clone instances are charged until you delete them.

WHAT TO DO

Finalize after sign-off and clean up test-clones.

Google Cloud: VM migration process

Replication runs every two hours

SAVES TIME

After the first full copy, incremental replication runs every two hours by default using changed block tracking.

WHAT TO DO

Start replication days before cut-over so the final copy is small.

Google Cloud: VM migration process

HCX licensing in VMware Engine

COMPLIANCE

From HCX 4.10.3, HCX activates automatically and inherits licensing when the on-premises connector pairs with HCX Cloud Manager.

WHAT TO DO

Check your on-premises HCX version and licence before planning a VMware Engine route.

Google Cloud VMware Engine: Migrating VMware VMs using VMware HCX

FINISH SAFELY

How do you check it worked, or roll back?

Full validation checklist

4 checks

Run these before you declare the migration complete. Record the results in the data validation report.

Check	How to check	What good looks like
Instance boots and apps run	Log in and run the app owner's test script.	All tests pass.
Network paths work	Test connections to databases, file shares and on-premises services.	All dependencies reachable.
Data is current	Check the latest records written before cut-over.	They are present.
Clean-up done	Check migrations are Finalized and test-clones deleted.	No leftover replication storage or test instances.

Rollback plan

If it goes wrong

ROLL BACK IF

- The app fails tests on the new instance
- Performance is unacceptable after cut-over

POINT OF NO RETURN

Until you delete the source VM you can roll back. Writes on the new instance are not copied back, so the longer you run there the more you lose.

1

Restart the source VM

Where: vSphere Client

Power on the source VM.

✓ **You should see:** It runs as before.

2

Redirect traffic

Where: DNS and firewalls

Point DNS and rules back to the source, and stop the Compute Engine instance.

✓ **You should see:** Users reach the source VM.

Agree the triggers and who decides before the go / no-go meeting. Use the rollback plan template.

Common problems and fixes

4 errors

`Source not Active in Sources tab`

Cause: The connector cannot reach vCenter or Google Cloud APIs.

Fix: Check ports 443 and 902 and access to *.googleapis.com and gcr.io.

`Replication fails on an encrypted VM`

Cause: The vCenter user lacks cryptographic access.

Fix: Add Cryptographic operations > Direct Access permissions.

`Cut-over failed and source is off`

Cause: The cut-over job did not complete.

Fix: Resume replication, then retry cut-over, or restart the source VM.

`New instance cannot reach on-premises services`

Cause: Firewall rules or routes are missing in the VPC.

Fix: Add routes and firewall rules, then retest.

Search the full error library →

FAQ

Frequently asked questions

Does the source VM keep running during replication?

Yes. It runs until cut-over, when Migrate to Virtual Machines shuts it down.

Can I test before switching?

Yes. A test-clone creates an instance from replicated data without touching the source.

Can I keep VMware in Google Cloud?

Yes. Google Cloud VMware Engine runs VMware, and HCX moves VMs into it.

What happens at finalize?

Replication data is deleted. The Compute Engine instance stays.

SOURCES

Official sources

6 official pages this guide is based on

Vendors change limits and features, so confirm details on the source before you rely on them. Last checked 4 Nov 2026.

- Google Cloud: Migrate from VMware overview
- Google Cloud: Prepare a VMware source for migration
- Google Cloud: VM migration process
- Google Cloud: Migrate individual VMs
- Google Cloud VMware Engine: Migrating VMware VMs using VMware HCX
- Google Cloud: Best practices for migrating VMs to Compute Engine