



Accelerate your hybrid cloud migration with Google Cloud VMware Engine

Seamlessly shift workloads from your datacenter to the cloud with Google Cloud VMware Engine

Introduction

The pandemic put strong pressures on organizations to modernize their infrastructure. The sudden rush of remote workers using virtual desktop infrastructure has resulted in surges and strains within current IT infrastructure. Organizations then were faced with a difficult choice: continue operations with slow, and at times insufficient capacity to support its workers, or upgrade their IT infrastructure. Upgrading IT infrastructure provides its own challenges: on-prem upgrades are an expensive endeavor and a considerable effort must be put into provisioning the right amount of hardware. Under-provisioning could potentially result in disruptions to operations and over-provisioning would result in wasted expenses. The other option is migrating to the cloud, which although does allow for elasticity with provisioning, does have challenges in the massive, time- and resource-intensive process of replacing legacy systems with cloud-based SaaS enterprise software.

Deloitte and Google Cloud have collaborated to help companies migrate and modernize workloads—transforming IT infrastructures to improve agility, run more affordably, and scale to new heights. Named a leader in Public Cloud Infrastructure Professional and Managed Services Worldwide by Gartner¹, Deloitte teams with Google Cloud to offer ecosystem solutions that help you build for today and scale for tomorrow.

Google Cloud VMware Engine is the fast path to Google Cloud that leverages on-premises investments. It simplifies the process of moving and modernizing critical workloads to Google Cloud – enabling business agility without risk, app refactoring or having to reskill your teams. By providing a complete platform that incorporates management, networking,

¹ <https://www2.deloitte.com/global/en/pages/technology/articles/gartner-critical-capabilities-for-public-cloud-it-transformation-services.html>

isolation, and high-speed connections to Google Cloud resources, Google Cloud VMware Engine gives enterprises a fast and secure way to meet their digital transformation goals on time.

What is Google Cloud VMware Engine?

Google Cloud VMware Engine is a fully managed, integrated offering that allows for a seamless migration to the cloud and unlocks big data insights. With this service, you can deploy VMware workloads natively on isolated and dedicated bare metal infrastructure, delivering the business agility you need while unlocking native access to cloud services.²

The service consists of three key components:

- **Hybrid Cloud Infrastructure** — Dedicated, isolated, private cloud deployed on a hyperconverged, enterprise-grade infrastructure stack. This enables you to run VMware workloads natively within Google Cloud, along with back-end operations and support for the entire solution and separated via a data plane for additional security.
- **Operating System** — The hybrid cloud management platform that orchestrates, automates, and maintains availability across the VMware bare metal and Google Cloud infrastructures. This is managed through a single management portal, through which you can view both VMware and Google Cloud environments.
- **Network Edge Services** — Enable communication between your hybrid architecture and the public internet with advanced networking and security capabilities provided by Google Cloud.

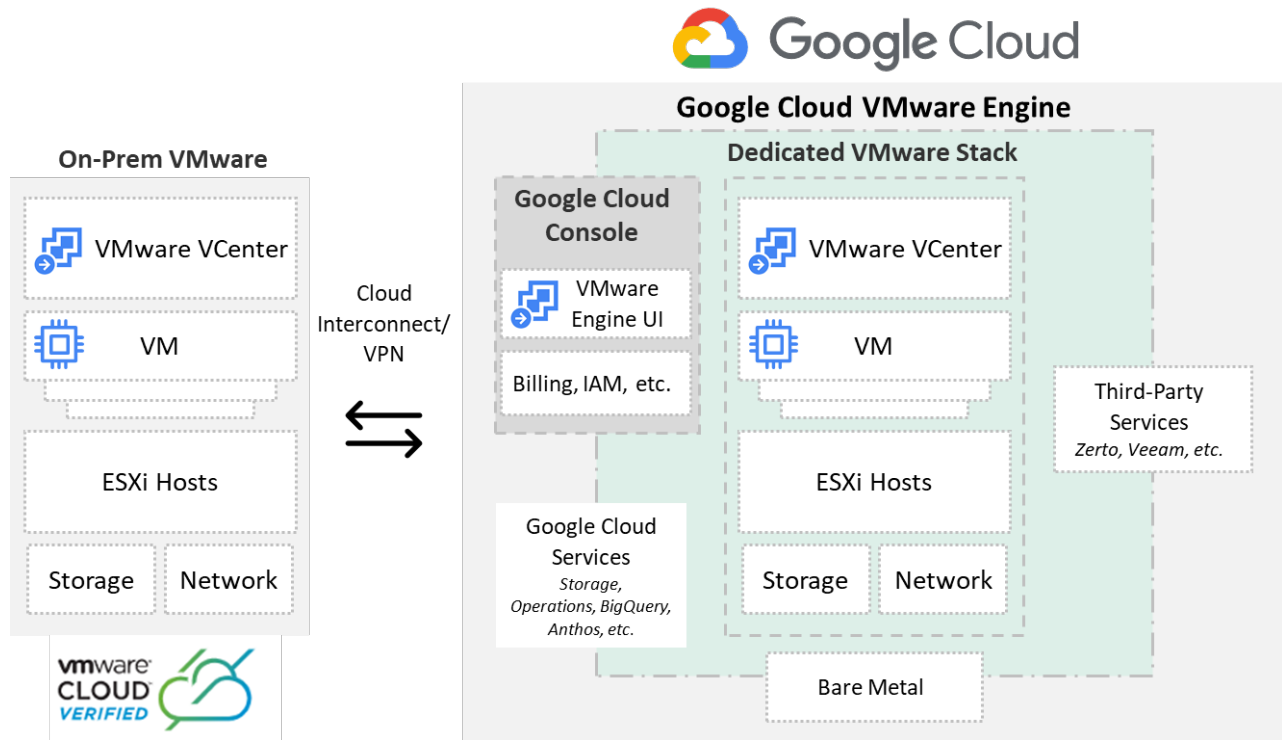


Figure 1: Above is a representative reference architecture on how one can extend/migrate existing VMware environments to Google Cloud. The Google Cloud VMware Engine allows for hybrid cloud workloads between your on-prem and cloud environment through a Google Cloud Interconnect

² [Google Cloud VMware Engine](#)




























Google Cloud VMware Engine Use Cases

The service is compatible with your existing VMware tools, processes, and skills training. This compatibility can enable your team to manage workloads without disrupting existing policies, such as those related to networking, security, data protection, and auditing. Use cases offered on Google Cloud VMware Engine include but are not limited to the following:

- **Rapid “Lift & Shift” to Cloud** — Increase capacity quickly, seamlessly while using familiar VMware tools throughout the workload migration process.
- **Disaster Recovery** — Recovery and replication with Google Cloud VMware Engine greatly reduces the effort and risk of creating and managing DR implementations.
- **Performance Intensive Workloads** — Google Cloud provides a hyper-converged architecture designed to run your most demanding VMware workloads. Run Oracle, Microsoft SQL Server, middleware systems, and high-performance NoSQL databases.
- **Virtual Desktop Infrastructure** — Integrate VMware Horizon® with Google Cloud VMware Engine to empower employees to work from anywhere, securely.
- **Application Modernization** — Migrate and modernize applications, infrastructure, and operations leveraging unified DevOps toolchains in the Google Cloud Platform.

Google Cloud VMware Engine’s Value Proposition

The service solves for ease and cost, your two immediate migration pain points. Google Cloud VMware Engine provides you with VMware operational continuity so you can benefit from a cloud consumption model and lower your total cost of ownership. To date, customers using the Google Cloud VMware Engine have received an average total cost of ownership (TCO) savings of 45% and an average time savings of over 9 months. ³

Migrate 	Run 	Innovate 								
<p>Ease migration</p> <ul style="list-style-type: none">• Move VMware workloads to the cloud as-is• No refactoring• Maintain continuity <p>Lower costs</p> <ul style="list-style-type: none">• Deliver efficiency• Leverage Google Cloud economics of scale	<p>Run securely</p> <ul style="list-style-type: none">• Run with confidence• Provide best in class security <p>Create operational agility</p> <ul style="list-style-type: none">• Operational continuity• Unified management• Cloud bursting• No need for DR sites• Fast scaling	<p>Innovate</p> <p>Build on Google Cloud services</p> <table border="0"><tr><td> Cloud SQL</td><td> Tensor Flow</td></tr><tr><td> Cloud Operations</td><td> Anthos</td></tr><tr><td> Google Kubernetes Engine</td><td> Network</td></tr><tr><td> BigQuery</td><td> Cloud Storage</td></tr></table>	 Cloud SQL	 Tensor Flow	 Cloud Operations	 Anthos	 Google Kubernetes Engine	 Network	 BigQuery	 Cloud Storage
 Cloud SQL	 Tensor Flow									
 Cloud Operations	 Anthos									
 Google Kubernetes Engine	 Network									
 BigQuery	 Cloud Storage									

Enterprise-grade Infrastructure — Fully managed software defined datacenter (SDDC). By running VMware on Google Cloud, you can spin up a VMware private cloud in about in a short period of time. With autoscale, users can leverage policy-driven automation to scale the nodes needed to meet the compute demands of the VMware infrastructure.

³ <https://www.VMware.com/content/dam/digitalmarketing/VMware/en/pdf/docs/vmw-economic-value-google-cloud-engine-infographic.pdf>

Simplified Operations — Consistent access control, monitoring tools when you migrate and run your VMware workloads on Google Cloud, simplifying governance and security enforcement. Unified billing and end to end first party support, facilitating faster cost allocation and issue resolution.

Superior Network — Low latency, high bandwidth connectivity to extend on-prem VMware datacenter to Google Cloud Platform with enhanced edge network. Global VPCs and connectivity via Google’s private network to serve users globally with consistent performance.

Google Cloud Platform Integration — Industry leading Data Analytics and AI & ML Services to democratize digital transformation. Unified consumption of Google Cloud Platform data services from Google Cloud VMware Engine for faster data driven insight gathering.

What’s Included in Google Cloud VMware Engine?

Google Cloud VMware Engine delivers a fully managed **VMware Cloud Foundation** hybrid cloud platform, including VMware vSphere®, vCenter®, vSAN™, NSX-T™, and HCX® technologies, all in a dedicated environment on Google Cloud’s dedicated hyperconverged hardware. Reduce your up-front investment, accelerate speed of provisioning, and reduce complexity by **using the same architecture and policies across both on-premises and the cloud.**⁴

- **VMware ESXi 7.0.1 U3c:** hypervisor on dedicated nodes
- **VMware vCenter 7.0 U2d:** centralized management of private cloud vSphere environment
- **VMware vSAN 7.0 U2:** hyper-converged, software-defined storage platform
- **VMware NSX Data Center 3.1.2:** network virtualization and security software
- **HCX Advanced 4.2.x:** application migration and workload rebalancing across data centers and clouds

The service currently offers one node type (ve1-standard-72).

	Specification	Benefit
Model	VMware Engine ve1-standard-72	High performance hyperconverged stack enables higher VM density for lower cost
CPU	Intel Xeon Gold 6240 (Cascade Lake) 2.6 GHz (x2), 36 Cores, 72 Hyper-Threads	Faster, latest generation CPU
Memory	768 GB	More memory than competition
Storage	<ul style="list-style-type: none"> ● 2 x 1.6 TB (3.2 TB) NVMe (Cache) ● 6 x 3.2 TB (19.2 TB) NVMe (Data) ● Hyperconverged design on vSAN 	Faster all-NVMe storage
Network	<ul style="list-style-type: none"> ● 4 x Mellanox ConnectX-4 Lx ● Dual Port 25 Gbe (total 100 GbE) ● Fully redundant network design 	<ul style="list-style-type: none"> ● Fully redundant ● Highly available networking
Cost	<ul style="list-style-type: none"> ● Per hour billing ● Reserved billing per node on an 1/3-year commitment (Paid monthly/paid in full upfront) 	<ul style="list-style-type: none"> ● Multiple billing options with a reserved discount⁵ ● Google Cloud VMware Engine Catalyst Program⁶ to reduce cloud total cost of ownership

⁴ [Announcing Google Cloud VMware Engine | Google Cloud Blog](#)

⁵ [Intel® Select Solutions for Google Cloud’s Anthos](#)

⁶ [Google Cloud VMware Engine Catalyst External One Pager - \[Q3'2021\] \(google.com\)](#)

VMware Solutions supported by Google Cloud VMware Engine –

The following products are not included by default but are VMware validated services compatible with Google Cloud VMware Engine.

- **VMware Horizon™ for VDI** — Delivers a seamlessly integrated hybrid cloud for virtual desktops and applications.
- **vRealize® Operations** — Delivers migration planning and cost assessment, continuous performance optimization based on intent, efficient capacity management, and proactive remediation across private clouds and Google Cloud.
- **vRealize® Automation** — Cloud automation platform that accelerates the delivery of IT services through automation and pre-defined policies.
- **vRealize® Network Insight** — Helps you build an optimized, highly-available, and secure network infrastructure across your virtual cloud network, hybrid, and multi-cloud environments.
- **VMware Site Recovery Manager™** — Enables Application Availability and Mobility for Private Cloud
- **VMware SD-WAN™** - Virtualizes WAN connections to improve agility, performance, and reliability for network traffic from branch-to-Google Cloud and across branches

Migration Strategies with Google Cloud

When an application is cloud-ready, select a migration strategy that reflects your organization's priorities, processes, and dependencies. Every workload has a migration path:

- Lift and Shift Workloads – Using Google Cloud VMware Engine
- Lift and Optimize Workloads – Using Google Compute Engine
- Improve and Move Workloads – Using Google Kubernetes Engine and Google Cloud's Anthos

One size does not fit all: many migration types

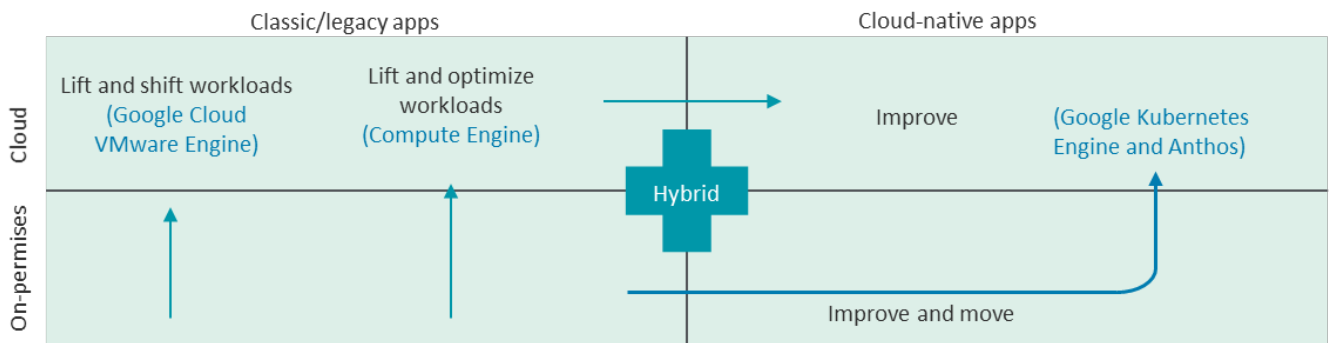


Figure 2: When it comes to migrating workloads, there isn't just one method that will be a best fit for your organization. The optimal method depends on your current systems and business requirements. Regardless the robust Google Cloud VMware Engine can tackle multiple migration types from the simpler lift and shift to the more time intensive process of refactoring applications.

Migration Leveraging the Intel and Google Cloud Collaboration

Being able to use consistent hardware architecture and familiar tools makes moving to a hybrid solution an easier task. Google Cloud VMware Engine runs on Intel architecture and most on-prem data centers also run on Intel processors which enables seamless migration. VMware HCX serves as network connection for large scale migration of live applications. This service offers bi-directional application mobility between any vSphere version 5.0 and higher service to customers at no additional charge. This feature enables cloud onboarding without retrofitting the source infrastructure and supports migration to Google Cloud without introducing application risk and complex migration assessments.

Live Migrations

Organizations using VMware vSphere **HCX-enabled vMotion** running on Google Cloud VMware Engine can live migrate virtual machines (VMs) from one host to another with zero downtime if the servers share the same underlying architecture ⁷. An estimation of live and cold migration is shown in the figure below.

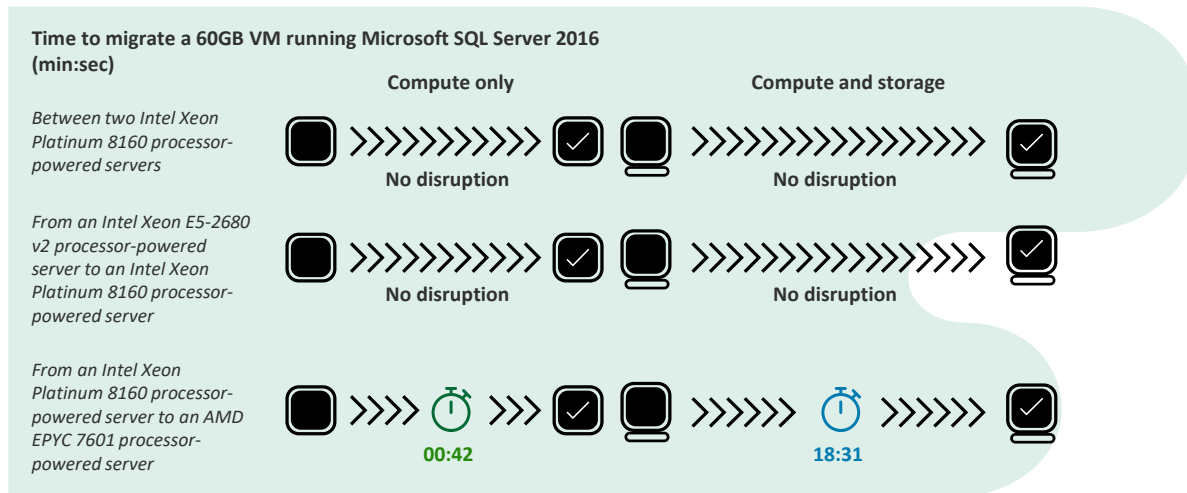


Figure 3: Principled Technologies ran a study to determine the wait time when migrating a 60GB VM running Microsoft SQL Server 2016 between different processors. The migration between Intel Processors based VMs did not cause a disruption, whereas the migration to an AMD processor based VM required shutting down the active VM. Wait times varied between 42 seconds when the VM only included compute (shared storage between the processors), and 18+ minutes when it was compute & storage (non-shared storage between processors).⁸

The EVC (Enhanced vMotion Compatibility) feature of VMware vMotion makes it possible to live migrate virtual machines even between different generations of CPUs within a given architecture. VMware runs on Intel architecture from older processing systems up through Intel’s 2nd Gen Intel Xeon Scalable processors and will run on the Intel 3rd Gen Intel Xeon Scalable processor.

Cold Migrations

Organizations who have on-prem data centers running non-Intel CPUs trying to migrate data to Google Cloud VMware Engine running Intel processors must do a cold migration which requires shutting down virtual machines before migrating data. This means users will experience downtime before applications resume on the new host. Data center staff often schedule migrations outside of production hours to limit the disruption.

Intel Optimization

AVX512_VNNI (Vector Neural Network Instructions) features can be enabled on **Google Cloud VMware Engine**. AVX512 VNNI is an x86 extension Instruction set and is a part of the AVX-512 ISA designed to accelerate convolutional neural network for INT8 inference. This feature merges three instructions (which occur consecutively in CNNs into one instruction and hence, saving 2 clock cycles).

Intel Select Solutions for Google Cloud’s Anthos are built with Intel hardware technologies that use the familiar VMware stack and run-on 2nd generation Intel Xeon Scalable processors, to simplify deployment and configuration of Google Cloud’s Anthos⁹.

“There is no downtime during data migration between the on-prem data center and cloud during live migration between legacy and current servers powered by Intel Xeon processors.”

– Principled Technologies Report

⁷ <https://www.principledtechnologies.com/Intel/Migration-in-mixed-CPU-environment-0419-v2.pdf>

⁸ [Intel Migration in mixed CPU environment \(principledtechnologies.com\)](https://www.principledtechnologies.com/Intel/Migration-in-mixed-CPU-environment-0419-v2.pdf)

⁹ <https://www.intel.com/content/www/us/en/products/solutions/select-solutions/cloud/google-cloud-anthos.html>

Conclusion

Wherever you stand on the journey to cloud, Deloitte and Google Cloud can help you along the way. Leveraging Deloitte's extensive IT and business transformation experience with Google Cloud's leading-edge technology, our alliance helps organizations achieve greater IT flexibility, scalability, and cost efficiencies through the thoughtful implementation of agile hybrid cloud or multi-cloud environments.

Cloud based systems offer customers the perfect blend of established organization benefits, and the scale, speed and agility of a startup. Deloitte and Google can simplify the migration of your VMware based business applications to Google Cloud with Google Cloud VMware Engine, and help your organization stay ahead of change, potentially mitigating further technical debt from legacy IT systems.

The Google Cloud VMware engine can help simplify the process of modernizing your critical VMware workloads to Google Cloud by enabling business agility without risk, app refactoring or having to reskill your teams. By providing a complete platform that incorporates management, networking, isolation, and high-speed connections to Google Cloud resources, Google Cloud VMware Engine gives enterprises a fast and secure way to meet their digital transformation goals on time while reducing your total cost of ownership.

Visit [Deloitte's](#) and [Google Cloud's](#) websites to learn how you can accelerate your cloud migration journey by more easily migrating or extending your VMware platform to Google Cloud.

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