Migrating your VMware workloads to Google Cloud

Here's how to easily lift your VMware vSphere-based workloads and shift to Google Cloud VMware Engine

Google Cloud

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Virtualization is a great way to improve efficiency and flexibility to your operations, and reduce costs. You've probably already made significant investments virtualizing much of your datacenter's operations.

The investments you've made were not just for infrastructure and software licensing, but also for obtaining knowledgeable staff and the latest technologies needed to manage the datacenter's operations, such as backup and recovery, disaster planning, and automation. The benefits gained from virtualization are many.

However, such rapid changes in the business environment are starting to show that owning a datacenter is not only a burden to maintain, but also could be a competitive disadvantage. Keeping up to date with the latest hardware and software, in addition to the raw costs of running and staffing a datacenter, can

have a negative effect on an organization's ability to strategically meet ever changing business demands.

Enterprises in this position find that migrating some or all of their on-premises operations to a commercial cloud service improves their ability to satisfy their customers' dynamically changing needs. As it turns out, having already virtualized your operations with VMware vSphere, you are now in a good place to consider migrating your operations to Google Cloud.

And, just like virtualization, the benefits of the cloud are many.

Benefits gained by migrating to the Google Cloud

- Delegate the management of the datacenter, its hardware and VMware product life cycles, to Google Cloud; now you can focus on meeting your business needs and innovating on application delivery.

- Provision VMware capacity on demand, grow/shrink capacity dynamically to match actual workload needs.

- Leverage your existing investments in VMware stack, processes, automation/tooling that utilize VMware product APIs, along with the VMware technical skills of the in-house staff.

- Modernize critical applications easily once the datacenter's operations shift to the cloud.

For example, one way to start is to consider simply migrating your VMware-based disaster recovery and backup workloads to Google Cloud. This will reduce management and storage costs while still using the same tools, processes, and policies that you use on-premises. And, you can further enhance availability by locating your data protection targets in different zones in Google Cloud.

Still, even though migrating infrastructure to the cloud sounds like the right thing to do, the reality of the task can seem overwhelming for some enterprises. There are challenges.

Challenges of migrating to the Cloud

Do you have the time, tools, and skill sets needed to handle the task of migrating your application workloads to cloud?

How do you choose the workloads to start with and how should you prioritize the applications to migrate first?

Do your customers understand their applications well enough to support migration and user acceptance efforts?

What if you do not have complete, up-to-date (or any) source code, configuration management data, and dependency information needed for migration?

Are there workloads that require legacy operating system versions and applications? This is a common issue, especially with active or pending Custom Support Agreements (CSA), and adds some risk.

What should you do about the capacity management issues caused by overprovisioning compute and storage resources?
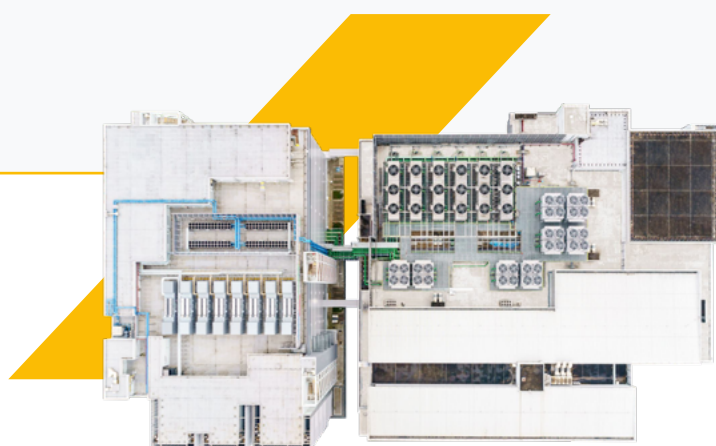
And how quickly can the migration be done, especially when there's an impending event to consider, such as an expiring datacenter lease or move?

Thankfully, there are tools available to make migration easy.

Introducing Google Cloud VMware Engine

Google Cloud VMware Engine, a fully managed service sold and supported by Google Cloud, greatly simplifies the job of cloud migration. And, to support enterprise production workloads, VMware Engine offers a fully managed VMware Cloud Foundation stack in a dedicated environment on Google Cloud's highly performant and reliable infrastructure.

This means that with VMware Engine, you can migrate or extend your on-premises workloads to Google Cloud in minutes by connecting to a native VMware environment that includes all the components you'll need—vSphere, vCenter, vSAN, NSX-T, and HCX—directly from the Google Cloud Console.
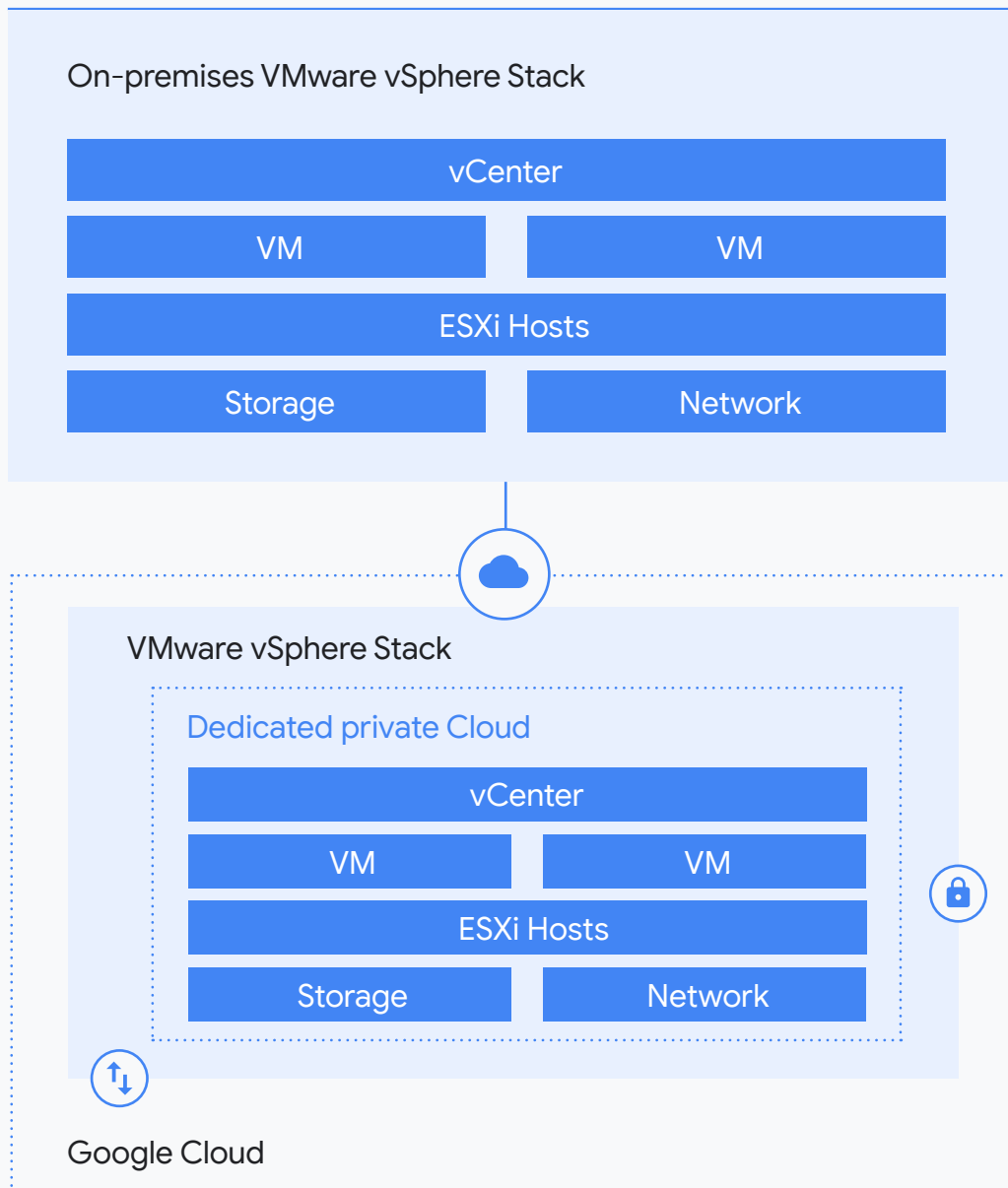
Figure 1: Google Cloud VMware Engine integrates an on-premises VMware vSphere stack natively with a dedicated, private cloud.

VMware Engine makes an enterprise's transition to the Cloud faster and with less risk, and without having to modify all their applications to fit into the cloud environment. The service enables you to seamlessly migrate on-premises vSphere applications to vSphere in your own private cloud while maintaining continuity with your existing tools, policies, and processes. This service is VMware Cloud Verified, the highest level of validation for VMware-based cloud services.

In particular, consider migrating your Disaster Recovery targets to the cloud. By leveraging VMware Engine nodes in multiple regions and using the GCP backbone to replicate data, this is one of the most cost-effective and easier strategies to implement.

With VMware Engine, migration of on-premise VMware VMs becomes a simple lift & shift to the cloud without having to make any changes. This is less risky than alternative migration approaches.

What is Google Cloud VMware Engine?

Google Cloud VMware Engine consists of three key components:

Hybrid cloud infrastructure

A dedicated, isolated, private cloud deployed on a hyperconverged infrastructure stack. This enables you to run VMware natively within Google Cloud, along with back-end operations and support for the entire solution, all separated through a data plane for additional security.

VMware Engine OS

The hybrid cloud management platform orchestrates, automates, and maintains availability across the VMware bare metal and Google Cloud infrastructures. It is managed through a single administrative portal, through which you can view both VMware and Google Cloud environments.

Network edge services

Enables communication between your hybrid architecture and the public internet with advanced networking and security capabilities provided by Google Cloud.
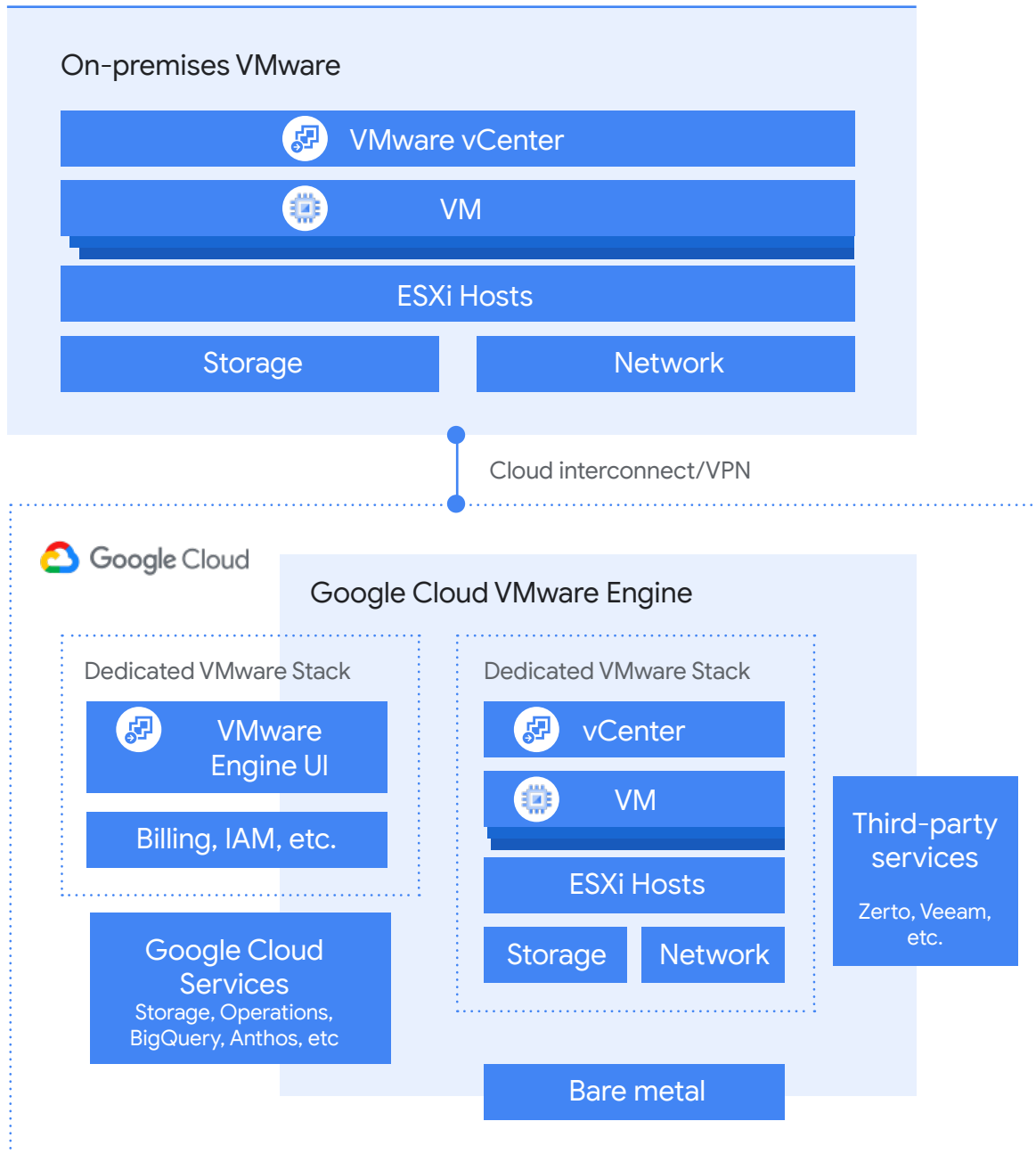
Figure 2: VMware Engine key components

Let's see how this works. First, we need to decide on what to migrate:

How to decide which application workloads to migrate:

Migrating workloads to the cloud isn't something an enterprise does on a regular basis. Few have the knowledge, skills, and experience in house to do this efficiently. So, a cloud migration project needs to start with a full assessment and classification of applications to discover: which would not be a good fit for cloud operation, which will require re-platforming for a different OS, which will require re-factoring for cloud operation, and which apps are just a simple lift & shift.

Such an assessment will need to take into consideration the economics of the effort, the strategic direction of the firm, their business objectives, and a deep understanding of the application and cloud technologies involved.

It helps to have workloads that are already virtualized and running in vSphere. These are good candidates for VMware Engine since the migration is vSphere to vSphere. This means that operating systems used by on-premises VMware environments will also be supported in cloud.

Not good candidates

But there are situations that would prevent virtualization and cloud migration:

1

Workload applications need to be x86/x64 Microsoft Windows or Linux distributions. Currently, VMware Engine does not support:

- UNIX - z/OS (Mainframe),

- IBMi (AIX, OS/400, OS/3xx) (AS400 / IBM Power),

- Solaris on SPARC,

- HPUX.

(see the support matrix in the VMware Engine documentation for details)

2

Workloads that have special hardware requirements or interfaces clearly would not be candidates for either virtualization or cloud migration.

3

Likewise, real-time applications sensitive to system latencies, such as trading platforms, videoconference, VOIP, and so on, would need to be tested to ensure that migrating these workflows to the cloud doesn't cause unacceptable performance degradation.

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Good candidates for migration

What workloads are good candidates for migration?

Most commercial off-the-shelf and custom-made applications running on x86/x64 systems would qualify. These include both server based as well as Virtual Desktop Infrastructure (VDI) workloads. For example, enterprises with distributed employees' accessing regionally diverse systems in VMware Engine can drastically improve end user experience for VDI and Windows file sharing (CIFS). This is possible because VMware Engine supports access to shared disks. So cluster-based systems are great candidates, including Oracle RAC, Microsoft SQL Failover Clusters, Veritas (Symantec) Clusters, and others.

Application discovery

To begin the cloud migration journey, take inventory of all applications whitin the organization, accounting for fependencies, requirements, and technical complexity.

Data gathering   Readiness assessment   Application interviews

Use a discovery tool

There are light-weight tools that can help you discover which applications in your datacenter inventory might be candidates for migration. A good discovery tool should deliver these key data points:

1

Operating System and application inventory.

2

Application dependency mapping showing what's on the application stack

3

Actual performance stats observed over a 3-4 week time that can be used to size the needed cloud resources

4

Some prediction of operating expenses for the cloud.

Using discovery tools will provide data about what is being migrated, and make recommendations about resource sizing that will reduce costs and capacity requirements. Application Owner Questionnaires should be used to capture additional details about the application as it pertains to business criticality, business continuity requirement, downtime affordability, change management and available test plans.

What do I need to consider before I migrate?

Here are some things to consider before deciding to migrate:

1 As discussed above, you need to know what to move and how much capacity that will require in the target environment.

2 What are the changes that might be required for security and governance compared to the existing environment?

3 What changes to operation management may be required to support source and target environments?

4 What should the architecture for stretching workloads to run over both on-premises and Cloud environments look like? Not just from a networking perspective but also for directory services used for authentication. How long will this hybrid cloud need to be around–is this a short-term migration or longer-term strategy?

5 Will target machines be re-IP'd during migration? What impact, if any, will that have on legacy applications?

6 What does post-migration success look like? What about functional and non-functional testing requirements?

7 Do you have a defined test plan (UAT) for each application? How much testing is required and do you have the resources, time, or the know how?

8 How will the disaster recovery process change? Does the disaster recovery and/or business continuity plan have to be updated and tested?

Before you begin

Network services

VMware Engine offers a VMware Private Cloud environment that is accessible from on-premises environments, enterprise managed devices, and Google Cloud services such as Virtual Private Cloud (VPC). Connectivity is delivered using the networking services supported by VMware Engine, such as VPNs and dedicated interconnect attachments. And, because some network services will require enabling user-specified address ranges, identifying those CIDR ranges is important.

So, you will need to allocate a CIDR range for vSphere/vSAN subnets for the Private Cloud. A Private Cloud is created as an isolated VMware stack environment (with ESXi hosts, vCenter, vSAN, and NSX-T)

managed by a vCenter server. Management components are deployed in the network that is selected for vSphere/vSAN subnets. The network CIDR range is divided into different subnets during the deployment. The vSphere/vSAN subnet address space must be unique. It must not overlap with any network that communicates with the GCVS environment, including any of your on-premises subnets, VPC subnets, or planned workload subnets. For more information on vSphere/vSAN subnets, see VLANs and subnets overview.

Here are the steps you'll need to follow to begin your migration to the cloud:

Create a new Private Cloud

We begin by going to the Google Cloud Platform VMware Engine portal to create your new private cloud. There we can create a new vSphere cluster or expand an existing cluster.

Google provides the flexibility to dynamically expand a Private Cloud. You can begin with a small configuration and then expand as you need higher capacity. Or you can create a Private Cloud based on current requirements and then expand as needs change.

Google configures the VMware infrastructure as part of the new cluster. The settings include storage settings for vSAN disk groups, VMware High Availability, and Distributed Resource Scheduler (DRS).

A Private Cloud can be expanded multiple times, provided that you stay within the overall node limits. Each time you expand a Private Cloud you add to the existing cluster or create a new one.

The Private Cloud you create is an isolated VMware stack (ESXi hosts, vCenter, vSAN, and NSX) environment managed by a vCenter server in a management domain. You can deploy VMware natively on bare metal infrastructure in the Private Cloud hosted locations.

A Private Cloud is deployed with the following VMware stack components:

1 VMware ESXi
Hypervisor on dedicated nodes

2 VMware vCenter
Appliance for centralized management of Private Cloud vSphere environment

3 VMware vSAN
Hyper-converged infrastructure solution

4 VMware NSX Data Center
Network Virtualization and Security Software

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Manage VLANs/subnets

Next, you want to create and manage VLANs/subnets for your Private Clouds. This is done from the VLANs/Subnets tab on the Network page of the Google Cloud VMware solution portal.

Google provides a network for each region where your Google Cloud VMware Solution

service is deployed. The network is a single TCP Layer 3 address space with routing enabled by default. All Private Clouds and subnets created in this region can communicate with each other without any additional configuration. You can create distributed port groups on the vCenter using the VLANs.
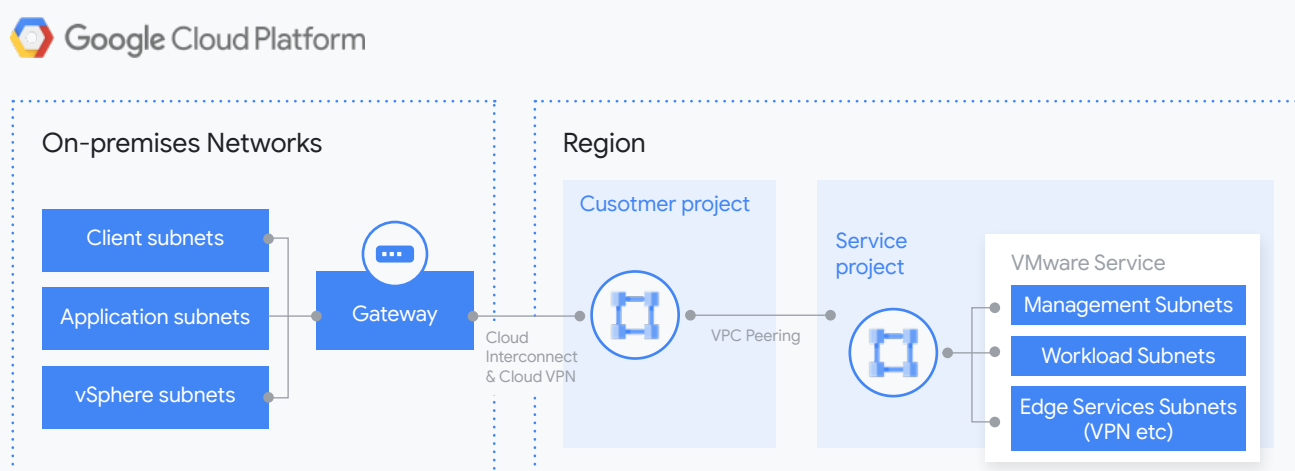

Figure 3: Google Cloud Platform Networking

After you create a VLAN/subnet, you can apply firewall rules. Firewall tables and the associated rules allow you to specify restrictions on traffic to apply to particular subnets and VLANs.

• A subnet can be associated with one firewall table.

• A firewall table can be associated with multiple subnets.

After you define a firewall table, you can specify the subnets that are subject to the rules in the table.

Setting up communication

Direct Interconnect

Google Direct Interconnect, the preferred way to communicate to Google Cloud, provides the high speed needed to transfer large amounts of data quickly, especially during initial setup, data recovery, and some backup applications.

VPN gateways

VPN gateways allow you to connect to the Google Cloud VMware Solution network from your on-premises network or from a client computer remotely. A VPN connection provides access to the vCenter and workloads on your Private Cloud. You can establish VPN connections using Google Cloud's VPN service or a GCVS VPN gateway.

While Google Cloud VPN supports Point-to-Site connectivity. Setting up a Point-to-Site gateway is easily done from the GCVS portal Network menu item. Once set up, we can use VPN to connect to the GCVS private cloud from on-premises services. The details on how to do this appears in the documentation.

Assign public IP addresses

Now you can assign a local IP address as a public IP address for the virtual machines in your Private Cloud environment. You do this from the Network=>Public IPs menu item at the Google Cloud VMware Solution portal.

Giving access to the vCenter server on a GCVS Private Cloud

To access the vCenter server on a Google Cloud VMware Solution Private Cloud from on-premises workstations, you must configure DNS address resolution so the vCenter server can be addressed by hostname as well as by IP address.

Configuring is easy from the GCVS portal Resources>Private Cloud menu item. This lets you create a zone on the DNS server for `*gve.goog.`, or a conditional forwarder on your on-premises DNS server that resolves to `*gve.goog.`

Launch vSphere client for your private cloud

Now you can launch the vSphere client from the Google Cloud VMware Solution portal. On the home page, click **Launch vSphere Client** and **Launch vSphere Cloud** from the private cloud you're managing.

Create virtual machines on your private cloud

You can now create and manage virtual machines and policies on your Private Cloud from the vSphere client for your private cloud.

To do this you will first need to upload an ISO or vSphere template from your local system, and then create a virtual machine in vCenter using this upload. For details, see the documentation.

With this basic setup, you can start using your private cloud the same way you would use your on-premises VM environment.

Migration services

Most organizations don't do migrations that often. So they don't have the expertise to manage a large migration. This is where partners, like River Meadow, come in. They have the experience, procedures, plans, tools, and staff to help manage your entire migration—from discovering which business-critical and non-critical apps to migrate, to identifying the best strategy to make the migration go smoothly.

Google also offers migration credits and incentives that can offset some of the initial migration planning and auditing costs. Contact your local rep to learn more about these offerings.

Additional migration strategies with Google Cloud

Migration projects are often large and involve many, many applications, workloads, technologies, constraints, and goals. That's why it is common for enterprise migration projects to include many different migration strategies within the greater project. Migrating directly to Google Cloud VMware Engine works well for many workloads, but we thought it may help to outline some other migration and modernization strategies available with Google Cloud.

Migrate VMs directly into Compute Engine

Similar to lifting and shifting with Google Cloud VMware Engine, you can also migrate existing VMs from on-prem or other clouds directly into Google Compute Engine. Since the vast majority of VM-based apps can be migrated as-is, this gives you two powerful approaches depending on your needs.

Here, instead of continuing to rely on VMware, your VMs would be converted into VMs that run natively in Google Compute Engine. This, of course, requires changes to your VM operating structure, but can be helpful for anyone looking to modernize in phases, who has time constraints, or if your application stack is not well-suited for pure lift & shift.

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Automatically convert VM-based workloads to run in containers in Kubernetes Engine

Migrating your application into containers on Google Kubernetes Engine (GKE) should be another consideration as a first step into the cloud. GKE provides a managed environment for deploying, managing, and scaling your containerized applications and delivers numerous benefits such as:

Delivering cost savings by efficiently managing and increasing workload density through lighter-weight containers and intelligent workload management

Increasing agility and reducing time-to-market (for example, by facilitating faster, automated continuous integration and continuous delivery processes, also known as CI/CD)

Container health monitoring and automatic restarts

Access to advanced modern operational management capabilities with Cloud Operations , Istio and other cloud services

If your application is a good candidate for containerization, you should then confirm support for any prerequisites associated with your desired migration. Some examples of good candidates for containerization often include: web application servers, business logic, J2EE middleware (e.g. Apache Tomcat), multi-tier stacks (such as LAMP, WordPress), dev/test applications, training, labs, and low load services.

Rebuild using Google Cloud microservices

Commonly-used application stacks are increasingly available in the cloud through managed services. As you begin devising your migration strategy, check whether managed services are available to support your application. If so, and if the associated components of your application have minimal customization, leveraging one or more Google Cloud managed services should be considered as another path for migration and modernization.

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Summary

Migrating a datacenter's operations to the cloud may seem a bit overwhelming. Meanwhile, not being in the cloud could be a competitive disadvantage in today's fast-changing business environment.

Google Cloud VMware Engine makes cloud migrations easier and faster by leveraging your existing virtualized infrastructure. VMware Engine seamlessly migrates your on-premises vSphere applications to vSphere in your own private cloud while maintaining continuity with all your existing tools, policies, and processes. And this can be done in just a few clicks, due to the design and automation of VMware Engine.

And, if you don't have the resources or expertise to manage a large migration, Google also offers credits and incentives that let you work with partners like River Meadow who are ready to help.

Resources

The following resources provide more information about migration and additional features available to assist with the overall process:

1   Getting Started with Google Migration

2   Google Cloud VMware Engine

3   RiverMeadow

Thank you