# Google Cloud Anthos

# Overview

Google Cloud Anthos is a platform for developing and running Kubernetes-based applications on Google's Kubernetes Engine (GKE), an open-source project that manages container services for the company's Cloud Platform. Anthos currently runs natively on Google Cloud Platform, on bare metal servers in enterprise data center and in public clouds, and on VMware vSphere servers within a customer data center.

Google's stated objective with Anthos is to provide enterprise users with an open source-based, container management platform that can be used to develop containerized applications that run on premises *and* in the public cloud with little to no modification. Application modernization is a primary use case for Anthos while GKE is generally regarded as the best platform to run microservices. Anthos will also appeal to users looking for a truly cloud native development platform that is easily portable to multi-cloud architectures.

## Highlights

- Anthos based on Google's GKE container management platform
- On premises implemented on VMware VM's
- Sold through partners with the Google Anthos Ready Program

## Technology

Anthos is actually a collection of open source projects that, when integrated, establish the Anthos platform. Components include:

**Google Kubernetes Engine (GKE)** – the container management center of Anthos. GKE runs on distributed, clustered infrastructure, on premises on VMware or natively in the cloud.

**GKE On-prem** – for customer deployment of GKE on a compatible hardware stack and as a virtual appliance within VMware vSphere within a customer's data center or other non-public cloud deployment model. Google manages the platform from the perspective of upgrading the software and applying the latest patches to maintain compatibility with versions running in public clouds.

**Anthos Service Mesh** – the service mesh connecting distributed components of applications deployed across data centers and cloud instances. It uses networking foundations such as VMware NSX and Cisco ACI.

**Anthos Migrate** – for streaming Anthos VMs to the cloud via replication and converting exiting VMs into Kubernetes-based containers (based on Velostrata acquisition).

**Anthos Config Management** – centralized repository of cluster configurations and operational policies.

**Cloud Ops** – (formerly Stackdriver) monitors the state of Anthos clusters as well as applications running on Anthos

**GCP Cloud Connect** – high speed connectivity between the enterprise data center and Google Cloud

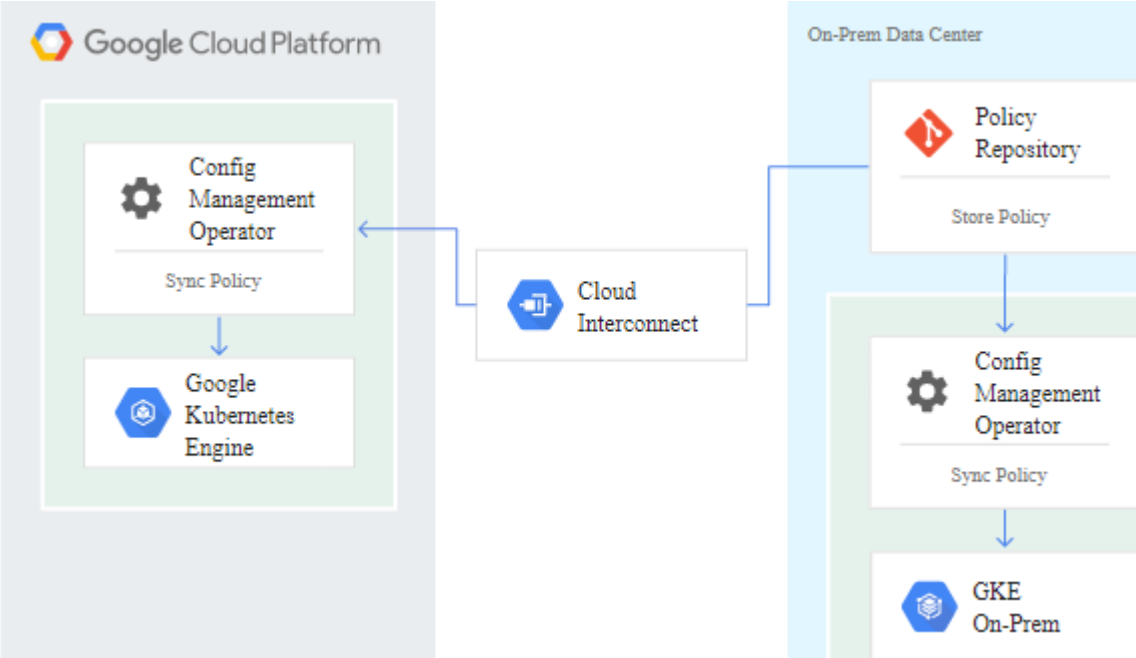
**GCP Marketplace** – curated list of ISV and open source applications that run on Kubernetes.

Anthos on premises runs on VMware, requiring four VMs in the initial configuration for administration, plus one to three VMs for each user cluster (to run workloads). Each VM must have 4 vCPUs, 8GB of memory and 40GB of storage space. Anthos requires layer 4 load balancers as well. The connectivity options are Cloud VPN, a dedicated interconnect such as GCP Cloud Interconnect, or partner interconnect.

## Management

Anthos on premises presents the administrator a dashboard for automated management of its infrastructure, containers, services, and policies. Monitoring and logging capabilities are also included. All are presented via a Google Cloud Platform dashboard interface. Users can define “Environs” that encompass differing cluster definitions tailored to differing applications development teams for example.

Configuration management is done via Anthos Config Management (see architectural diagram below) which integrates with Anthos clusters on-premises or in the cloud. It is used to deploy and monitor configuration changes stored in a central Git repository. It also includes a Policy Controller which enforces custom business logic against every API request to Kubernetes and allows administrators to use the same logic to scan and audit Anthos clusters.




Anthos Kubernetes clusters are registered as part of a Google Cloud environ using Google Cloud Connect, allowing multiple clusters – on and off premises – to be viewed and managed together in the Anthos dashboard. Using this dashboard, administrators can view the state of all clusters within an Anthos deployment – on premises and in the cloud. Administrators can add clusters to this view by registering them with Connect to a Google Cloud project environ. GKE clusters on-premises are registered automatically. Customers can run Anthos in two other public clouds. However, the only GA option for this is AWS. Azure is pre-GA With limited support.

## Anthos Support

For customers who choose to download and install Anthos to an on-premises cluster, Google Cloud offers a variety of support packages that include support for Anthos and GKE on-prem. Customers with an existing Google Cloud Support package already have support for Anthos and GKE on-prem. Troubleshooting is a collaborative process between the Anthos administrator and Google Cloud personnel.

Support responsibilities are divided between Google and Anthos administrators.

Google's responsibilities include:

- Maintenance and distribution of GKE in the cloud and on prem, the Ubuntu admin workstation,
- Regular patching and security fixes
- User notification of available upgrades and upgrade scripts
- Operating the Connect and Stackdriver services in the cloud
- Troubleshooting and correcting issues related to Google-provided components in the cloud

Customer responsibilities include:

- Overall system administration for on-premises clusters.
- Maintaining any application workload deployed on the cluster.
- Running, maintaining, and patching the data center infrastructure, including networking, servers, storage, and connectivity to Google Cloud.
- Running, maintaining, and patching vSphere and network load balancers.
- Maintaining support contracts with VMware and the networking provider
- Upgrading GKE on-prem versions on a regular basis.
- Testing and deployment updated node machine images with Ubuntu patches.
- Monitoring of the cluster and applications and responding to any incidents.
- Ensuring Cloud Logging and Cloud Ops agents are deployed to clusters.
- Providing Google with environmental details for troubleshooting purposes.

If a customer chooses to acquire an Anthos on premises appliance from a partner, then support is typically provided by the partner in collaboration with Google. Some or all of the above listed customer support responsibilities can be off-loaded to the partner as part of its services offering.

# Acquisition Model

Anthos charges calculated hourly and are based on the number of vCPUs in use. A vCPU is considered "under management" when it is seen as schedulable compute capacity by the Anthos control plane, meaning all vCPUs in the relevant user cluster, and excluding both the admin cluster and the master node.

Setting up Anthos in the data center requires an Anthos subscription (on-prem license) plus an active Google Cloud Project, essentially a Google Cloud account that gives customers access to APIs and sets up billing.

## Partners

Partners can provide critical additional benefits to prospective Anthos users and systems administrators who have little prior Kubernetes experience. Currently there are a number of enterprise infrastructure suppliers that offer an Anthos appliance – a complete, pre-integrated hardware/software “stack,” often with services included. These partners include:

Cisco – Cisco HyperFlex with Google Cloud Anthos integrates Anthos with Cisco’s HyperFlex HIC platform that also includes the HyperFlex Container Storage Interface (CSI) for persistent storage

HPE – HPE GreenLake for Anthos is the Anthos platform delivered as a service on pre-integrated and tested infrastructure.

NetApp – NetApp HCI for Anthos is a fully tested and certified HCI appliance that includes compute, networking and NetApp Trident for persistent container storage.

Other HCI platform partners offer solutions that have undergone Google's Anthos Ready Platform Qualification process. These include Dell (PowerFlex), HPE (Simplivity, Nimble), Lenovo (ThinkAgile), and Nutanix. Google has also established and Anthos Ready Storage Partner qualification process. Vendors in this category include Dell EMC, HPE, NetApp, Portworx, Pure and Robin

## Evaluator Group *EvaluScale*™: Google Cloud Anthos

| | Criteria | Description | EG View of Google Anthos | Explanation for Google Anthos |
|---|---|---|---|---|
| 1 | **Services Offered** | Breadth of installation, management and support services offered by vendor | Area for Development | Post-implementation monitoring and automated software patching with collaborative troubleshooting |
| 2 | **Virtualization** | Platforms used to virtualize the computing environment | Area for Development | GKE on prem is a premier container management platform but must run in a VMware VM. Bare metal version in beta |
| 3 | **Infrastructure Management** | Tools/service provided for infrastructure management | Exceeds Requirements | Good selection of open source automated management configuration and tools to be used by the user |
| 4 | **Hybrid/Multi Cloud Support** | Ability to integrate public clouds into the computing environment | Exceeds Requirements | Connectivity to multiple clouds is supported. Anthos supported in Google and AWS public clouds |
| 5 | **Single Vendor Infrastructure Support** | Single vendors source for all maintenance and support issues | Area for Development | Google offers limited support for Anthos software only via its broader Google Cloud Support package |
| 6 | **Contract Flexibility and Minimum Requirements** | Minimum capacity levels, dollar volume commitments, contract terms required | Meets Requirements | Multiple options for pay per use and subscription for software only. Partners provide full stack as a Service solutions |
| 7 | **Cloud Connectivity** | Cloud connectivity options supported | Meets Requirements | Google Cloud Connect or customer VPN. |
| 8 | **Geographic Availability** | Ability to meet customer needs outside of the US | Meets Requirements | Available world-wide |
| 9 | **Optional, Add-on Services** | Additional, chargeable services offered in conjunction with the base services | Area for Development | No additional services beyond support. Partners can provide additional services. |
| 10 | **Storage** | Storage types and infrastructure included in the service | Area for Development | Integrates with external storage via VMware vSphere |
| 11 | **Ability to Execute** | Ability of vendor to fulfill its contractual obligations | Meets Requirements | Google is new to enterprise computing but Kubernetes is in high demand. Google will also continue to attract Anthos partners. |

## Evaluator Group Opinion:

Anthos represents Google's response to the need for an application modernization platform that delivers cloud services to enterprise cloud and on-premises users. In that regard, the on premises version is similar to AWS Outposts and Microsoft Azure Stack Hub, both of which are reviewed within Evaluator Groups ongoing research into Compute as a Service (CaaS). However, just because it is in the same general category as Outposts and Hub does not mean that Anthos is equivalent to the other two. Anthos on premises is different in several key ways:

- Anthos on premises is a collection of open source projects which the user has to install and integrate to a cluster of industry standard servers and install on VMware vSphere. Installation and integration are the responsibility of the user. But this can also be done by an Anthos partner who offers a pre-integrated hardware and software appliance, generally implemented on the partner's HCI platform.

- Users acquire the hardware and software separately or must look to a partner for a pre-integrated hardware/software solution. Total platform support will require participation from Google and the hardware vendor (or vendors).

- Google does not manage Anthos on premises in the same way that it manages Anthos running in Google's public cloud. Google ships platform updates—all the way down to the OS—to limit how much the user has to do manually. Otherwise, all other operational and hardware lifecycle management is performed by the user or an Anthos partner.

Because of the popularity of Kubernetes, Anthos will be "in the running" as a potential on-premises platform for managed containerized application development. But at the moment, it will require the acquisition of operational expertise on the part of the user which, at this point in time, is specialized. There are multiple components that have to be understood and learned to bring Anthos into an enterprise production data center environment.

EvaluScale™ is a methodology developed by Evaluator Group to determine the value offered by a product within a technology area. Evaluation criteria are developed through IT client engagements and an understanding system usage. The definitions of the criteria and explanations of how products are reviewed can be found in the Evaluator Group Evaluation Guide, which is reflected in the EvaluScale published in individual Product Briefs. The EvaluScale for each product is determined through in-depth review and analysis attained from vendor interviews, reviews of user / administration guides, hands-on testing and/or client engagements.