

eBook

Confidently migrate to Google Cloud with Datadog

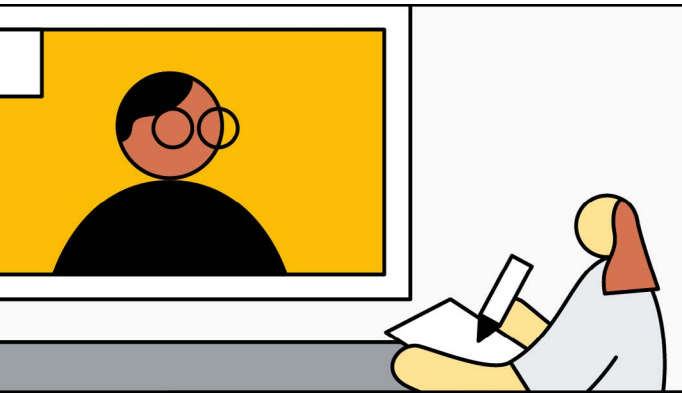


With the “new normal” of a hybrid workforce, rising customer expectations, and accelerating uncertainty, business leaders are under pressure to deliver quickly on digital initiatives that will provide the flexibility, efficiency, and innovation to compete in the race to serve customer needs. Cloud migration is crucial in this digital transformation, and few enterprises can afford to take on prolonged migration efforts – but delaying cloud adoption leaves companies at a competitive disadvantage. Cloud platforms like Google Cloud offer unique benefits to moving applications and workloads off on-premise infrastructure, but such migrations can be challenging without some guidance. In this e-book, we’ll talk about the benefits and complexities of migrating workloads to Google Cloud and cover how a monitoring solution like Datadog can easily track the entire migration, as well as the performance of each of your Google Cloud services side-by-side.



The benefits of migrating to Google Cloud

Google Cloud offers you the flexibility to migrate, build, and optimize apps across hybrid and multicloud environments while minimizing vendor lock-in, leveraging best-of-breed solutions, and meeting regulatory requirements.



Multicloud app and data management

Google Cloud empowers you to quickly build new apps and modernize existing ones to increase your agility and reap the benefits of multicloud. [Google Anthos](#) provides a consistent platform and data analysis for your deployments no matter where they reside, along with a service-centric view of all your environments.

- ✓ Migrate VMs directly to [Compute Engine \(GCE\)](#) and optimize for budget and performance
- ✓ Build, deploy, and optimize apps on [Kubernetes Engine \(GKE\)](#), Anthos serverless landing zones, and VMs anywhere — simply, flexibly, and securely
- ✓ Gain consistent development and operations experiences for hybrid and multicloud environments
- ✓ Achieve up to 4.8x ROI within three years, according to the [Forrester Total Economic Impact study](#)

Accelerated application delivery

Google Cloud offers a best-in-class managed Kubernetes and serverless platform on cloud and on-premises environments so you can build enterprise-grade containerized applications faster. Run your apps on a fully managed Kubernetes cluster with [GKE Autopilot](#). Start quickly with single-click clusters and scale up to 15,000 nodes. Leverage a high-availability control plane, including multi-zonal and regional clusters. Eliminate operational overhead with industry-first four-way auto-scaling.

With Google Cloud, you can build applications with your favorite language, dependencies, and tools, and deploy them in seconds. Cloud Run abstracts away all infrastructure management by automatically scaling up and down from zero almost instantaneously, depending on traffic. [Cloud Run](#) charges you only for the exact resources you use. You can build a fast, scalable software delivery pipeline no matter where you run by seamlessly implementing DevOps and site reliability engineering (SRE) practices with cloud-native tooling and expert guidance from Google Cloud.

Cost-effective pricing structure

With Google Cloud's pay-as-you-go pricing structure, you pay only for the services you use, with no up-front fees or termination charges. Google Cloud also offers automatic savings based on monthly usage and by pre-paying for resources at discounted rates. For example, you can save up to 57% with committed use discounts on Compute Engine resources like machine types or GPUs.

Open, flexible, and scalable technology

Google is one of the largest contributors to the open source ecosystem and works with the open source community to develop well-known open source technologies, such as Kubernetes. Google Cloud then rolls these out as managed services to give users greater choice and longevity.

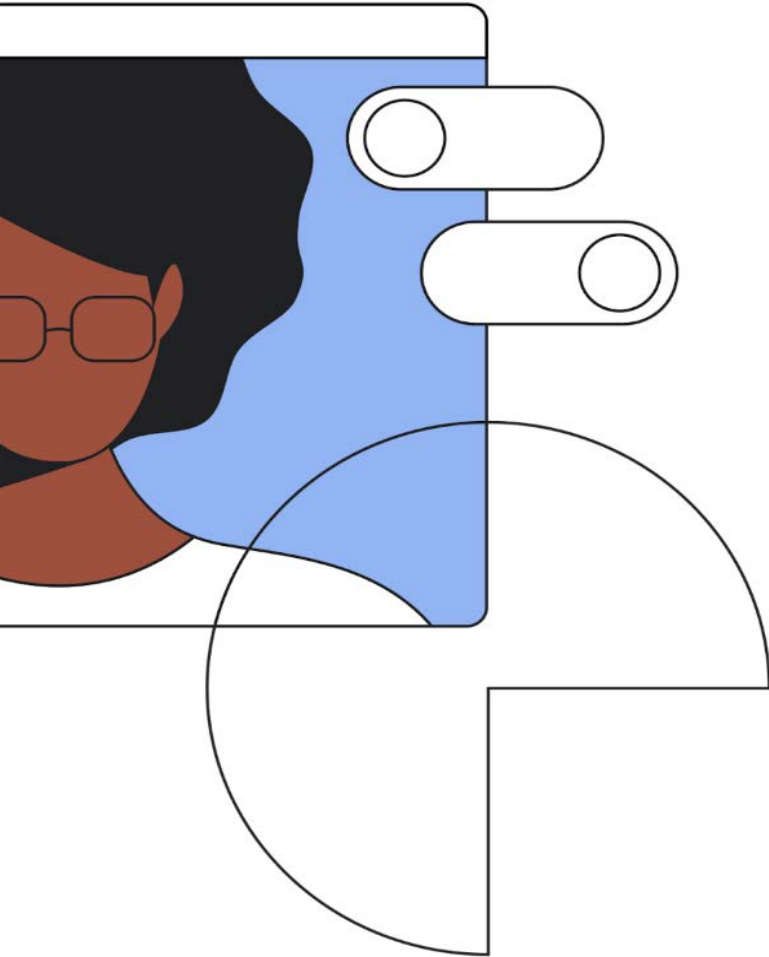
Advanced data analytics and AI/ML

Where Google Cloud truly shines compared to competitors is in its data analytics offerings. For example, BigQuery is a serverless, highly scalable, and cost-effective multicloud data warehouse that lets you process and analyze petabytes of data across clouds with scale and cost effectiveness. With these analytics capabilities, organizations can:

- ✓ Democratize insights with built-in machine learning
- ✓ Power business decisions with a flexible, multicloud analytics solution
- ✓ Run analytics at scale with [27% lower three-year TCO](#) than cloud data warehouse alternatives

In addition, Google Cloud's AI tools can help you generate insights from data with a complete suite of data management, analytics and machine learning tools, as well as train deep learning and machine learning models cost-effectively with high-performance Cloud GPUs and Cloud TPUs.

The challenges of migrating to the Cloud



When migrating your workloads to Google Cloud, you need end-to-end visibility to decrease friction throughout the migration process — especially in hybrid environments, where application services are located both on-prem and in the cloud. Without this end-to-end visibility, migrations can create blind spots, leading to costly outages and other performance incidents.

Once migrations are complete, it's important to continuously monitor your applications and track key performance metrics from each Google Cloud service to troubleshoot issues and ensure applications are available for customers.

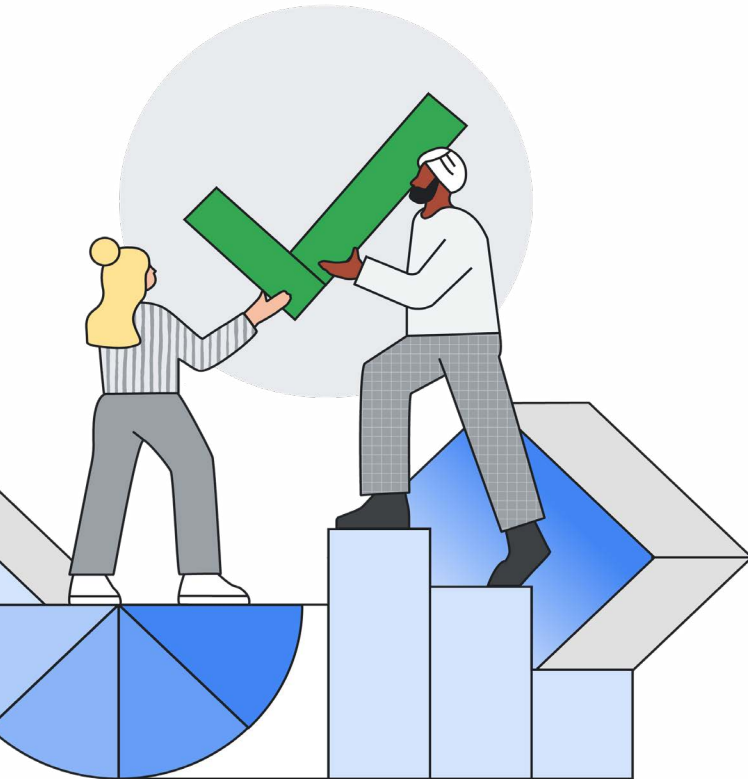
Cloud migrations can also be costly up front, especially as you decide which workloads you need to migrate. Any change to an application during the migration process often requires investing time and money to ensure you have the right tools to support your existing workloads. For example, you may need to refactor some or all of your existing application architecture and infrastructure to leverage new cloud services and ensure interoperability, or you may decide to break down a monolithic application into several different microservices.

Moving applications to the cloud can also disrupt your established development environment and processes with new systems and unfamiliar tools. Training team members will be a critical part of ensuring a smoother migration. Without an established migration plan that fits with your team goals and bandwidth, team (and leadership) buy-in will be more difficult, especially if your team members are unfamiliar with using cloud services or with the complexities of the migration process.

One common concern teams have is ensuring the security of newly migrated services. Google Cloud employs a highly opinionated approach to security that helps ensure your data is safe from Day One while also providing granular controls down to the user level to support your organization's policies and regulatory requirements.

Phases of a cloud migration

Now that we've gone over some of the benefits and challenges of migrating to the cloud, let's look more at how to get started.



Cloud migrations require careful planning and execution. Google Cloud recommends a three-phase process:

1

Discovery and assessment

2

Preparing the cloud environment

3

Migrating and modernizing

By following this process, you can ensure a successful migration.

Phase 1: Discover and assess

Cloud migration is a complex process that takes time and resources and can create disruption if not handled carefully. Planning is critical. The first phase of a migration includes assessing your existing on-prem inventory and how prepared your organization is for the move to the cloud. Google Cloud offers a comprehensive Fit Assessment to help customers discover and assess which of their workloads are fit for modernization.

Using a lightweight command-line interface (CLI) running on your admin desktop, the Fit Assessment does not require a connection to the internet, so you don't need to worry about additional permissions or security concerns. Main features include:

- ✓ vSphere VM inventory
- ✓ Guest-level data collection via script running on each VM
- ✓ Support for Linux and Windows VMs
- ✓ Multi-format reporting — or, you can view reports in [Google Cloud Console](#)
- ✓ Data collection for automating parts of the migration process

Google Cloud's [Fit Assessment Tool](#) is an advanced recommendation solution that helps organizations understand the potential benefits of migration and offers prescriptive guidance, including:

- ✓ **Lift & shift analysis:** Understand which VMs you should migrate to Compute Engine or Google Cloud VMware Engine (GCVE).
- ✓ **Modernize (refactor) to containers analysis:** Determine which VM-based applications can be automatically refactored and migrated to a containerized environment.
- ✓ **On-prem VM modernization analysis:** That helps you determine which workloads to shift or attach to Anthos VM on bare metal.
- ✓ **Prescriptive guidance:** That offers alternatives based on need — for example, low effort and short time vs. high modernization and high value.

In addition to mobilizing resources for migration, preparing your organization for the move is critical, as migrating to the cloud introduces significant changes in team workflows. Mobilizing teams may include developing strategies for areas such as risk mitigation, training, and communication to ensure a smoother migration for your organization. It's important to assess which strategy makes the most sense for your existing infrastructure and business needs.

Phase 2: Prepare the cloud environment

The next step in the pre-migration process is to get one or more Google Cloud environments ready to support your applications

and data. Google calls these environments [landing zones](#). A landing zone is a modular and scalable configuration that provides all the Google Cloud services and features necessary for deploying enterprise workloads in a cloud environment. Landing zones help your enterprise deploy, use, and scale Google Cloud services more securely, and they have the ability to grow and adapt as your enterprise adopts more cloud-based workloads over time. It is also where you will enable Datadog's Google Cloud integrations, create dashboards with Datadog, set up communication channels for incident response, and resolve observability gaps in your legacy environment.

A landing zone spans multiple areas and includes different elements, such as identities, resource management, security, and networking. Although every landing zone comprises a unique set of elements, a typical example might include:

- ✓ **Cloud Resource Manager:** Which defines a resource hierarchy with organizational policies.
- ✓ **A Cloud Identity account:** Which synchronizes with an on-premises identity provider and Identity and Access Management (IAM) providing granular access to Google Cloud resources.
- ✓ **Multiple Datadog [integrations](#):** To pull data from Google Cloud and third-party services.
- ✓ **A network deployment** that includes:
 - Shared VPC network for each environment (production, development, and testing) that connects resources from multiple projects to the VPC network

- Virtual Private Cloud (VPC) firewall rules that control connectivity to and from workloads in the Shared VPC networks
 - Cloud NAT gateway to allow outbound connections to the internet from resources in these networks without external IP addresses
 - Cloud Interconnect, which connects on-premises applications and users. (Alternatively, you can choose Dedicated Interconnect or Partner Interconnect.)
 - Cloud VPN to connect to other cloud service providers
 - Cloud DNS private zone to host DNS records for your deployments in Google Cloud
- ✓ **One or more service projects:** Deployed in the Shared VPC networks. These service projects host your application resources.
 - ✓ **Google Cloud operations suite:** Including Cloud Audit Logs, Firewall Rules Logging and VPC Flow Logs to help ensure all necessary data is logged and available to Datadog for analysis.
 - ✓ **A VPC Service Controls perimeter:** For each environment, including Shared VPC and the on-premises environment. A security perimeter isolates service and resources, which helps improve your ability to mitigate the risk of data exfiltration from supported Google Cloud services.

Phase 3: Migrate and modernize workloads

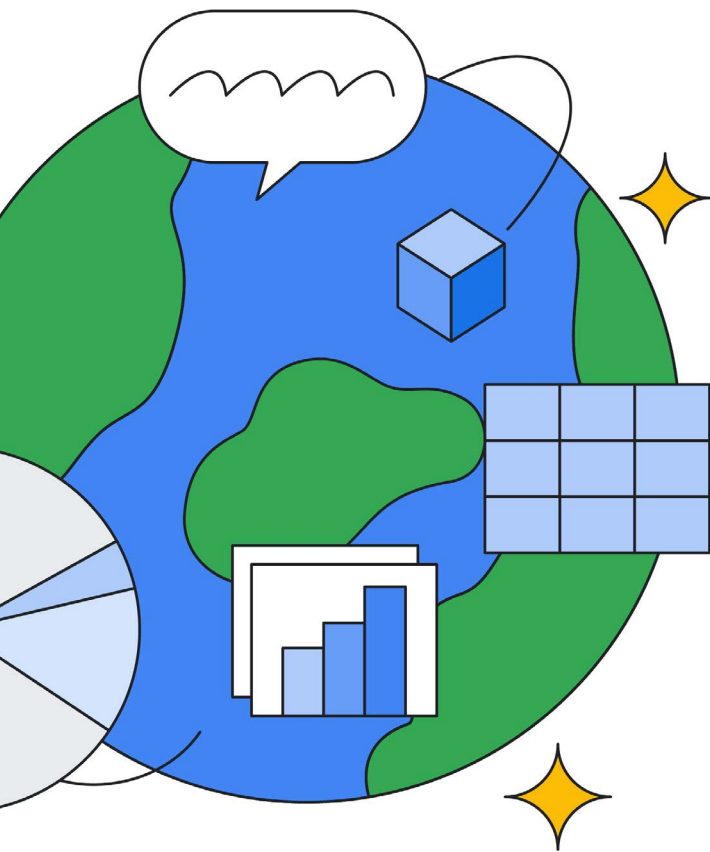
Modern applications are dynamic, scalable, and intelligent. They are built on a new set of patterns: rather than monolithic applications running on VMs, modern applications are composed of microservices running on containers, which facilitates CI/CD, scalability on demand, and resiliency.

Google Cloud offers two highly automated tools to help modernize applications during migration:

[Migrate to Containers](#) automates the process of modernizing traditional applications away from virtual machines and into native containers. The solution extracts the critical application elements from the VM so you can easily insert those elements into containers in GKE or Anthos clusters without the VM layers (like Guest OS) that become unnecessary with containers. This significantly reduces the cost and labor that would be required for a manual application modernization project. Upon completion, it also empowers your teams to deploy, operate, and maintain existing applications more efficiently and cost effectively, using the same services, policies, and methodologies of a modern platform.

[Migrate to Virtual Machines](#) provides a straightforward as-a-service interface within Cloud Console, as well as flexible migration options that reduce the time and effort typically needed for a migration. You can migrate a single app with a few clicks, execute a migration sprint with 100 systems using groups, or use the Google Cloud API to build an in-house migration factory.

Monitoring a migration to Google Cloud with Datadog



Whether you're moving to a fully Google Cloud-hosted environment or planning to maintain a hybrid solution, you need continuous visibility across your architecture during every phase of a migration. Datadog is a monitoring and security platform that combines all your telemetry data into a single place, allowing you to confidently migrate your workloads.

Datadog provides full visibility across your organization's systems — infrastructure, network, applications, services, and more — before, during, and after migration. Once users establish the current state of systems, Datadog continues to provide a centralized platform to measure and improve system performance and security on an ongoing basis. With more than 600 vendor-supported integrations and accompanying out-of-the-box preset dashboards, including for nearly all Google Cloud services, Datadog brings together data from on-prem, hybrid, and cloud environments, enabling you to monitor all your services throughout the migration process.

Datadog complements Google Cloud's assessment tools, giving you greater insight into which services are good candidates for moving to the cloud. Datadog allows you to monitor newly migrated hosts as soon as they spin up, and easily compare performance between on-prem and cloud services. Datadog's features are also tightly integrated with each other, so you can pivot between any datapoint — for example, from a distributed trace to related logs or infrastructure metrics — to get more context for troubleshooting an issue. You can also create dedicated dashboards for tracking workload performance for all your services throughout your migration, as well as alerts to notify you of any performance anomalies.

Visualize dependencies between services before a migration

As mentioned before, it's critical to first assess your current application workloads to identify qualified candidates for migration. Datadog's Service Map can help you visualize the components of your architecture and each one's dependencies, so you can make more informed decisions on which services can be moved to the cloud. For example, you can use the Service Map to determine if an application database has too many dependencies to safely migrate to the cloud without disrupting workloads.

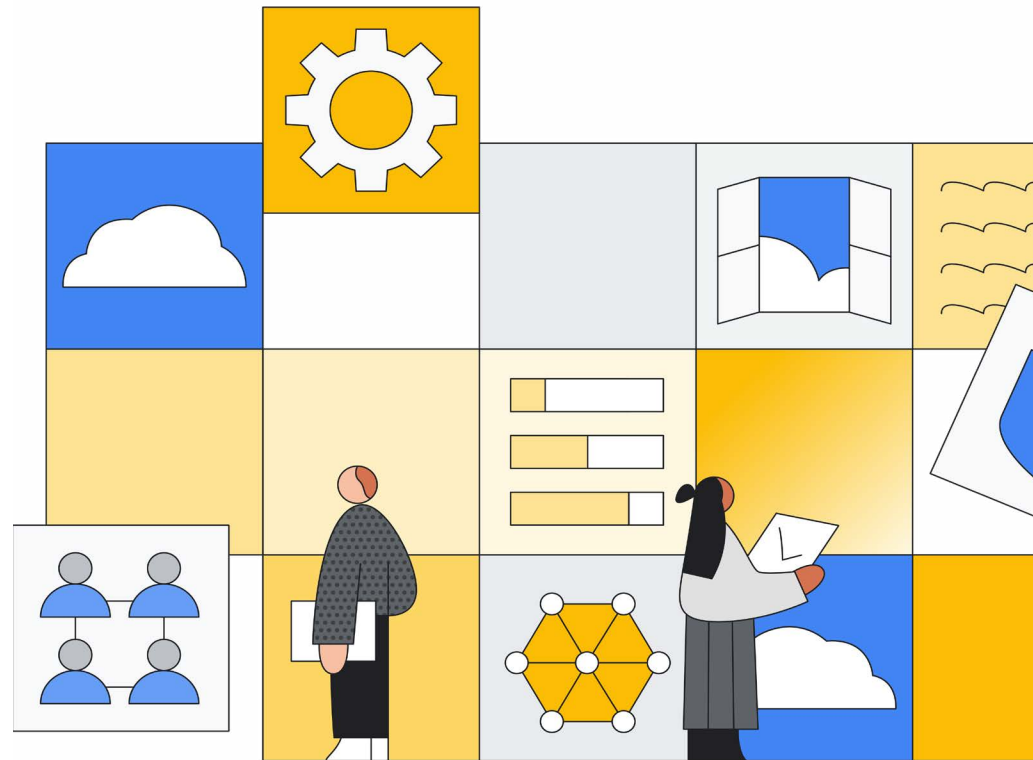
Compare high-level performance for on-prem and cloud hosts during a migration

You can use Datadog's Host Map to get a high-level view of key performance metrics for your hosts, such as CPU utilization or request throughput. This enables you to easily identify under- or over-provisioned resources and compare performance between your on-prem and newly migrated hosts. For example, you can use the Host Map to compare the performance of on-prem services to ones that were moved (i.e., "re-hosted") to GCE instances, so you can create a proof of concept and test Google Cloud services before you decide to migrate your remaining workloads.

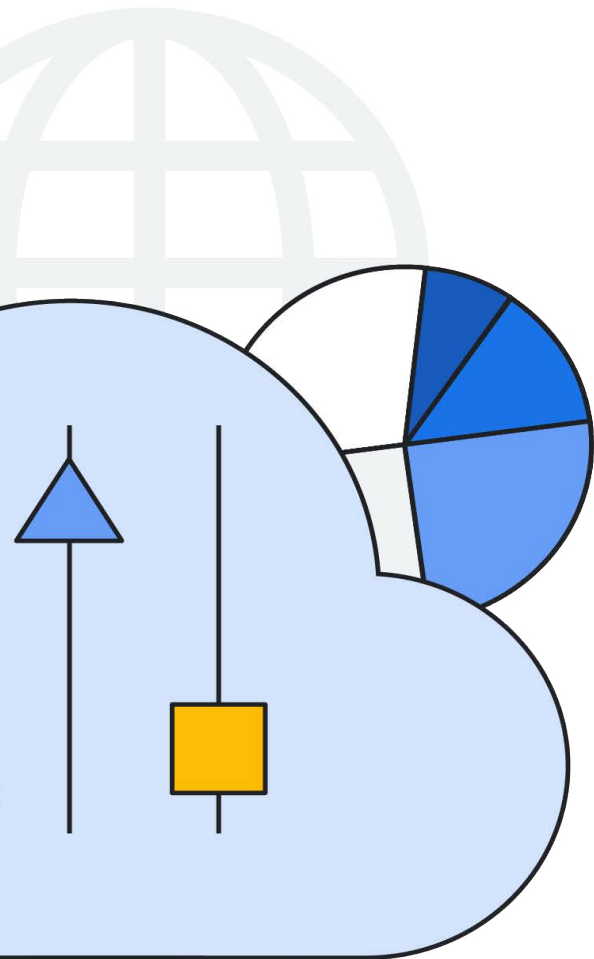
Datadog automatically pulls in tags, such as `host` and `service`, from all your on-prem hosts as well as infrastructure tags from your Google Cloud services like `availability zone` and `autoscaling_group`, so you can search for and drill down to specific resources across any on-prem and cloud environment.

Detect new hosts as soon as they come online

A key benefit of migrating workloads to Google Cloud is being able to leverage its provisioning and scaling capabilities. Google Cloud can automatically scale resources to meet demand, and Datadog monitors those resources as soon as they spin up. With Live Container monitoring, you get insight into the status and performance of all your Kubernetes clusters and individual containers hosted on GKE in real time. Datadog collects resource metrics at a two-second resolution, so you are continuously updated on the state of your container environments.



Monitoring your workloads on Google Cloud with Datadog



As each of your newly migrated workloads comes online, Datadog allows you to proactively monitor them with full visibility into their dynamic Google Cloud environments. Datadog's core features unify metrics, traces, logs, network performance data, and more from on-prem data centers and from the full suite of Google Cloud services, providing a single source of truth for quick troubleshooting, performance optimization, and cross-team collaboration. All of your metrics, logs, and traces in Datadog are organized under a common set of tags, so you can seamlessly access, pivot between, and correlate all the data relevant to a particular issue. This helps reduce risk during modernization of infrastructure and applications and continues to ensure that migrations and other operations occur on-time and on-budget.

[Infrastructure Monitoring](#) provides metrics, visualizations, and alerting to ensure your engineering teams can maintain and optimize your Google Cloud and hybrid environments.

[Google Cloud integrations](#) use Google Cloud APIs to pull data from nearly all Google Cloud services (in addition to hundreds of other third-party services) including App Engine, Compute Engine, Kubernetes Engine, BigQuery, and more.

[Application Performance Monitoring \(APM\)](#) provides end-to-end distributed tracing from browser and mobile apps all the way down to databases and individual lines of code. By seamlessly correlating distributed traces with frontend and backend data, Datadog APM enables you to monitor service dependencies and health metrics, reduce latency, and eliminate errors so that your users get the best possible experience.

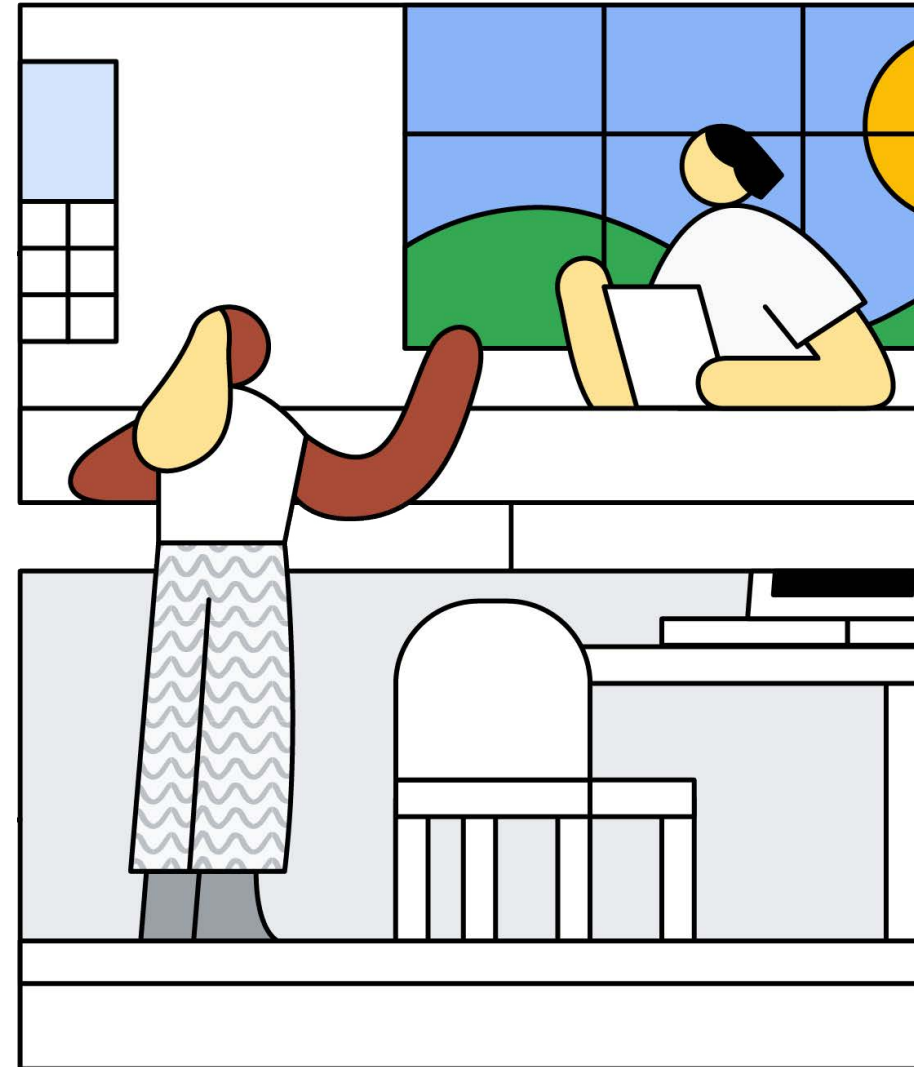
[Log Management](#) unifies logs, metrics, and traces in a single view, giving you expanded context for analyzing log data. Whether you're troubleshooting issues, optimizing performance, or investigating security threats, Logging without Limits™ provides a cost-effective, scalable approach to centralized log management, so you can get complete visibility across your stack.

[Service Catalog](#) enhances this function by consolidating all knowledge about microservices such as ownership, interdependencies, critical resources, and real-time performance. It allows you to manage service ownership at scale and identify dependencies in complex, microservice-based applications so you can collaborate effectively during incidents, detect gaps in observability, and gain instant performance insights.

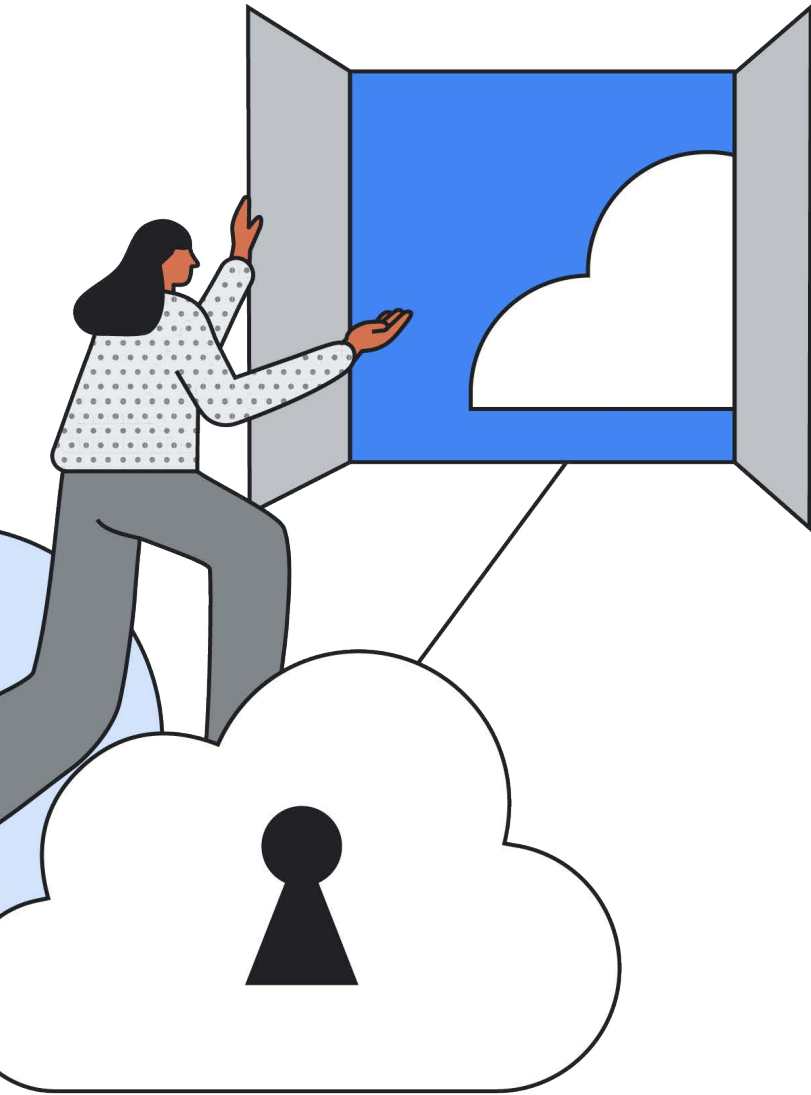
[Network Performance Monitoring \(NPM\)](#) provides full visibility into every network component that makes up your on-prem, cloud, and hybrid environments, with little to no overhead. By monitoring the performance of connections among your hosts, services, virtual private clouds (VPCs), and other elements, you can quickly determine when your network is the root cause of any issue.

[Cloud Security Management](#) delivers real-time threat detection and continuous configuration audits across your entire production environment. Built on top of Datadog's observability platform, Cloud Security Platform helps identify misconfigurations as well as suspicious file and process activity. Automated enrichment of ingested logs provides insight into security threats so you can view and correlate context-rich signals to reconstruct attack paths and secure your environment.

[Cloud Workload Security \(CWS\)](#) performs deep, in-kernel analysis of workload activity across your hosts and containers to uncover threats, providing out-of-the-box threat detection, with the ability to customize security rules to extend coverage to your whole environment. CWS also offers File Integrity Monitoring (FIM), which collects file change events, providing deep visibility into file activity across your entire environment including containers and hosts.



Migrations: The more you know



We've looked at the benefits of migrating to Google Cloud to build cost-effective, resilient applications, as well as some challenges with moving services to the cloud. It's important to create a migration strategy so you can reduce any unexpected performance issues as you move workloads. And, once you start the migration process, cross-platform visibility is key to ensuring a successful migration.

Migrating to the cloud opens up a vast array of opportunities for modernizing and optimizing legacy applications, but a successful cloud migration requires thorough planning and access to the right tools and training. With extensive planning and preparation, your organization will be well equipped to navigate a cloud migration.

As you move your workloads to the cloud, you'll need to monitor them to ensure that your services remain available to users. Datadog's built-in support for Google Cloud provides insight into your resources throughout every stage of a migration—as well as after your workloads have been migrated—so you can ensure a successful transition and make informed decisions about how to optimize usage and leverage the full potential of the cloud.

[Sign up](#) for your free 14-day Datadog trial today.