



Keurig Dr Pepper: An SAP Cloud Migration and Modernization Journey

SAP on Google Cloud

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Keurig Dr Pepper (KDP) is one of the leading beverage companies in North America, offering some of the most recognized hot and cold beverage brands to consumers across the continent. Formed in 2018 from the merger of Keurig Green Mountain and Dr Pepper Snapple Group, KDP is the first company to bring both hot and cold beverages together in the market, with its wide range of 125+ brands that are designed to satisfy virtually any consumer need, at any time. The company’s powerful sales and distribution network means it can deliver its portfolio to consumers at nearly every point of purchase.

The merger inspired the newly formed KDP’s migration to the cloud, as the company looked to reduce IT costs and operate more efficiently. KDP was looking to merge its data centers, as well as to migrate its instance of SAP Hybris to the cloud and begin using containers for its SAP systems for greater agility, among other benefits of the cloud.

After performing a cost-benefit analysis of various cloud providers, KDP selected Google Cloud as its cloud infrastructure-as-a-service provider. A successful pilot of SAP Hybris on Google Cloud followed in 2018 and 2019, after which KDP began exploring the benefits of migrating the rest of its SAP environment and running Kubernetes on Google Cloud for even greater agility, availability, and cost-savings. KDP decided to migrate more than 450 SAP and other workloads from on-premises and third-party

colocation instances to Google Cloud, with the support of implementation partner HCLTech. The Google Cloud Professional Services Organization (PSO), together with KDP and HCLTech, established the following objectives and guiding principles for the migration project:

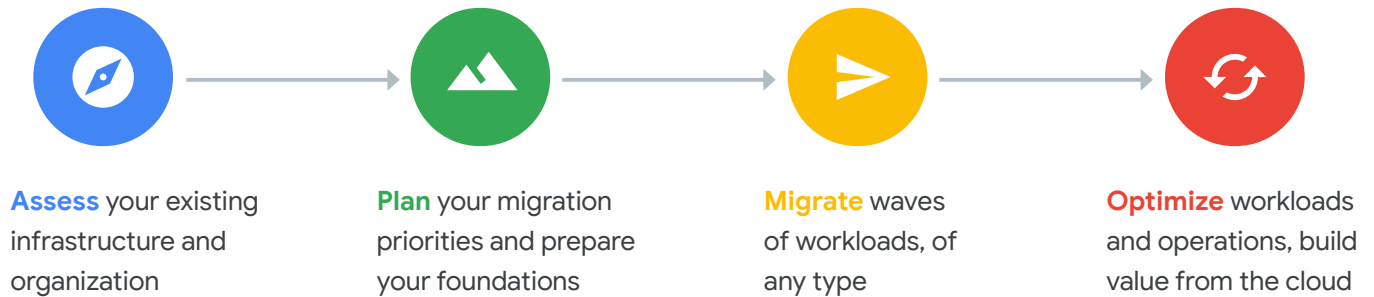
- Migrate all systems from data centers to Google Cloud by March 2020
- Execute the migration in two distinct streams: Google Cloud Infrastructure Build and SAP Migration
- Build an additional disaster recovery site with Google Cloud Bare Metal as a Service (BMaaS)
- The target solution deployment should meet or exceed current SLA requirements
- Employ an “as-is” deployment strategy
- Do not introduce technology “for technology’s sake”
- All patterns should follow the same deployment architecture
- Retain all current app and database combinations

In this white paper, we’ll take a closer look at the four-stage migration process. We’ll explain in detail the steps that the Google Cloud PSO team, the KDP project team, and HCLTech took to execute the migration with minimal disruption to support business continuity – and how your organization can take similar steps. We’ll also address lessons learned that can help your company consider and prepare for its own cloud migration of SAP and non-SAP workloads.



Keurig Dr Pepper (KDP) is one of the leading beverage companies in North America, offering some of the most recognized hot and cold beverage brands to consumers.

4 stages of cloud migration



ASSESS: Perform a cloud discovery and application assessment

A cloud migration involves significant changes within the organization, spanning people, processes, and technology. To begin the migration journey, Google Cloud PSO, KDP, and HCLTech collaborated on a cloud discovery exercise to identify hardware and SAP applications running in KDP’s data center that are qualified to migrate their workloads to Google Cloud quickly and with minimal effort. We defined requirements, dependencies, and other integration components for systems running in KDP’s data center, considering the following factors:

- Whether an application has dependencies and integrates with other applications
- How critical the application is for the business
- How difficult the application is to migrate, whether it requires any upgrades, or whether we can quickly perform a lift and shift of the workload

Engaging a cloud migration partner

For organizations that have put off moving to the cloud, one of the barriers is often the perceived risk – particularly the risk of disruption in planning and executing a migration. To minimize risk, Google Cloud recommends engaging either [Google Cloud Professional Services Organization](#) or a third-party Google Cloud service partner that will augment your team’s cloud skill set and work with you to plan and execute the entire project. [Explore Google Cloud service partners.](#)



PLAN: Lay a foundation, prepare resources, and shore up security

Next, we created a full migration plan to move systems from the on-premises data center and colocation instances to Google Cloud. Developing a migration plan prevents issues during the migration and ensures that production go-live proceeds smoothly. Items we addressed in the migration plan included SAP workload priorities, timelines, functional and application testing, volume testing milestones, resources, and project costs.

This step assesses your current environment(s) and generates detailed insights into your applications, using Google Cloud automation methods to deploy SAP HANA and the appropriate Google Cloud application resources.

Setting a Google Cloud foundation

Establishing the Google Cloud foundation is the most important set of steps required to plan for a migration. Doing so helps enterprises create the basic cloud infrastructure to support SAP workloads and plan

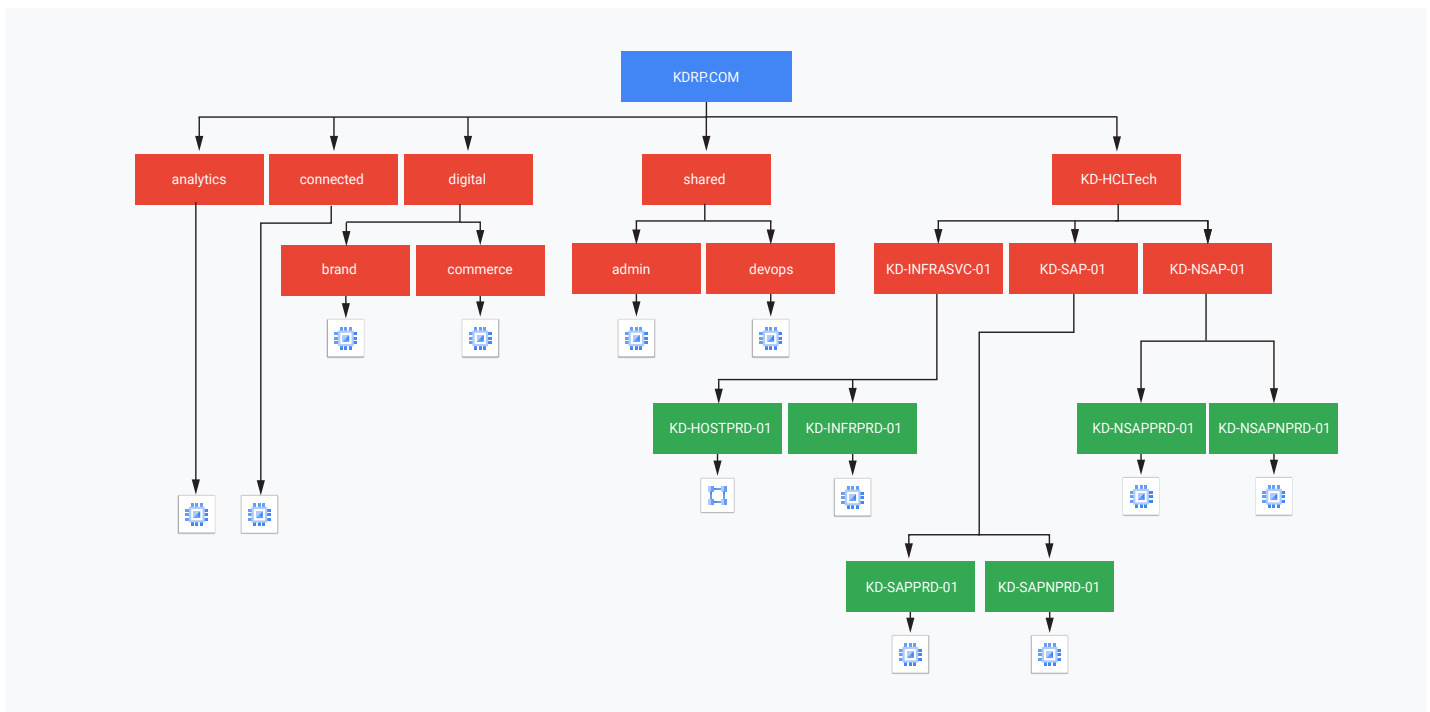
how that infrastructure supports SAP applications. This planning allows companies to create cloud projects, which form the basis for enabling and using all Google Cloud services – for instance, configuring Virtual Private Clouds (VPCs) within Google Cloud and consuming Google Cloud resources like Compute Engine, Storage, and Network, among others.

The Google Cloud team worked with KDP and HCLTech to establish a Google Cloud foundation that addressed the following six areas:

1 Resource hierarchy of organization, folders, and projects

Through [Resource Manager](#), Google Cloud provides companies with resources such as organizations, folders, and the ability to manage projects in folders, which allow you to group and organize other Google Cloud resources hierarchically.

In the case of KDP, the Google Cloud [resource hierarchy](#) leverages the existing “KDRP.com” Google Cloud organization as the root node of its structure. Google Cloud recommends [one project per application](#) of service for each environment approach you employ.



The preceding diagram provides a high-level overview of the structure for the Host and Service project.

- **KD-Infra-svc-project-01**
 - KD-host-project-01 project contains network and [security services](#) (e.g., [Cloud Interconnects](#), [VPN gateways](#), connections, shared and service VPCs, [subnets](#), and [firewalls](#)).
 - KD-infra-svc-project-01 project contains infrastructure Google Compute Engine (GCE) instances (e.g., Domain Controllers, Microsoft Endpoint Configuration Manager, SolarWinds, Splunk Connectors, SAP Enterprise Backup Solution, monitoring solutions, etc.).
- **KD-sap-svc-project-01**
 - KD-sap-svc-project-01 project contains production SAP GCE instances.
 - KD-sap-svc-nonprod-01 project contains non-production SAP GCE instances.
- **KD-nonsap-svc-project-01**
 - KD-non-sap-svc-project-01 project contains non-SAP Fly Together Applications and other production, non-SAP Compute Engines.
 - KD-non-sap-ncp-svcproject-01 project contains non-SAP Fly Together Applications and other non-production, non-SAP Compute Engines.

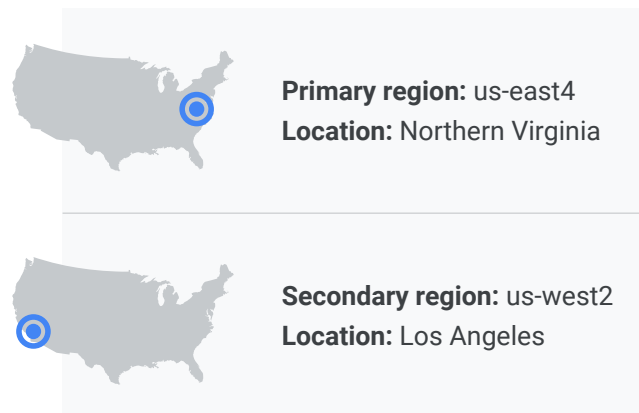
[Learn more](#) about Google Cloud resource hierarchy.

Additional information and reference documents

- [Explore Google Cloud locations](#) and which products are available in which locations.
- [Learn more](#) about Google Cloud regions and zones, as well as Google Cloud service dependencies.
- [See Google Cloud’s global products](#), which are available with no dependence on location.
- [Discover](#) the Google Cloud Dedicated Interconnect locations for guidelines on choosing colocation facilities.

Google Cloud regions

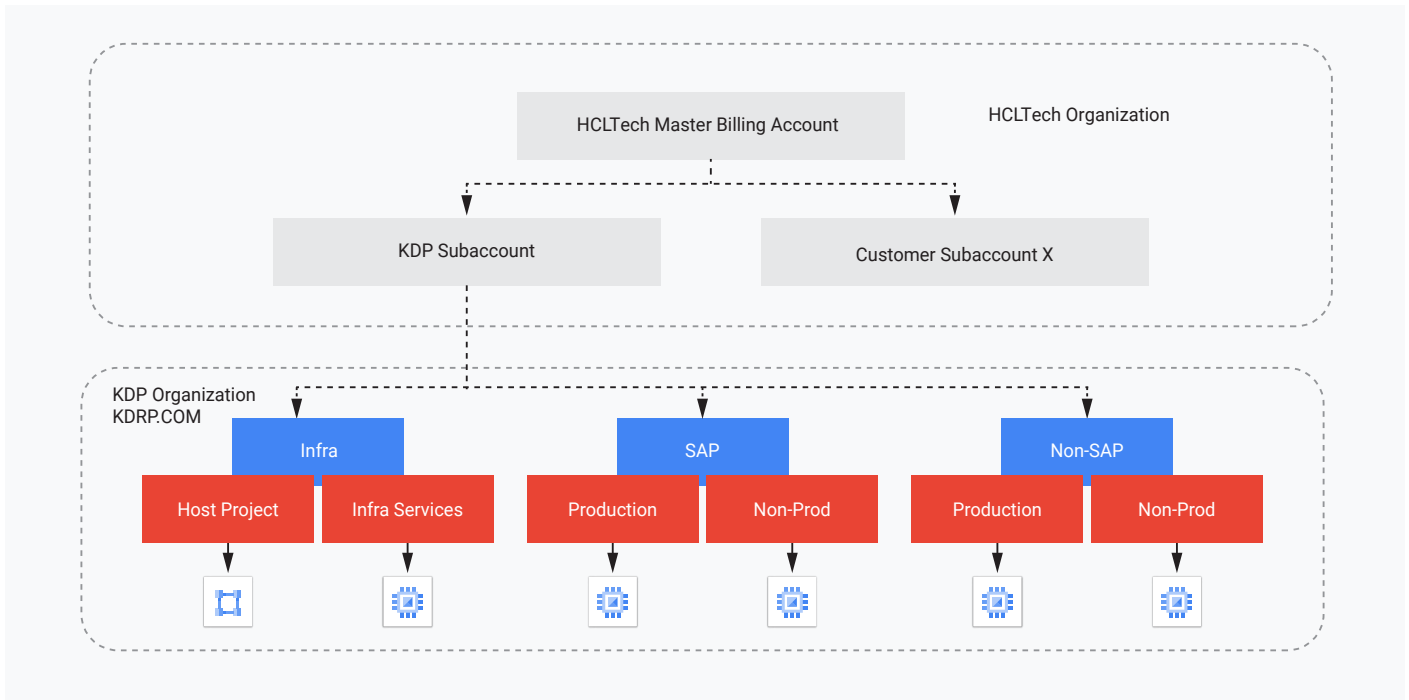
In an effort to leverage the breadth of Google Cloud’s [geographical regions](#), the Google Cloud PSO team followed the recommendations of the [Google Cloud Region Picker](#) for KDP’s [network data centers](#) and services. KDP’s current “hot and cold” infrastructure and applications will be deployed to these diverse geographic regions:



The primary region was selected due to its geographic proximity to KDP’s existing data centers, to minimize latency. We selected the secondary site (DR site) to provide full geographic disparity within North America, and because this region offered the 12 TB virtual machines (VMs) needed for a DR environment at the time of migration.



Billing Subaccounts



2 Billing

Next, we created a billing hierarchy subaccount strategy that would allow for a master billing account for HCLTech and a billing subaccount for KDP.

In this design, the HCLTech master billing account charges the KDP subaccount to cover resources and services used by HCLTech to run infrastructure and SAP workloads on Google Cloud for KDP.

When creating a billing strategy for your organization, Google Cloud recommends taking these steps:

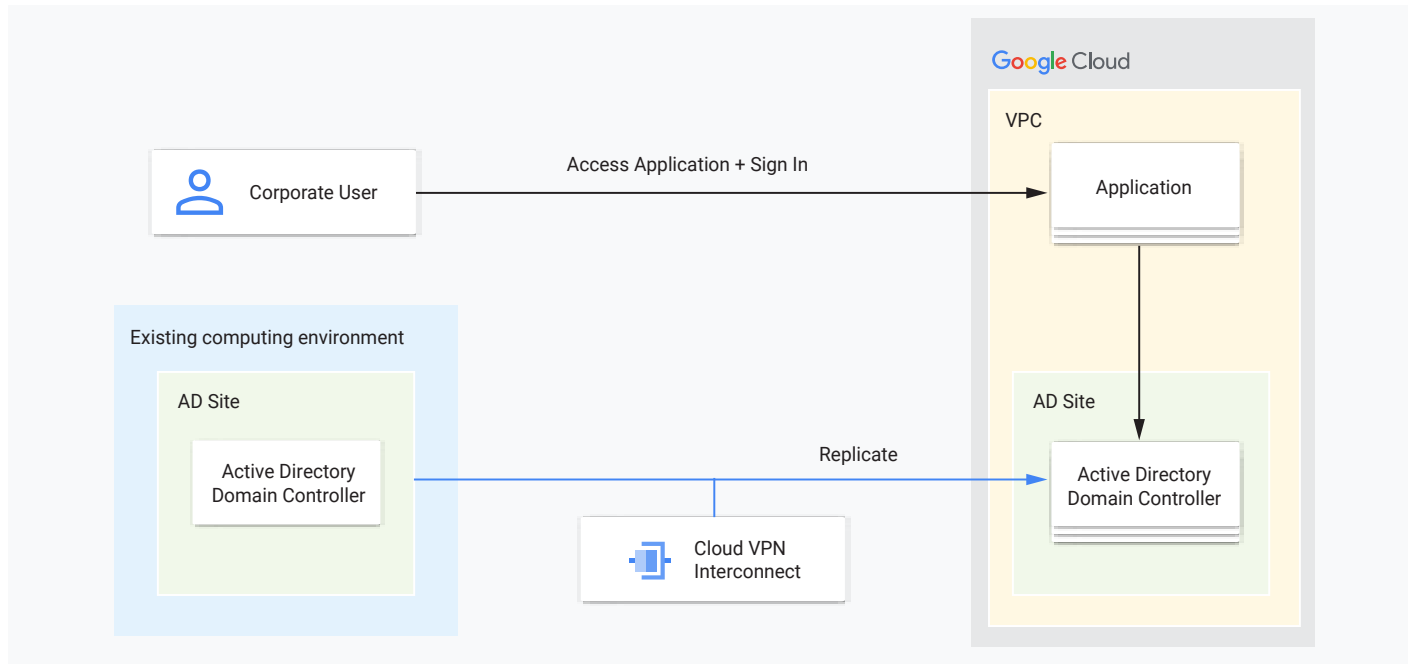
- Break out the current SAP and non-SAP “prod” and “non-prod” projects into folders, and then put the projects under them. This creates another layer of separation, should it become necessary later.
- Choose a more descriptive name for the “Infrastructure” folder – for example, “Infrastructure/Services” – if you decide to have multiple “Infrastructure” and/or “Services” projects.
- Configure billing alerts to notify you early on of any projects with unexpectedly high spending.

Additional information and reference documents

- Learn more about [using resource hierarchy for access control](#).
- Dive deeper into [projects](#).
- Find out more about [how IAM Policy inheritance works](#).
- Set up [custom roles for billing](#) access.
- Receive [billing and budget alerts](#).



Architecture for Active Directory Domain Controller



3 Extending Active Directory

The Google Cloud PSO and HCLTech teams worked together to design a solution for extending KDP’s Active Directory environment, which offers the company flexibility for future identity and networking considerations.

To extend Active Directory, we integrated domains into Google Cloud DNS forwarding [as instructed in the reference tutorial](#). Note that doing so requires [Cloud DNS forwarding](#), a feature that’s in beta. For reference, the [Google Cloud Managed Service for Microsoft Active Directory solution](#) leverages the same functionality.

Additional information and reference documents

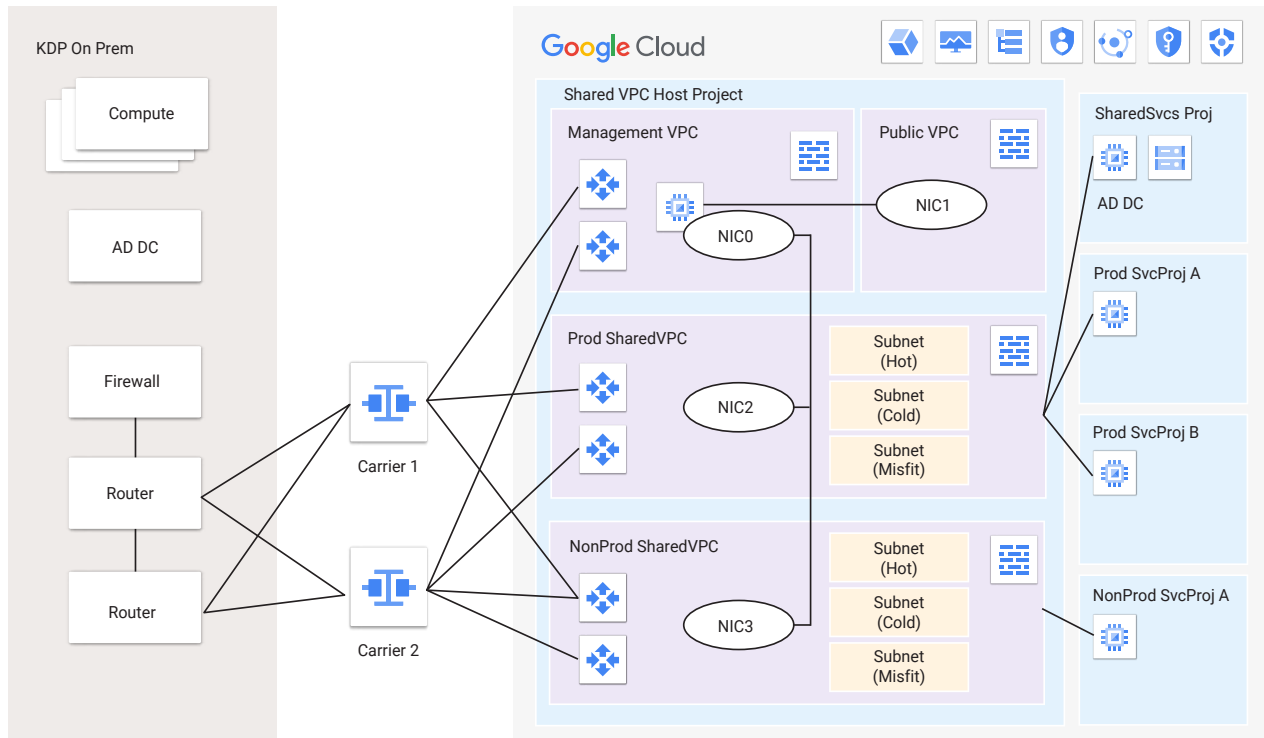
- Understand the benefits of the resource forest pattern [Active Directory integration in a hybrid environment](#).
- Learn more about [Cloud DNS features and capabilities](#).
- Learn to map [Active Directory groups to Google Cloud IAM groups](#).

4 Network and connectivity

KDP runs SAP and non-SAP workloads on Google Cloud in a [shared VPC model](#). This model allows the KDRP.com organization to connect resources from multiple projects to a common VPC network, so that they can communicate with each other securely and efficiently using internal IPs from the VPC network. With a [shared VPC model](#), services that are offered across the organization, like Interconnect between on-premises infrastructure and Google Cloud, can be shared while still segregating production and non-production workloads – which complies with Google Cloud best practices and KDP security standards.

We deployed four VPCs: public, management, production, and non-production. While production and non-production workloads are separated, traffic can flow between them as permitted by any third-party firewall that meets the customer requirements. Interaction with the internet occurs through the public network, and the third-party firewalls secure traffic for both the public and management networks as well.

Network Architecture of KDP on Google Cloud



Traffic flow

To monitor traffic through the networks while enhancing high availability, we deployed a pair of Palo Alto Networks VM-500 network virtual appliances (NVAs) in an active-active configuration. Two zones – an internal and an external zone – on the Palo Alto Networks NVAs have been configured to a single virtual router. All traffic from the internet will terminate at Google Cloud external load balancers, which will forward traffic to NVAs for secure communications to production or non-production Compute Engines.

KDP uses [Cloud Interconnects](#), which connect to [Cloud Partner Interconnects](#) and are set up in an active/passive configuration to achieve 99.9% availability between KDP's current data centers and the us-east4 and us-west2 Google Cloud regions. You can find a list of the available Cloud Interconnect locations [here](#).

As an example, a peering configuration for KDP could look like this:

- **East coast data center**
 - Ashburn, iad-zone1-1, [Equinix Ashburn \(DC1-DC11\)](#)

- Los Angeles, lax-zone1-8, [Equinix Los Angeles \(LA1\)](#)
- **West coast data center**
 - Los Angeles, lax-zone1-19, [CoreSite - LA1](#)
 - Atlanta, atl-zone1-11, [Equinix Atlanta \(AT2/AT3\)](#)

This type of configuration is a cost-effective way to create interconnect attachments in the same regions as your VM instances to avoid egress costs when the VM instances send traffic to your on-premises network.

Additional information and reference documents

- Learn more about [VPC firewall rules](#), and about [Palo Alto Networks VM-Series Firewalls](#).
- Get an overview of [hybrid and multi-cloud patterns and practices](#).
- Learn more about [types of Cloud VPNs and compare their capabilities and SLAs](#).
- Explore best practices and reference architectures for [VPC design](#).
- Understand [resource hierarchies](#).

Network security

To strengthen KDP networks against perimeter threats, Google Cloud recommended deploying all systems in Google Cloud using the principle of least privileges and established firewall rules to manage traffic between source and target subnets and instances tagged using separate custom service accounts. Learn more [here](#).

Below are tools, recommendations, and best practices for building secure networks as you plan your migration:

- [VPC Service Controls](#) can help protect Google Cloud resources by providing context-based controls. Context-based controls should be used along with identity-based controls ([Google Cloud IAM](#)) to help provide defense in depth.
- [Firewall Rules Logging](#) allows you to audit, verify, and analyze the effects of your firewall rules. For example, you can determine if a firewall rule designed to deny traffic is functioning as intended.
- [VPC Flow Logs](#) record a sample of network flows sent from and received by VM instances, including instances used as [Google Kubernetes Engine \(GKE\)](#) nodes. Use these logs for network monitoring, forensics, real-time security analysis, and expense optimization.
- [Cloud Armor](#) provides additional real-time protection against DDoS attacks for external-facing applications, which KDP will leverage once it begins hosting external-facing applications on Google Cloud.
- [Identity-Aware Proxy \(IAP\)](#) provides additional access control for Google Cloud applications and VMs. IAP is the most secure way to perform authentication and authorization to VMs on Google Cloud, and can protect both secure shell (SSH) and remote desktop protocol (RDP) connections.

5 Security

The Google Cloud, HCLTech, and KDP established five basic concepts to implement security on Google Cloud during each phase of the migration:

1. Implement [explicit firewall rules](#).
2. Implement a well-defined process of [provisioning IAM users](#) and [service accounts](#) (including credential activation).
3. Track escalation of [IAM privileges](#) (for example, changing roles and permission for users and service accounts).
4. Learn how to conduct your own [forensics](#).
5. Deploy basic [Forseti Security for Google Cloud](#).

To manage the process of reviewing and responding to security threats, KDP leveraged its existing relationship with [Splunk](#) to run its security operations. The Google Cloud PSO team recommended using [this model](#) for pushing the logs of the SAP instances to Splunk.

6 Key management

To secure sensitive customer data stored on Google Cloud, KDP uses [Cloud Key Management Service \(KMS\)](#) with Cloud IAM integration and logging support. With Cloud KMS, KDP's data is now secured by:

- [Encryption](#) at rest
- AES 256-bit [encryption keys](#)
- [Cloud IAM](#) permissions for user-level permissions on individual keys
- [Monitor Logs](#) for system auditing and proper use of keys
- Simple, fast, native Google Cloud integration

MIGRATE: Determine and execute the migration strategy to Google Cloud

Creating a high-level migration strategy for SAP and non-SAP workloads

Any organization developing a migration strategy faces many decisions, as the KDP, Google Cloud, and HCLTech teams did – the most significant being which migration approach to take for each application and system. The following table will help you consider your choices in light of your organization’s priorities and risk profile, and the dependencies of other applications that integrate with your SAP systems.

Replace (Greenfield)	Refactor (Move and improve)	Replatform (Lift and optimize)	Rehost (Lift and shift)
Decommission the entire application and replace it with a new cloud-native application.	Move the existing applications and workloads to run on modern form factors without modifying code.	Move applications to Google Cloud with significant changes, taking advantage of the cloud environment.	Move as-is from the current environment to Google Cloud.
<ul style="list-style-type: none"> • Highest level of time and effort required • Risk of business disruption • High cost • High degree of testing required • Highest innovation 	<ul style="list-style-type: none"> • Highest level of time and effort required • Risk of business disruption • High cost • High degree of testing required 	<ul style="list-style-type: none"> • Highest level of time and effort required • Risk of business disruption • High cost • High degree of testing required 	<ul style="list-style-type: none"> • Lowest time and effort required • Easy to migrate • Lowest cost to migrate • Low risk • Some innovation

Note: More than one path is often chosen to migrate an entire SAP landscape to Google Cloud.

For KDP’s move to the cloud, the KDP, Google Cloud, and HCLTech teams elected to perform a lift-and-shift migration, moving the applications and workloads from the on-premises environment to Google Cloud directly, without rewriting or changing them. However, before conducting a lift-and-shift migration, it’s necessary to identify the closest size Compute Engine on Google Cloud and compare the size to your on-premises machine. We performed an SAP quick-sizing exercise to identify SAP-certified HANA VMs and SAP application servers that are required for each environment to ensure we used the correct size of [Google Cloud VM](#) for deploying SAP applications on the database.

The migration was an opportunity for members of the KDP IT team to develop new cloud skills and redefine their roles for operating in the cloud. Through multiple workshops with KDP and HCLTech, we aligned KDP’s staff resources to build necessary skills – including how to use and move workloads quickly using [Migrate for Compute Engine](#) and [supported operating systems](#).

1 Google Compute Engine

During the initial migration, GCE instances were running with a mix of Windows and Linux operating systems. Instances that require a license run on a “pay as you go” (PAYG) model.

In terms of SAP licenses, SAP runs on Google Cloud under a [bring-your-own-license](#) (BYOL) model. Instances using this model run on “Sole tenant” nodes. With the BYOL model, KDP provided the implementation team with its SAP software licenses to ensure that KDP would be in compliance with SAP’s licensing terms and agreements.

GCE instances should be right-sized based on post-migration performance. Compute Engine on Google Cloud automatically provides a sizing recommendation by default based on CPU and memory usage of the VM instances. And, if the [Stackdriver](#) monitoring agent is installed, which provides a report, and if the monitoring agent is installed, it collects additional disk, CPU, network, and memory data from VM instances to monitor and size your infrastructure.

Note: Some instances were running on a very old operating system that was not supported on Google Cloud. Google Cloud PSO worked with KDP and HCLTech service partners and guided them with several recommendations and options.

Recommendations and Best Practices

	Option 1: Upgrade the instance to a Google Cloud-supported OS before using M4CE	Option 2: Migrate the unsupported OS as-is using M4CE, and upgrade the OS later	Option 3: Build the target instance on a supported OS and perform backup and restore
Pros	<ul style="list-style-type: none"> This is Google Cloud best practice. This option is low risk. 	<ul style="list-style-type: none"> Quickly lift and shift using automation tools - M4CE. 	<ul style="list-style-type: none"> This option is low risk.
Cons	<ul style="list-style-type: none"> The OS upgrade may require downtime, and project timelines could be affected. 	<ul style="list-style-type: none"> Having an application running on an unsupported OS adds risk. In case of issues, it’s difficult to troubleshoot and identify a permanent fix. This option requires vendor-based support. 	<ul style="list-style-type: none"> More time is required for the migration. This option is costlier, as more integration and regression testing is required.

For SAP systems to run at peak performance, it's critical that you select the correct machine type.

- For SAP Netweaver Application, see the specific recommended Google Cloud instance type [here](#).
- Google Cloud "highmem" and "ultramem" instances are certified for SAP HANA, IBM DB2, ASE, MaxDb, and MS SQL Server. Learn more [here](#).

Note: Because of the time constraint, KDP wanted to move out of its on-premises data center, so our teams agreed to implement the SAP high availability solution in phase 2.

To further accelerate the migration, the KDP, Google Cloud, and HCLTech teams evaluated a number of Google Cloud automation tools to perform the lift-and-shift migration of SAP workloads from the current data center to Google Cloud, settling on Migrate for Compute Engine and CloudEndure (the latter of which is now deprecated).

2 Storage

We deployed premium [Zonal Persistent Disks](#) (SSD) for all SAP workloads. All non-production and production workloads requiring higher IOPS and throughput will also leverage this disk type for boot disk and attached storage.

3 Google Cloud Storage

KDP has leveraged [Google Cloud Storage](#) with SAP Enterprise Backup Solution, and standard multi-regional or regional buckets will be used as required by KDP's disaster recovery (DR) requirements. Data stored in Google Cloud Storage is encrypted using default encryption.

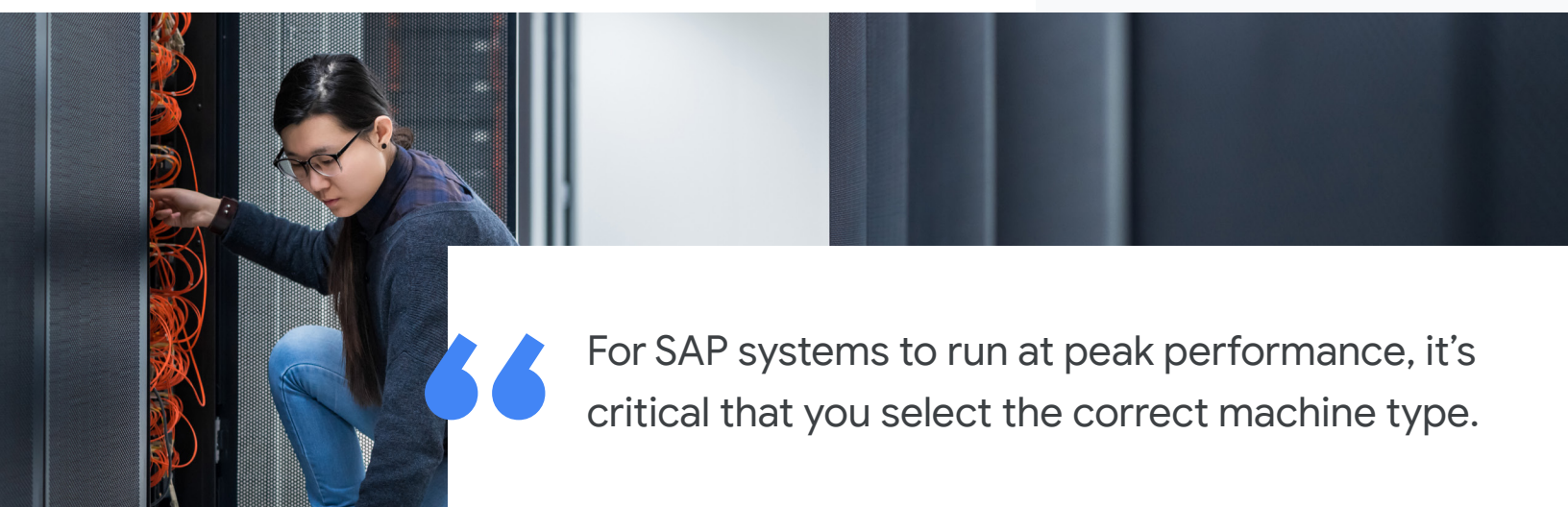
Additional information and reference documents

- Dive deeper into [GCE public and custom images](#), and more.
- [Right-size your cloud instance](#) before migrating a virtual machine to Compute Engine with [GCE instance sizing recommendations](#).
- Discover how to [create VMs with multiple network interfaces](#).
- Learn more about the automation tool [Migrate for Compute Engine \(M4CE\)](#).

Google Cloud offers the following storage types:

- [Standard \(HDD\) persistent disks](#): Low-cost block storage for large devices
- [SSD persistent disks](#): Fast and reliable block storage, with high IOPS and low latency
- [Local SSDs](#): High-performance local block storage
- [Cloud Storage buckets](#): Affordable object storage

For more information, see [Storage Options](#).



For SAP systems to run at peak performance, it's critical that you select the correct machine type.

Beginning the migration

Having defined a migration strategy based on KDP’s migration triggers, business goals, and SAP workload priorities, we began to execute the migration in four phases, focusing first on modernizing SAP systems that were critical to business workloads and that will see continued investment.

Phase 1: Lift and Shift

SAP Application	DB Type	Region	GCP Instance Type
ECC 6	HANA	US East 4	m2-ultramem-416
ECC 6	SQL Server	US East 4	n1-highmem-32
BW	HANA	US East 4	m1-megamem-96
SCM	SQL Server	US East 4	n1-standard-32
SLT	SQL Server	US East 4	n1-standard-32
PI	SQL Server	US East 4	n1-standard-32
GRC	SQL Server	US East 4	n1-standard-16
MII	SQL Server	US East 4	n1-standard-32
EP	SQL Server	US East 4	n1-standard-16
Solman	SQL Server	US East 4	n1-standard-32

Phase 2: Consolidate and Convert

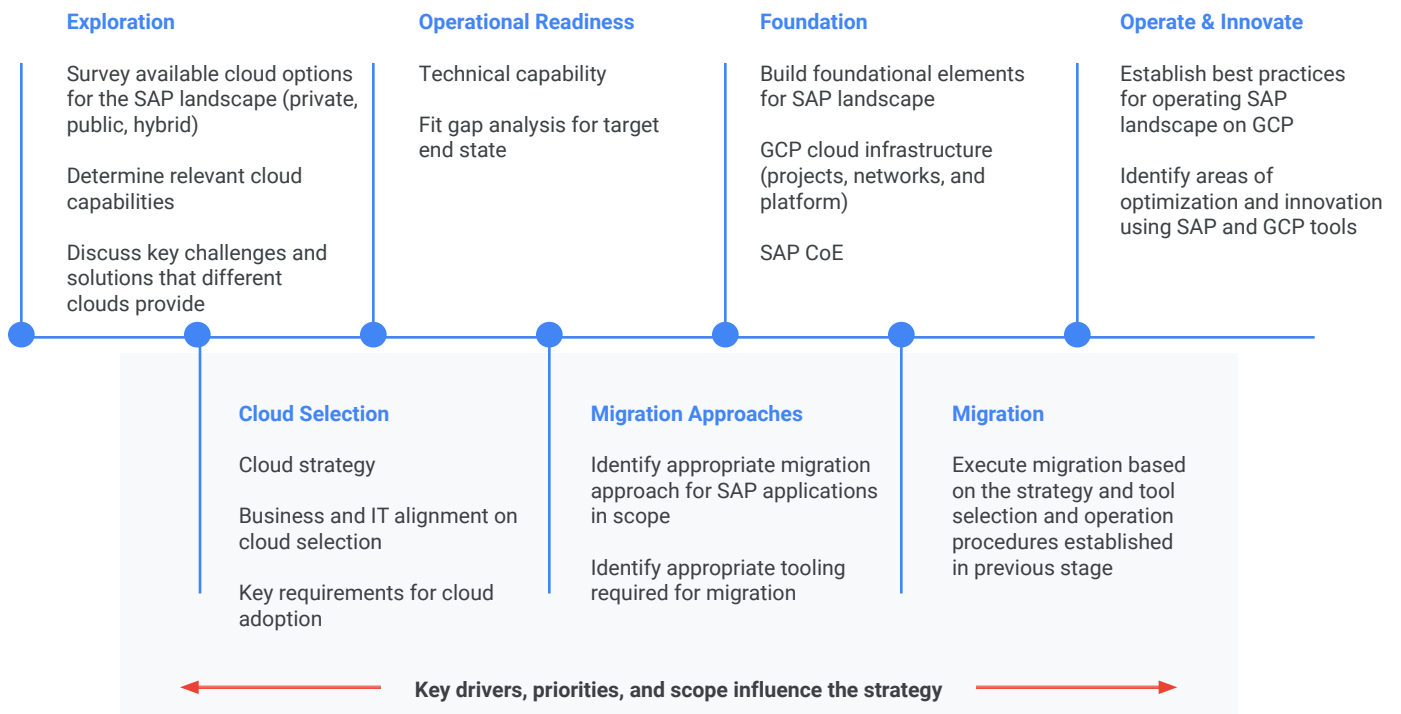
SAP Application	DB Type	Region	GCP Instance Type
EWM	HANA	US East 4	m1-ultramem-160
GRC	HANA	US East 4	n2-highmem-8
Solman	HANA	US East 4	n2-highmem-80
PO	HANA	US East 4	
S/4	HANA	US East 4	n2-highmem-64

Phase 3: High Availability

SAP Application	DB Type	Region	GCP Instance Type
ECC 6	HANA	US East 4	m2-ultramem-416
ECC 6	SQL server	US East 4	n1-highmem-32
S/4	HANA	US East 4	n2-highmem-64
SCM	SQL Server	US East 4	n1-standard-32
EP	SQL server	US East 4	n1-standard-16

Phase 4: Disaster Recovery

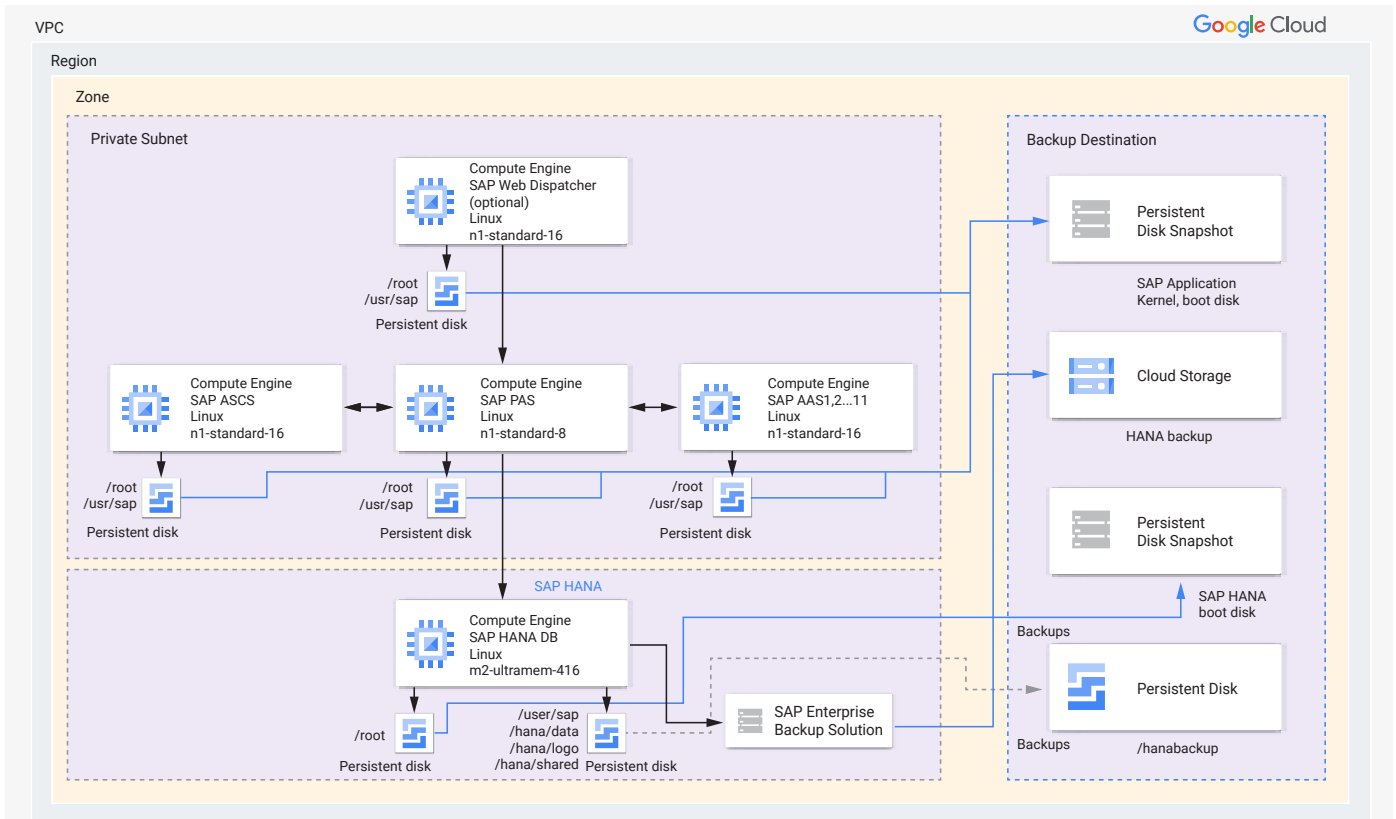
SAP Application	DB Type	Region	GCP Instance Type
ECC 6	HANA	US West 2	m2-ultramem-416
ECC 6	SQL Server	US West 2	n1-highmem-32
SCM	SQL Server	US West 2	n1-standard-32
SLT	SQL Server	US West 2	n1-standard-32
PI	SQL Server	US West 2	n1-standard-32
MII	SQL Server	US West 2	n1-standard-32



Hot vs. cold system

Following the merger of Keurig (hot) and Dr Pepper Snapple Group (cold), KDP needed to bring its multiple data centers together under one HCLTech support contract. By doing so, KDP simplified and unified the support processes while it works through the SAP licensing requirements and back-end support systems.

SAP ECC on HANA Architecture – March 2019 (Deprecated)



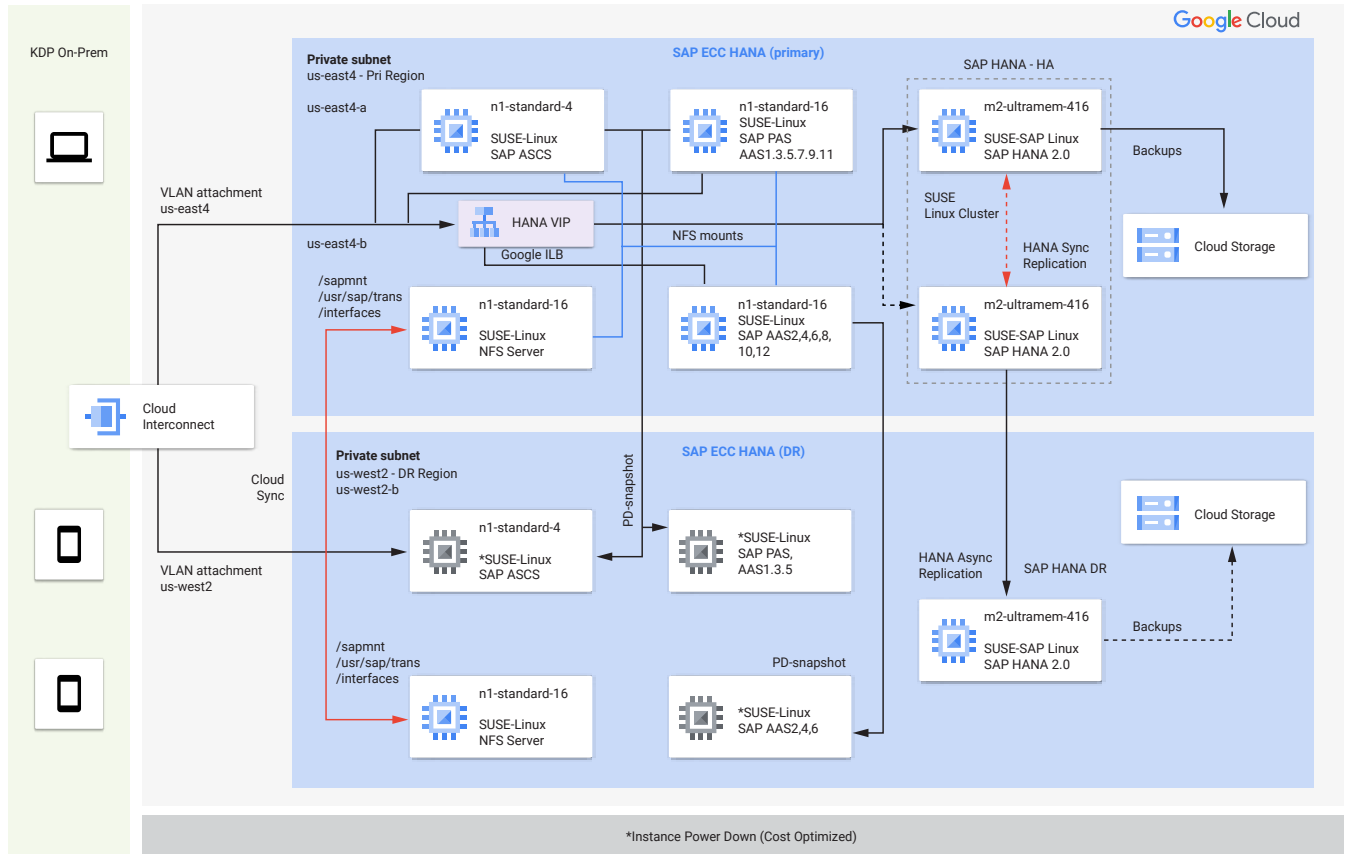
OPTIMIZE: High availability considerations and cost optimization

After workloads have been migrated to Google Cloud, it is important to ensure you manage them properly. We worked with KDP and HCLTech to prepare different teams that need to be actively involved in monitoring and securing SAP workloads on Google Cloud, and planning for high availability and disaster recovery.

High availability (HA) refers to sets of techniques, engineering practices, and design principles that enable business continuity in the event of failures. These approaches work by eliminating any single point of failure (SPOF) in the system and providing the ability to seamlessly resume operations with minimal business disruption in case of any component failure(s) in the system. Fault recovery is the process of recovering and resuming after an outage due to a failed system component.

Before the migration, KDP struggled with availability, experiencing three outages in one month. So, for KDP's SAP HANA 12 TB instance, the Google Cloud PSO team proposed an HA architecture across the zone in order to meet the SLA of 99.99%.

SAP ECC on HANA Architecture with High Availability – Current



Additional information and reference documents:

SUSE Best Practices for HANA HA on Google Cloud

- Explore the [SUSE HA Test Practice Cluster guide](#).
- Refer to section 10.1.1 for different test cases of [SAP HANA SAP HANA Performance Optimized Test Scenarios](#).
- SAP HANA SR performance Optimized Scenario - SLES 12SP01 - [SAP HANA HA autofailover](#).
- Download the [SUSE Linux Enterprise server for SAP and HANA Applications 12 SP4 Guide](#).

SAP documentation and important open storage service (OSS) notes

- System Replication Best Practices - [SAP HANA System Replication](#)
- System Replication Setup - [How To Perform System Replication for SAP HANA](#)
- [Troubleshoot System Replication](#)



Disaster recovery

When a primary site that hosts mission-critical technical infrastructure becomes completely unavailable, that is considered a disaster. It's important to consider the probability that a disaster might occur with or without warning because some steps, such as relying on completion of replicas, depend on whether a disaster occurs with warning. In all cases, you need to retain full access to your disaster recovery systems both for users and any other systems interacting with the DR system. You also need to ensure that enough capacity is available at the disaster recovery site. Learn more [here](#).

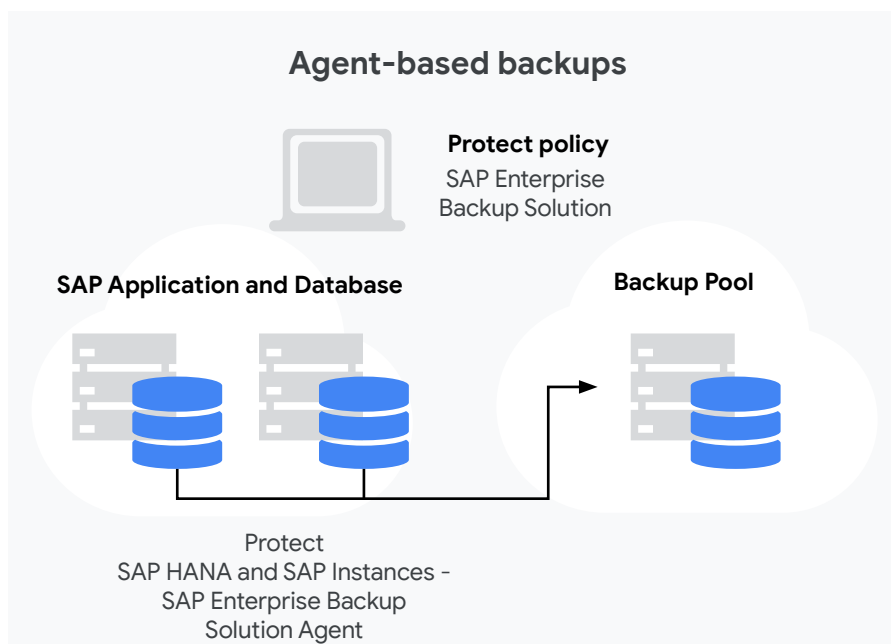
Options for Google Cloud for SAP DR

DR Scenario	RTO	RPO	Database	File Shares	App Servers	Cost \$\$
1	Days	Day	*Backup/restore	*Backup/restore	*Backup/restore	Low
2	Hours	Minutes	Backup/restore or asynchronous replication	Backup/restore or file sync async replication	Backup/restore	Medium
3	Minutes	~0	Asynchronous replication	Storage asynchronous replication	Pre-build, restore from GCP image or Google snapshot	High

Backup and recovery

The KDP team used SAP Enterprise Backup Solution to deliver backup and restore functionality for SAP HANA and Netweaver applications for SAP S/4HANA on Google Cloud. The software platform delivers the unparalleled advantages and benefits of a truly holistic approach to data and information management.

SAP Enterprise Backup Solution Architecture



“This whole journey has made us much more resilient and takes out huge daily operational risk for all of KDP while saving on our operating costs. Great win all around and a fantastic set of learnings for KDP and for all of our partners.”

– VP of IT Digital Transformation

Lessons learned

Throughout the migration process, the KDP, Google Cloud PSO, and HCLTech teams continually assessed our progress to revisit key strategies, identify wins, and glean learnings – for ourselves and for any company embarking on a cloud migration of their SAP systems. Below are key lessons and takeaways from the KDP migration.

- While planning a migration, identify current cloud knowledge and skills of the company and the migration partner, and where those knowledge and skills differ from those of the Google Cloud team. Then, develop a training plan that will fill those skills gaps to ensure the project go-live is successful. The following training courses and resources proved to be invaluable to the KDP and HCLTech teams:
 - [Google Cloud Essentials](#) and [Google Cloud Architecture](#)
 - [Foundation of Google Cloud Security](#)
 - [Identifying and resolving application latency issues with SRE](#)
 - [SAP on Google Cloud fundamentals](#)
 - [SAP deployment checklist on Google Cloud](#)
 - [Disaster recovery using SAP HANA backups](#)
- Understand the impact of live migrations to the SAP HANA systems and multi-zone setup.

- IO performance issues related to storage performance were discovered. These were tied to the number of CPUs allocated to an instance. As a result, on most of KDP’s non-HANA databases, we had to quadruple the number of CPUs on the instance to get the same performance in a non-cloud data center.
- SAP ECC suffered outages while running SAP HANA on a single node, as high availability was not implemented in phase 1.
- During large migrations of VMs, we discovered that when using Migrate for Compute Engine (Velostrata), VMs need to be shut down in colocations and moved to another environment that is entirely controlled by the customer or the implementation partner.
- While working with partners on Google Cloud, perform a capacity planning exercise, especially for any large VM instances used for SAP workloads.

Forge ahead with a smooth cloud migration

It’s no longer a question of whether it makes sense to migrate your SAP systems to the cloud, but rather when. Concerns about the business disruption have kept many organizations from taking advantage of the cloud’s many performance benefits, but KDP has demonstrated how it’s possible to migrate critical SAP and non-SAP workloads quickly and with minimal business disruption when you team up with the right cloud provider and partner.



To learn more about how Google Cloud can help your organization accelerate business outcomes, reduce risk, and leverage the best cloud technology for your SAP investment, contact us at cloud.google.com/solutions/sap.