Google Cloud Platform Workshop "GCP for Almarai"

GCP can help Almarai to accelerate innovation and its ability to digitally transform

Agenda

Google Cloud

Google Cloud Platform Introduction (GCP)

Google Cloud

What makes Google Cloud different

Best-in-class Security ❯ Protect systems, data, and users
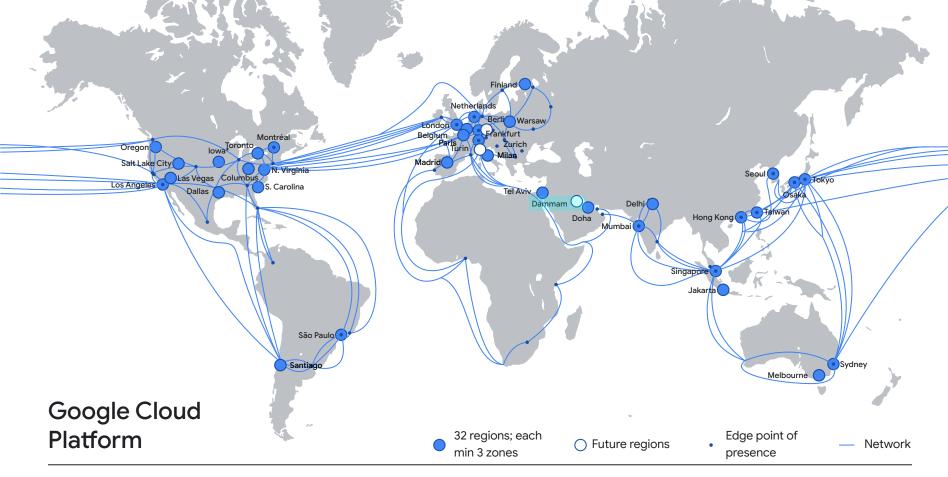
Hybrid & Multi-Cloud ❯ Enables choice

Fully Managed No Ops ❯ Ease of use with serverless

Embedded AI & ML ❯ Intelligence in everything

Best of Google ❯ Bringing culture of innovation to customers and partners

Google Cloud Platform

Regions, PoPs, and network

32 regions; each min 3 zones

Future regions

Edge point of presence

Network

*Exception: region has 4 zones.

Google Cloud

As part of the 2030 alignment, His Excellency, **Abdullah Alswaha**, Minister of Communications and Information Technology of Saudi Arabia, met with **Thomas Kurian**, CEO of Google Cloud and **Abdul Rahman Al Thehaiban,** the Managing Director for Google Cloud META, to discuss their strategic partnership in cloud computing and the ways to promote the growth of the digital economy and entrepreneurship in the KSA.

Google Data Centers

spark

MODON

stc

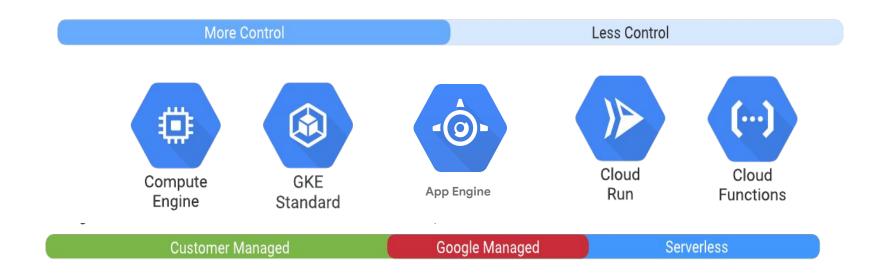**Google energy goal** is to run its data centers on carbon-free energy worldwide by 2030

GCP Core Services

Cloud Compute products portfolio

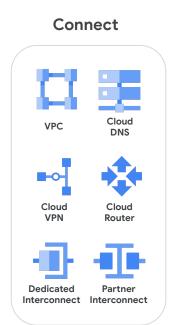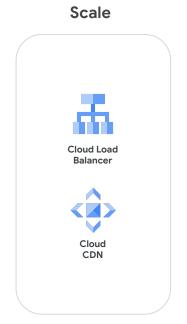Everything you need to lift-and-shift today, and expand and/or modernize tomorrow

More Control | Less Control

Compute Engine | GKE Standard | App Engine | Cloud Run | Cloud Functions

Customer Managed | Google Managed | Serverless

Google Cloud

Cloud Networking products portfolio

Everything you need to lift-and-shift today, and expand and/or modernize tomorrow

Connect

VPC

Cloud DNS

Cloud VPN

Cloud Router

Dedicated Interconnect

Partner Interconnect

Secure

Cloud Armor

Firewall Rules

Packet Mirroring

Cloud IAP

Cloud NAT

Scale

Cloud Load Balancer

Cloud CDN

Optimize

Premium Tier

Standard Tier

Network Intelligence Center

Modernize

GKE Networking + On-Prem (in Anthos)

Traffic Director (in Anthos)

Google Cloud
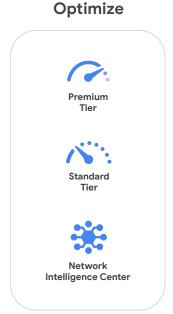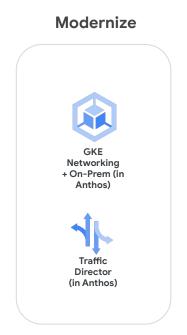
Google Cloud's security offerings

Governance, risk compliance

Third-party audits and certifications

Assured Workloads

Risk Manager

Google Vault for Workspace

& Identity & access management
Cloud Identity Cloud IAM Identity Platform
Titan Security Key Cloud Resource Manager
Cloud IAP **BeyondCorp Enterprise**
Certificate Authority Service

Endpoint security
Chromebooks,   Device
ChromeOS, Chrome browser,Management
Safe Browsing

Application security
Binary Authorization Container Registry Vuln Scanning Web Security Scanner
Secret Manager **Apigee** reCAPTCHA Enterprise

Default encryption at rest
Cloud KMS, HSMs,
Confidential Computing

Data security
Workspace doc controls, IRM

Cloud DLP
Workspace DLP

Network security
Cloud Firewalls & VPCs Default encryption in transit Anthos Service Mesh
Cloud Armor Cloud IDS

Infrastructure security
Cloud Infrastructure

Security monitoring operations

Cloud Audit Logging

Security Command Center

Chronicle

Workspace Security Center

Access Transparency

Siemplify

Mandiant

Google Cloud

Cloud Database & Storage products portfolio
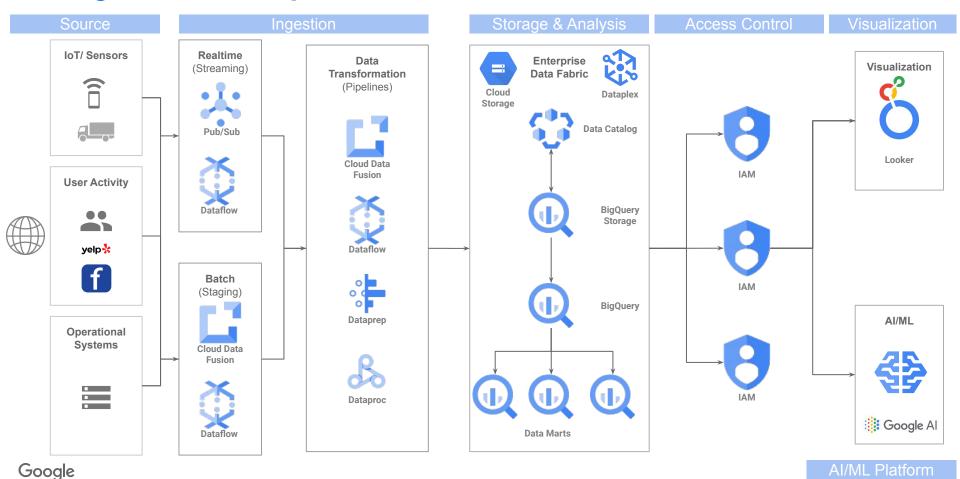
Everything you need to lift-and-shift today, and expand and/or modernize tomorrow

In Memory	Relational		NoSQL		Analytical	Object	Block	File
Memorystore	Cloud SQL	Cloud Spanner	Firestore	Cloud Bigtable	BigQuery	Cloud Storage	Persistent Disk	Filestore
Managed Redis & Memcached	Managed MySQL and PostgreSQL, and SQL Server	Scalable relational database	Serverless, scalable, document store	Low-latency, scalable key-value and wide-column store	Enterprise DW	Unstructured data, objects or blobs	Local VM file storage	Lift/shift apps requiring file

Google Cloud
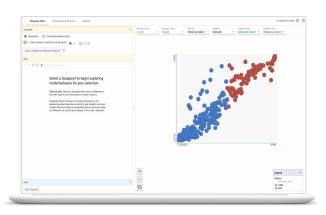
Google Data Analytics Platform

Source	Ingestion	Storage & Analysis	Access Control	Visualization

Source

IoT/ Sensors

User Activity

yelp

Operational Systems

Ingestion

Realtime
(Streaming)

Pub/Sub

Dataflow

Batch
(Staging)

Cloud Data Fusion

Dataflow

Data Transformation
(Pipelines)

Cloud Data Fusion

Dataflow

Dataprep

Dataproc

Storage & Analysis

Cloud Storage

Enterprise Data Fabric

Dataplex

Data Catalog

BigQuery Storage

BigQuery

Data Marts

Access Control

IAM

IAM

IAM

Visualization

Looker

AI/ML

Google AI

Google

Google AI Platform for smarter applications

Pre-trained APIs

No training data needed, get started right away

AutoML

Easily create custom models (A no-code approach)

Core AI Platform

Help data scientists and ML engineers build custom AI

Google

SAP Innovations with Google Cloud
SAP modernization, infused with all of your data, and amplified with AI/ML

Modern infrastructure
(Running SAP on Google Cloud)

Velocity and scale for the business

- Scaled-up S/4 from 6 to 12 TB seamlessly
- Scaled-out BWoH and grew to 8 nodes
- Higher uptime for SAP with Live Migration

Smart analytics
(Integrating SAP + non-SAP data)

Critical analytics to run the business

- Loaded 15+ petabytes into Google BigQuery
- Joined inventory with point-of-sale data
- Gained end-to-end supply chain visibility

Machine learning extensions
(Augmenting with AI services)

Data insights to transform the business

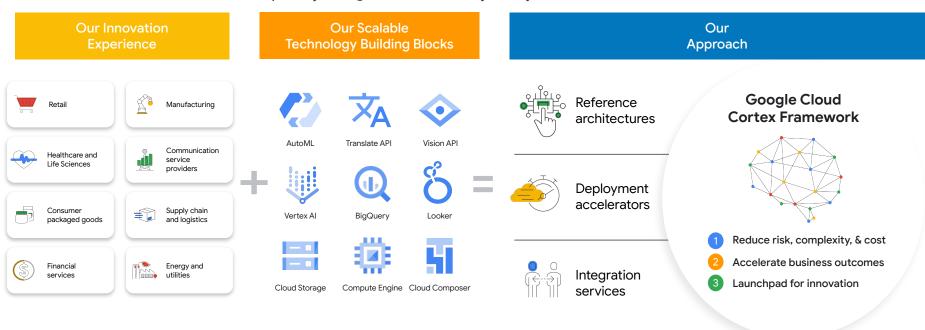- Leveraged the best of machine learning
- Predicted inventory shelf-outs
- Reduced lost sales by restocking in-store

Unlocking Innovation

Google

Google Cloud

Making Innovation Repeatable & Scalable

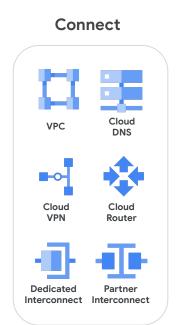Cortex Framework was developed by Google and is used by many SAP customers to accelerate innovation

Our Innovation Experience	Our Scalable Technology Building Blocks	Our Approach

Our Innovation Experience

- Retail
- Manufacturing
- Healthcare and Life Sciences
- Communication service providers
- Consumer packaged goods
- Supply chain and logistics
- Financial services
- Energy and utilities

+

Our Scalable Technology Building Blocks

- AutoML
- Translate API
- Vision API
- Vertex AI
- BigQuery
- Looker
- Cloud Storage
- Compute Engine
- Cloud Composer

=

Our Approach

- Reference architectures
- Deployment accelerators
- Integration services

Google Cloud Cortex Framework

1. Reduce risk, complexity, & cost
2. Accelerate business outcomes
3. Launchpad for innovation

A scenario-driven approach to accelerate cloud innovation & business outcomes

Google Cloud Fundamentals
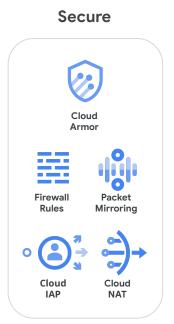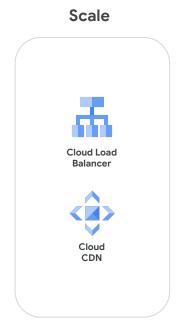
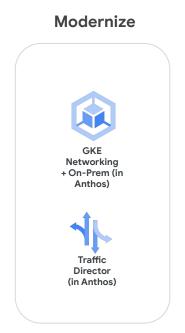Google Cloud

Cloud Networking products portfolio

Everything you need to lift-and-shift today, and expand and/or modernize tomorrow

Connect	Secure	Scale	Optimize	Modernize
VPC	Cloud Armor	Cloud Load Balancer	Premium Tier	GKE Networking + On-Prem (in Anthos)
Cloud DNS	Firewall Rules	Cloud CDN	Standard Tier	Traffic Director (in Anthos)
Cloud VPN	Packet Mirroring		Network Intelligence Center	
Cloud Router	Cloud IAP			
Dedicated Interconnect	Cloud NAT			
Partner Interconnect				

Google Cloud
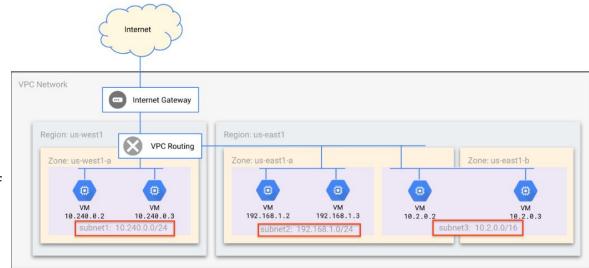
Bisectional Bandwidth

319Tb/sec [2021]
Japan Internet Test

1300 Tb/sec
Single Google Datacenter

Virtual Private Cloud (VPC) Networks

- A VPC network, is an SDN virtual version of a physical network but is a **Global** resource

- Subnets are **Regional** resources, created in VPC networks, and define sets of usable IP ranges for GCP services

- VMs in different zones within the same region can share the same subnet (stretched subnet)

Google Cloud
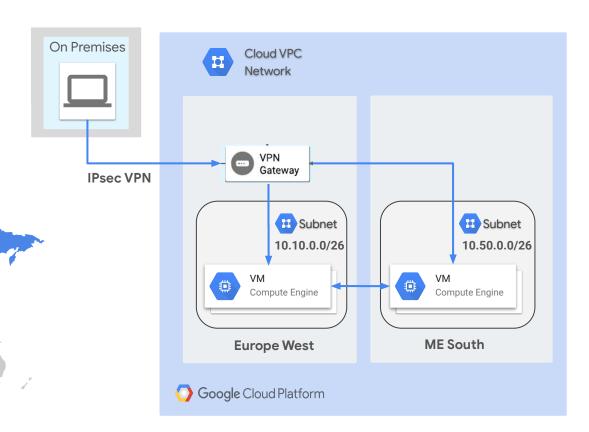
Google Global VPC

- Private connectivity globally

- Single VPN

- Centralized management of network

On Premises

IPsec VPN

Cloud VPC Network

VPN Gateway

Subnet
10.10.0.0/26

VM
Compute Engine

Europe West

Subnet
10.50.0.0/26

VM
Compute Engine

ME South

Google Cloud Platform

Google Cloud

Optimize for cost or performance with Network Service Tiers

Premium Tier (default) uses Google's largest-in-world network of "private express lanes" for performance (1.4x), reliability, and security above and beyond the public internet

Standard Tier offers use of public ISPs at a lower price point

Premium

Standard

Google Cloud

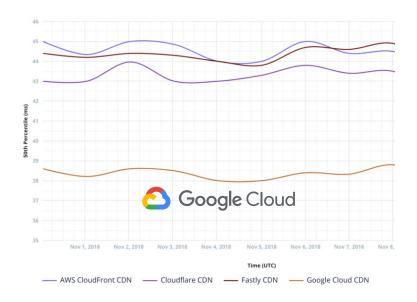# Consistently great user experiences anywhere via Cloud CDN

Easy to Use & Manage
- Single IP address for delivery worldwide
- Single-click activation

Engineered for Security
- TLS (SSL) by default at no additional cost
- Backends unexposed to the Internet
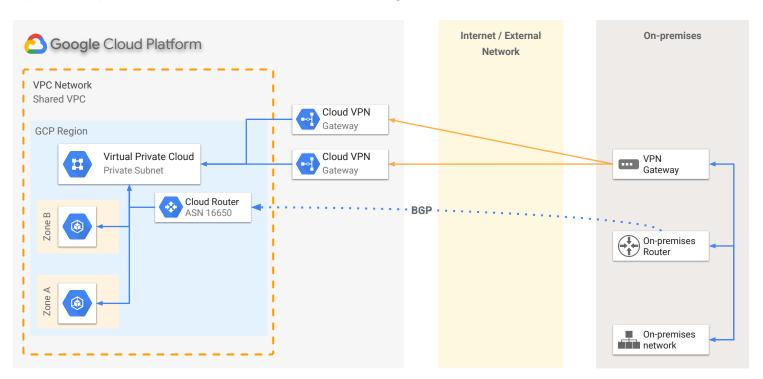
Best Reach, Performance & Availability
- #1 fastest global CDN per Cedexis by Citrix
- 96 edge caches peered with nearly every public ISP in the world
- Optimized for last mile (e.g. QUIC, HTTP/2)

AWS CloudFront CDN — Cloudflare CDN — Fastly CDN — Google Cloud CDN
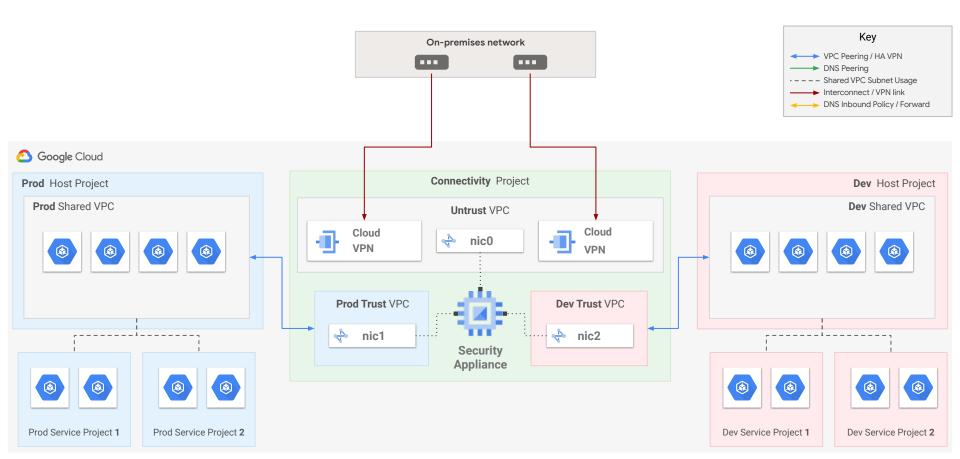
Hybrid Cloud Networking

Extend your on-premise data center into GCP using Virtual Private Cloud & Cloud VPN

Hub & Spoke VPC architecture with familiar Firewall Virtual Appliance
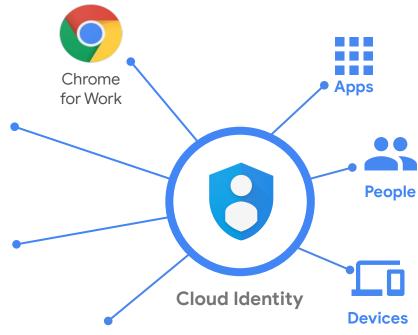
Google Cloud Identity

What is Cloud Identity?

- Cloud Identity is an Identity as a Service (IDaaS) solution that **allows you to centrally manage users and groups** who can access enterprise resources, such as Google Cloud & Google Workspace

- It is the same identity service that powers Google Workspace (formerly G Suite) and can also be used for 3rd party applications
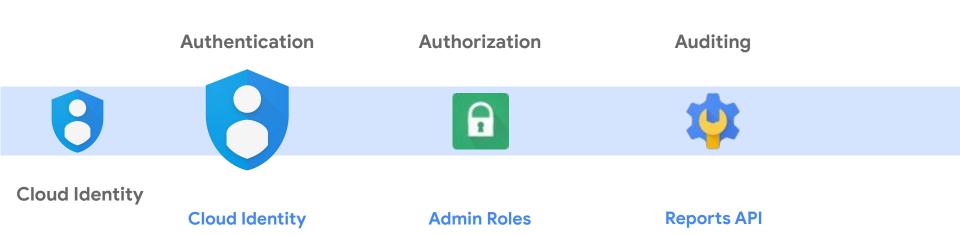
Chrome for Work

Android for Work

Google Cloud

Google Workspace

Cloud Identity

Apps

People

Devices

Google Cloud

Controlling access - Google Cloud Platform (GCP)

| Authentication | Authorization | Auditing |

GCP

Cloud Identity

Cloud IAM

Cloud Audit Logs

Google Cloud

Controlling access - Google Cloud Identity

Authentication   **Authorization**   **Auditing**

Cloud Identity

Cloud Identity   **Admin Roles**   **Reports API**

Google Cloud
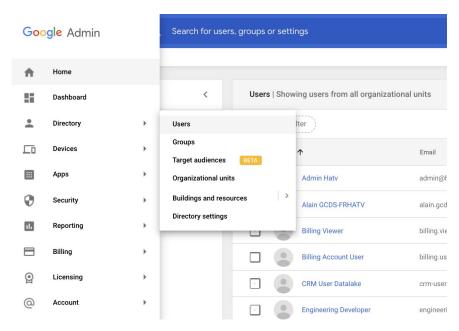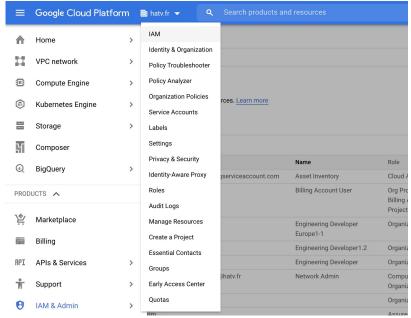
Two Consoles for Users/Access Management

Google Admin (admin.google.com)

Managing Users, Groups, and <u>Authentication</u> settings

Google Cloud
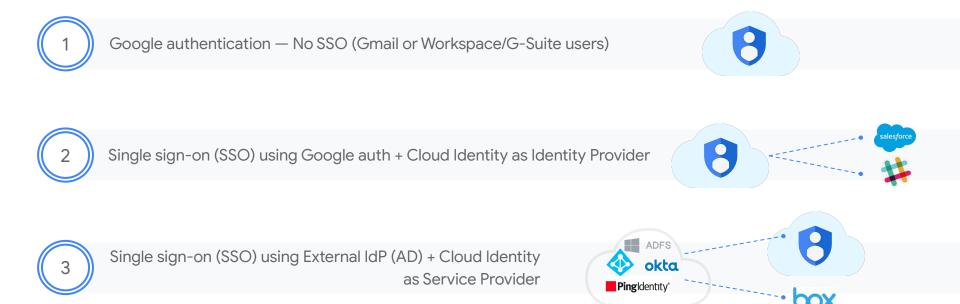
Cloud Console (console.cloud.google.com)

Roles & <u>Authorization</u> for GCP
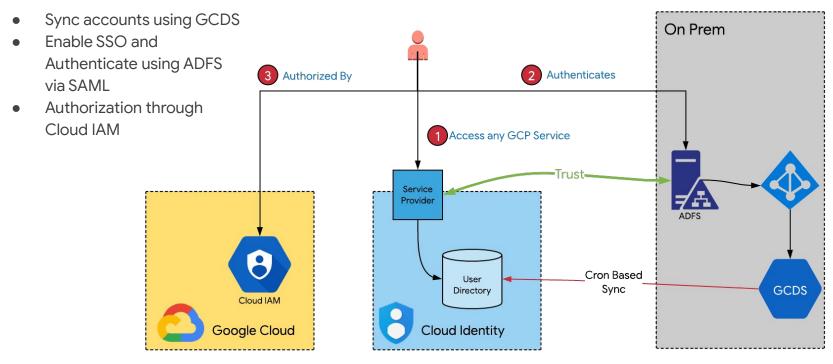
User authentication options

1. Google authentication — No SSO (Gmail or Workspace/G-Suite users)

2. Single sign-on (SSO) using Google auth + Cloud Identity as Identity Provider

3. Single sign-on (SSO) using External IdP (AD) + Cloud Identity as Service Provider

Google Cloud

AD On-Premise Best Practice

- Sync accounts using GCDS
- Enable SSO and Authenticate using ADFS via SAML
- Authorization through Cloud IAM

Cloud Identity Security Options

- **With Multi-factor Authentication with two-Step verification (2SV)** users are required to enter either in addition to their username and password:

  - A **verification code** sent by Google via text message, phone call, or from an Android/iPhone mobile application

  - Or use a **Security Key** (U2F standard) when they sign in

Allowed 2-step verification methods
Select allowed 2-step verification methods. Learn more
○ Any
◉ Only Security Key

Google Cloud
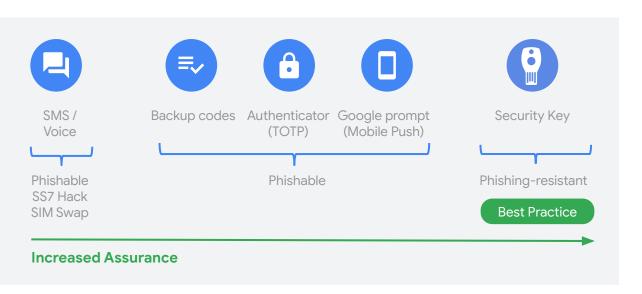
2SV with Google authentication

Any 2SV is better than no 2SV, but not all the 2SV methods are the same

SMS / Voice

Backup codes

Authenticator (TOTP)

Google prompt (Mobile Push)

Security Key

Phishable
SS7 Hack
SIM Swap

Phishable

Phishing-resistant

Best Practice

Increased Assurance

- 2SV adds critical protection against compromised passwords
- **Google recommends Security Keys for best in class security**
- Zero reported account hijackings after security key deployment
- **Google 2SV can be enforced also post-SSO! (requires CI Premium)**
- Android phones can be used as Security Keys

Google Cloud
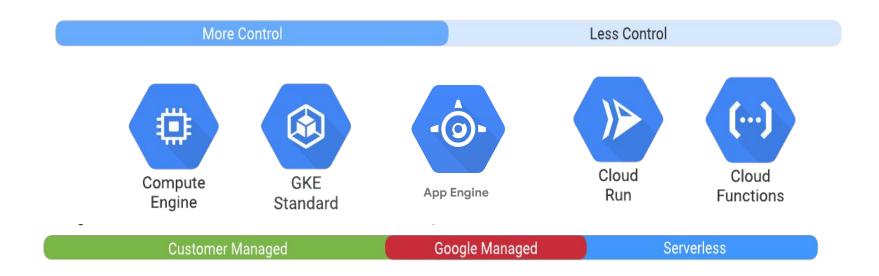
GCP Compute Services

Cloud Compute products portfolio

Everything you need to lift-and-shift today, and expand and/or modernize tomorrow
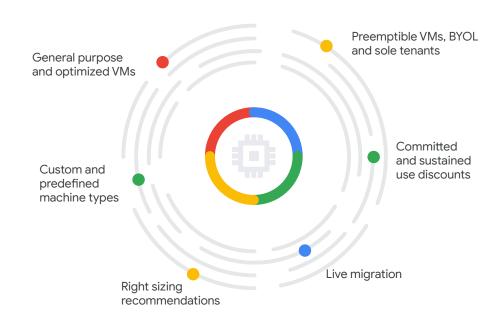
Google Compute Engine

Compute Engine lets you create and run virtual machines on Google infrastructure.

Get access to a variety of predefined and customizable VM families coupled with consumption and pricing models, as well as functionality for all of your application and workload requirements.

General purpose and optimized VMs

Preemptible VMs, BYOL and sole tenants

Committed and sustained use discounts

Live migration

Right sizing recommendations

Custom and predefined machine types

Google Cloud

VM families for real world needs

The right capabilities for all your workloads

Best TCO	Most Flexible, Leading perf/$	Workload-Optimized		
• Web Serving • Steady-state LOB apps • Dev & Test environments	• Enterprise apps • Medium databases • Web & App Serving	• EDA • HPC • Scientific Modeling • AAA Gaming	• SAP HANA • Largest in memory DBs • Real-time data analytics • In-memory cache	• ML • HPC • Massive parallelized computation
Cost savings a priority	Leading perf and perf/$	Highest performance CPUs	Most memory on Compute Engine	Highest performance GPUs
Cost-Optimized **(E2)**	**General Purpose** **(N2, N2D)**	**Compute-Optimized** **(C2, C2D*)**	**Memory-Optimized** **(M2)**	**Accelerator-Optimized** **(A2/A3)**

New

* Roadmap

Pay for what you use

Simple, no upfront fees

Easily flex up and down

Custom sizing available
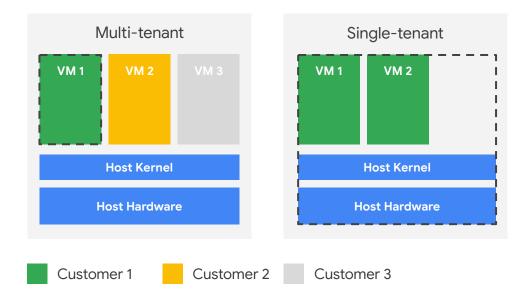
Fixed VM Configurations
Dictated by vendor

Right-sized Recommendations
Optimize for your usage

2 instances could be resized to save an estimated $33 per month

Google Sole Tenant Nodes

Multi-tenant

VM 1	VM 2	VM 3

Host Kernel

Host Hardware

Single-tenant

VM 1	VM 2	

Host Kernel

Host Hardware

■ Customer 1   ■ Customer 2   ■ Customer 3

Physical Compute Engine server dedicated to your VM instances

- Separate instances in other projects, or group instances together on same host hardware
- Host kernel/network not shared
- CPU and RAM not shared

Leverage existing licenses and isolate workloads

- Comply with licensing requirements for bringing existing licenses to GCP
- Use Sole Tenant Nodes to isolate workloads for privacy or regulatory requirements

Google Cloud

GPUs in the Cloud

Accelerate complex compute jobs by adding GPUs

Easily add GPUs to your VMs
- GPUs capable of up to 960 teraflops of performance per instances

All the benefits of Compute Engine
- VM shapes
- Per-second billing
- Preemptible GPU

Customers use GPUs for:

- Machine Learning
- Scientific Computing
- Physical Simulation

- Molecular Modeling
- 3D Visualizations

Google Cloud
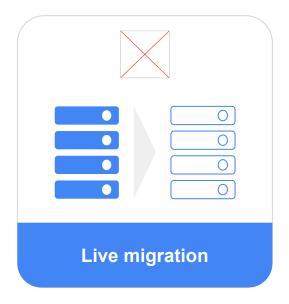
Live Migration

Live migration keeps your virtual machine instances running even when a host system event occurs, such as a software or hardware update.

✓ Compute Engine live-migrates your running instances to another host in the same zone rather than requiring your VMs to be rebooted.

✓ Perform maintenance that is integral to keeping infrastructure protected and reliable without interrupting any of your VMs.

Live migration

Google Cloud
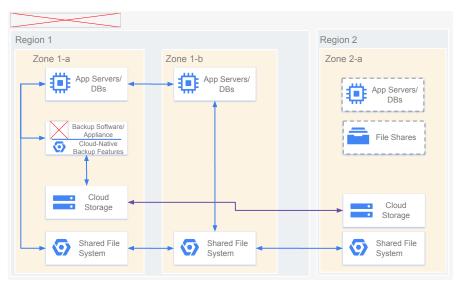
High-availability and recoverability for cloud hosted workflows

- **High-availability across zones** to keep workflows active
  - Leverage multi-zone HA capabilities (e.g. shared file storage, regional object storage)
  - Deploy managed services with built-in regional HA (e.g. GKE, BigTable)

- **Backup and recovery across regions** to minimize operational downtime
  - Stage passive (or active) resources in a secondary region to support critical workflows (e.g. SAP, VMware)
  - Support failover to secondary region if primary region becomes unavailable

Implement cross-region redundancy to minimize downtime in case of a region failure

Google Cloud
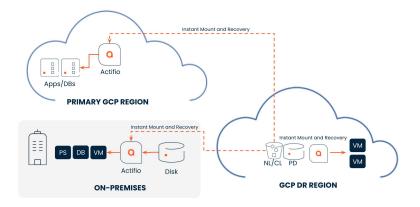
GCP-Native Management via Actifio

- **Backup critical infrastructure to cloud or in-cloud**
  - Application-consistent database backups (e.g. for SAP HANA, Oracle, SQL Server)
  - VMware VM backups
  - Leverages space-efficient, "incremental forever" backup technology
  - Backups stored on cost-effective Google Cloud Storage

- **Restore in secondary location to support Disaster Recovery**
  - Implement hybrid and/or cross-region DR
  - Restore apps/VMs into Google Compute Engine or Google VMware Engine
  - Instant mount and recovery to minimize RTO

- **Simplify and cost-reduce**
  - Easy-to-use, SaaS-based solution
  - Consumption-only pricing
  - Data storage efficiency minimizes TCO

Google Cloud

Cloud Storage products portfolio

Everything you need to lift-and-shift today, and expand and/or modernize tomorrow

In Memory	Relational		NoSQL		Analytical	Object	Block	File
Memorystore	Cloud SQL	Cloud Spanner	Firestore	Cloud Bigtable	BigQuery	Cloud Storage	Persistent Disk	Filestore
Managed Redis & Memcached	Managed MySQL and PostgreSQL, and SQL Server	Scalable relational database	Serverless, scalable, document store	Low-latency, scalable key-value and wide-column store	Enterprise DW	Unstructured data, objects or blobs	Local VM file storage	Lift/shift apps requiring file

Google Cloud

Persistent Disk

	Local SSD	Standard Persistent Disk	SSD Persistent Disk
Target scenarios	In-memory databases High-performance scratch space	Large data processing workloads and some enterprise applications Genomics processing, video transcoding in GCE	High performance database and enterprise applications MySQL, SQL Server, Oracle
Features	Ephemeral storage Highest-performance	Persistent storage Cost sensitive	Persistent storage Performance sensitive
	Encryption 3TB	Encryption, Snapshots 64 TB, Disk Size sets performance (Attach larger VMS for max SSD performance)	

Google Cloud

Cloud storage options for any use case

Standard		Nearline	Coldline	Archive
In multi-region locations for serving content globally.	**In regional locations for data accessed frequently or high throughput needs**	**For data access less than once a month**	**For data accessed roughly less than once a year**	**For long term retention**
Streaming videos	Video transcoding	Serving rarely accessed docs	Serve rarely used data	Regulatory archives
Images	Genomics	Backup	Movie archive	Tape replacement
Websites	General data analytics & compute		Disaster recovery	
Documents				

Google Cloud
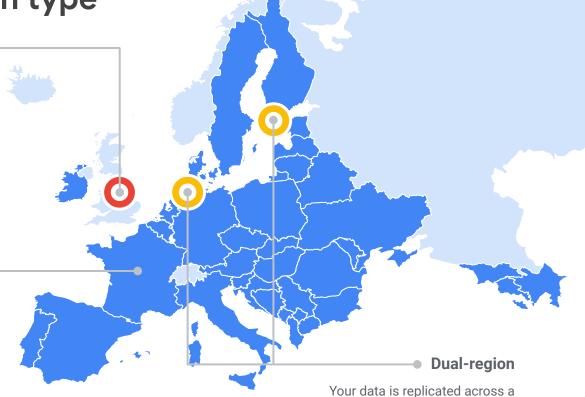
Choosing a location type

Regional

Your data is stored in a specific region with replication across availability zones in that region. Good for colocating compute and storage for high performance.

Multi-Region

Your data is distributed redundantly across US, EU, or Asia. Good for serving content to end users and when you want automatic failover.

Dual-region

Your data is replicated across a specific pair of regions. Good for when you need colocated compute and storage and automatic failover.

Google Cloud

Operations Management in GCP

Accessing GCP

Mobile App

Google Cloud SDK
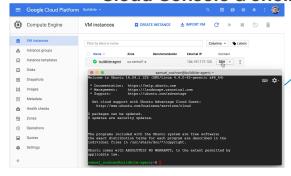
Restful APIs

Cloud Console & Shell
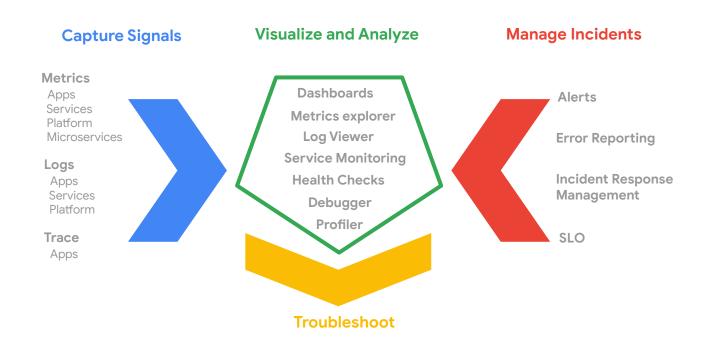
```
https://www.googleapis.com/compute/v1/projects/[PROJECT_ID
]/zones/[ZONE]/instances -d
'{
  "disks":[
    {
      "boot":"true",
      "initializeParams":{

"sourceImage":"https://www.googleapis.com/compute/v1/proje
cts/debian-cloud/global/images/debian-8-jessie-v20160301"
      }
    }
  ],
```

Operations Management Observability at scale

Capture Signals

Visualize and Analyze

Manage Incidents

Metrics
Apps
Services
Platform
Microservices

Logs
Apps
Services
Platform

Trace
Apps

Dashboards

Metrics explorer

Log Viewer

Service Monitoring

Health Checks

Debugger

Profiler

Alerts

Error Reporting

Incident Response
Management

SLO

Troubleshoot

Google Cloud
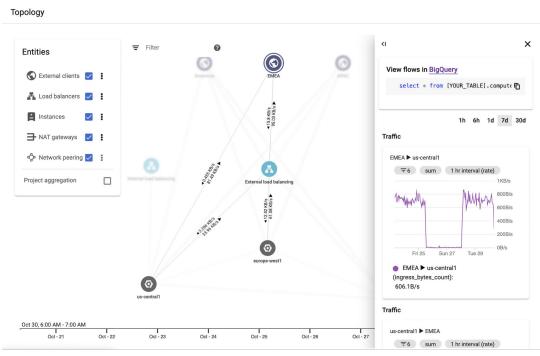
Intelligent, proactive network management for hybrid cloud

Network Intelligence Center

A comprehensive platform for proactive monitoring, verification, and optimization to simplify management of complex/hybrid networks

Some capabilities (Connectivity Test, Topology) are cloud-native for the first time

Google Cloud

Cost management tools

Billing Reports

View costs & forecasts at a glance

Billing Export

Dive into the data & create custom dashboards

Budgets, Alerts & Quota

Set budgets & get alerts on your spending
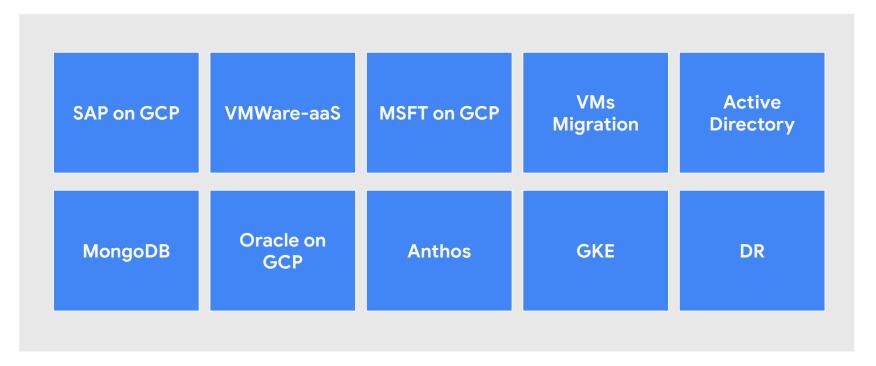
Recommendations

Get recommendations for cost savings & efficiency

Google Cloud
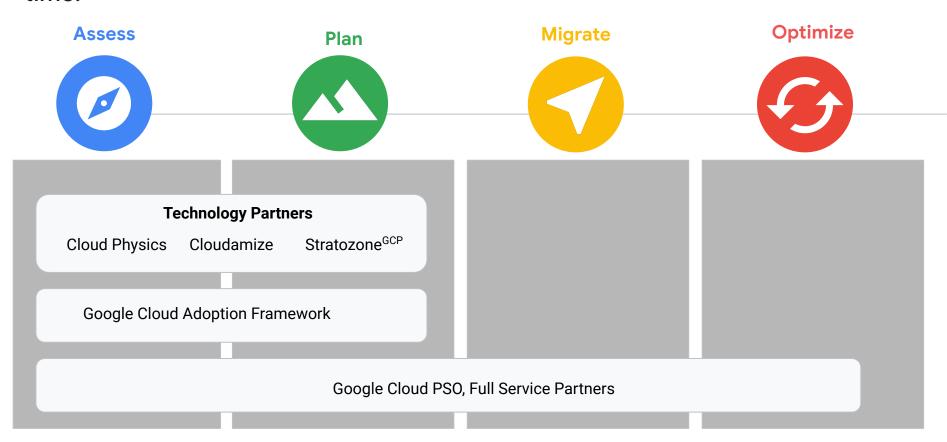
Running SAP on GCP

Workloads you can run on GCP
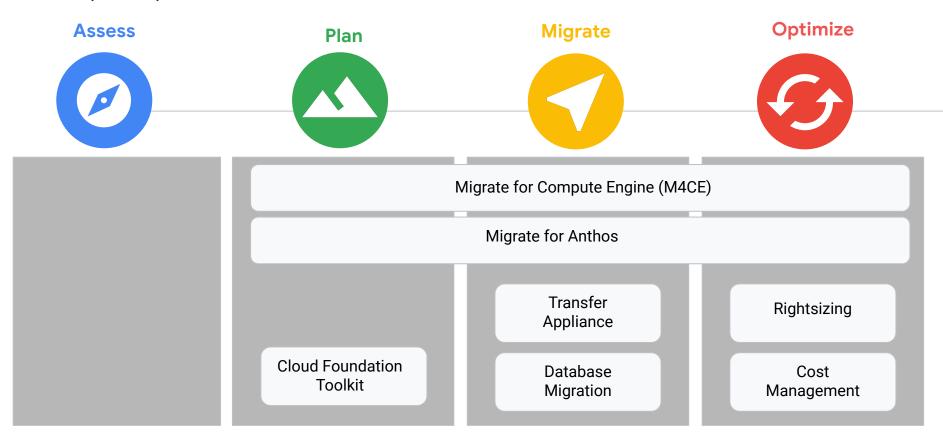
SAP on GCP	VMWare-aaS	MSFT on GCP	VMs Migration	Active Directory
MongoDB	Oracle on GCP	Anthos	GKE	DR

Google Cloud

Google migration tools, support, and partners can deliver your project on time.

Assess

Plan

Migrate

Optimize

Technology Partners

Cloud Physics   Cloudamize   Stratozone^{GCP}

Google Cloud Adoption Framework

Google Cloud PSO, Full Service Partners

Google migration tools, support, and partners can deliver your project on time. (Cont.)

Assess

Plan

Migrate

Optimize

Migrate for Compute Engine (M4CE)

Migrate for Anthos

Cloud Foundation Toolkit

Transfer Appliance

Database Migration

Rightsizing

Cost Management

Realize true cost optimization in the cloud with GCE

Like for Like
Google's VM shapes are highly competitive priced

Pre-migration Rightsizing
Automated cloud instance sizing prior to migration

GCE Custom Machine Types
Machine CPU and RAM configuration that suits your needs

Automatic sustained & committed use discounts
Consumption-based discount rewards
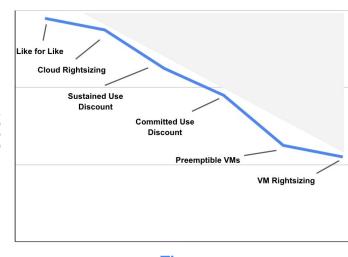
Preemptible VMs
Create and run much lower priced instances

GCE Post-migration Ongoing Rightsizing
Dynamic adjustment of cloud instance resources

Cost

Like for Like

Cloud Rightsizing

Sustained Use
Discount

Committed Use
Discount

Preemptible VMs

VM Rightsizing

Time

Google Cloud

Google Cloud Cost Management Guide

Why Google Cloud for SAP? - key differentiators

Minimize Downtime

Live migration allows for zero downtime maintenance

Secure Network

Google fiber globally with < 1MS SLAs between zones

Grow As You Go

Virtualized infrastructure flexibility with committed use discounts
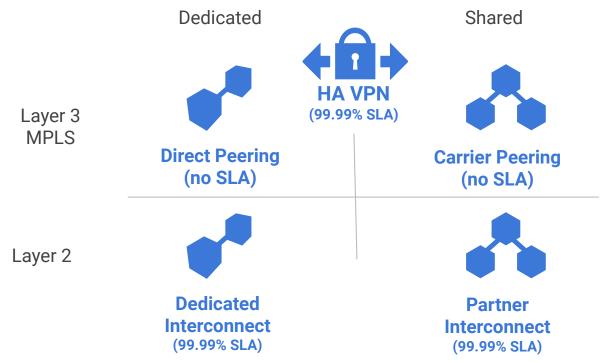
Leading Innovation

SAP & Google partnership with leading data management, AI/ML and robotics capabilities
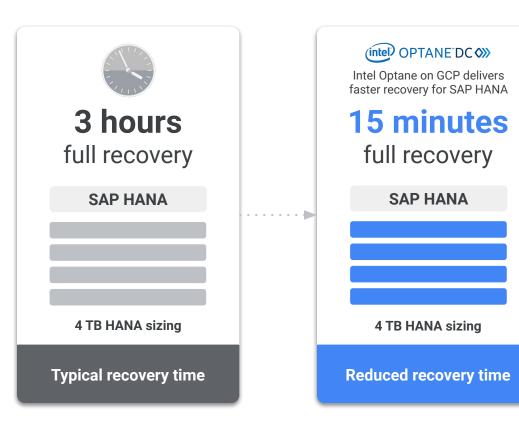
Connect your On-premises sites to our Cloud

Dedicated   Shared

Layer 3
MPLS

**Direct Peering
(no SLA)**

**HA VPN
(99.99% SLA)**

**Carrier Peering
(no SLA)**

Layer 2

**Dedicated
Interconnect
(99.99% SLA)**

**Partner
Interconnect
(99.99% SLA)**

Google Cloud
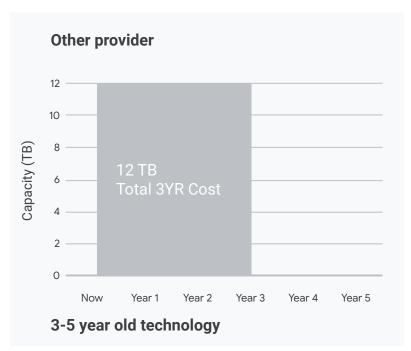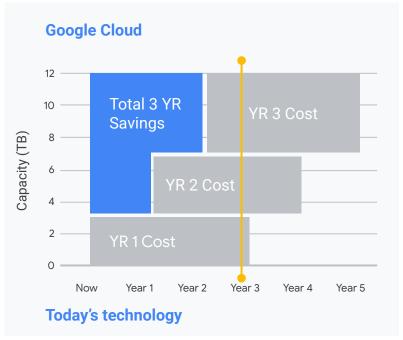
With Google Cloud all-VM infrastructure, upfront hardware purchase not required

Other provider

Capacity (TB)

12 TB
Total 3YR Cost

Now | Year 1 | Year 2 | Year 3 | Year 4 | Year 5

3-5 year old technology

Google Cloud

Capacity (TB)

Total 3 YR Savings

YR 3 Cost

YR 2 Cost

YR 1 Cost

Now | Year 1 | Year 2 | Year 3 | Year 4 | Year 5

Today's technology

Google Cloud

Elastic scale

- Pay for today NOT tomorrow
- Flex and move at YOUR pace
- Manage peak processing needs

Google Cloud Platform

SAP Application	SAP Application	SAP Application
32 CPU VM	64 CPU VM	32 CPU VM

Normal processing · Peak processing · Normal processing

Elastically scale the architecture
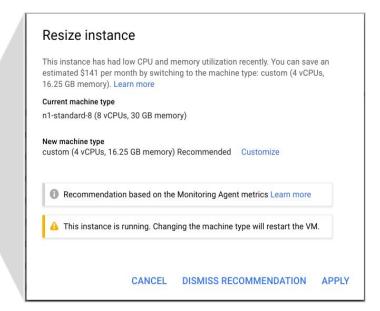
VM scaling

The VM will restart as the recommendation is applied for resizing the instance

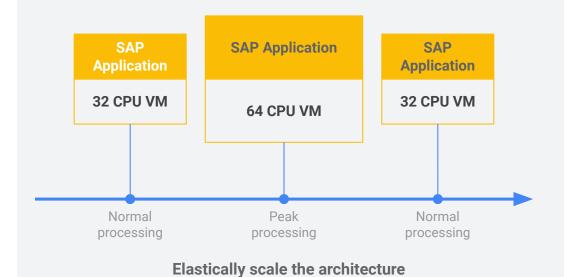|	Name ^	Zone	Recommendation	Internal IP	External IP	Connect	
☐ ✓	ges-is2ap01dr	europe-west2-c	💡 Save $99 / mo	10.32.225.3 (nic0)	35.234.138.66	SSH ▾	⋮
☐ ✓	ges-is2app01	europe-west1-b	💡 Save $75 / mo	10.143.225.7 (nic0)	104.155.91.73	SSH ▾	⋮
☐ ✓	ges-is2app02	europe-west1-c	💡 Save $121 / mo	10.143.225.8 (nic0)	35.233.31.124	SSH ▾	⋮
☐ ✓	ges-is2app03	europe-west1-d	💡 Save $124 / mo	10.143.225.9 (nic0)	35.241.174.224	SSH ▾	⋮
☐ ✓	ges-is2ci01	europe-west1-b	💡 Save $81 / mo	10.143.225.3 (nic0)	35.187.106.184	SSH ▾	⋮
☐ ✓	ges-is2ci01dr	europe-west2-c	💡 Save $50 / mo	10.32.225.2 (nic0)	35.242.146.65	SSH ▾	⋮
☐ ✓	ges-is2ci02	europe-west1-c	💡 Save $81 / mo	10.143.225.2 (nic0)	35.240.125.211	SSH ▾	⋮
☐ ✓	ges-is2db01	europe-west1-b		10.143.224.3 (nic0)	35.205.109.91	SSH ▾	⋮
☐ ✓	ges-is2db01-dr	europe-west2-c		10.32.224.2 (nic0)	35.230.147.37	SSH ▾	⋮
☐ ✓	ges-is2db02	europe-west1-c	💡 Save $303 / mo	10.143.224.2 (nic0)	104.199.66.1	SSH ▾	⋮
☐ ✓	ges-jump01	europe-west1-b		ges-jump01 (10.143.226.2) (nic0)	35.240.94.36	RDP ▾	⋮
☐ ✓	ges-jump01-dr	europe-west2-c		ges-jump01-dr (10.32.226.2) (nic0)	35.242.178.48	RDP ▾	⋮

Resize instance

This instance has had low CPU and memory utilization recently. You can save an estimated $141 per month by switching to the machine type: custom (4 vCPUs, 16.25 GB memory). Learn more

Current machine type
n1-standard-8 (8 vCPUs, 30 GB memory)

New machine type
custom (4 vCPUs, 16.25 GB memory) Recommended   Customize

ⓘ Recommendation based on the Monitoring Agent metrics Learn more

⚠ This instance is running. Changing the machine type will restart the VM.

CANCEL   DISMISS RECOMMENDATION   APPLY

Custom Machine Types

Customer Requirement:
48 CPUs with 200 GB Memory

Pre-defined

Custom

Increase Cores and Memory (OLAP + OLTP)
(Custom, Standard-, High-memory- and High-CPU machine types)

SAP HANA Node

64 vCPUs
416 GB Memory

n1-highmem-64

SAP HANA Node
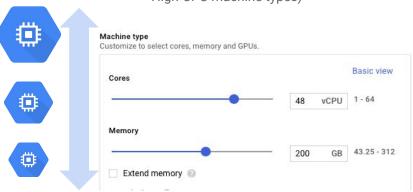
48 vCPUs
200 GB Memory

custom-48-200

Custom Sizing for SAP - between 32-64 vCPUs and up to 624 GB Memory

Machine type
Customize to select cores, memory and GPUs.

Cores		Basic view
	48 vCPU	1 - 64

Memory		
	200 GB	43.25 - 312

☐ Extend memory ⓘ

SAP Certified IaaS Configurations
Google Machine Types

Our Partnership is Strong-
SAP runs Google Cloud

Developing core strategic product S/4HANA on Google Cloud:
20,000+ Developers, Thousands of virtual machines

All Developer & Demo Environments on GCP: Data Lifecycle
Management based on GCP exclusively (All developer code),
Voyage demo environments (Sapphire etc) based on GCP

Only GCP for SAP Private Data Center: Galaxy SAP Private
Region (Frankfurt) for SAP + Customers on GCP

Externally Available on GCP for SAP Customers: Certified GCP
VMs for on premises, S/4Hana Cloud first on GCP, SAP
Marketing Cloud on GCP, Integrated Business Planning on GCP,
SAP Cloud Platform Services on GCP, HEC on GCP, Ariba on
GCP, Callidus using Anthos, Successfactors on GCP

Google Cloud
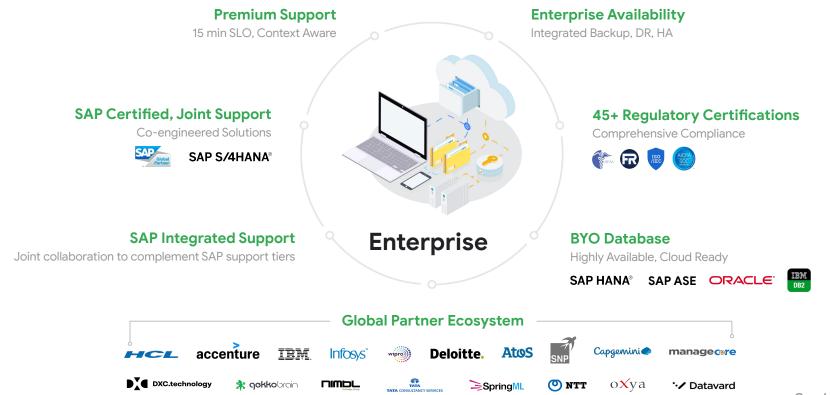
Google Cloud Private Region for SAP
External Reference (German)

Google Cloud is production-ready for SAP enterprises

Premium Support
15 min SLO, Context Aware

Enterprise Availability
Integrated Backup, DR, HA

SAP Certified, Joint Support
Co-engineered Solutions

SAP S/4HANA®

45+ Regulatory Certifications
Comprehensive Compliance

SAP Integrated Support
Joint collaboration to complement SAP support tiers

Enterprise

BYO Database
Highly Available, Cloud Ready

SAP HANA®   SAP ASE   ORACLE®   IBM DB2

Global Partner Ecosystem

HCL   accenture   IBM   Infosys®   wipro   Deloitte.   Atos   SNP   Capgemini   managecore

DXC.technology   gekkobrain   nimbl   TATA CONSULTANCY SERVICES   SpringML   NTT   Oxya   Datavard

Google Cloud

SAP customers come to GCP for secure & reliable IaaS

Upgrade in weeks not months

Features faster

Sub-millisec, secure, Google owned network

Instant response time

Grow flexibly with large VM headroom

Pay only for value

Save millions in reduced downtime

Secure business continuity

Cut the time and cost to drive insights from data

Real-time insights

Upgrade

Run

Innovate

Cortex Framework Data Foundation for SAP

Scalable data cloud foundation

Endorsed **integration tools and patterns**

Templates and building blocks to accelerate delivery
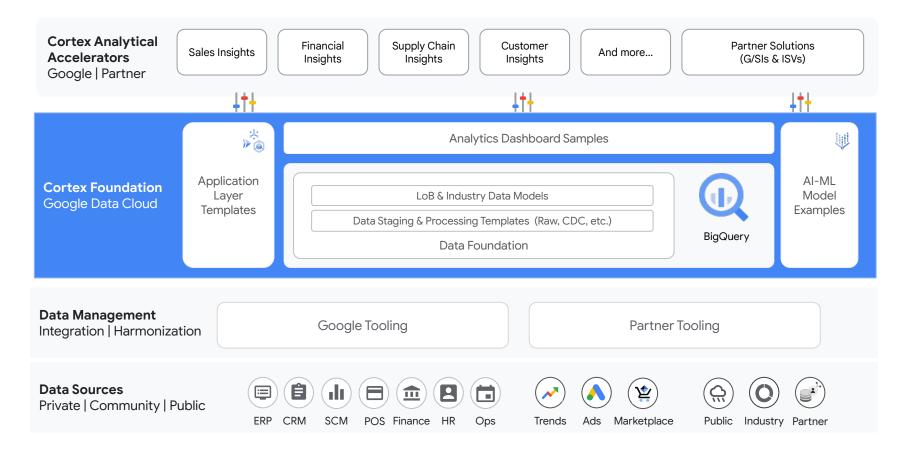
Sample analytics scenarios to easily extend for your business needs
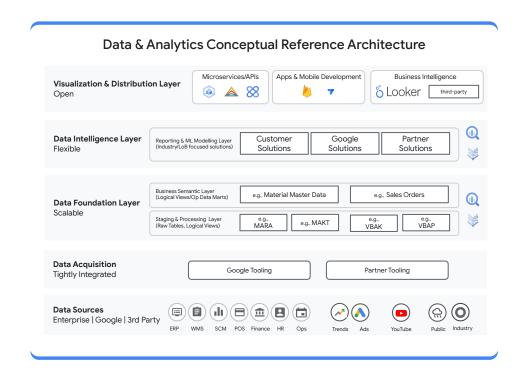
Automated deployment tools

Packaged services to kick-start your implementation

Data & Analytics Conceptual Reference Architecture

Visualization & Distribution Layer Open	Microservices/APIs	Apps & Mobile Development	Business Intelligence — Looker, third-party
Data Intelligence Layer Flexible	Reporting & ML Modelling Layer (Industry/LoB focused solutions)	Customer Solutions / Google Solutions / Partner Solutions	
Data Foundation Layer Scalable	Business Semantic Layer (Logical Views/Op Data Marts) — e.g. Material Master Data, e.g. Sales Orders		
	Staging & Processing Layer (Raw Tables, Logical Views) — e.g. MARA, e.g. MAKT, e.g. VBAK, e.g. VBAP		
Data Acquisition Tightly Integrated	Google Tooling	Partner Tooling	
Data Sources Enterprise | Google | 3rd Party	ERP WMS SCM POS Finance HR Ops	Trends Ads	YouTube Public Industry

Google Cloud Cortex Framework Reference Architecture

Cortex Analytical Accelerators
Google | Partner

| Sales Insights | Financial Insights | Supply Chain Insights | Customer Insights | And more... | Partner Solutions (G/SIs & ISVs) |

Cortex Foundation
Google Data Cloud

Application Layer Templates

Analytics Dashboard Samples

LoB & Industry Data Models

Data Staging & Processing Templates (Raw, CDC, etc.)

Data Foundation

BigQuery

AI-ML Model Examples

Data Management
Integration | Harmonization

| Google Tooling | Partner Tooling |

Data Sources
Private | Community | Public

ERP · CRM · SCM · POS · Finance · HR · Ops · Trends · Ads · Marketplace · Public · Industry · Partner

Cortex Framework Data Foundation for SAP

Out of the box accelerator content

Pre-defined Data Marts
SAP ERP data modeling in BigQuery

Processing templates
Automated generation of real time and batch Change Data Capture (CDC) processing, and hierarchy resolution in BigQuery

Machine Learning templates
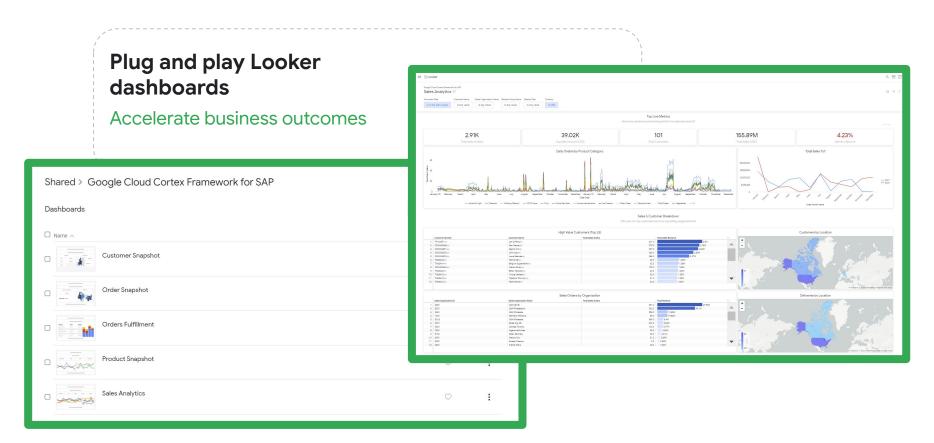Common scenarios like product recommendation with BigQuery ML and Vertex AI

Plug and play business dashboards
Sales analytics, order fulfillment, customer and product snapshots with Looker

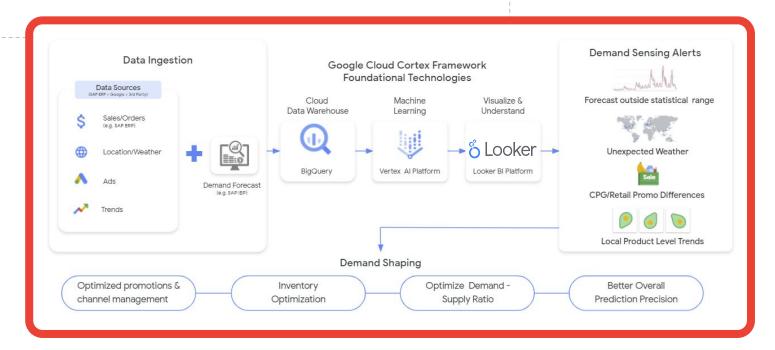### Sample LoB and industry solution templates
For example, order-to-cash and demand shaping

Building blocks and templates
accelerate the journey

Purchasing

Sales & Distribution

Master Data

Google Cloud

Plug and play Looker dashboards

Accelerate business outcomes

Shared > Google Cloud Cortex Framework for SAP

Dashboards

	Name ∧	
☐	Customer Snapshot	
☐	Order Snapshot	
☐	Orders Fulfillment	
☐	Product Snapshot	
☐	Sales Analytics	♡ ⋮

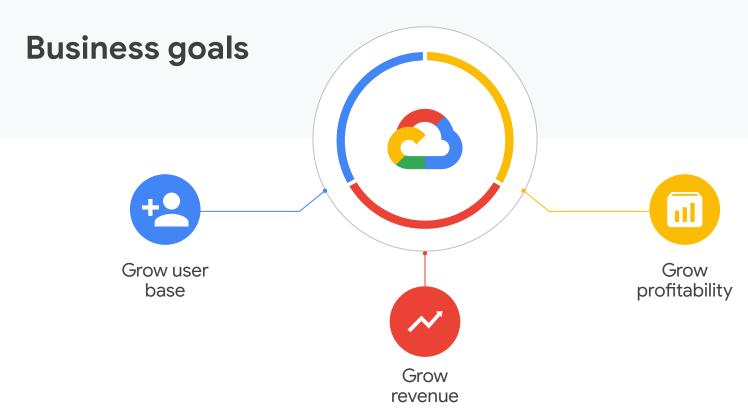# Solution extension example, Demand Shaping
Launchpad for future innovation

Application Modernization (AppMod)

Q: How the Cloud can speed up your Digital Transformation?

Answer: Faster TTM

Business goals

Grow user base

Grow revenue

Grow profitability

Google Cloud

Principles for cloud-native applications

01   Architectural patterns: Microservices

02   Everything as code
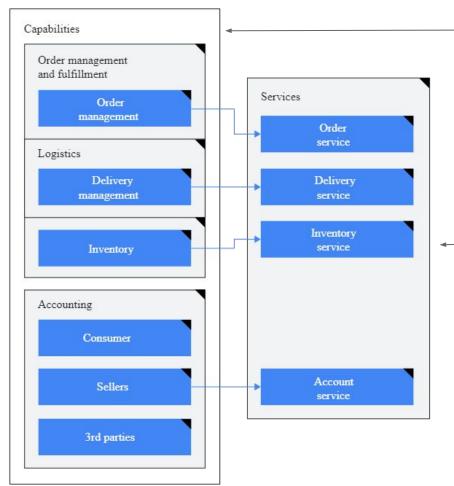
03   Everything as containers

04   Automation

05   Proactive security & compliance

06   Scalable

Google Cloud

Monolithic application (*a monolith*)

An application built a single deployable unit with integrated modules and features.

Examples:
- A Java EE application
- A .NET Web Application

Microservice

A single service that is built to accommodate an application feature. The application is the aggregate of multiple services.
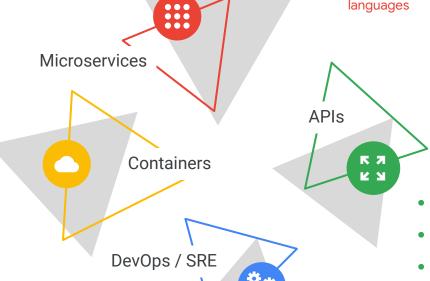
Microservices are loosely coupled through APIs. They can use different languages, and have different life cycles.

Diagram labels:

Capabilities
- Order management and fulfillment
  - Order management
- Logistics
  - Delivery management
  - Inventory
- Accounting
  - Consumer
  - Sellers
  - 3rd parties

Services
- Order service
- Delivery service
- Inventory service
- Account service

Google

Cloud-Native Apps

Microservices

- Reduce time to market
- Gain agility
- Use best of breed languages

APIs

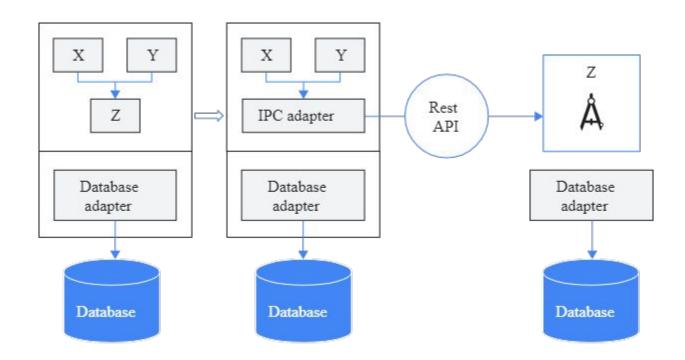- Accelerate digital transformation
- Increase digital connectivity
- Activate new business Channels

Containers

- Unlock hybrid capabilities
- Build on open standards
- Become truly scalable

DevOps / SRE
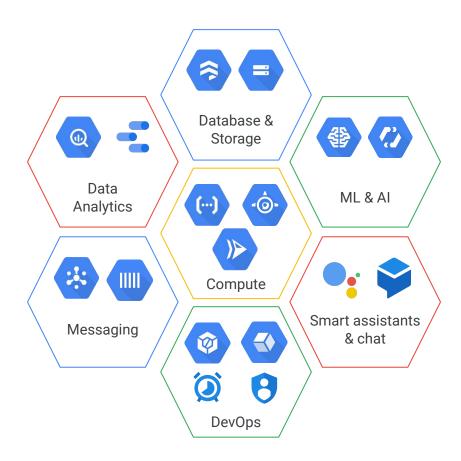
- Reduce time to market
- Improve reliability

Migrating to Cloud-Native: decompose monolith apps
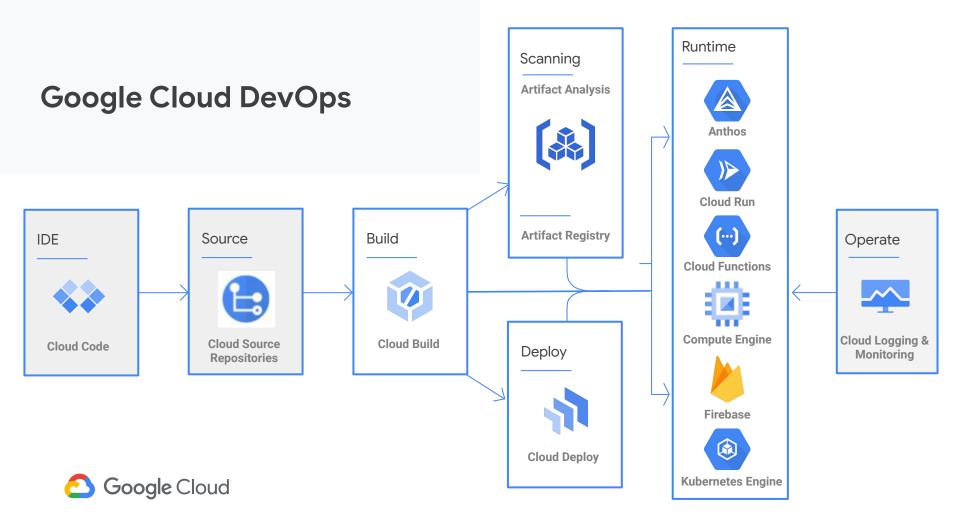
GCP Services to manage Cloud-Native Apps
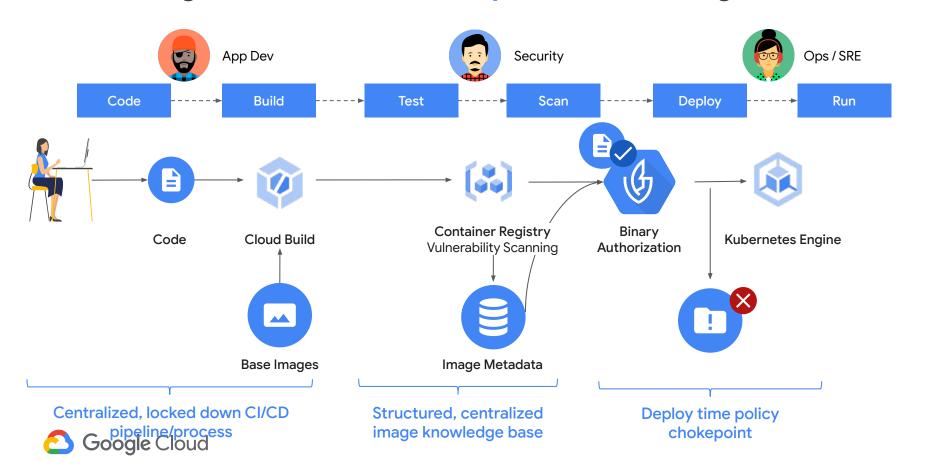

Database & Storage

ML & AI

Data Analytics

Compute

Messaging

Smart assistants & chat

DevOps

Google

App Modernization & Cloud Migration

Multiple Paths to Modernize Applications

Modernization practice focus

Discover · Assess · Plan

Status quo

Retire
Decommission

Retain
Encapsulate with modern data platform and API technology (APIgee)

Migration factory

Rehost
VMs on GCE

Replatform
Containers on GKE / Anthos

Change factory

Refactor
Change source code to leverage GCP services and cloud native frameworks

Reimagine
Rewrite with Java Spring or .NET Core

Deploy Optimize Scale

Google Cloud

Google Cloud DevOps

IDE

Cloud Code

Source

Cloud Source Repositories

Build

Cloud Build

Scanning

Artifact Analysis

Artifact Registry

Deploy

Cloud Deploy

Runtime

Anthos

Cloud Run

Cloud Functions

Compute Engine

Firebase

Kubernetes Engine

Operate

Cloud Logging & Monitoring

Google Cloud

Establishing a **Secure Software Pipeline** With Google Cloud

App Dev   Security   Ops / SRE

Code → Build → Test → Scan → Deploy → Run

Code   Cloud Build   Container Registry Vulnerability Scanning   Binary Authorization   Kubernetes Engine

Base Images   Image Metadata

Centralized, locked down CI/CD pipeline/process

Structured, centralized image knowledge base

Deploy time policy chokepoint

Google Cloud
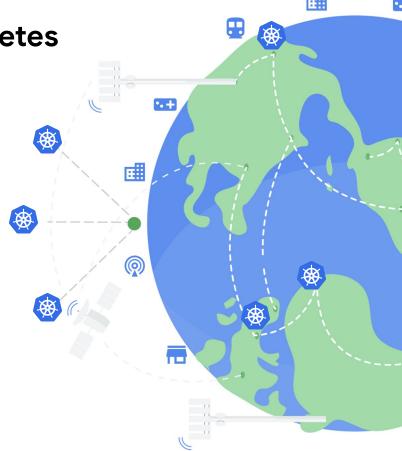
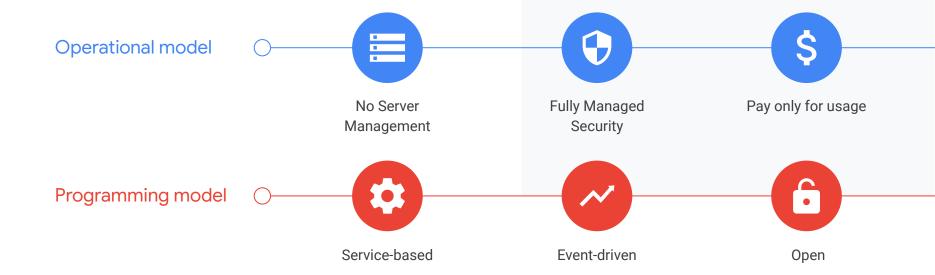# GKE - Best-in-Class Kubernetes

Google Kubernetes Engine (GKE) provides the best Kubernetes experience on the planet

- Record-breaking 15K node scalability for a single cluster

- AI-driven **auto-scaling, auto-repairs,** and **auto-upgrades** keep clusters healthy and hyper-responsive to massive resource spikes
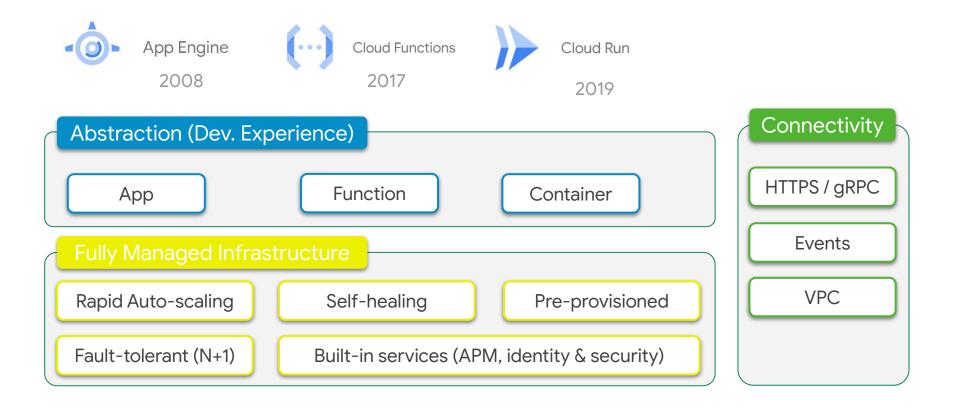
- World-class GPU/TPU integration

What is Serverless?
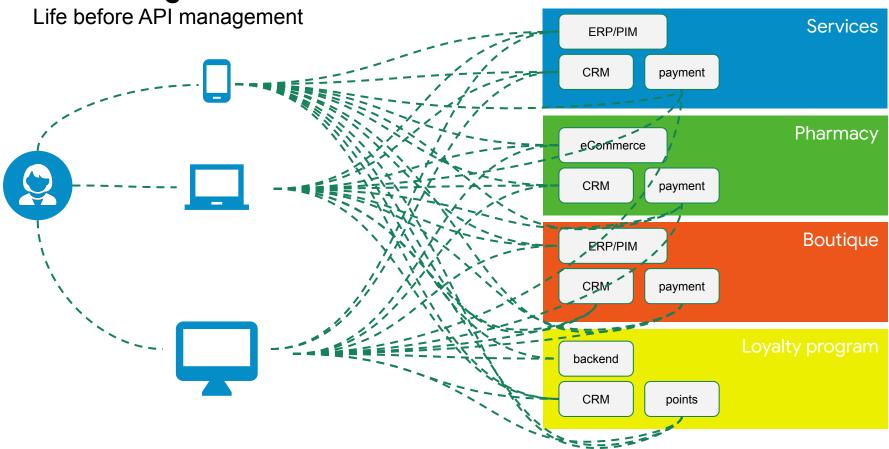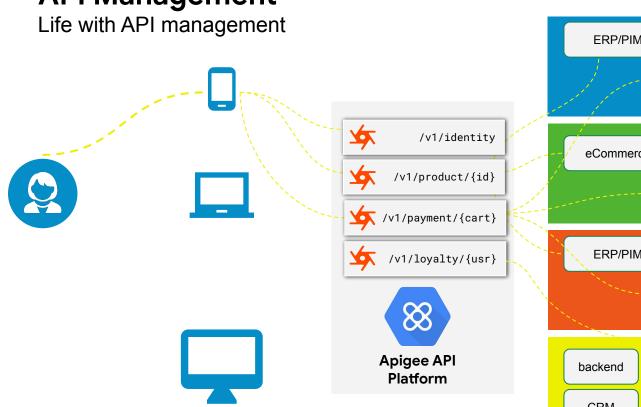
Operational model

- No Server Management
- Fully Managed Security
- Pay only for usage

Programming model

- Service-based
- Event-driven
- Open

Google Cloud

Serverless Compute on Google Cloud

App Engine
2008

Cloud Functions
2017

Cloud Run
2019

Abstraction (Dev. Experience)

| App | Function | Container |

Fully Managed Infrastructure

| Rapid Auto-scaling | Self-healing | Pre-provisioned |

| Fault-tolerant (N+1) | Built-in services (APM, identity & security) |

Connectivity

HTTPS / gRPC

Events

VPC

API Management
Life before API management

	Services
ERP/PIM	
CRM	payment

	Pharmacy
eCommerce	
CRM	payment

	Boutique
ERP/PIM	
CRM	payment

	Loyalty program
backend	
CRM	points

API Management
Life with API management

Services

ERP/PIM

payment

/v1/identity

/v1/product/{id}

Pharmacy

eCommerce

payment

/v1/payment/{cart}

/v1/loyalty/{usr}

Boutique

ERP/PIM

payment

Apigee API Platform

Loyalty program

backend

CRM   points

API-powered management

Staff Channels

Developers & Partners

Product API

API Platform

API Analytics

Developer Portal

API Security

Extensions

Consumer channels

Partner channels

Public cloud

Data lake

Personalised offers

Earn

Burn

Account management

Third party cloud

Loyalty platforms

On-prem

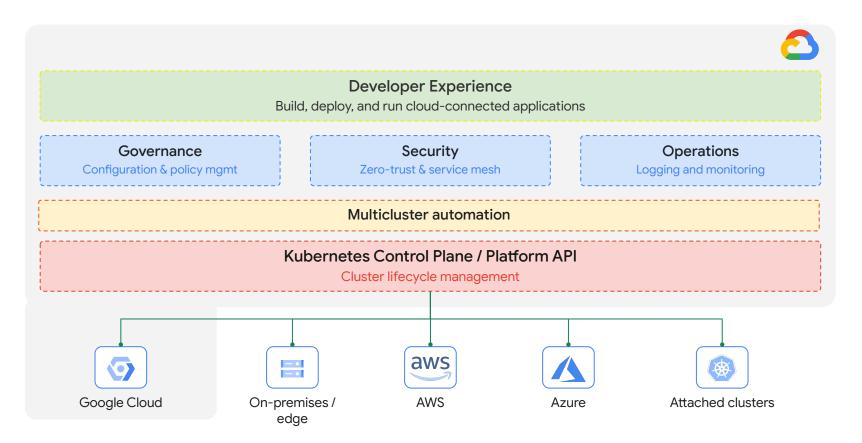Commerce platform

Introducing Google Cloud's Anthos

Anthos lets you build and manage modern **hybrid and multi-cloud** applications without infrastructure lock-in

Build once, to run anywhere, across your existing on-premise infrastructure and all major public cloud providers

Google Cloud

Other Public Clouds (AWS, Azure, etc.)

Anthos

On-Premise Edge and Data Center

Anthos is a Multi-Cluster Management Platform

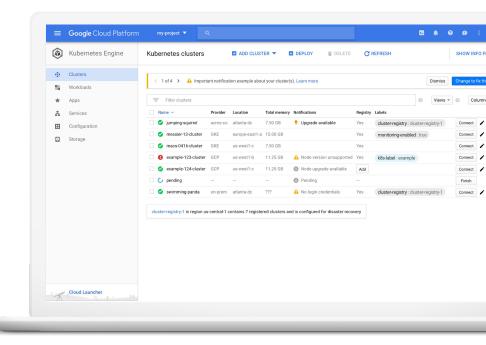Use Anthos to run containerized workloads at scale anywhere with a cloud-backed managed platform

Developer Experience
Build, deploy, and run cloud-connected applications

Governance
Configuration & policy mgmt

Security
Zero-trust & service mesh

Operations
Logging and monitoring

Multicluster automation

Kubernetes Control Plane / Platform API
Cluster lifecycle management

Google Cloud

On-premises / edge

AWS

Azure

Attached clusters

Unified Management Hub

Single pane of glass across Google Cloud & on-premises & other public cloud

01 Orchestrate and manage
on-prem containers
just like GKE in the cloud

02 Consistent operating model with
access to GCP services across
hybrid environments

03 Single-pane-of-glass for multiple
Kubernetes clusters, no matter
where

Serverless Anywhere

Cloud Run for Anthos is a managed serverless product that

- Rapidly scales containerized applications from zero to *N*
- Supports HTTP and gRPC protocols
- Natively handles private DNS resolution
- Runs absolutely anywhere Anthos runs

GitOps At Scale

Anthos Config Management (ACM) is a GitOps automation suite that provides policy and configuration at scale

- Synchronizes configuration for any cluster, either on-prem and in the cloud
- Continuously enforces compliance policies
- Enables end-to-end auditability and CI peer-review through policy-as-code
- Can **manage all your cloud infrastructure**, not just your Kubernetes apps

Check in configurations

Listen for upstream changes and apply these across environments

Anthos Controlplane

Client Cluster   Client Cluster   Client Cluster

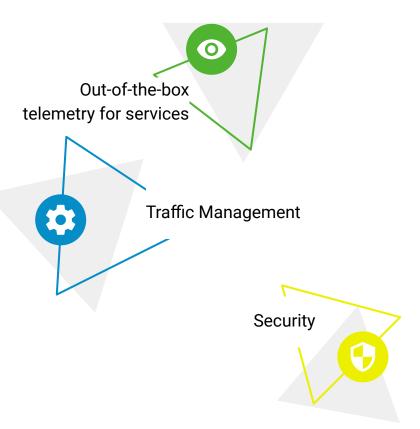Client Cluster   Client Cluster   Client Cluster

Zero Trust Networking

Anthos Service Mesh (ASM) provides service management and a single pane of glass for

- Logging, metrics, and SLO monitoring

- Service identity, AuthN/Z, and encryption

- Traffic management: routing, and load balancing

- AI-driven curated insights, recommendations, and operating analytics

Out-of-the-box telemetry for services

Traffic Management

Security

Operation Efficiency

Logging

Collect Logs from Platforms, Apps and Services

- Log search/view/filter
- Error reporting & Dashboard
- Log Metrics
- Log Router for easy export

Monitoring

Monitor metrics from Platforms, App, Services and Microservices

- Dashboards
- Metrics Explorer/Custom Metrics
- Uptime Checks
- Service Monitoring
- Alert Management

APM

Monitor and troubleshoot Application performance

- Trace - Latency analysis across distributed apps
- Profiler - CPU and memory profiling
- Debugger - In production debug and conditional snapshots

1-Click Ecosystem

Marketplace for Anthos lets you centrally manage production-grade 3rd party software and data in a completely self-service manner

- 'Click to deploy' pre-integrated Kubernetes applications anywhere that Anthos runs
- Single bill for GCP and 3rd party services
- Built-in support for negotiating bespoke vendor quotes
- Managed updates

Thank you