



# Getting Started With Google Cloud Platform

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# Cloud Architecture Basics

# Cloud Misconceptions

Save 50% over on-premises

You can pay for everything up front

# Cost

Costs can be static month over month

No maintenance required

# Cloud Misconceptions

We can't control our  
data

On-premises is much  
more secure

# Security

Google can read our  
files

There's no audit trail

# Cloud Misconceptions

Throughput is too low

Node to node latency is  
too high

## Performance

We can't get enough  
memory

It takes too long to scale

# Cloud Best Practices

Design your organization/project structure

Plan and test before doing

Centralize logging and auditing

Deploy least-privilege security on all levels

Learn patterns for resilience and performance

Prefer managed services over unmanaged

Automate deployment and operations

Understand billing and cost optimization

# GCP Building Blocks - Full List

AI and Machine Learning

API Management

Compute

Containers

Data Analytics

Databases

Developer Tools

Healthcare and Life Sciences

Hybrid and Multi Cloud

Internet of Things (IoT)

Management Tools

Media and Gaming

Migration

Networking

Security and Identity

Serverless Computing

Storage

# GCP Building Blocks - Course Scope

## **AI and Machine Learning**

API Management

## **Compute**

## **Containers**

## **Data Analytics**

## **Databases**

## **Developer Tools**

Healthcare and Life Sciences

Hybrid and Multi Cloud

Internet of Things (IoT)

## **Management Tools**

Media and Gaming

Migration

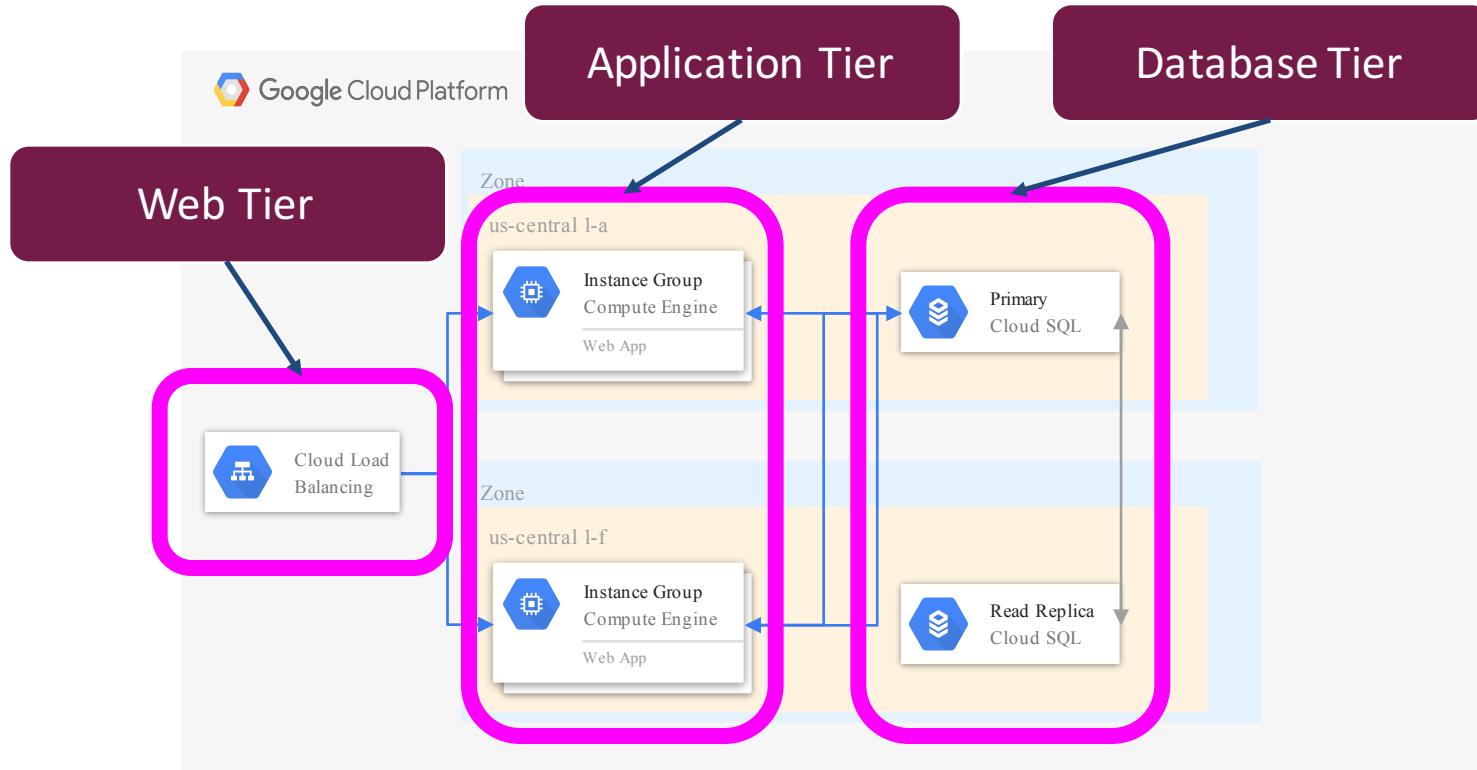
## **Networking**

## **Security and Identity**

## **Serverless Computing**

## **Storage**

# Learning Architecture Diagrams





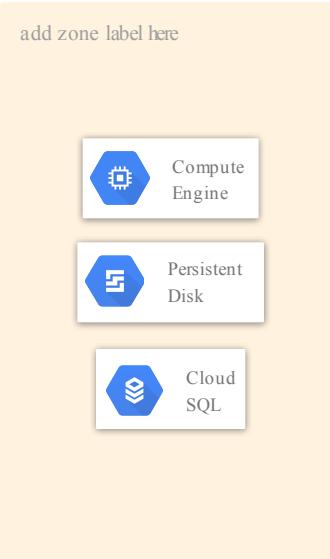
## Global Infrastructure and Service Scope

# Data Center

Guess what?  
There is no  
actual icon  
for a Google  
Data Center.  
Why is that?

**10s of thousands of servers**  
**Security at every layer**  
**Low latency, high bandwidth**  
**Resilience at every layer**

# Zone



2+ data centers, co-located  
Independent failure domain  
Redundant fiber connectivity  
Redundant Internet connectivity  
<1ms RT latency  
Scope for some unmanaged resources

# Region

add  
region  
label  
here



Cloud  
Storage



Cloud  
Functions



Cloud  
Bigtable

Independent geographic area  
2+ Zones  
<5ms RT latency @ 95th percentile  
Scope for many managed resources

# Multi-Region

same as  
region  
color



Cloud  
Spanner



Cloud  
Storage



Cloud  
Firestore

Designed for resilience

2+ Regions (same continent)

Scope for many resilient resources

# Global

same as  
region  
color



Cloud Load  
Balancing



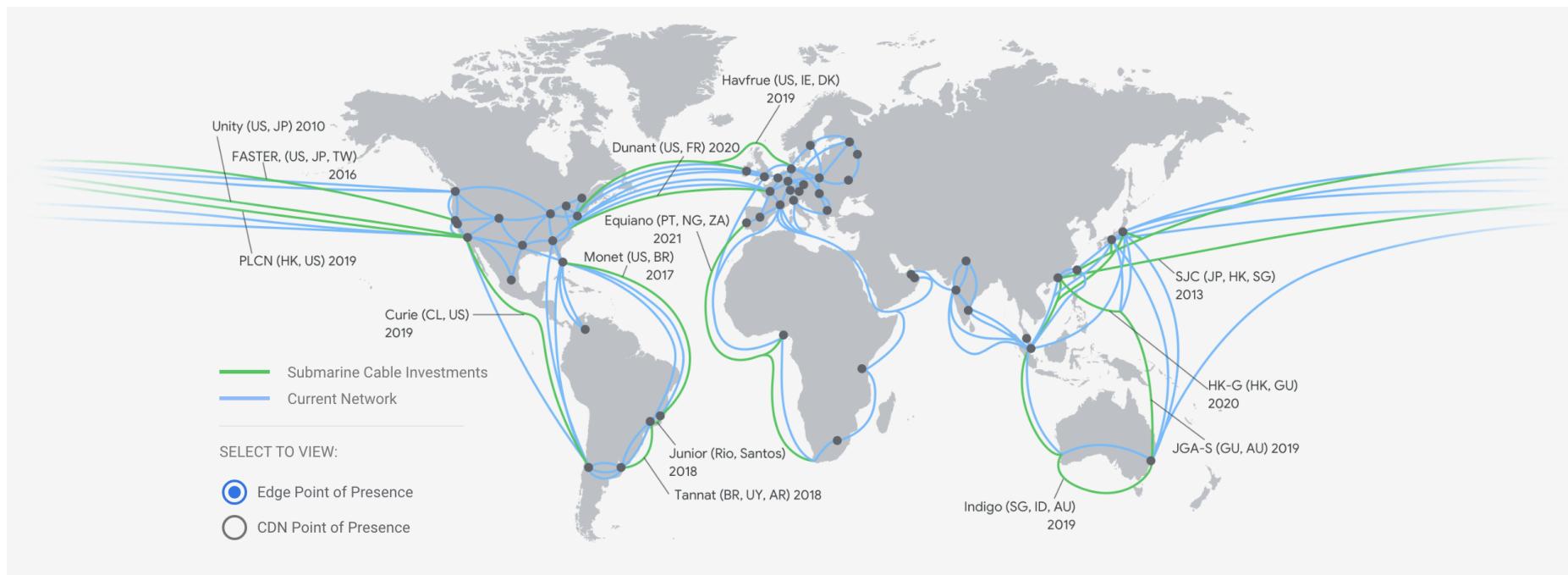
Virtual  
Private Cloud



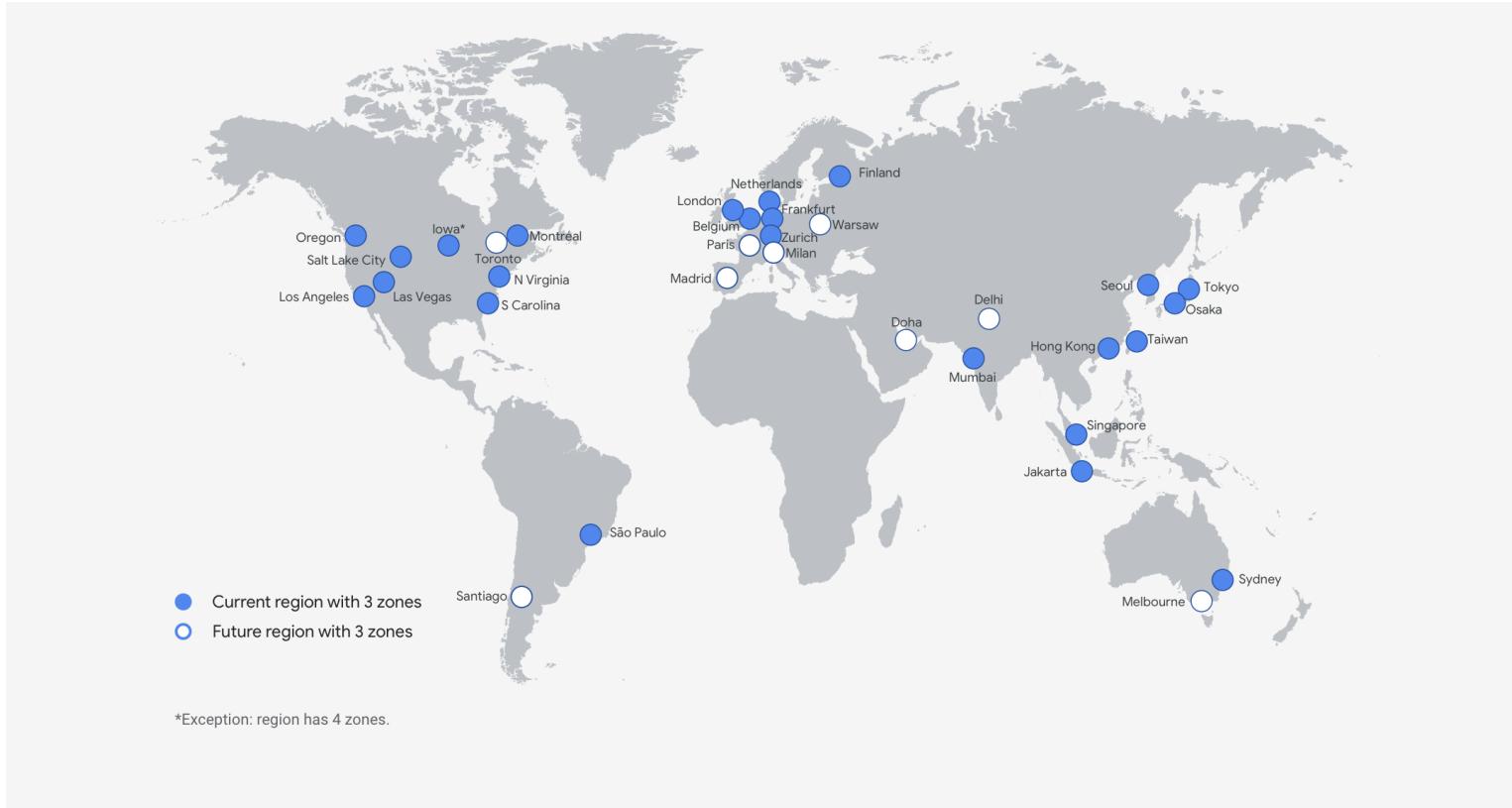
Cloud  
DNS

Not tied to any single region  
Designed for extreme availability  
Scope for many managed resources

# Global Fiber Network 08/2020



# Region Placement 10/2020



# Cloud Console Demo

Building Block List

Project Creation

Enabling APIs



# GCP Security and Monitoring



The 3 A's!

Authentication

Authorization

Accounting/Auditing

# Cloud IAM Elements

Folders

Organization

Members

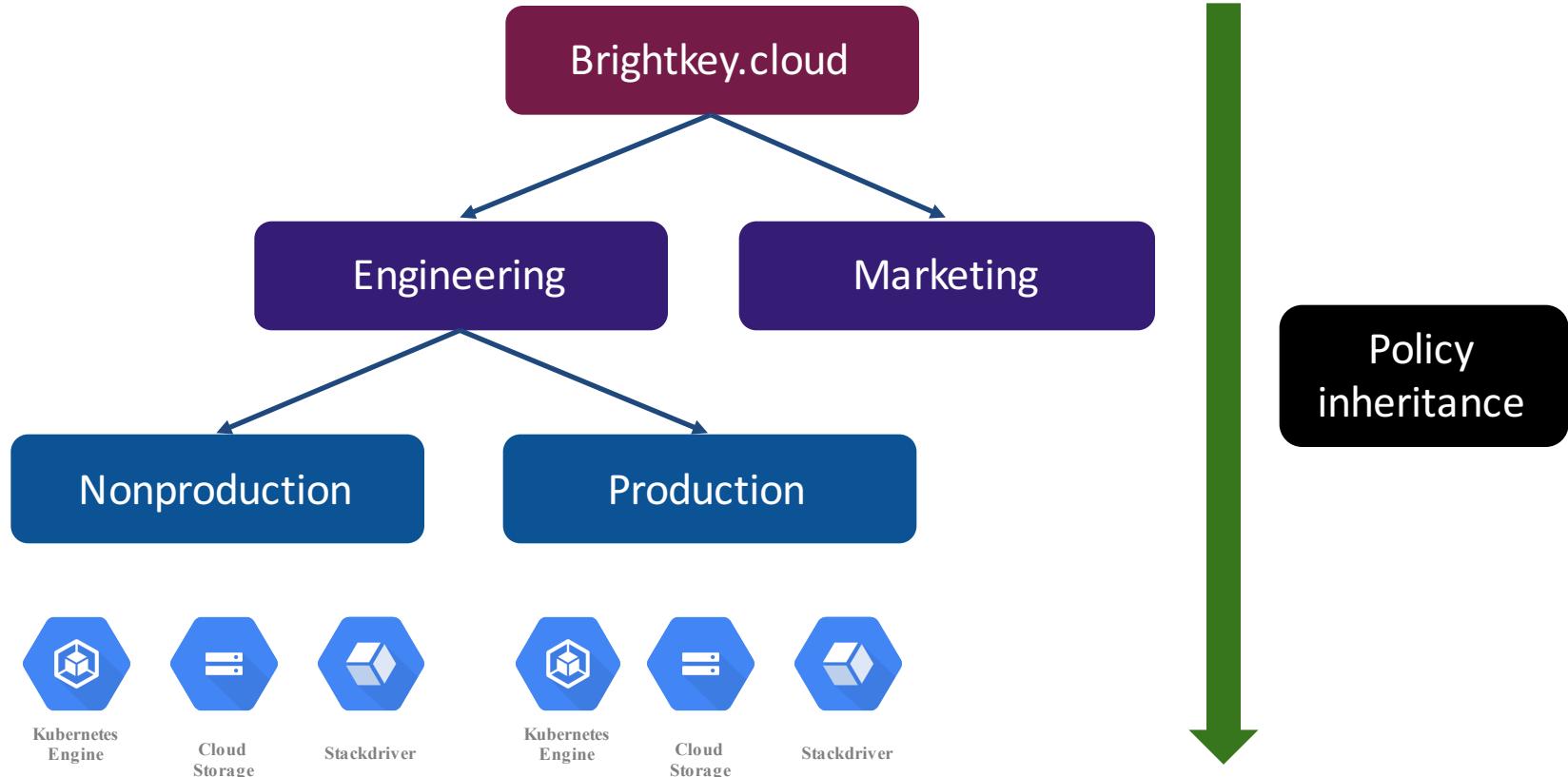
Projects

Resources

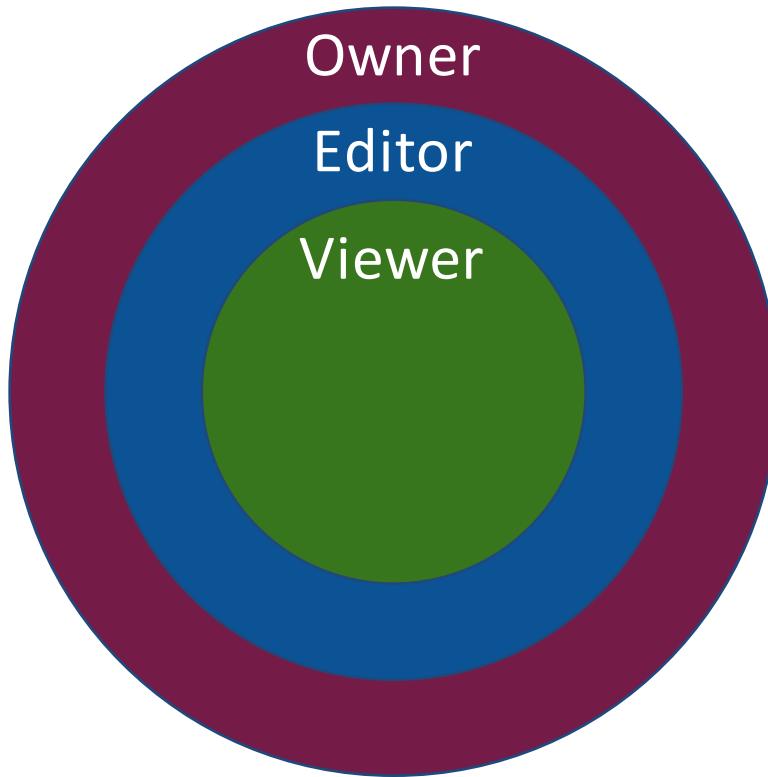
Roles



# Cloud IAM Hierarchy



# Cloud IAM Roles - Primitive



# Cloud IAM Roles - Predefined

## Compute Engine

networkAdmin  
loadbalancerAdmin  
instanceAdmin

## Billing

admin  
projectAdmin  
creator

## Storage

objectAdmin  
objectCreator  
legacyBucketWriter

## BigQuery

dataEditor  
jobUser  
admin

# Cloud IAM Roles - Custom

compute.networks.list

container.clusters.create

storage.buckets.get

pubsub.topics.publish

# IAM Demo

Explore Primitive/Predefined Roles

Add Member

Create Custom Role

Assign Role to Member

# Service Accounts

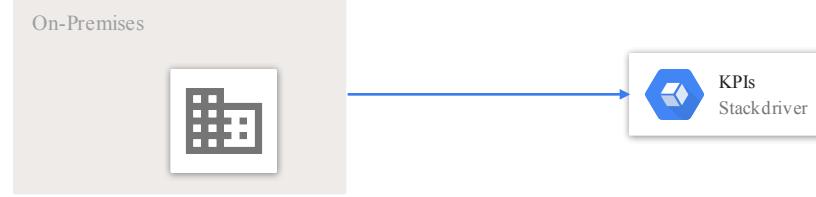
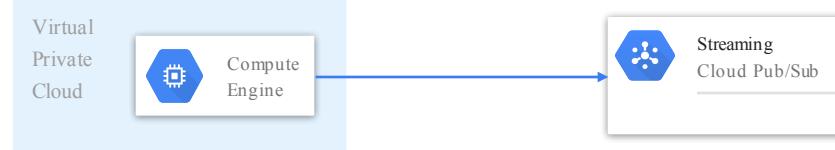
User-Managed

Default

Custom

Google-Managed

Google APIs



Internal Google Processes

# Service Account Demo

Create Service Account (Cloud Console)

Assign Role to Service Account

Create Key for Service Account



Gcloud CLI

Language-specific client libraries

Product-specific CLIs

# Cloud SDK Demo

Explore Cloud SDK Install Steps

Configure Cloud SDK

Explore Cloud SDK Configs



Monitoring  
Logging  
Error Reporting  
Debugger  
Trace  
Profiler



Billing Reports  
Cost Trends  
Export to BigQuery  
Budget alerts

# Free Tier



New customer \$300 credit  
Always free products  
Limited usage products

# StackDriver and Billing Demo

Explore Default Dashboards

Explore Billing Data

Create Budget Alert



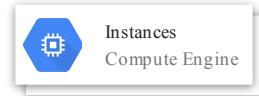
# Networking In GCP

# Virtual Private Cloud (VPC) Basics



Networks are GLOBAL  
Subnets are REGIONAL  
Firewall rules deny by default  
Does not support all services

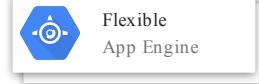
# VPC Services Supported



Instances  
Compute Engine



Clusters  
Kubernetes Engine



Flexible  
App Engine

# VPC Types



Default  
Auto Mode  
Custom Mode

# VPC Elements



Subnet

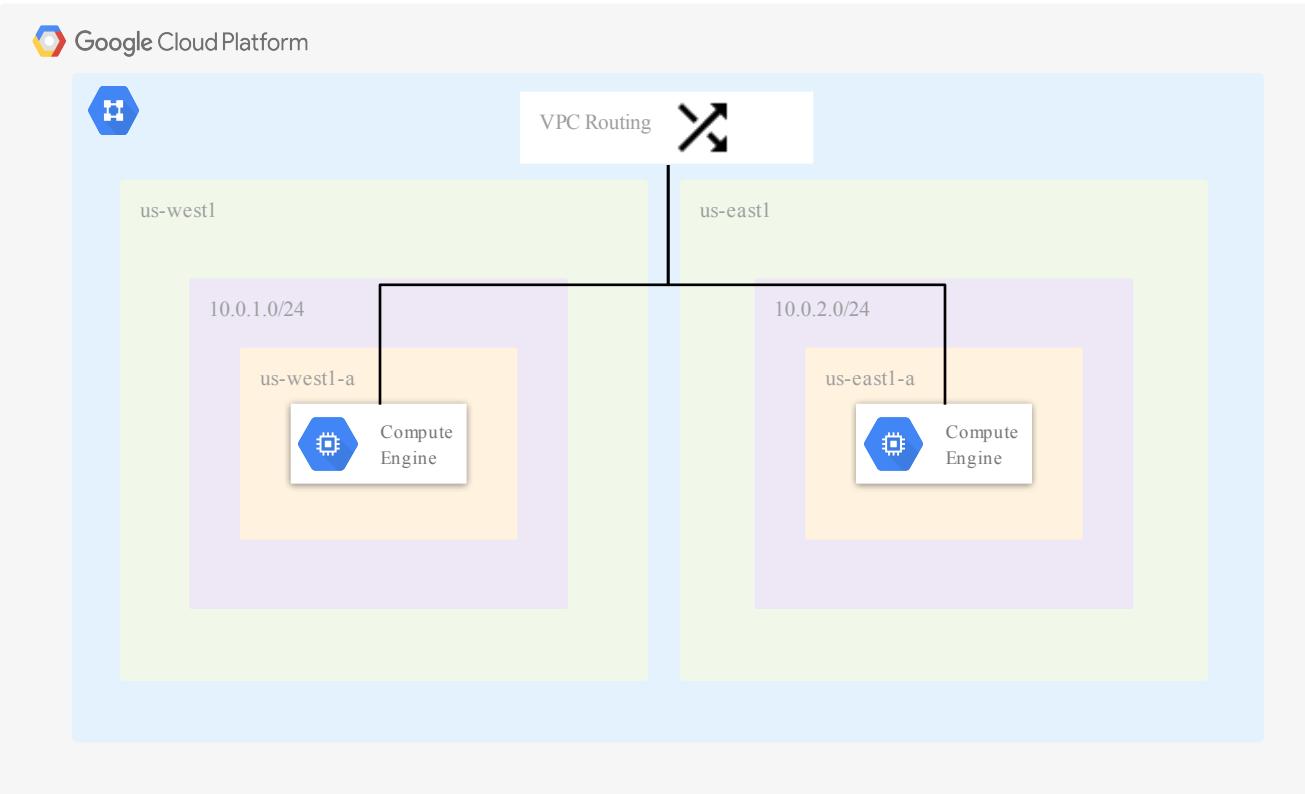
Routes

Firewall Rules (ingress and egress)

VPC Flow logging

VPC Peering (transitive routing)

# VPC Diagram



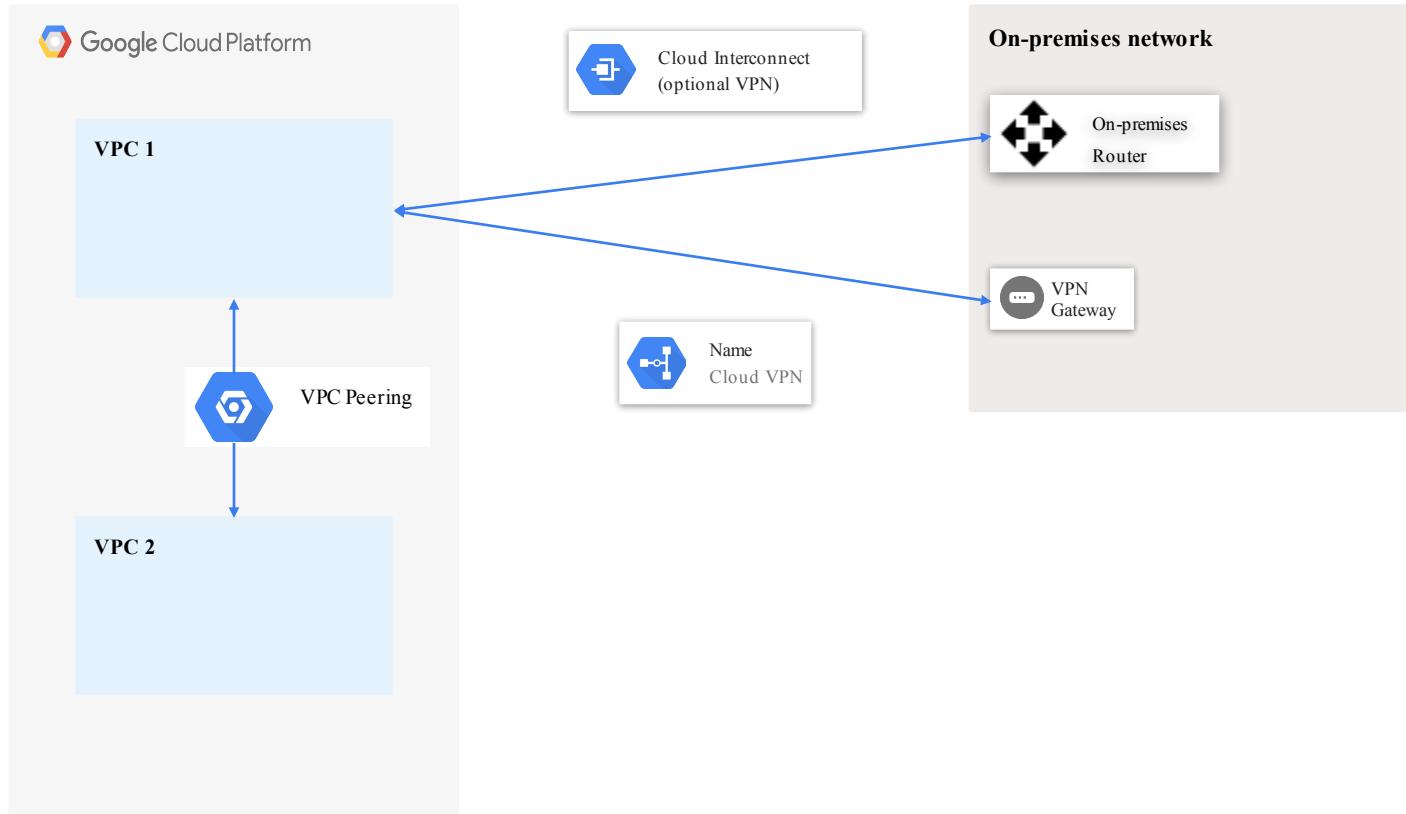
# VPC Demo

Explore Default VPC

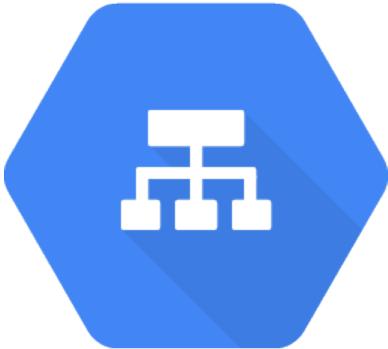
Create Custom Mode VPC Network

Deploy VPC using Cloud SDK

# Hybrid Network Connectivity



# Cloud Load Balancing



Regional or Global  
External or Internal  
Layer 4 TCP/UDP listeners  
Layer 7 HTTP/HTTPS listeners  
Path-based routing for Layer 7

# Cloud Load Balancing Resources



Front end protocol/port  
Back end services and buckets  
(Layer 7) SSL Policies  
(Layer 7) Host and Path Rules

# Cloud DNS



Global scope only  
Public or Private zones  
Private zones 1:1 with VPC network  
DNS Peering for cross-network resolution  
100% uptime SLA  
Use Google Domains for registration

# Load Balancing and DNS Demo

Explore Cloud LB Dashboard

Explore LB Creation Options

Explore Cloud DNS Dashboard

Create Private DNS Zone (Cloud SDK)



# GCP Compute Services

# Google Compute Engine (GCE)



- Zonal resource
- Windows or Linux
- Live Migration
- Configurable resources
- Multiple cost models

# GCE Machine Types



General Purpose  
Memory Optimized  
Compute Optimized  
Shared Core  
Custom



Resource-based Pricing  
Sustained-use Discounts  
Committed-use Discounts  
Sole-tenancy Pricing  
Preemptible VM

# GCE Demo

Launch GCE Instance (Console)

Launch GCE Instance (Cloud SDK)

# Cloud Functions (GCF)



Regional resource  
Serverless code execution  
Language choices  
Code location choices  
Trigger choices

# GCF Languages (as of 10/2020)



Go  
Node.js  
Python 3  
Java

# GCF Code Locations



- Inline editor
- ZIP upload
- Zip from Cloud Storage
- Cloud Source Repository

# GCF Triggers (as of 08/2020)



HTTP

Cloud Pub/Sub

Cloud Storage

Cloud Firestore

Google Analytics for Firebase

Firebase Authentication

Firebase Realtime Database

Firebase Remote Config

# GCF Demo

Create Cloud Function (Cloud Console)

Create Cloud Function (Cloud SDK)



# Data Storage and Databases in GCP

# Persistent Disk



- Zonal or Regional resource scope
- Block storage
- HDD and SSD options
- Supports GCE and GKE
- Transparent upsize to 64Tb
- Snapshot replicated to all regions
- Shareable if read-only

# Cloud Storage



- Multiple resource scope options
- Object storage
- Extremely durable (11 9s)
- Multiple storage classes
- 10s of ms to first-byte
- Unlimited objects per bucket
- Objects available via URL

# Cloud Storage Location Types

## Regional

1 region

Data replicated into zones

Colocate compute/storage

Latency/performance design

## Dual-region

2 regions

Data replicated in each region

Colocate compute/storage

Automatic failover

## Multi-region

3+ regions on 1 continent

Data replicated in each region

Distributed end users

Automatic failover

# Cloud Storage Classes

## Standard

Hot data  
0 day minimum  
Lowest access cost  
Highest storage cost  
Highest availability

## Nearline

Hot data  
30 day minimum  
Higher access cost  
Lower storage cost  
Lower availability

## Coldline

Cold data  
90 day minimum  
Higher access cost  
Lower storage cost  
Lower availability

## Archive

Cold data  
365 day minimum  
Highest access cost  
Lowest storage cost  
No availability SLA

# PD and Cloud Storage Demo

Create/Attach/Upsize Persistent Disk

Explore bucket creation wizard

Explore Storage Transfer options

# Cloud SQL



Zonal or Regional resource scope

Managed Relational DB service

Multiple engine choices

MySQL

Postgres

SQL Server

Lower operational overhead

# Cloud Spanner

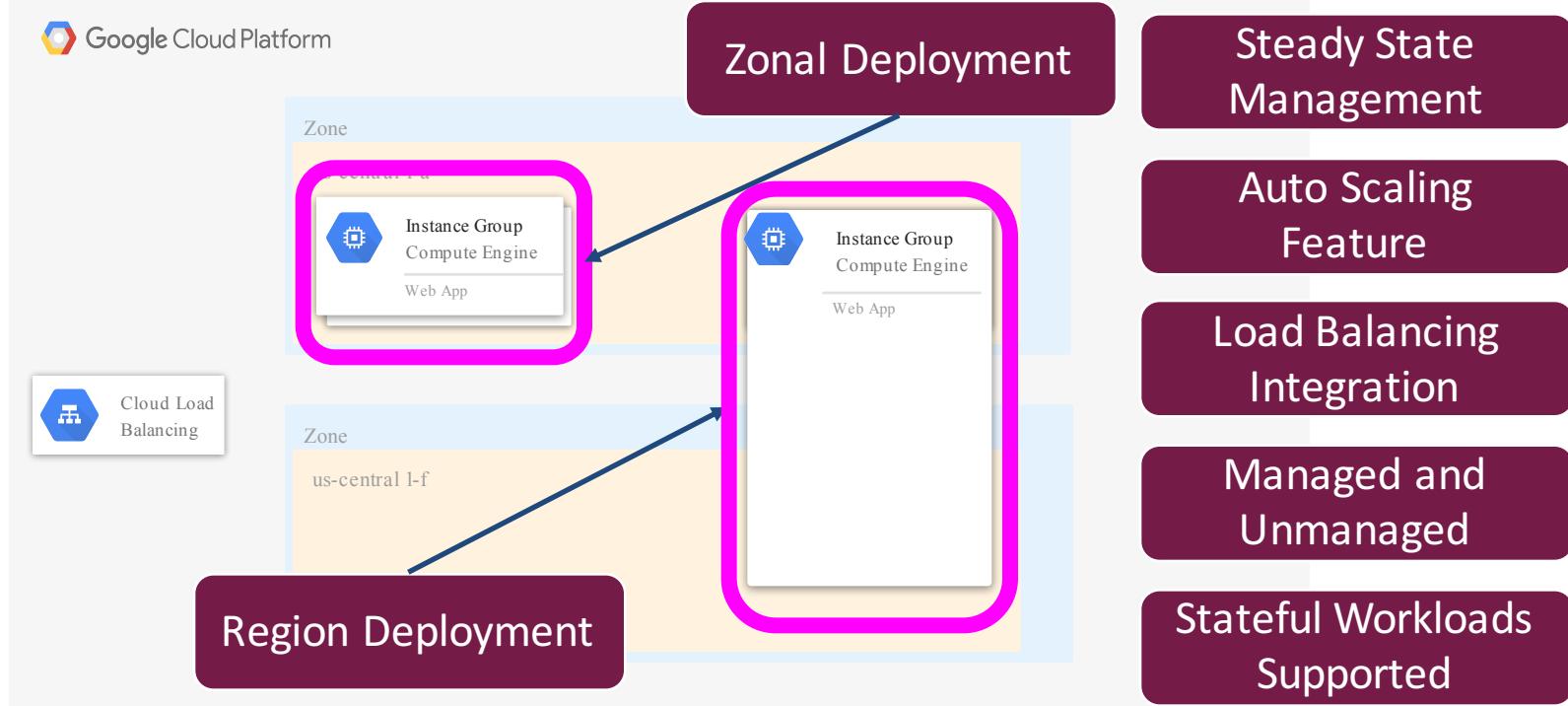


- Regional or Multi-regional resource scope
- Managed relational DB service
- Multi-region can span continents
- Multiple write entry points, up to 1000s
- Much higher entry cost than Cloud SQL



# GCP Application Deployment Options

# GCE Instance Groups



# Cloud Load Balancing Demo 2

Create Unmanaged Instance Group

Finish Cloud Load Balancer Setup

# Google App Engine (GAE)



- Regional resource scope
- Serverless applications
- GAE Standard (SaaS)
- GAE Flexible (PaaS)
- Automated deployment
- Automated scaling

# GAE Standard

Scales to zero for cost optimization

Java, Python, PHP, Go,  
Node.js



No SSH access to app sandbox

Network access via APIs

# GAE Flexible

Minimum footprint  
required

Java, Python, PHP, Go,  
Node.js, **Ruby**, .NET



Optional SSH allowed  
(Docker)

Network access via VPC

# Google Kubernetes Engine (GKE)



- Zonal or Regional resource scope
- Containerized applications
- Managed Kubernetes
- Automated deployment
- Pod and cluster autoscaling

# Google Kubernetes Engine (GKE)

Supports stateful  
applications (DBs!)

Manage nodes with  
Cloud SDK



Manage pods,  
containers with kubectl

Manage clusters,  
ingresses, PVCs

# GAE and GKE Demo

Deploy GAE Standard app (Cloud SDK)

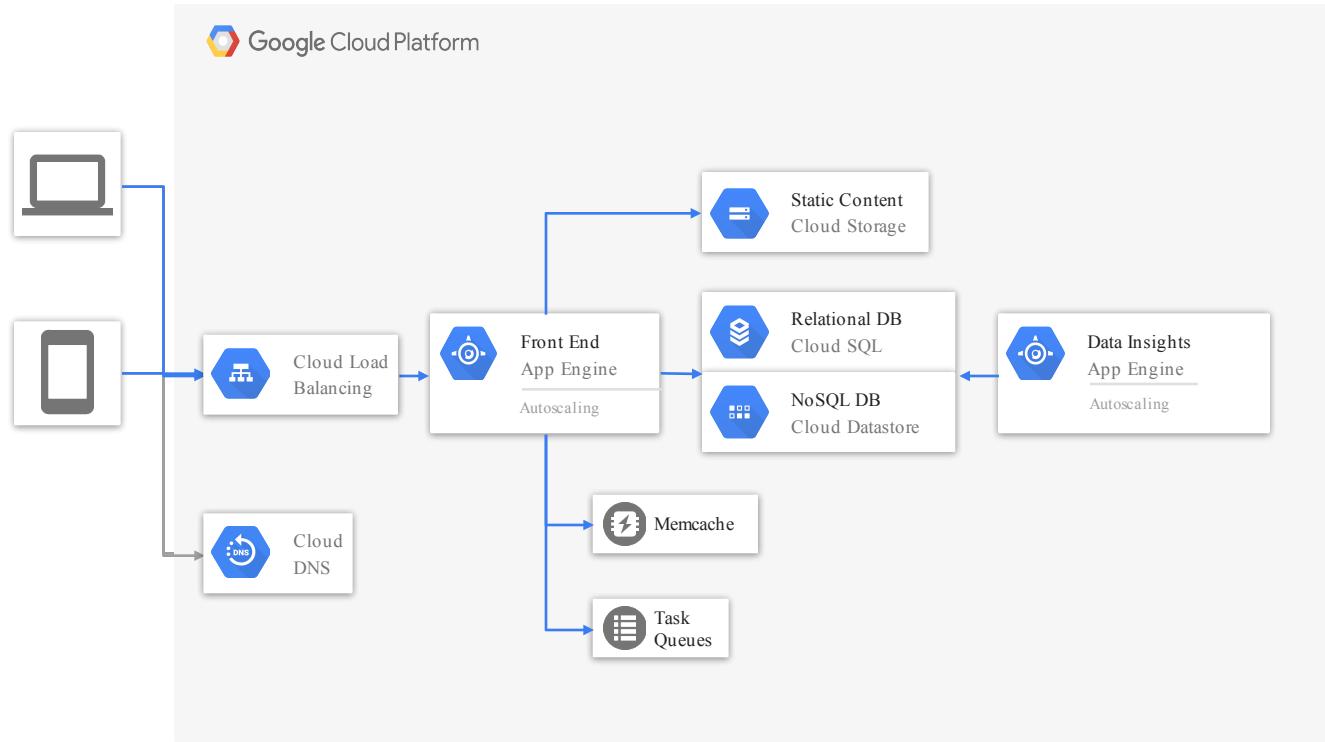
Explore GKE dashboard (Cloud Console)

Deploy GKE Cluster (Cloud SDK)



# Automating GCP Operations

# Using Managed Services



# Deployment Manager



- Regional resource scope
- Infrastructure as Code
- YAML for static deploy
- Python or Jinja2 for dynamic deploy

# Marketplace



- Variable resource scopes
- Managed solutions
- Open source
- Off the shelf products

# Cloud SDK Automation

## Authorization

User account authorization

Service account authorization

## Filtering and formatting

```
--format="yaml" / --format="value(projectId)"  
--filter="labels.costcenter=demo"
```

## Best practices

don't hard code values

use --filter and --format

# Deployment Manager Demo

Explore templates

Deploy a single-vm template

Clean up afterward



# GCP Big Data, AI and ML

# BigTable



Regional resource scope

Managed NoSQL

Scalable but not serverless

Powers well-known apps:

- Search
- Analytics
- Maps
- Gmail

HBase compatible\*

Great for many concurrent reads/writes\*

# BigQuery



- Regional resource scope
- Managed Data Warehouse
- Scales to Petabytes
- SQL (ANSI:2011) compliant
- Dedicated CLI
- Separate compute and storage tiers
- Integrates and ML and BI offerings

# Cloud DataStore/Firebase



- Regional or multi-regional resource scope
- Cloud-native NoSQL
- Strong mobile support
- Offline support for clients
- Documents and collections
- ACID compliance

# Cloud DataFlow



Zonal and Regional resource scope  
Managed Apache Beam  
Batch or streaming data pipelines  
For Hadoop use DataProc instead

# Cloud AutoML



No service scope documented  
Natural Language  
Translation  
Video Intelligence  
Vision  
Tables  
Basic and Advanced versions

# Other AI/ML Services



AI Platform



Cloud Vision API



Cloud Speech-to-Text



Cloud Video Intelligence API



Cloud Natural Language API



Cloud Jobs API



Advanced Solutions Lab



Cloud Text-to-Speech



Cloud Translation API



Dialog Flow Enterprise Edition



AI Hub



Cloud TPU



Recommendations AI



Cloud Inference API



AI Platform Data Labeling Service

Google is best-in-class in this area for a reason!

# BigQuery Demo

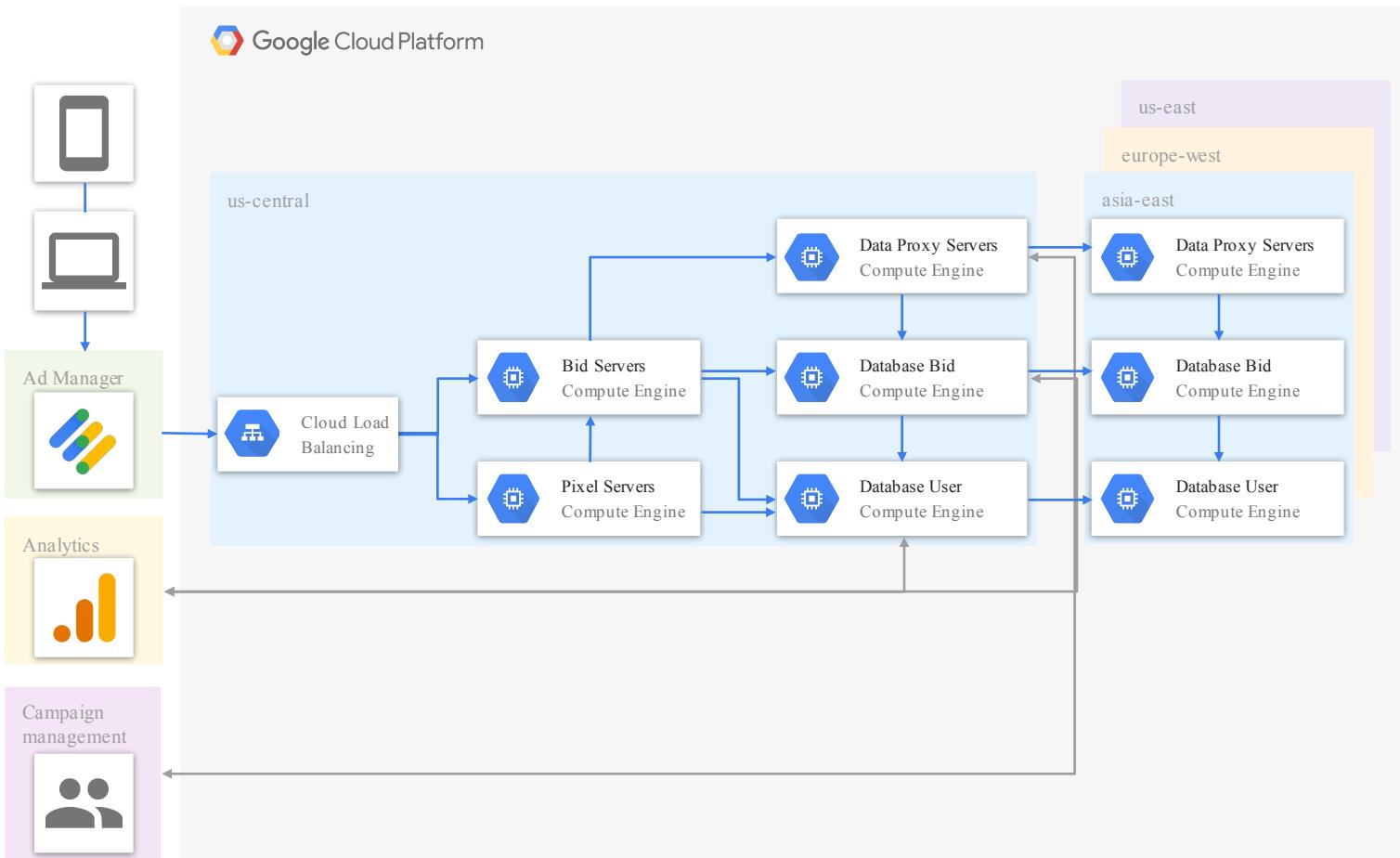
Explore billing data

Configure audit log sink to BigQuery

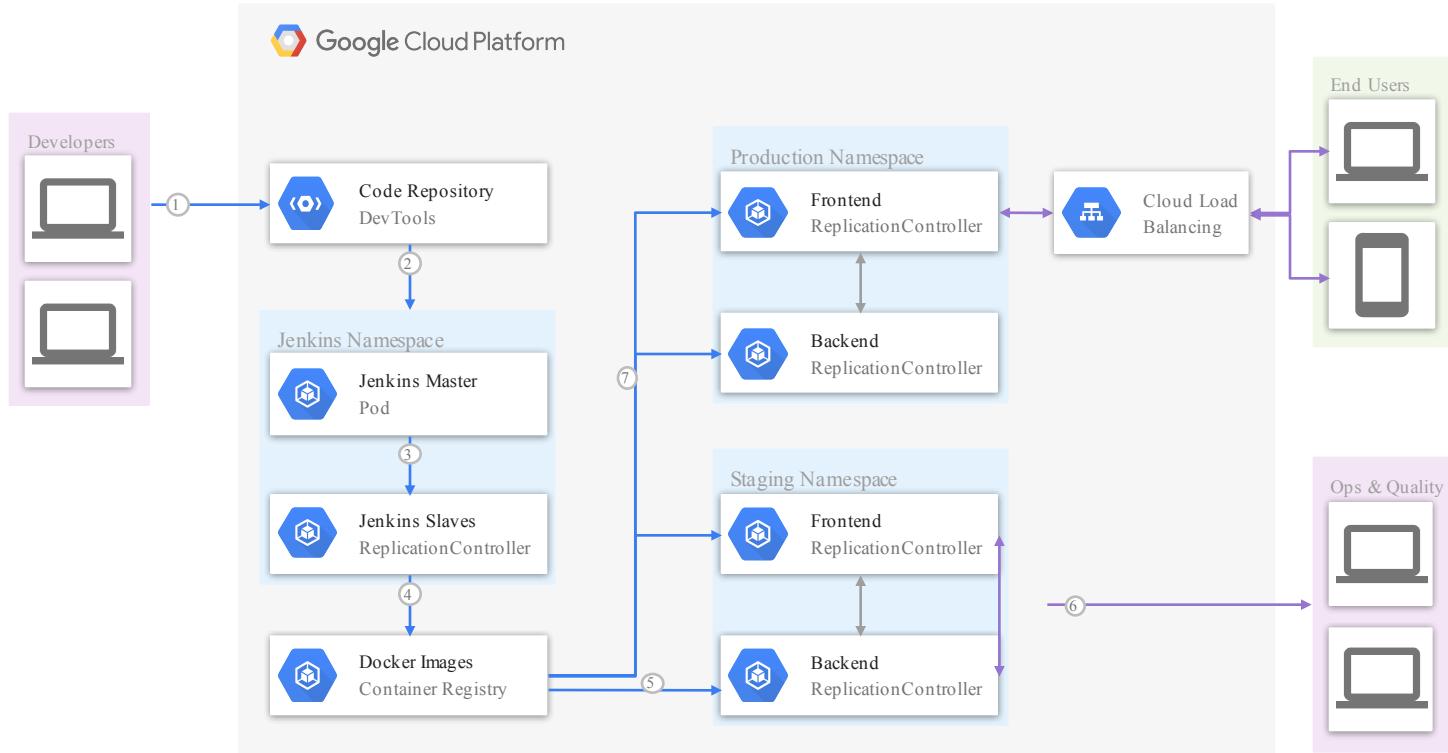


# Infrastructure Examples Q&A

# Mobile Ad-serving RTB Platform



# CI/CD Platform



1 Commit Code

2 Code Enters CD Pipeline

3 Test/Build Job Submitted to Slave

4 Push Docker images

5 Images Deployed to Staging

6 Operational and Functional Testing

7 Images Deployed to Production

What next?

Create your first project!  
Experiment with QuickStarts!  
Get certified!?!?!

# Video Titles To Watch

Complete Video Course

AWS Certified Solutions Architect - Associate (SAA-C02)

Chad Smith

livelessons

Complete Video Course

AWS Certified Security - Specialty

Chad Smith

livelessons

Complete Video Course

AWS Certified SysOps Administrator (Associate)

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AWS Account Setup Best Practices

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