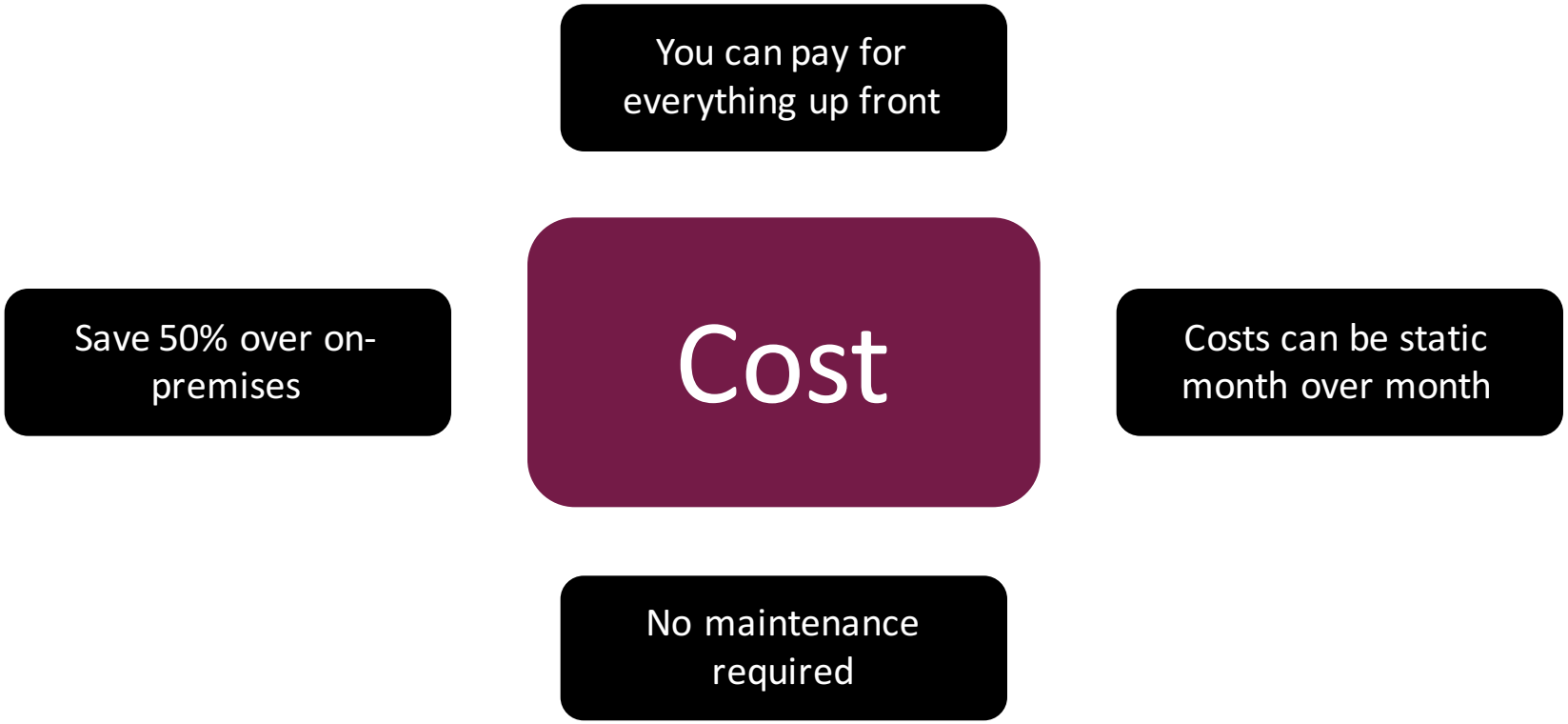
Getting Started With Google Cloud Platform

Chad Smith

Pearson

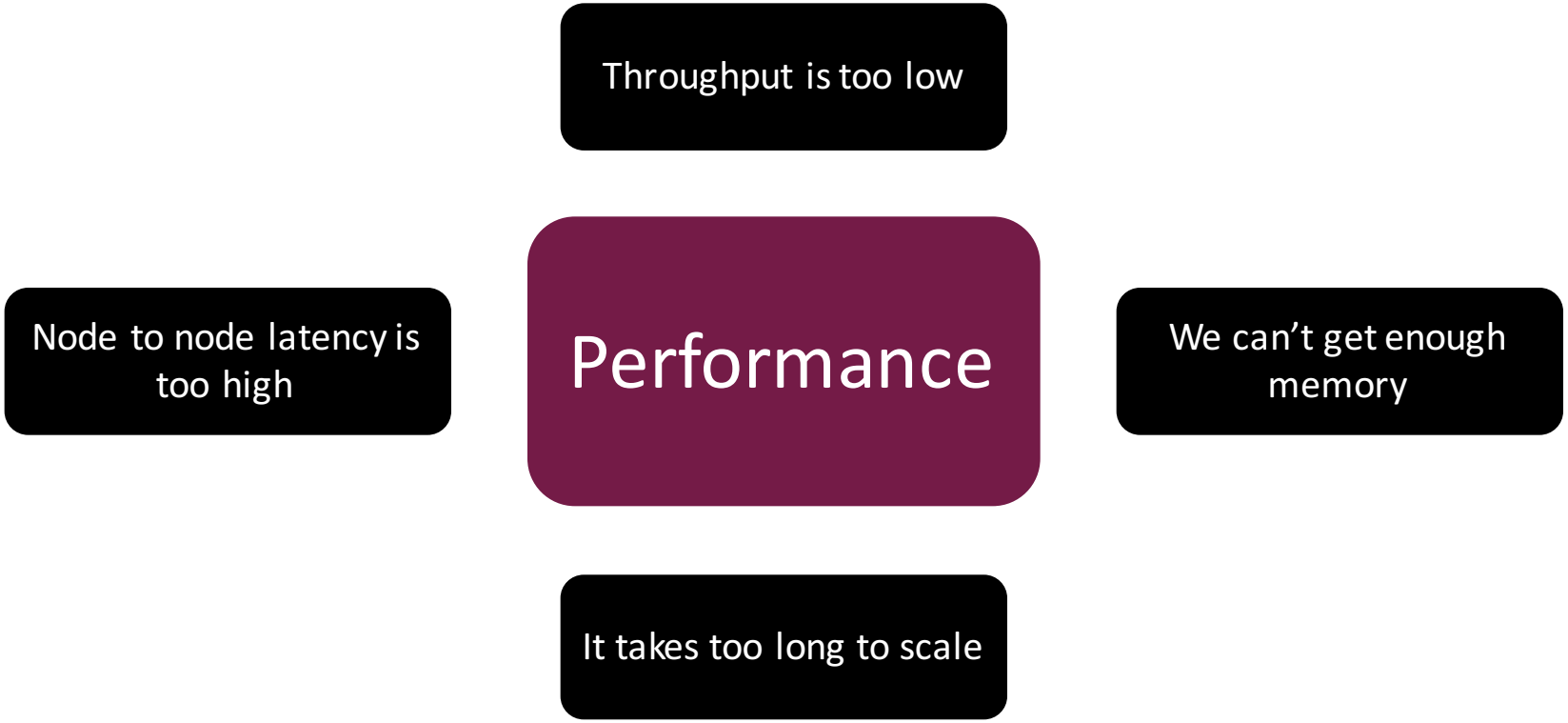
Cloud Architecture Basics

Cloud Misconceptions



Cloud Misconceptions

Cloud Misconceptions



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
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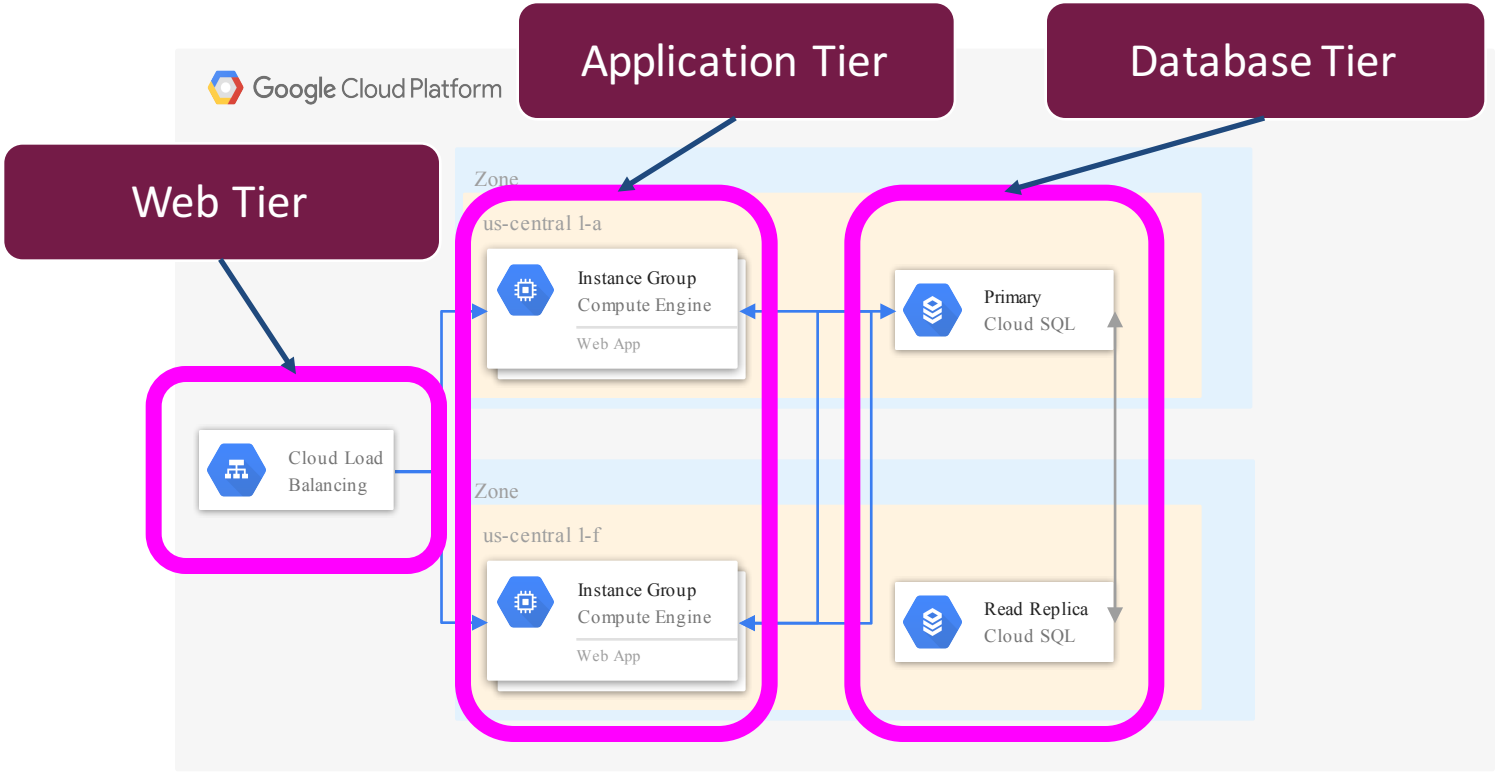
Learning Architecture Diagrams



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Global Infrastructure and Service Scope

Data Center

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

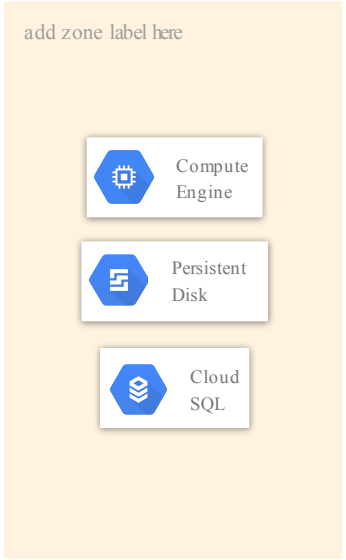
10s of thousands of servers

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

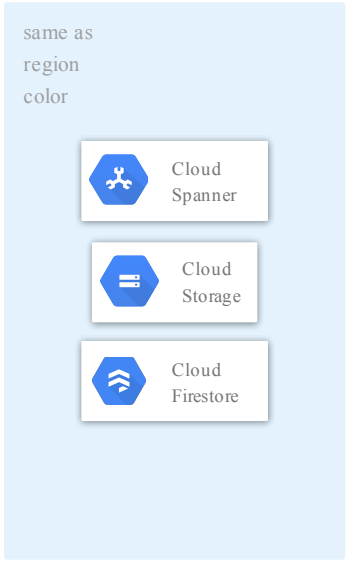
Independent geographic area

2+ Zones

<5ms RT latency @ 95th percentile

Scope for many managed resources

Multi-Region

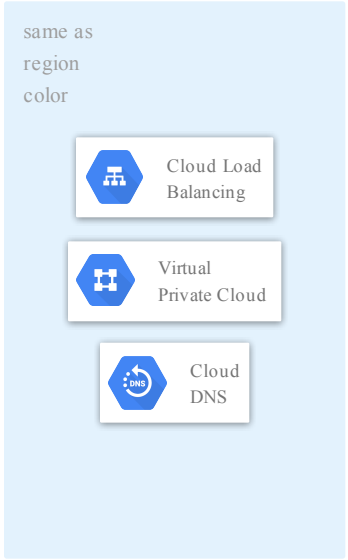


Designed for resilience

2+ Regions (same continent)

Scope for many resilient resources

Global

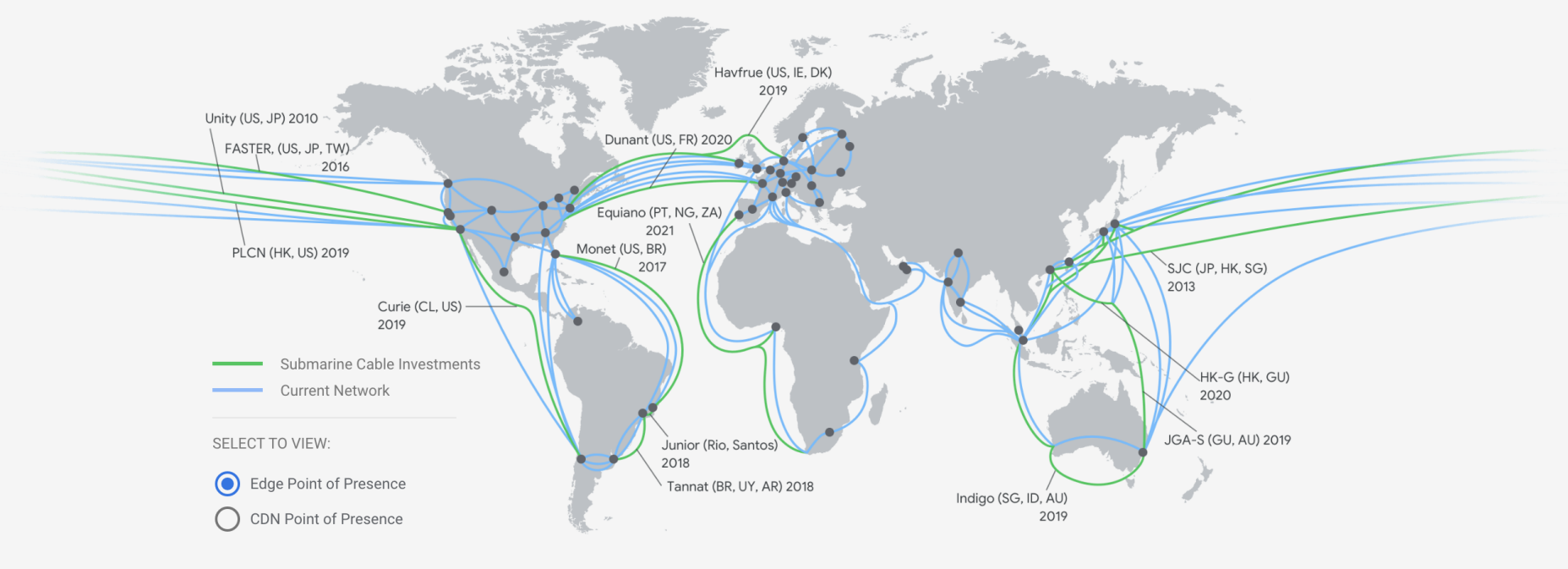


Not tied to any single region

Designed for extreme availability

Scope for many managed resources

Global Fiber Network 05/2020



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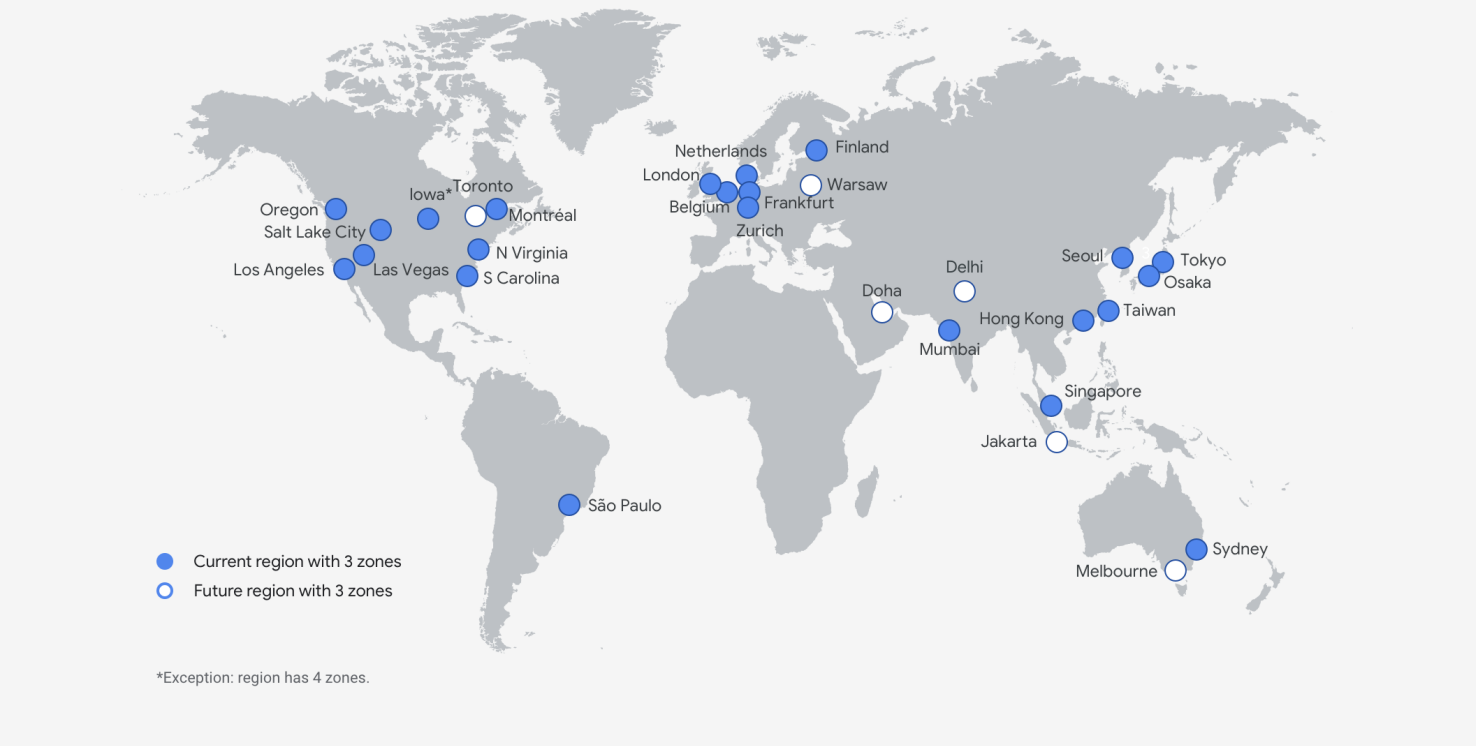
Region Placement 05/2020



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Cloud Console Demo

Building Block List

Project Creation

Enabling APIs

GCP Security and Monitoring

Cloud IAM

The 3 A’s!

Authentication

Authorization

Accounting/Auditing

Cloud IAM Elements

Folders

Organization

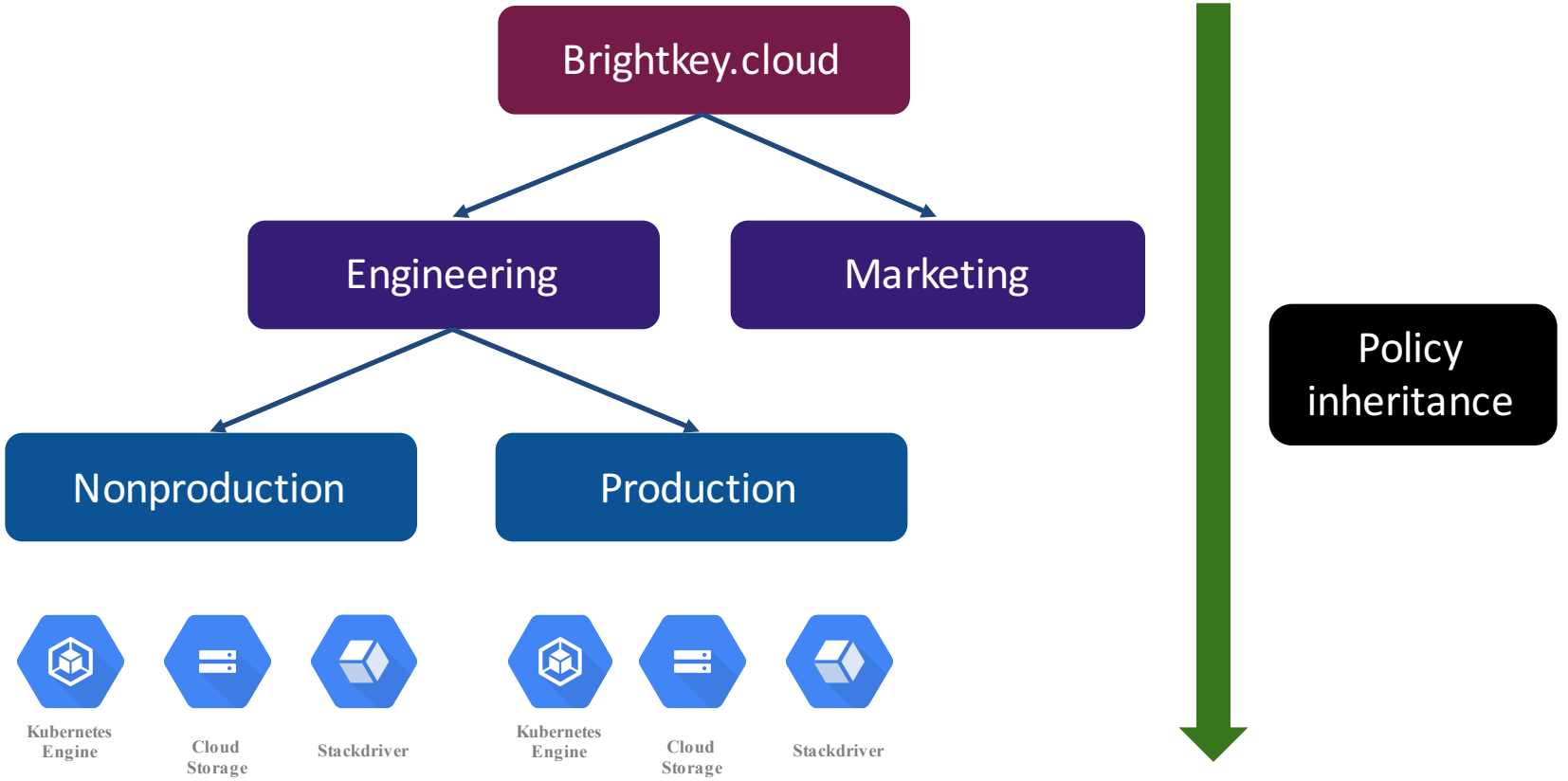
Projects

Members

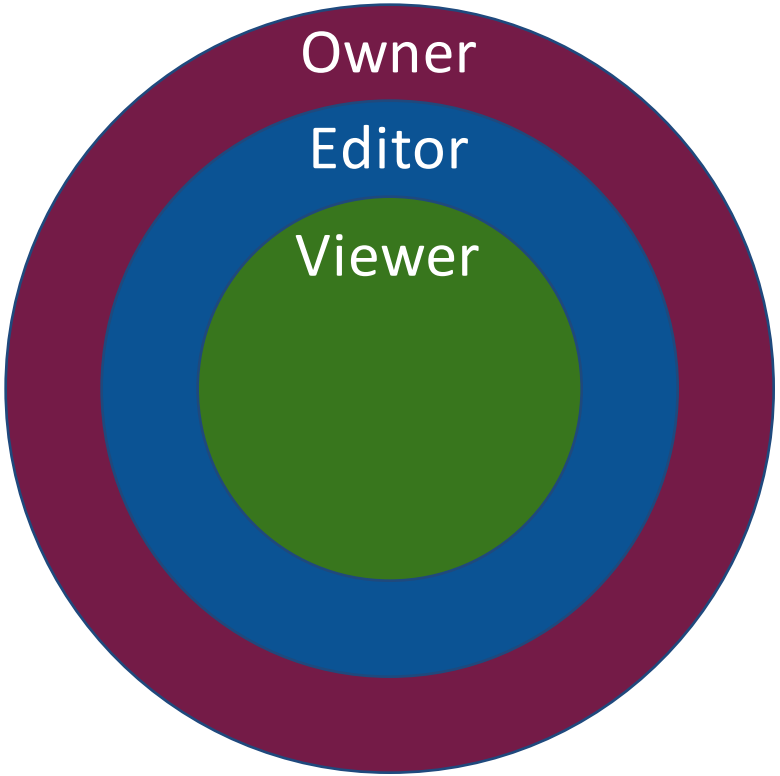
Resources

Roles

Cloud IAM Hierarchy



Cloud IAM Roles - Primitive



Cloud IAM Roles - Predefined

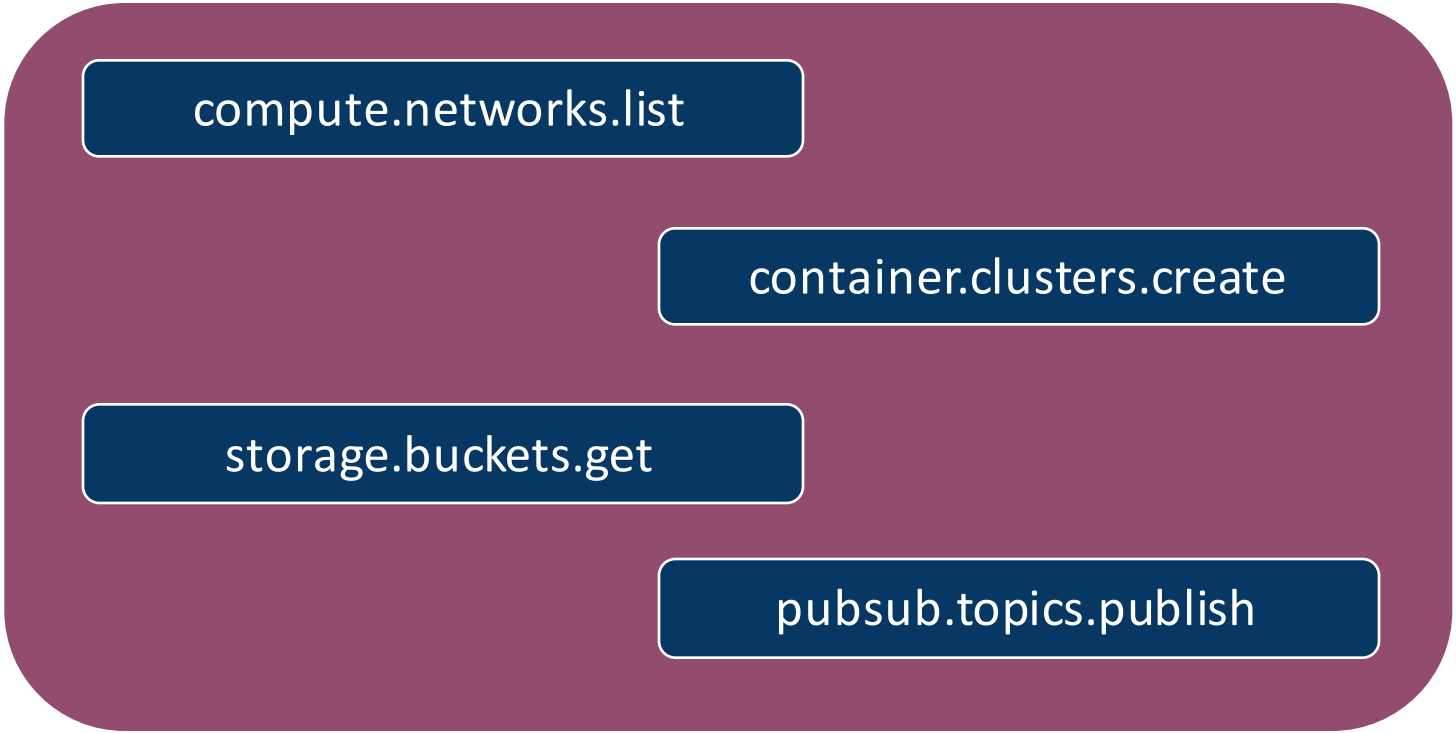
Compute Engine
networkAdmin
loadbalancerAdmin
instanceAdmin

Billing
admin
projectAdmin
creator

Storage
objectAdmin
objectCreator
legacyBucketWriter

BigQuery
dataEditor
jobUser
admin

Cloud IAM Roles - Custom



IAM Demo

Explore Primitive/Predefined Roles

Add Member

Create Custom Role

Assign Role to Member

Service Accounts

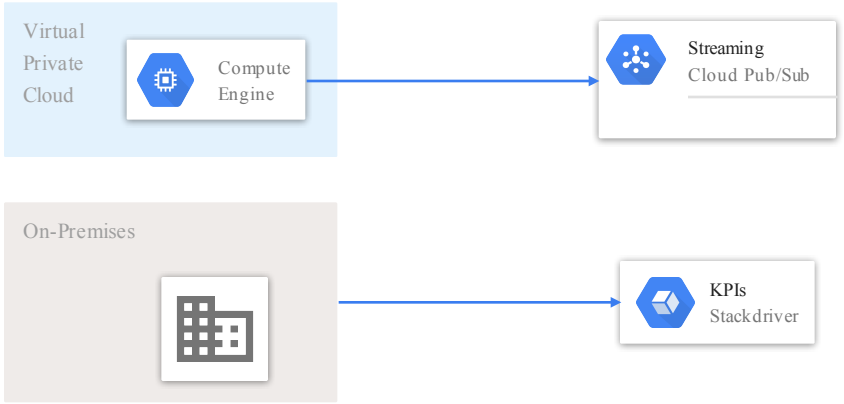
User-Managed

Default

Custom

Google-Managed

Google APIs



Service Account Demo

Create Service Account (Cloud Console)

Assign Role to Service Account

Create Key for Service Account

Cloud SDK

Gcloud CLI

Language-specific client libraries

Product-specific CLIs

Cloud SDK Demo

Explore Cloud SDK Install Steps

Configure Cloud SDK

Explore Cloud SDK Configs

StackDriver

Monitoring

Logging

Error Reporting

Debugger

Trace

Profiler

Billing

Billing Reports

Cost Trends

Export to BigQuery

Budget alerts

Free Tier

New customer $300 credit

Always free products

Limited usage

StackDriver and Billing Demo

Explore Default Dashboards

Explore Billing Data

Create Budget Alert

Networking In GCP

Virtual Private Cloud (VPC) Basics

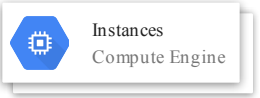
Networks are GLOBAL

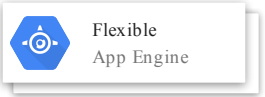
Subnets are REGIONAL

Firewall rules deny by default

Does not support all services

VPC Services Supported





VPC Types

Default

Auto Mode

Custom Mode

VPC Elements

Subnet

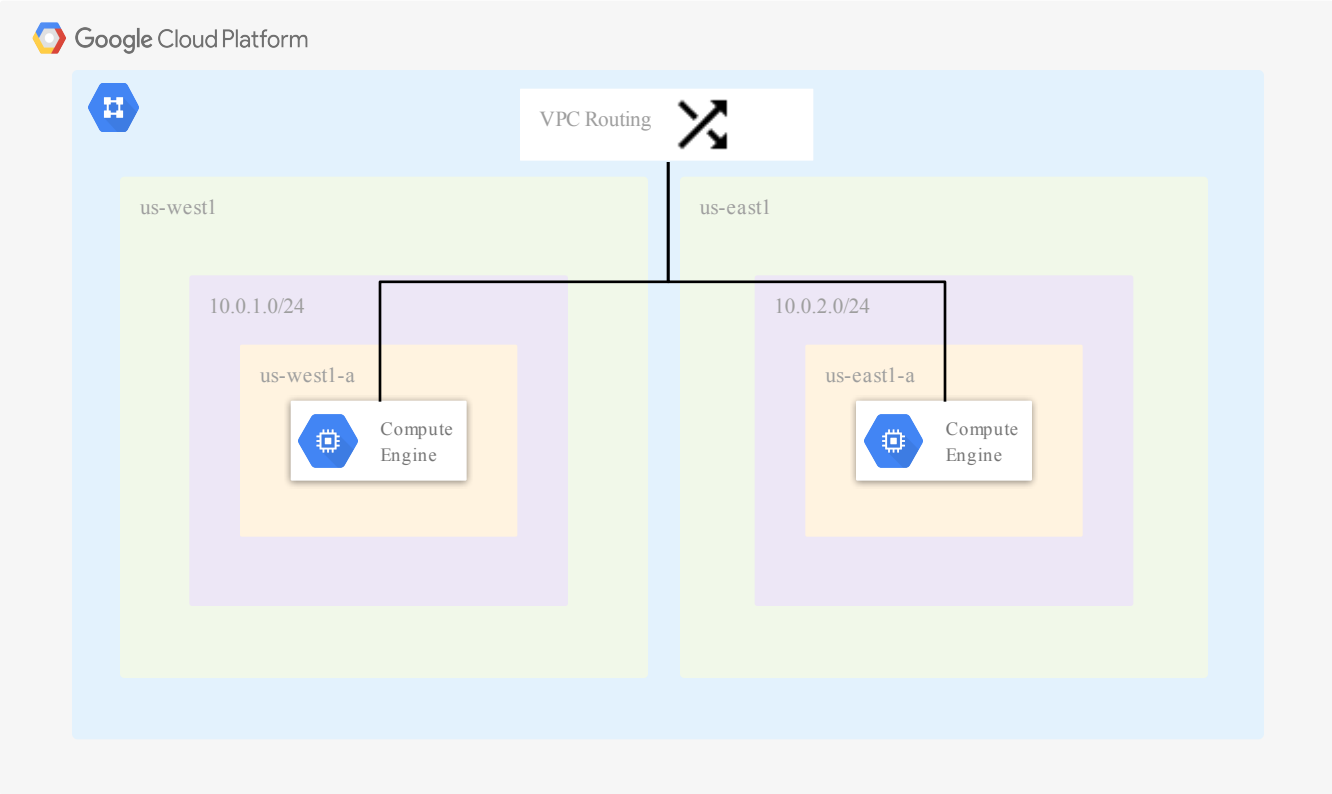
Routes

Firewall Rules (ingress and egress)

VPC Flow logging

VPC Peering (transitive routing)

VPC Diagram


Google Cloud Platform
VPC Routing
us-west1
us-east1
10.0.1.0/24
10.0.2.0/24
us-west1-a
us-east1-a
Compute Engine
Compute Engine

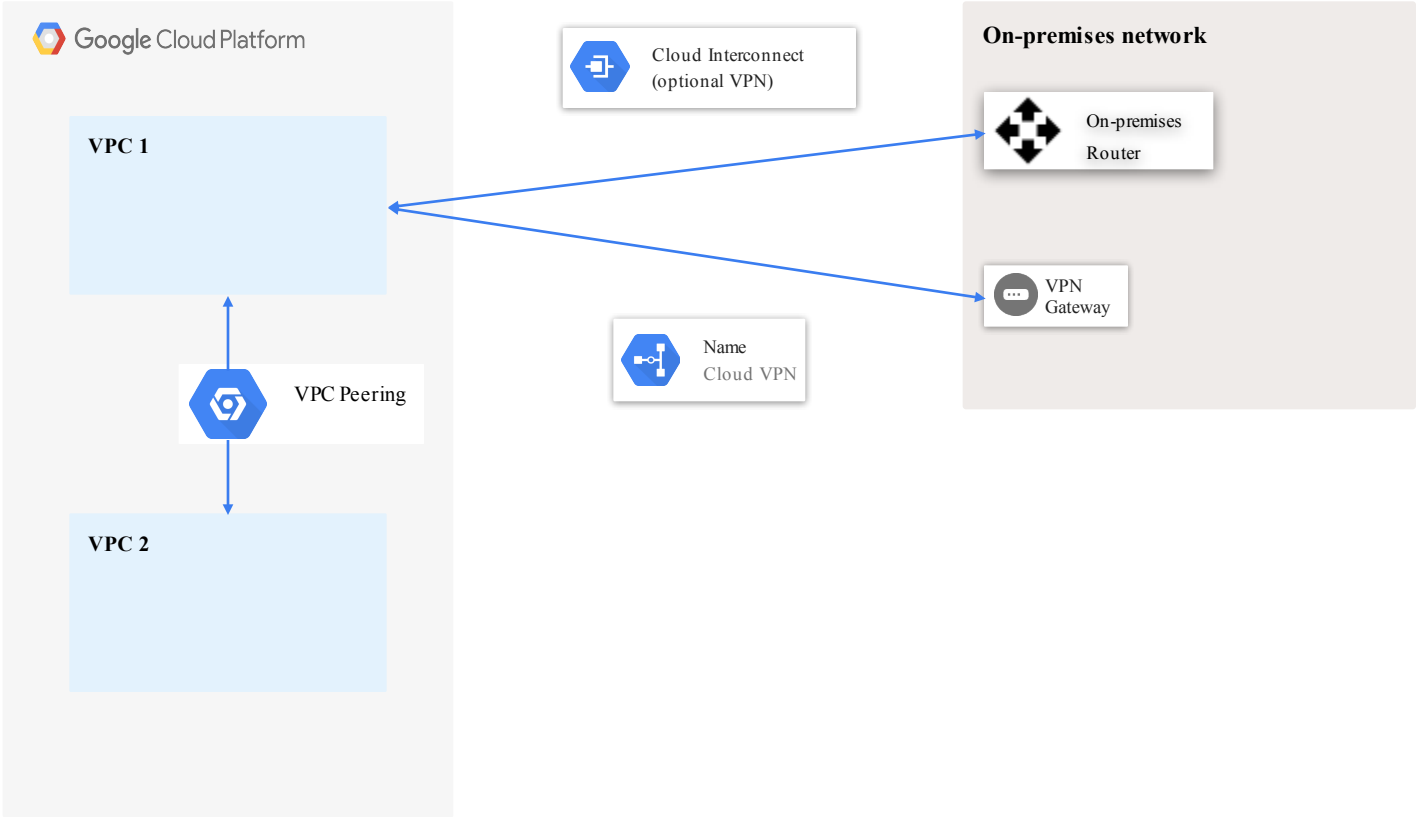
VPC Demo

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

GCE Pricing

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 07/2020)

Go

Node.js

Python

Java

GCF Code Locations

Inline editor

ZIP upload

Zip from Cloud Storage

Cloud Source Repository

GCF Triggers (as of 07/2020)

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

Archive
Hot 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

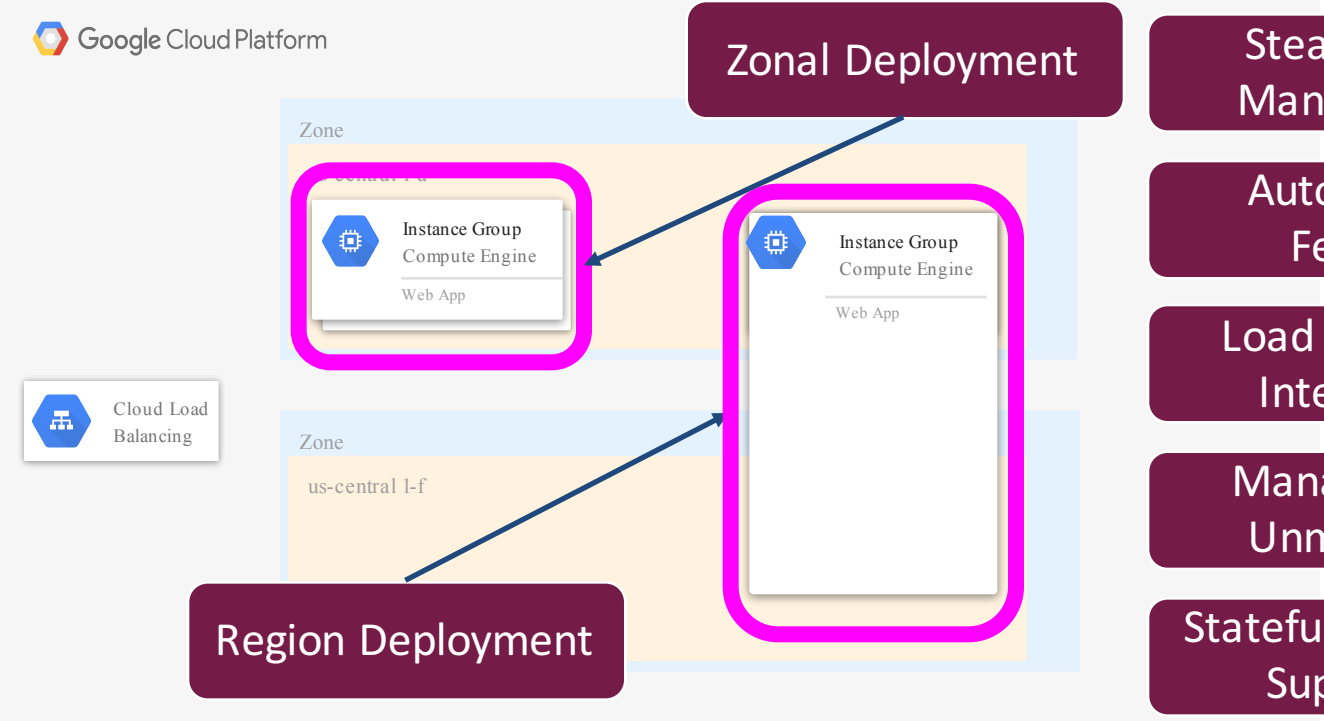
Multi-region can span continents

Multiple write entry points, up to 1000s

Much higher entry cost than Cloud SQL

GCP Application Deployment Options

GCE Instance Groups



- Steady State Management
- Auto Scaling Feature
- Load Balancing Integration
- Managed and Unmanaged
- Stateful Workloads Supported

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

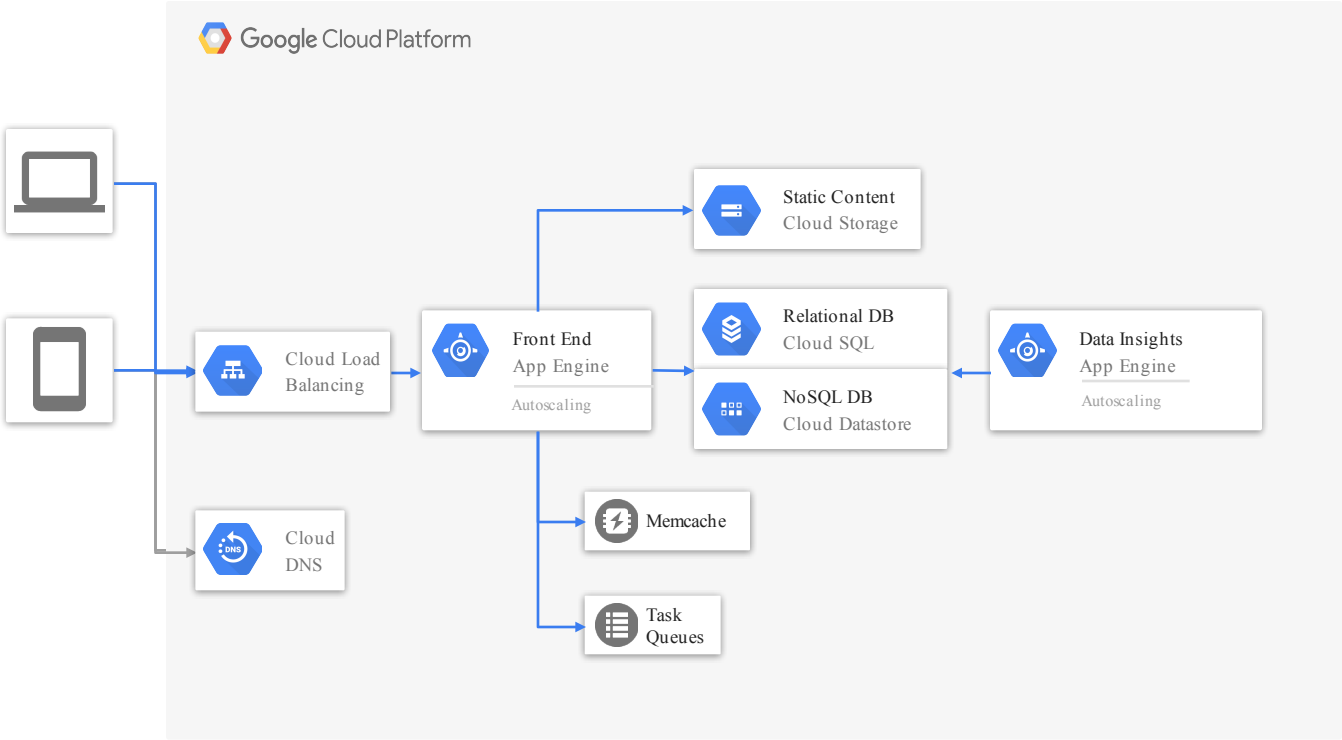
Deploy GAE Standard app (Cloud SDK)

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/Firestore

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

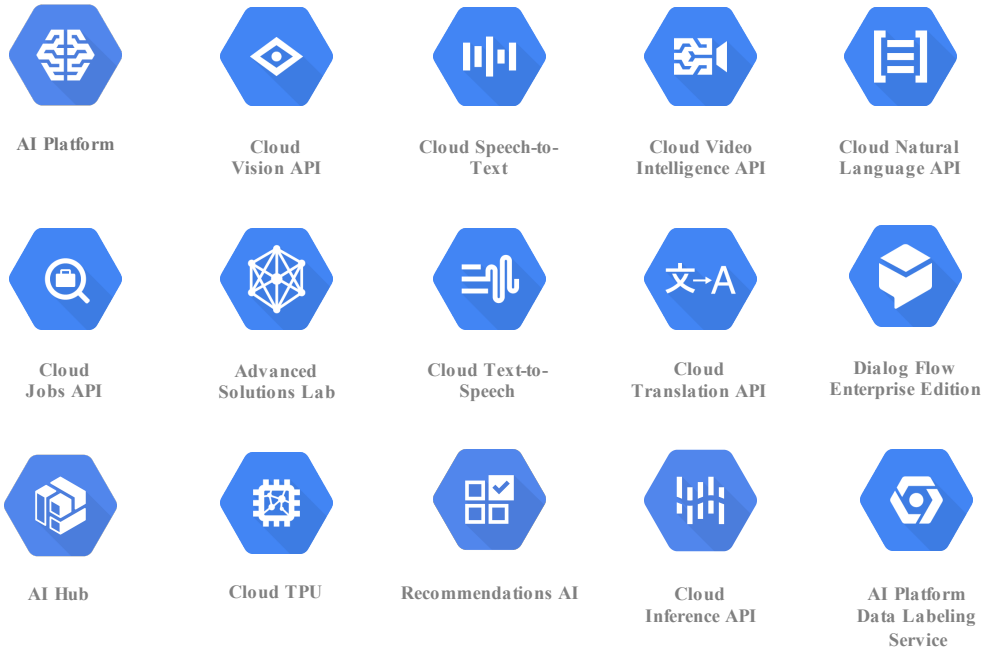
Video Intelligence

Vision

Tables

Basic and Advanced versions

Other AI/ML Services



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

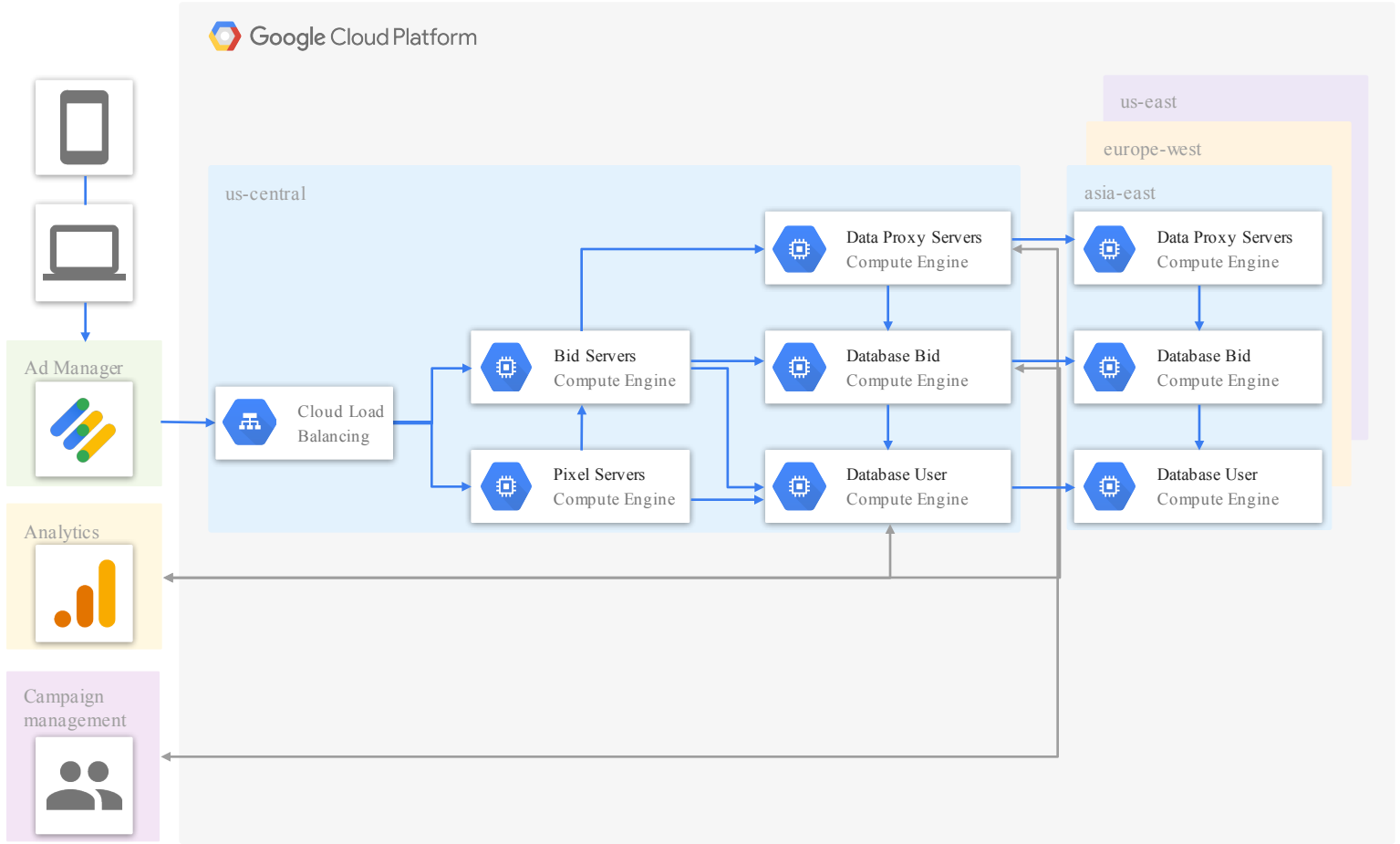
BigQuery Demo

Explore billing data

Configure audit log sink to BigQuery

Infrastructure Examples Q&A

Mobile Ad-serving RTB Platform



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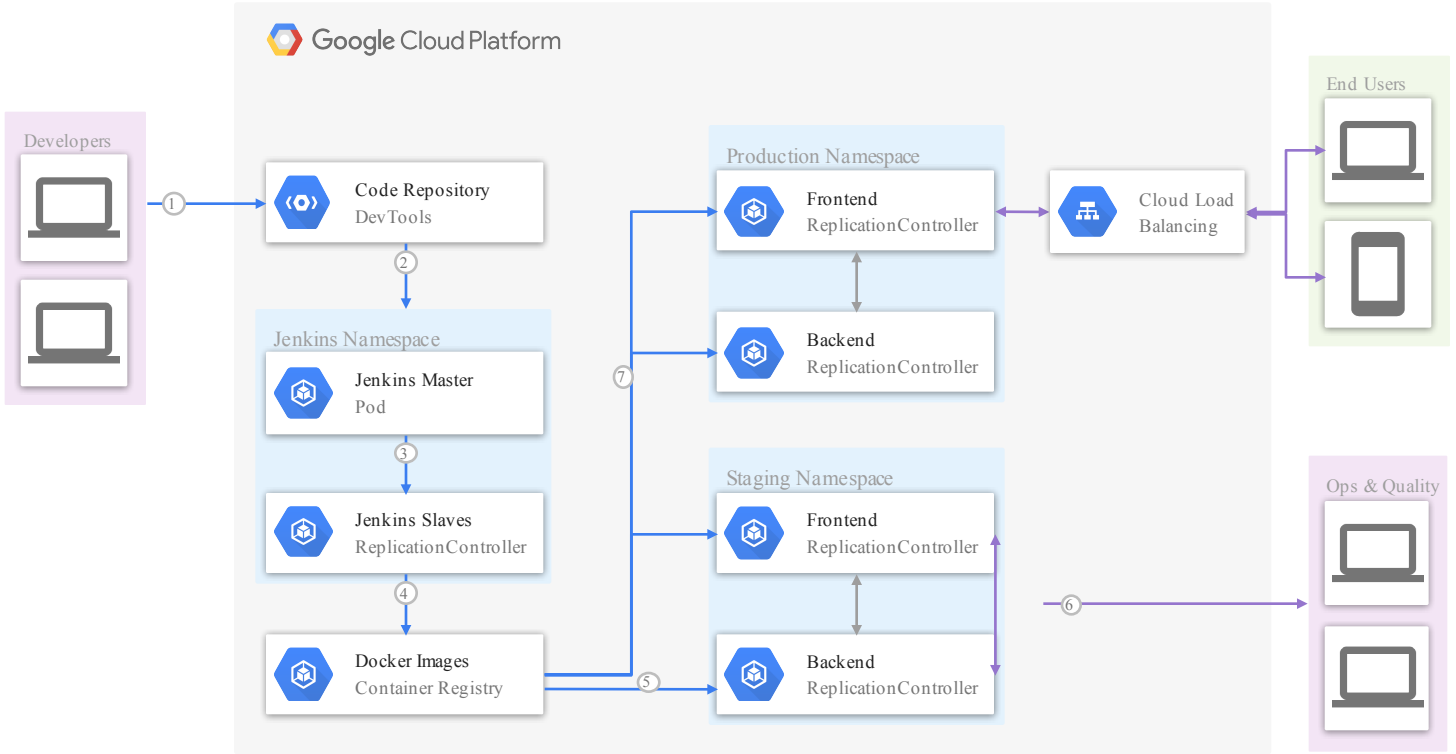
CI/CD Platform



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!?!?!?