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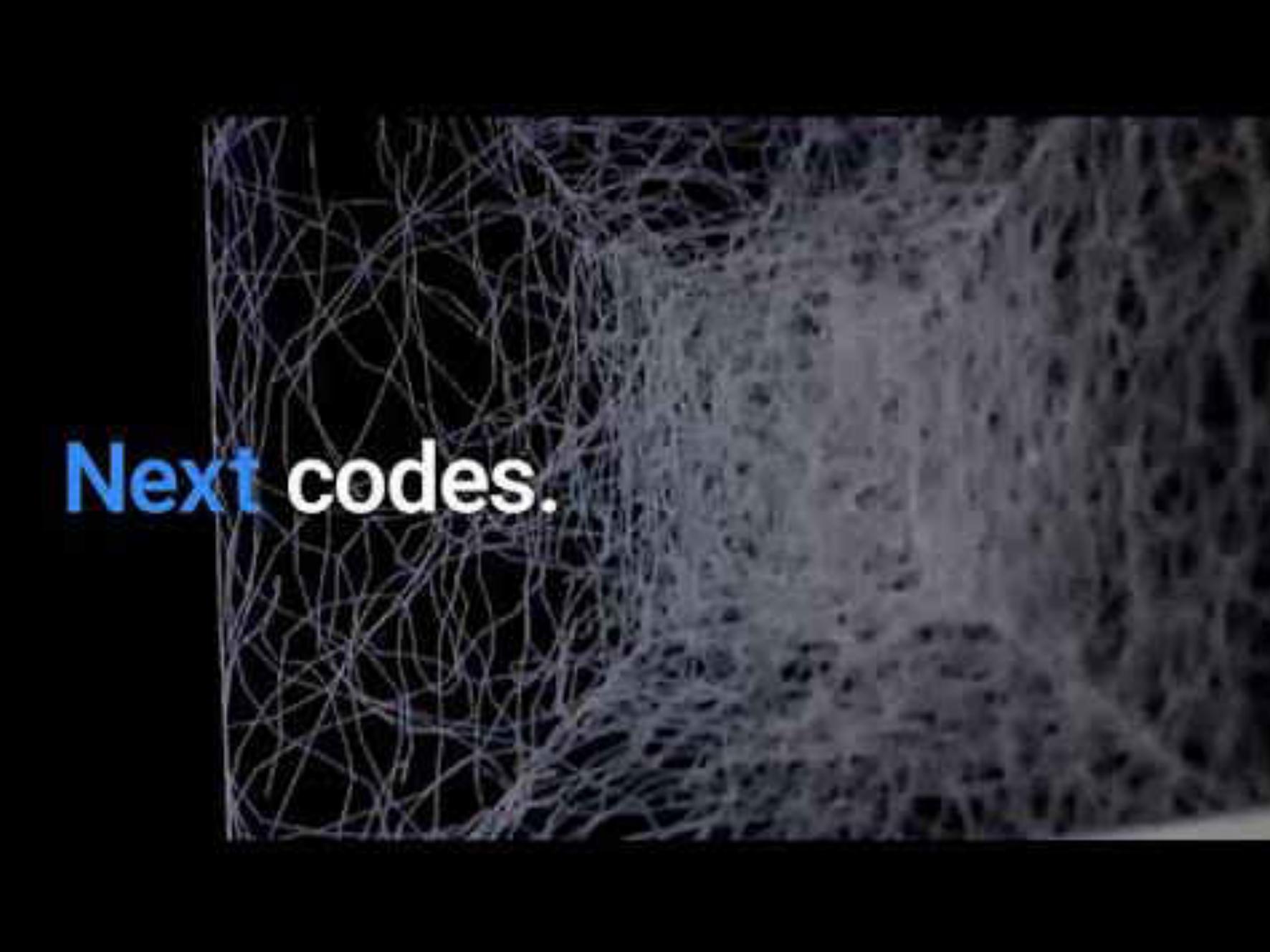
7 Welcome to Cloud OnBoard

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9 #GoogleCloudOnBoard
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13 </Start Training>

Wifi GoogleGuestPSK
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Next codes.



[Alejandro Montenegro]
[Engineering Lead, Google Cloud Denmark]

@amontene

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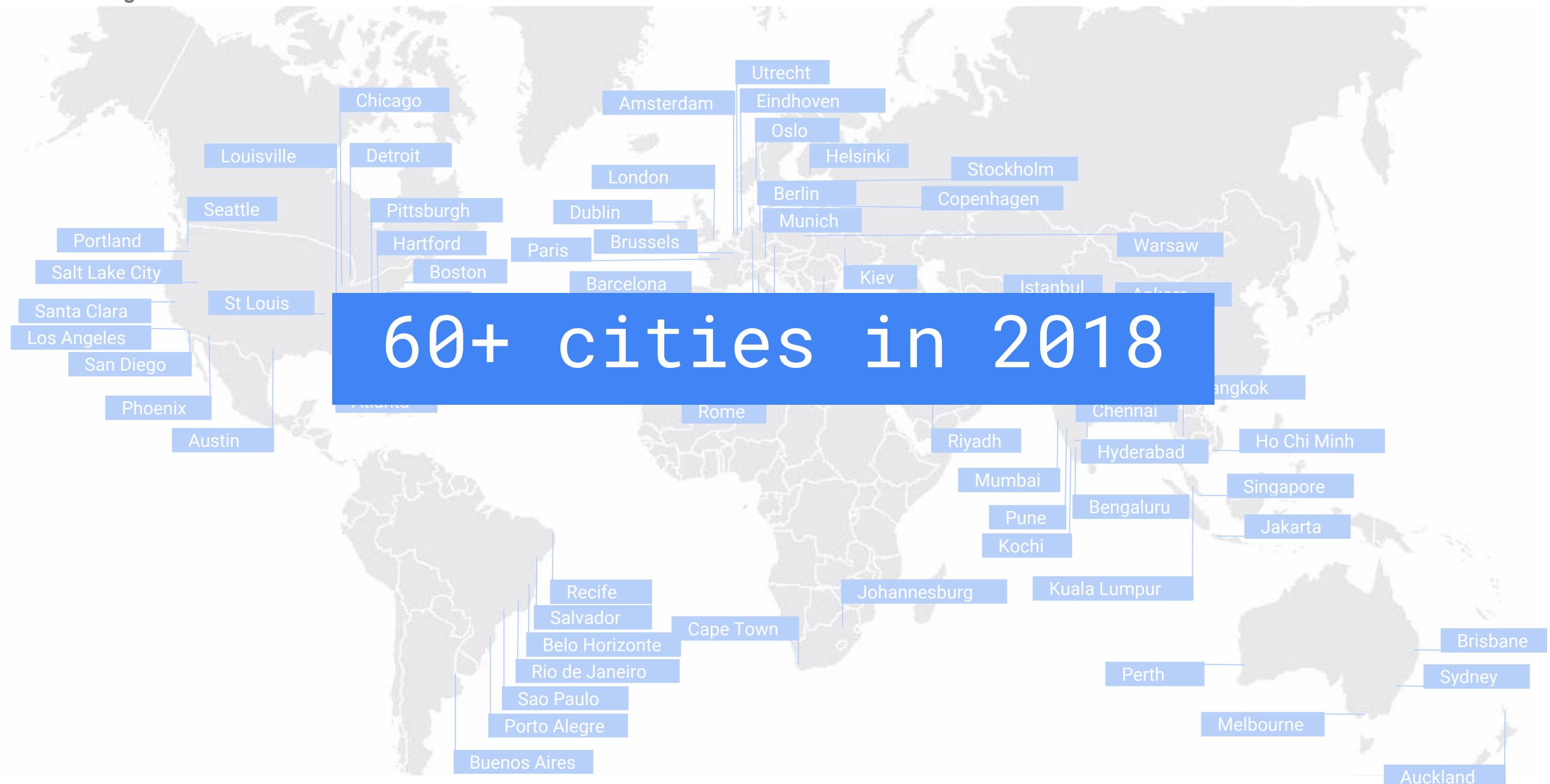
Google Cloud

Cloud OnBoard



Google Cloud

Cloud OnBoard



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Certification of Attendance

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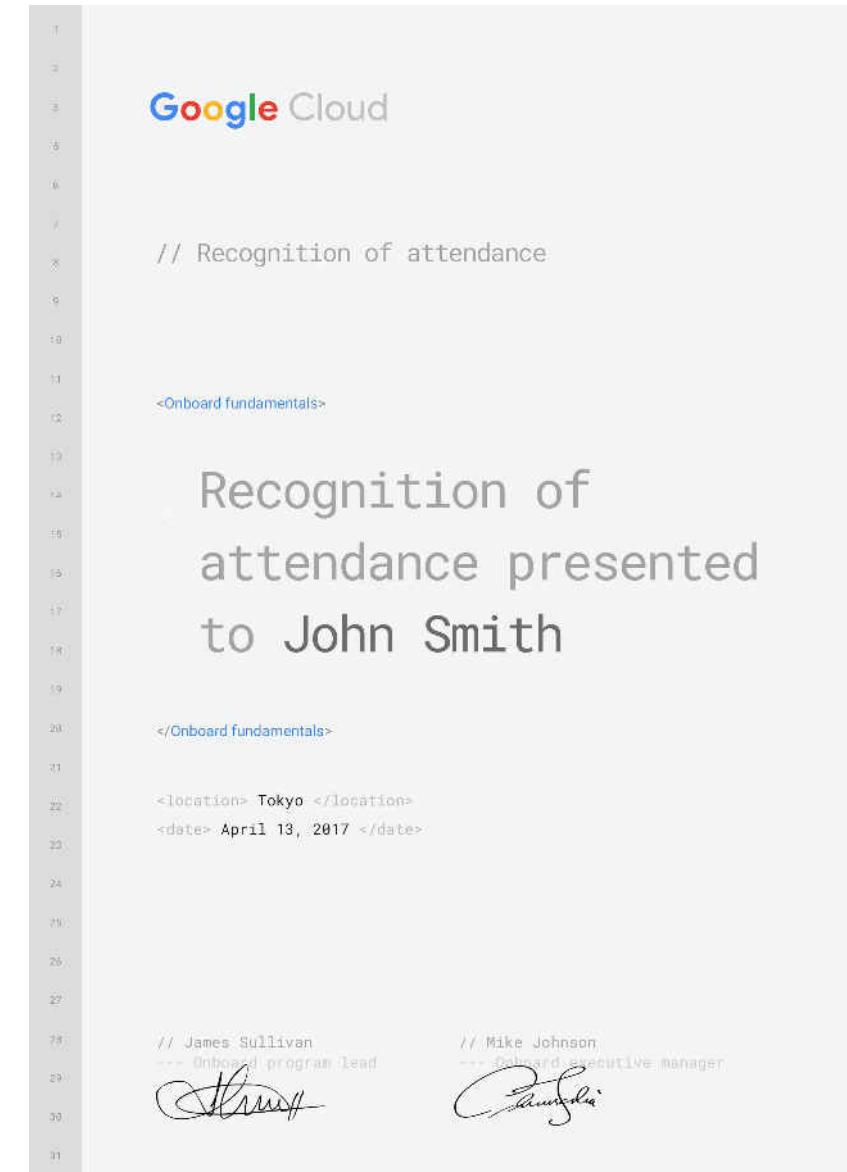
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Activities in Denmark

- 3rd Google Cloud OnBoard
- Google (Cloud) Developer Group (Find them at Meetup.com)
- ngCopenhagen Event
- Extended Google IO with Trifork
- TensorFlow Dev Summit Extended with Nordic AI
- Partner conferences with Salesforce and Deloitte
- KubeCon!

Partners present today

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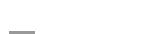
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Google Cloud

Organise the world's information and make
it universally accessible and useful

Google



7 Cloud products with 1 billion users



Partner with all of Google

All brands



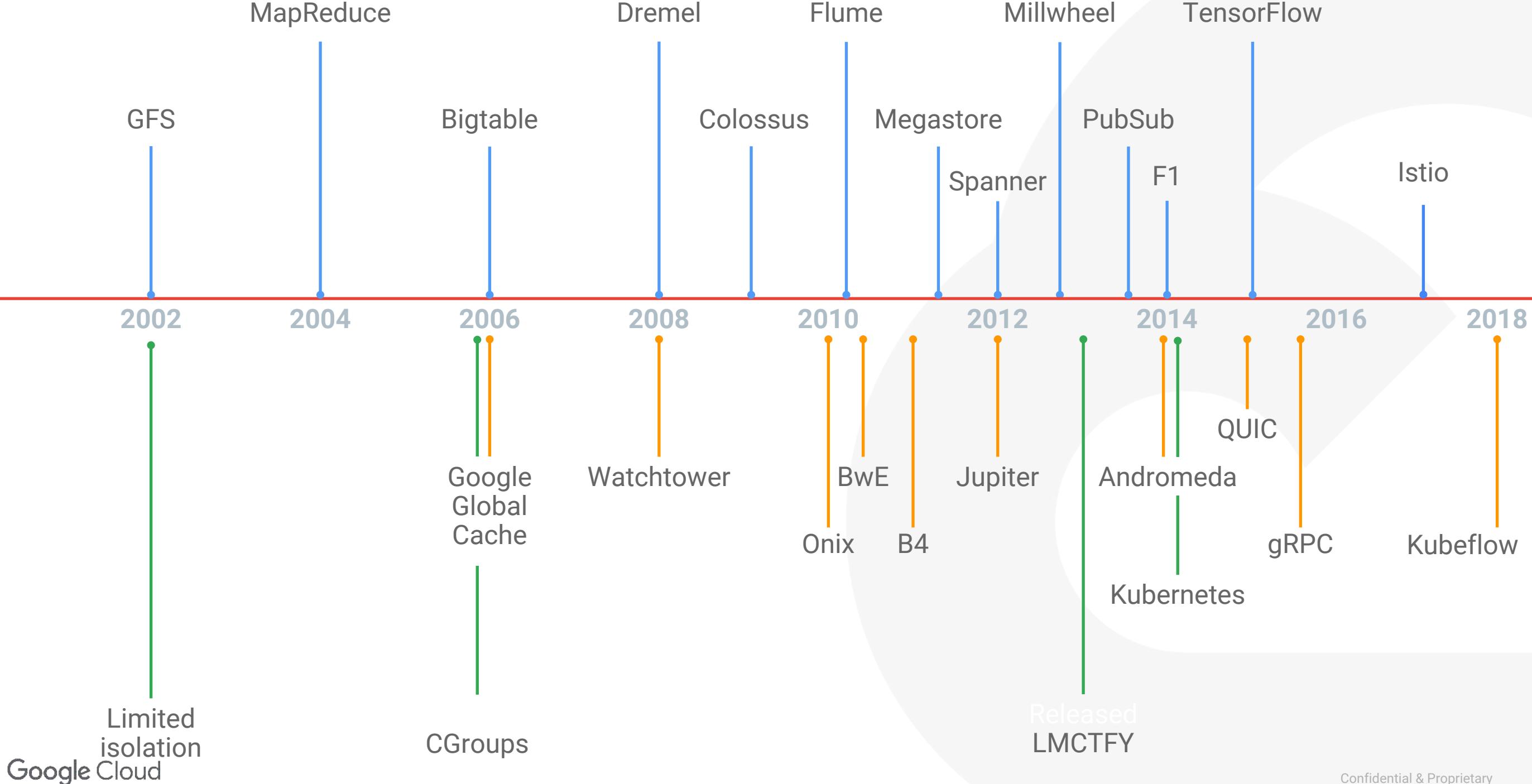
All our growth experience

All our innovation

Delivered engineer to engineer

Pricing for long term customer relationship

15+ years reinventing the cloud technology



and open source cloud technologies

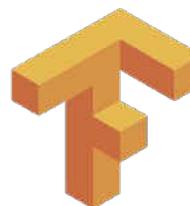


#1

Kubernetes
Highest engagement
on Github

~1,100

Open source projects on GitHub
received commits from Googlers
in 2017



#2

Tensorflow
Highest engagement
on Github

900+

Active employees in GitHub
in 2017

7x

More repositories committed- to
than Amazon and 25% more
than Microsoft

Why choose Google Cloud Platform

World-Class Network

Deep investment in high-speed performance

Open Platform

Customer flexibility for a hybrid world

Artificial Intelligence

Machine Learning
Data & Analytics

Powerful Security

Purpose-built and multi-layer

Customers are Partners

Shared responsibility and reliability



**Carries more
than 25% of
the world's
internet
traffic**



Stop bad actors in their tracks

91%

of cyberattacks start
with a phishing email¹

84%

of organizations hit by
a DDoS attack in 2016

86% of those more than once²

A business is hit with a
ransomware attack every
40 seconds³

We filter **10 million**
spam and malicious emails
every minute

Google has

1000x the bandwidth
of the largest DDoS attacks ever⁴

We protect **3 Billion**
devices from URLs with
malicious content every day



At Google, everything
runs in a container

On average, we launch

4 billion

new containers per week

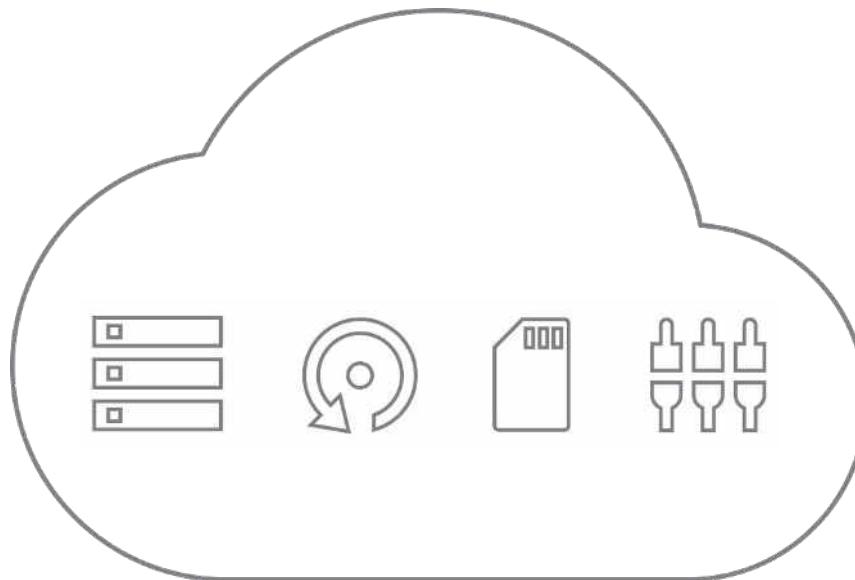


The future of computing is flexibility

A different kind of cloud



First Wave Physical/Co-location
Storage, processing, memory, network



Second Wave Virtualization
Storage, processing, memory, network



Third Wave Google Cloud
Fully managed, serverless / DevOps

How is Google Cloud Platform Different?

Let
Developers
Just Code



Solid
Foundation

Serverless
Data
Platform

The background image shows a panoramic view of the New York City skyline during sunset. The sky is a warm orange and yellow, transitioning into a darker blue at the top. The Empire State Building stands prominently in the center-right, its Art Deco spire reaching towards the clouds. To its right, One World Trade Center rises from the ground. The Hudson River is visible in the foreground, reflecting the sunlight. Numerous other skyscrapers of various heights are scattered across the horizon, creating a dense urban landscape.

Google Cloud

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Instructor

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[Ran Shiloni]
[Cloud Trainer, Google]

tw/instagram: @ranshiloni



Profile Pic



Security Pic

17

Cloud OnBoard

{

(📝) Registration 08:30 AM

Welcome and Building What's Next ('Google Cloud') 09:30 AM

('Module 1') Introducing Google Cloud Platform 10:00 AM

('Module 2') Getting Started with Google Cloud Platform 10:40 AM

(🌮) Break 11:20 PM

('Module 3') Virtual Machines in the Cloud 11:40 PM

('Module 4') Storage in the Cloud 12:20 PM

(🥪) Lunch 12:50 PM

('Module 5') Containers in the Cloud 01:40 PM

('Module 6') Applications in the Cloud 02:50 PM

(🌮) Break 03:30 PM

('Module 7') Developing, Deploying, and Monitoring in the Cloud 03:50 PM

('Module 8') Big Data and Machine Learning in the Cloud 04:30 PM

}

Igniting your Career with Google Cloud | Q & A 05:10 PM

Cloud OnBoard <!Agenda>

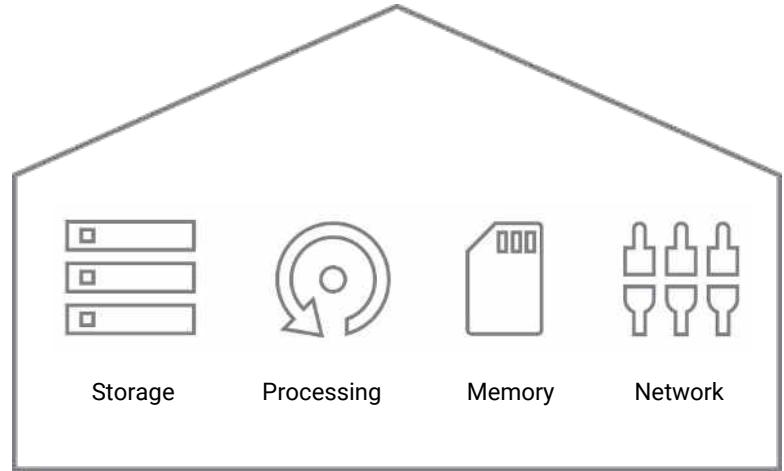
1	{
2	() Registration 08:00 AM
3	('Module 1') Introducing Google Cloud Platform 09:00 AM
4	('Module 2') Getting Started with GCP: Projects and Products 09:45 AM
5	() Break 10:30 PM
6	('Module 3') GCP Infrastructure as a Service: Google Compute Engine 11:00 AM
7	('Module 4') Containers on GCP: Google Kubernetes Engine 11:45 AM
8	() Lunch 12:30 PM
9	('Module 5') GCP Platform as a Service: Google App Engine 01:30 PM
10	('Module 6') Storage Options on GCP: Cloud Storage, SQL and more! 02:15 PM
11	() Break 03:00 PM
12	('Module 7') Developing, Deploying, and Monitoring in the Cloud 03:20 PM
13	('Module 8') Big Data and Machine Learning in the Cloud 04:00 PM
14	Igniting your Career with Google Cloud Training & Certification 04:45 PM
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Introducing Google Cloud Platform

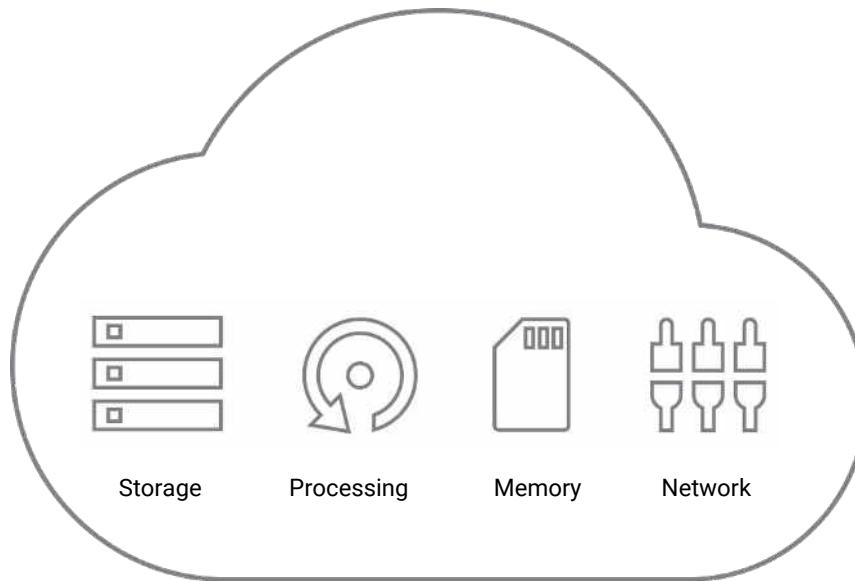
Google Cloud Platform Fundamentals: Core Infrastructure
v4.0

The Journey to a Flexible Web-Scale Cloud



Physical/Colo

User-configured, managed, and maintained



Virtualized

Google Cloud

Serverless/DevOps

Fully automated

Google Cloud

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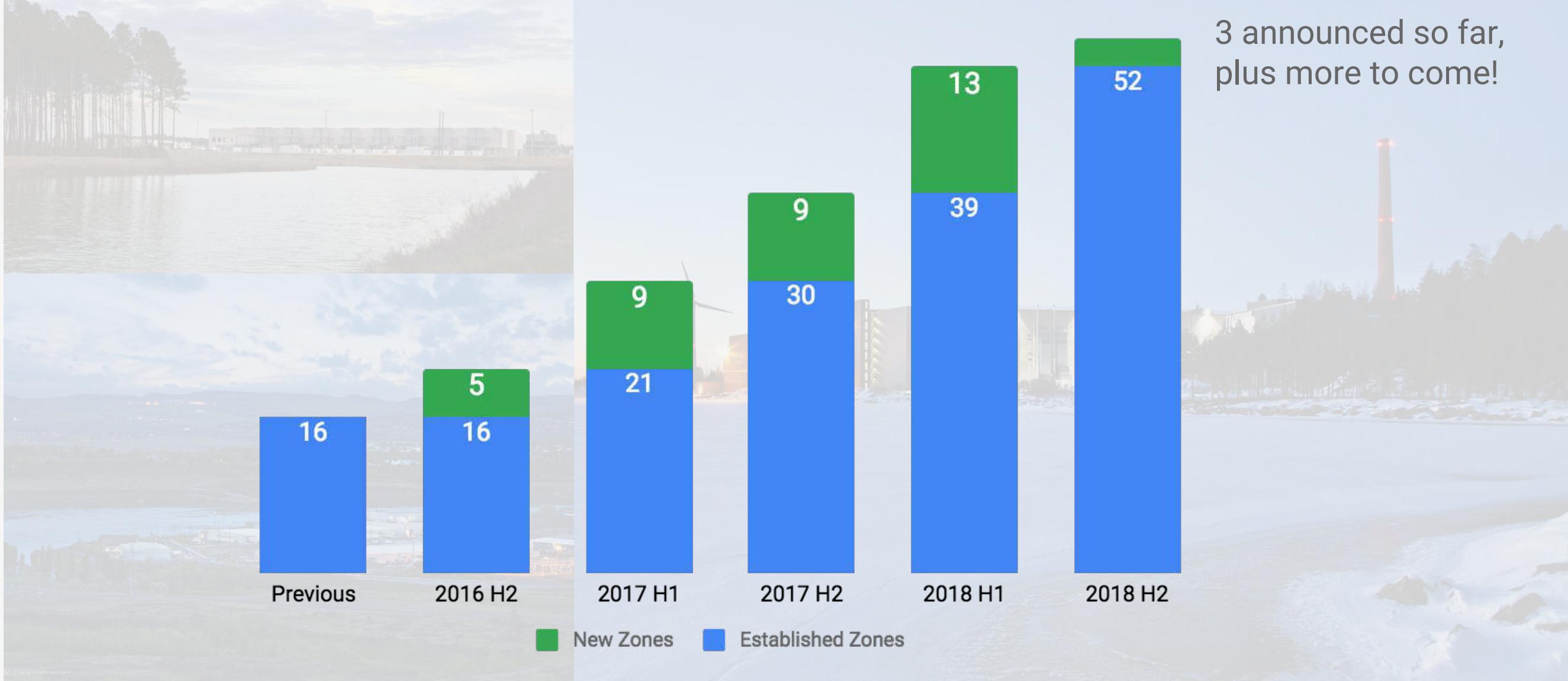
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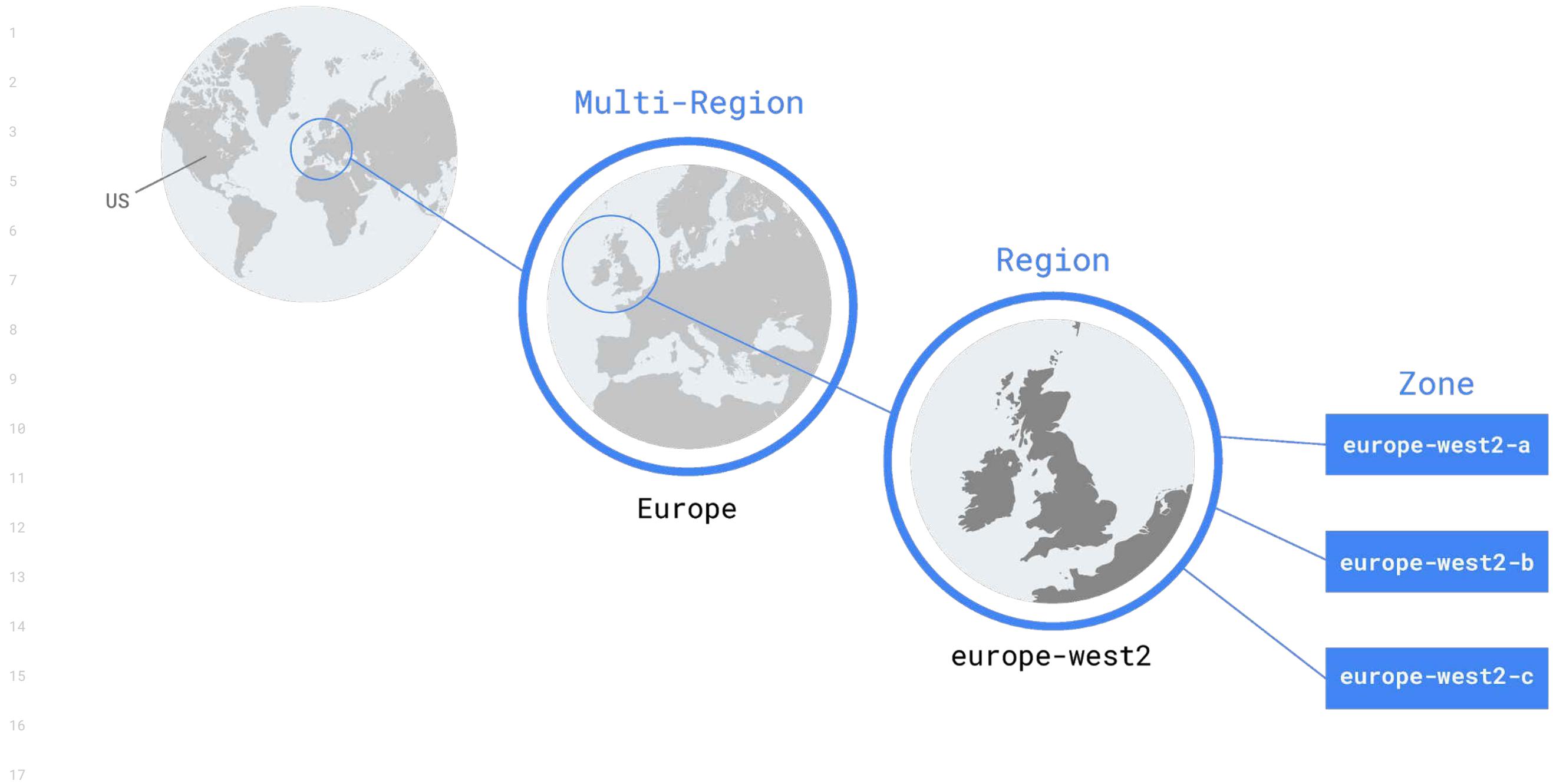
Every company is
a data company



Thirty-nine new zones

over last two and a half years



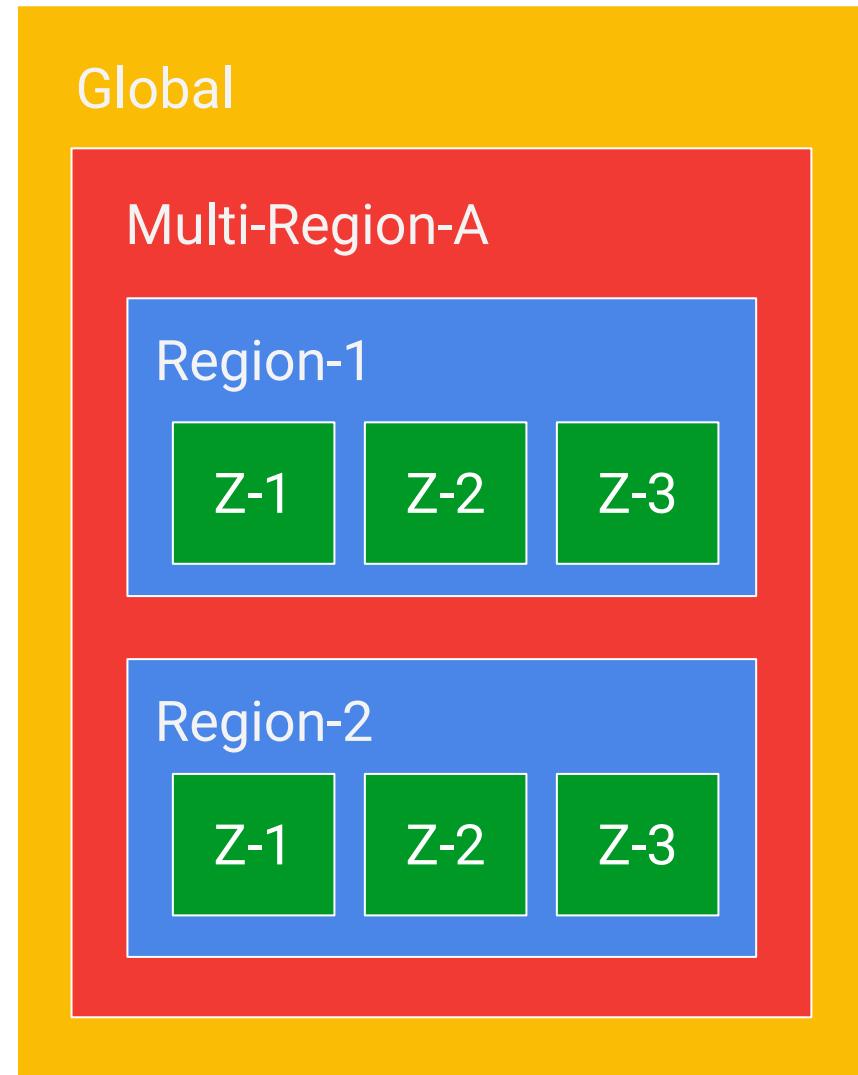


Zones: Independent failure domains within a region

Regions: Geographically independent locations

Multi-Regions: Collection of regions

Global: Any location



Google sustainability

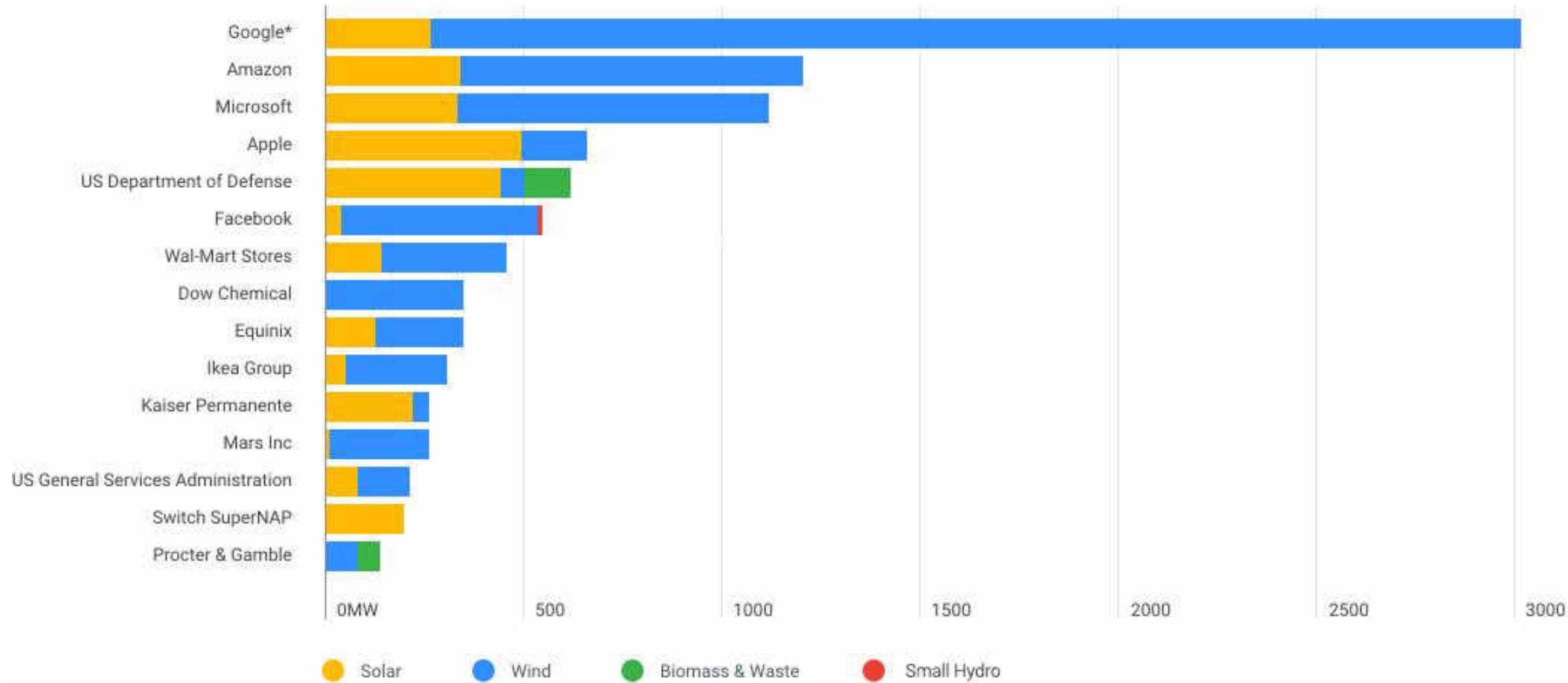
Carbon neutral since 2007

100% renewable for all operations



El Romero Solar Farm in Chile (80 MW for Google)

Google sustainability



Source: Bloomberg New Energy Finance

Renewable Energy

Over past 5 years, we've reduced our carbon intensity by 55%



Carbon Neutral since 2007

At 2.6 GW, Google is the world's largest corporate purchaser of renewable energy

Efficient Data Centers

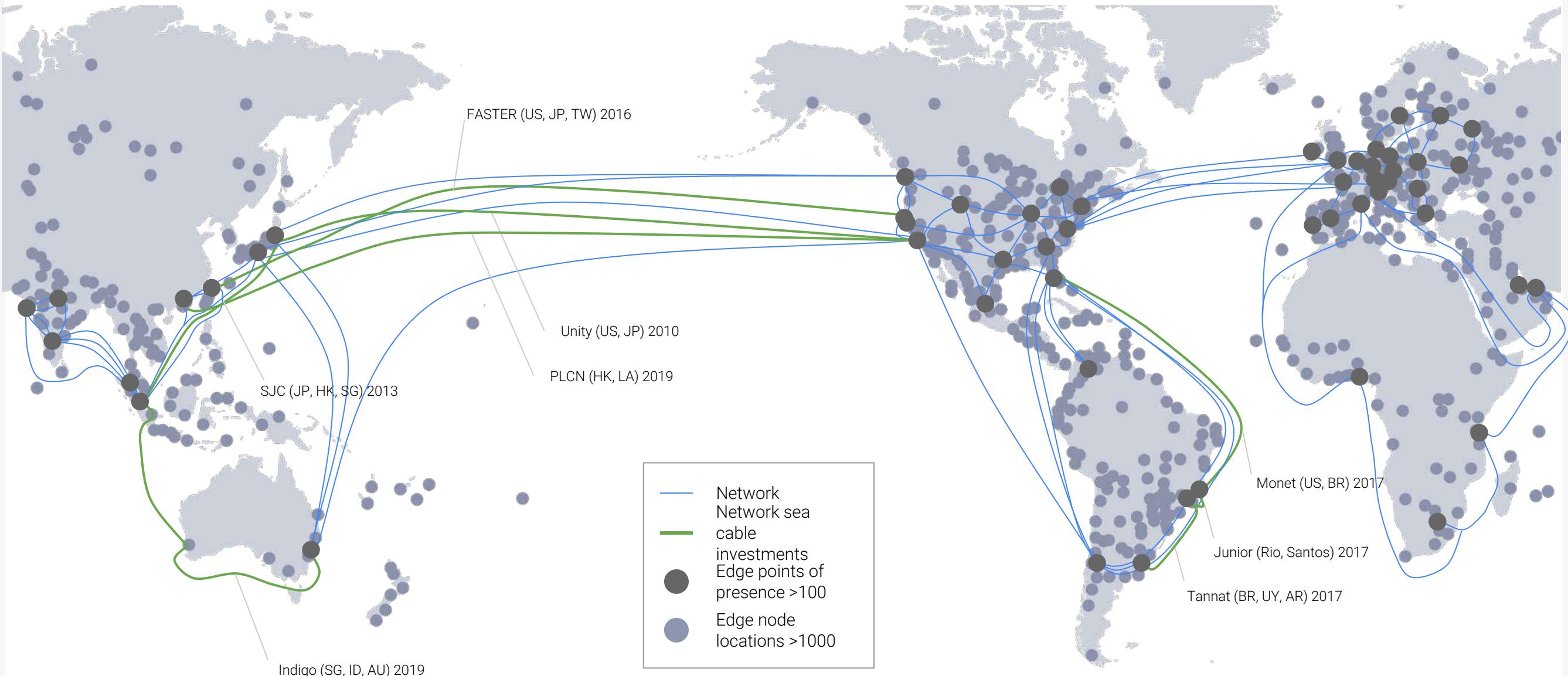
Our data centers use nearly six times less overhead energy



On average, a Google data center uses 50% less energy than a typical data center

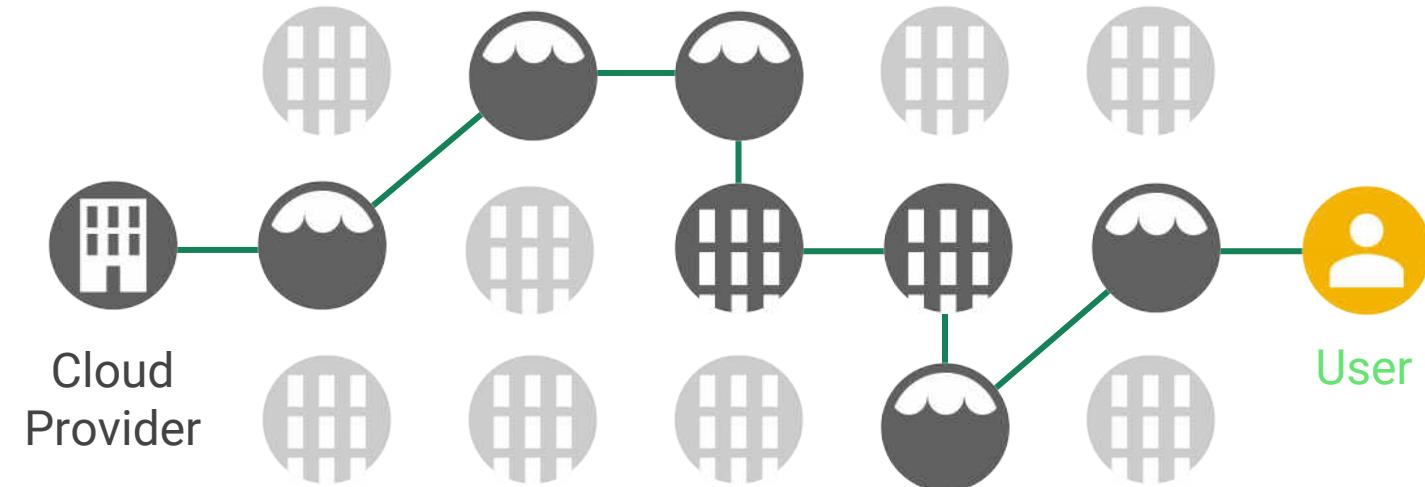
We now deliver 3.5x as much computing power with the same amount of electricity vs 5 years ago

Google Cloud Network

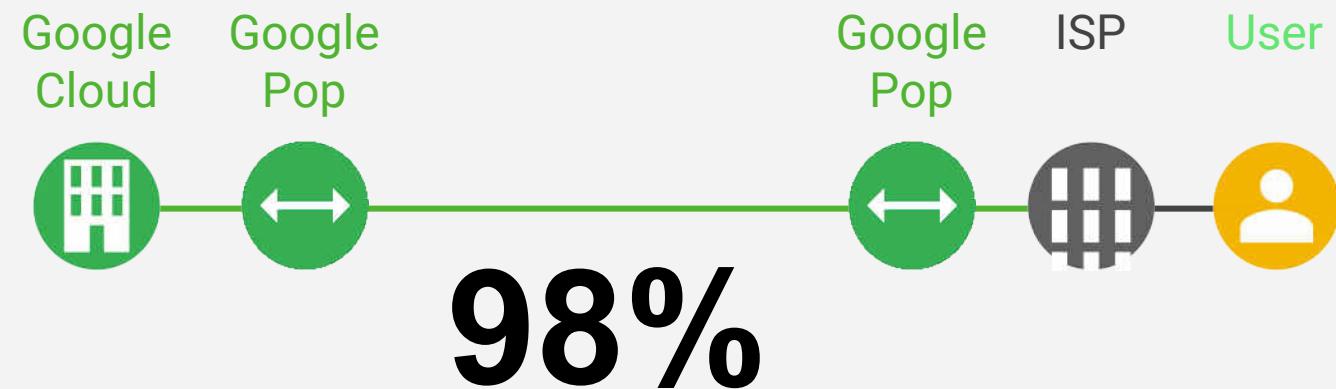


The Network Matters

Typical Cloud Provider

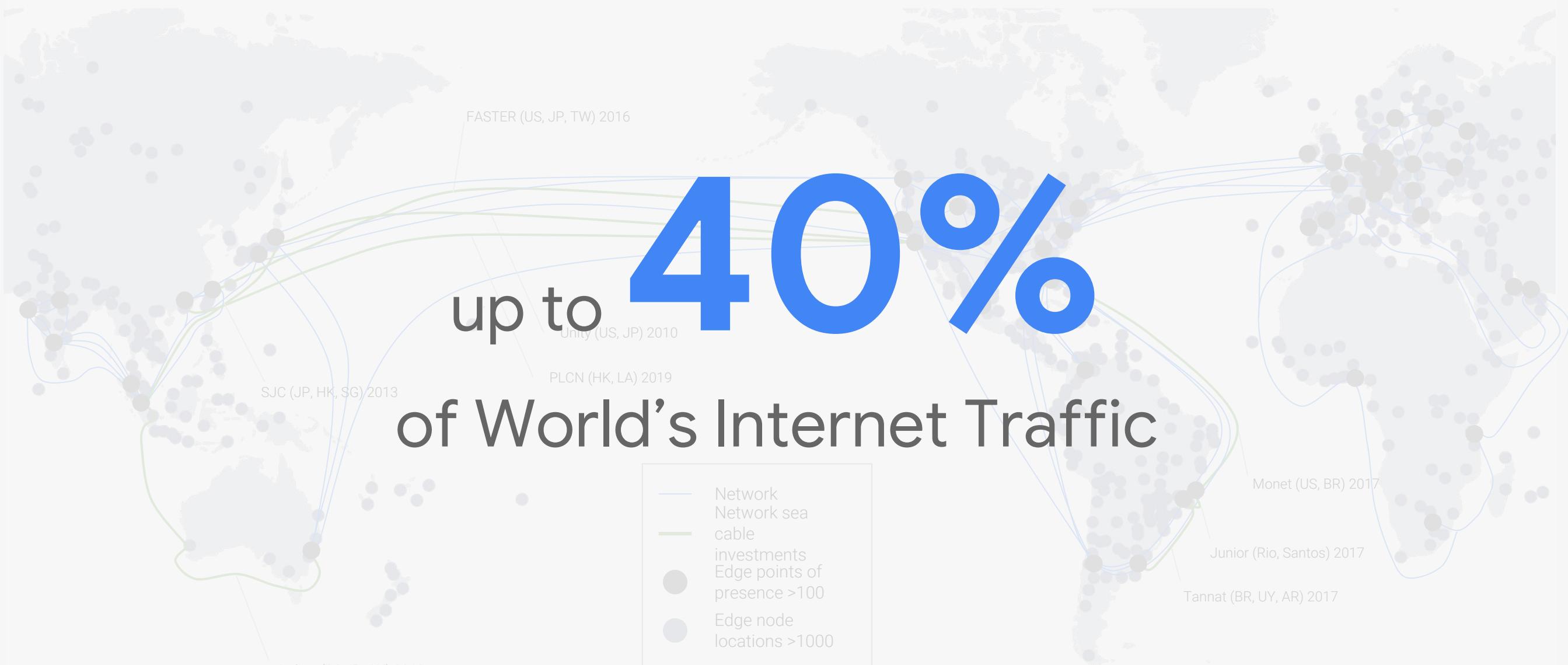


Google Cloud



of packets delivered directly to user ISP

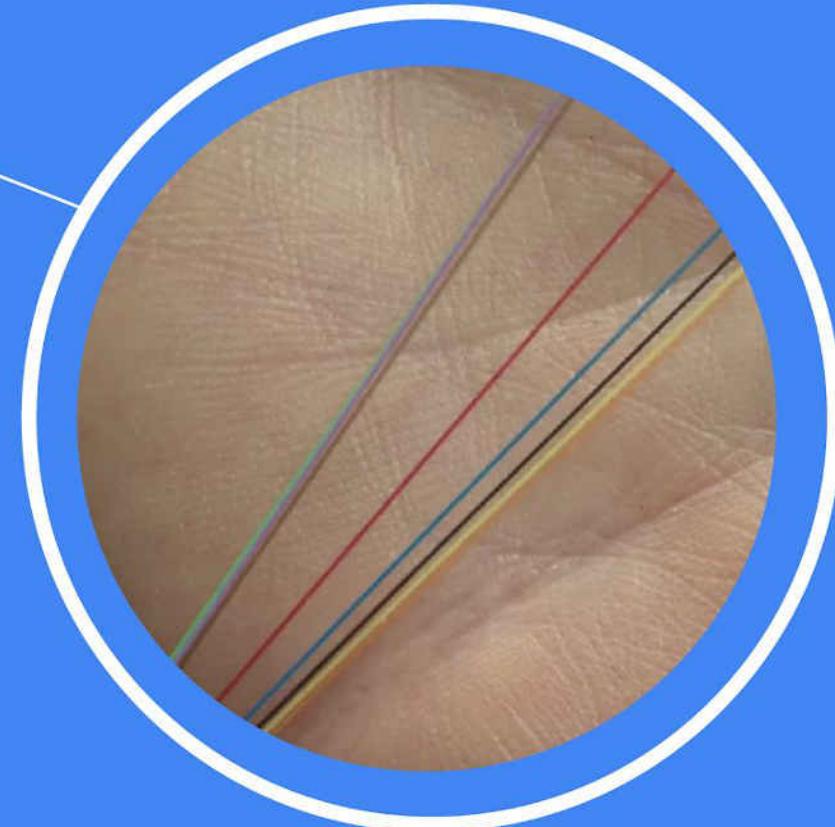
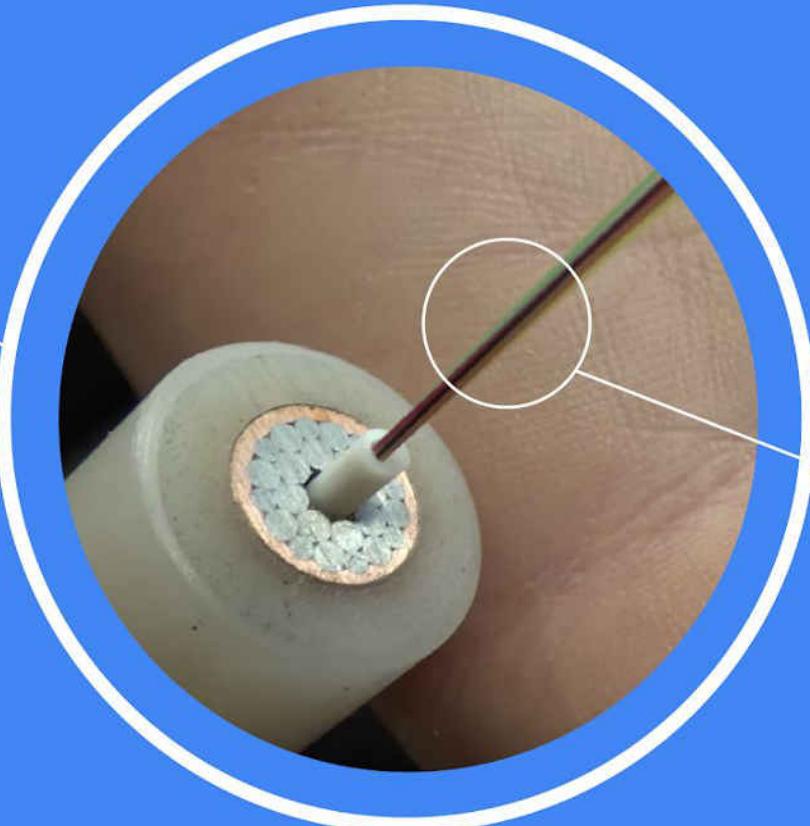
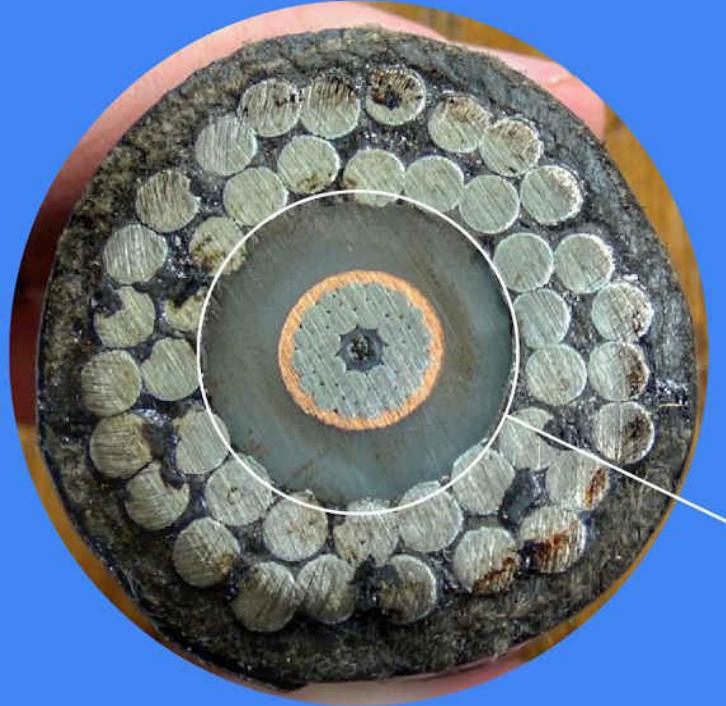
Google Cloud Network



SOURCE: <https://www.forbes.com/sites/timworstall/2013/08/17/fascinating-number-google-is-now-40-of-the-internet>

Google Cloud Network Is Also Delicious ^\(\ツ)\/_^





1 Google offers customer-friendly pricing innovations

2 Billing in sub-hour 3 increments

4 For virtual machines and
5 containers in the cloud;
6 data processing and other
7 services too

8 Discounts for 9 sustained use

10 Automatically applied to
11 virtual machine use over
12 25% of a month

13 Custom VM 14 instance types

15 Pay only for the resources
16 you need for your
17 application



Open APIs and open source mean flexibility

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3 Open APIs;
4 compatibility with
5 open-source services
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11 Cloud Bigtable
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16 Cloud Dataproc
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1 Open source for a rich
2 ecosystem
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TensorFlow Kubernetes



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15 Forseti Security
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1 Multi-vendor-friendly
2 technologies
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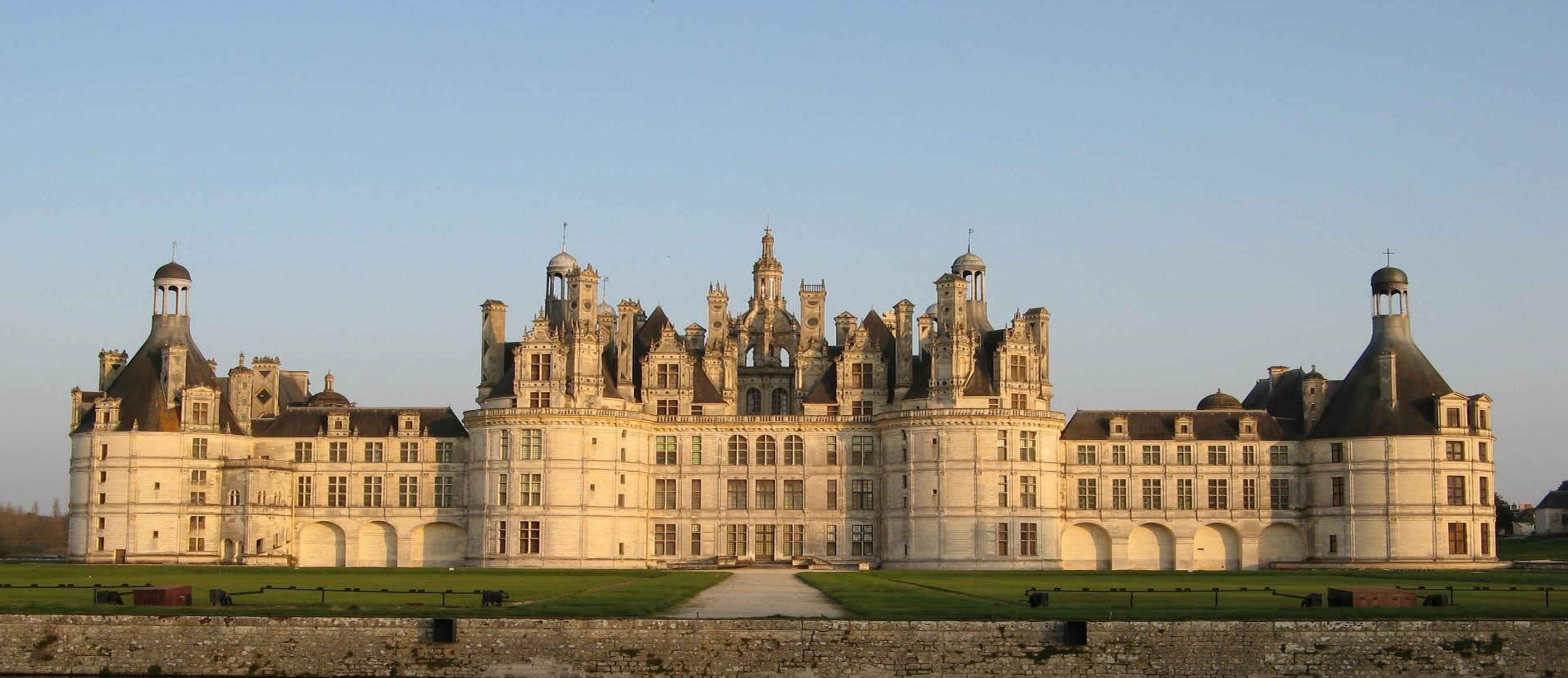
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16 Google Stackdriver
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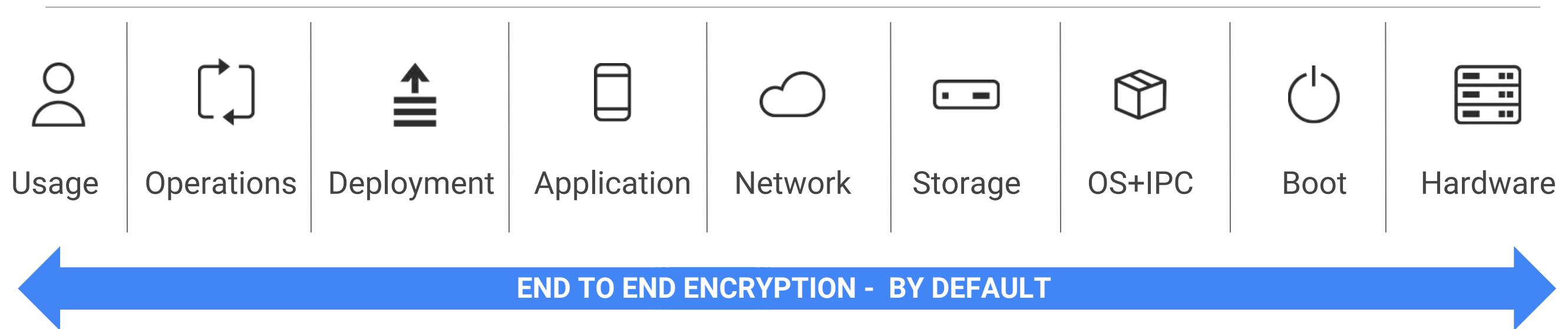
Our approach to security in two words:

Trust Nothing



How many organizations
think about security

Layered Defense in Depth Security



700+
Security Engineers

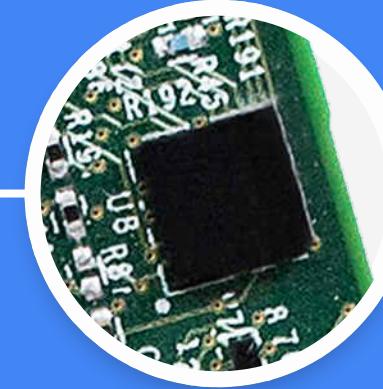
160 x Academic
Papers on Security

700+ Common vulnerabilities &
exposures discovered and/or fixed

1 Security is designed into Google's technical infrastructure

2 Layer	3 Notable security measures (among others)
5 Operational security	6 Intrusion detection systems; techniques to reduce insider risk; employee U2F use; software development practices
7 Internet communication	8 Google Front End; designed-in Denial of Service protection
9 Storage services	10 Encryption at rest
11 User identity	12 Central identity service with support for U2F
13 Service deployment	14 Encryption of inter-service communication
15 Hardware infrastructure	16 Hardware design and provenance; secure boot stack; premises security

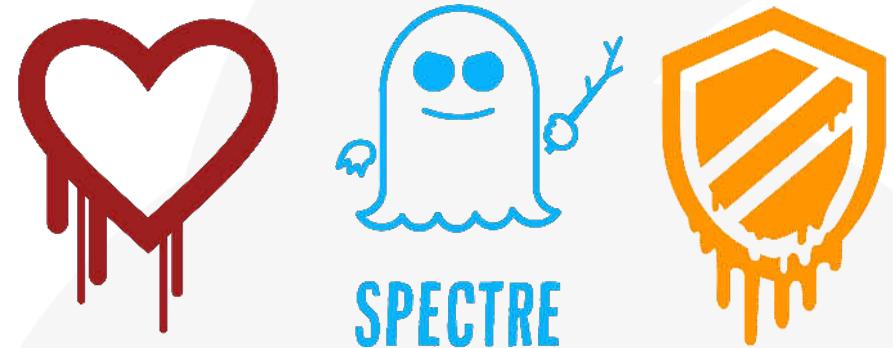




Titan

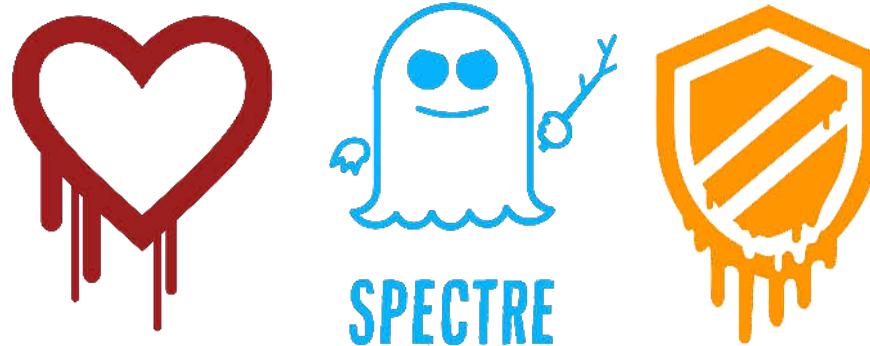
Google's purpose-built chip to establish **hardware root of trust** for both machines and peripherals on cloud infrastructure

Project Zero

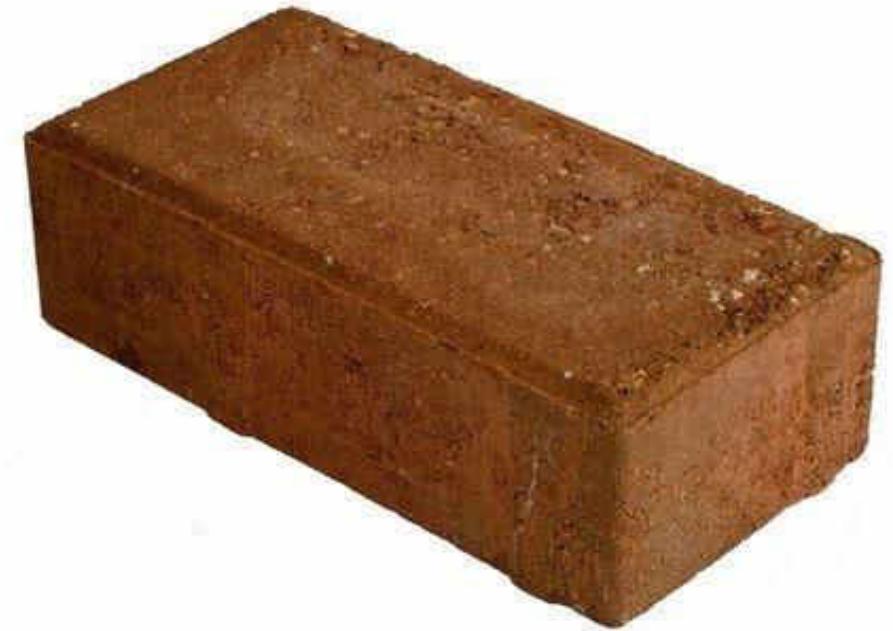


"I think Google wins out here on the clearest, most comprehensive customer communications"

Lydia Leong, Gartner



Secure from Spectre and Meltdown



Google Cloud

Our Journey Today

Network	Compute	Storage/DB	Big Data	Machine Learning	Management
 Virtual Network	 Compute Engine (IaaS)	 Persistent Disk	 BigQuery	 Cloud ML	 Stackdriver
 Load Balancing	 Container Engine	 Cloud Storage	 Dataflow	 Vision API	 Monitoring
 CDN	 Container Registry	 Cloud SQL	 Dataproc	 Speech API	 Logging
 Interconnect	 Cloud Functions	 BigTable	 Datalab	 Translate API	 Debugger
 DNS	 AppEngine (Paas)	 Datastore	 Pub/Sub	 Prediction API	 Support

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Review

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Name some of Google Cloud Platform's pricing innovations.

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- Sub-hour billing
- Sustained-use discounts
- Compute Engine custom machine types

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Name some benefits of using Google Cloud Platform other than its pricing.

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- Commitment to environmental responsibility
- Commitment to open-source technologies
- Robust infrastructure

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Getting Started with Google Cloud Platform

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GCP Fundamentals: Core Infrastructure

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v4.0

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</Cloud OnBoard>

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Cloud OnBoard



Cloud security requires collaboration

- Google is responsible for Managing its infrastructure Security .
- You are responsible for Securing your data.
- Google helps you with best practices, templates, products, and solutions .

Agenda

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5 Google Cloud Platform resource hierarchy

6 Identity and Access Management (IAM)
7

8 Interacting with Google Cloud Platform
9

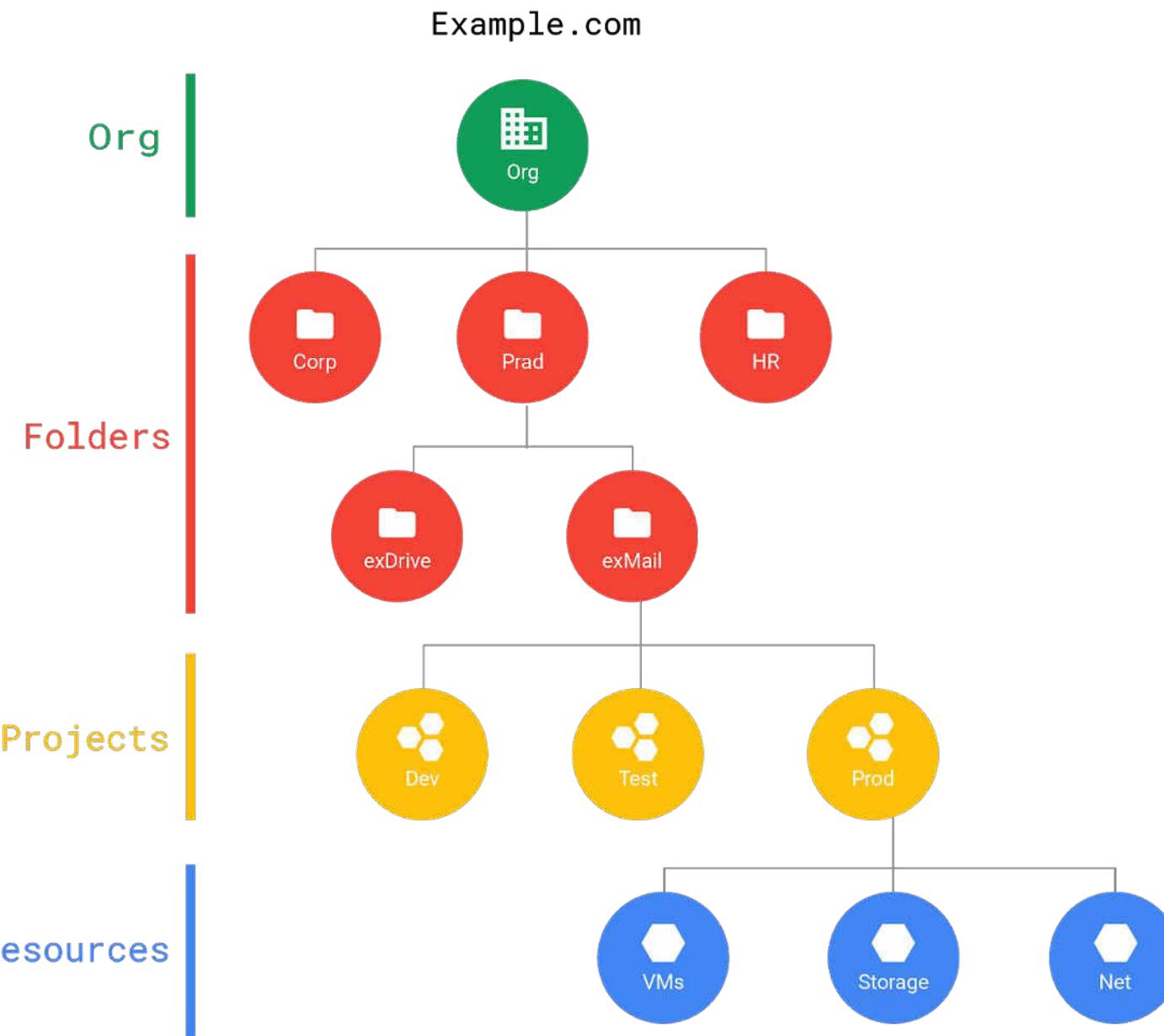
10 Cloud Launcher
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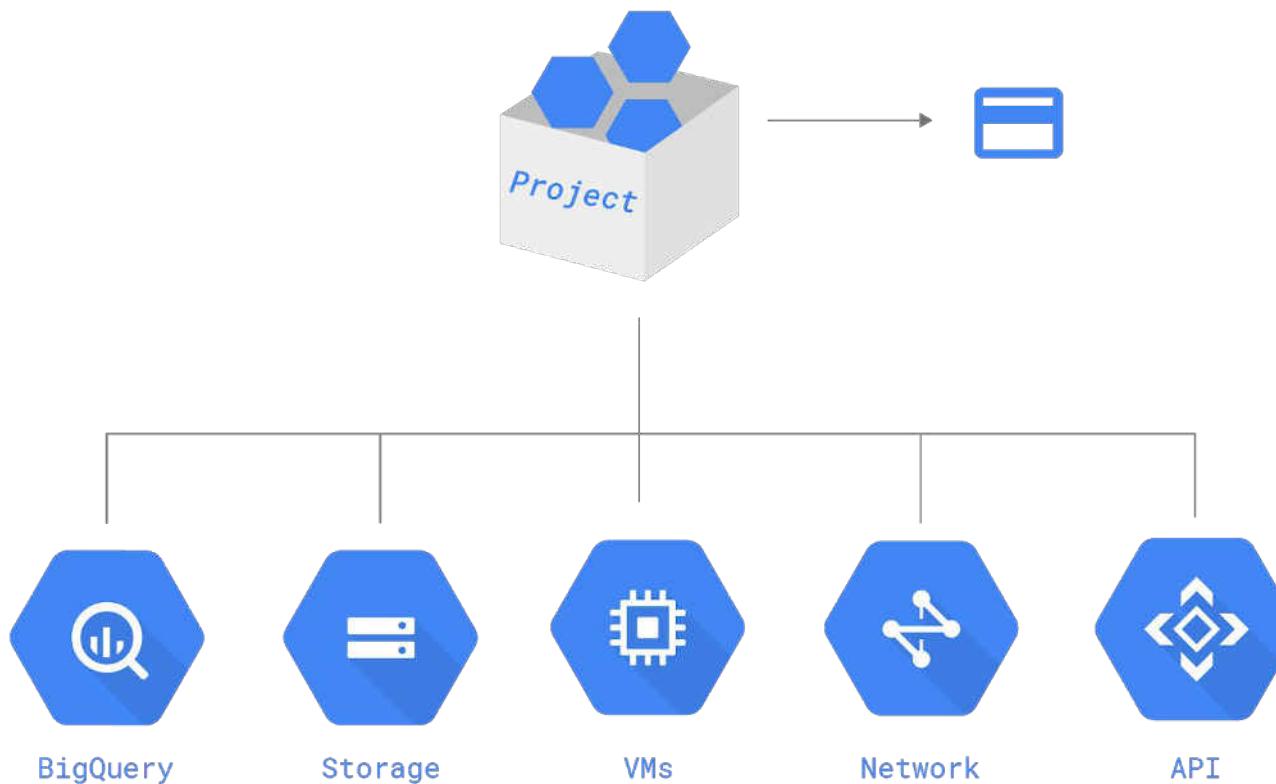
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Resource hierarchy levels define trust boundaries

- Group your resources according to your organization structure
- Levels of the hierarchy provide trust boundaries and resource isolation.



Projects organize resources

- All Google Cloud Platform services you use are associated with a project
- Use the project to:
 - Track resource and quota usage
 - Enable billing.
 - Manage permissions and credentials.
 - Enable services and APIs.

Demo

The screenshot shows the Google Cloud Platform interface for creating a new project. At the top, there's a blue header bar with the 'Google Cloud Platform' logo and a search icon. Below it, a large button labeled 'New Project' is prominently displayed. A message box indicates a quota of 9223372036854776000 projects remaining. The 'Project name' field is filled with 'My Project'. A large, bold, black text overlay 'Challenge Accepted' is centered on the page.

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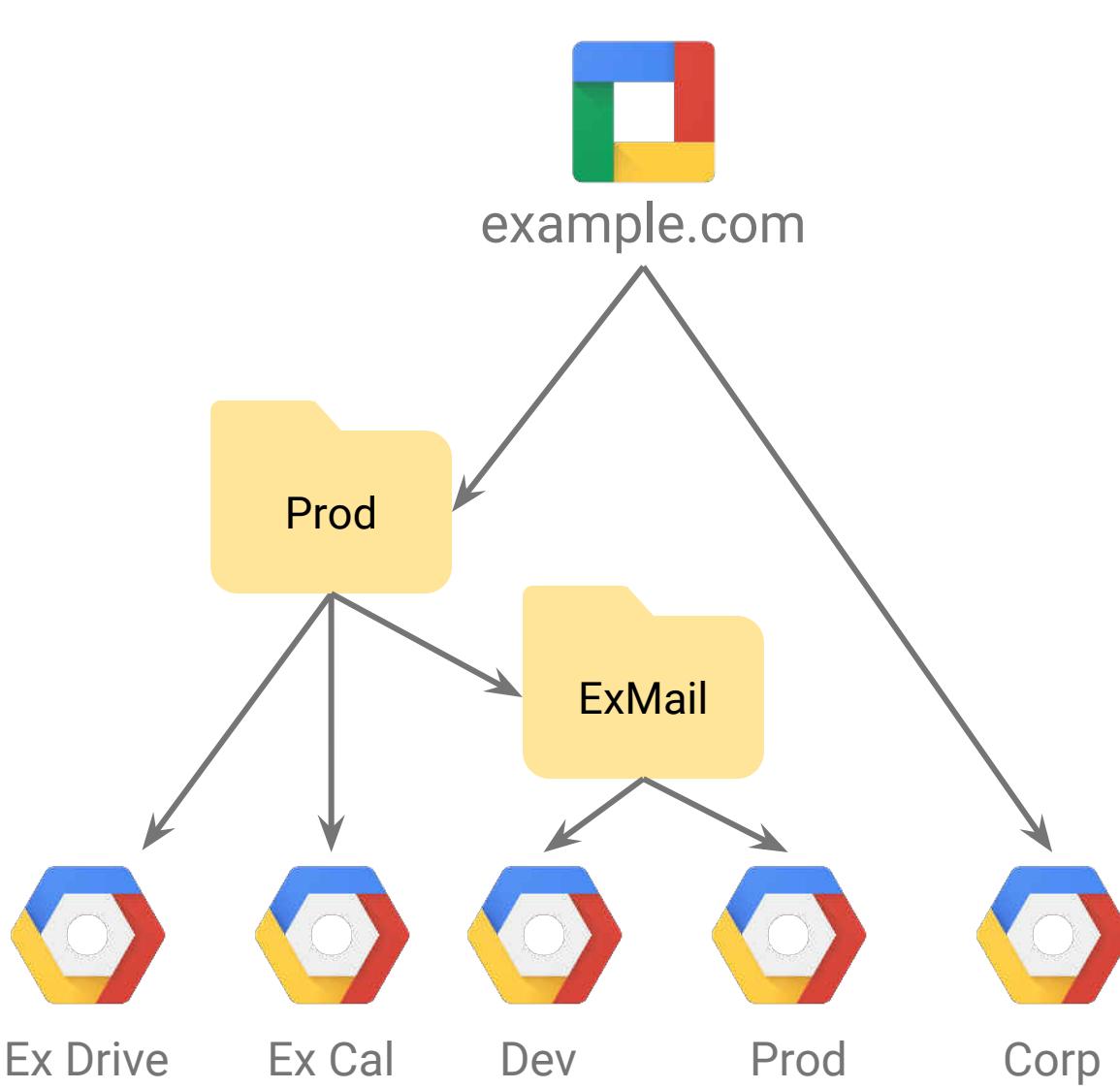
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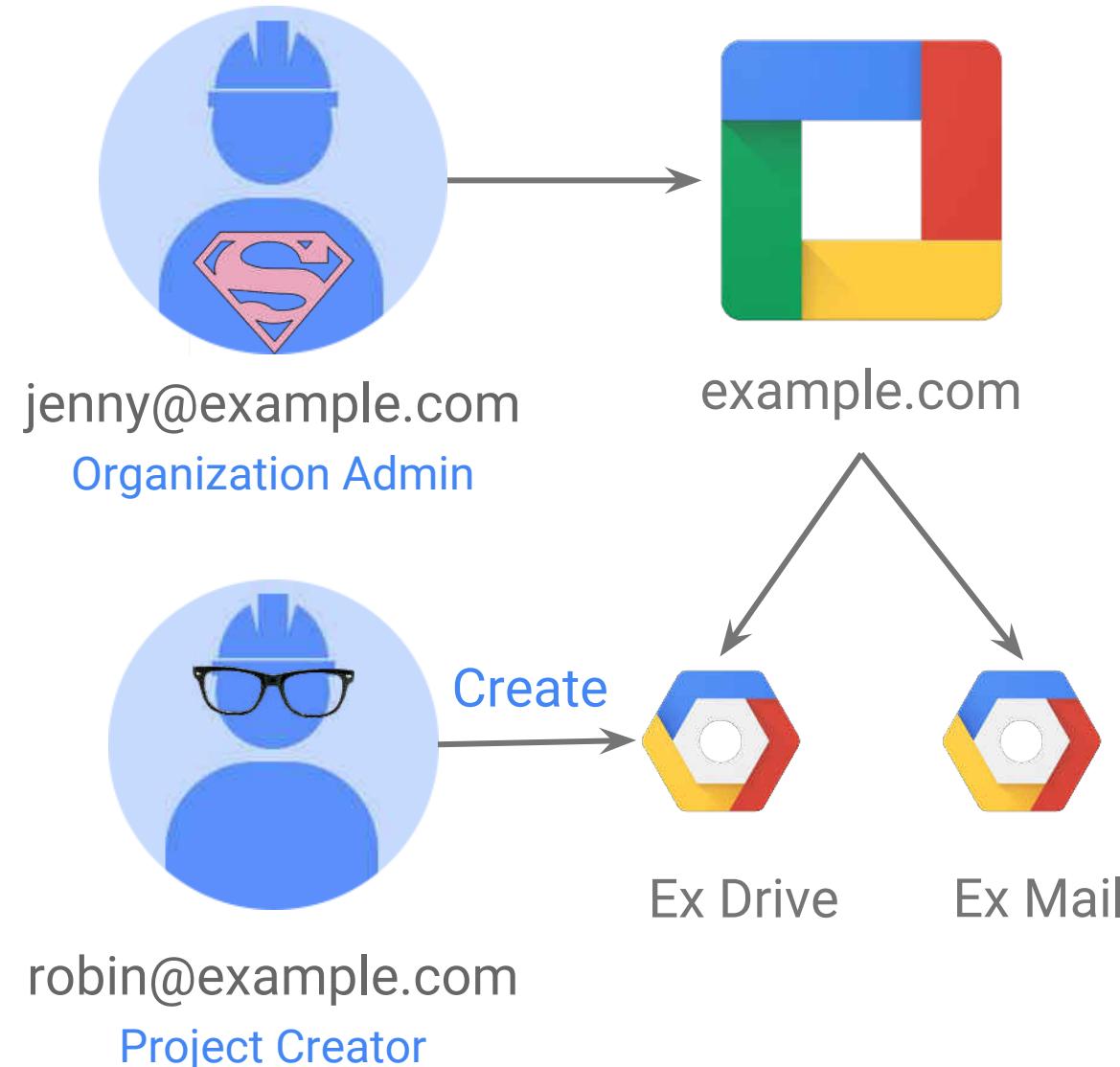
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Folders offer flexible management

- Folders group projects under an organization.
- Folders can contain projects, other folders, or both.
- Use folders to assign policies.

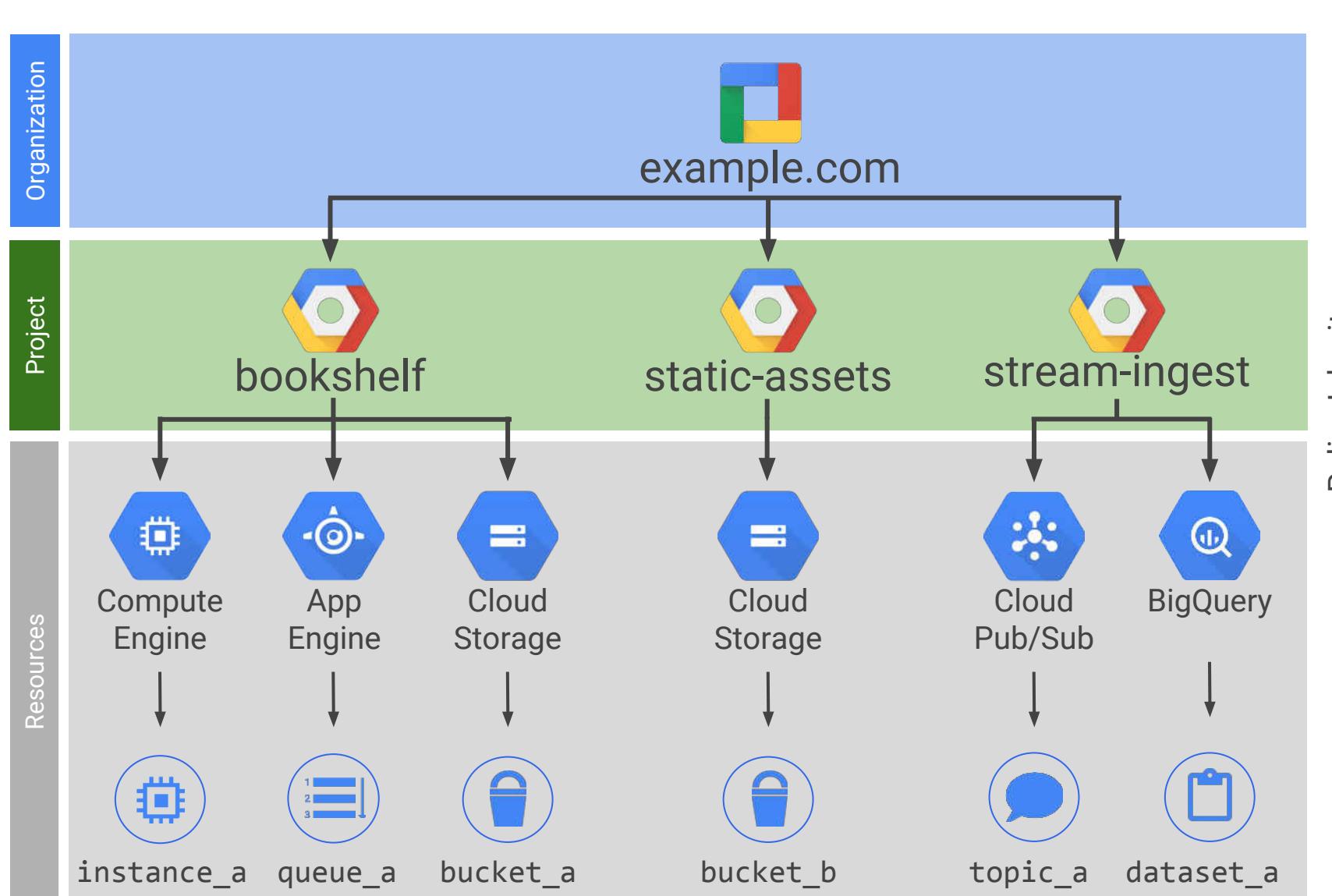
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The organization node organizes projects

- The organization node is the root node for Google Cloud resources.
- Notable organization roles:
 - **Organization Policy Administrator:** Broad control over all cloud resources
 - **Project Creator:** Fine-grained control of project creation

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An example IAM resource hierarchy

- A policy is set on a resource.
 - Each policy contains, a set of roles and role members.
- Resources inherit policies from parent.
 - Resource policies are a union of parent and resource.
- A less restrictive parent policy overrides a more restrictive resource policy.

Agenda

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5 Google Cloud Platform resource hierarchy

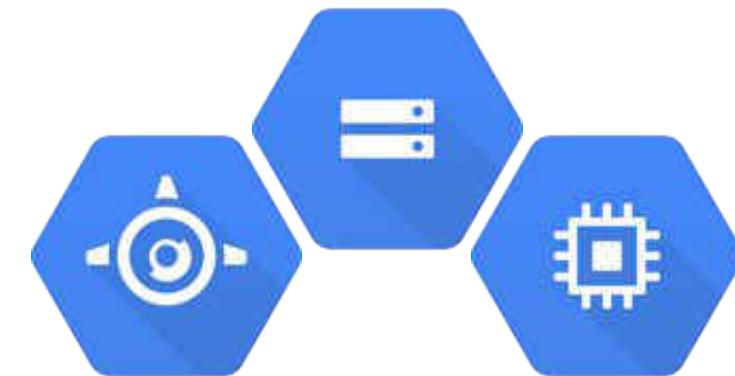
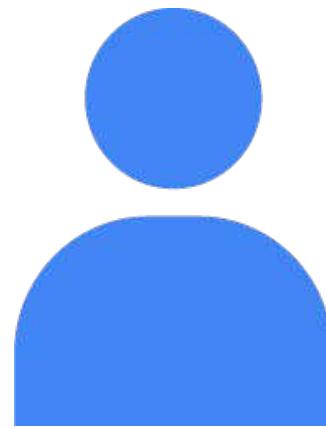
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7 Identity and Access Management (IAM)

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9 Interacting with Google Cloud Platform

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11 Cloud Launcher

12 Quiz

Google Cloud Identity and Access Management defines..



Who

can do what

on which resource

IAM policies can apply to any of four types of principals



Who



Google account
test@gmail.com



Service account
test@project_id.iam.gserviceaccount.com



Google group
test@googlegroups.com

G Suite

G Suite or Cloud
Identity domain
test@example.com

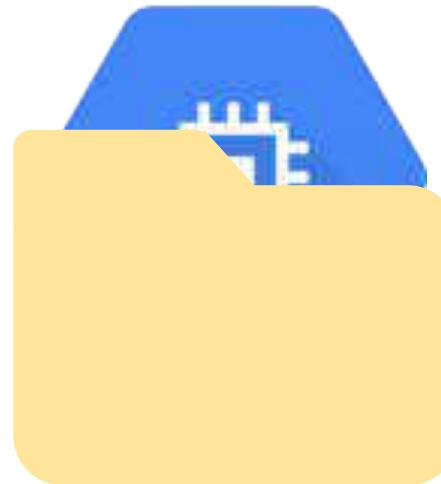
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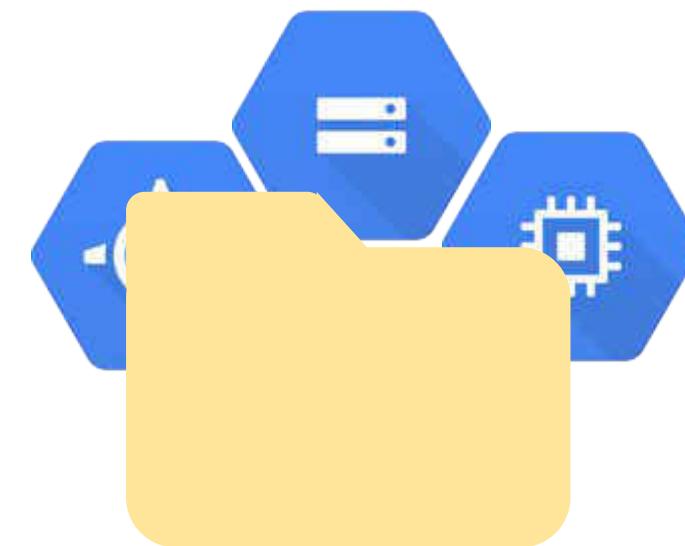
There are three types of IAM roles



Primitive



Predefined



Custom Beta

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2 **IAM primitive roles apply across all GCP services in a**
3 **project**



12 can do what

12 on all resources

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IAM primitive roles offer fixed, coarse-grained levels of access



Owner

- Invite members
- Remove members
- Delete projects
- And...



Editor

- Deploy applications
- Modify code
- Configure services
- And...



Viewer

- Read-only access



Billing administrator

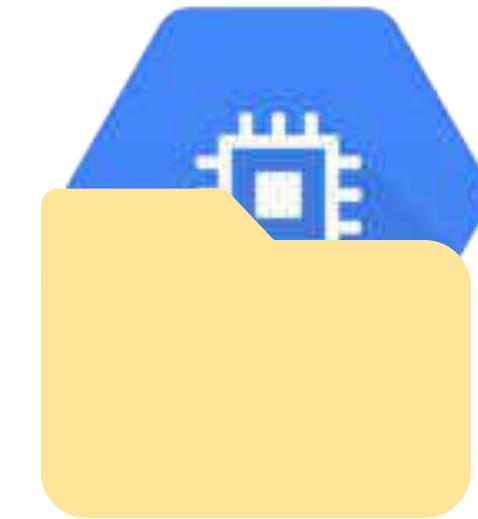
- Manage billing
- Add and remove administrators

A project can have multiple owners, editors, viewers, and billing administrators.

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3 **IAM predefined roles apply to a particular GCP service in a
project**

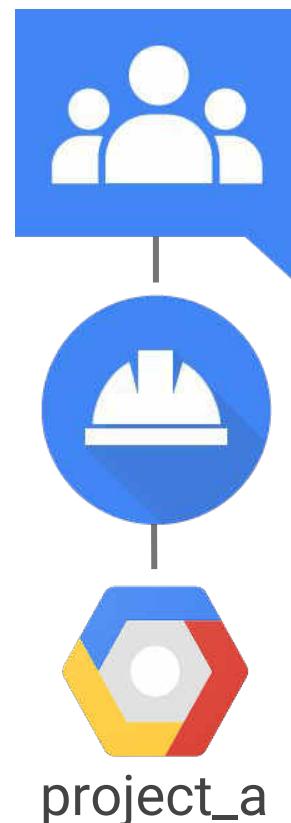


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13 can do what



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16 on Compute Engine resources in
this project, or folder, or org

1 IAM predefined roles offer more fine-grained permissions on particular
2 services



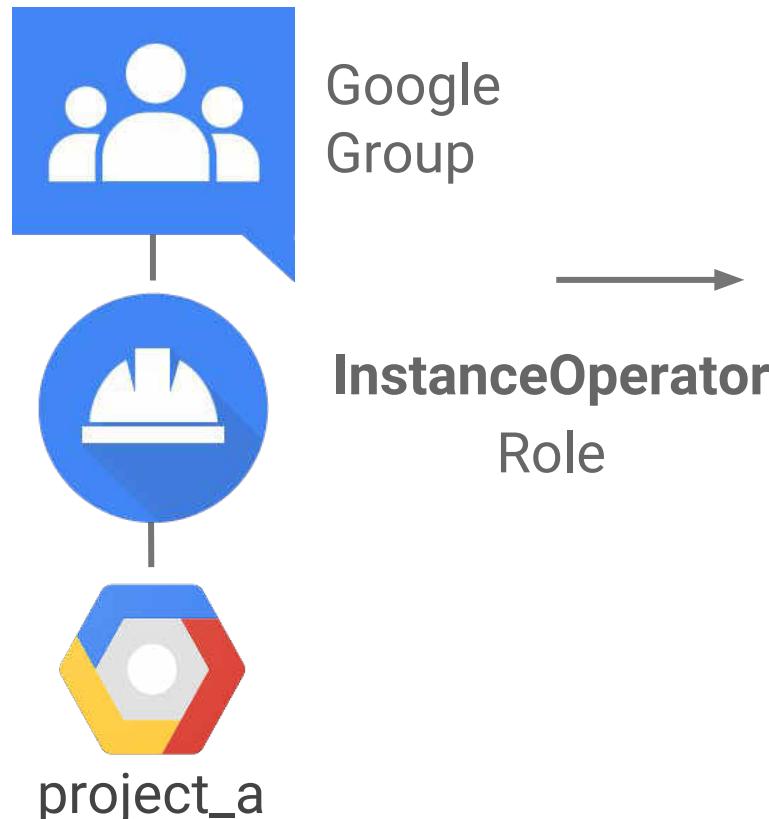
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5 <*service*>.<*resource*>.<*verb*>

- 6
- 7 ✓ *compute.instances.delete*
- 8 ✓ *compute.instances.get*
- 9 ✓ *compute.instances.list*
- 10 ✓ *compute.instances.setMachineType*
- 11 ✓ *compute.instances.start*
- 12 ✓ *compute.instances.stop*
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1 IAM custom roles **Beta** let you define a precise set of permissions
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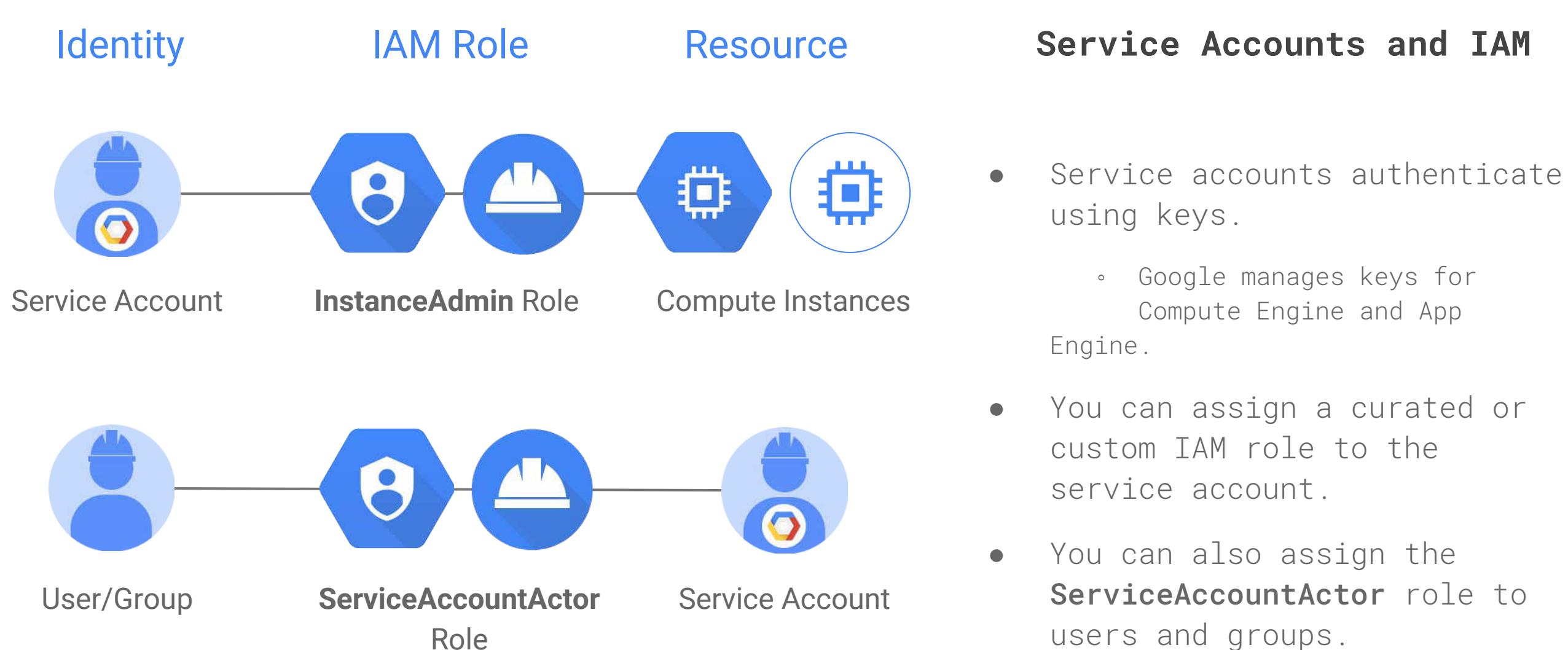
- ✓ *compute.instances.get*
- ✓ *compute.instances.list*
- ✓ *compute.instances.start*
- ✓ *compute.instances.stop*

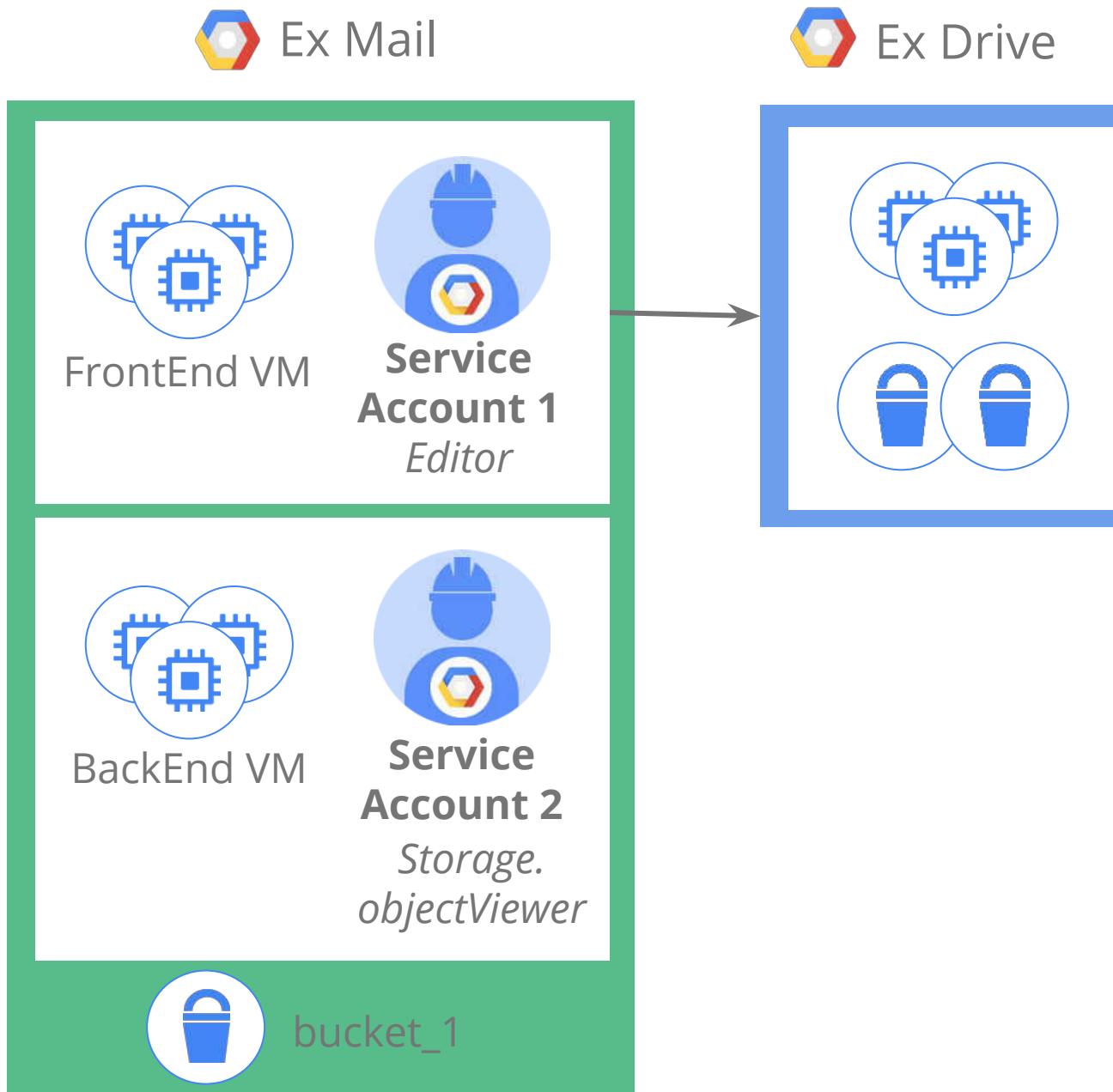
Service Accounts control server-to-server interactions

- Provide an identity for carrying out server-to-server interactions in a project
- Used to authenticate from one service to another
- Used to control privileges used by resources
 - So that applications can perform actions on behalf of authenticated end users
- Identified with an email address:

PROJECT_NUMBER@developer.gserviceaccount.com

PROJECT_ID@developer.gserviceaccount.com





Example: Service Accounts and IAM

- VMs running FrontEnd are granted **Editor** access to project_b using Service Account 1.
- VMs running BackEnd are granted **objectViewer** access to bucket_1 using Service Account 2.
- Service account permissions can be changed without recreating VMs.

Budgets and alerts

Budget Name

Billing Account or Selected Project ▼

Budget Amount

Specified Amount ▼ \$ 500.00

Last Month's Spend

Percent of Budget	Amount
50 %	\$ 250.00 X
90 %	\$ 450.00 X
100 %	\$ 500.00 X

+ Add Item

Save

Why use project quotas?

- Prevent runaway consumption in case of an error or malicious attack
- Prevent billing spikes or surprises
- Forces sizing consideration and periodic review



Agenda

1
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4
5 Google Cloud Platform resource hierarchy

6
7 Identity and Access Management (IAM)

8
9 Interacting with Google Cloud Platform

10
11 Cloud Launcher

12
13 Review

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There are four ways to interact with GCP

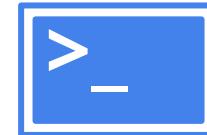
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**Cloud Platform
Console**

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8
Web user
interface



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**Cloud Shell
and Cloud SDK**

11
12
Command-line
interface



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**Cloud Console
Mobile App**

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16
For iOS and
Android



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18
REST-based API

19
20
For custom
applications





Google Cloud SDK

- [SDK](#) includes CLI tools for Cloud Platform products and services
 - gcloud, gsutil (Cloud Storage), bq (BigQuery)
- Available as Docker image
- Available via Cloud Shell
 - Containerized version of Cloud SDK running on Compute Engine instance

Google Cloud Platform Console

- Centralized console for all project data
- Developer tools
 - Cloud Source Repositories
 - Cloud Shell
 - Test Lab (mobile app testing)
- Access to product APIs
- Manage and create projects



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RESTful APIs

- Programmatic access to products and services
 - Typically use JSON as an interchange format
 - Use OAuth 2.0 for authentication and authorization
- Enabled through the Google Cloud Platform Console
- Most APIs include daily quotas and rates (limits) that can be raised by request
 - Important to plan ahead to manage your required capacity

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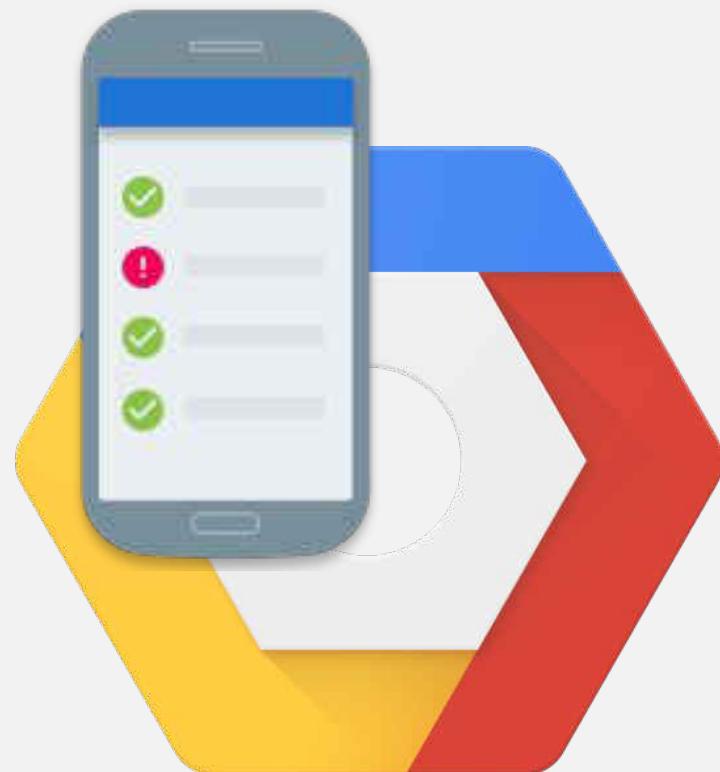
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APIs Explorer

- The [APIs Explorer](#) is an interactive tool that lets you easily try Google APIs using a browser.
- With the APIs Explorer, you can:
 - Browse quickly through available APIs and versions.
 - See methods available for each API and what parameters they support along with inline documentation.
 - Execute requests for any method and see responses in real time.
 - Easily make authenticated and authorized API calls.



Cloud Console Mobile App

- Manage virtual machines and database instances
- Manage apps in Google App Engine
- Manage your billing
- Visualize your projects with a customizable dashboard



Client Libraries

- [Cloud Client Libraries](#)
 - Community-owned, handcrafted client libraries
- [Google API Client Libraries](#)
 - Open source, generated
 - Support various languages
 - Java, Python, JavaScript, PHP, .NET, Go, Node.js, Ruby, Objective-C, Dart

Agenda

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5 Google Cloud Platform resource hierarchy

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9 Interacting with Google Cloud Platform

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11 Cloud Launcher

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13 Review





Cloud Launcher gives quick access to solutions

- A solution marketplace containing pre-packaged, ready-to-deploy solutions
 - Some offered by Google
 - Others by third-party vendors
- You pay for the underlying GCP resource usage.
 - Some solutions also assess third-party license fees.

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Google Cloud Platform resource hierarchy

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Identity and Access Management (IAM)

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Interacting with Google Cloud Platform

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Cloud Launcher

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Review

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Cloud OnBoard

- The countdown begins: Get ready to Build What's Next with Google Cloud Platform

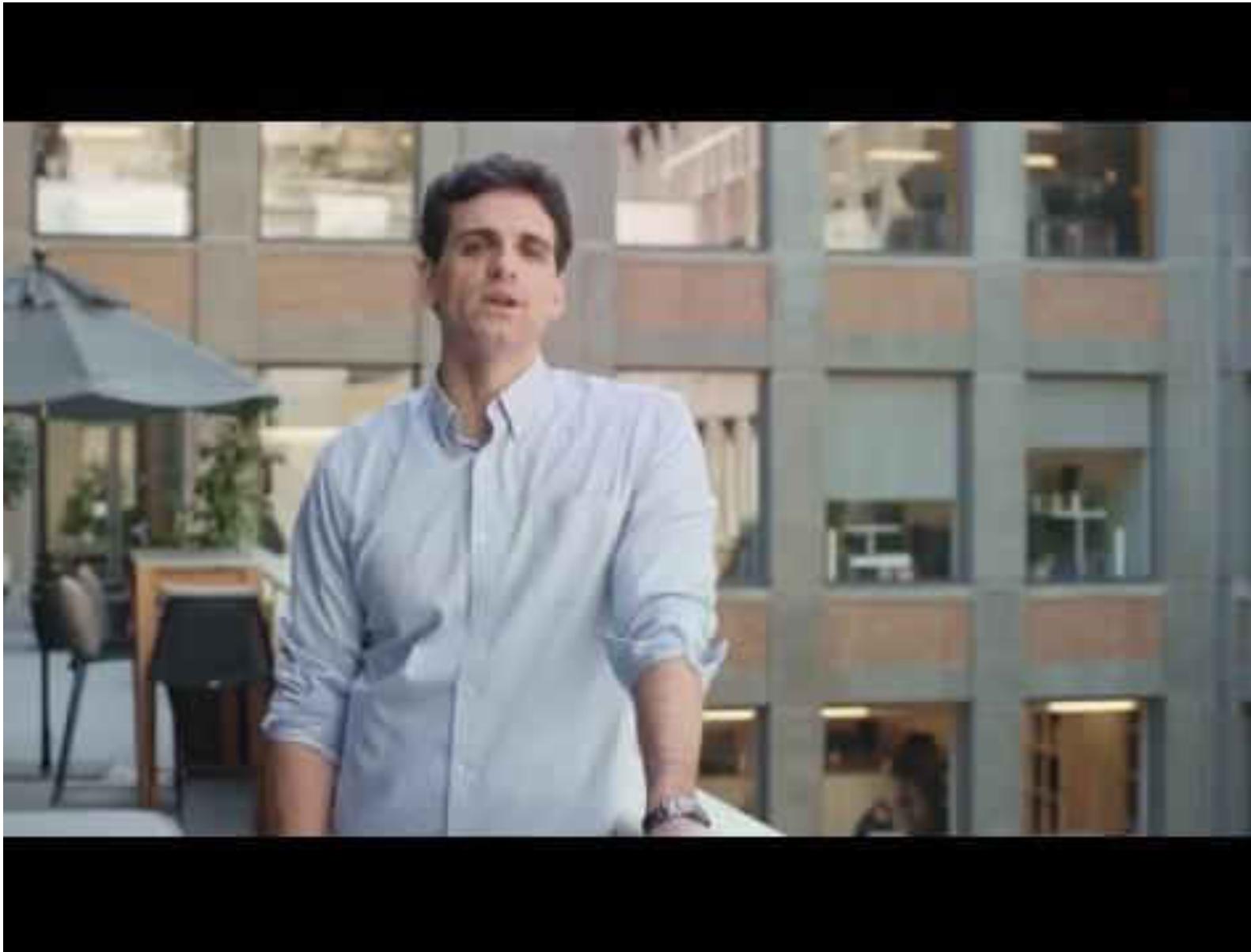
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Share your experience with #GoogleCloudOnBoard

/Cloud OnBoard

What's next on Cloud



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GCP offers a range of computing architectures



Compute Engine

IaaS



Kubernetes Engine

Hybrid



App Engine

PaaS



Cloud Functions

Serverless logic



Managed services

Automated elastic resources



Toward managed infrastructure

Toward dynamic infrastructure

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2 <Cloud OnBoard>

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Virtual Networks & Machines in the Cloud

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GCP Fundamentals: Core Infrastructure

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v4.0

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</Cloud OnBoard>

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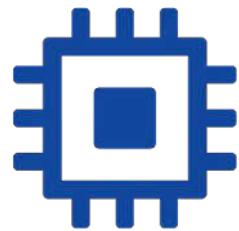
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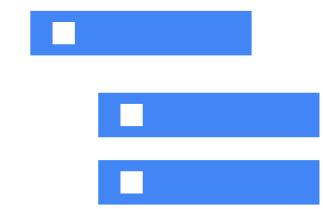
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Purpose-built
chips



Purpose-built
servers



Purpose-built
storage



Purpose-built
network



Purpose-built data
centers

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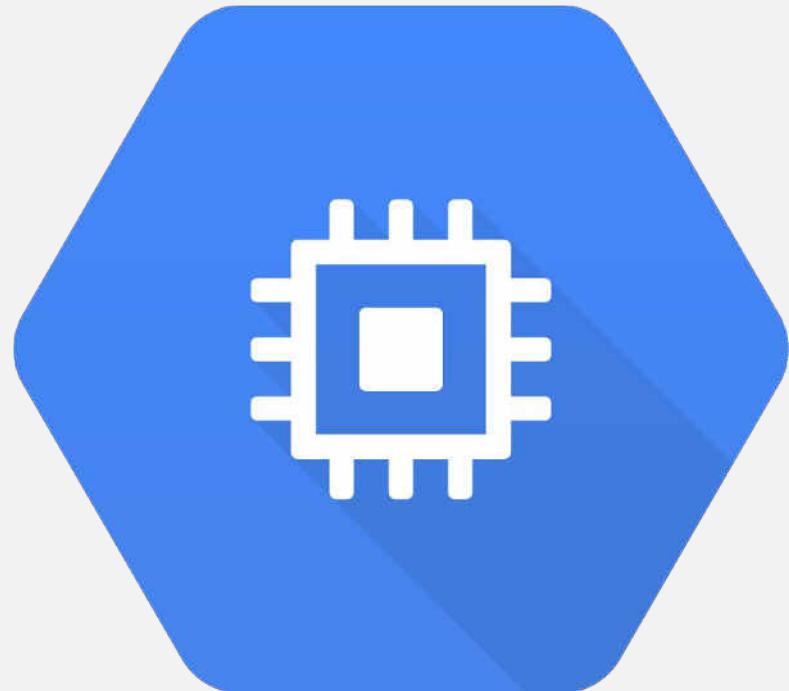
Agenda

Virtual Private Cloud (VPC) Network

Operations and tools

Compute Engine

Review

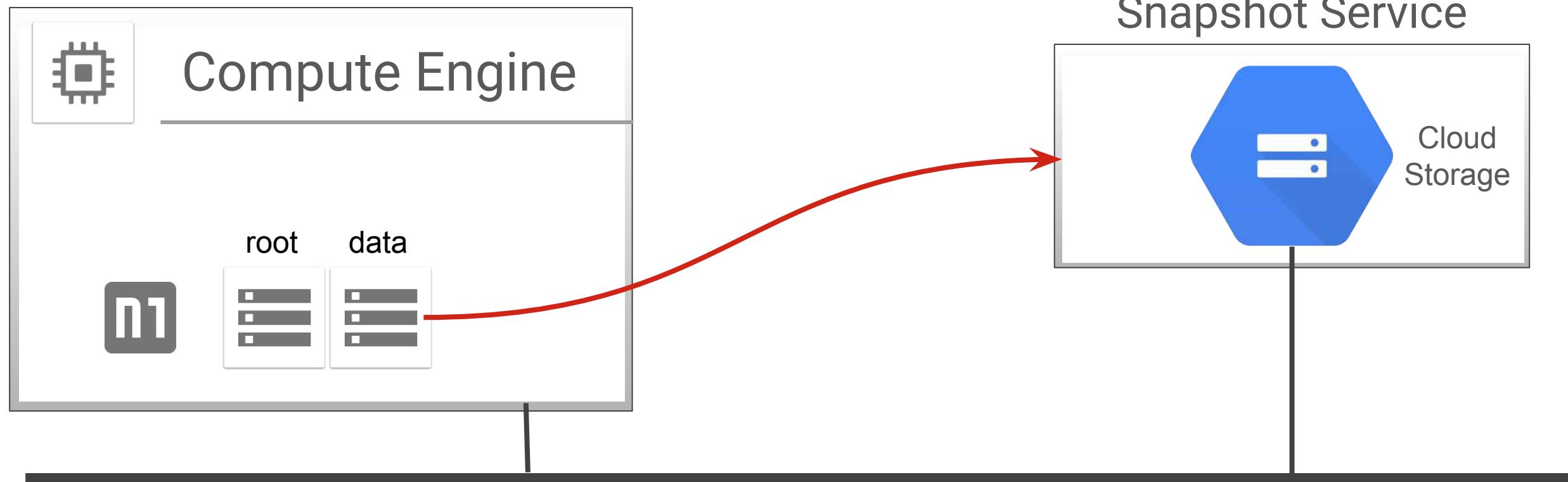


Compute Engine offers managed virtual machines

- High CPU, high memory, standard and shared-core machine types
- Persistent disks
 - Standard, SSD, local SSD
 - Snapshots
- Resize disks with no downtime
- Instance metadata and startup scripts

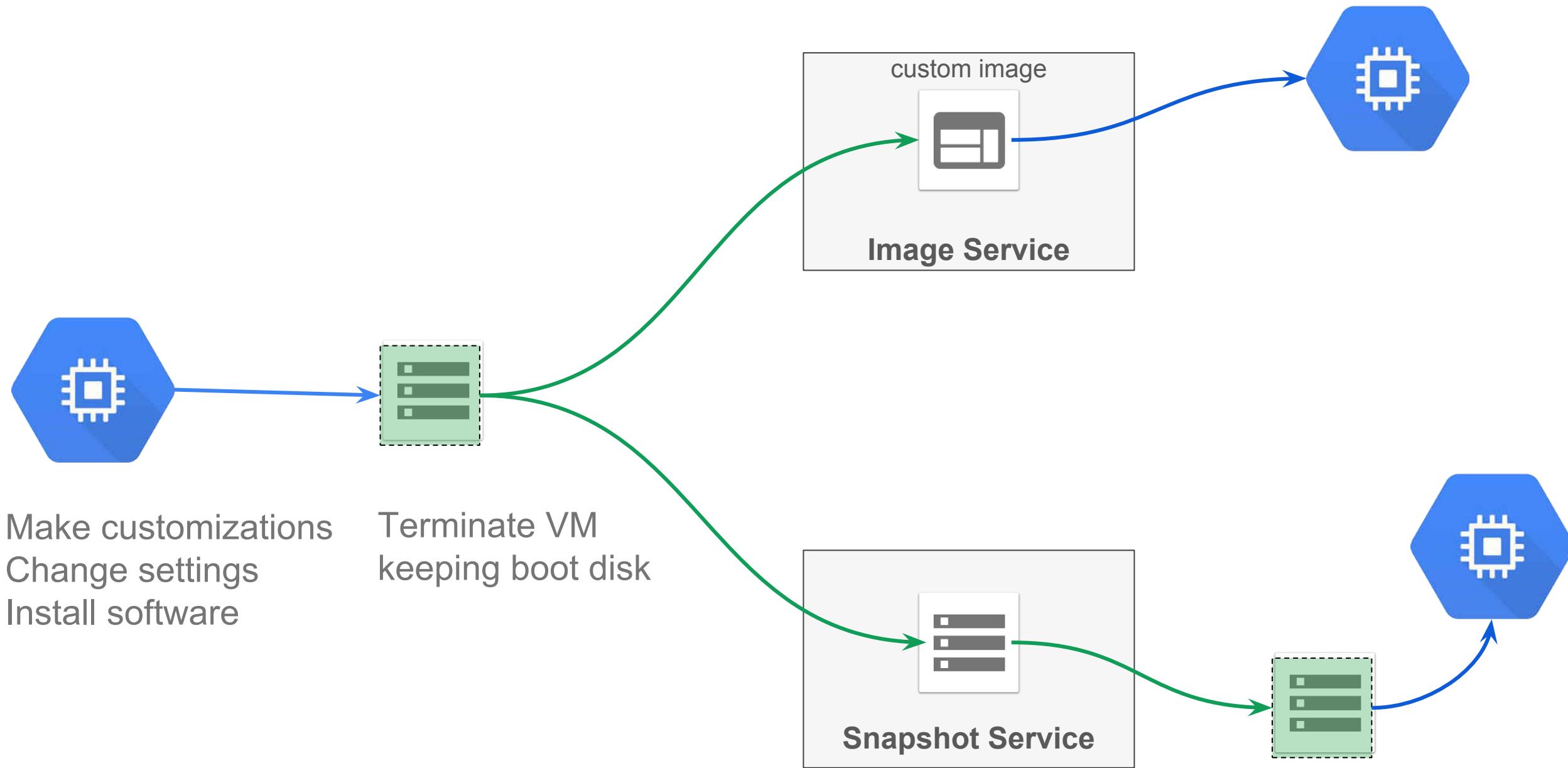
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Snapshot: Disk backup

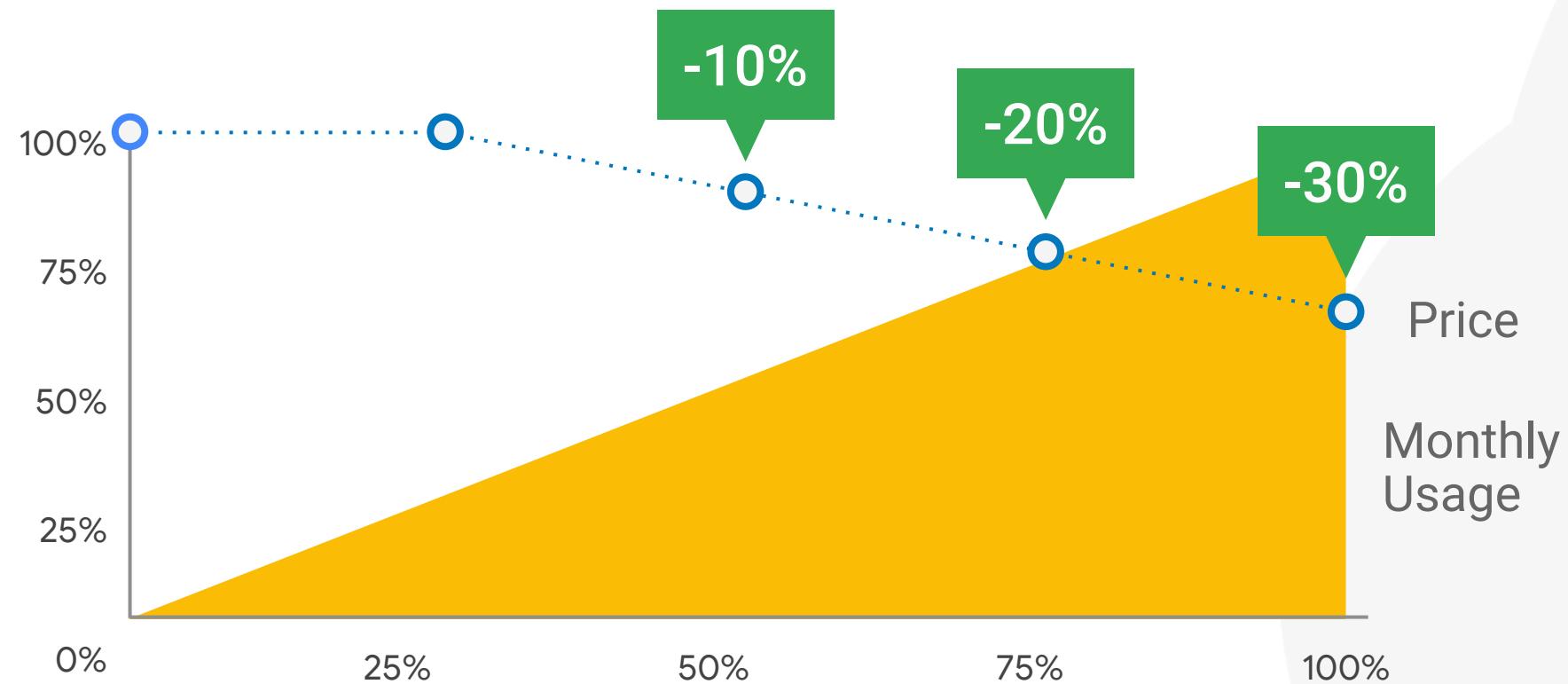


Backup critical data into a durable storage solution to meet application availability and recovery requirements.

Snapshots and Custom Images



Automatic Sustained Use Discounts

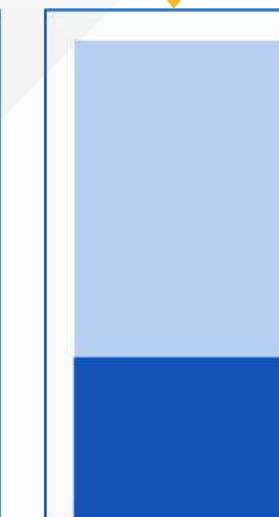
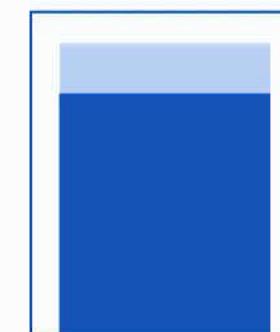
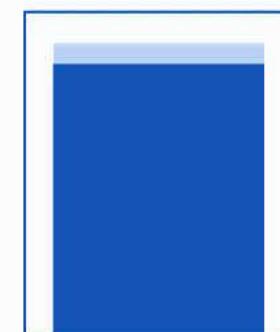
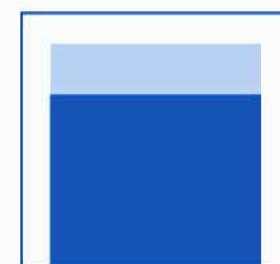
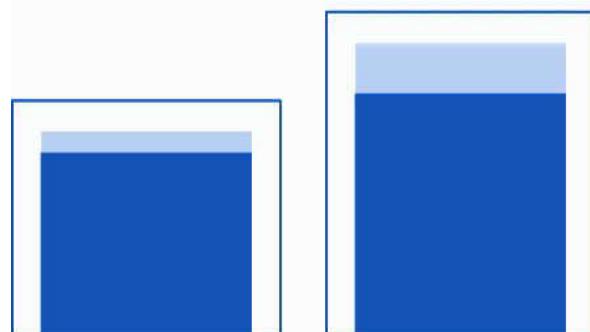
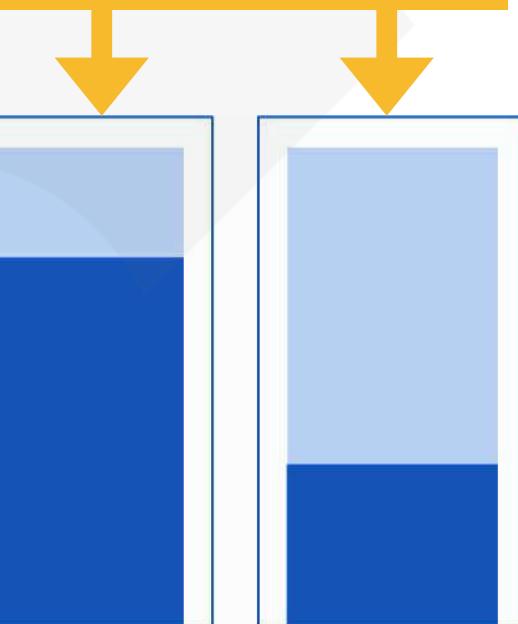


24%
average
savings

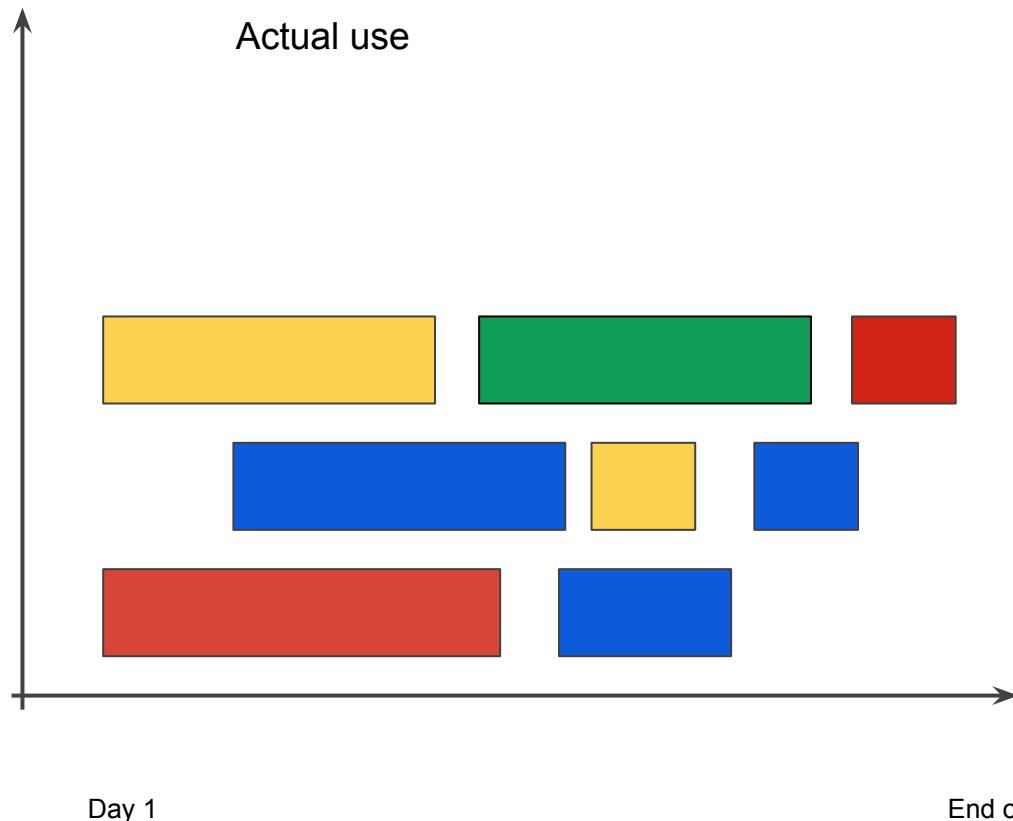
Rightsizing Recommendations

Optimize for **your** usage

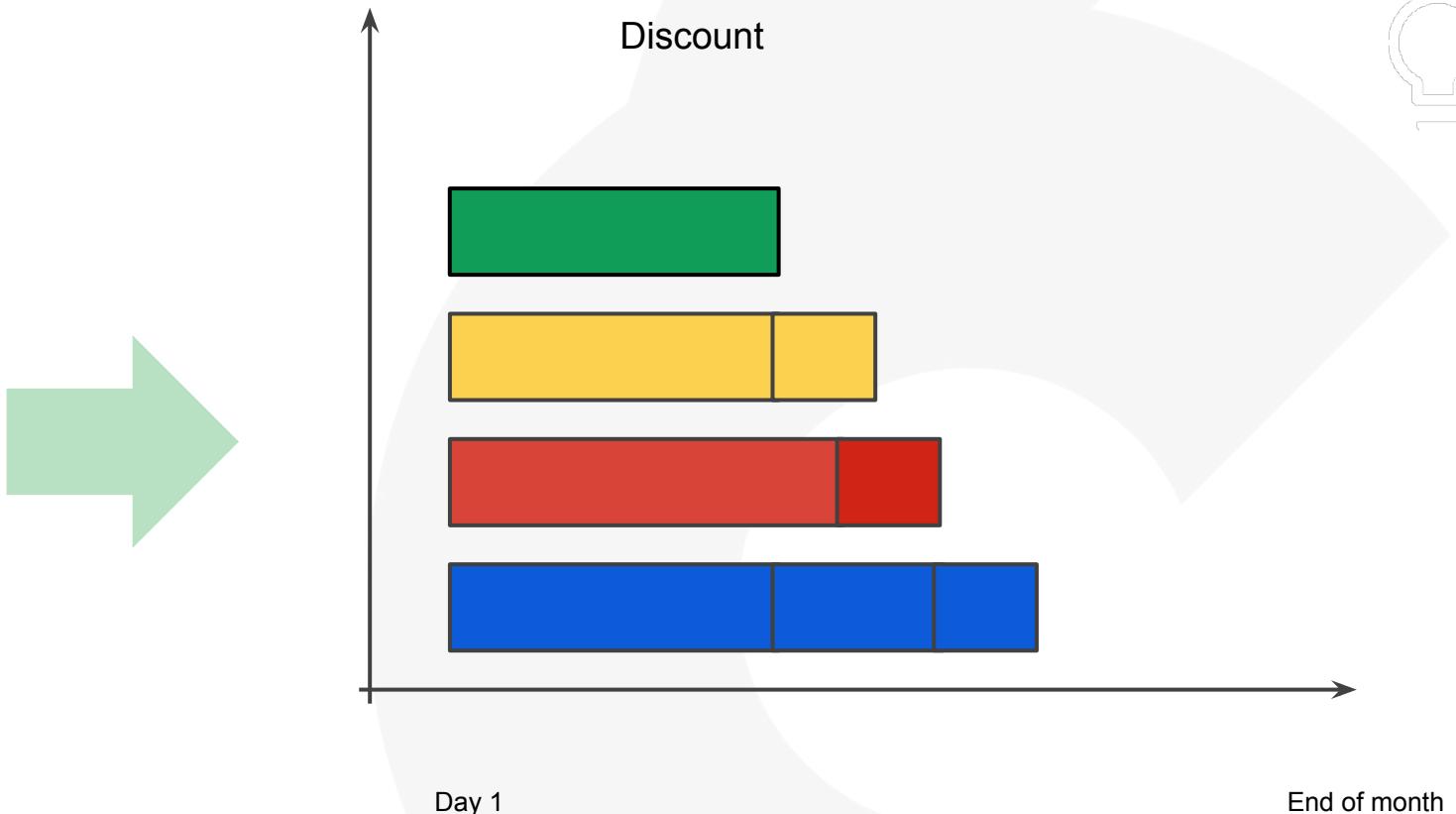
2 instances could be resized to
save an estimated \$33 per month



Inferred instances discount



Google Cloud



Preemptible VMs

Up to 80% cheaper for short-lived instances

CPU and GPU

Google Cloud

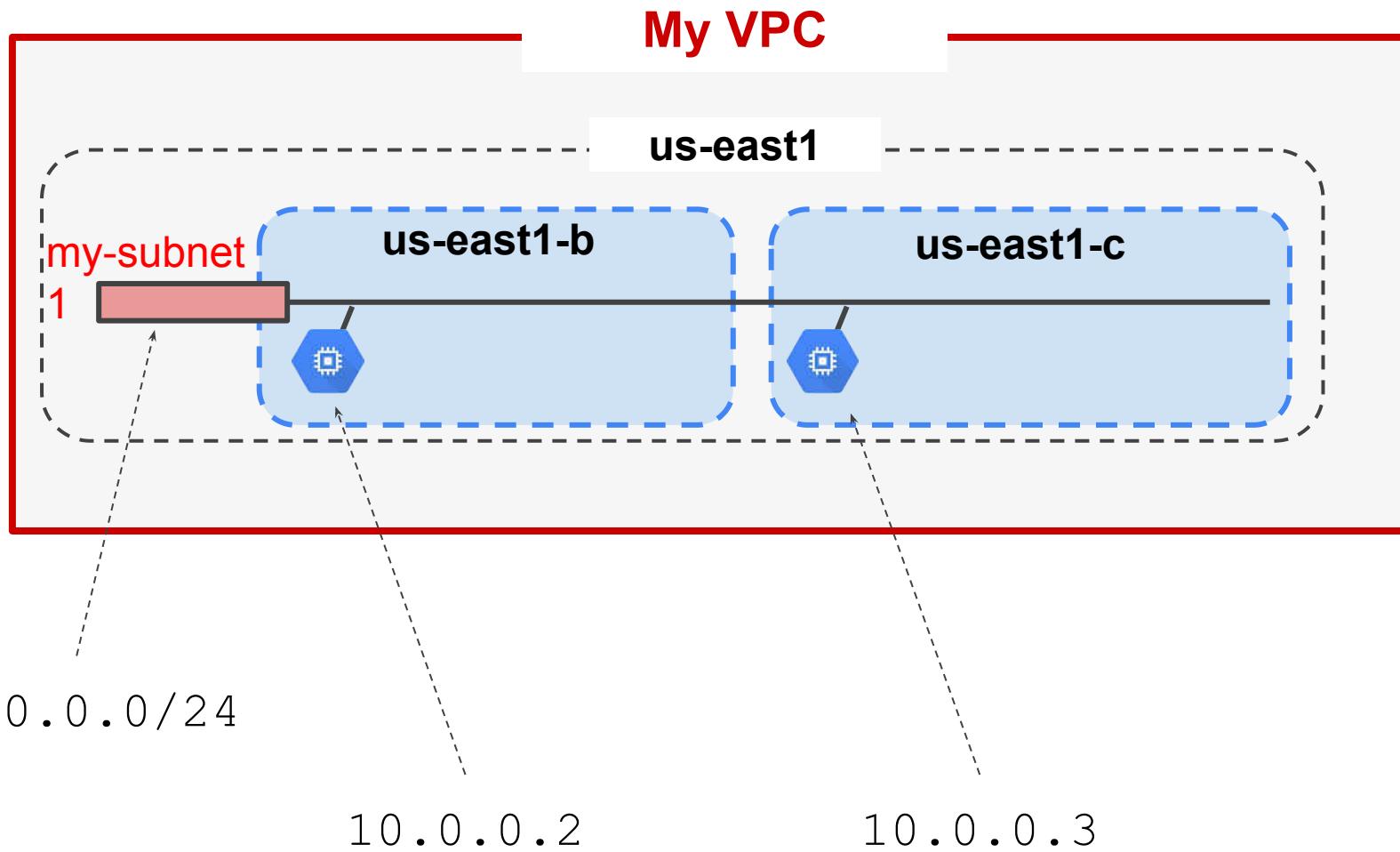


Virtual Private Cloud Network

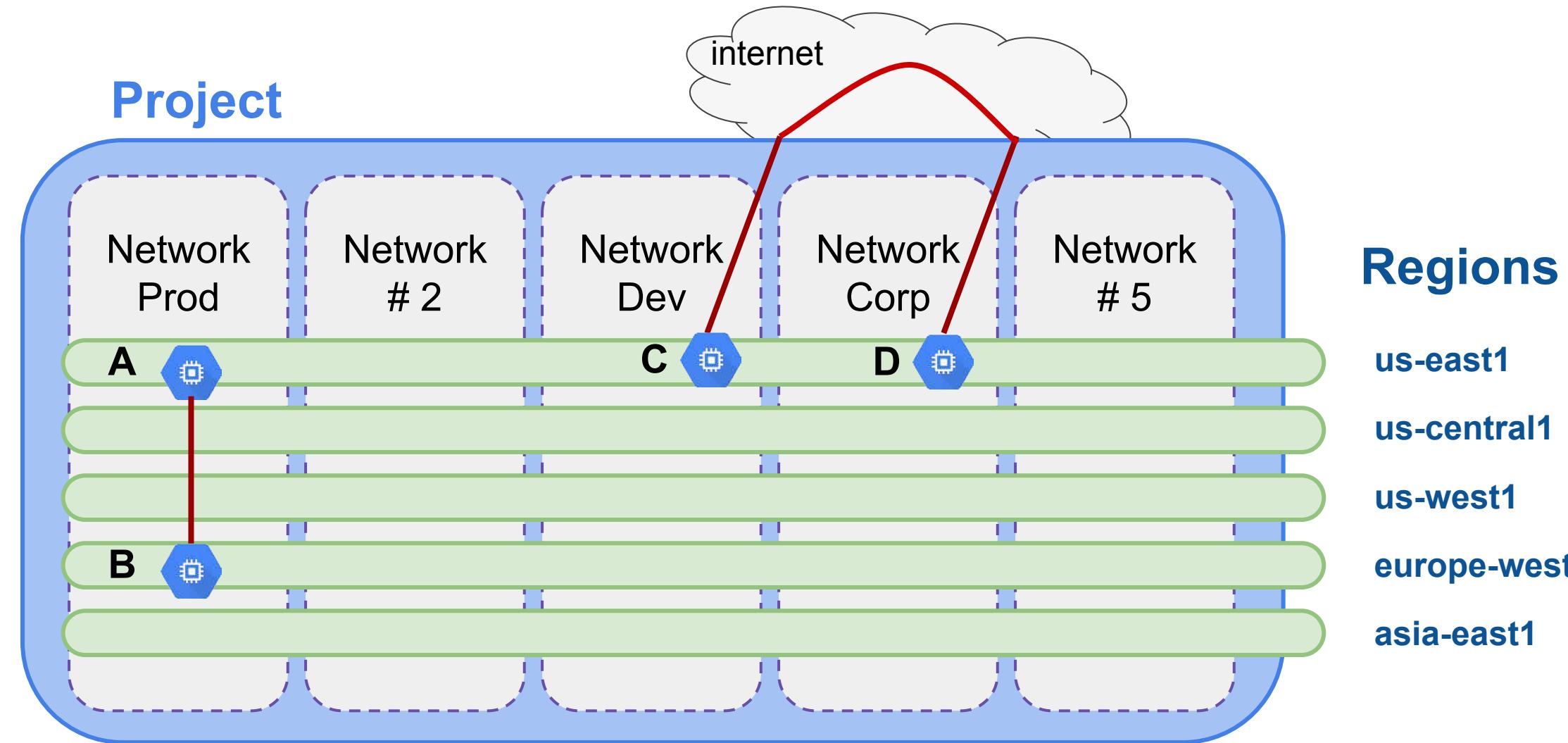


- Managed networking functionality for Google Cloud Platform resources
- Provision Cloud Platform resources, connect them to each other, and isolate them from one another in a Virtual Private Cloud (VPC) .

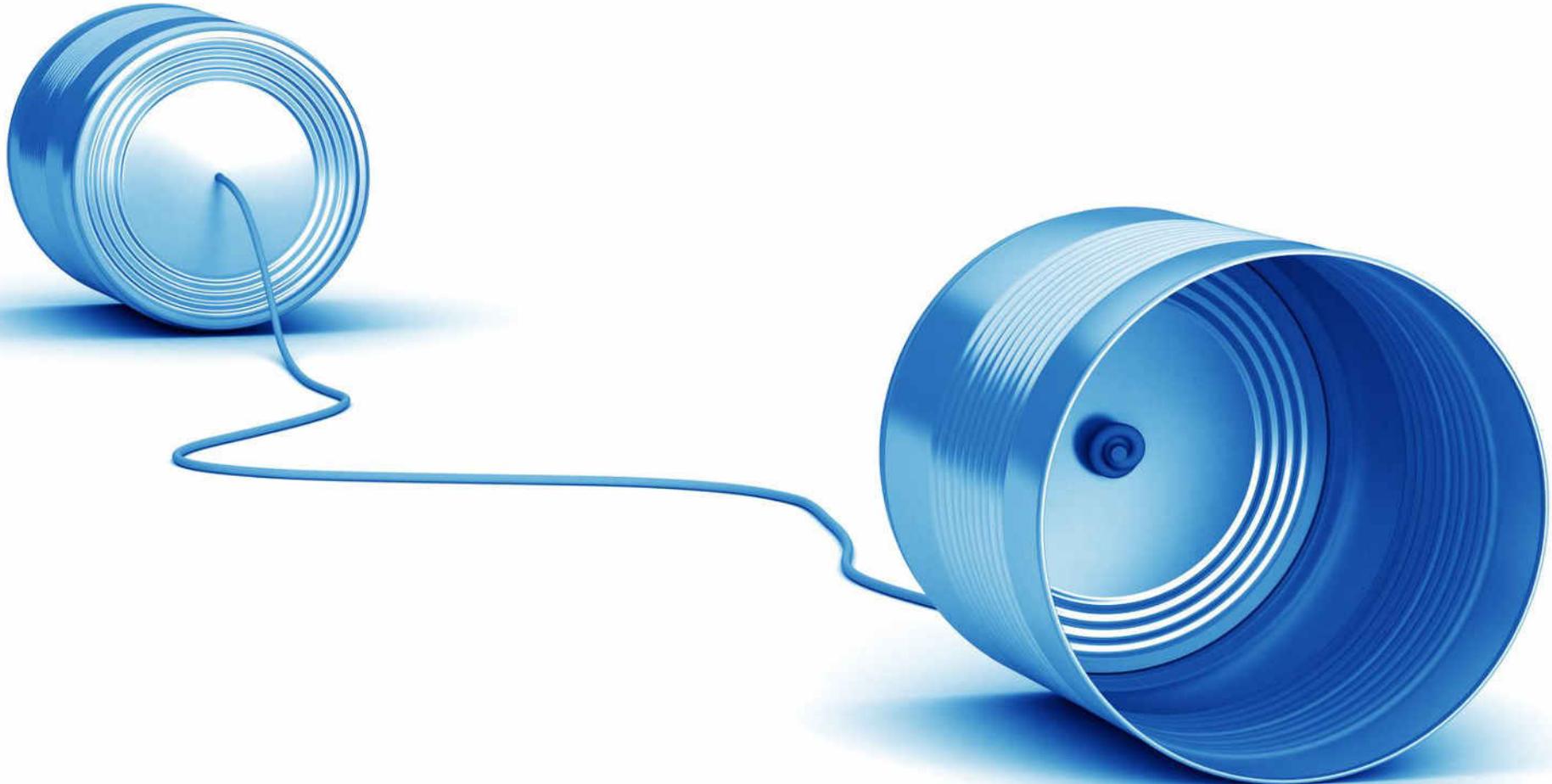
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5 Google Cloud VPCs are global; subnets are regional
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Networks isolate systems



- A and B can communicate over **internal IPs** even though they are *in different regions*.
- C and D must communicate over **external IPs** even though they are *in the same region*.





VPC Network offers many internetworking features

- Fine-grained networking policies
- Fine-grained IP address range selection
- Routes
- Firewalls
- Virtual Private Network (VPN)
- Cloud Router

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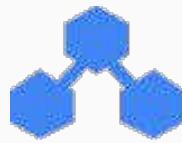
Connectivity Options to Google



Cloud VPN

Fully managed, highly available IPsec gateway for Compute Engine VMs.

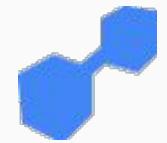
- Connect on-premise systems to Compute Engine.
- Connect a Compute Engine project to another Compute Engine project.



Carrier Interconnect

Direct, physical connection to all Cloud Platform services. No Internet needed.

- Connectivity via [service providers](#)
- Latency sensitive or Internet bandwidth constrained
- Connectivity to Compute Engine, Cloud Storage, BigQuery, etc.



Direct Peering

Connect directly to Google at any of 70+ edge locations in 33 countries.

- Private peering between autonomous systems and BGP
- Open to anyone who meets the network technical requirements



Cloud DNS is highly available and scalable

- Create managed zones, then add, edit, delete DNS records
 - Programmatically manage zones and records using RESTful API or command-line interface

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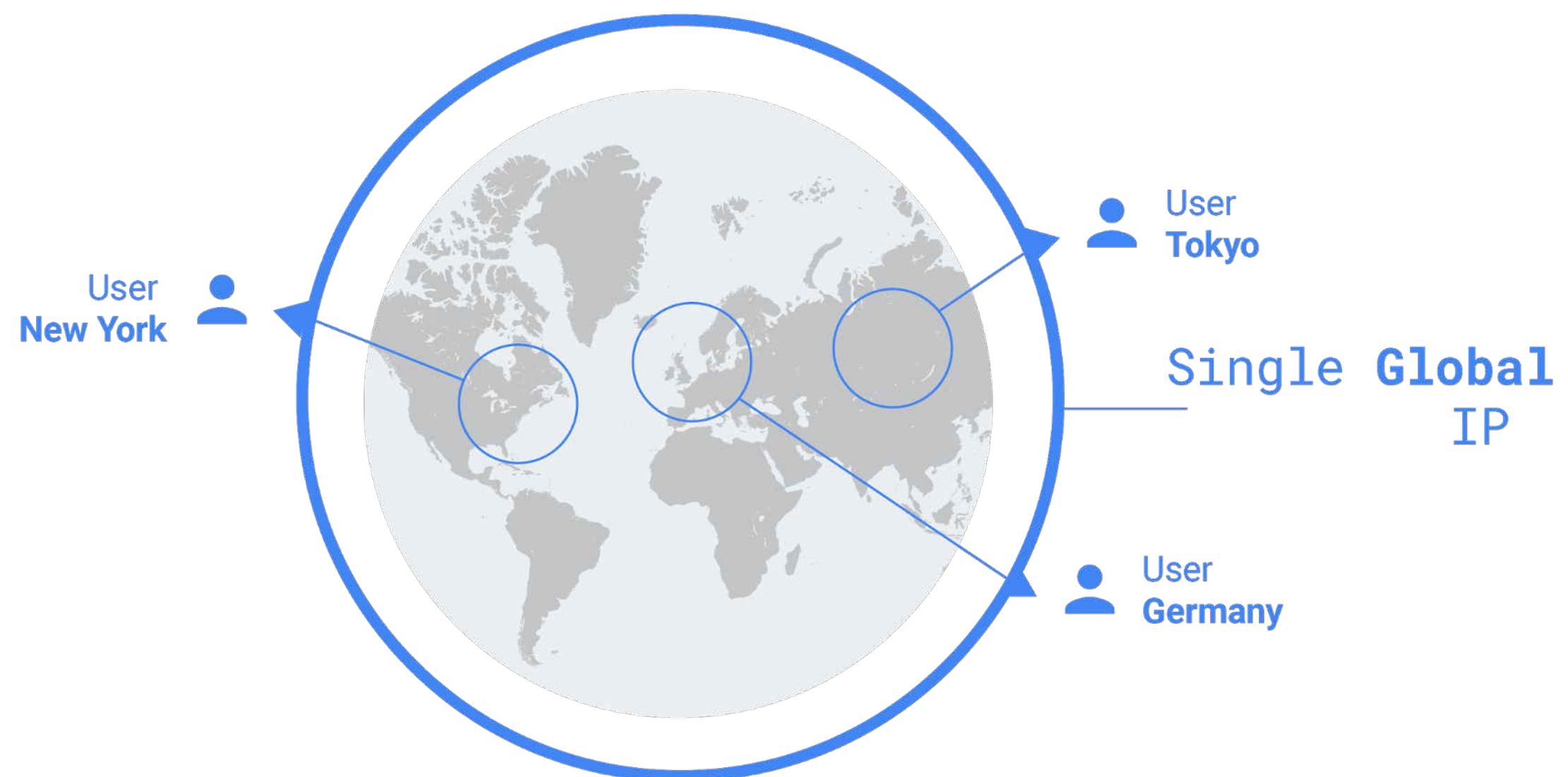
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Global Load Balancer



Cloud Load Balancing: HTTP(S)

- Balance HTTP-based traffic across multiple Compute Engine regions
- Global, external IP address routes traffic
- Traffic is directed only to instances that pass health checks
- Scalable, requires no pre-warming and provides resilience, fault tolerance



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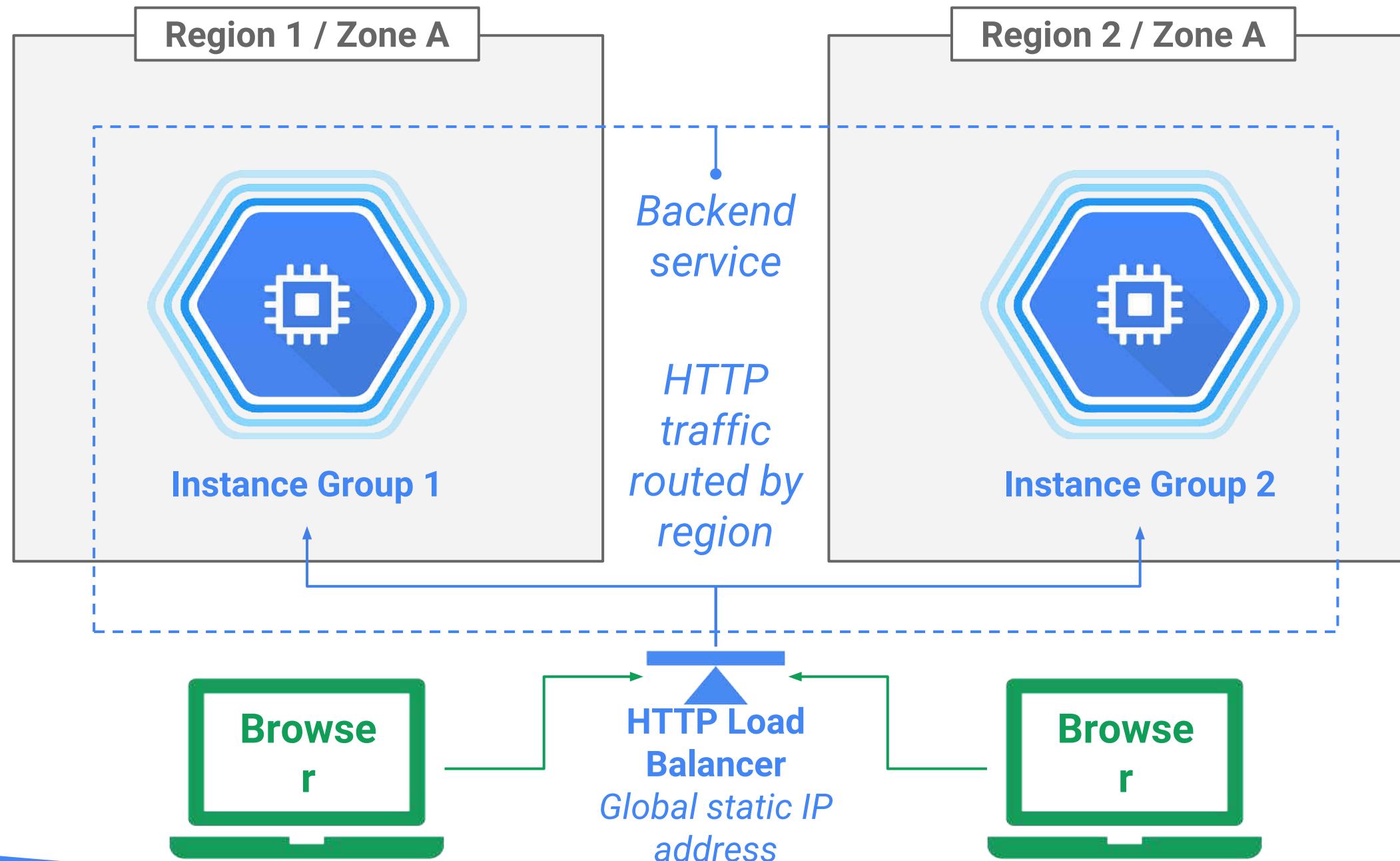


Cloud Load Balancing: TCP/SSL, UDP

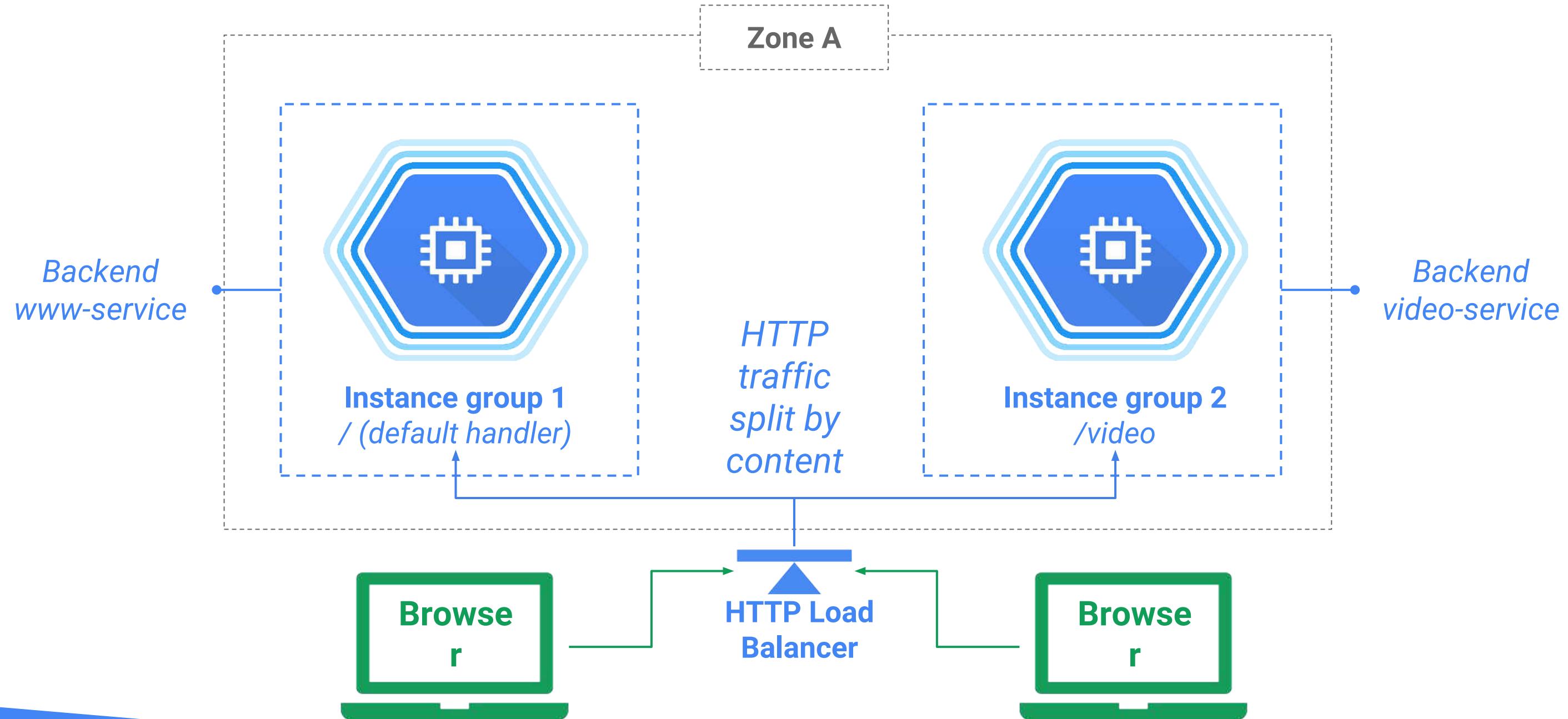
- Spread TCP/SSL and UDP traffic over pool of instances within a Compute Engine region
- Traffic is directed only to instances that pass health checks
- Scalable, requires no pre-warming

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Example: Cross-Region Load Balancing



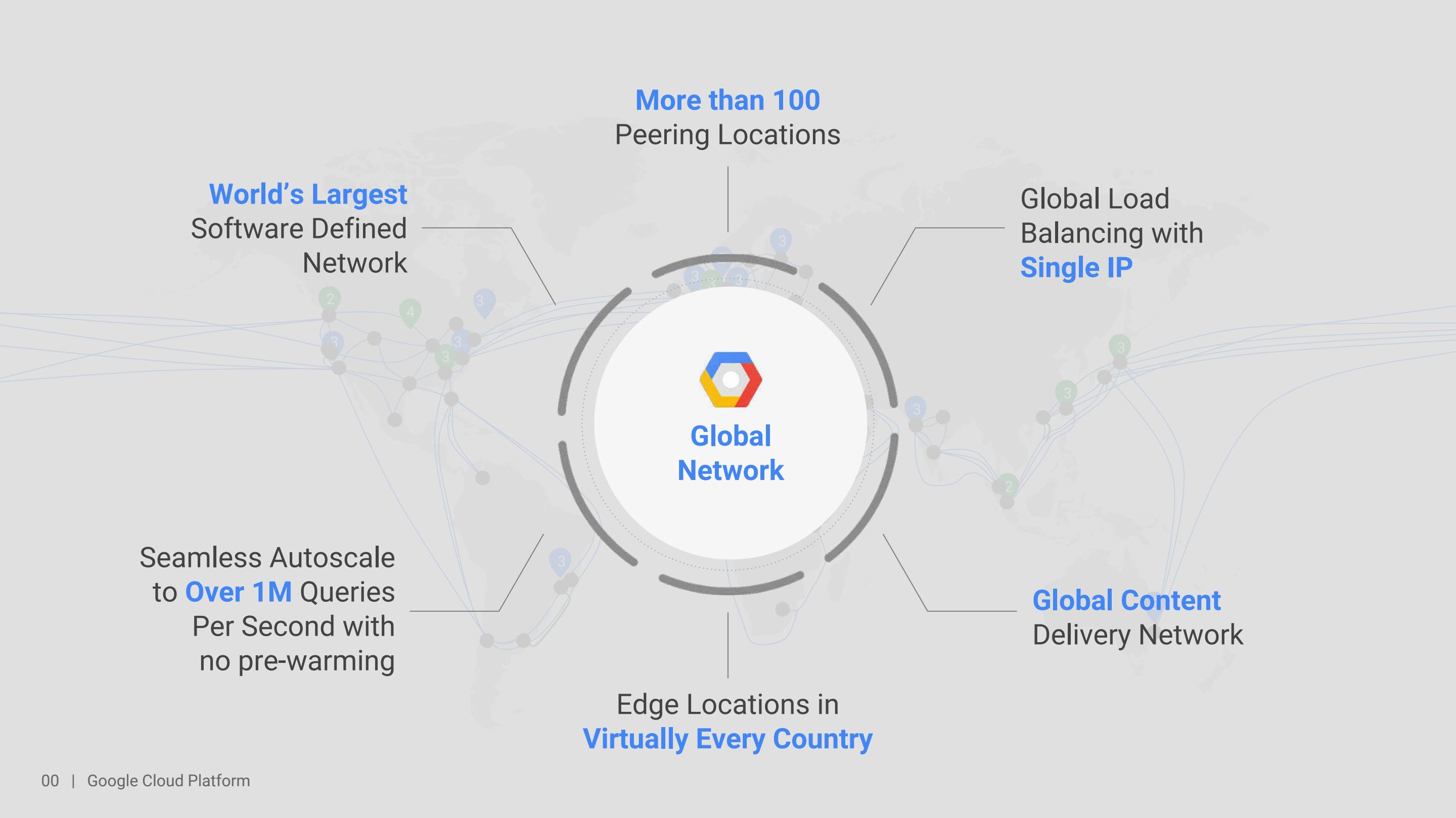
Example: Content-Based Load Balancing





Cloud CDN (Content Delivery Network)

- Use Google's globally distributed edge caches to cache HTTP(S) load-balanced content far closer to your users than your instances
 - Faster delivery of content to users while reducing costs
- Cloud CDN uses caches at network locations to store responses generated by instances



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Containers in the Cloud

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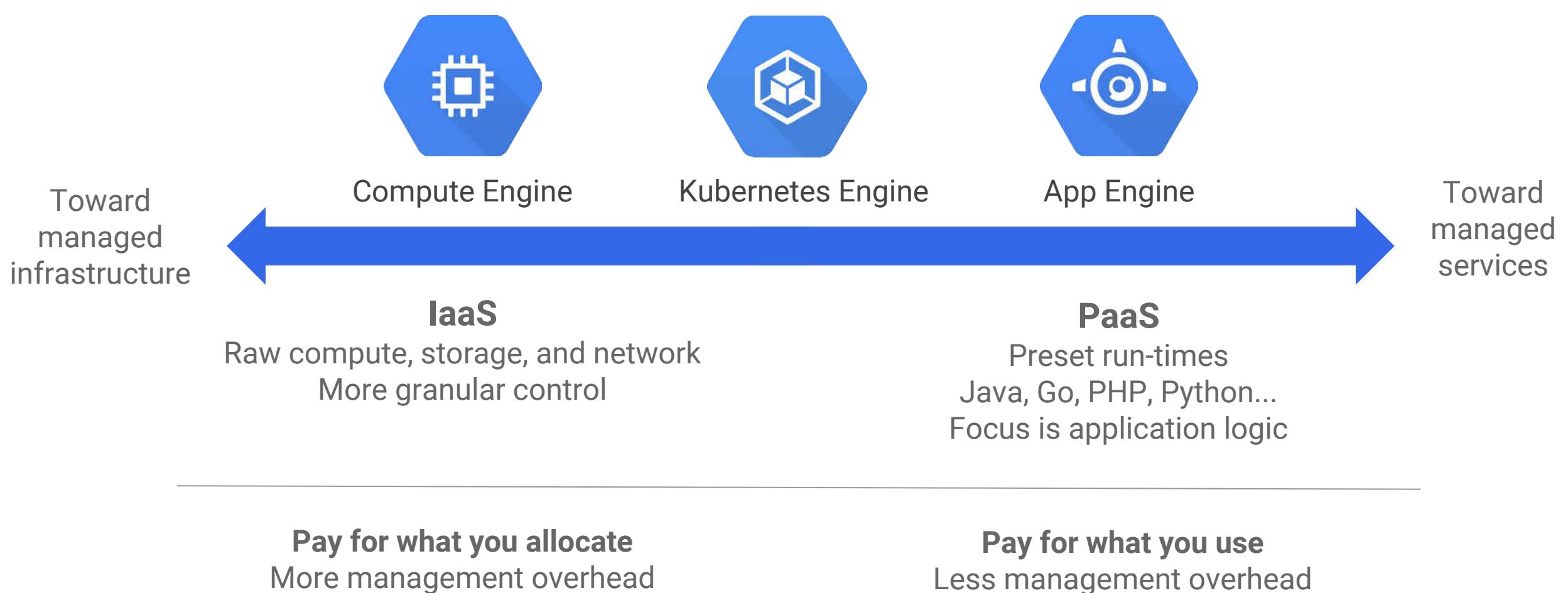
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IaaS and PaaS



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Introduction to Containers

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Kubernetes

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Kubernetes Engine

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Quiz

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What containers are good for anyway?

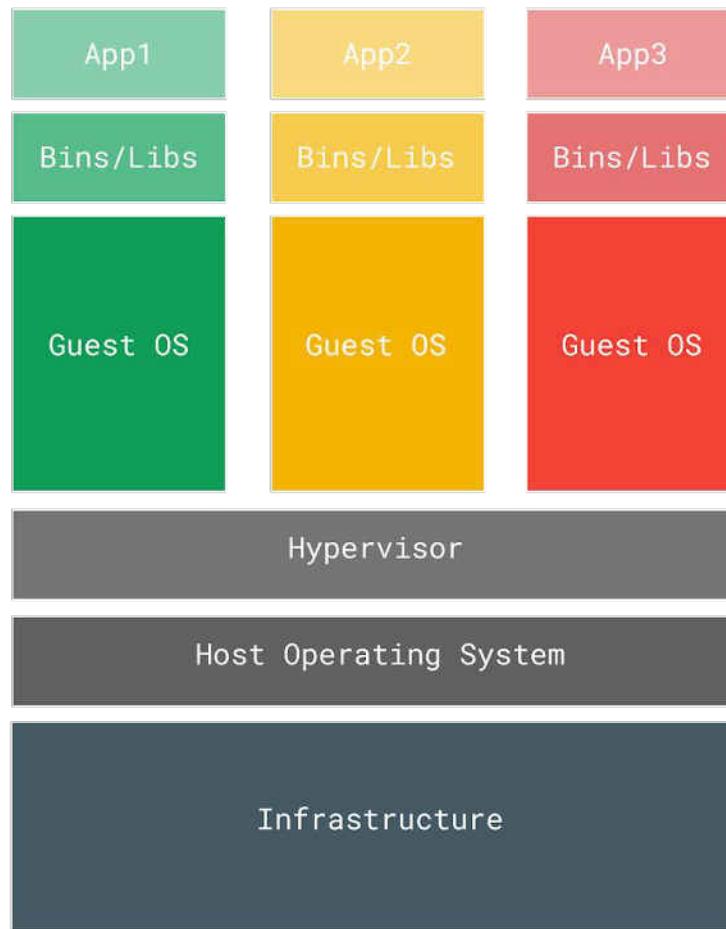


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What containers are good for anyway?

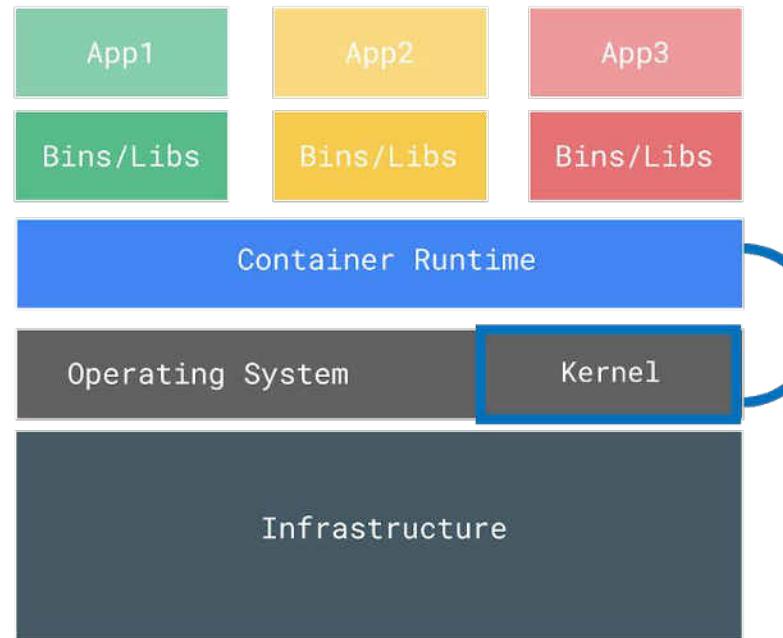
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**Operating-system-level virtualization,
also known as containerization, refers
to an operating system feature in
which the kernel allows the
existence of multiple isolated
user-space instances.**

wikipedia

Virtual Machines VS Containers



Hypervisor-based
Virtualization



Container
Virtualization

- Separates operating system from application code and dependencies
- Isolates individual processes
- Popular implementations include [Docker](#)

Agenda

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6 Introduction to Containers

7 Kubernetes

9 Kubernetes Engine

11 Review

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Guess someone didn't use

Kubernetes

4,000+

Projects Based on
Kubernetes



442

Years of
Effort*

15,000

Contributors

20k+

GitHub Stars



Kubernetes is a container cluster orchestration system

- Automates deployment, scaling, and operations for container clusters
- Open source, based on Google's experience over 10+ years
- Built for a multi-cloud world
 - Public, private, hybrid



Kubernetes eases application management

- **Workload portability**
 - You can run in many environments, across cloud providers.
 - Implementation is open and modular.
- **Rolling updates**
 - You can upgrade applications without downtime.
- **Persistent storage**
 - Details of how storage is provided are abstracted from how it is consumed.

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Kubernetes makes applications more elastic

- **Multi-zone clusters**
 - Run a single cluster in multiple zones
- **Load balancing**
 - External IP address routes traffic to correct port
- **Autoscaling**
 - Automatically adapt to changes in workload

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6 **Introduction to Containers**

7 **Kubernetes**

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9 **Kubernetes Engine**

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11 **Review**

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At Google, everything runs
in a container

On average, we launch
4 billion
new containers per week





Kubernetes Engine manages and runs containers

- Fully managed cluster management and orchestration system for running containers
 - Based on Kubernetes
 - Uses Compute Engine instances and resources
- Uses a declarative syntax to manage applications
 - Declare desired application configuration, Kubernetes Engine implements, manage



Why use Kubernetes Engine?

- Decouples operational, development concerns
- Manages and maintains
 - Logging, health management, monitoring
- Easily update Kubernetes versions as they are released

Kubernetes Engine's complementary services



Google Cloud Container Builder

Create Docker container images from app code in Google Cloud Storage

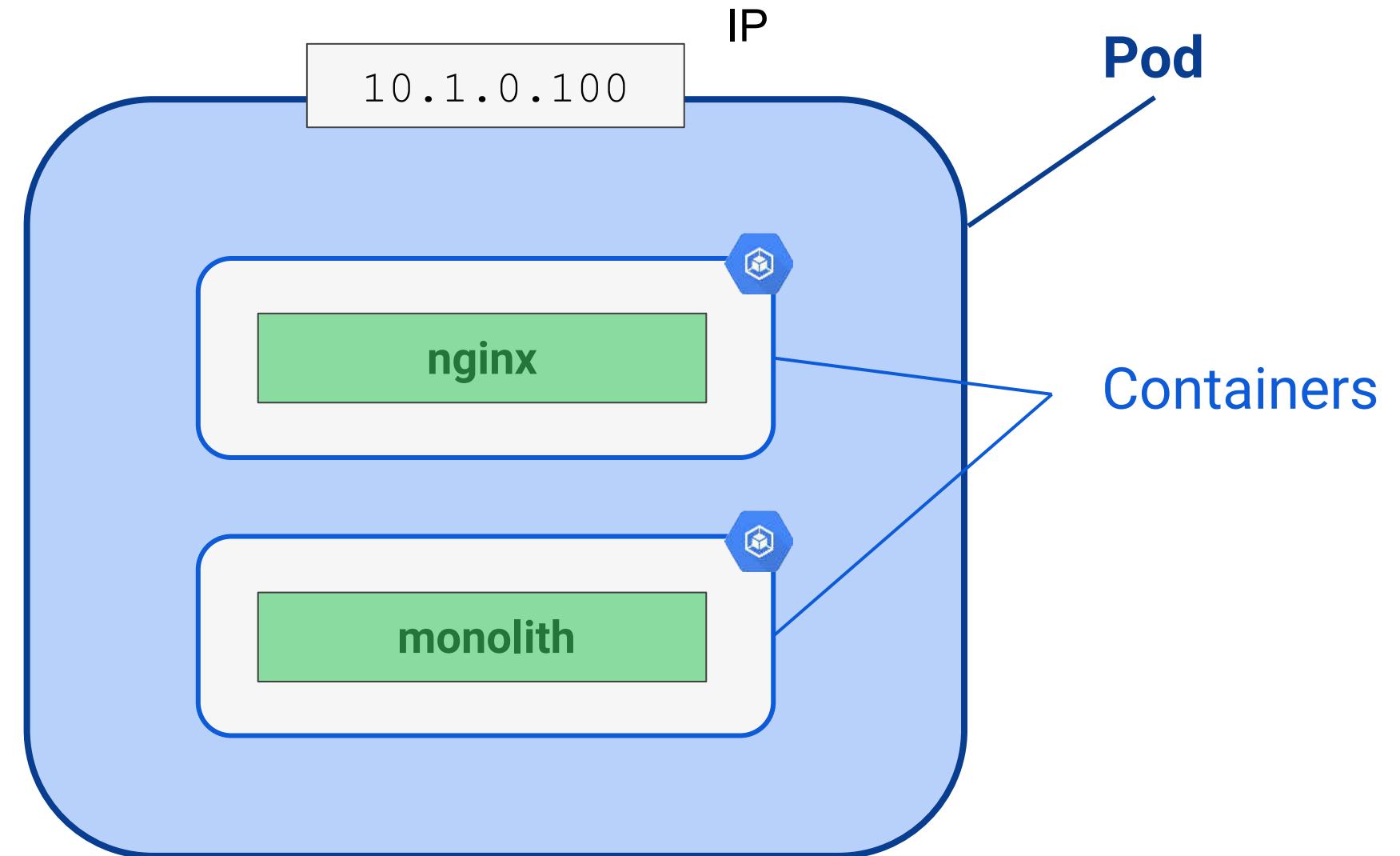


Google Container Registry

Docker image storage that's private to your GCP project

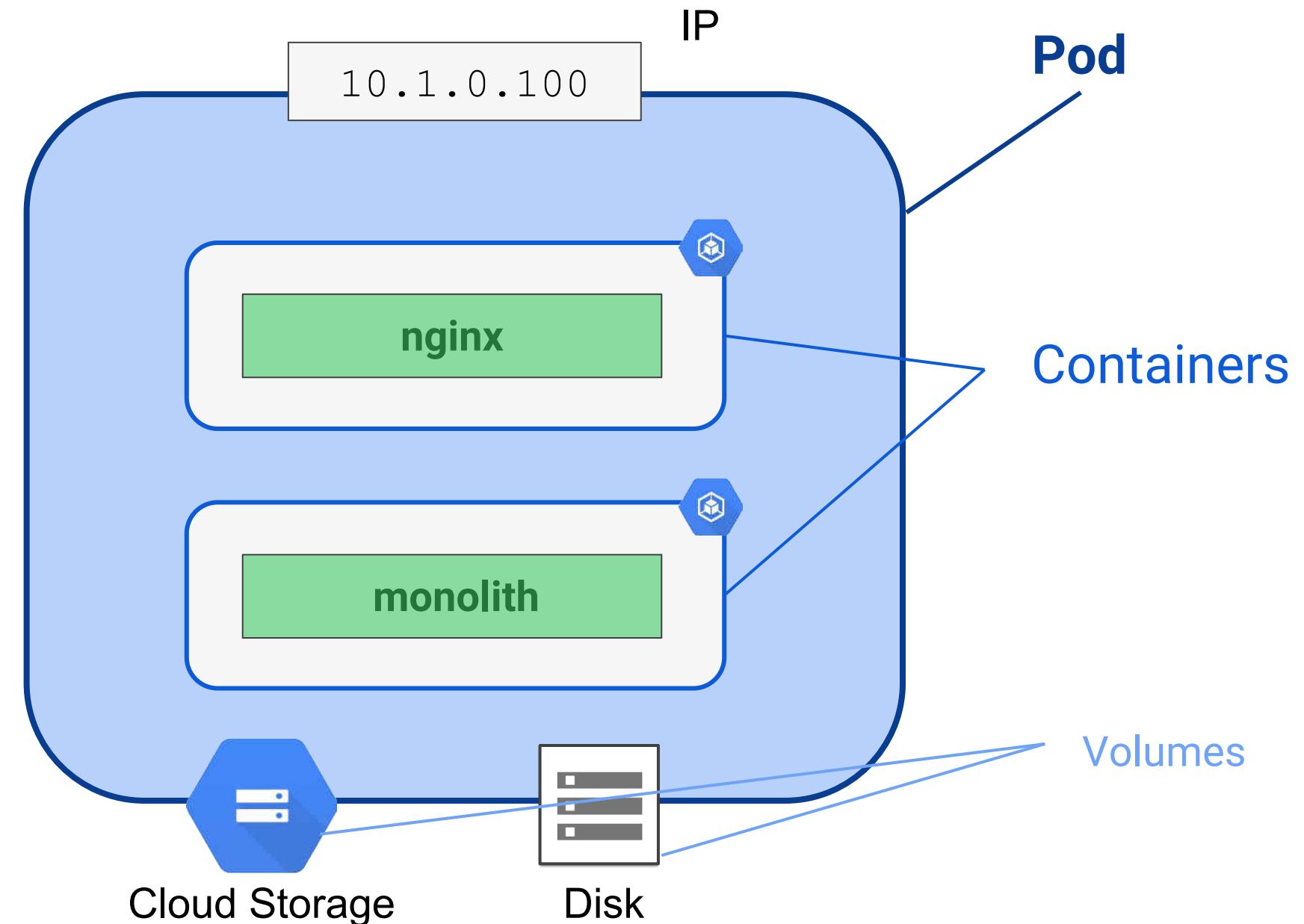
Pods

- A Pod is Kubernetes Engine's abstraction to represent an application
- It holds one or more containers
- The containers in the pod share:
 - A single IP address
 - A single namespace

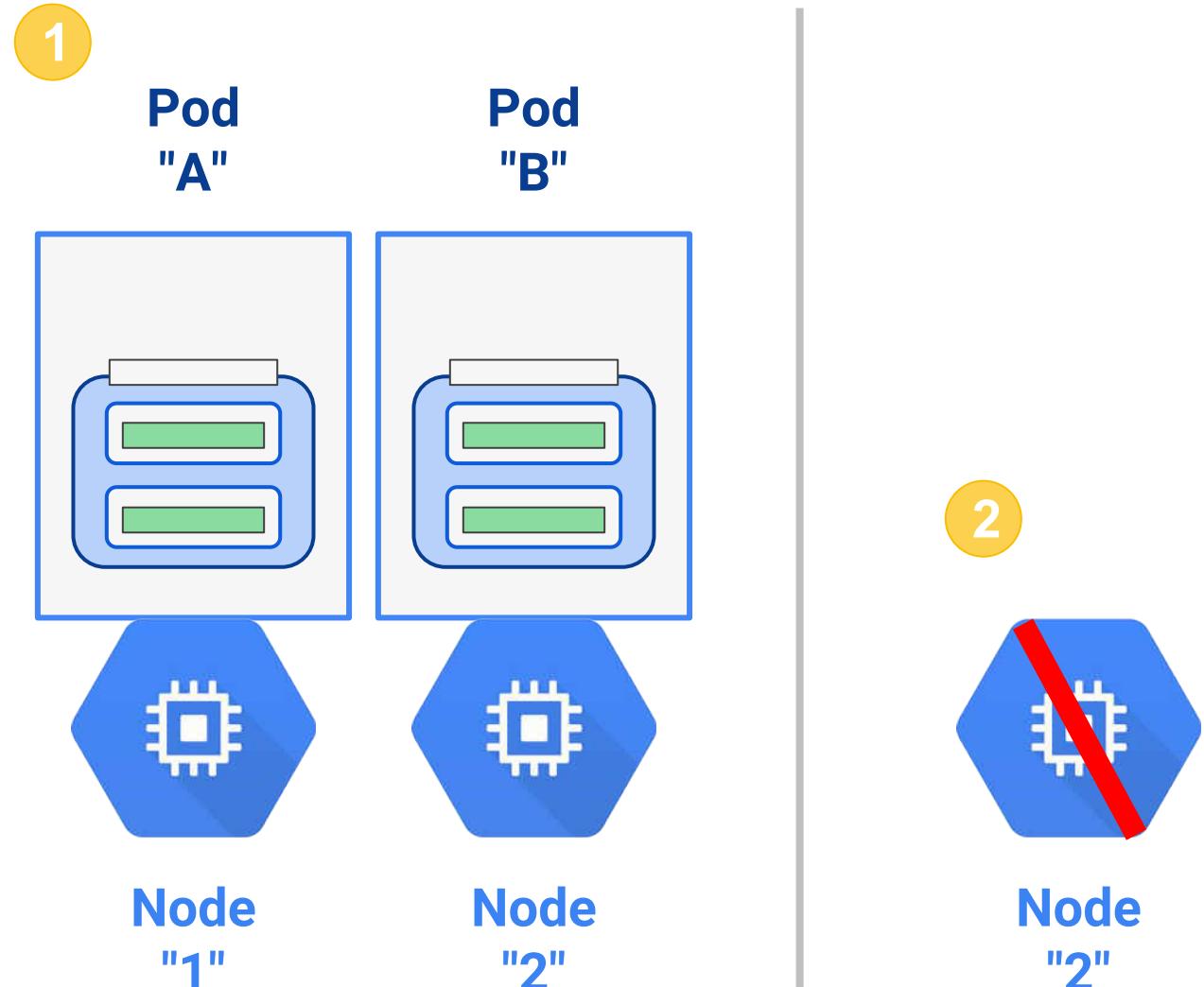


Pods

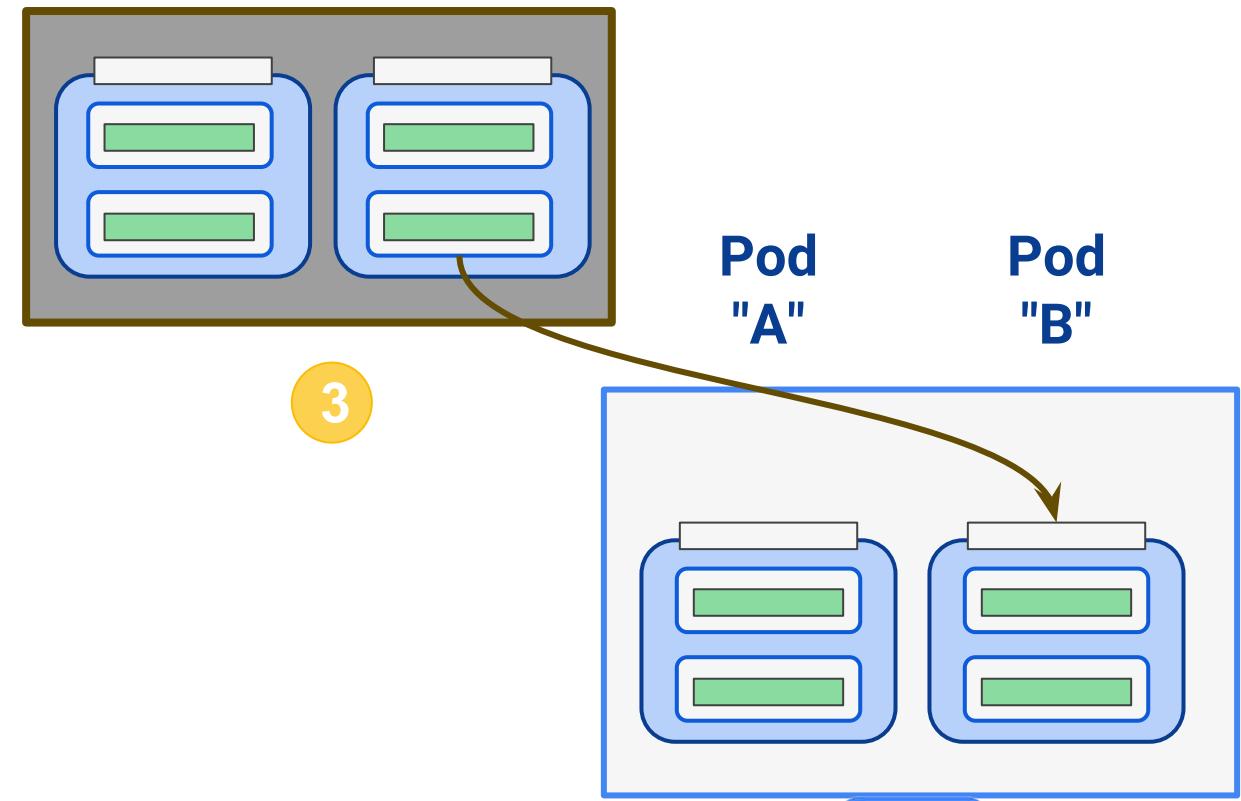
- A Pod can share other items
 - Access to storage



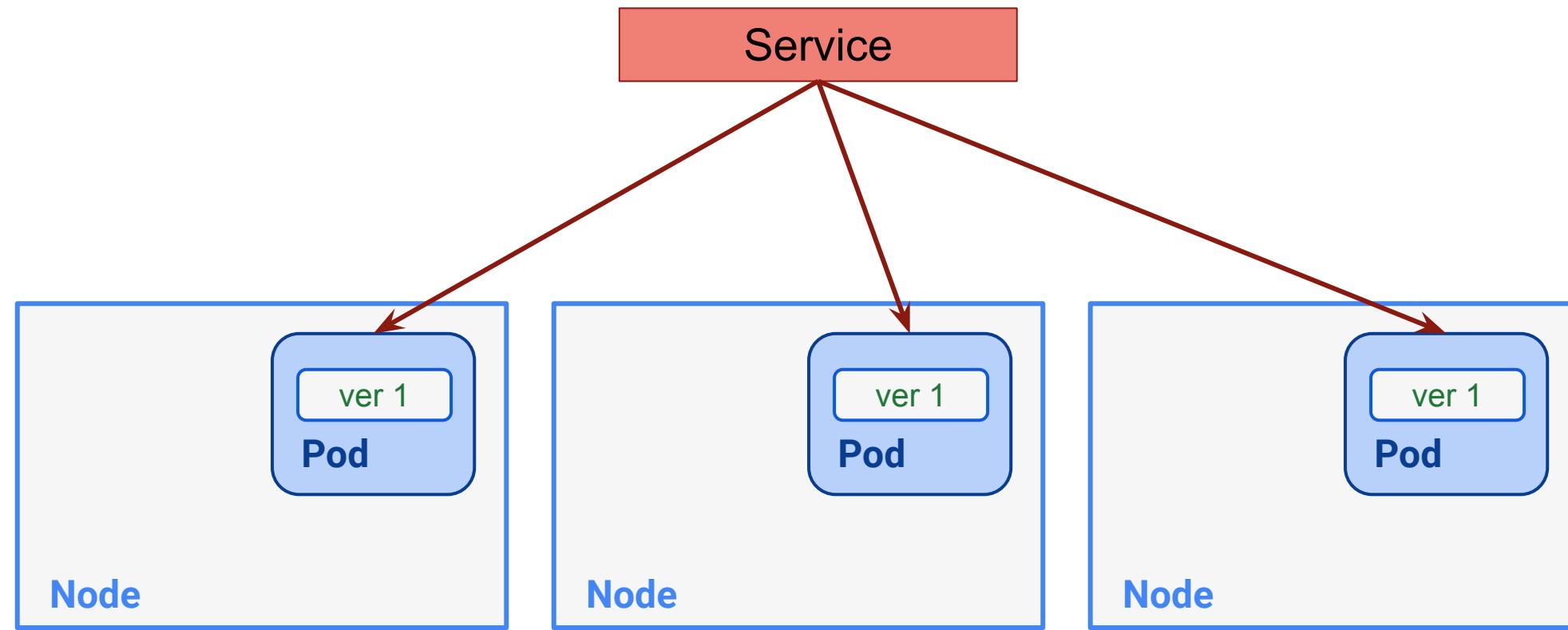
Resiliency



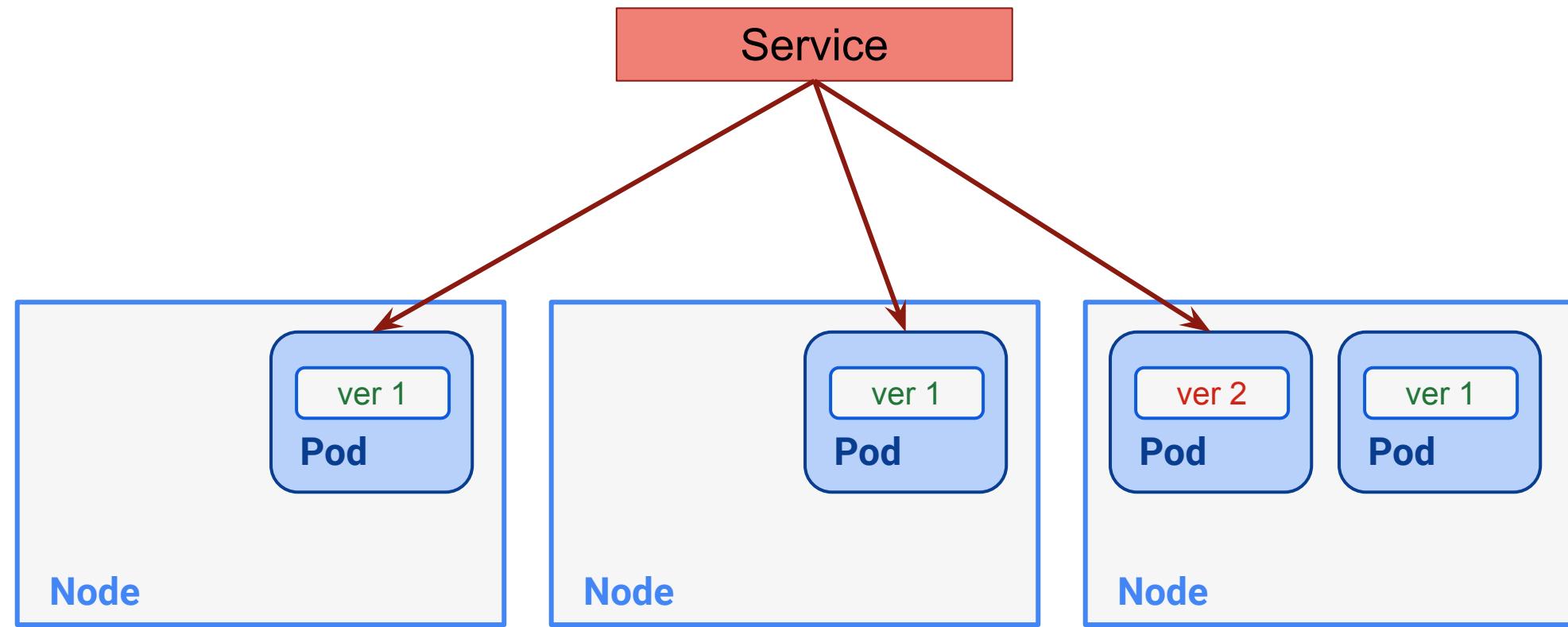
Deployment



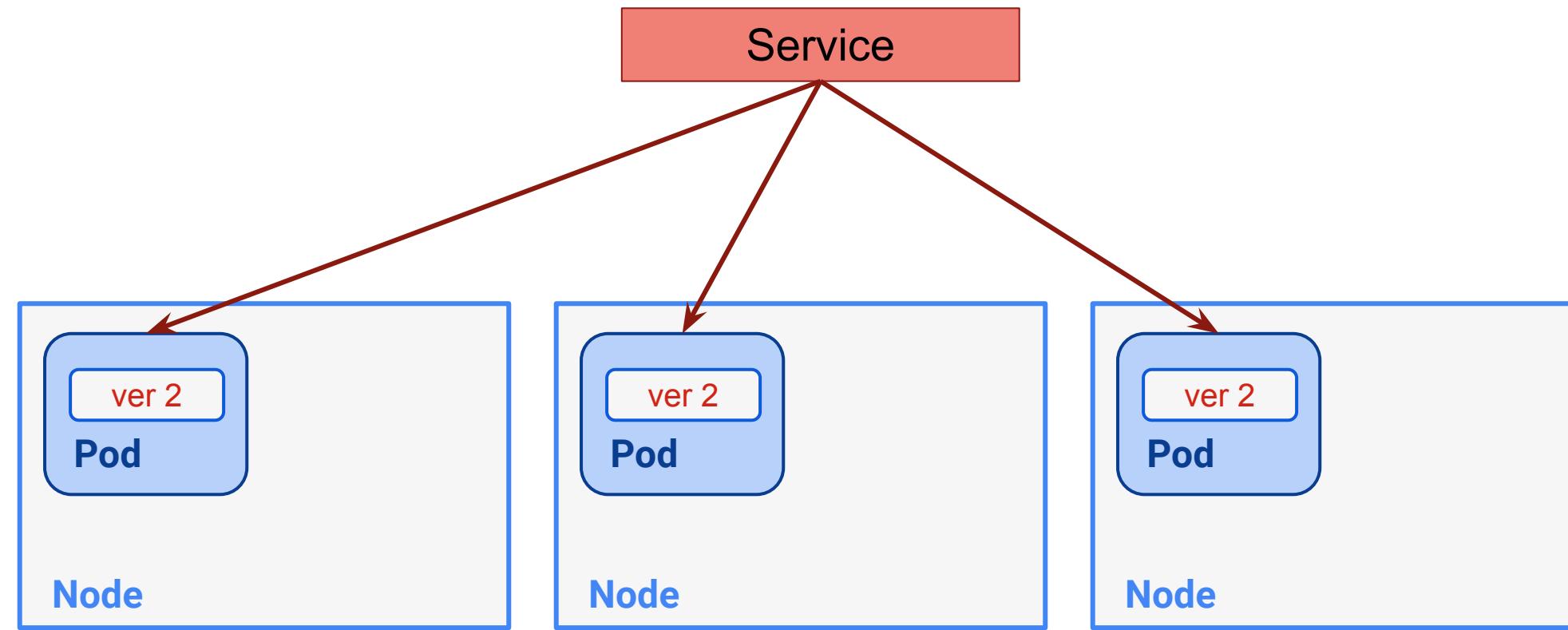
Rolling Update (1 of 3)



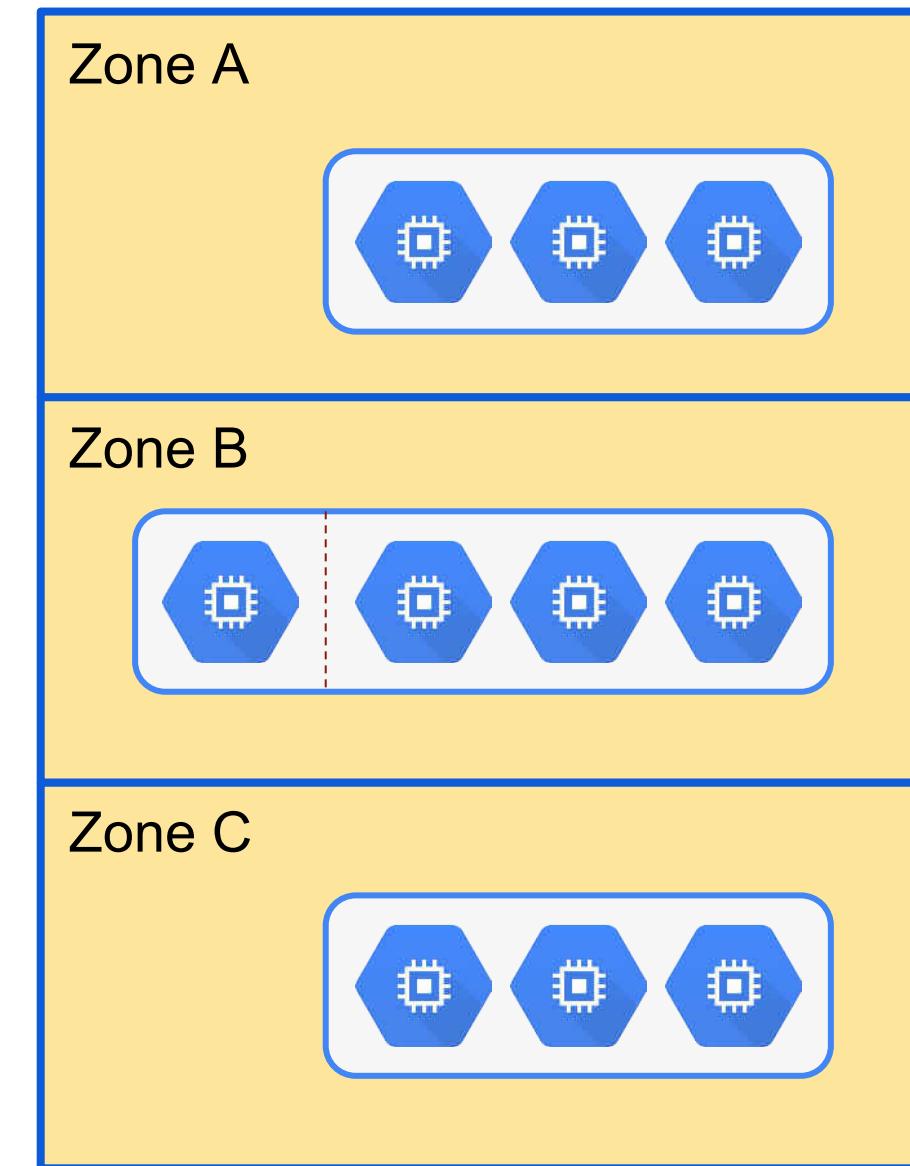
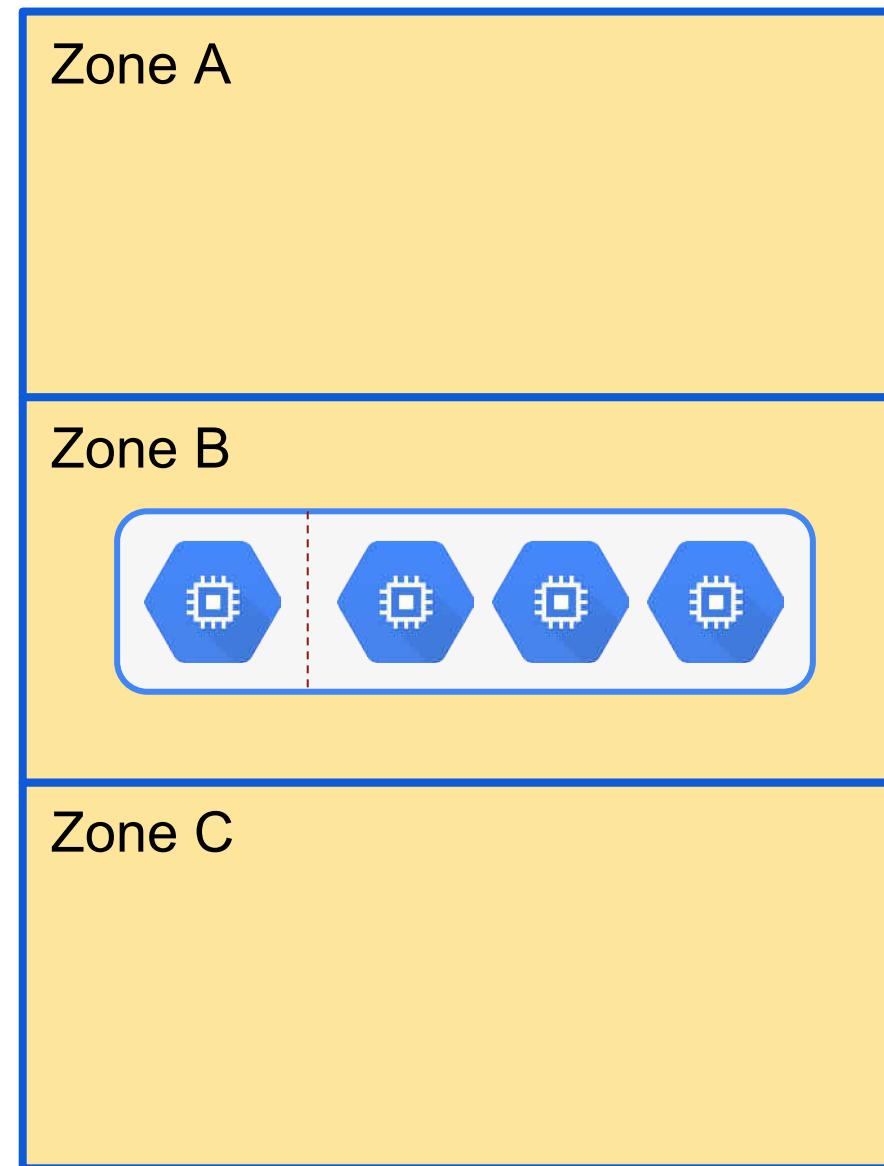
Rolling Update (2 of 3)

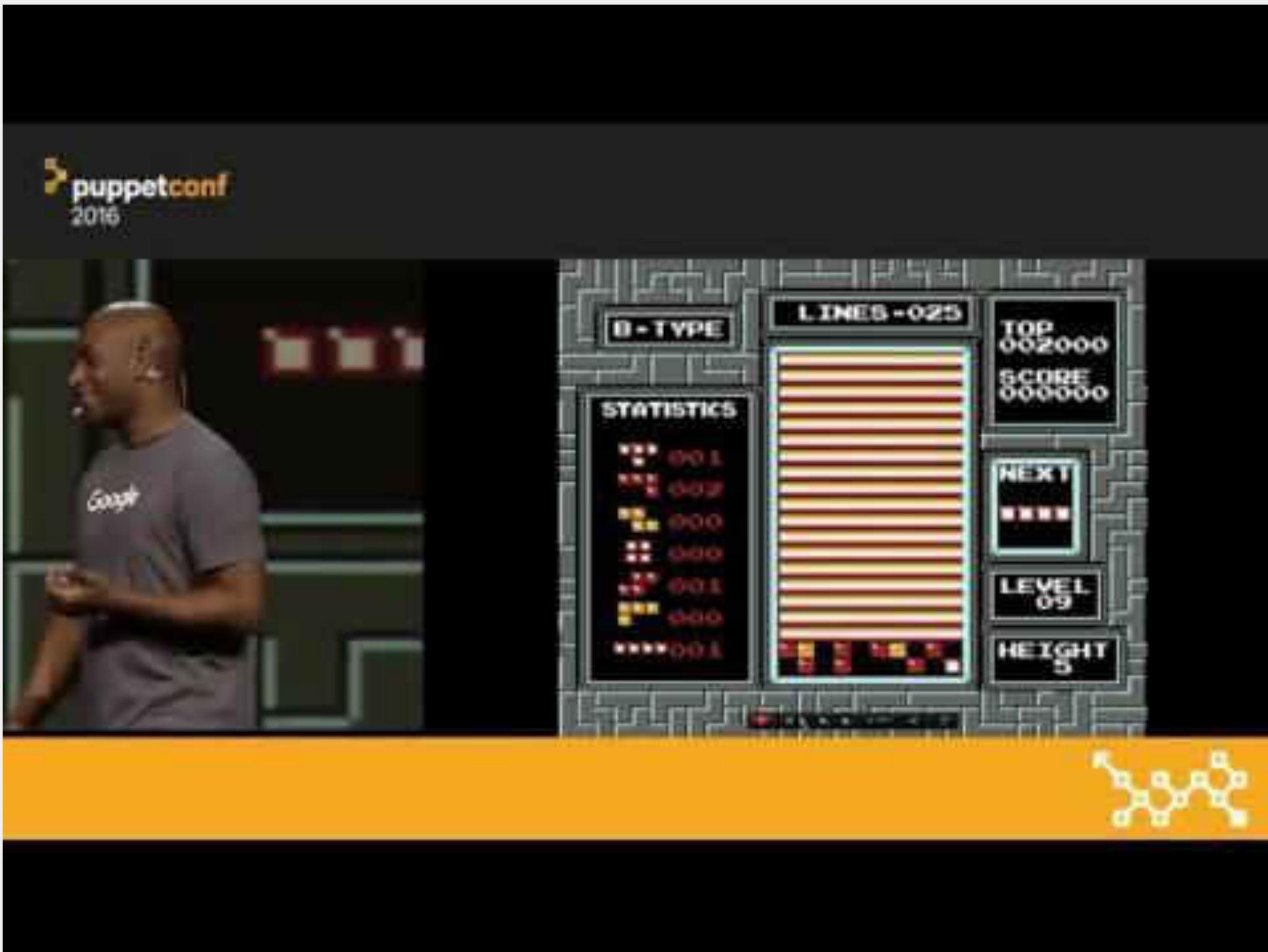


Rolling Update (3 of 3)



Multi-zone Container Clusters





Deploying Apps: Kubernetes Engine vs App Engine

	Kubernetes Engine	App Engine Standard	App Engine Flexible
<i>Language support</i>	Any	Java, Python, Go & PHP	Any
<i>Service model</i>	Hybrid	PaaS	PaaS
<i>Primary use case</i>	Container-based workloads	Web and mobile applications	Web and mobile applications, container-based workloads

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Cloud OnBoard

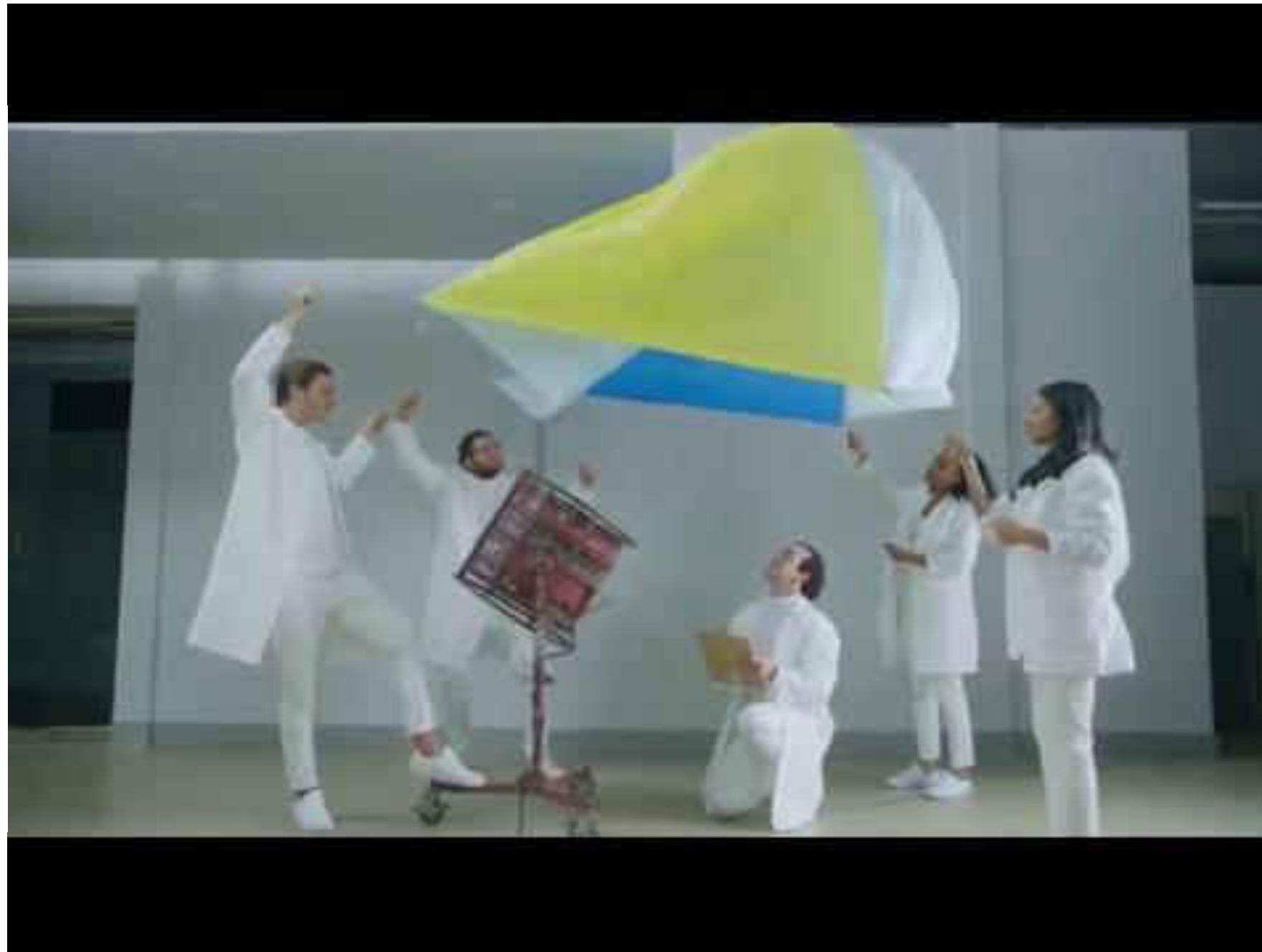
- The countdown begins: Get ready to Build What's Next with Google Cloud Platform

Loading: 1:26



Share your experience with #GoogleCloudOnBoard

/Cloud OnBoard



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Applications in the Cloud

7

GCP Fundamentals: Core Infrastructure

v4.0

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@Ranshiloni

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#GoogleCloudOnBoard

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Agenda

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Google App Engine
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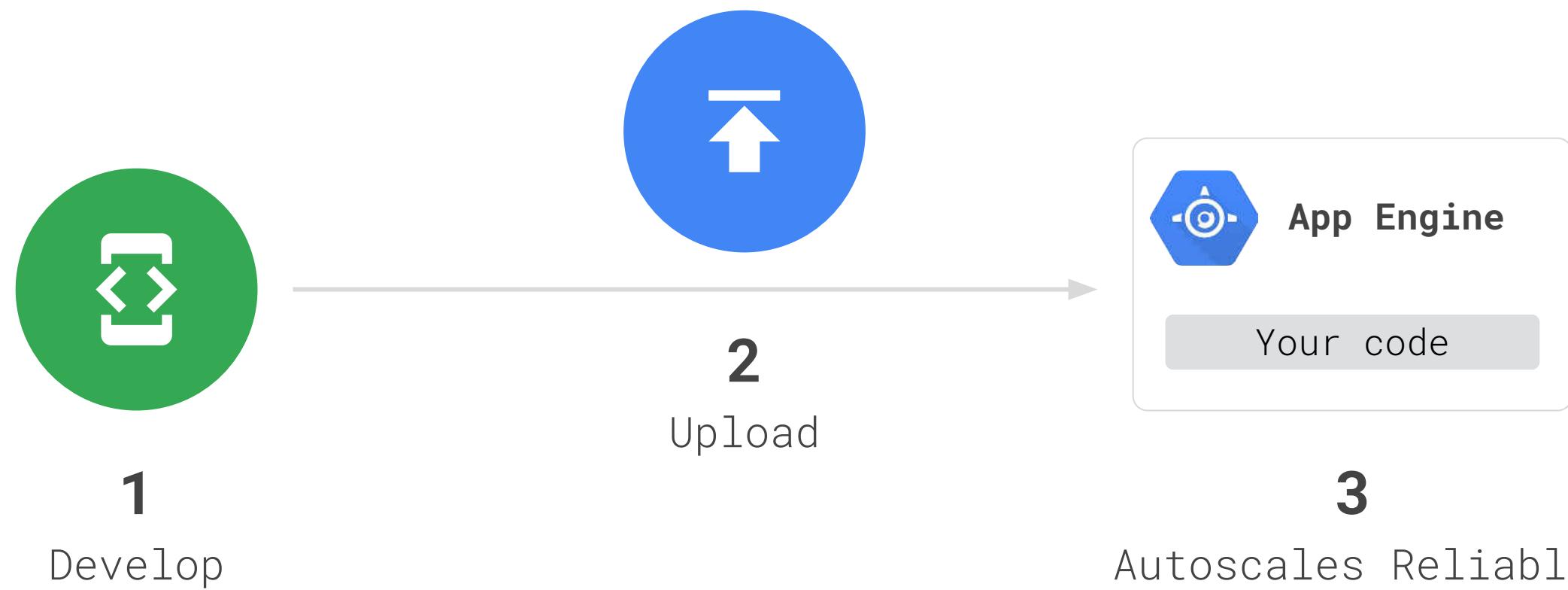
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6 Google App Engine Standard Environment
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8 Google App Engine Flexible Environment
9

10 Google Cloud Endpoints and Apigee Edge
11

12 Review
13

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3 Google Cloud Platform began in 2008, with App Engine,
5 a serverless way to run web applications
6
7





App Engine

Now serving
320 Billion
requests per day

Google Cloud





App Engine is a PaaS for building scalable applications

- App Engine makes deployment, maintenance, and scalability easy so you can focus on innovation
- Especially suited for building scalable web applications and mobile backends



App Engine standard environment

Requirements

- Specific versions of Java, Python, PHP, and Go are supported
- Your application must conform to sandbox constraints:
 - No writing to local file system
 - All requests time out at 60 seconds
 - Third-party software installations are limited

Agenda

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3 Google App Engine
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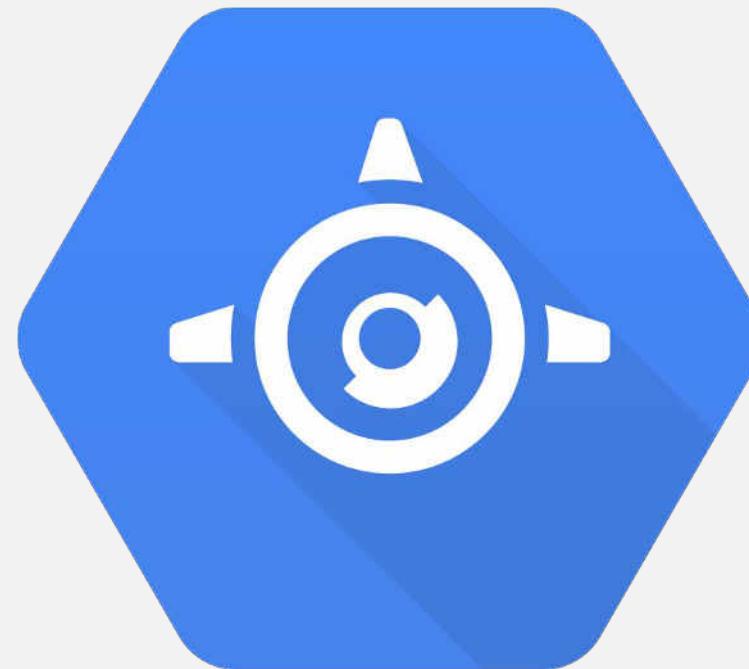
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6 Google App Engine Standard Environment
7

8 Google App Engine Flexible Environment
9

10 Google Cloud Endpoints and Apigee Edge
11

12 Review
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App Engine standard environment



- Easily deploy your applications
- Autoscale workloads to meet demand
- Economical
 - Free daily quota
 - Usage based [pricing](#)
- SDKs for development, testing and deployment

Example App Engine standard workflow: Web applications

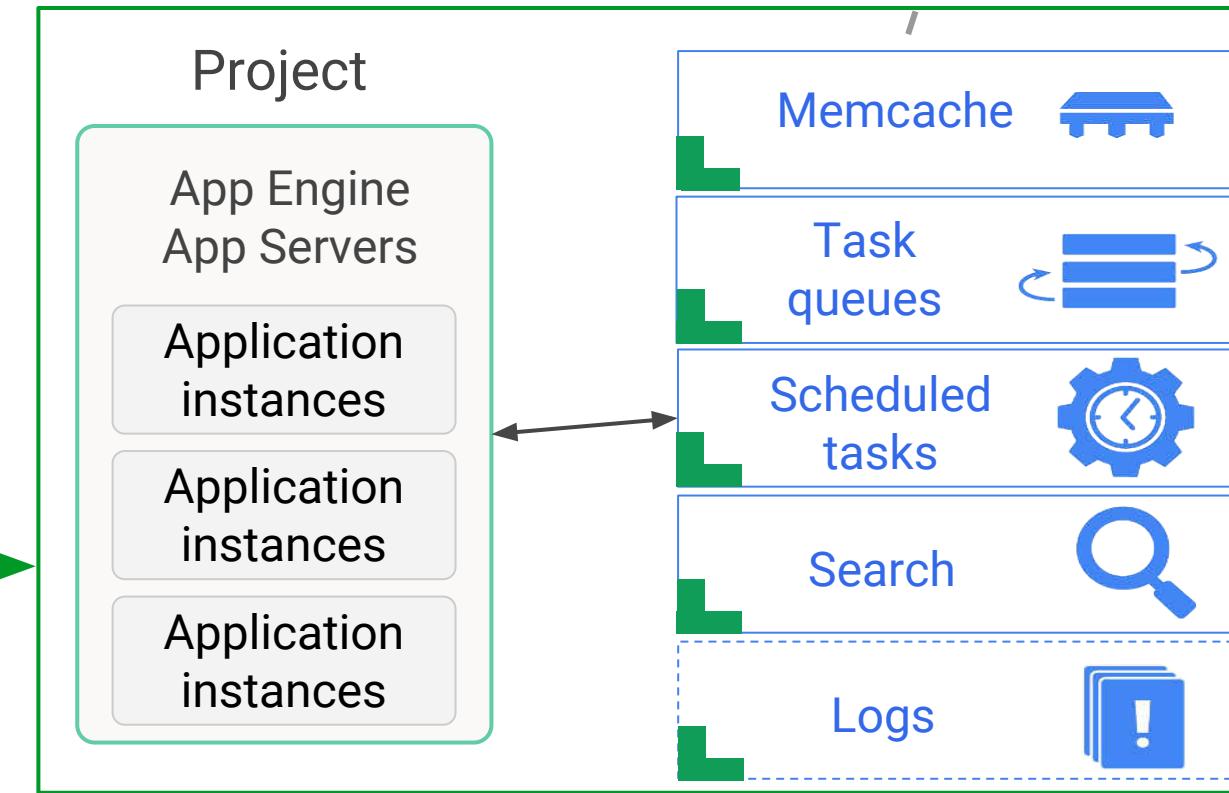
- 1 Develop & test the web application locally



- 2 Use the SDK to deploy to App Engine



- 3 App Engine automatically scales & reliably serves your web application



App Engine can access a variety of services using dedicated APIs

Agenda

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Google App Engine

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6 Google App Engine Standard Environment

7
8 Google App Engine Flexible Environment

9
10 Google Cloud Endpoints and Apigee Edge

11
12 Review

App Engine flexible environment

- Build and deploy containerized apps with a click
- No sandbox constraints
- Can access App Engine resources
- **Standard runtimes:** Python, Java, Go, Node.js
- **Custom runtime support:** Any language that supports HTTP requests
 - Package your runtime as a Dockerfile



Comparing the App Engine environments

	Standard Environment	Flexible Environment
<i>Instance startup</i>	Milliseconds	Minutes
<i>SSH access</i>	No	Yes (although not by default)
<i>Scaling</i>	Manual, basic, automatic	Manual, automatic
<i>Write to local disk</i>	No	Yes (but writes are ephemeral)
<i>Support for 3rd-party binaries</i>	No	Yes
<i>Network access</i>	Via App Engine services	Yes
<i>Pricing model</i>	After free daily use, pay per instance class, with automatic shutdown	Pay for resource allocation per hour; no automatic shutdown

Agenda

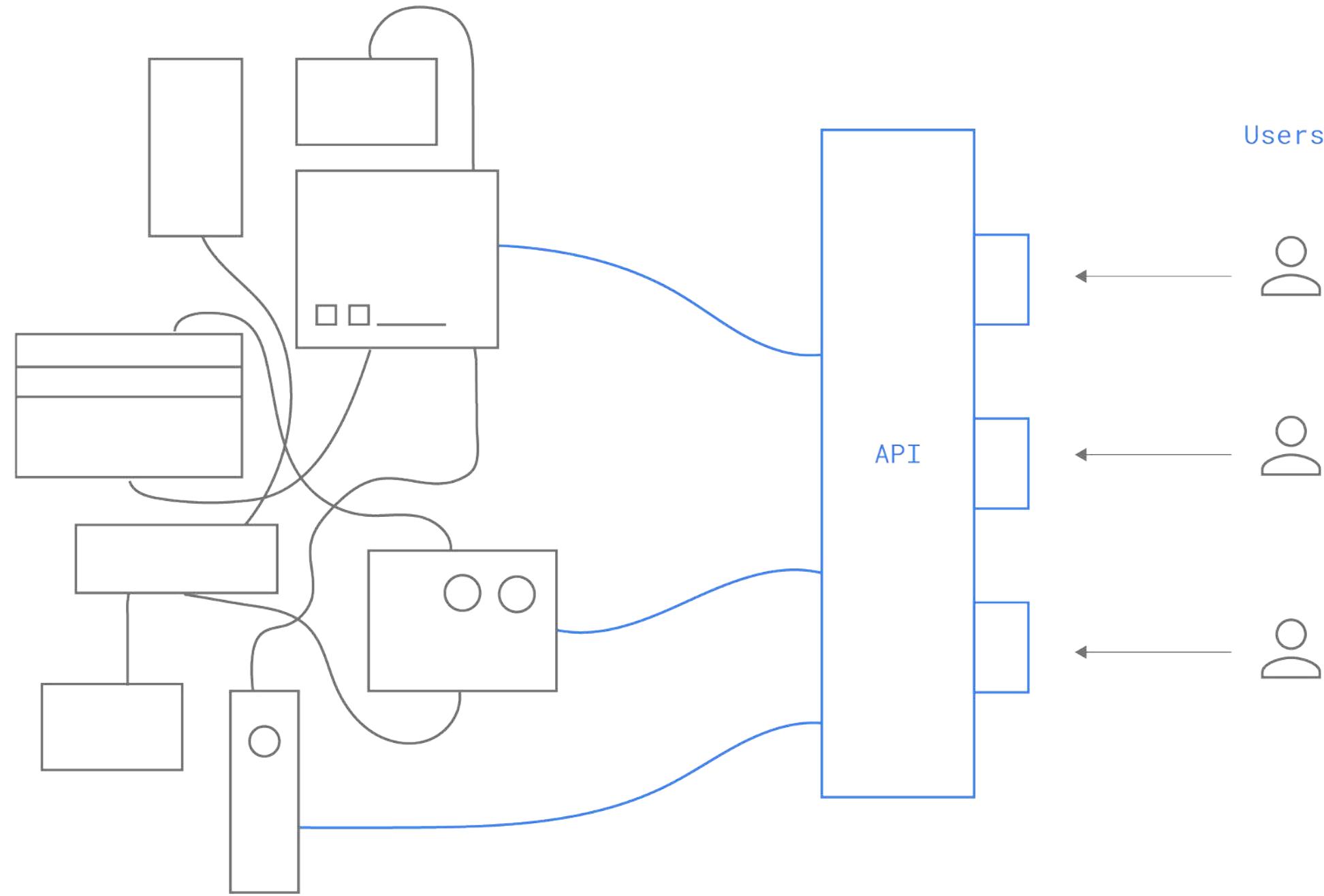
1
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3 Google App Engine

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Cloud Endpoints helps you create and maintain APIs

- Distributed API management through an API console
- Expose your API using a RESTful interface
- Control access and validate calls with JSON Web Tokens and Google API keys
 - Identify web, mobile users with Auth0 and Firebase Authentication
- Generate client libraries



Cloud Endpoints: Supported platforms

- Supports App Engine standard or flexible environment, Compute Engine, Kubernetes Engine
- Use Java or Python open-source Frameworks or any other framework and language
- Supports iOS, Android, and JavaScript clients

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Apigee Edge helps you secure and monetize APIs

1. A platform for making APIs available to your
2. customers
3. and partners
4. Contains analytics, monetization, and a
5. developer portal

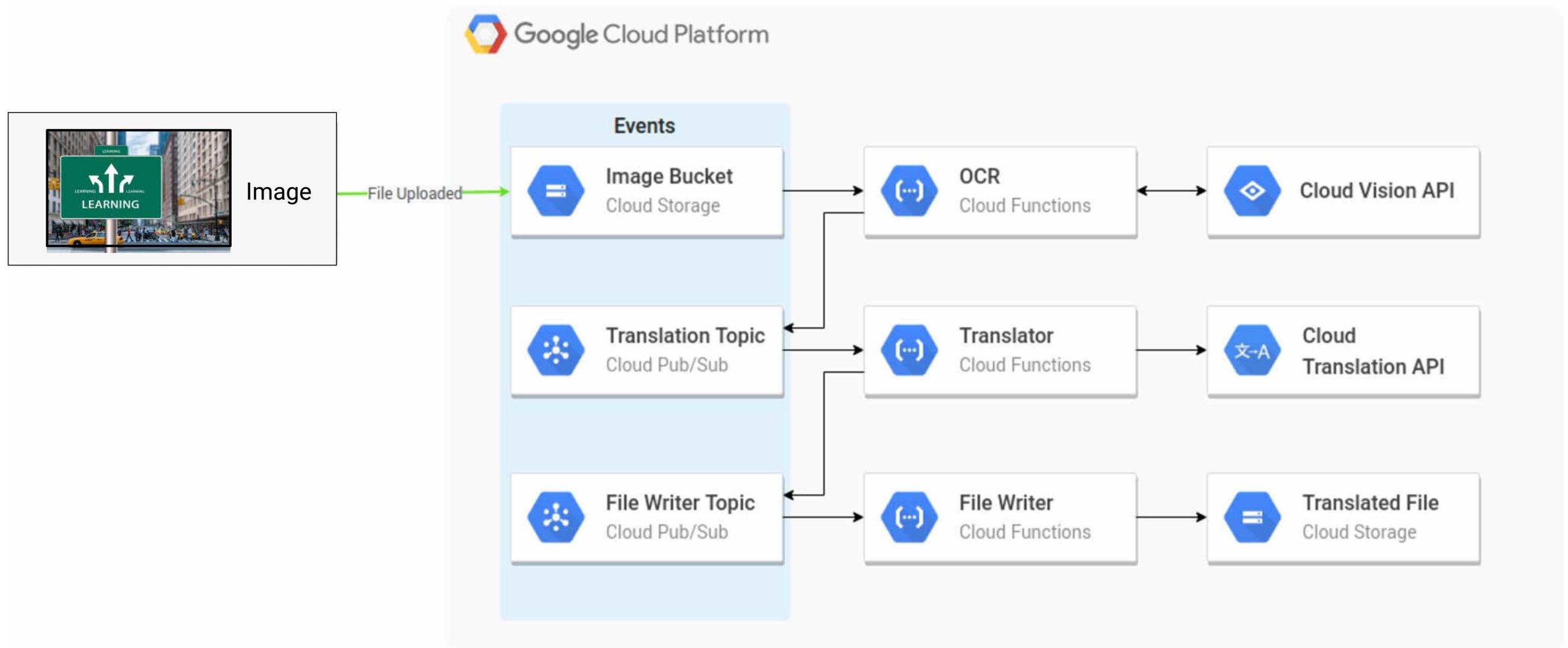
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apigee
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Cloud Functions Beta

- Create single-purpose functions that respond to events without a server or runtime
 - Event examples: New instance created, file added to Cloud Storage
- Written in Javascript; execute in managed Node.js environment on Google Cloud Platform

Microservices example using Cloud Functions





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Agenda

Google App Engine

Google App Engine Standard Environment

Google App Engine Flexible Environment

Google Cloud Endpoints and Apigee Edge

Review

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2 <Cloud OnBoard>

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Storage in the Cloud

7

GCP Fundamentals: Core Infrastructure

v4.0

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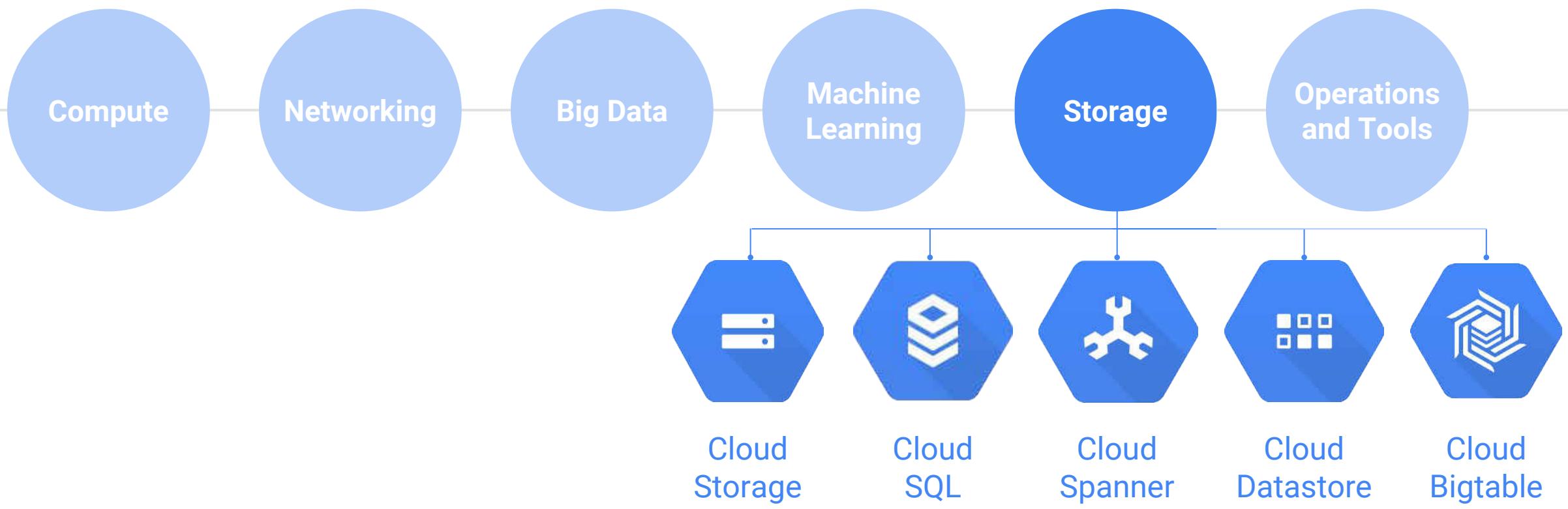
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</Cloud OnBoard>

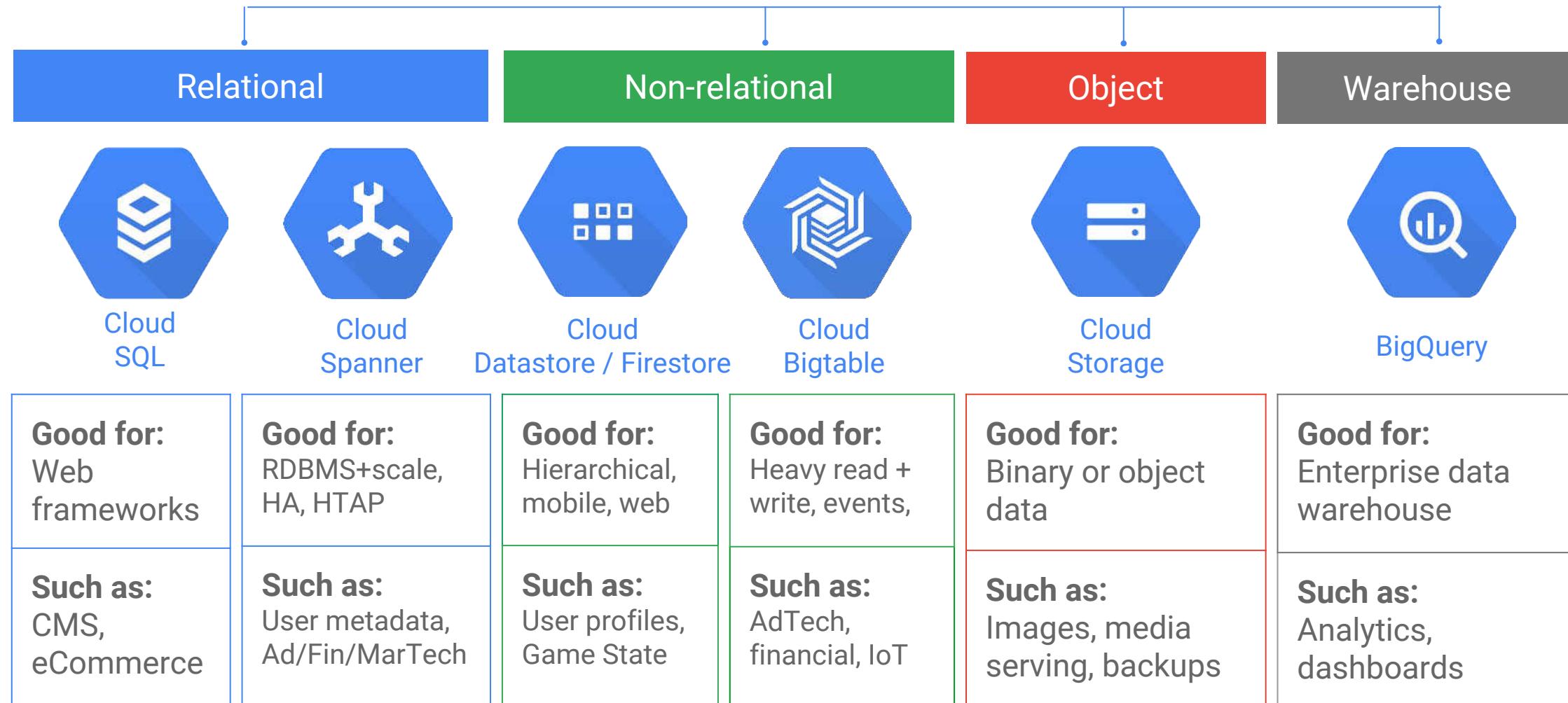
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Google Cloud Platform



Storage & Database Portfolio



Agenda

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5 **Cloud Storage**

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7 **Cloud SQL and Cloud Spanner**

8
9 **Cloud Bigtable**

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11 **Cloud Datastore**

12
13 **Comparing storage options**



Cloud Storage is binary large-object storage

- High performance, internet-scale
- Simple administration
 - Does not require capacity management
- Data encryption at rest
- Data encryption in transit by default from Google to endpoint
- Online and offline import services are available

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Your Cloud Storage files are organized into buckets

Bucket attributes:

- Globally unique name
- Storage class
- Location
 - Region or multi-region
- IAM policies or
 - Access Control Lists
- Object versioning setting
- Object lifecycle management rules

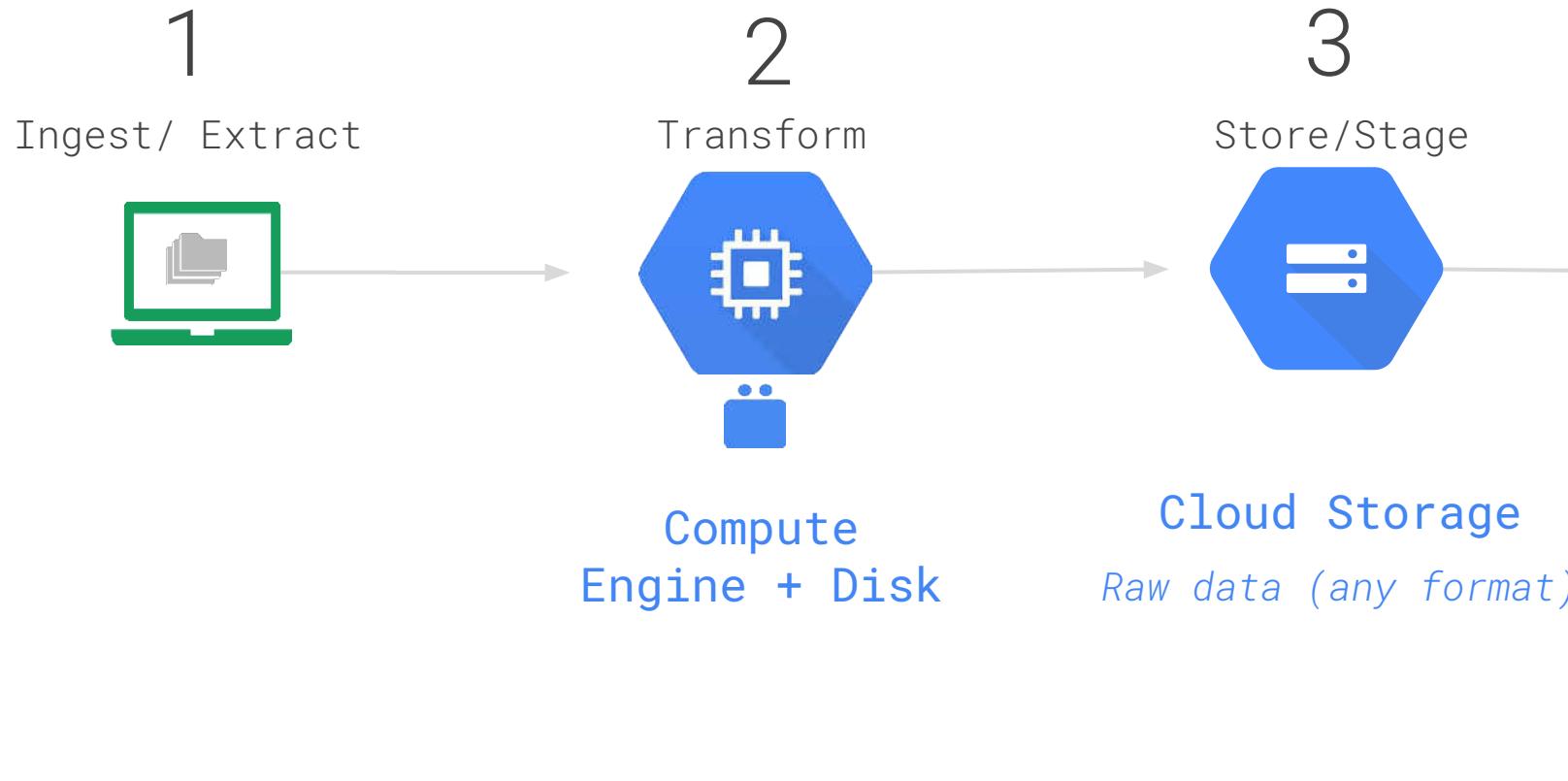
Bucket contents:

- Files (in a flat namespace)
- Access Control Lists

Choosing among Cloud Storage classes

	Multi-regional	Regional	Nearline	Coldline
Intended for data that is...	Most frequently accessed	Accessed frequently within a region	Accessed less than once a month	Accessed less than once a year
Availability SLA	99.95%	99.90%	99.00%	99.00%
Access APIs	Consistent APIs			
Access time	Millisecond access			
<u>Storage price</u>	Price per GB stored per month			
<u>Retrieval price</u>	Total price per GB transferred			
Use cases	Content storage and delivery	In-region analytics, transcoding	Long-tail content, backups	Archiving, disaster recovery

2
3 Use Cloud Storage for persistent storage and as staging
4 ground for import to other Google Cloud products





Transfer Appliance

GA Q2'18

Transport data to the Cloud at faster-than-internet speeds

- Large-scale secure offline ingestion
- Petabyte-scale imports in days, not years
- Moving data to the cloud made easy with 100TB and 500TB models



Online transfer > 7 days -- use Transfer Appliance

Use
Google
Transfer
Appliance



	1 Mbps	10 Mbps	100 Mbps	1 Gbps	10 Gbps	100 Gbps
1 GB	3 hrs	18 mins	2 mins	11 secs	1 sec	0.1 sec
10 GB	30 hrs	3 hrs	18 mins	2 mins	11 secs	1 sec
100 GB	12 days	30 hrs	3 hrs	18 mins	2 mins	11 secs
1 TB	124 days	12 days	30 hrs	3 hrs	18 mins	2 mins
10 TB	3 years	124 days	12 days	30 hrs	3 hrs	18 mins
100 TB	34 years	3 years	124 days	12 days	30 hrs	3 hrs
1 PB	340 years	34 years	3 years	124 days	12 days	30 hrs
10 PB	3,404 years	340 years	34 years	3 years	124 days	12 days
100 PB	34,048 years	3,404 years	340 years	34 years	3 years	124 days



"Thanks to **Google Cloud Platform** and the Google Genomics team, the greatest minds in science from around the world will be able to study **trillions of data points in one single database.**"



UPLOADED

100
TERABYTES

of data from more than
1,300 WHOLE GENOMES
to Google Cloud Storage

UP TO
200 GIGABYTES PER RAW GENOME



MSSNG project could easily surpass a
PETABYTE

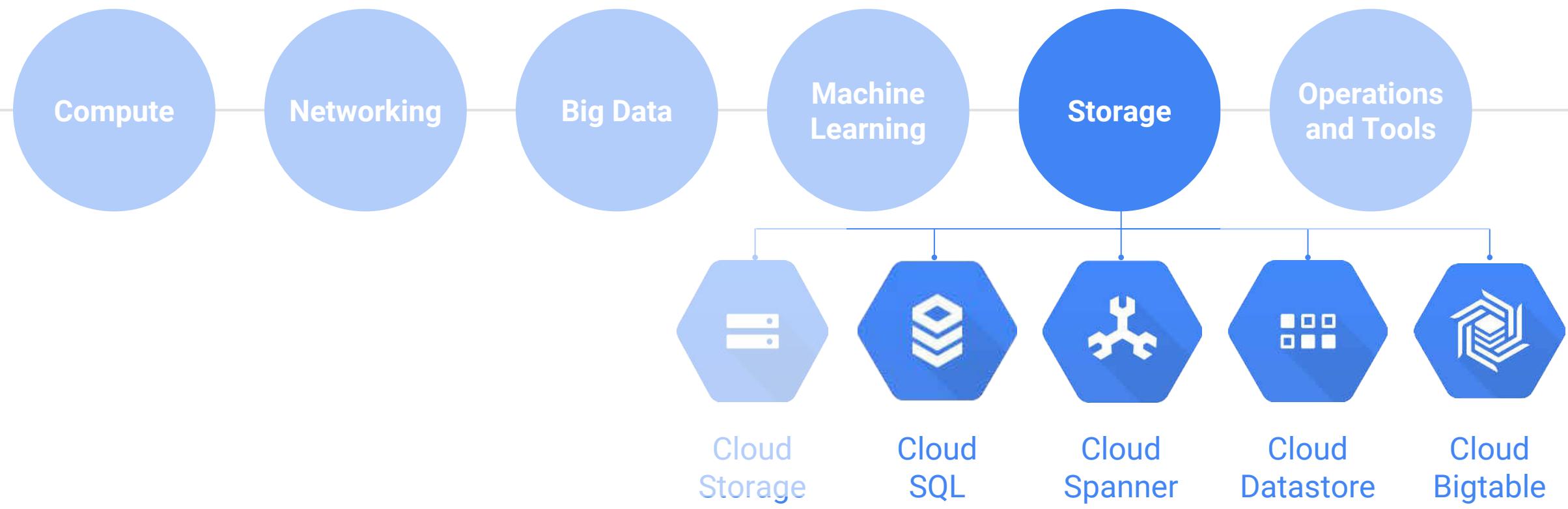
OF DATA

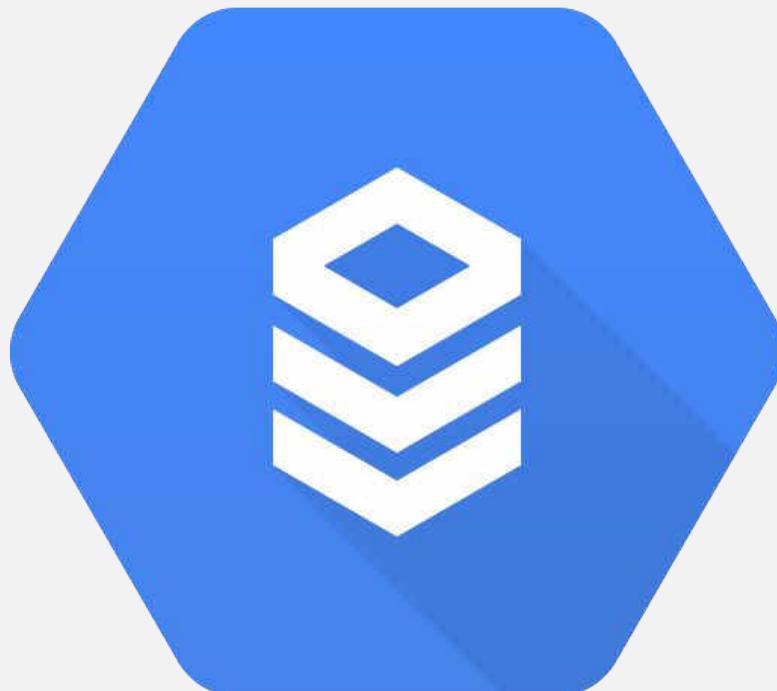
WHOLE GENOMES FROM
10,000

PEOPLE

Making MSSNG world's largest single repository of autism-related DNA sequencing data







Cloud SQL is a managed RDBMS

- Offers MySQL and PostgreSQL DBaaS
- Automatic data replication
- High Availability (failover)
- Managed backups and updates
- Vertical scaling (read and write)
- Horizontal scaling (read replicas)
- Google security

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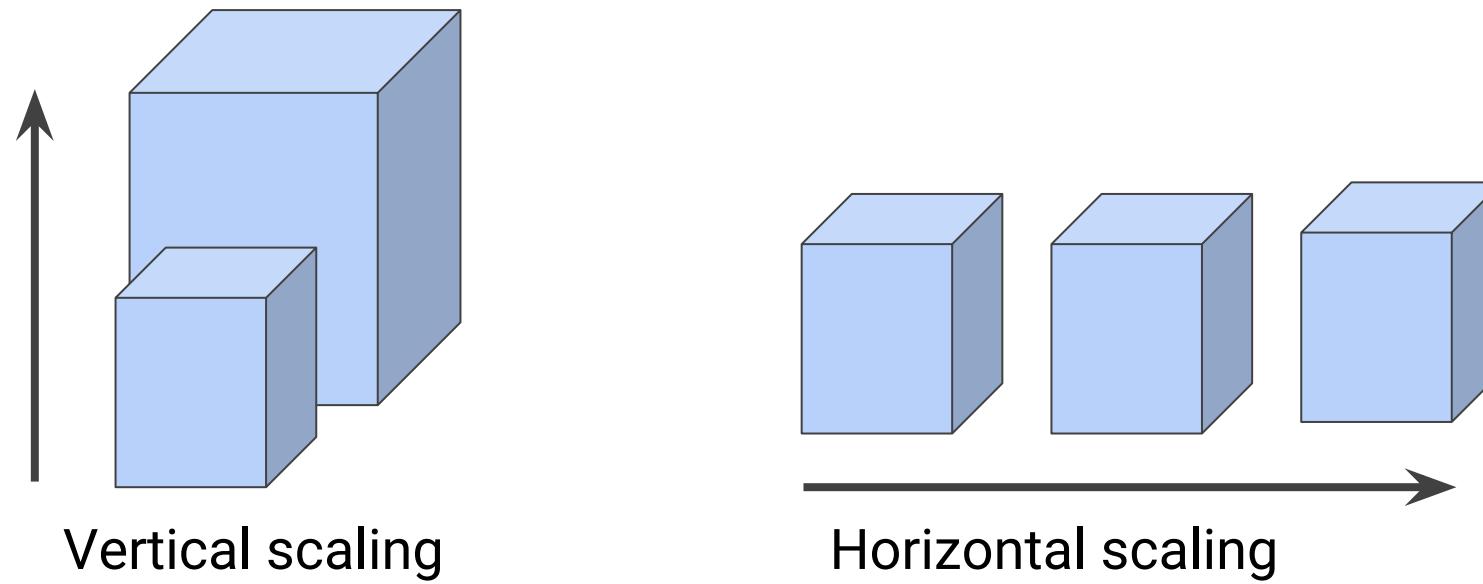
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Demo!

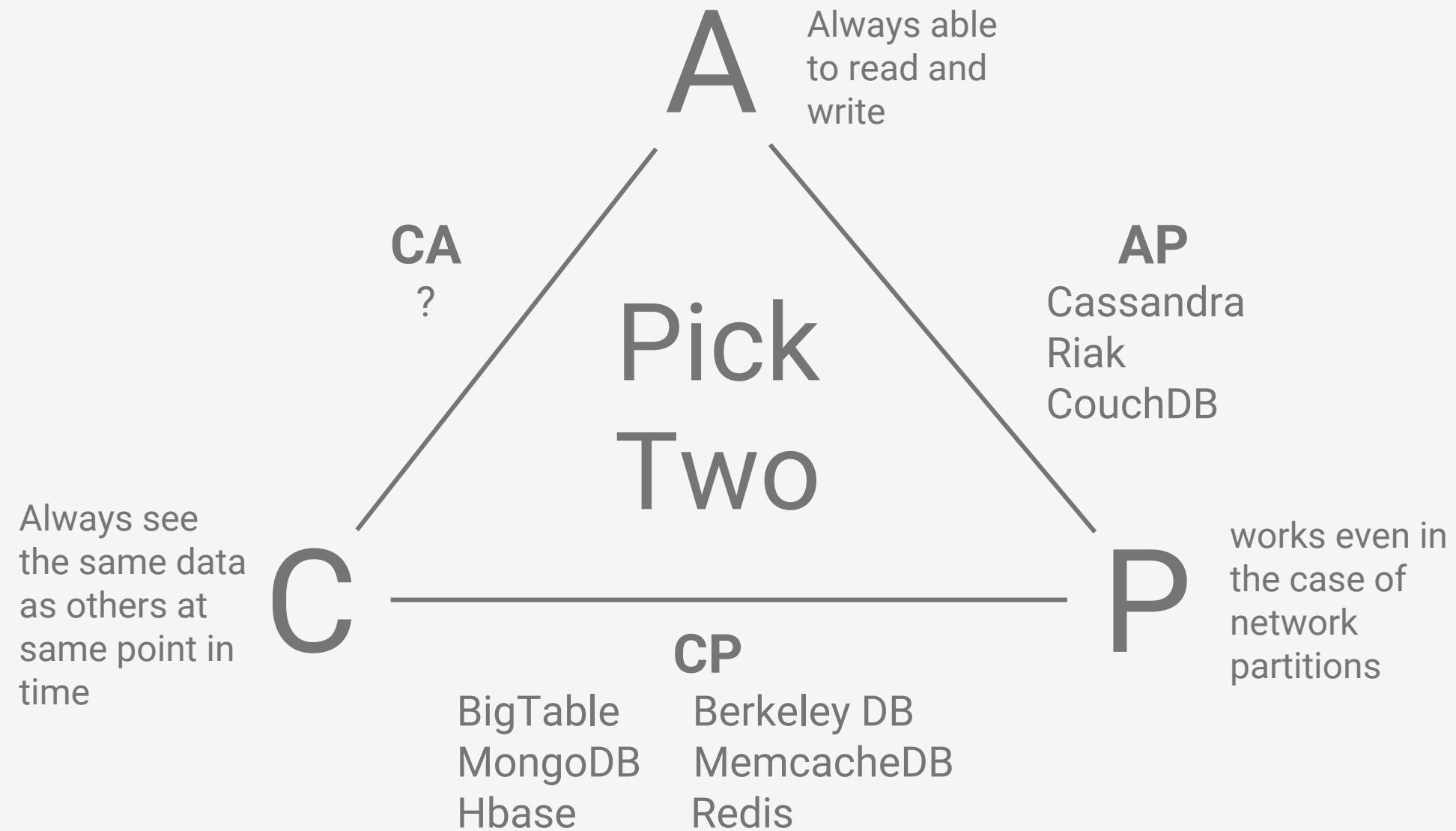
Let's create a SQL instance, configure its performance and setup a backup and replica!

How to grow the thumbnail service?



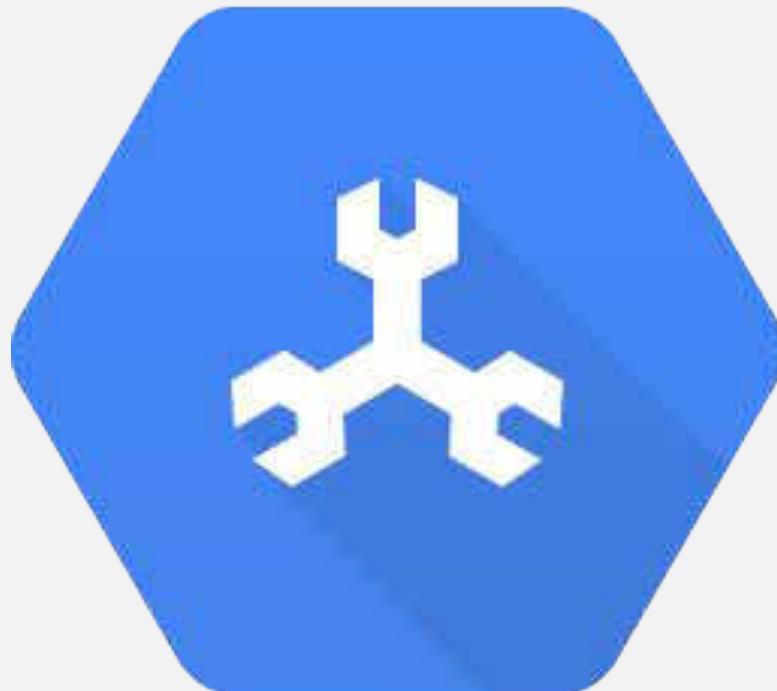


What about Spanner & the CAP Theorem



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Cloud Spanner is a horizontally scalable RDBMS



supports:

- Global synchronous replication
- Strong consistency
- Automatic data sharding
- Fully managed
- Scaling with no downtime
- SQL (ANSI 2011 with extensions)
- JDBC



Cloud Spanner

Google's mission-critical scalable relational Database Service



Fully managed DBaaS with horizontal scale and automated data sharding



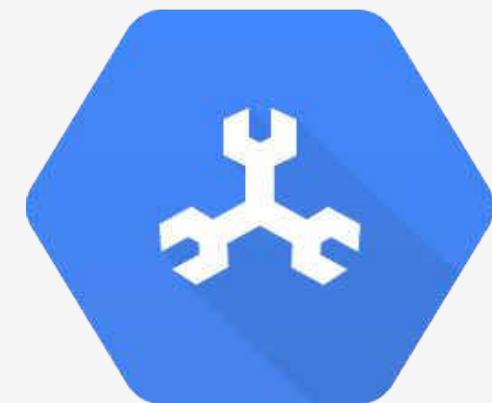
Traditional relational semantics and consistency model:
Schemas, **A**tomic **C**onsistent **I**solated **D**urable transactions, SQL



Automatic, **synchronous replication within and across regions** for availability



Battle-tested within Google for 5+ yrs (AdWords, Google Play), **now offered on Google Cloud**





Google Cloud Platform

GCP updates | June 6, 2017



STORAGE & DATABASES
Spinner
Cloud ~~Spanner~~ GA

The world's first horizontally scalable

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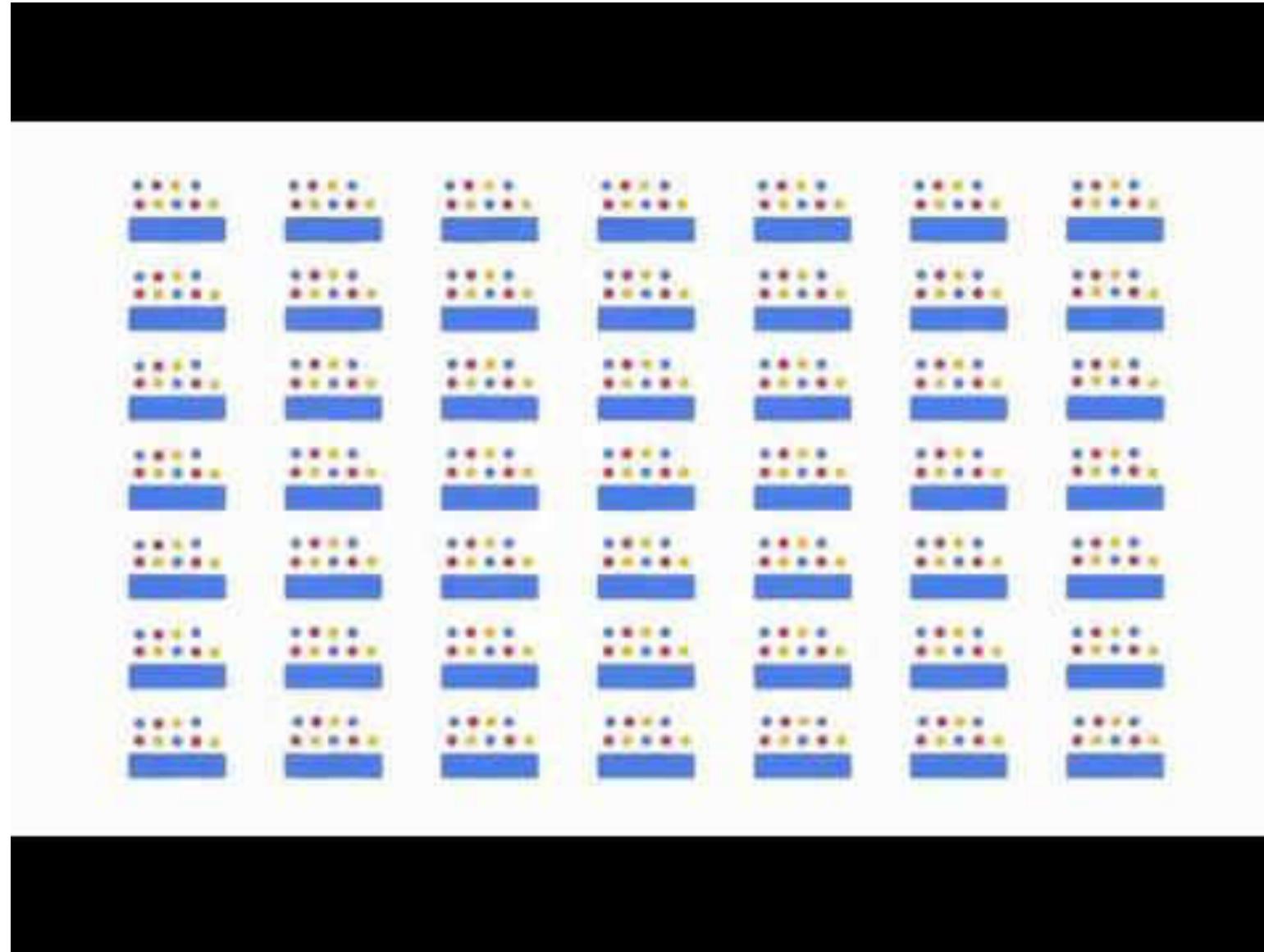
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Cloud Spanner

Google's mission-critical scalable relational Database Service



Fully managed DBaaS with horizontal scale and automated data sharding



Traditional relational semantics and consistency model:
Schemas, **A**tomic **C**onsistent **I**solated **D**urable transactions, SQL



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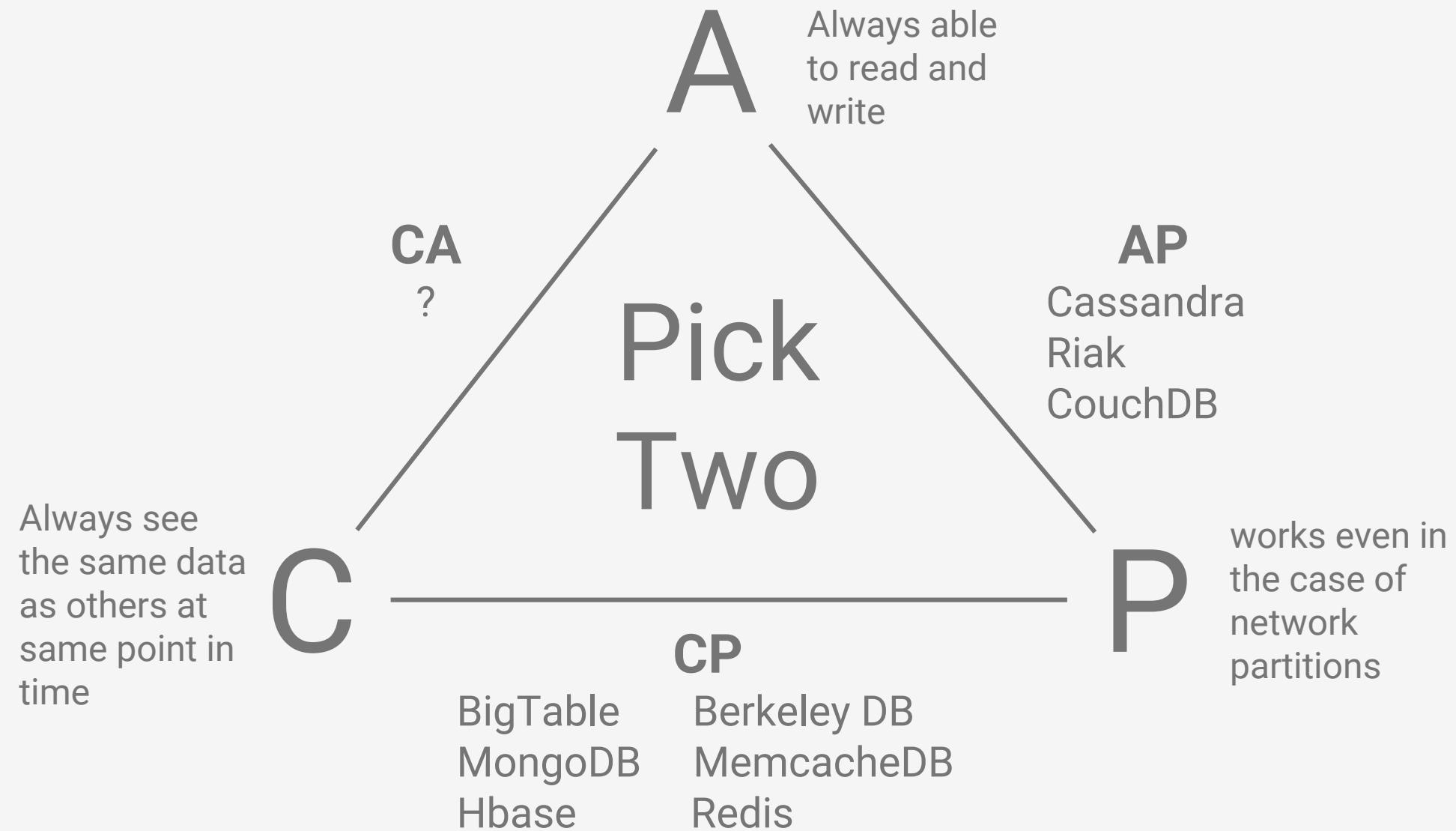
From Alpha/Beta to GA

- Standard SQL (ANSI 2011, BigQuery dialect)
- Monitoring, Audit logging, IAM
- Client libraries in popular languages (Java, Python, Go, Node.js, etc.)
- JDBC driver (read-only)
- Multi-region, finally!**





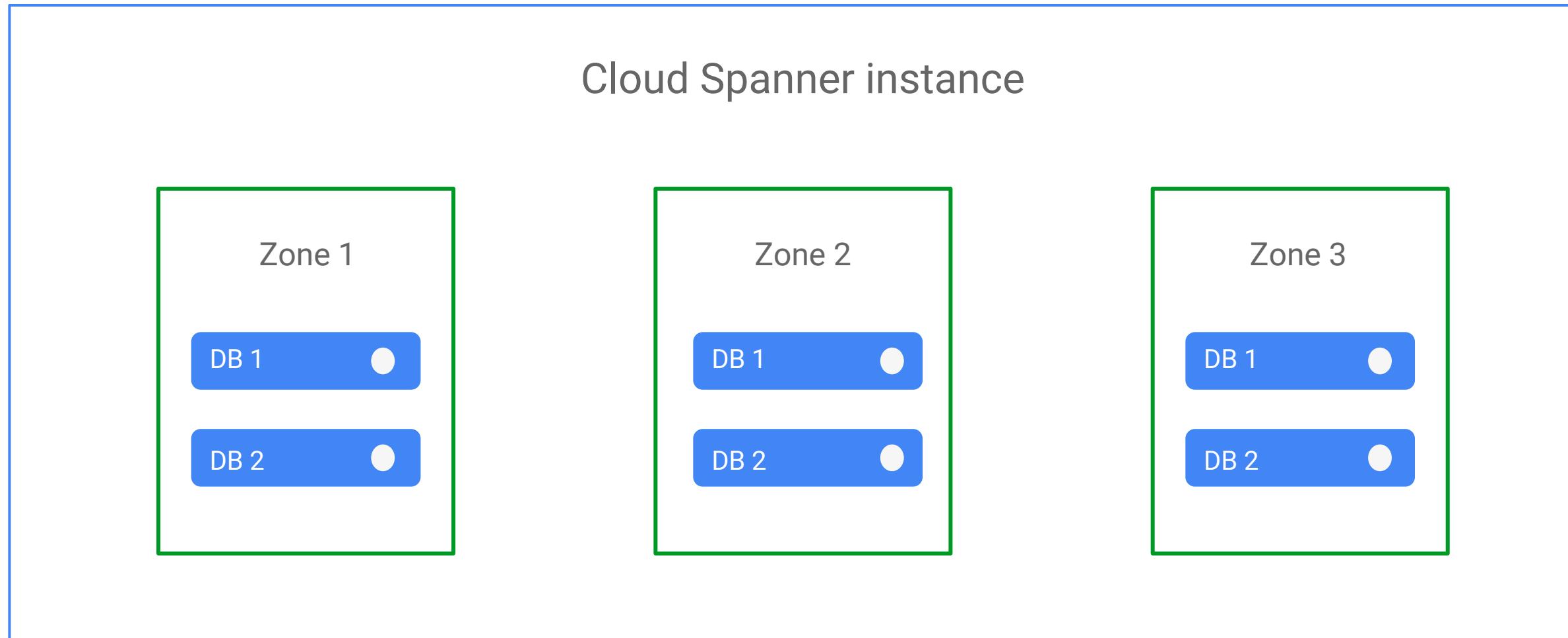
What about Spanner & the CAP Theorem



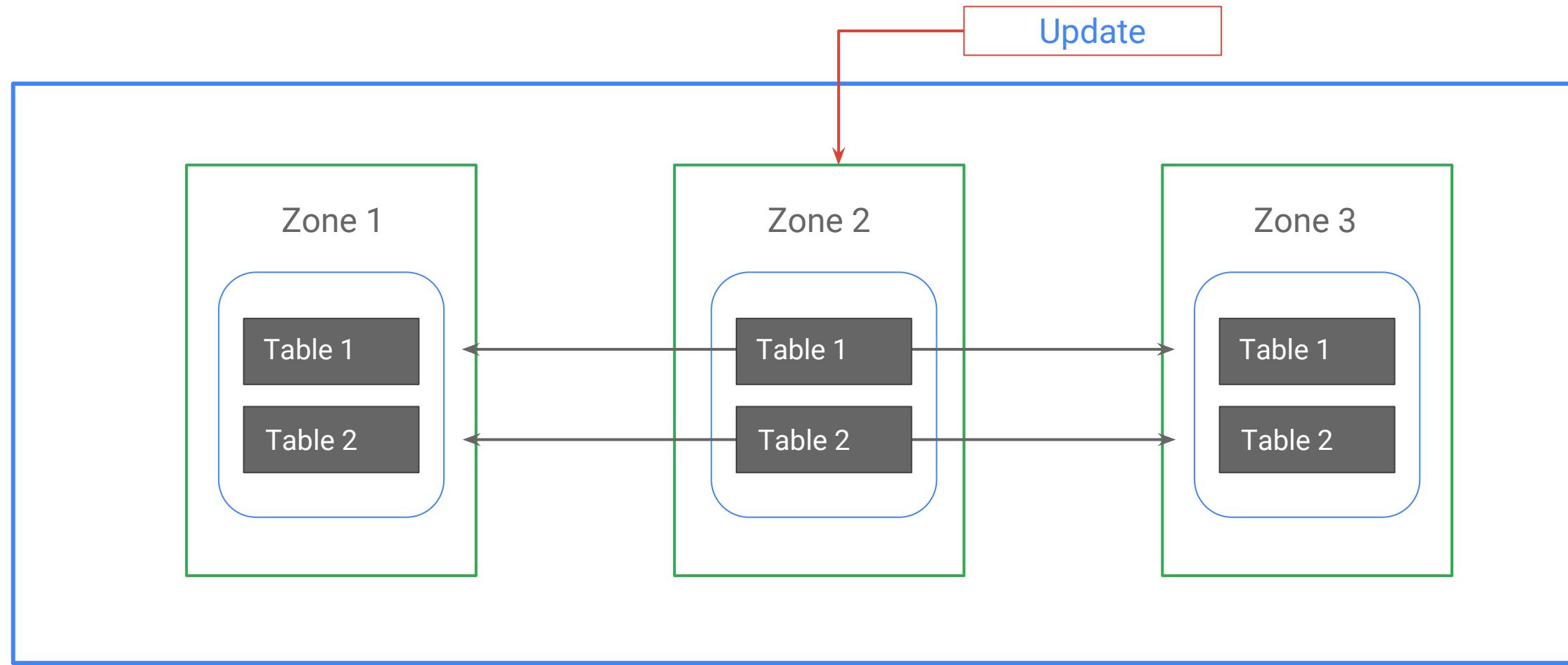


	CLOUD SPANNER	TRADITIONAL RELATIONAL	TRADITIONAL NON-RELATIONAL
Schema	✓ Yes	✓ Yes	✗ No
SQL	✓ Yes	✓ Yes	✗ No
Consistency	✓ Strong	✓ Strong	✗ Eventual
Availability	✓ High	✗ Failover	✓ High
Scalability	✓ Horizontal	✗ Vertical	✓ Horizontal
Replication	✓ Automatic	⟳ Configurable	⟳ Configurable

Architecture



Data replication





Cloud Spanner makes it simple

	Cloud Spanner	Traditional Relational	Traditional Non-relational
Schema	✓ Yes	✓ Yes	✗ No
SQL	✓ Yes	✓ Yes	✗ No
Consistency	✓ Strong	✓ Strong	✗ Eventual
Availability	✓ High	✗ Failover	✓ High
Scalability	✓ Horizontal	✗ Vertical	✓ Horizontal
Replication	✓ Automatic	⌚ Configurable	⌚ Configurable



Cloud Bigtable is managed NoSQL

- Fully managed NoSQL, wide-column database service for terabyte applications
- Integrated
 - Accessed using HBase API
 - Native compatibility with big data, Hadoop ecosystems

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Why choose Cloud Bigtable?

- Replicated storage
- Data encryption in-flight and at rest
- Role-based ACLs
- High throughput writes, low latency reads
- Drives major applications such as Google Analytics and Gmail

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Bigtable Access Patterns

Application API

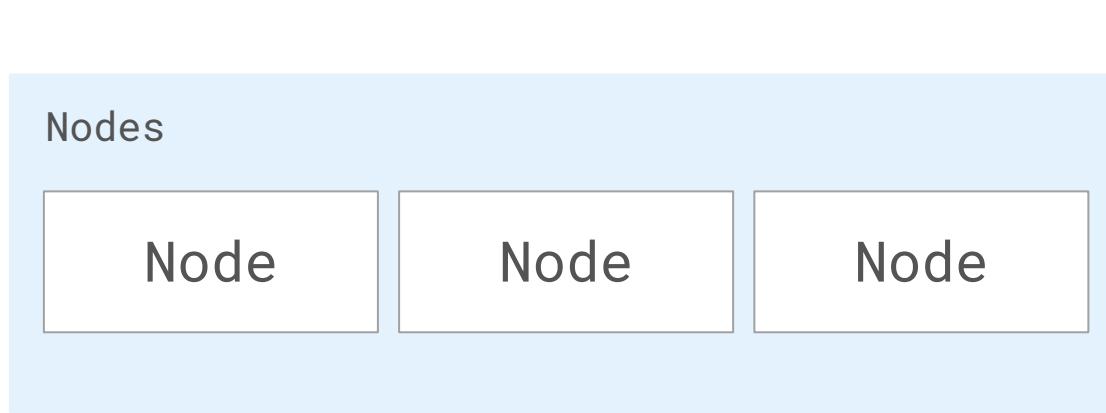
Data can be read from and written to Cloud Bigtable through a data service layer like Managed VMs, the HBase REST Server, or a Java Server using the HBase client. Typically this will be to serve data to applications, dashboards, and data services.

Streaming

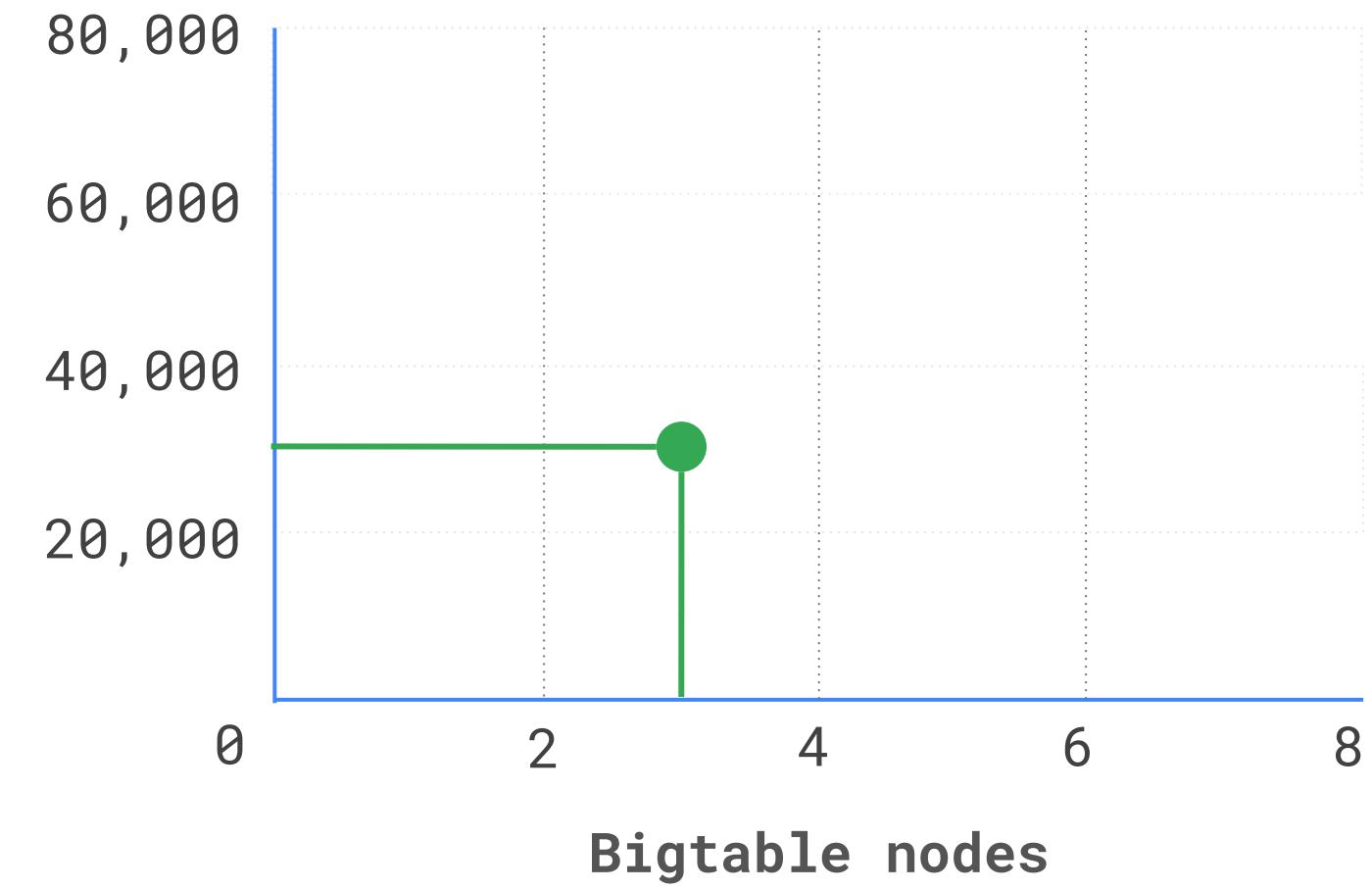
Data can be streamed in (written event by event) through a variety of popular stream processing frameworks like Cloud Dataflow Streaming, Spark Streaming, and Storm.

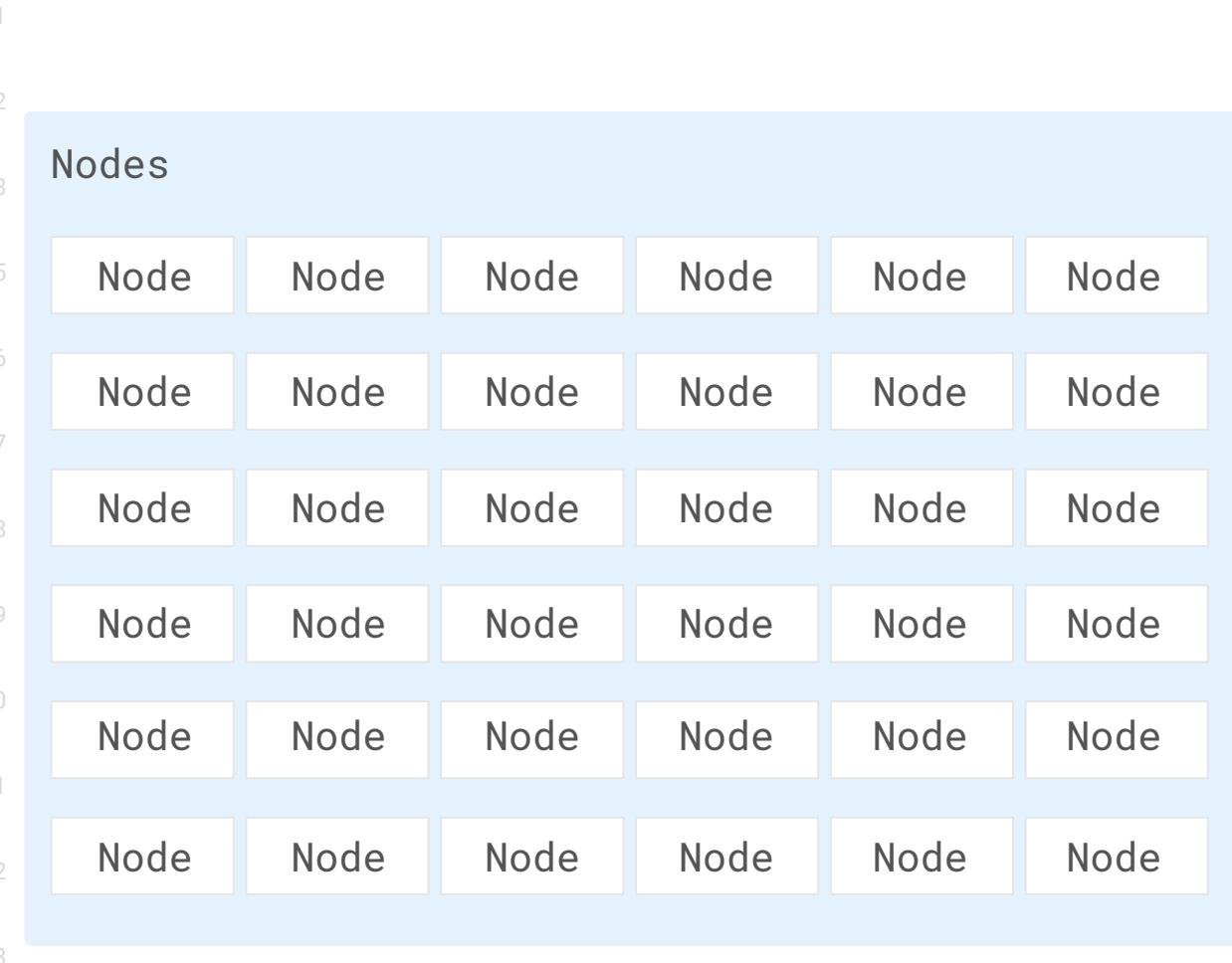
Batch Processing

Data can be read from and written to Cloud Bigtable through batch processes like Hadoop MapReduce, Dataflow, or Spark. Often, summarized or newly calculated data is written back to Cloud Bigtable or to a downstream database.

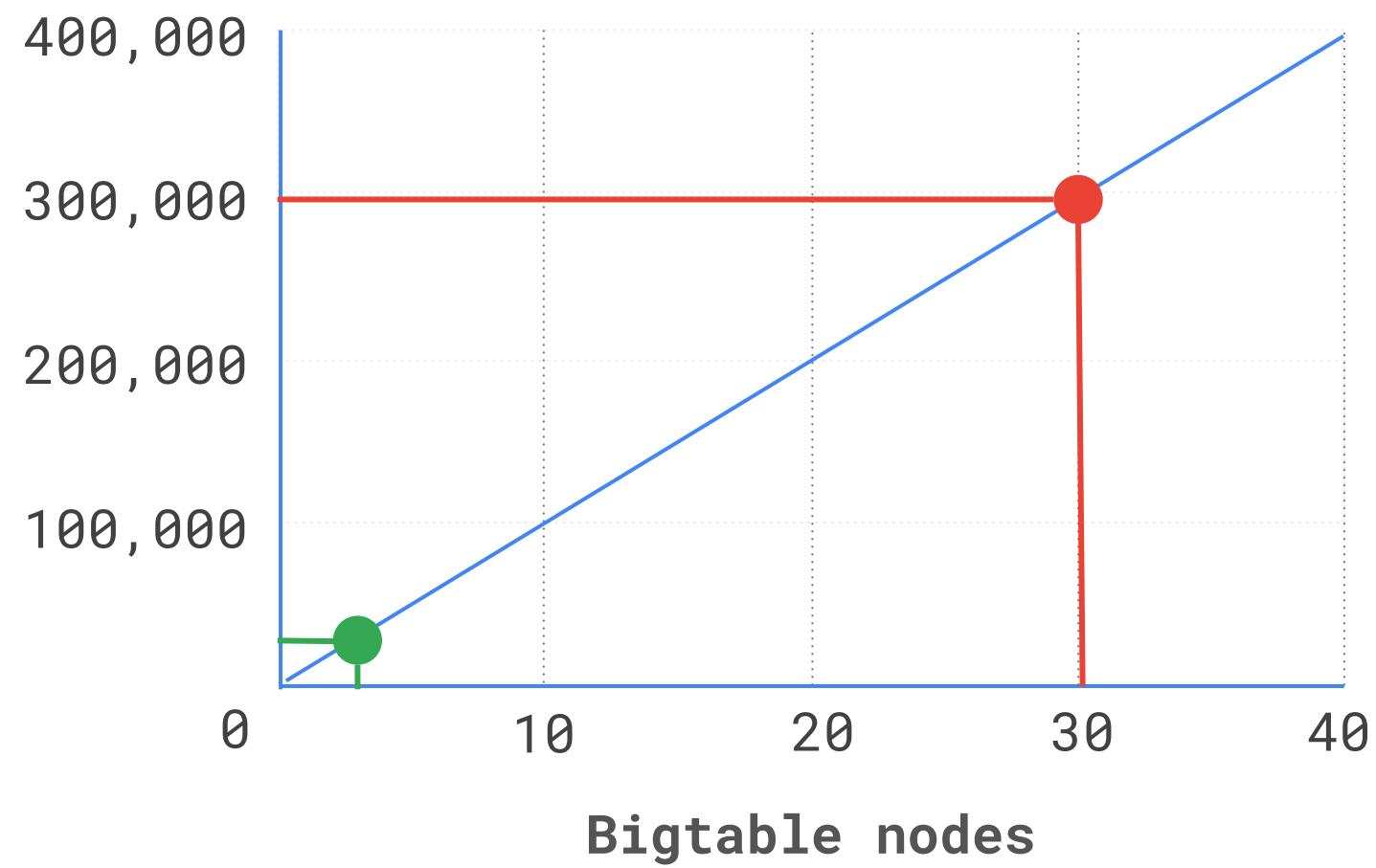


QPS

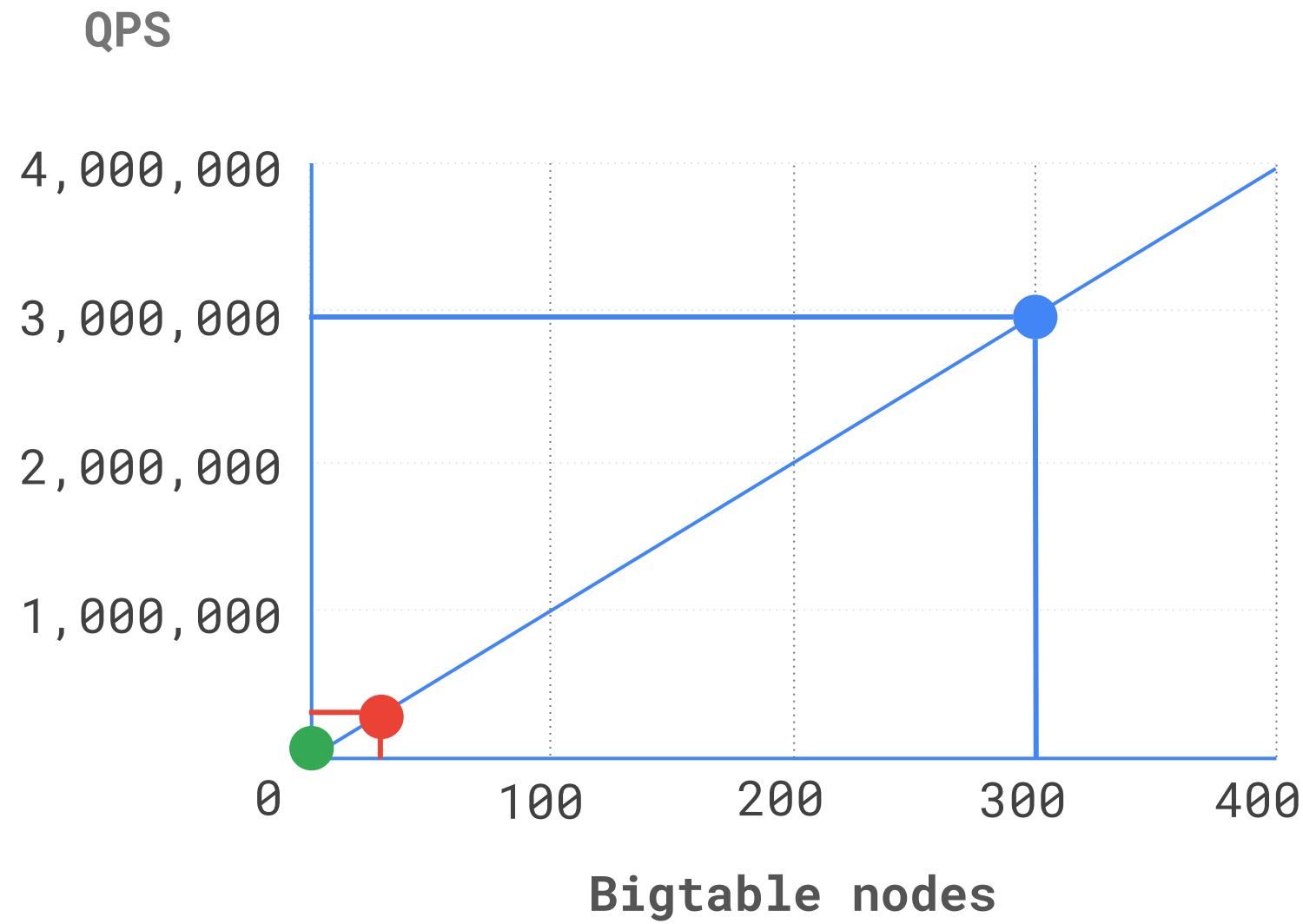




QPS



Nodes



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Clients

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LB / proxy

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Processing

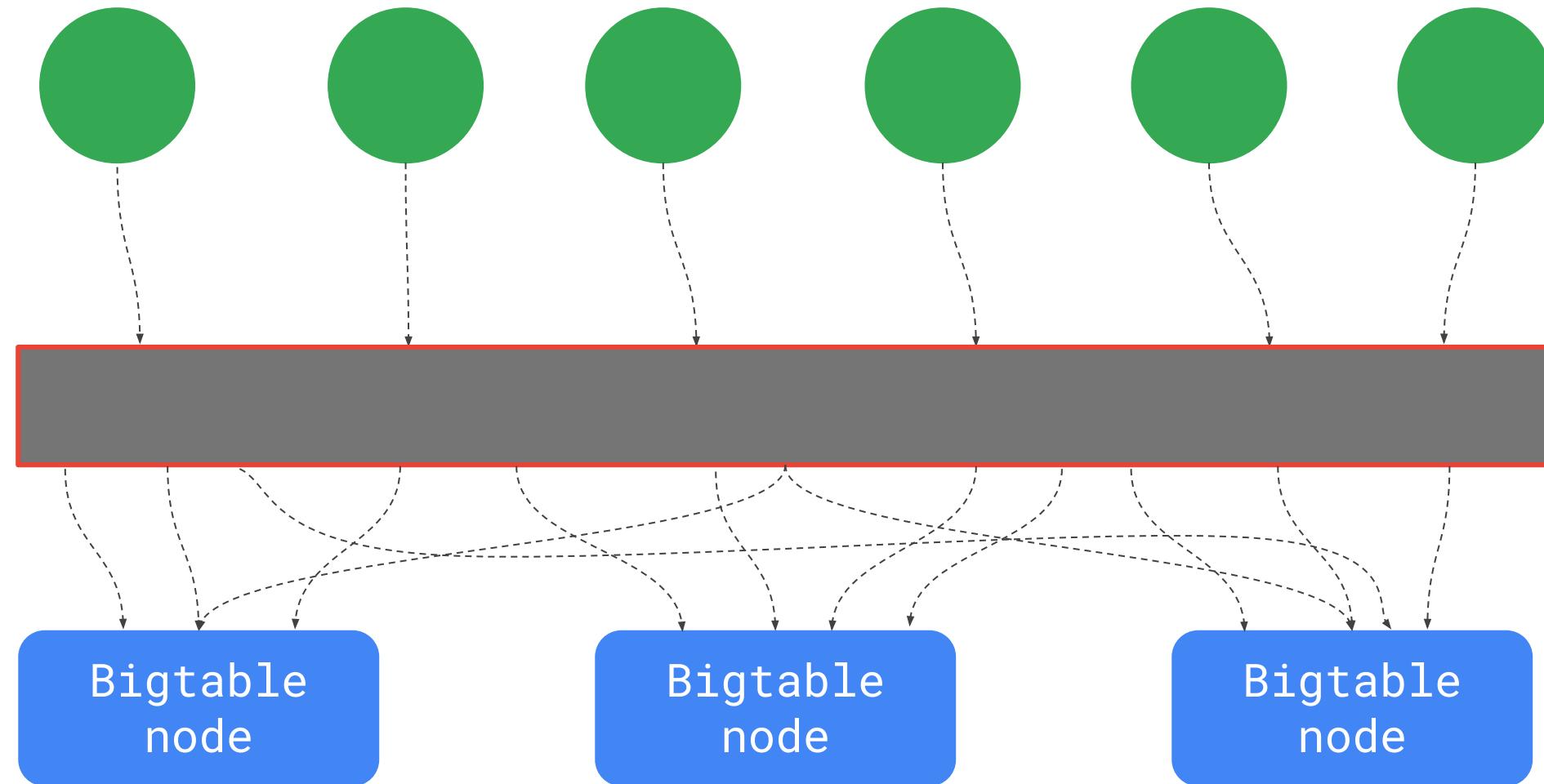
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**Bigtable
node**

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**Bigtable
node**

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**Bigtable
node**

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Storage

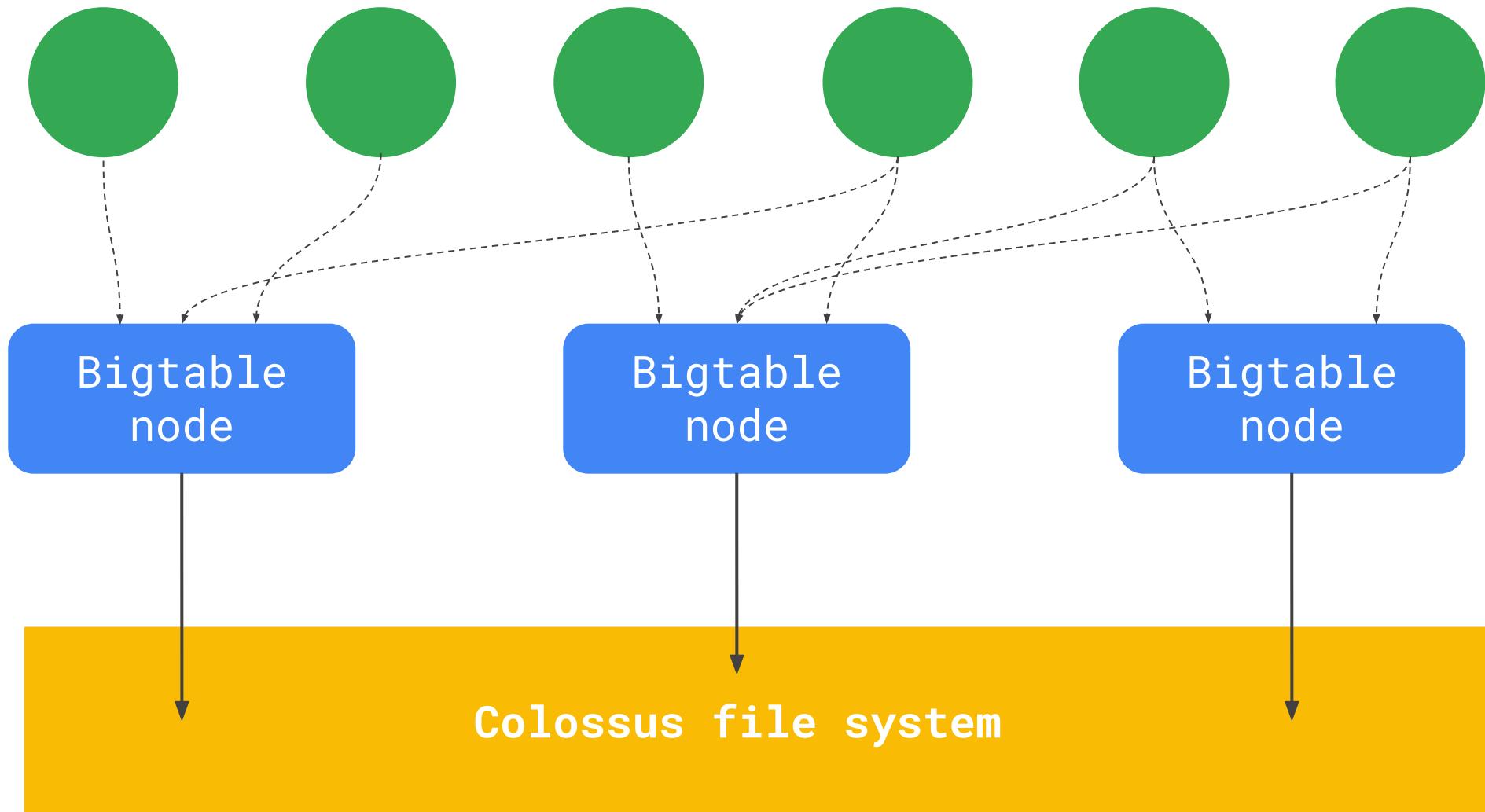
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Colossus file system

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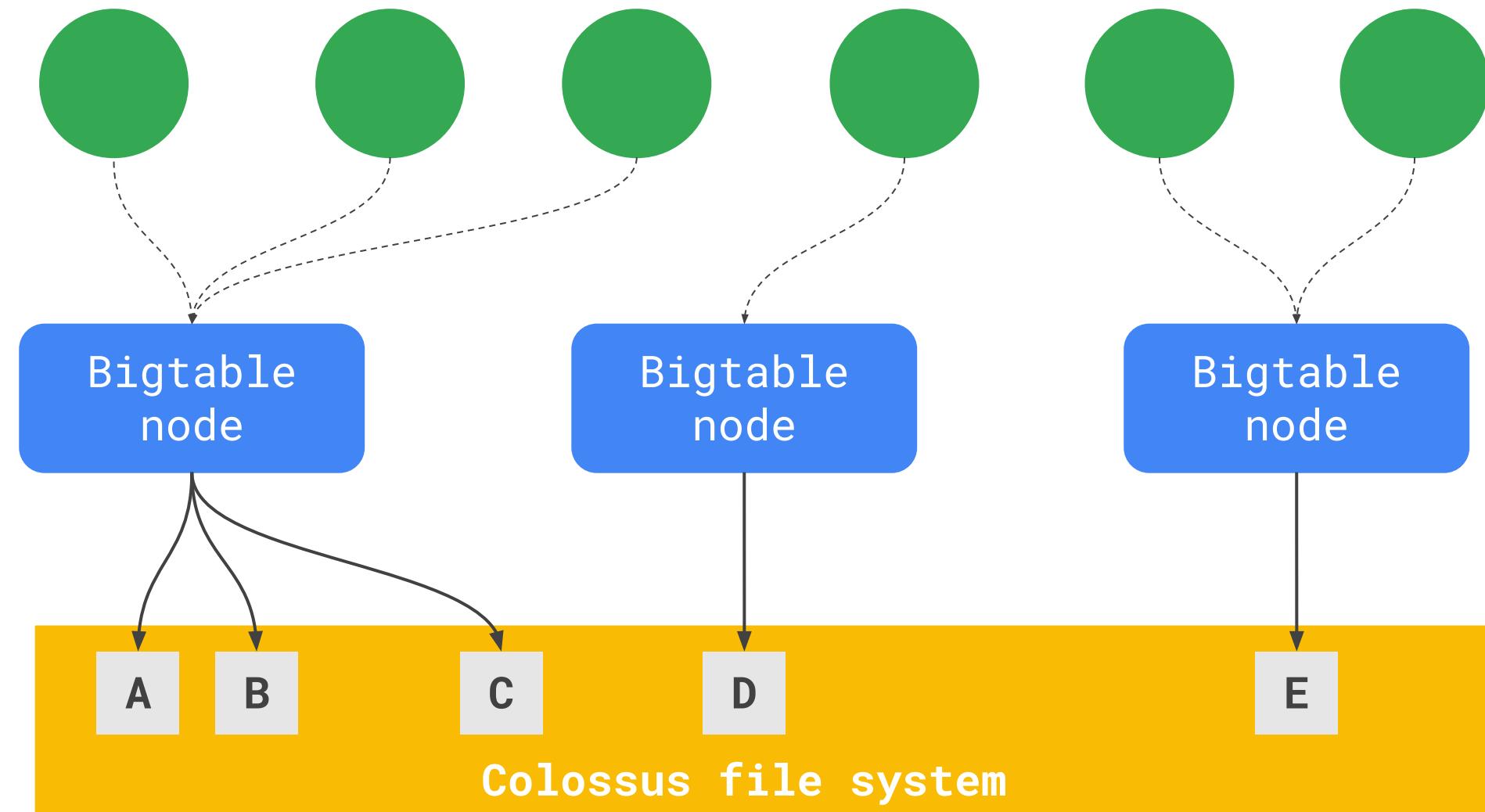
Storage

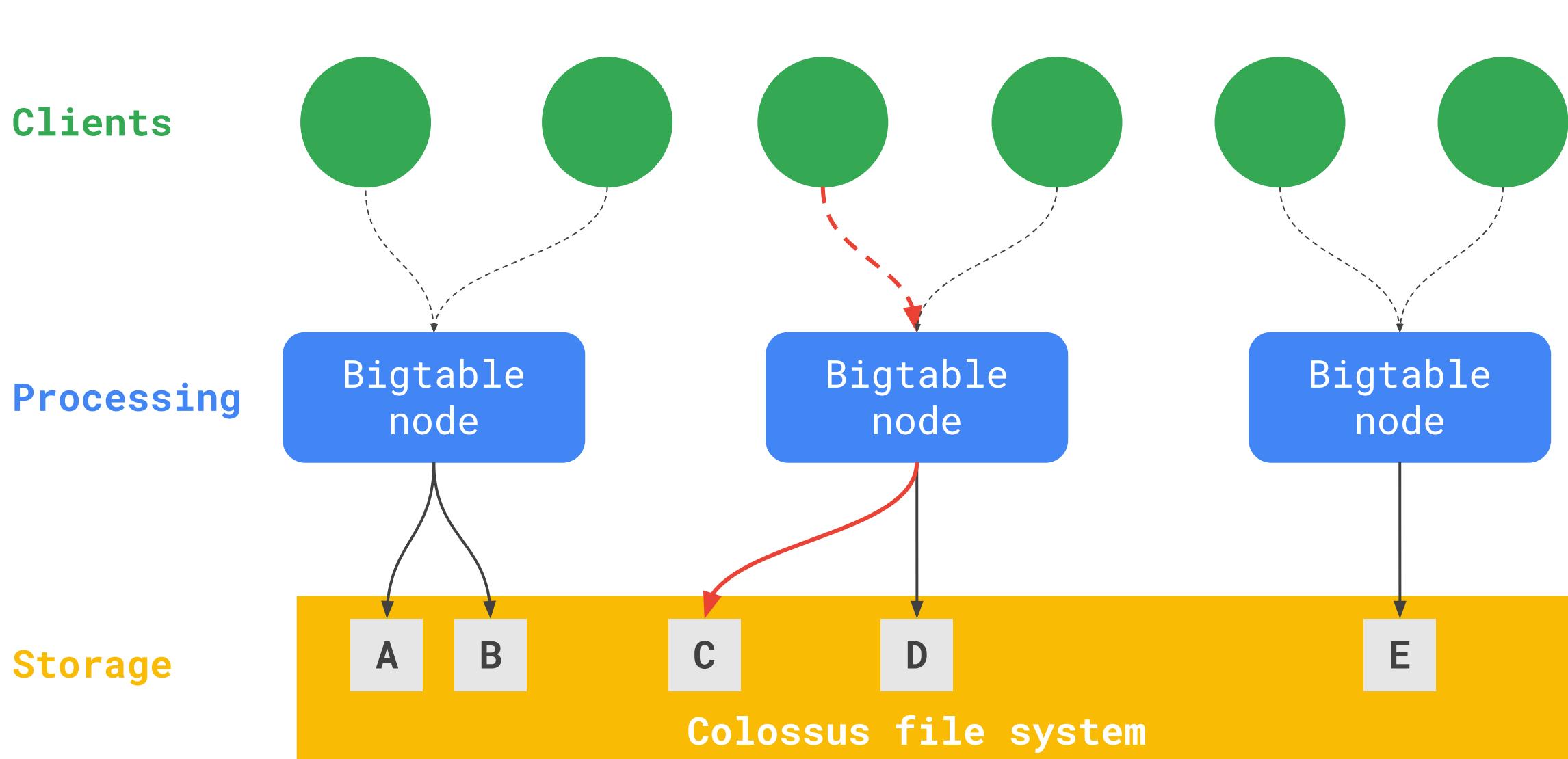
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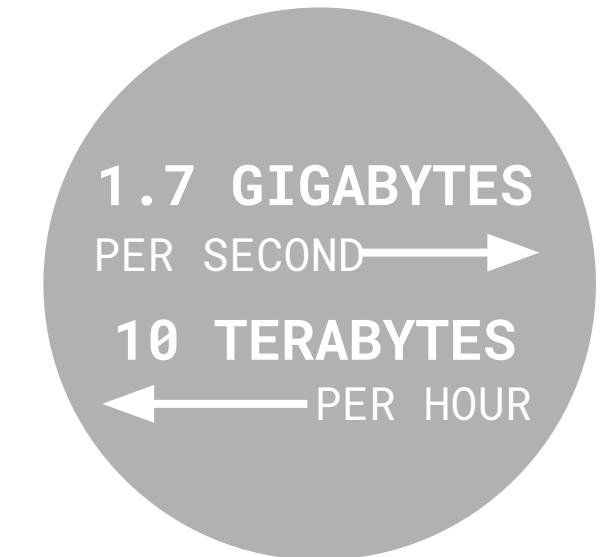
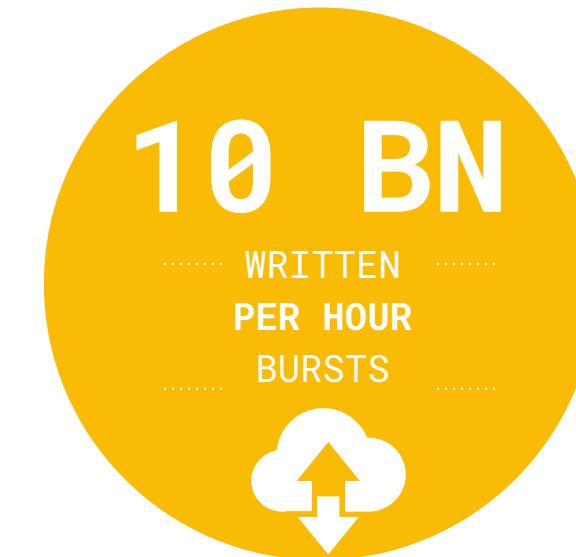
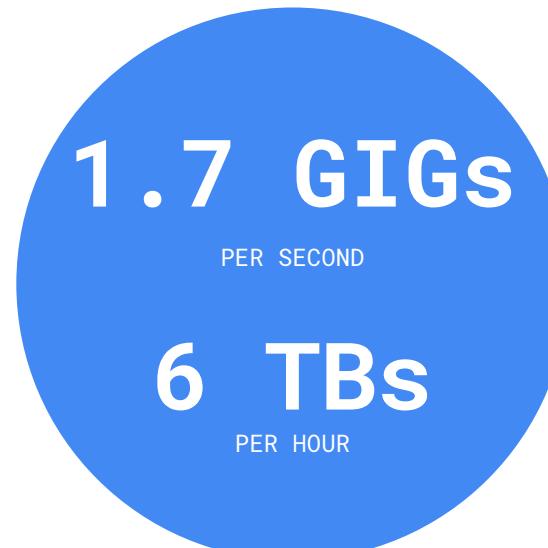
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3 FIS was able to improve reliability and scalability
5 on a massive data-processing challenge



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16 The Consolidated Audit Trail (CAT) is a data repository of all equities and options
17 orders, quotes, and events; FIS processed the CAT to organize 100 billion market events
into an "order lifecycle" in a 4-hour window using Cloud Bigtable.

Agenda

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2 Cloud Storage

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4 Cloud Bigtable

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6 Cloud SQL and Cloud Spanner

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8 Cloud Datastore

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10 Comparing storage options

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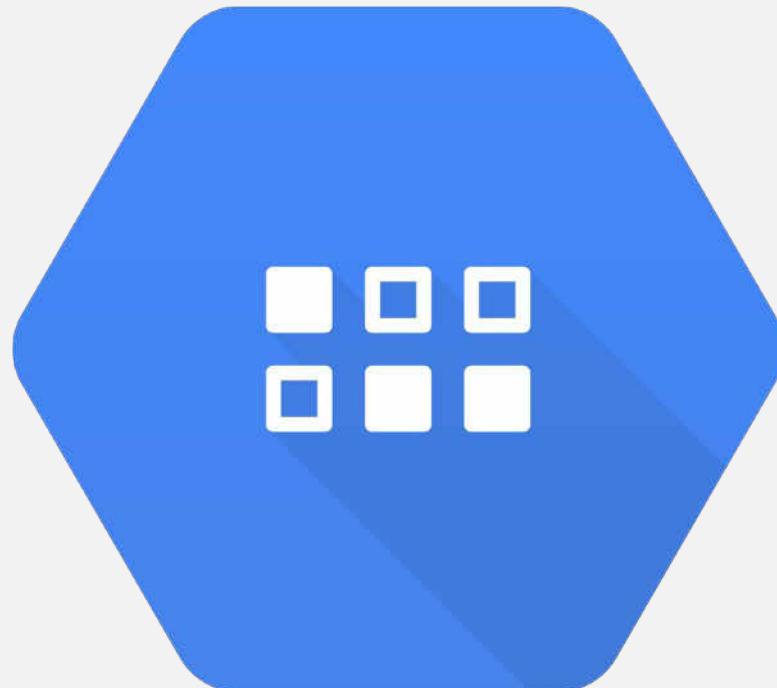
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Cloud Datastore is a horizontally scalable NoSQL DB

NoSQL designed for application backends

- Fully managed
 - Uses a distributed architecture to automatically manage scaling
- Built-in redundancy
- Supports ACID transactions

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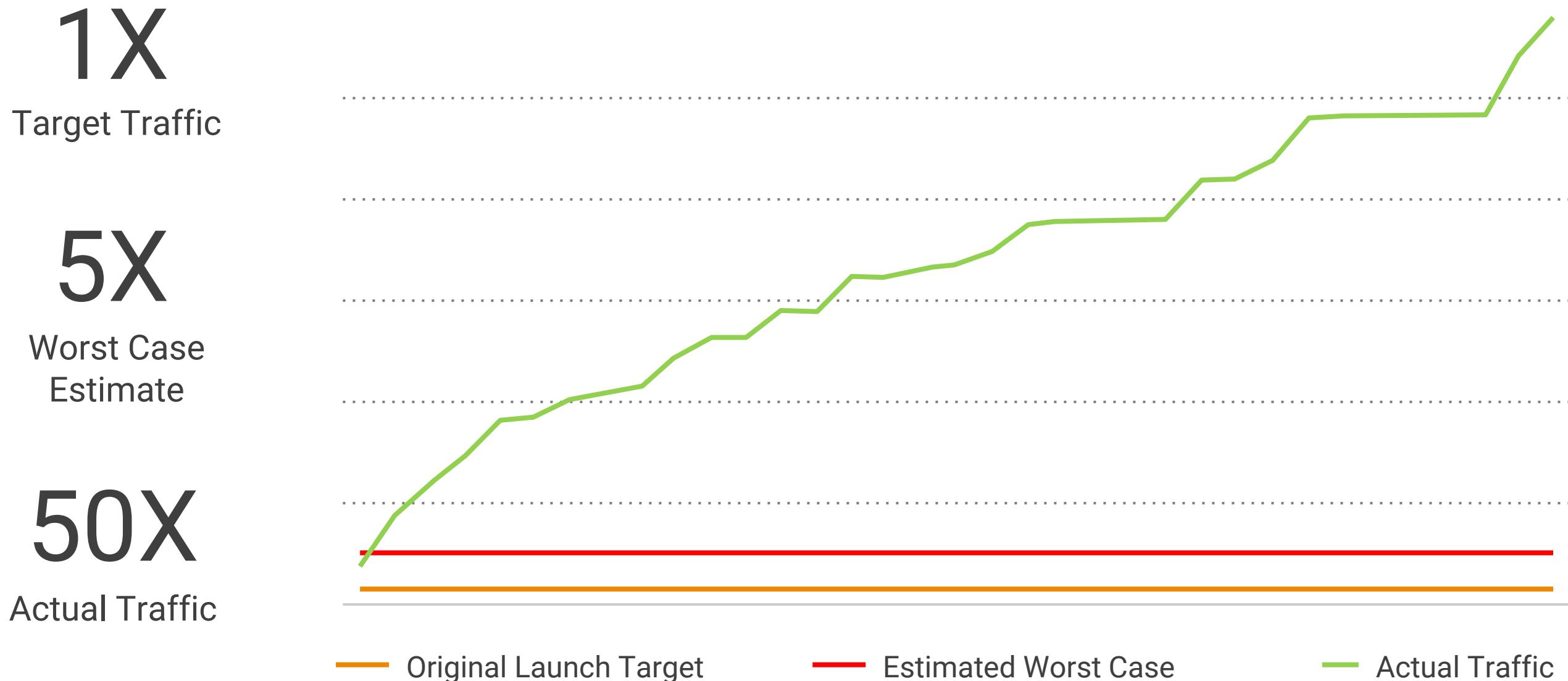
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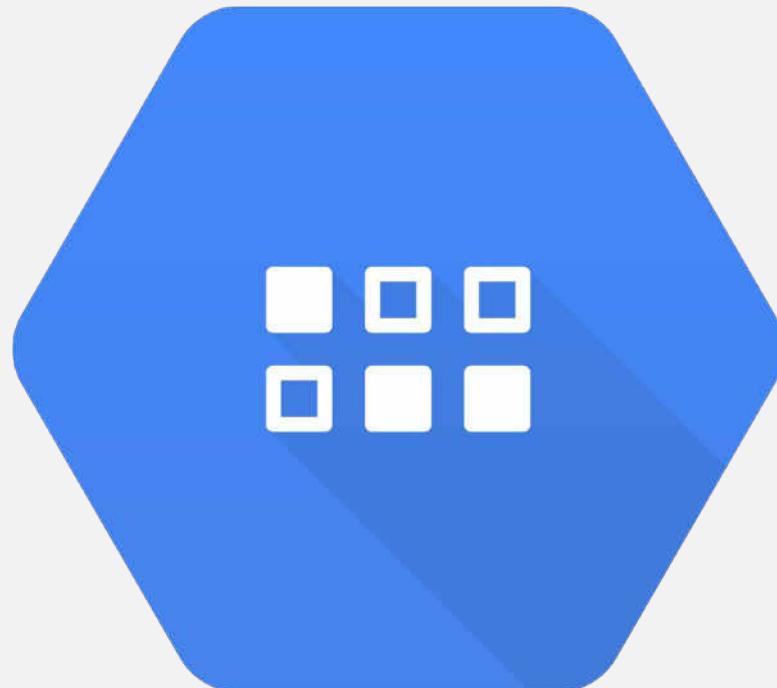
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Pokemon Go Datastore Transactions Per Second

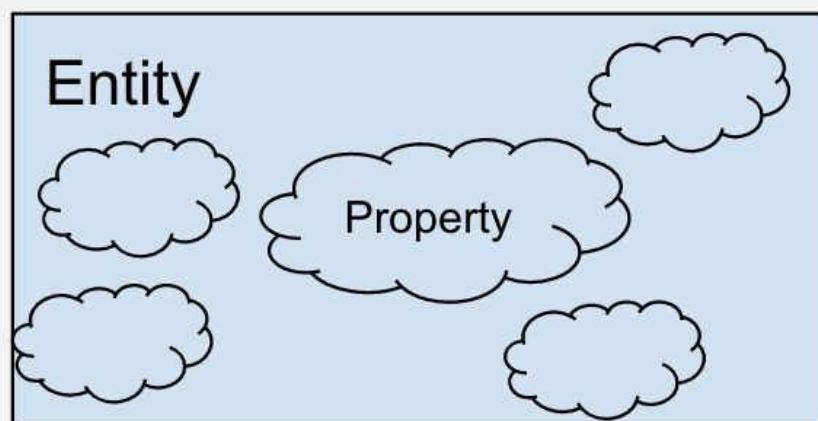
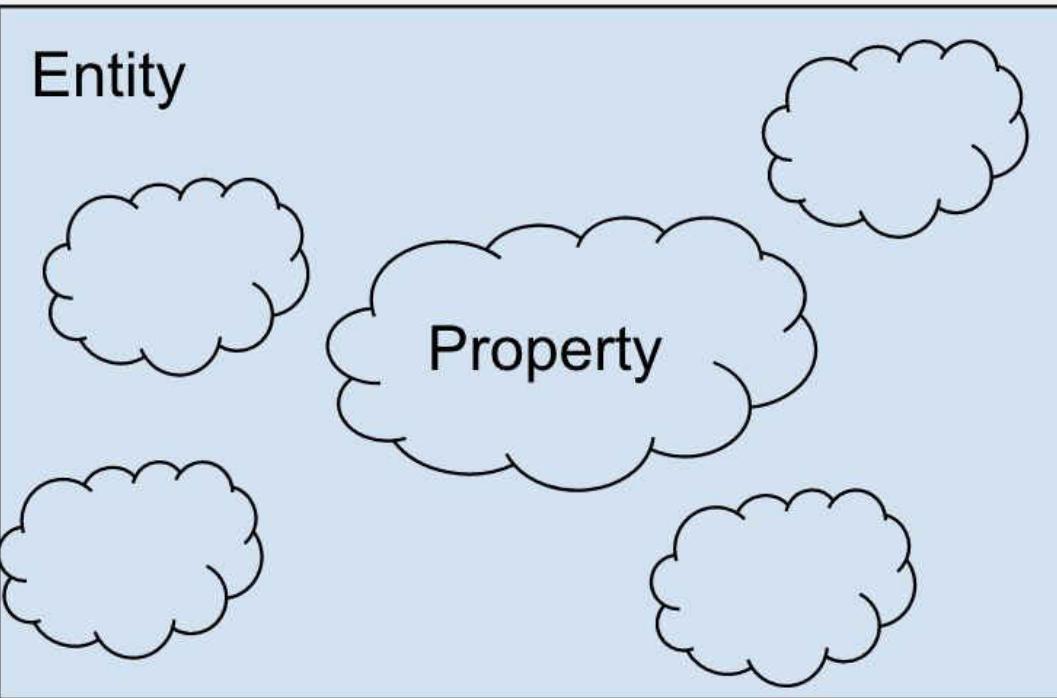




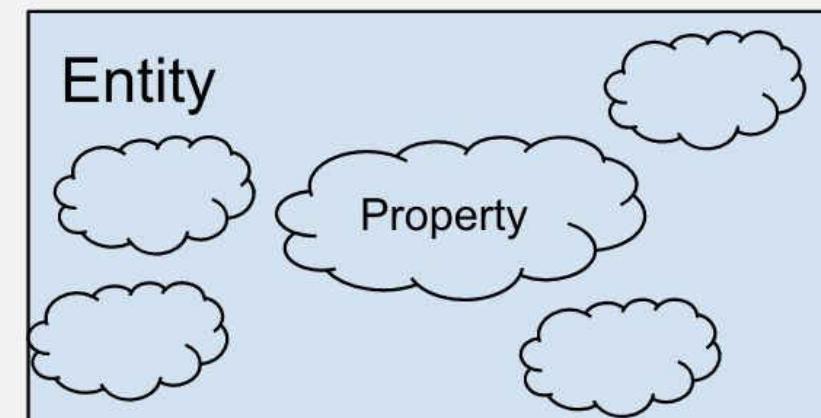
Google Cloud Datastore: benefits

- Schemaless access
 - No need to think about underlying data structure
- Local development tools
- Includes a free daily quota
- Access from anywhere through a RESTful interface

Kind



Concept	Cloud Datastore	Relational database
Category of object	Kind	Table
One object	Entity	Row
Individual data for an object	Property	Field
Unique ID for an object	Key	Primary key



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Comparing storage options: technical details

	Cloud Datastore	Bigtable	Cloud Storage	Cloud SQL	Cloud Spanner	BigQuery
Type	NoSQL document	NoSQL wide column	Blobstore	Relational SQL for OLTP	Relational SQL for OLTP	Relational SQL for OLAP
Transactions	Yes	Single-row	No	Yes	Yes	No
Complex queries	No	No	No	Yes	Yes	Yes
Capacity	Terabytes+	Petabytes+	Petabytes+	500 GB	Petabytes	Petabytes+
Unit size	1 MB/entity	~10 MB/cell ~100 MB/row	5 TB/object	Determined by DB engine	10,240 MiB/row	10 MB/row

Comparing storage options: use cases

	Cloud Datastore	Bigtable	Cloud Storage	Cloud SQL	Cloud Spanner	BigQuery
Type	NoSQL document	NoSQL wide column	Blobstore	Relational SQL for OLTP	Relational SQL for OLTP	Relational SQL for OLAP
Best for	Getting started, App Engine applications	“Flat” data, Heavy read/write, events, analytical data	Structured and unstructured binary or object data	Web frameworks, existing applications	Large-scale database applications (> ~2 TB)	Interactive querying, offline analytics
Use cases	Getting started, App Engine applications	AdTech, Financial and IoT data	Images, large media files, backups	User credentials, customer orders	Whenever high I/O, global consistency is needed	Data warehousing

Choosing where to store data on GCP

unstructured



Cloud Storage

structured

Transactional workload

SQL

No-SQL

Cloud SQL



One database enough

Cloud Spanner



Horizontal scalability

Data analytics workload

Millisecond Latency



Cloud Bigtable

Latency in seconds



BigQuery

Cloud Datastore

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6 <Coffee>  
7 |  
8 | <ol>  
9 | | <li> [BREAK]  
10| | [30 MINUTES]  
11| </ol>  
12</Coffee>  
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Cloud OnBoard

- The countdown begins: Get ready to Build What's Next with Google Cloud Platform

Loading: 1:26



Share your experience with #GoogleCloudOnBoard

/Cloud OnBoard



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Developing, Deploying, and Monitoring in the Cloud

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GCP Fundamentals: Core Infrastructure

10 V4.0

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</Cloud OnBoard>

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Development in the cloud

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Deployment: Infrastructure as code

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Monitoring: Proactive instrumentation

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Deployment Manager



- Infrastructure management service
- Create a .yaml template describing your environment and use Deployment Manager to create resources
- Provides repeatable deployments

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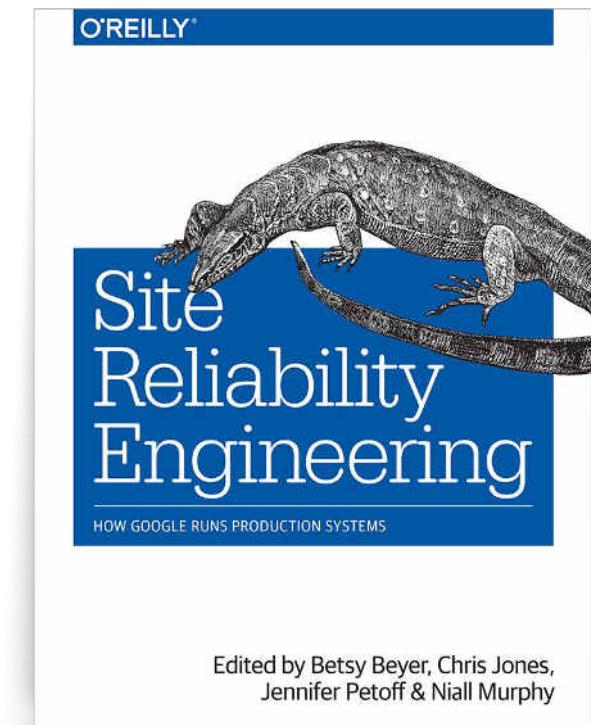
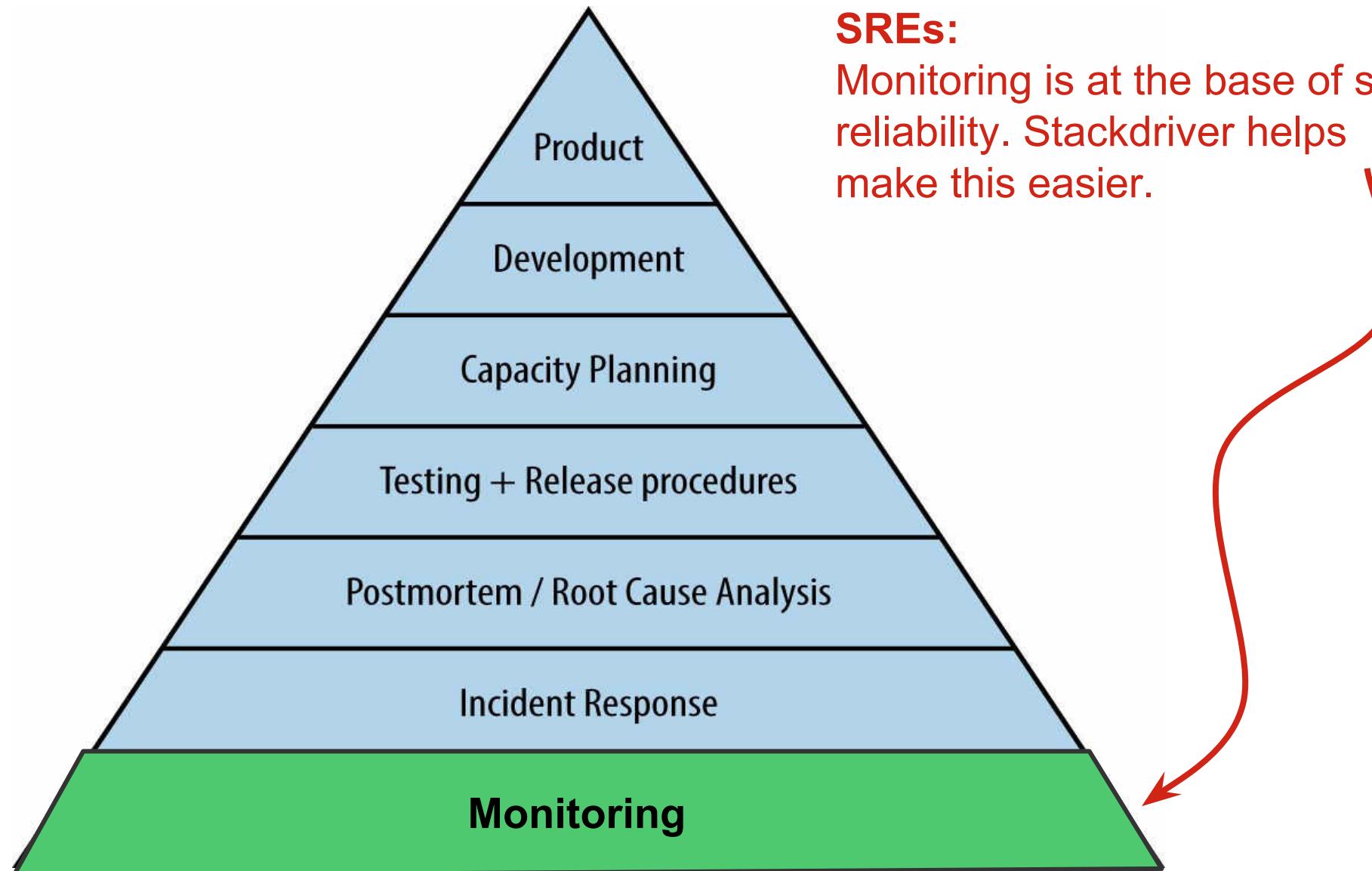
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Site reliability





Stackdriver



Monitoring



Logging



Debug



Error Reporting



Trace

Google Cloud



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5 Stackdriver offers capabilities in five areas
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Error dashboard

Debug applications

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Big Data and Machine Learning in the Cloud

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GCP Fundamentals: Core Infrastructure

v4.0

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</Cloud OnBoard>

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Glen Murphy
Designer

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Agenda

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Big Data

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Machine Learning

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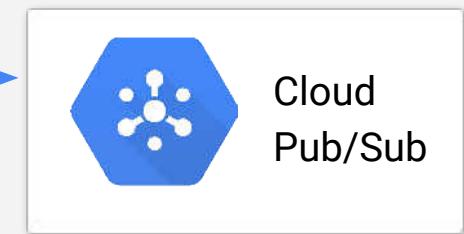
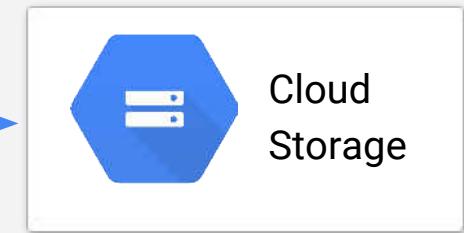
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GCP Data Pipelines - ingest



*Raw logs,
database
extracts, etc.*

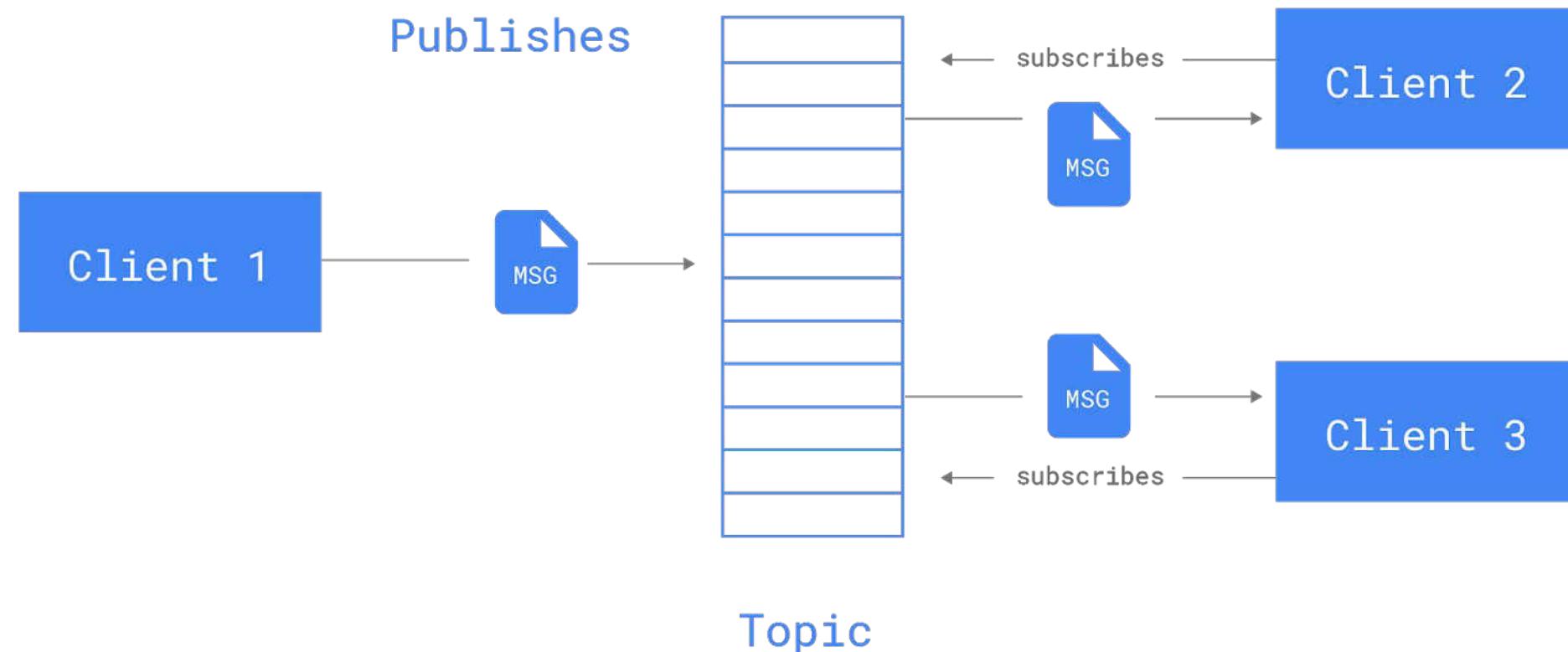


What is Pub / Sub?



- ✓ Scalable & reliable messaging system
- ✓ Act as a buffer between sending and receiving applications
- ✓ Based on proven Google technology (Gmail, etc...)

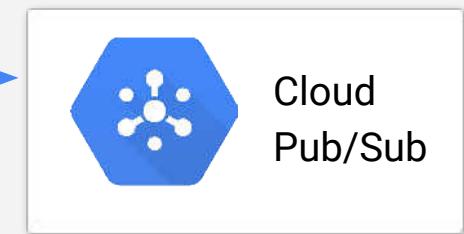
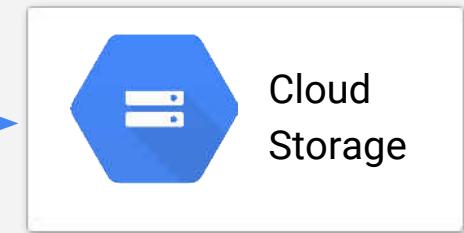
Pub / Sub



GCP Data Pipelines - ingest

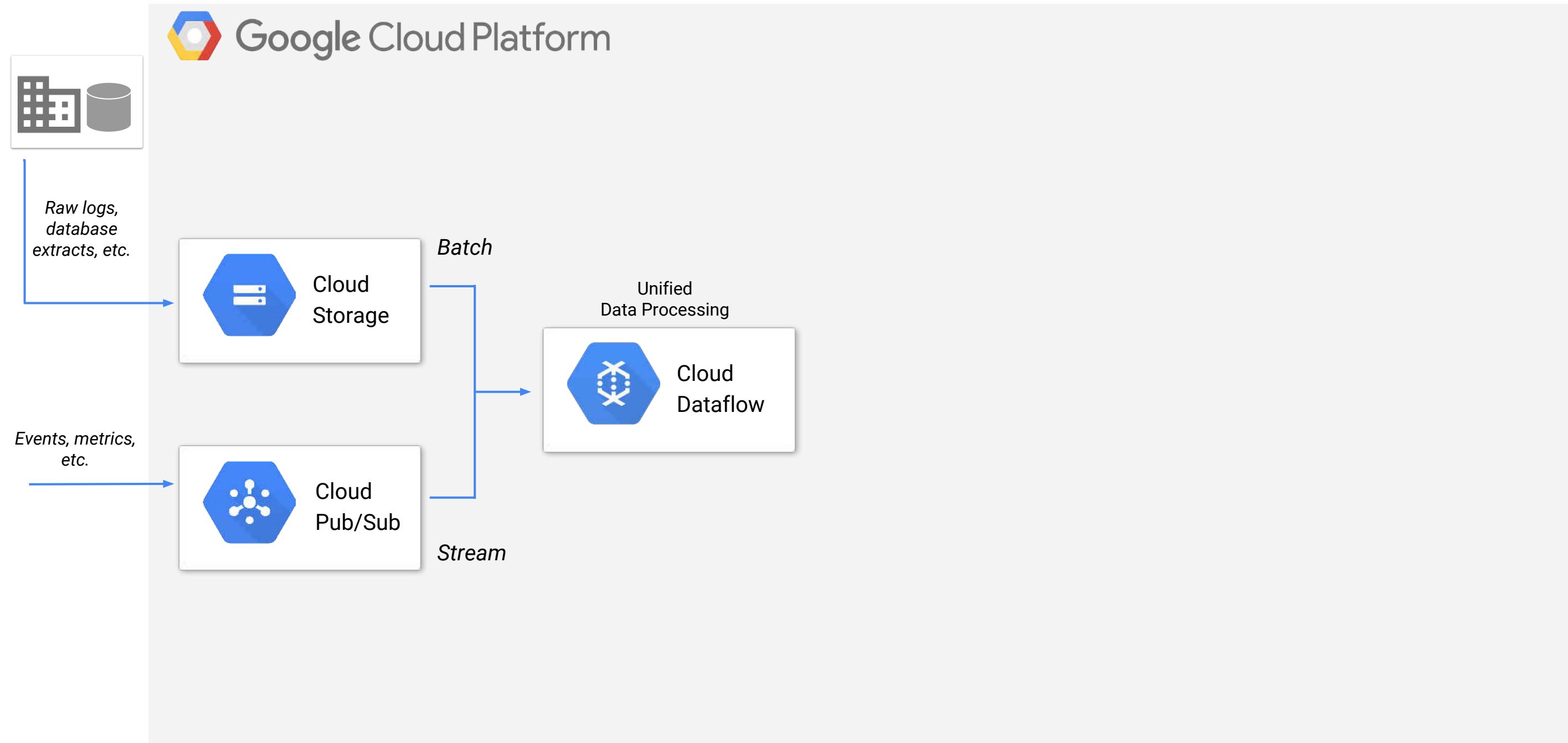


*Raw logs,
database
extracts, etc.*



*Events, metrics,
etc.*

GCP Data Pipelines - process and transform



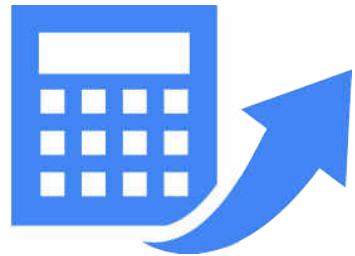
What is Dataflow?



- ✓ Easy way to create data processing pipeline
- ✓ Each pipeline reads data from **source**, performs **transformations** and output results to **sink**
- ✓ Write code once and get **batch** and **streaming**

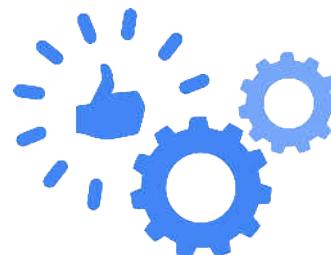
Where do customers use Cloud Dataflow?

ETL



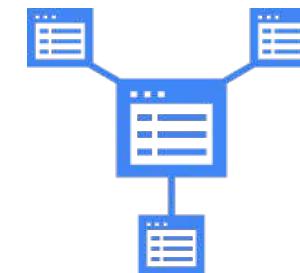
- Movement
- Filtering
- Enrichment
- Shaping
- Reduction

Analysis



- Batch computation
Ex: Convert 1 day of transactions from € to \$
- Continuous computation
Ex: Record total sales

Orchestration



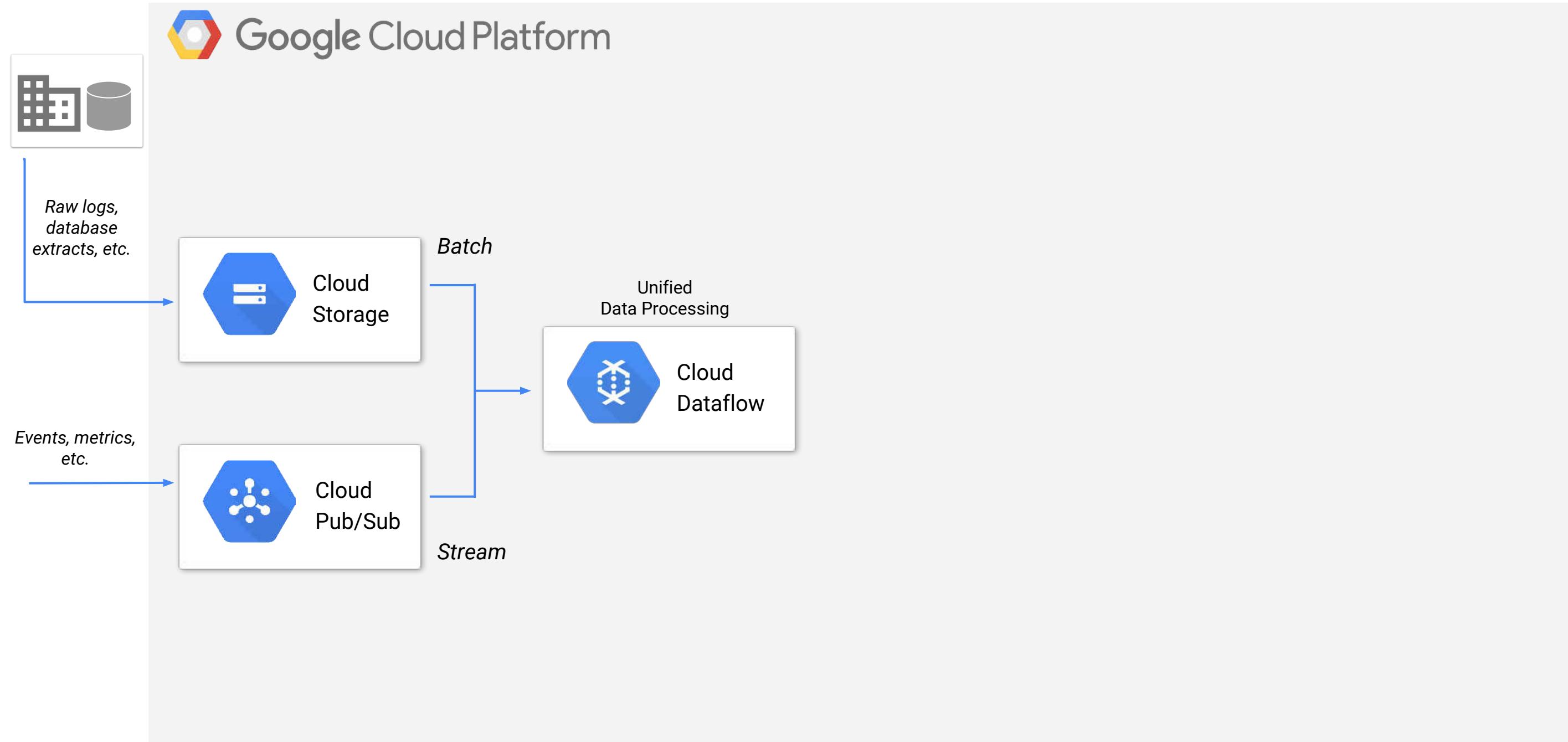
- Composition
Ex: JOIN
- Simulation
Ex: Prepare data



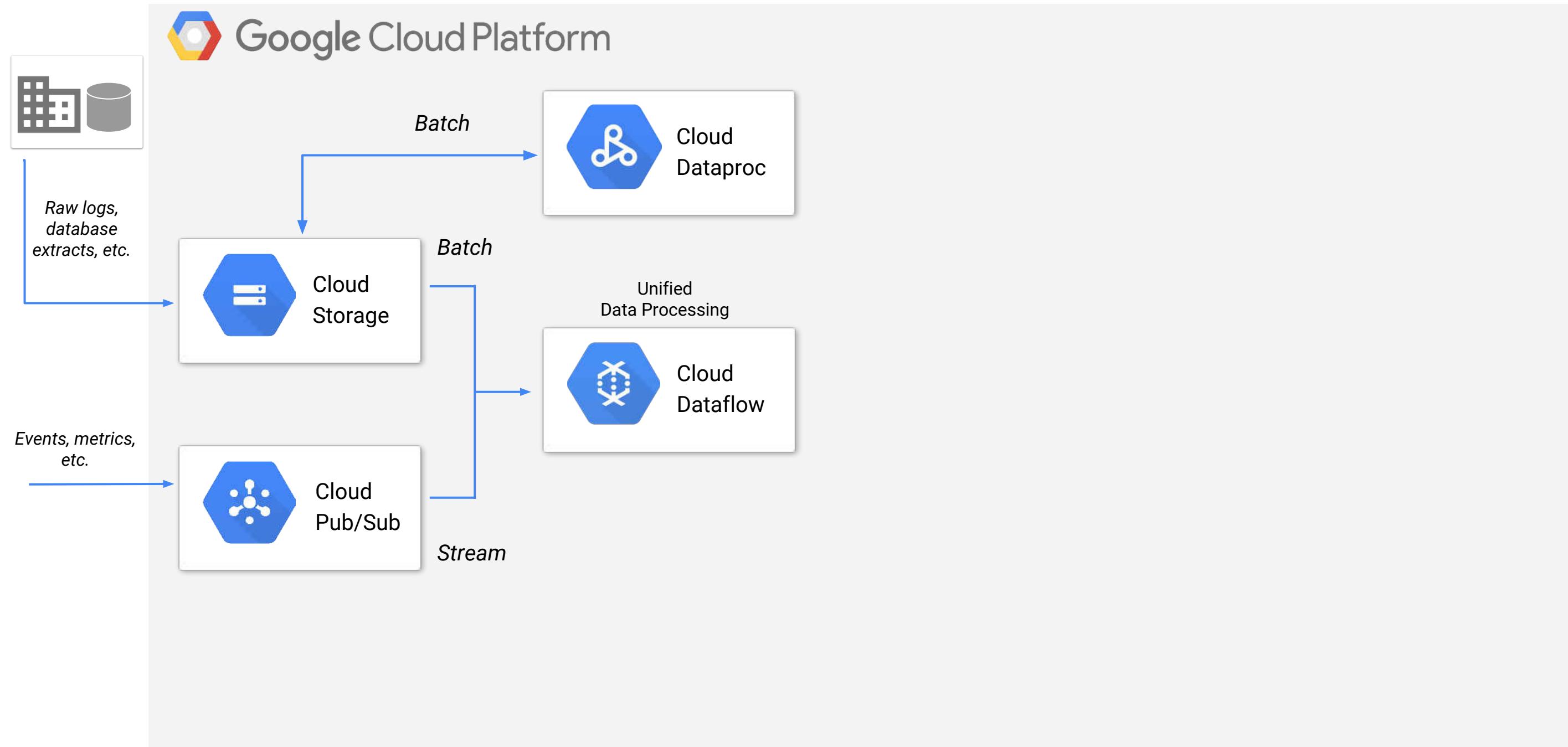
“We are very excited about the productivity benefits offered by **Cloud Dataflow** and **Cloud Pub/Sub**.
It took half a day to rewrite something that had
previously taken over six months to build using Spark”

Paul Clark
Director of Technology

GCP Data Pipelines - process and transform



GCP Data Pipelines - process and transform



What is Dataproc?



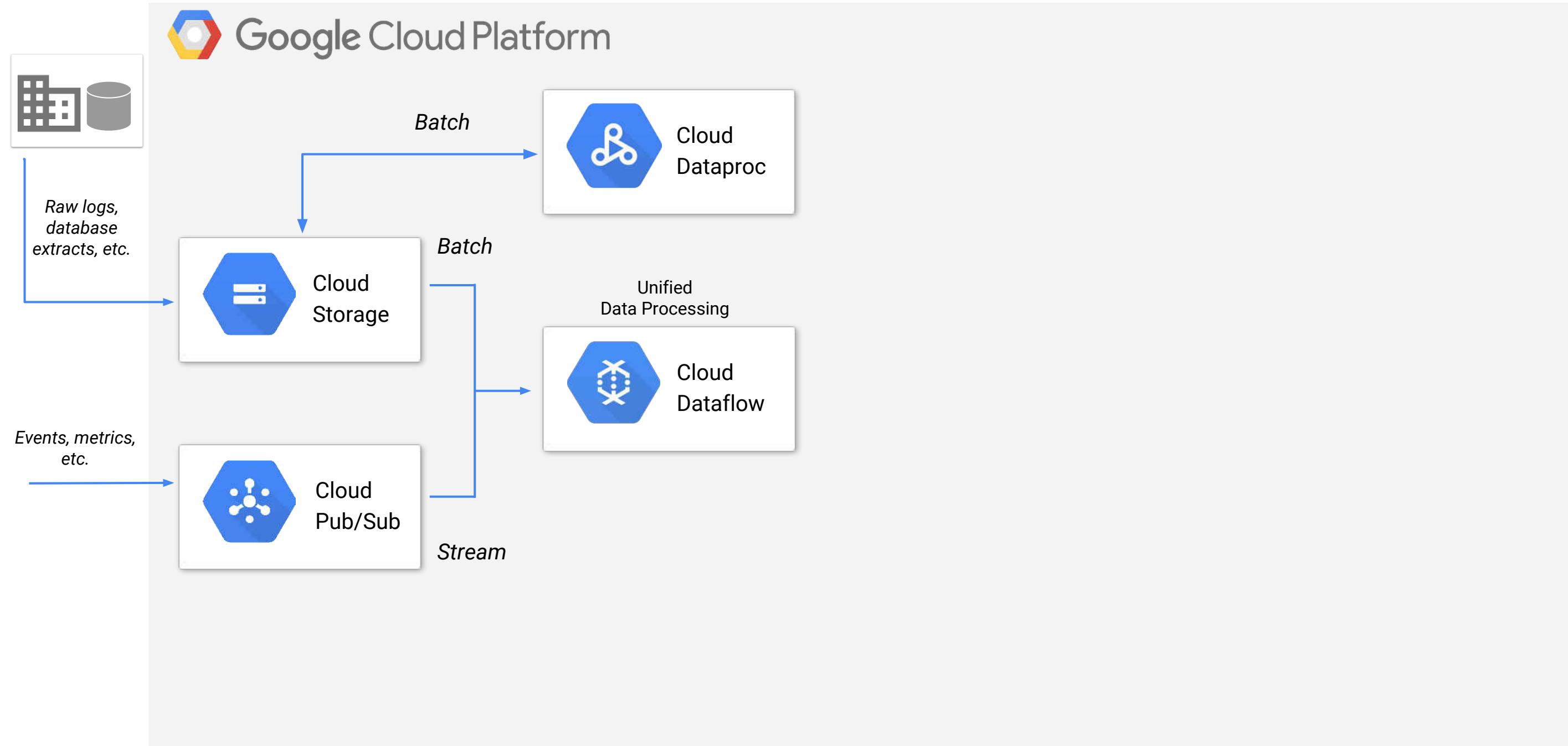
- ✓ Managed Hadoop, MapReduce, Spark, Pig, and Hive service, to easily process big datasets at low cost
- ✓ Create clusters in less than 90sec in average
- ✓ Scale clusters up & down even when jobs are running

Why use Dataproc?

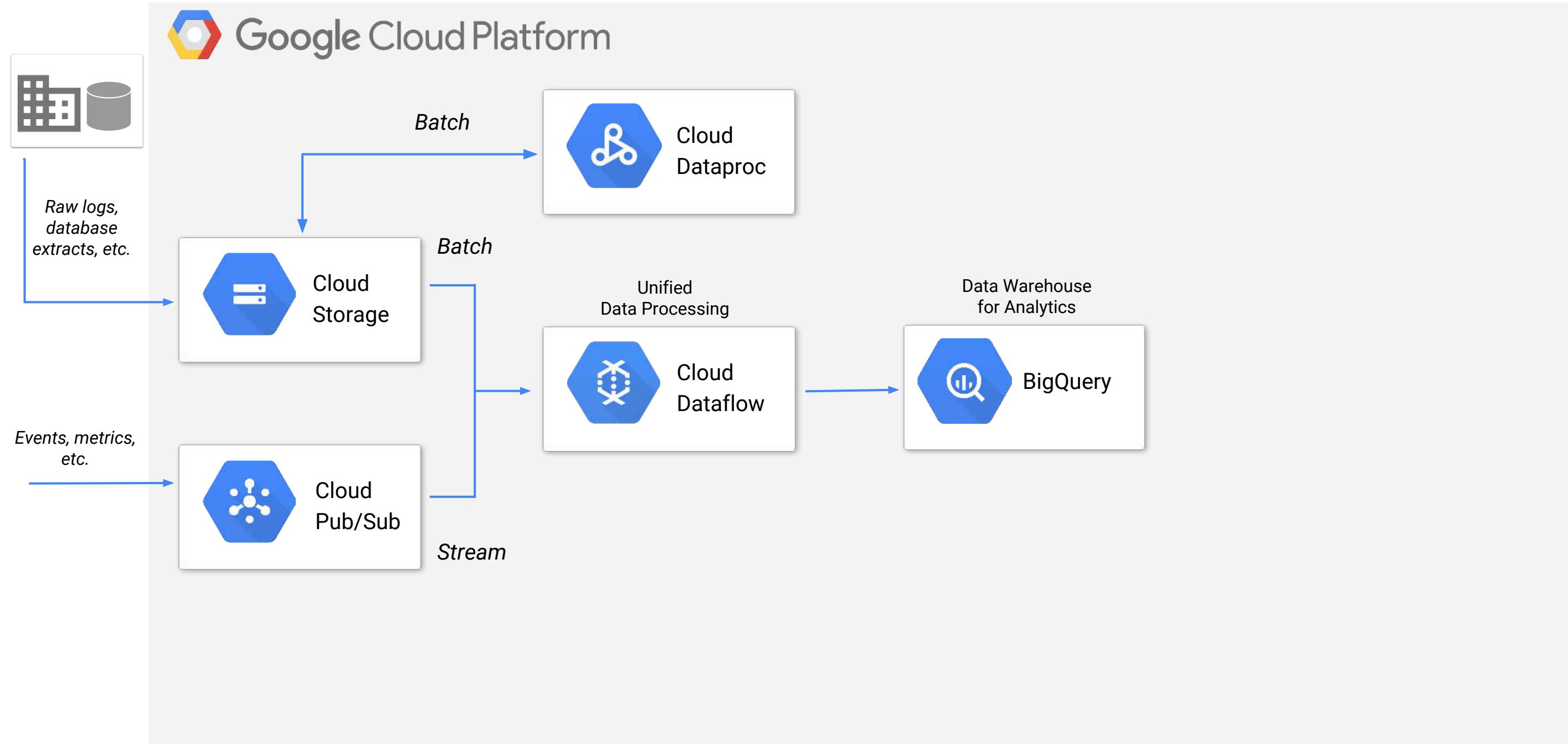


- ✓ Easily migrate on-premise Hadoop jobs to the Clouds
- ✓ Integrate with Spark / Spark SQL / Spark ML, GCP services, etc...
- ✓ Cost-effective:
 - Pay for what you use
 - Can use preemptible VMs
 - Custom Machine Types
 - No maintenance costs

GCP Data Pipelines - process and transform



GCP Data Pipelines - store and analyze



What is BigQuery?



Petabyte-Scale Enterprise Data Warehouse for Analytics



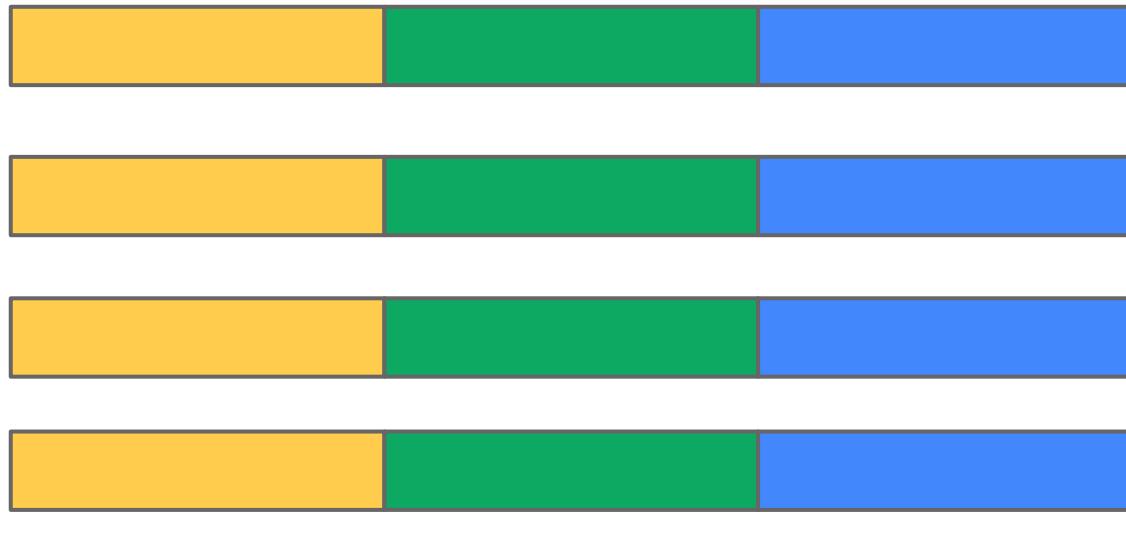
Support industry standards such as SQL, JDBC, ODBC



Fully Managed and Serverless

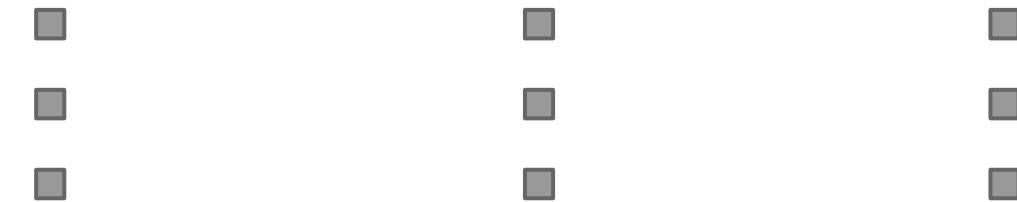
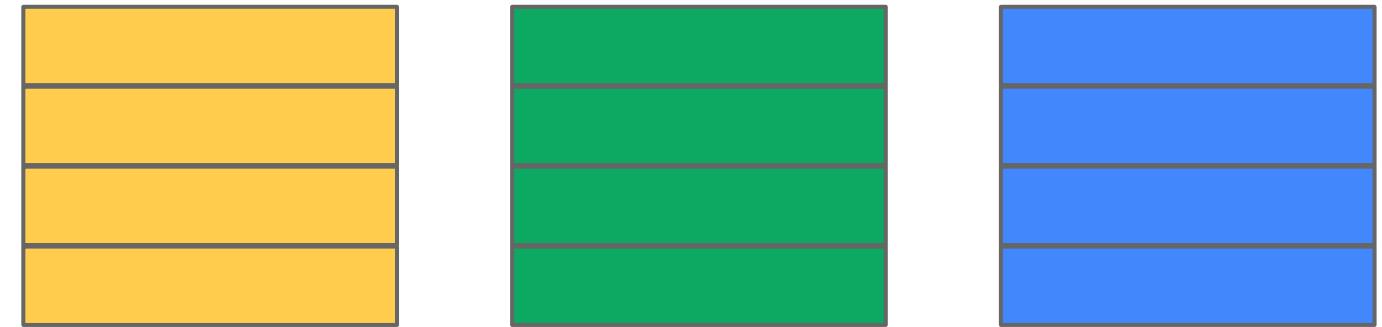
BigQuery storage

Relational database



Record-oriented storage
Supports transactional updates

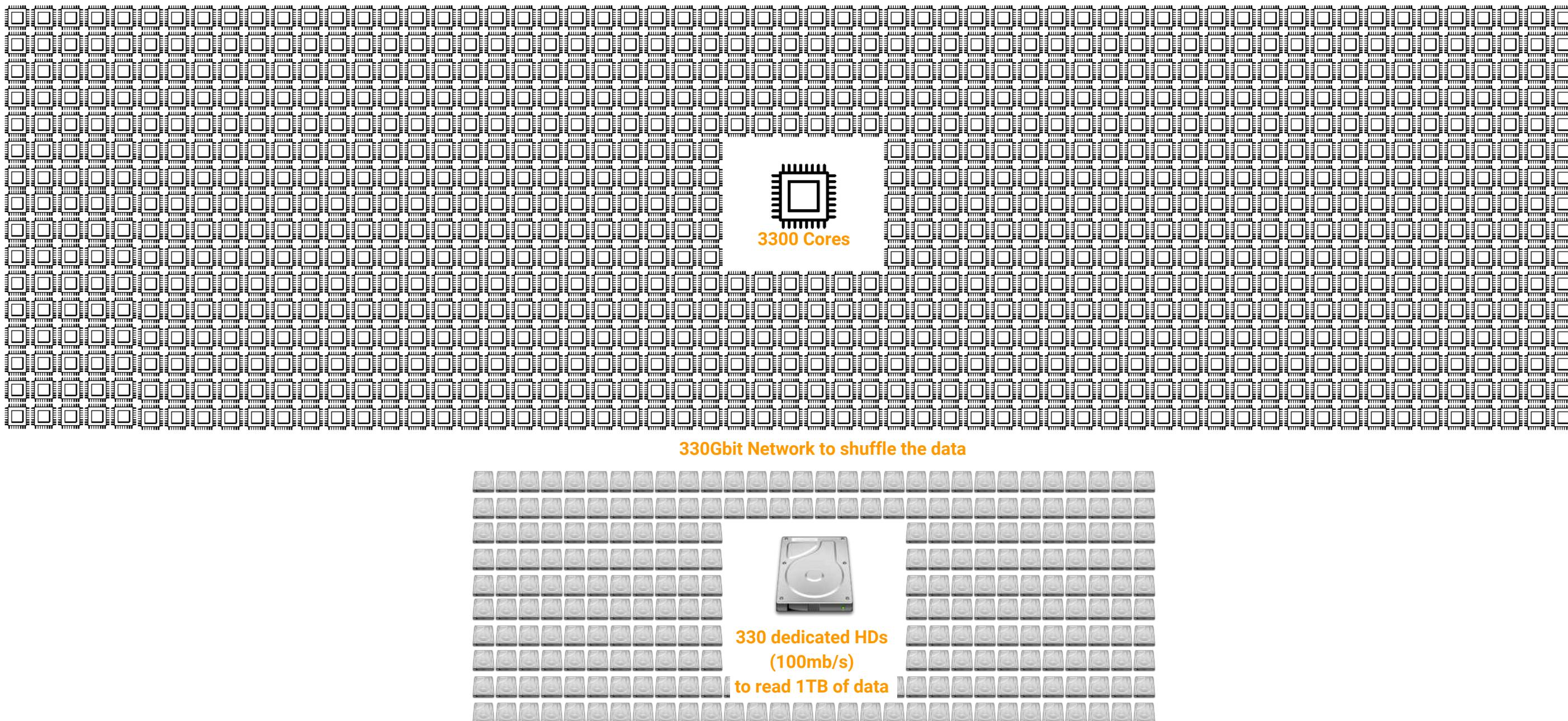
BigQuery Storage



Each column in separate, compressed,
encrypted file that is replicated 3+ times

No indexes or keys are required

BigQuery: what you need **ad-hoc** to run this query....





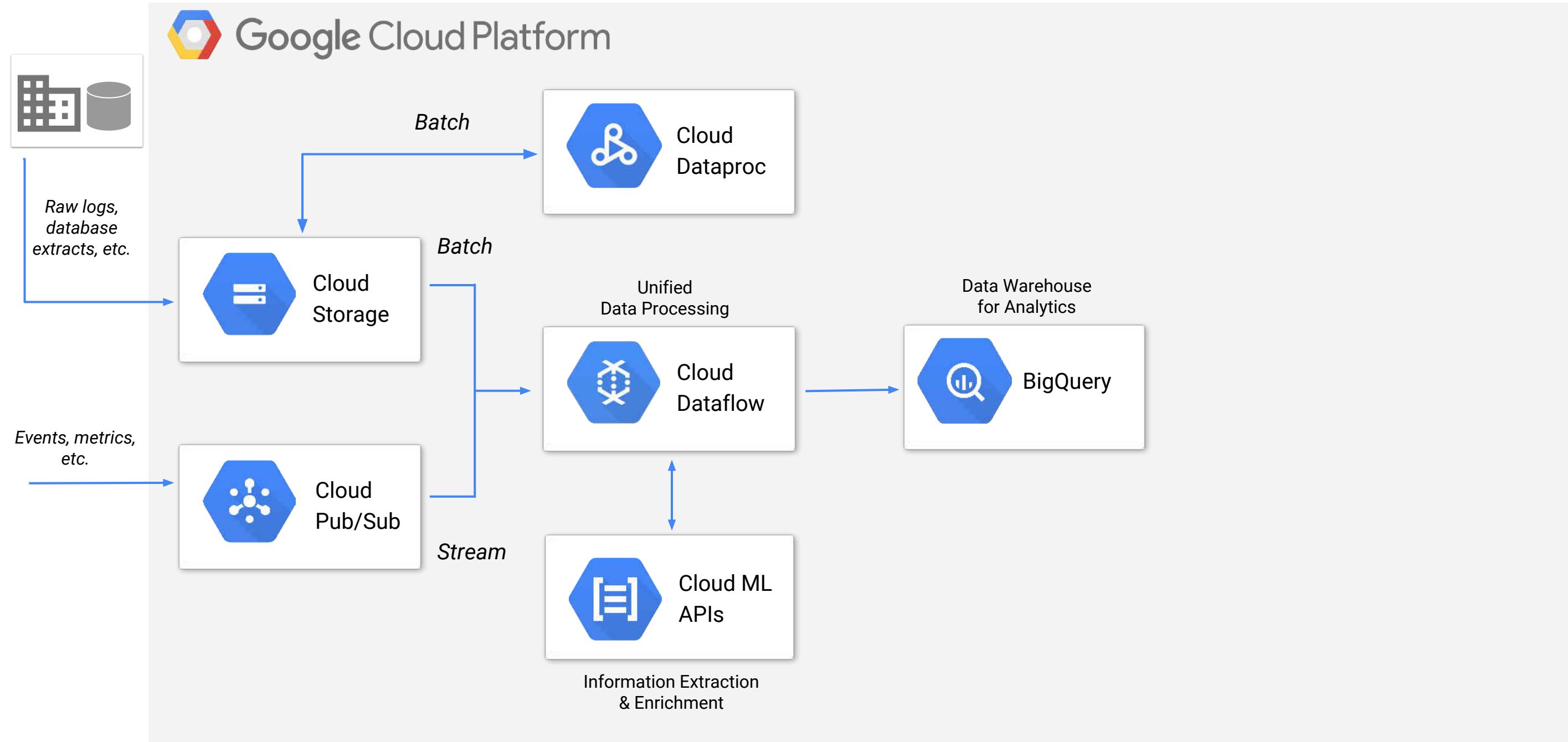
Spotify®

“From traditional batch processing to rock-solid event delivery to the **nearly magical abilities of BigQuery**, building on **Google’s data infrastructure** provides us with a significant advantage where it matters the most.”

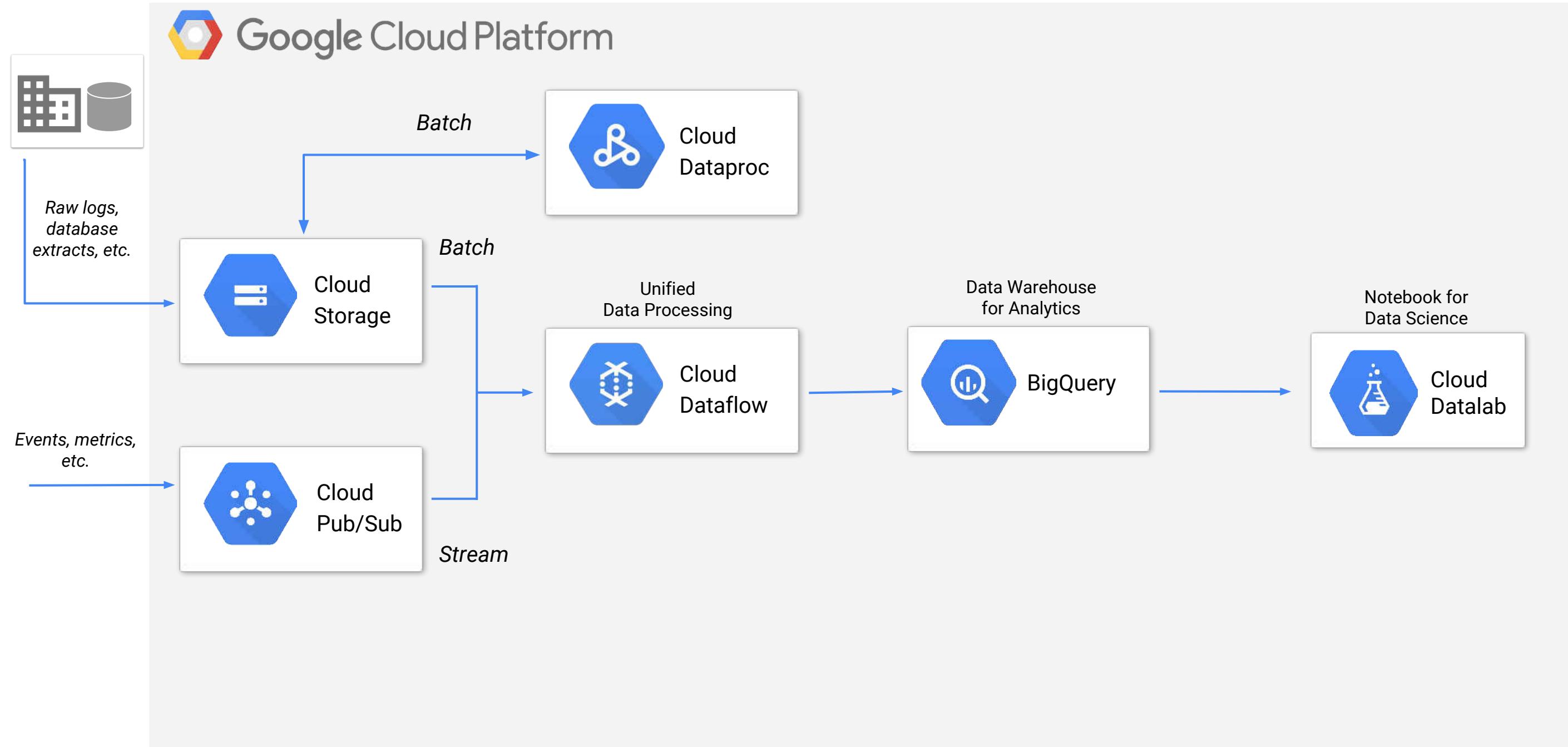
Nicholas Harteau

VP of Engineering and Infrastructure

GCP Data Pipelines - store and analyze



GCP Data Pipelines - experiment and visualize

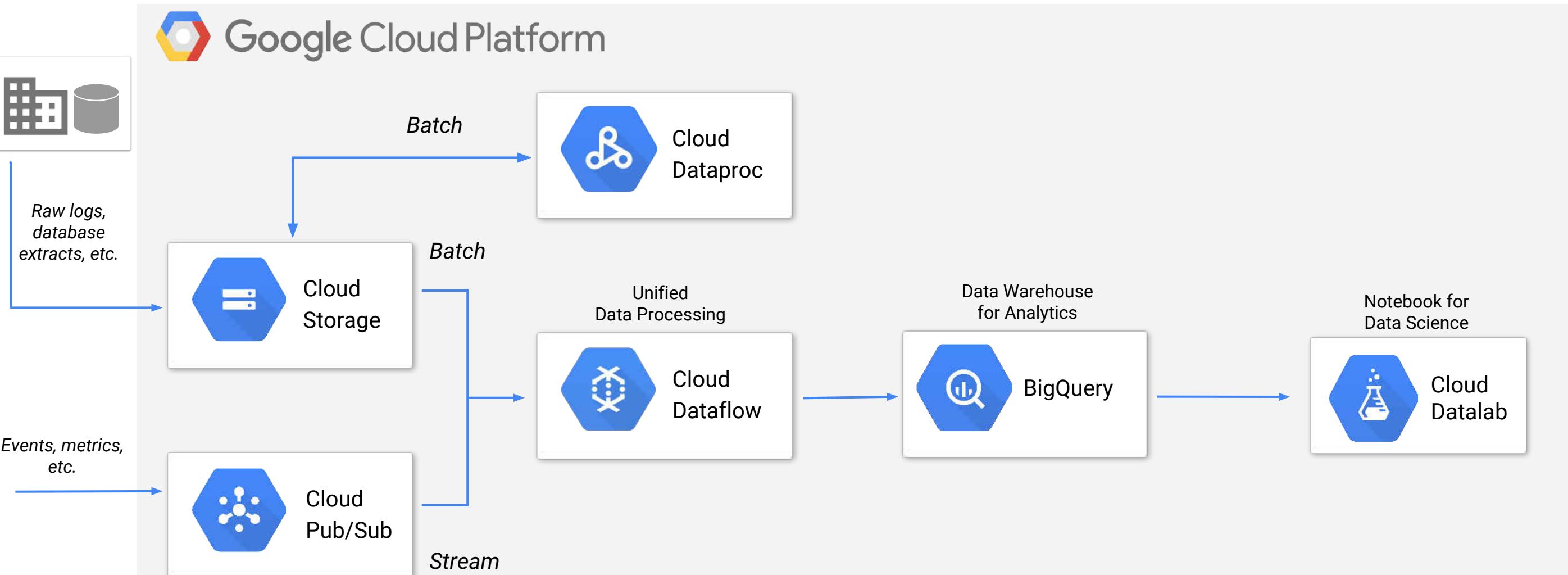


What is Datalab?



- ✓ Exploratory, interactive data science tool for data exploration
- ✓ Notebook-interface
Leverage existing Jupiter modules
- ✓ Scalable (CPU, GPU & memory) & cost-effective (pay as you use)

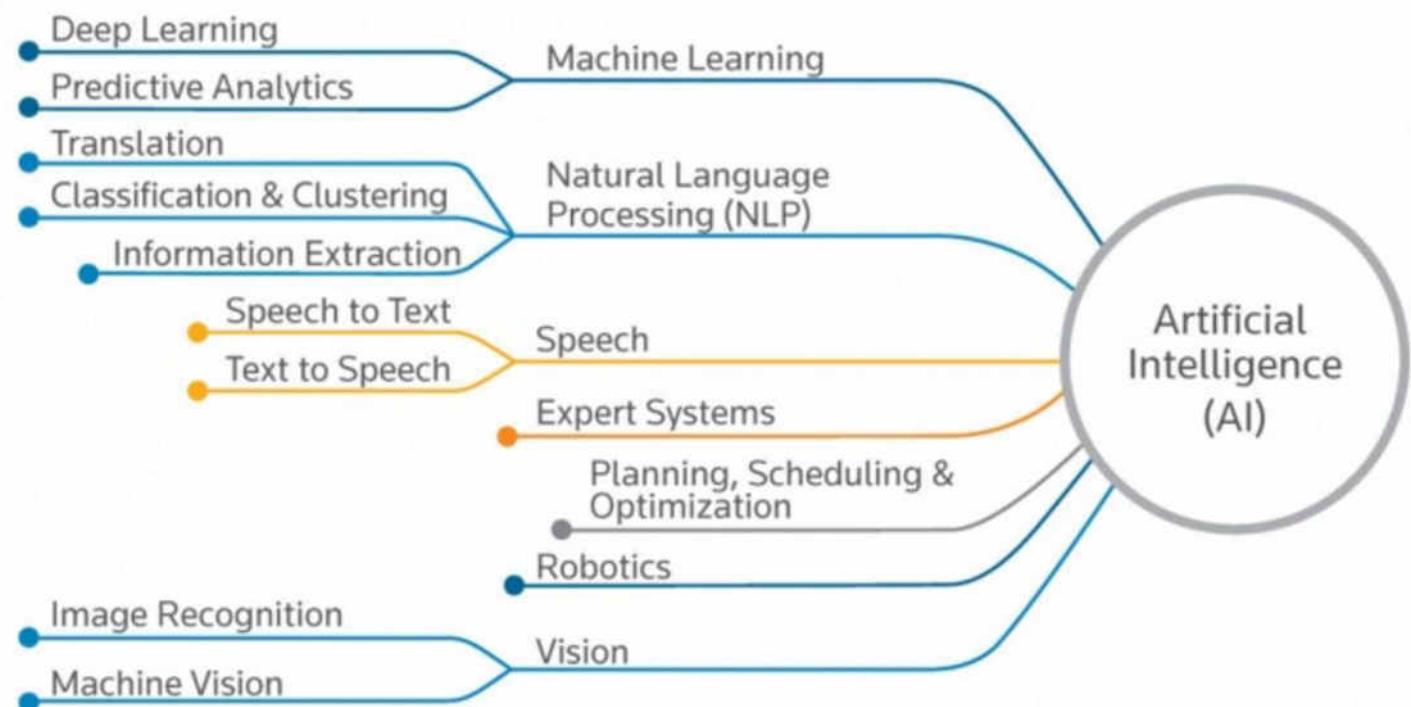
GCP Data Pipelines



... and now we can use machine learning tools

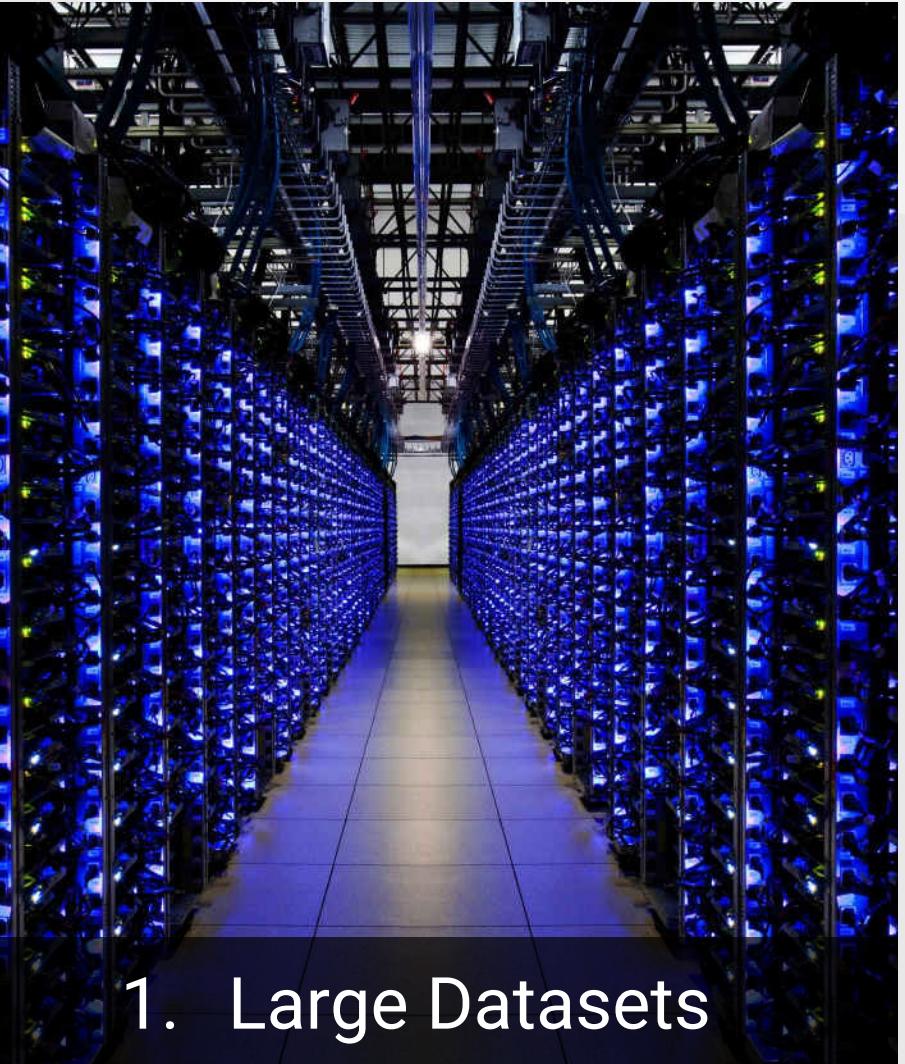
Machine Learning

- ✓ A field of Artificial Intelligence
- ✓ A way of solving problems w/out explicitly codifying the solution
- ✓ A way of improving systems that improve themselves over time

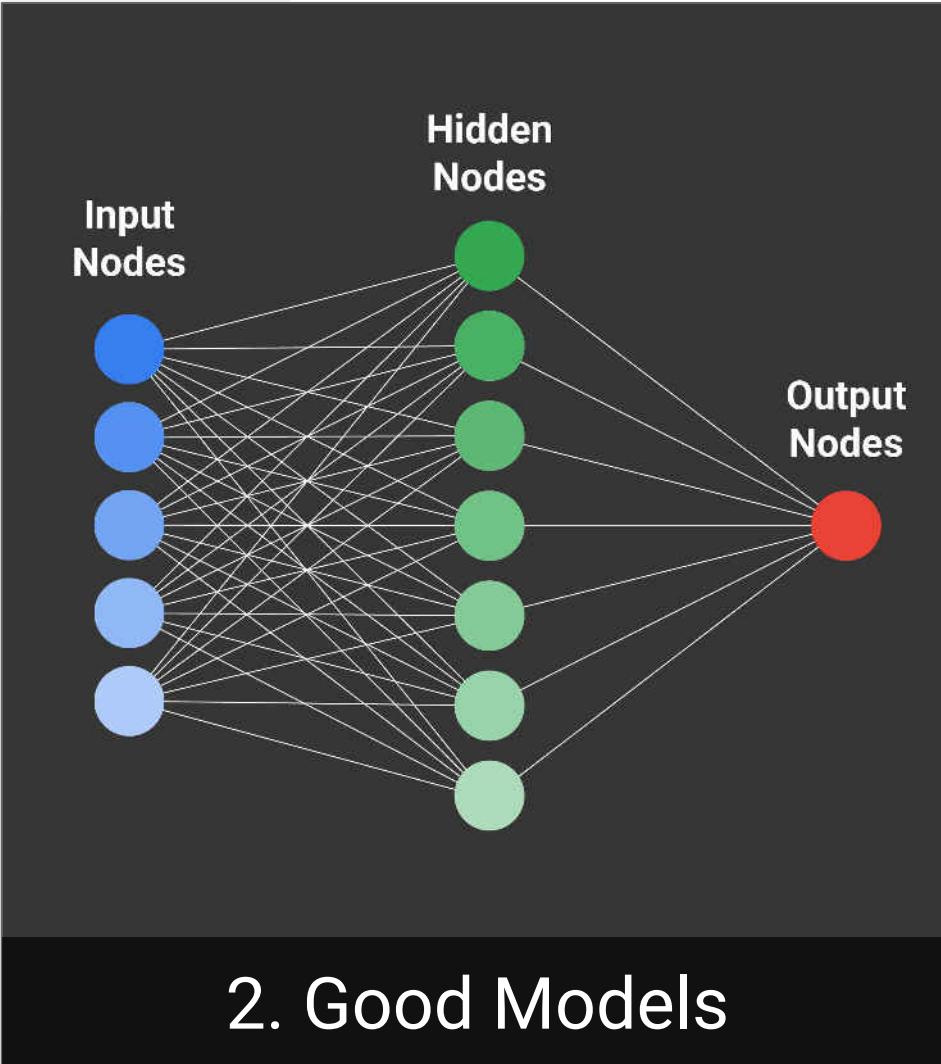


Source: Neota Logic

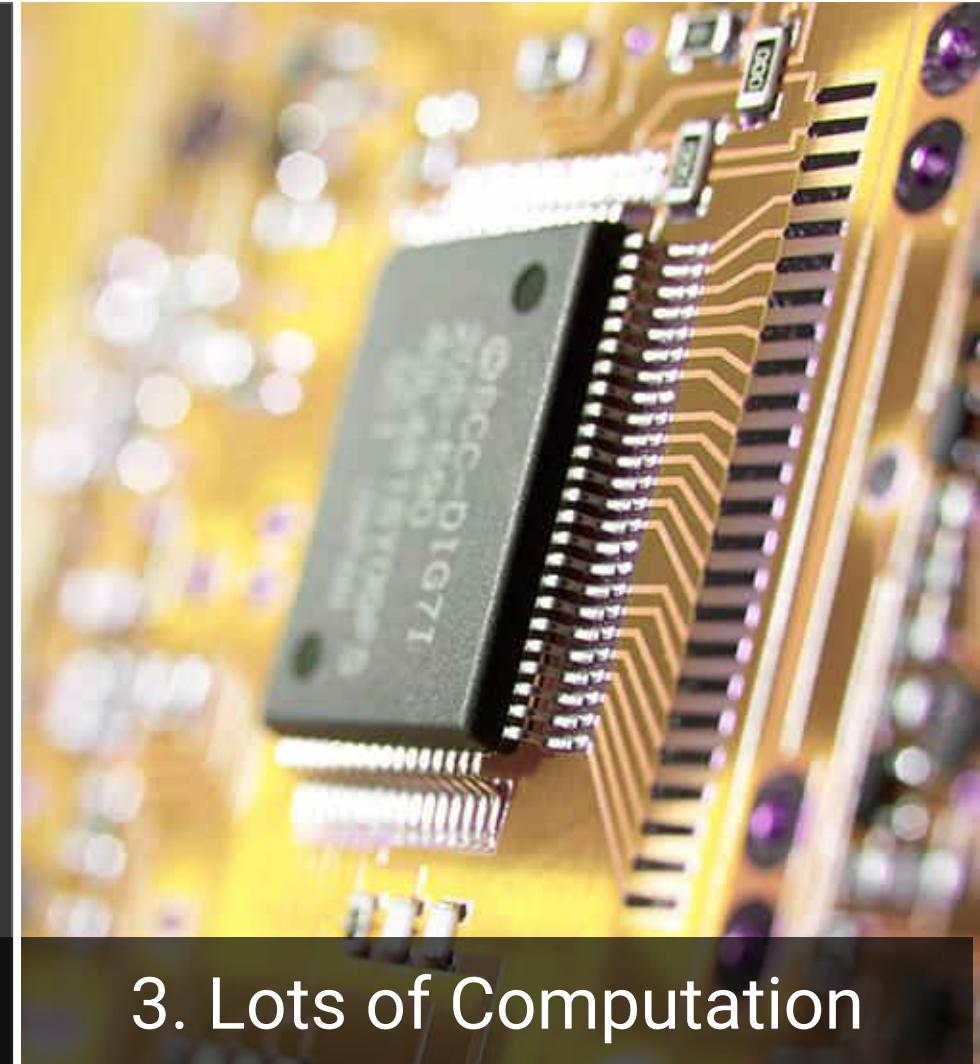
ML is “old”: why all the attention now?



1. Large Datasets



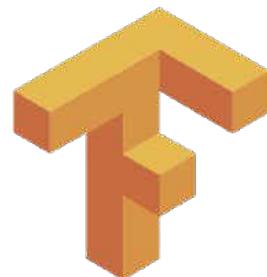
2. Good Models



3. Lots of Computation

Full spectrum of ML models

Build your own models:
your data + your models



TensorFlow



Cloud ML Engine

Train our implemented models:
your data + our models



Cloud AutoML

Call our fully-trained models as APIs:
our data + our models



Cloud
Vision API



Cloud
Speech API



Cloud
Video
Intelligence API



Cloud
Translation
API



Cloud
Natural Language
API



Cloud
Data Loss
Prevention
API

[Build your own models:](#)
your data + your models

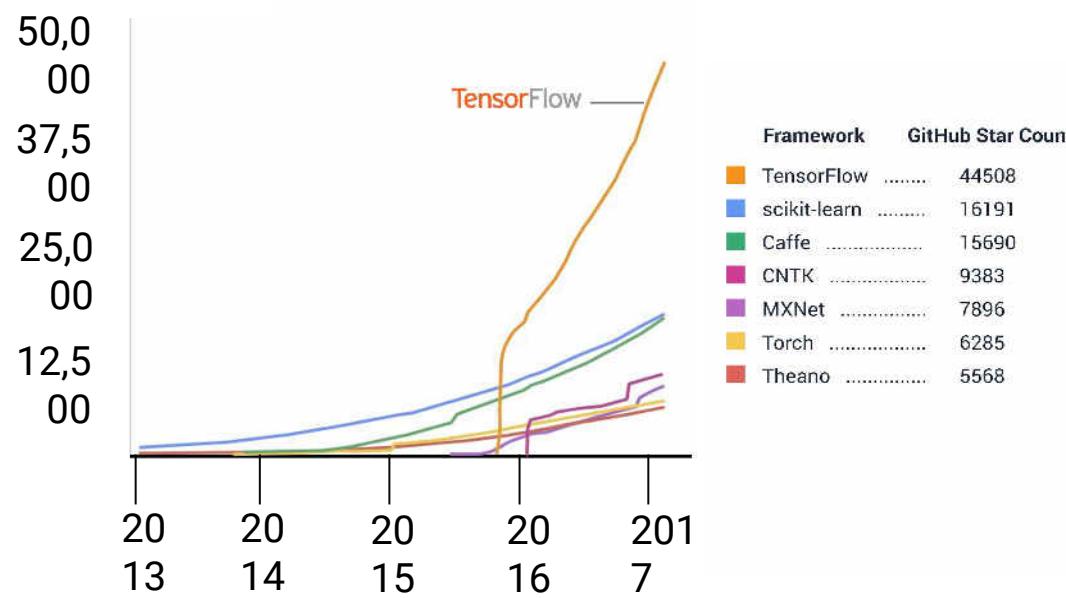
A Powerful ML Framework



TensorFlow



Cloud ML Engine



TensorFlow is open-source machine learning framework.

Most popular project on GitHub, large and growing contributing community, and dedicated team of Google engineers



Runs on Windows, Linux, macOS, Android, iOS, CPU, GPUs, TPU and HPC clusters



Cloud ML Engine provides an easy way to operationalize ML training, tuning, and deployment

- Airbus have a business selling **high resolution satellite images** to companies and governments who do things like track level of snow pack
- They were able to reduce the number of errors by **nearly 75%**

"In our tests, Google Cloud Machine Learning enabled us to improve the accuracy and speed at which we analyze the images captured from our satellites. It solved a problem that has existed for decades."

Mathias Ortner, Data Analysis and Image Processing Lead
Airbus Defence & Space



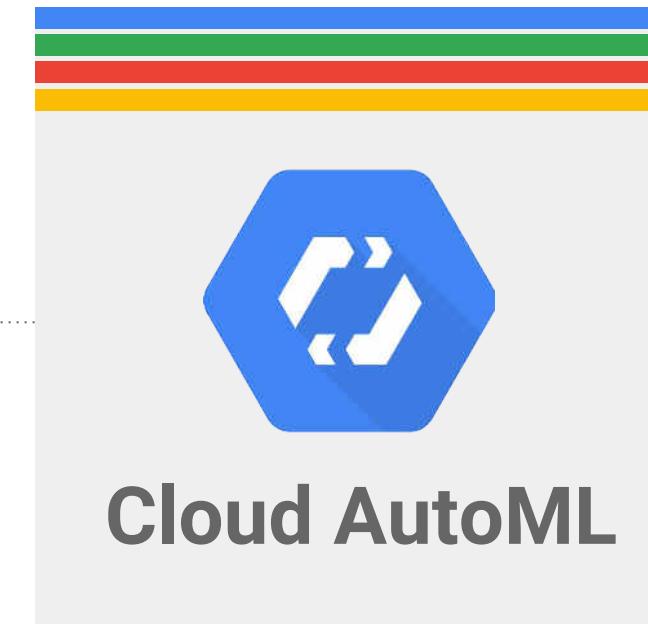
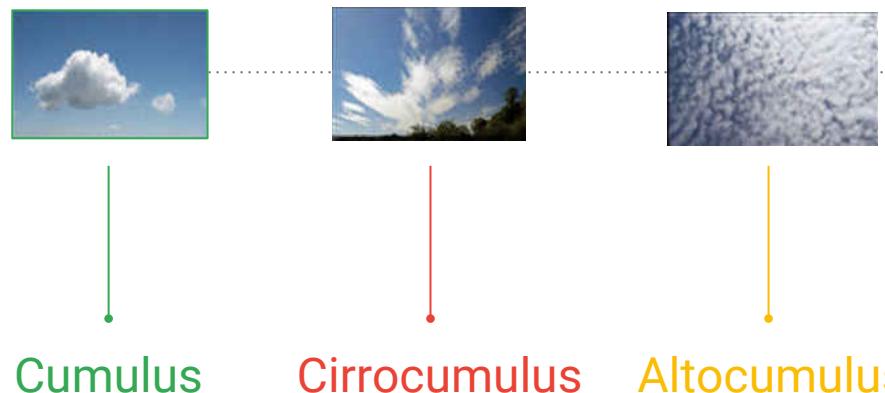
Cloud AutoML Vision

Train our implemented models:
your data + our models

Upload images + label

Train your model

Evaluate



Model is ready to make prediction.

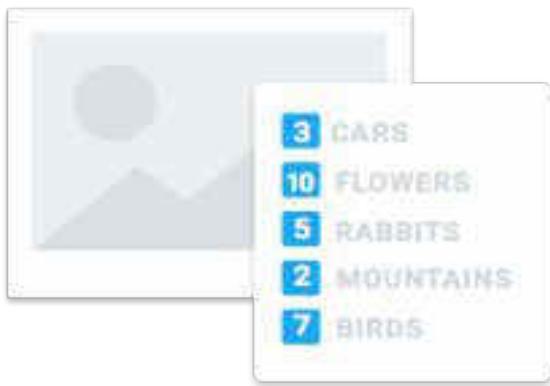
This model can scale as needed to adapt to customer demands.



Vision API



TRY THE API



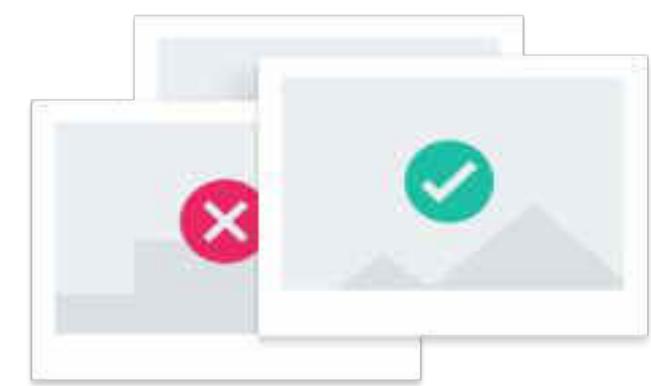
Object Recognition



Facial sentiment & logos



Extract text (OCR)



Detect inappropriate content

GIRO APP



Speech API

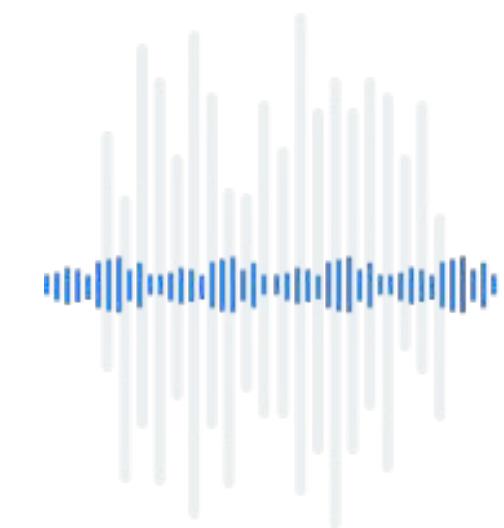


TRY THE API

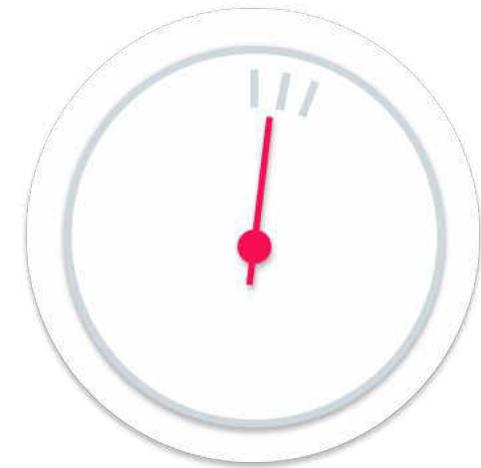
Convert to:



[Speech Recognition](#)



[Noise Robustness](#)



[Real-time results](#)



[Over 100 languages](#)



Translation API



TRY THE API



Text Translation



Automatic language detection



Continuous Updates



Premium edition BETA

Recent improvements in Google Translate

old: PBMT

new: GNMT

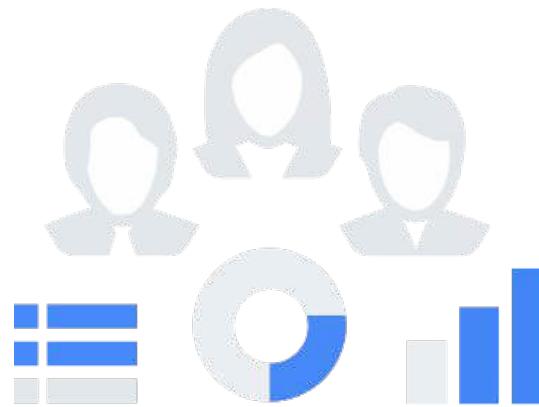




Natural Language API



TRY THE API



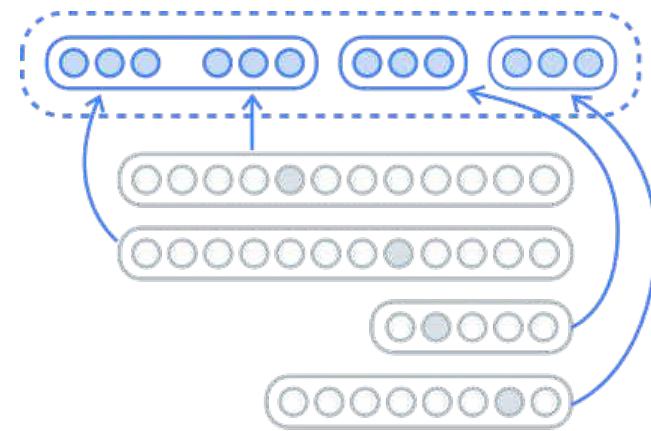
Entity Recognition



Sentiment Analysis



Multi-Language Support



Syntax analysis

Tacotron or Human?

“She earned a doctorate
in sociology at
Columbia University.”

“She earned a doctorate
in sociology at
Columbia University.”

Tacotron 2

Human



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Instructor

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[Ran Shiloni]
[Cloud Trainer, Google]

tw: @ranshiloni
insta: ranshiloni

The Next Big Thing



2 Training Manual (Online version)



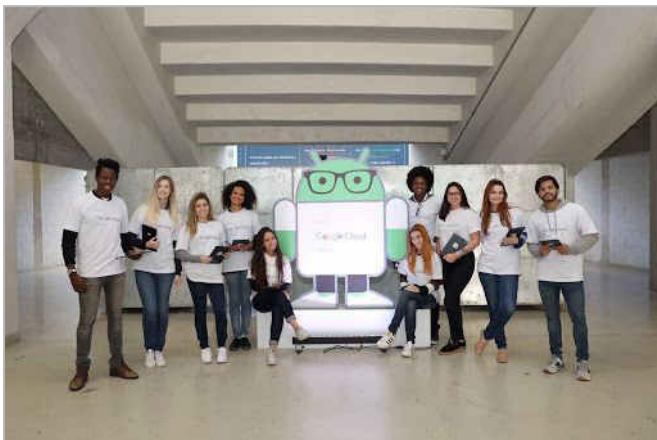
16 goo.gl/oYg7BK
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Getting started on your Google Cloud learning journey

1

Today

Google Cloud Platform
Fundamentals:
Core Infrastructure



2

Tomorrow

Complete hands-on labs:
GCP Essentials Quest
google.qwiklabs.com

A screenshot of the Qwiklabs website. The main heading reads "Real Training, Real Time, Real Environments". Below it, text says "Get hands-on practice working with cloud technologies and software. Train on-demand and learn at your own pace." A yellow sidebar on the left says "Qwiklabs Joined Google!" and features the Google logo. A blue sidebar on the right says "Finish a Quest, Earn a Badge" and shows three badge icons.

3

Future

Find more training online
cloud.google.com/training

A screenshot of the Google Cloud Platform website. The top navigation bar includes links for "Why Google", "Products", "Solutions", "Launcher", "Pricing", "Customers", "Documentation", and "Support". The main content area features a large image of people working at laptops, with the text "Google Cloud Training" and a description: "Training and Certification for you to make the most of Google Cloud technologies. Our classes include technical skills and best practices to help you get up to speed quickly and continue your learning journey. We offer fundamental to advanced level training in on-demand, live, and virtual options. Certifications help you validate and prove your skill and expertise in Google Cloud technologies." A "FIND A CLASS" button is visible.

2 3 Make Google Cloud certification your goal!

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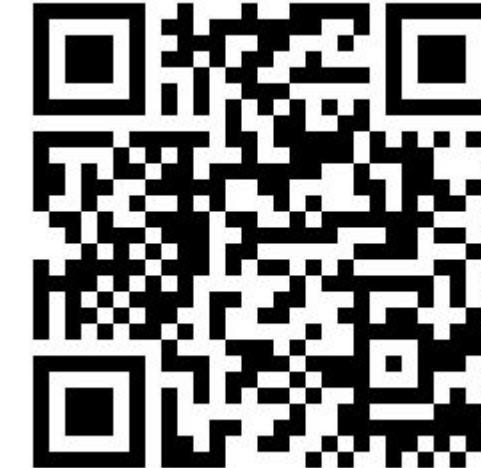


Professional Cloud Architect

Demonstrate your proficiency to design, build and manage solutions on Google Cloud Platform.

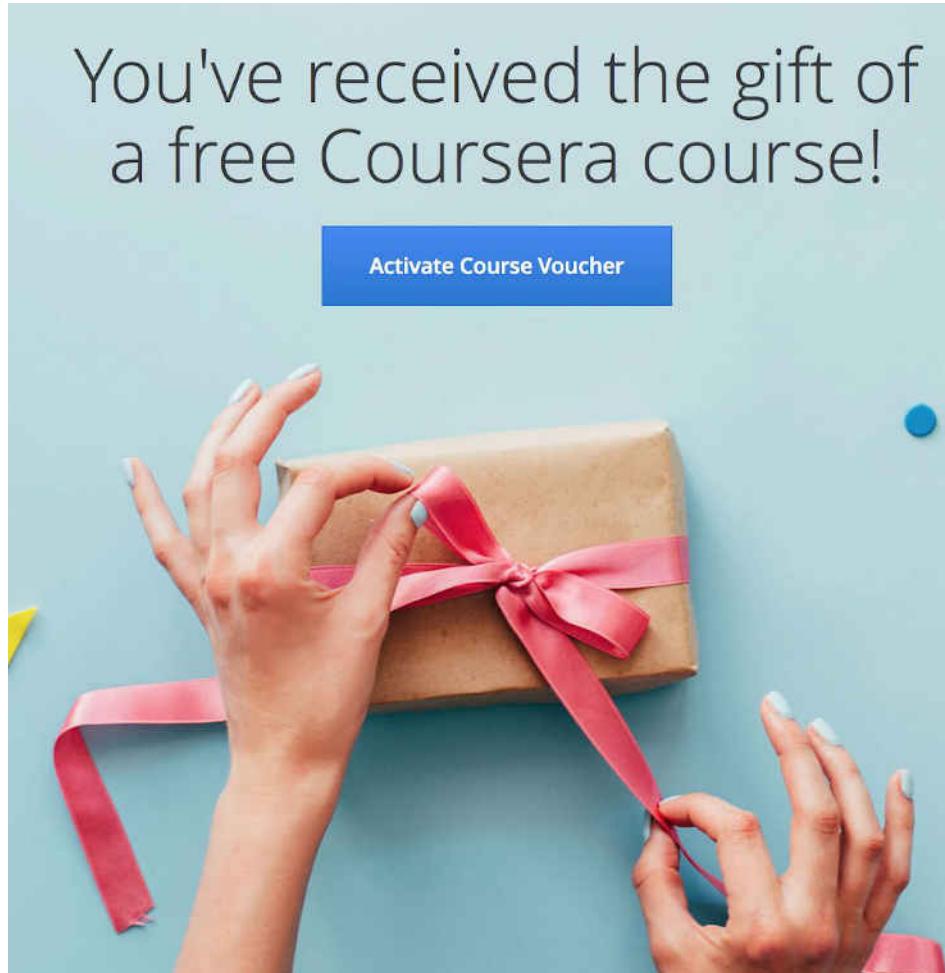
[REGISTER](#)[DETAILS](#)

Find study guides, tips, practice exams, and testing sites



cloud.google.com/certification

To help you get started
Activate your voucher now for a free course



- 1 Go to
<https://www.coursera.org/voucher/Cloudonboard>

- 2 Activate voucher and sign up for a free account

- 3 Enroll in **Getting Started with Google Kubernetes Engine for Free -Limited period offer!!**

Explore other Courses at
Coursera.org/Googlecloud



Google Cloud Startup Program

Google Cloud is a perfect fit for launching and scaling your early-stage startup.

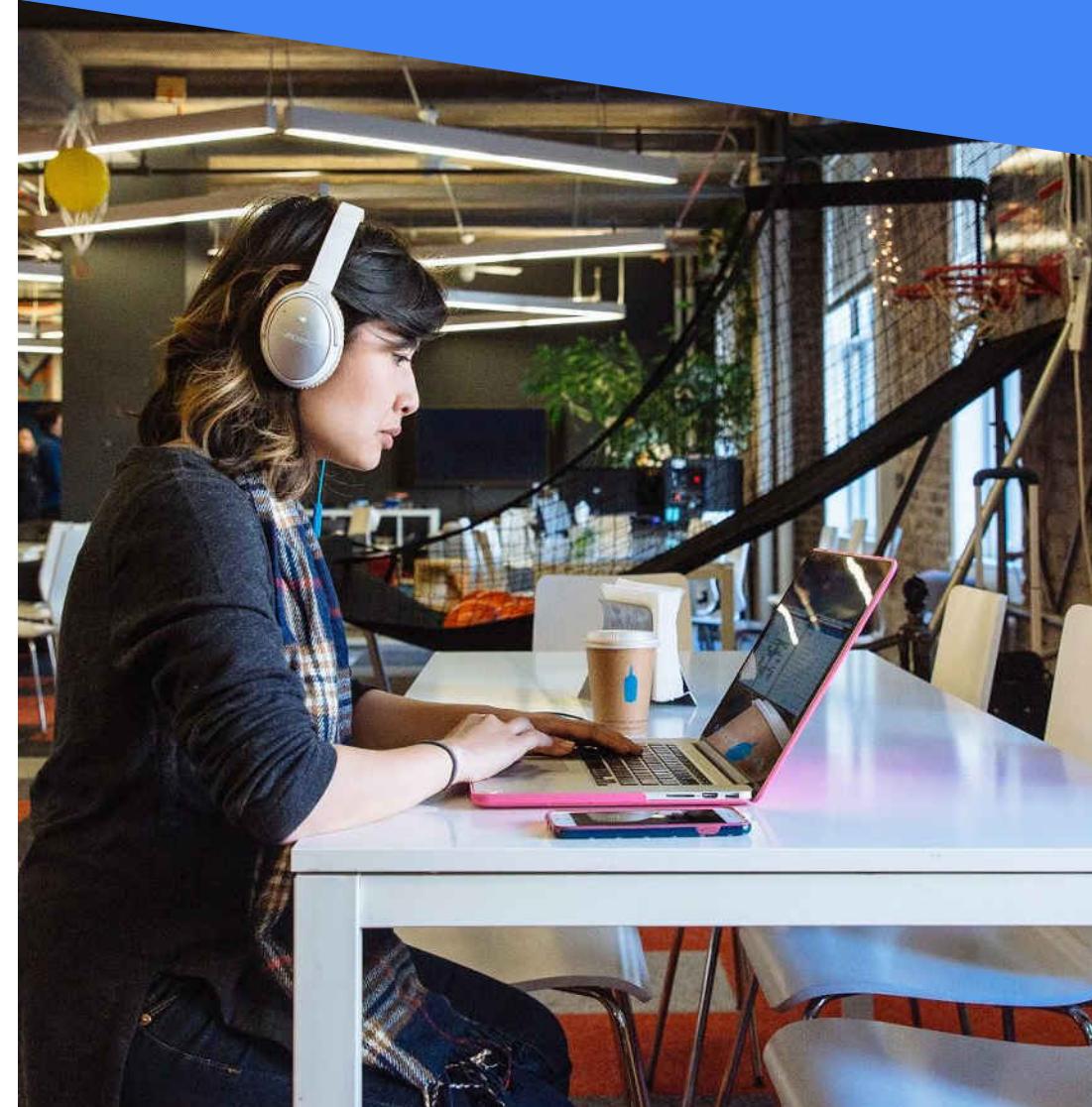
A special offer for Cloud OnBoard attendees:

Visit <https://goo.gl/smr42L> before June 16th to enroll, and eligible startups receive **\$3,000** in Google Cloud and Firebase credits.

cloud.startups@google.com

g.co/cloudstartups

**\$3,000
in credits**



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<Start Training>



Google Cloud

See you
next time A small icon of two hands shaking.

</Start Training>



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7 **https://goo.gl/qs9oGs**
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10 #GCPOnBoard
11 @GoogleCloud_DE

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13 </Start Training>

Wifi GoogleGuestPSK

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15 **Password** pUp3EkaP
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Google Cloud's big data services are fully managed and scalable



Cloud
Dataproc

Managed
Hadoop
MapReduce,
Spark, Pig,
and Hive
service



Cloud
Dataflow

Stream and
batch
processing;
unified and
simplified
pipelines



BigQuery

Analytics
database;
stream data
at 100,000
rows per
second



Cloud
Pub/Sub

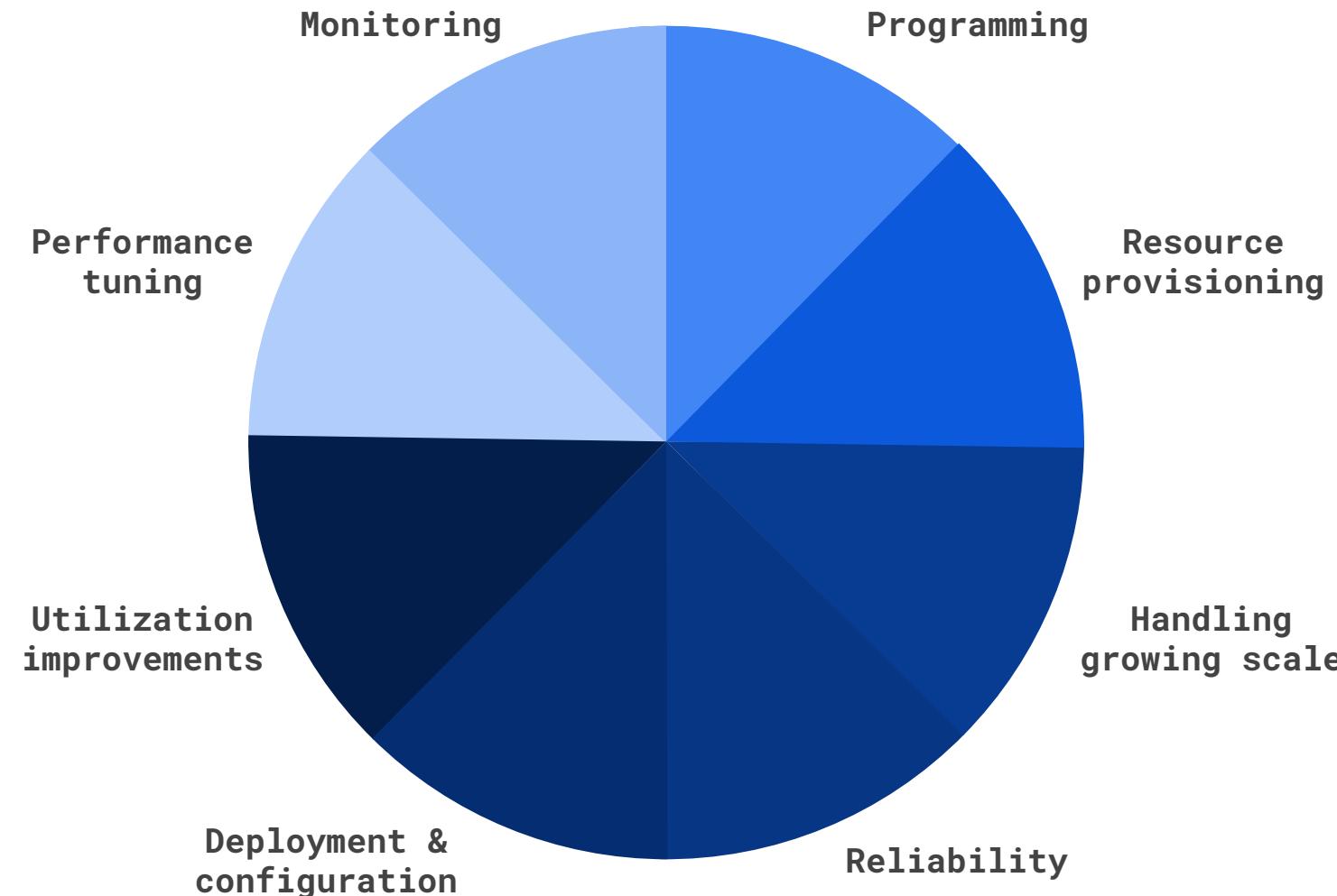
Scalable and
flexible
enterprise
messaging



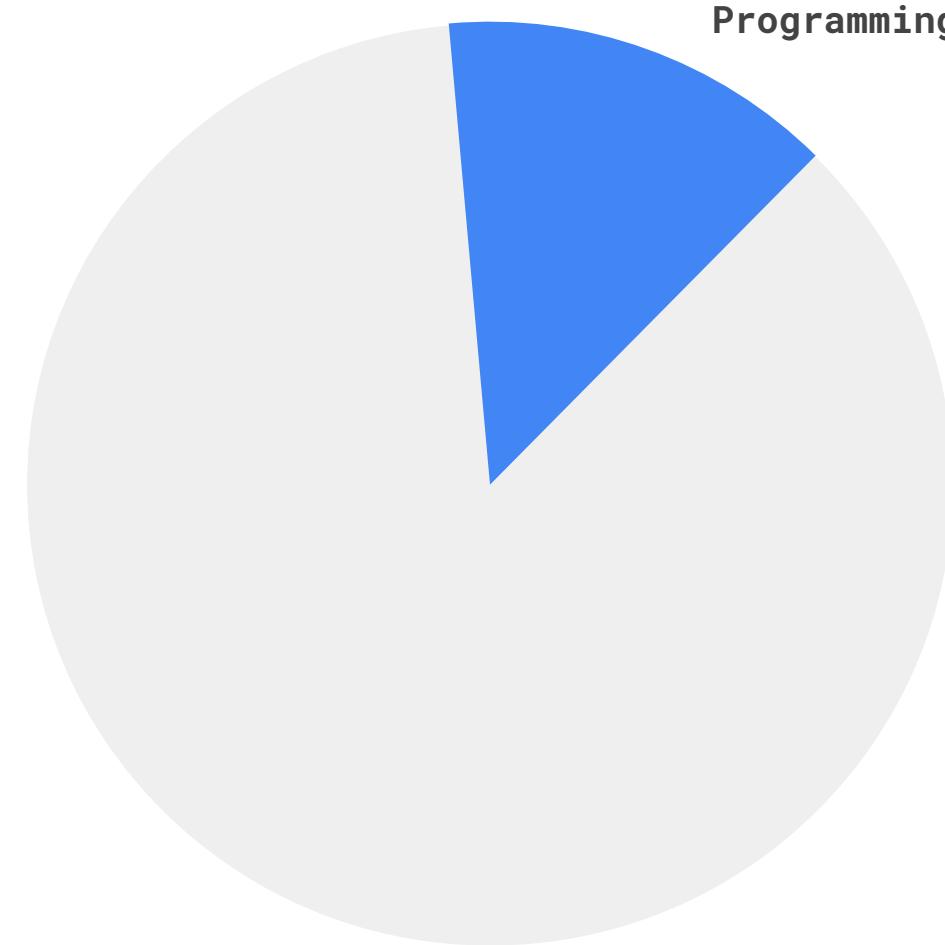
Cloud
Datalab

Interactive
data
exploration

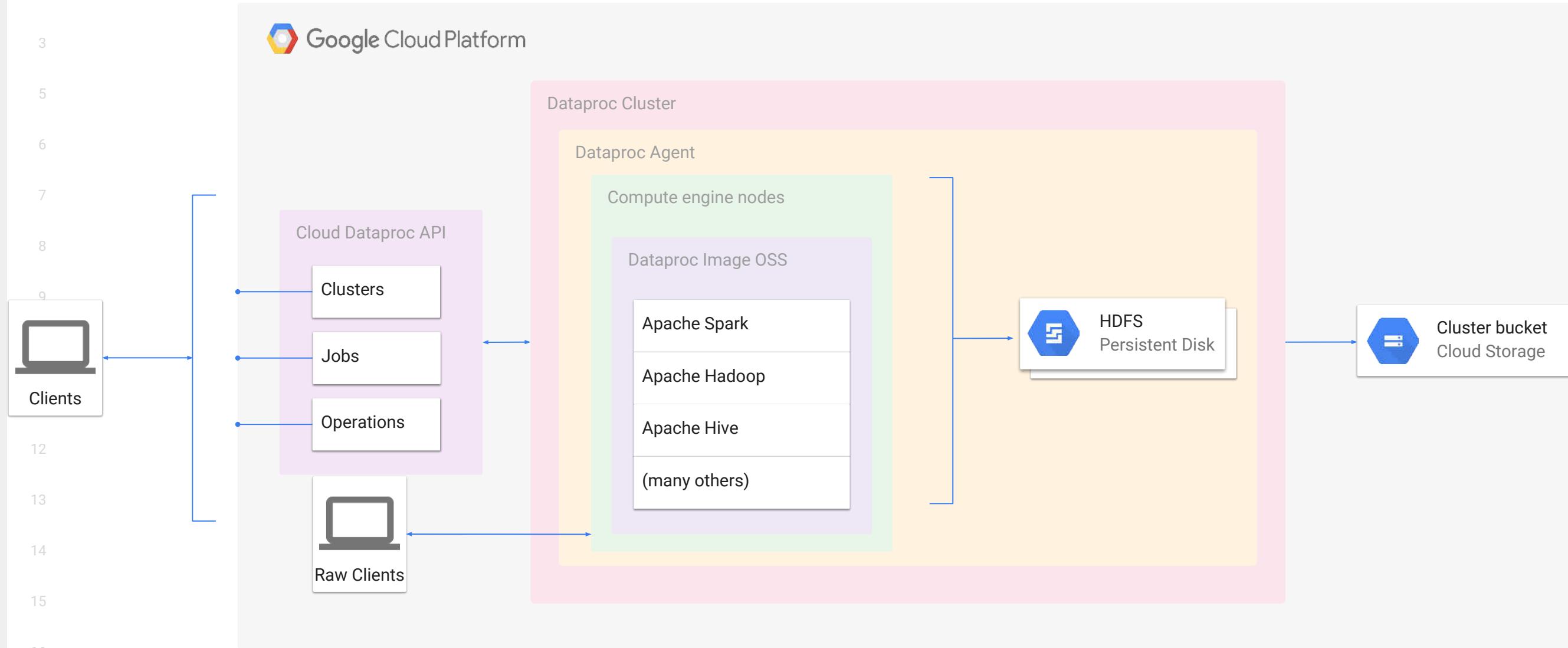
Typical Big Data Processing



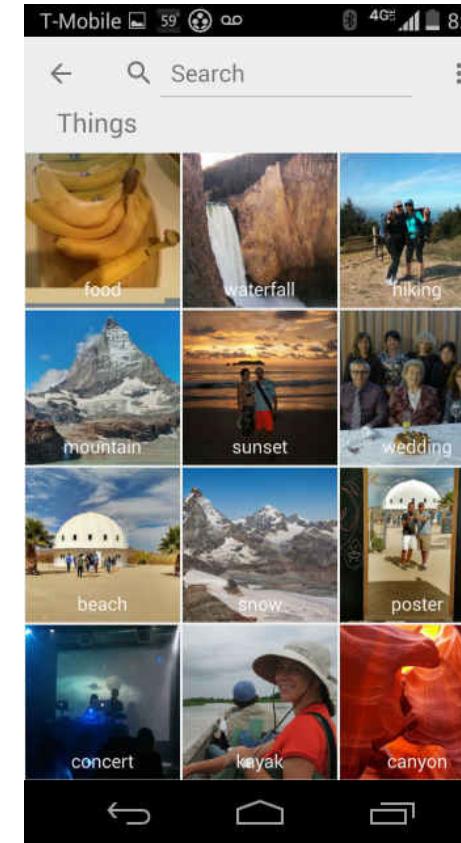
Big Data with Google: Focus on insight, not infrastructure.



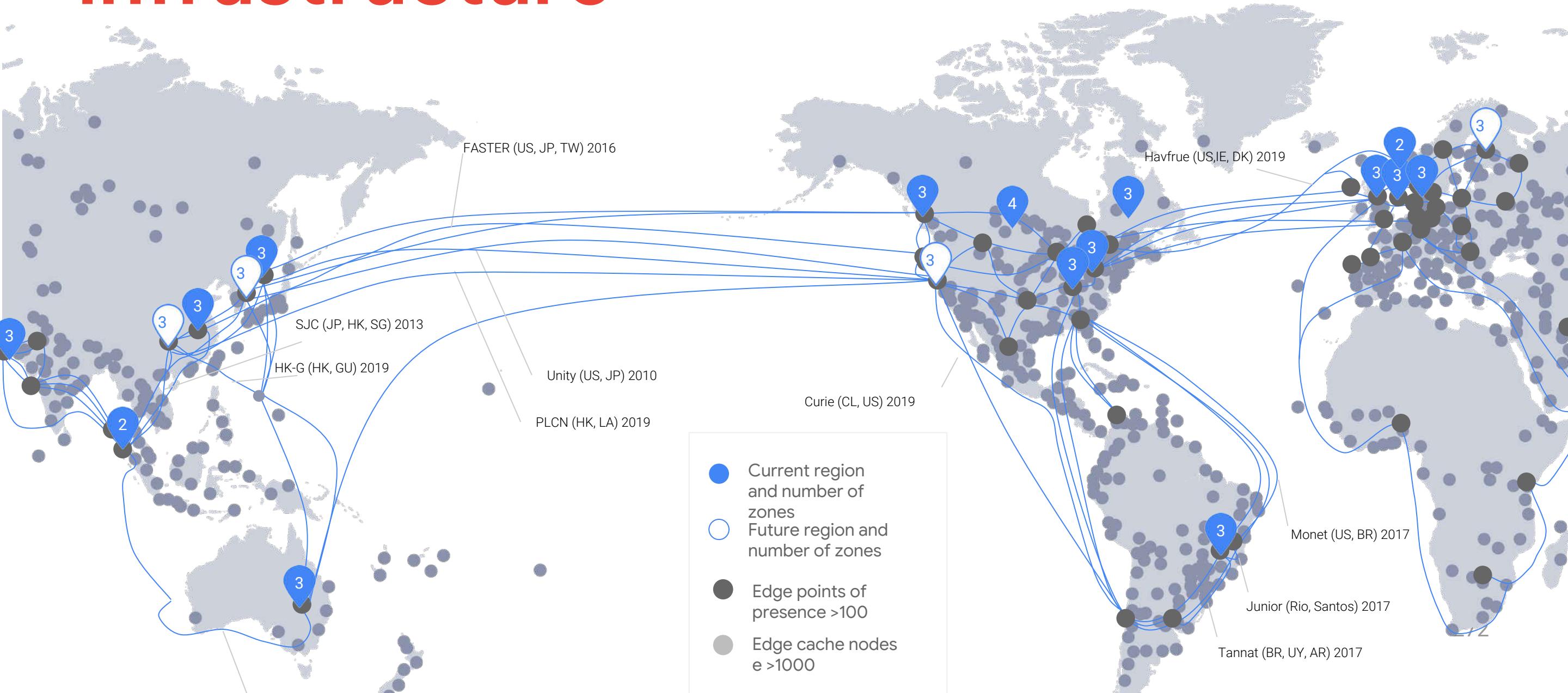
Cloud Dataproc under the hood



Machine Learning APIs enable apps that see, hear, and understand



Global network infrastructure





BigQuery runs on Google's high-performance infrastructure

- Compute and storage are separated with a terabit network in between
- You only pay for storage and processing used
- Automatic discount for long-term data storage

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Why use Cloud Pub/Sub?

- Building block for data ingestion in Dataflow, Internet of Things (IoT), Marketing Analytics
- Foundation for Dataflow streaming
- Push notifications for cloud-based applications
- Connect applications across Google Cloud Platform (push/pull between Compute Engine and App Engine)

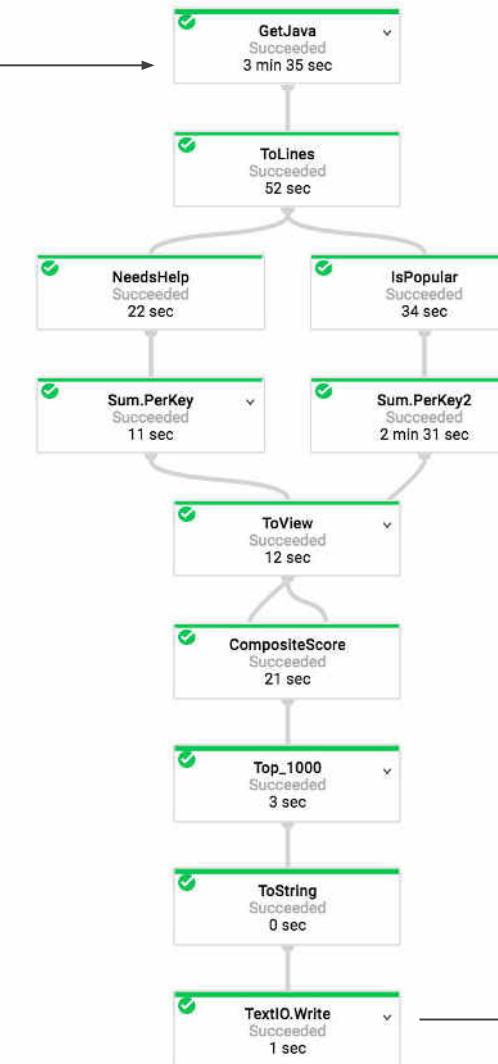
1 Dataflow pipelines flow data from a source through transforms
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3 Source



4 BigQuery

5 Transforms



Sink

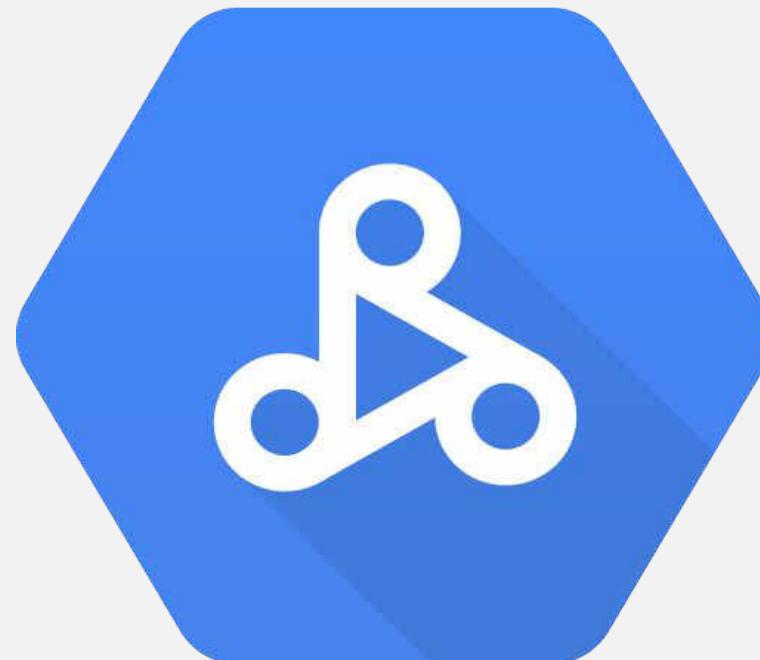


Cloud Storage



BigQuery is a fully managed data warehouse

- Provides near real-time interactive analysis of massive datasets (hundreds of TBs)
- Query using SQL syntax (SQL 2011)
- No cluster maintenance is required
- Compute and storage are separated with a terabit network in between
- You only pay for storage and processing used
- Automatic discount for long-term data storage



Why use Cloud Dataproc?

- Easily migrate on-premises Hadoop jobs to the cloud.
- Quickly analyze data (like log data) stored in Cloud Storage; create a cluster in 90 seconds or less on average, and then delete it immediately.
- Use Spark/Spark SQL to quickly perform data mining and analysis.
- Use Spark Machine Learning Libraries (MLlib) to run classification algorithms.

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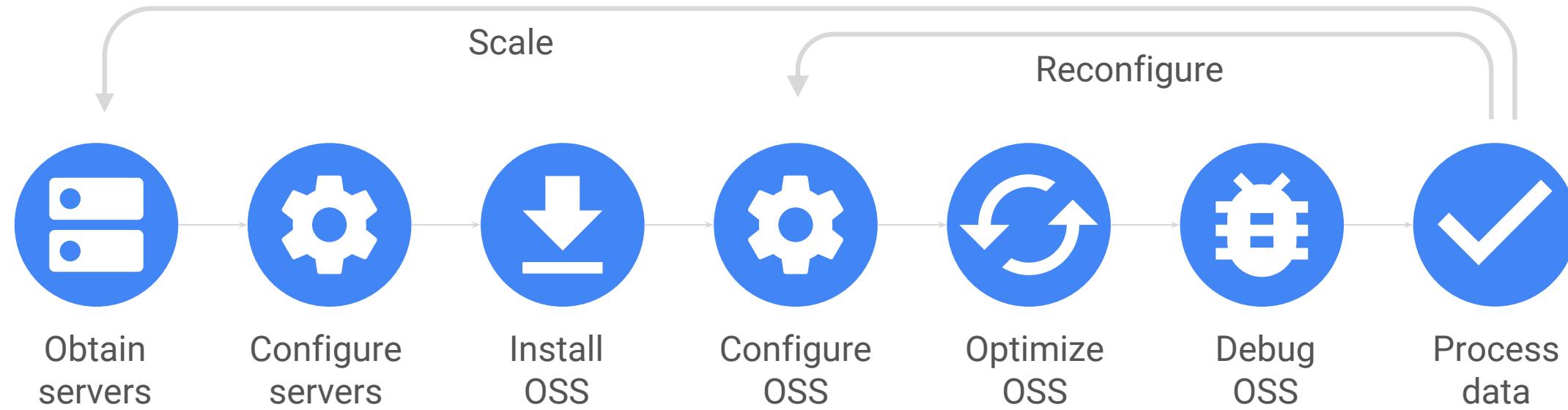
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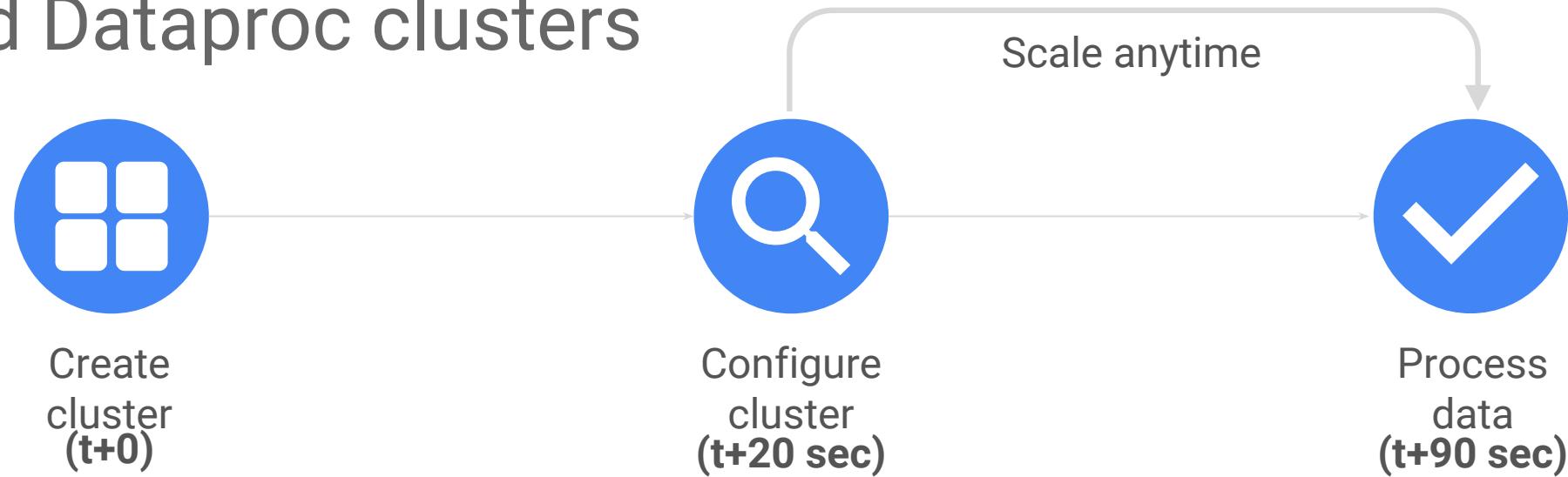
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Typical Spark/Hadoop clusters...



... vs Cloud Dataproc clusters





Cloud ML



Machine Learning APIs

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Open source tool to build and run neural network models

- Wide platform support: CPU or GPU; mobile, server, or cloud

Fully managed machine learning service

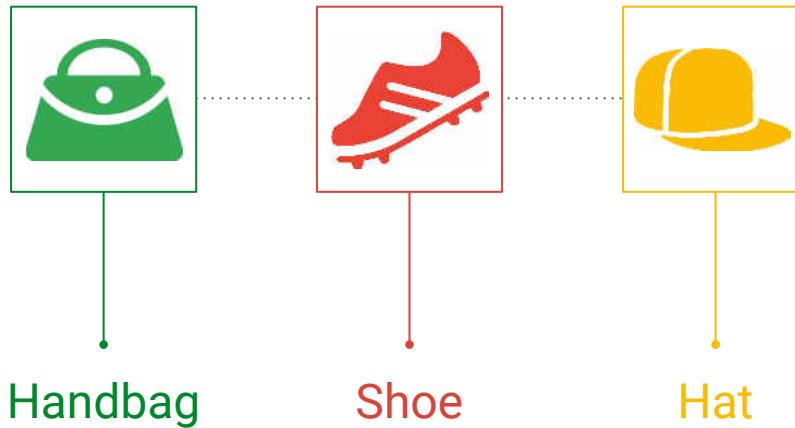
- Familiar notebook-based developer experience
- Optimized for Google infrastructure; integrates with BigQuery and Cloud Storage

Pre-trained machine learning models built by Google

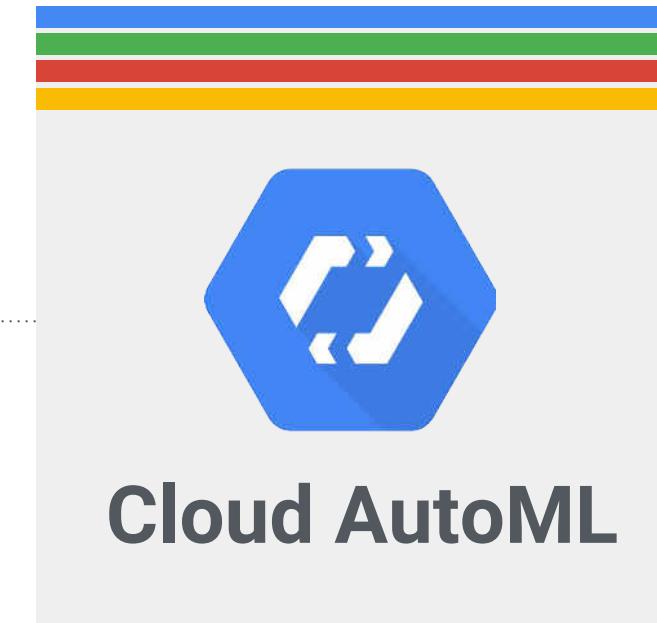
- Speech: Stream results in real time, detects 80 languages
- Vision: Identify objects, landmarks, text, and content
- Translate: Language translation including detection
- Natural language: Structure, meaning of text

Cloud AutoML Vision

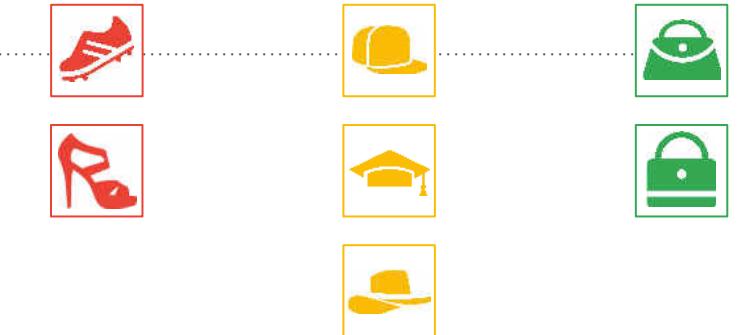
Upload and label
images



Train your model
in minutes or one day



Evaluate



Model is now trained and ready to make prediction.
This model can scale as needed to adapt to customer demands.

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Why use the Cloud Machine Learning platform?

For structured data



Classification and regression



Recommendation



Anomaly detection

For unstructured data



Image and video analytics



Text analytics



Cloud Vision API

- Analyze images with a simple REST API
 - Logo detection, label detection, etc
- With the Cloud Vision API, you can:
 - Gain insight from images
 - Detect inappropriate content
 - Analyze sentiment
 - Extract text

AI-enabled content management



Using Vision API to make it even easier for companies to discover, organize and drive actionable insights from their content





Cloud Speech API

- Recognizes over 80 languages and variants
- Can return text in real time
- Highly accurate, even in noisy environments
- Access from any device
- Powered by Google's machine learning



Cloud Natural Language API

- Uses machine learning models to reveal structure and meaning of text.
- Extract information about items mentioned in text documents, news articles, and blog posts.
- Analyze text uploaded in request or integrate with Cloud Storage.

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Cloud Translation API

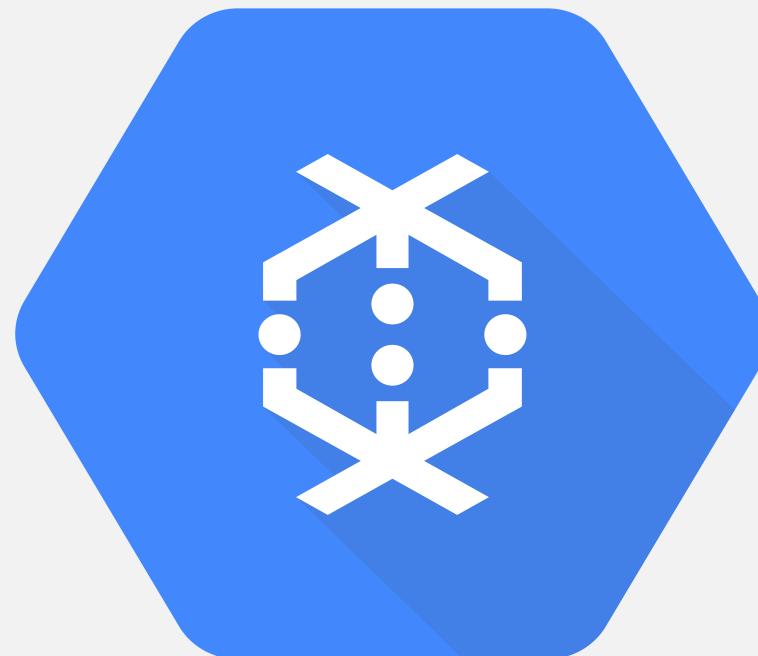
- Translate arbitrary strings between thousands of language pairs
- Programmatically detect a document's language
- Support for dozens of languages



Cloud Video Intelligence API^{Beta}

- Annotate the contents of videos
- Detect scene changes
- Flag inappropriate content
- Support for a variety of video formats

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Cloud Dataflow offers managed data pipelines

- Processes data using Compute Engine instances.
 - Clusters are sized for you
 - Automated scaling, no instance provisioning required
- Write code once and get **batch** and **streaming**.
- Transform-based programming model.

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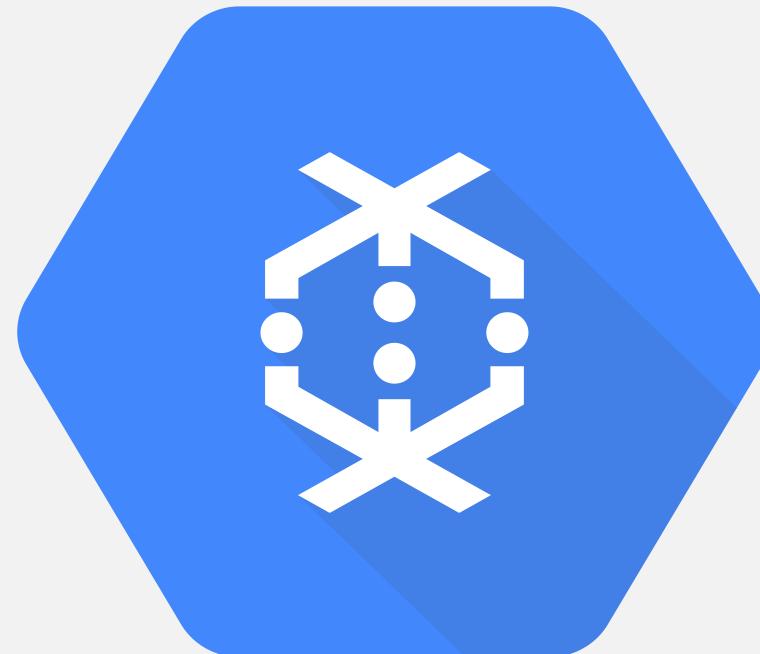
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Why use Cloud Dataflow?

- *ETL* (extract/transform/load) pipelines to move, filter, enrich, shape data
- *Data analysis*: batch computation or continuous computation using streaming
- *Orchestration*: create pipelines that coordinate services, including external services
- Integrates with GCP services like Cloud Storage, Cloud Pub/Sub, BigQuery, and Bigtable
 - Open source Java and Python SDKs



Cloud Datalab offers interactive data exploration

- Interactive tool for large-scale data exploration, transformation, analysis, and visualization
- Integrated, open source
 - Runs on App Engine
 - Built on Jupyter (formerly IPython)

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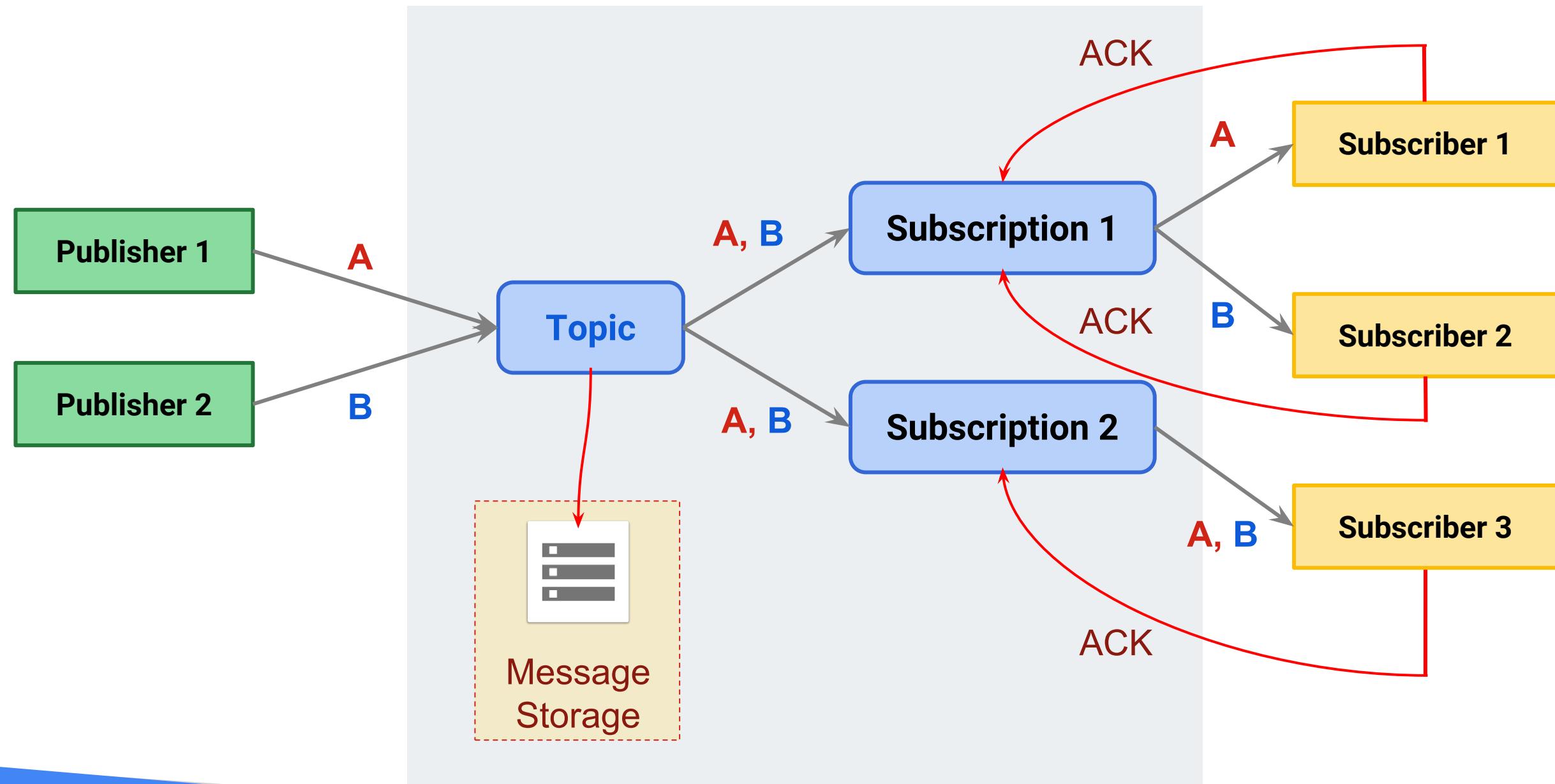


Cloud Pub/Sub is scalable, reliable messaging

- Supports many-to-many asynchronous messaging
 - Application components make push/pull subscriptions to topics
- Includes support for offline consumers
- Based on proven Google technologies

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Multiple Publishers and Subscribers





Why use Cloud Datalab?

- Create and manage code, documentation, results, and visualizations in intuitive notebook format.
 - Use Google Charts or matplotlib for easy visualizations.
- Analyze data in BigQuery, Compute Engine, and Cloud Storage using Python, SQL, and JavaScript.
- Easily deploy models to BigQuery.

Notebook ▾

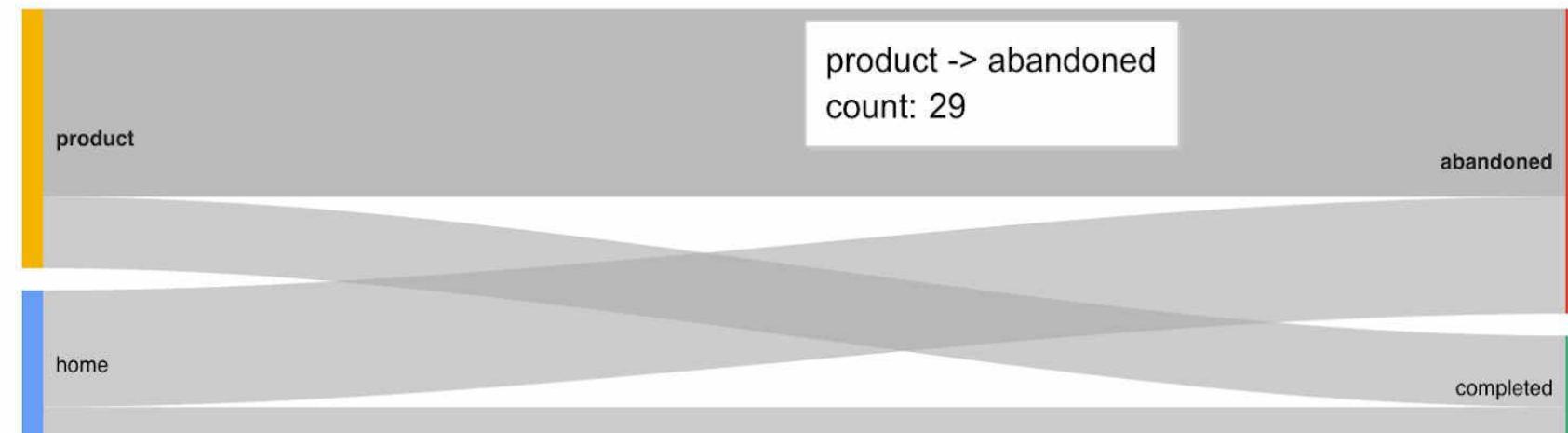
[+ Add Code](#) [+ Add Markdown](#) [Delete](#) [Move Up](#) [Move Down](#) [Run ▾](#) [Clear ▾](#) [Reset Session](#)[Navigation](#) [Help](#)

```
1 %%sql --module conversions
2 select if (path = '/', 'home', 'product') as start,
3        if (tx <> 0, 'completed', 'abandoned') as outcome,
4        count(*) as count from (
5   select visitId, hits.page.pagePath as path, hits.hitNumber as hitNumber,
6          sum(if(hits.page.pagePath == '/confirm.html', 1, 0)) within record as tx
7   from [google.com:analytics-bigquery:LondonCycleHelmet.ga_sessions_20130910]
8   order by visitStartTime, hitNumber)
9 where hitNumber = 1
10 group by start, outcome;
```

Visualize paths taken

Sankey diagram makes it easier to see tabular data

```
%chart sankey conversions
```



Help for Python APIs

You can enter class? or member? within a code cell in the notebook to get help on a Python API.

For example, try str? to get help information on the built-in Python method to convert a value to its string representation.

Additional help topics and links are also available from the menu off the Help icon on the top of the page.

Docs and Samples

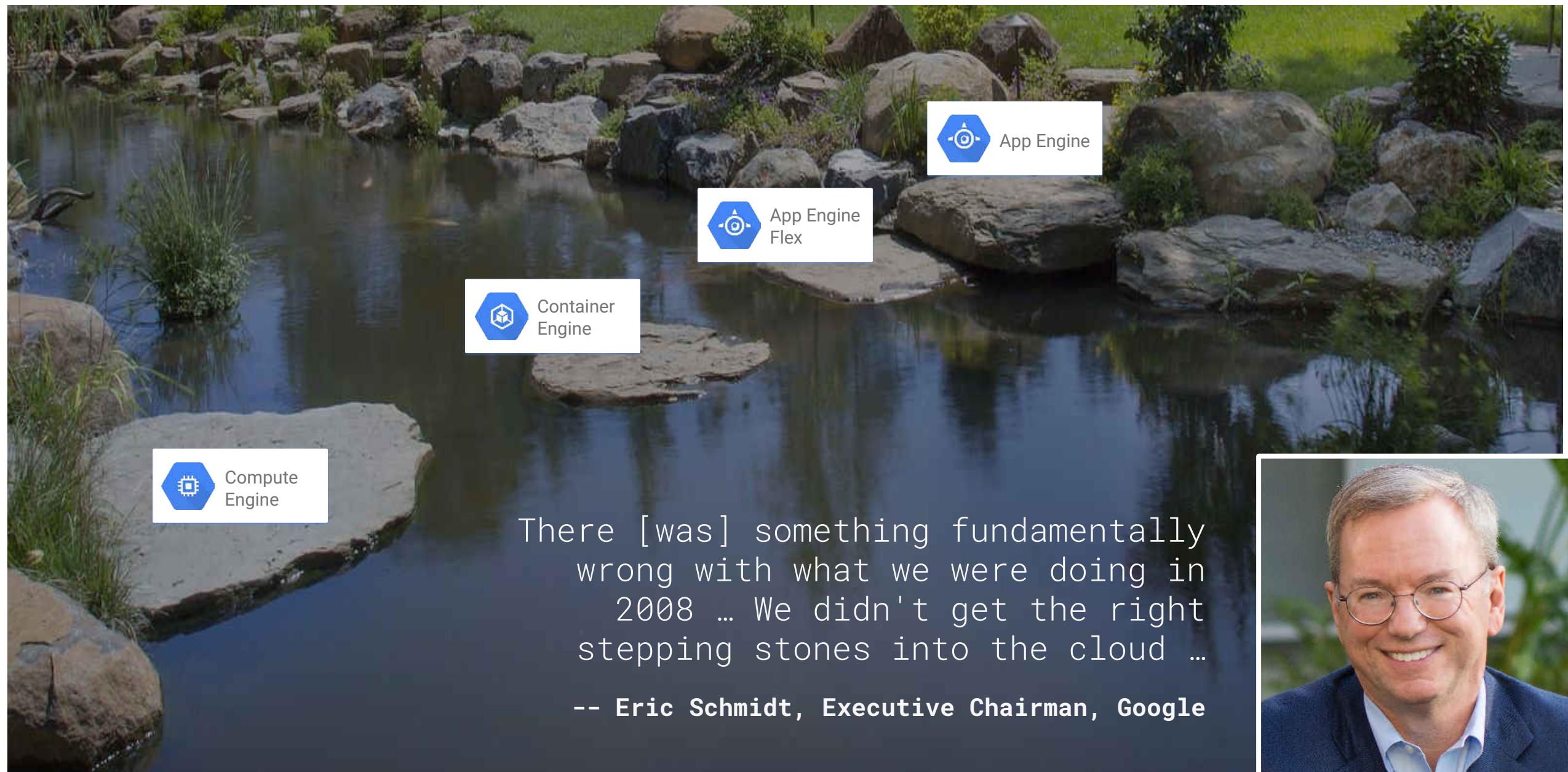
The [Datalab Guide](#) featuring documentation and sample notebooks is also a great way to check out how you can use Datalab.

Google Cloud Platform

Network	Compute	Storage/DB	Big Data	Machine Learning	Management
 Virtual Network	 Compute Engine (IaaS)	 Persistent Disk	 BigQuery	 Cloud ML	 Stackdriver
 Load Balancing	 Container Engine	 Cloud Storage	 Dataflow	 Vision API	 Monitoring
 CDN	 Container Registry	 Cloud SQL	 Dataproc	 Speech API	 Logging
 Interconnect	 Cloud Functions	 BigTable	 Datalab	 Translate API	 Debugger
 DNS	 AppEngine (Paas)	 Datastore	 Pub/Sub	 Prediction API	 Support

3 Choose your storage solution based on your access pattern

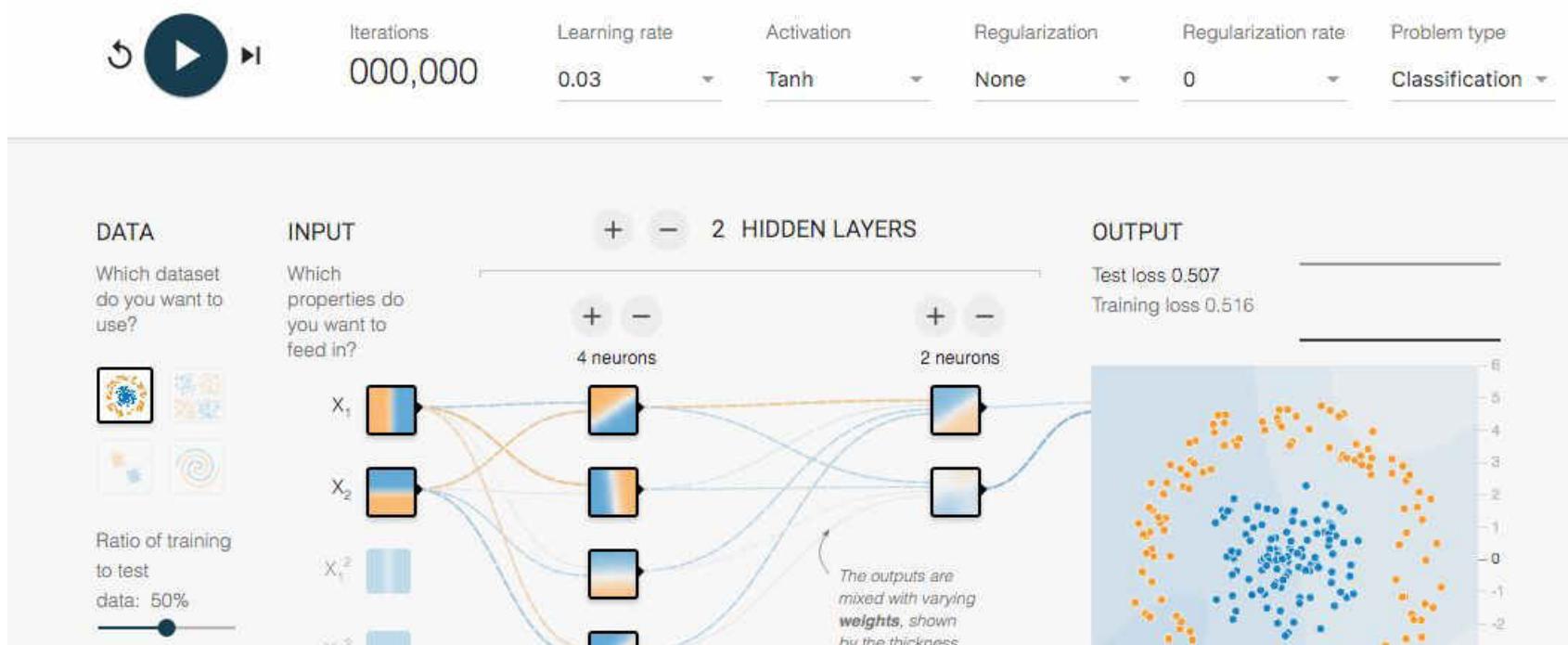
	Cloud Storage	Cloud SQL	Datastore	Bigtable	BigQuery
Capacity	Petabytes +	Gigabytes	Terabytes	Petabytes	Petabytes
Access metaphor	Like files in a file system	Relational database	Persistent Hashmap	Key-value(s), HBase API	Relational
Read	Have to copy to local disk	SELECT rows	Filter objects on property	scan rows	SELECT rows
Write	One file	INSERT row	put object	put row	Batch/stream
Update granularity	An object (a "file")	Field	Attribute	Row	Field
Usage	Store blobs	No-ops SQL database on the cloud	Structured data from AppEngine apps	No-ops, high throughput, scalable, flattened data	Interactive SQL* querying fully managed warehouse



There [was] something fundamentally wrong with what we were doing in 2008 ... We didn't get the right stepping stones into the cloud ...

-- Eric Schmidt, Executive Chairman, Google



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3 Demo: Playing with neural networks to learn what they are5
6 Tinker With a **Neural Network** Right Here in Your Browser.
7 Don't Worry, You Can't Break It. We Promise.

<http://playground.tensorflow.org/>

Cloud Pub/Sub: Complexity

