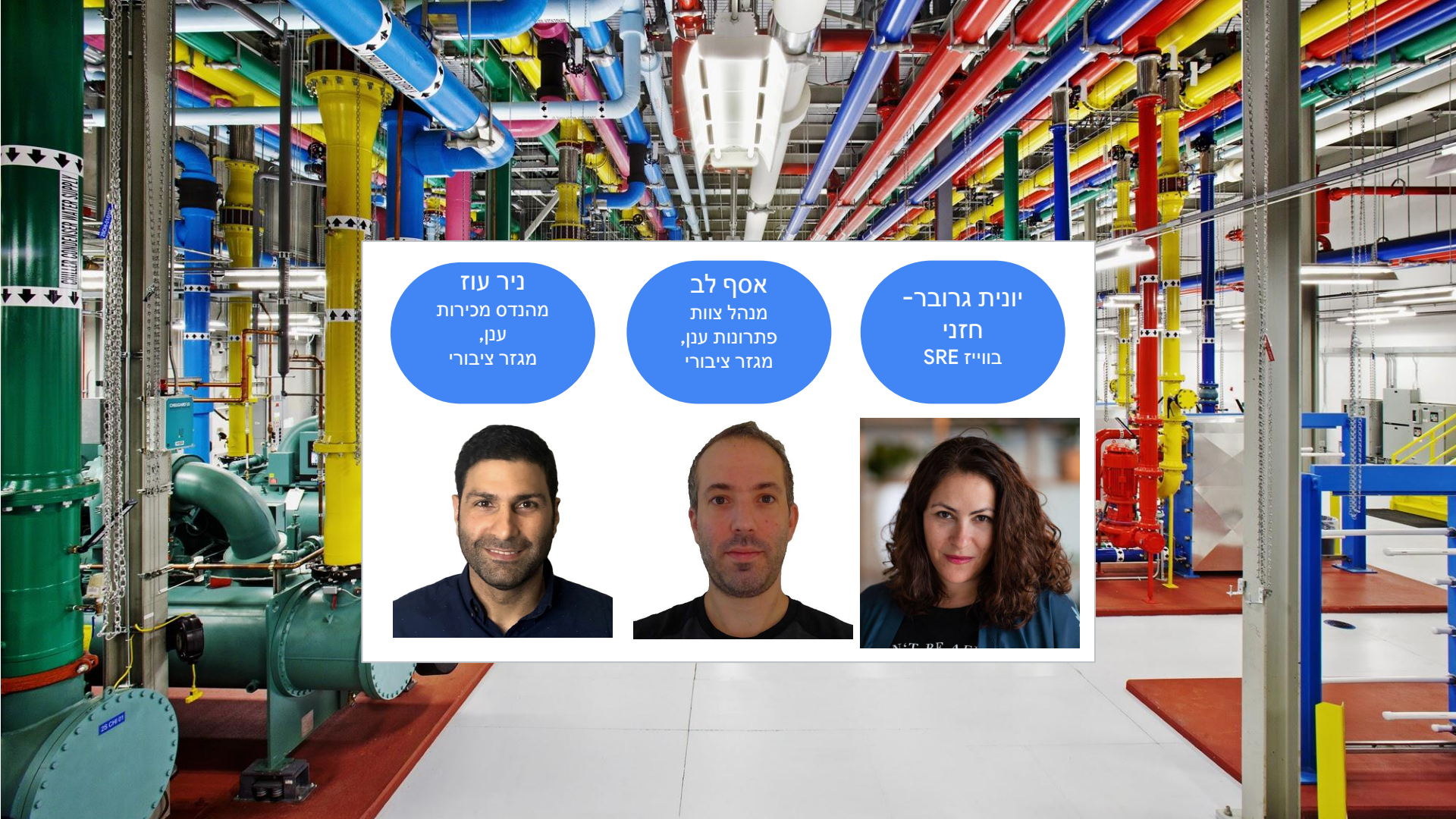
Google Cloud Core הצגת - ווביינר
Infrastructure

14/10/2021


יונית גרובר-חזני
בווייז SRE
אסף לב
מנהל צוות פתרונות ענן, מגזר ציבורי
ניר עוז
מהנדס מכירות ענן, מגזר ציבורי

סדר יום

- חברת Google
- הקמת הענן של Google בישראל
- איך מתחילים למידה עצמית
- Google Cloud Core Infra++
  - היררכית משאבים וIAM בענן Google
  - מכונות וירטואליות בענן Google
  - אחסון בענן Google
  - Containers בענן Google
  - Multi & Hybrid Cloud
  - פיתוח בענן, serverless וניטור
  - AI/ML & Data Management

Google Cloud

Alphabet Google

Google Ventures
Venture & Capital Funding

Waymo
Self Driving Vehicles

SideWalk Labs
Solving Big Urban Problems

Jigsaw
Global Online Security Solutions

Fiber
High Speed Internet Services

Wing
Drone-based Delivery of Freight

CapitalG
Private Equity

Google X
Innovation Lab & Research

Calico
Longevity Research

Verily
Improving Quality of Life

DeepMind
AI & Machine Learning

Google

Search Advertising
SEM

Google Cloud

YouTube
Internet Video Service

Google Health
Google Health AI and Consumer Health Products

Maps
Mapping, Location Services & Logistics

Google Marketing Platform
Data Analytics Suite of Tools

Devices and Services
Pixel, Nest Chromecast

Android
Mobile Operating System


בלעדי

גוגל תכריז רשמית על פרויקט הכבל התת ימי שיחבר בין אירופה לאסיה – ויעבור בישראל

הפרויקט כולל הנחת שני כבלים שיחברו בין הודו, עומאן, ג'יבוטי, ערב הסעודית וירדן, לאיטליה, צרפת, יוון וישראל, בהיקף השקעה של מאות מיליוני דולרים. החיבור בין שני הכבלים יעבור קרקעית בישראל, לאחר עבודות תשתית שתבצע בזק עבור השותפות בפרויקט

Google 2006 מתחילה לפעול בישראל

מעל 1500 עובדים בשני מרכזים פיתוח

Start up קמפוס

השקעה ורכישת חברות ישראליות - WAZE, Velostrata, Alooma

הקמת מרכז לפיתוח שבבים

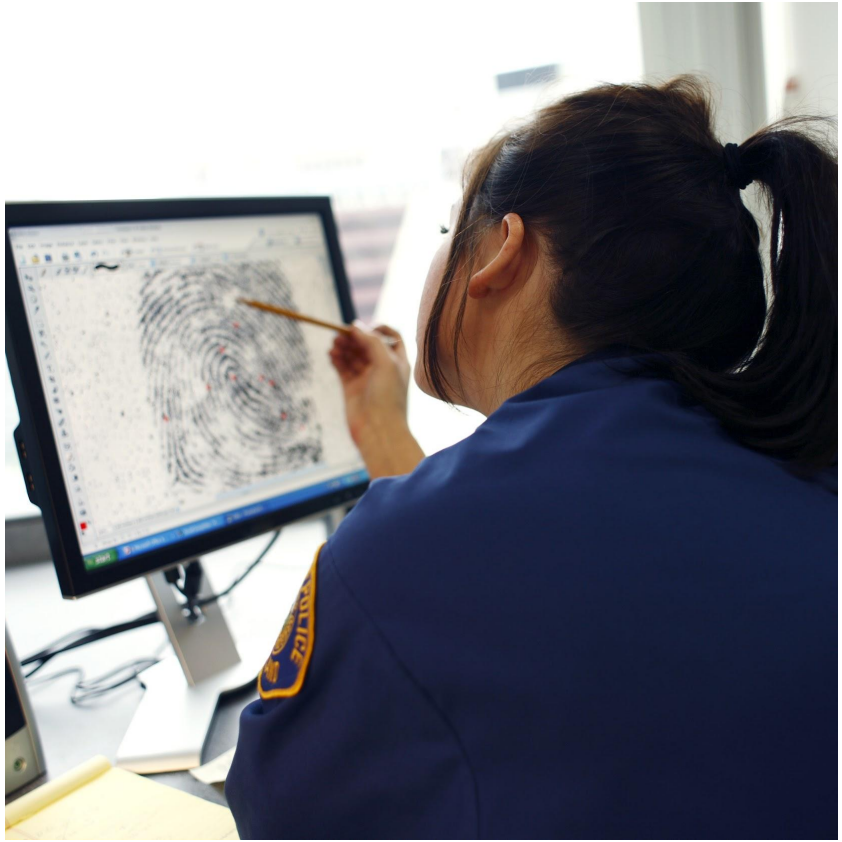
פתיחת מעבדת החדשנות X moonshot lab

הכרזה על הקמת ענן ציבורי בישראל

כבל תת ימי שיעבור בישראל

פעילות חברתית נרחבת

מה מייחד אותנו



אבטחת מידע	הגנה פרואקטיבית, הצפנה מקצה לקצה, חומרה ותקשורת ייעודית
ענן היברידי וריבוי עננים	פתרונות חוצי ענן המבוססים על קוד פתוח
אוטומציה ללא אופרציה	מגוון רחב של פתרונות ושירותים מנוהלים מקצה לקצה
בינה מלאכותית	בינה מלאכותית ולמידת מכונה מוטמעים בפתרונות הענן
שיתופיות	הדרך הטובה ביותר ליצור, לתקשר ולשתף פעולה
חדשנות	תרבות של חדשנות באמצעות מינוף יכולות קבוצת Alphabet

פרטיות והגנת המידע בGoogle Cloud

אנו אף פעם לא נותנים לגוף ממשלתי גישת "דלת אחורית"

נוהלי הפרטיות שלנו נבדקים בסטנדרטים בינלאומיים

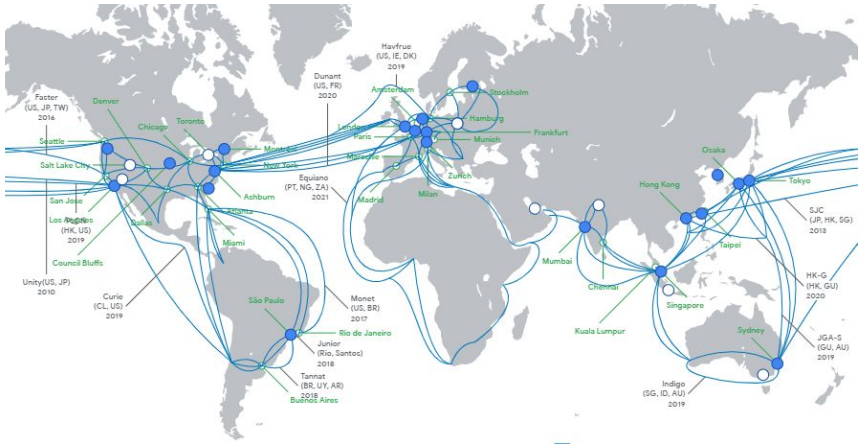
Google Cloud לא משתמשת במידע הלקוח לשם פרסום

המידע שלכם, לא של Google

Google לעולם לא תמכור את מידע הלקוח לצד ג׳

כברירת מחדל, כל המידע בענן מוצפן מקצה לקצה

אבטחה מהשורה הראשונה מנק׳ הקצה למרכזי הנתונים



אבטחה באופן יסודי

אחת הרשתות הפרטיות הגדולות בעולם, מה שממזער את הסיכון לחשיפת לקוחות לאינטרנט הציבורי

אבטחת מידע

זיהוי מידע רגיש ומיסכו באופן אוטומטי באמצעות **יותר מ-120** מזהים אוטומטיים

הצפנה כברירת מחדל

הענן של גוגל **מצפין** את **התעבורה** ואת **המידע** בעת מנוחה בתור **ברירת מחדל**

“

Forrester names Google Cloud a Leader in The Forrester Wave™: Infrastructure as a Service (IaaS) Platform Native Security, Q4 2020 report

Forrester IaaS Security Q4 2020

תוכנית הקמת הענן של Google בישראל

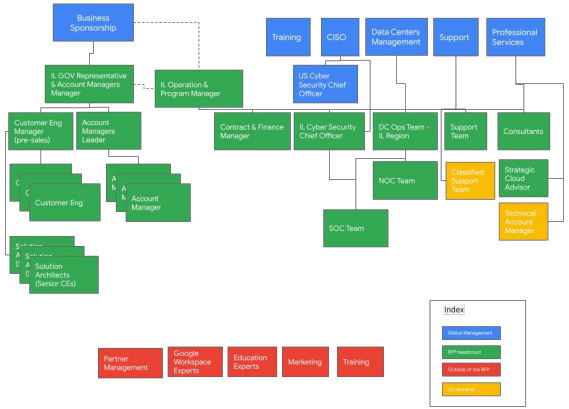
האזור הישראלי

- האזור הישראלי מורכב מ-3 אזורים (Zones)
- האזורים מופרדים ומספקים שרידות מלאה
- האזור הישראלי החלקי יהיה זמין מאוד בקרוב
- האזור הישראלי, בדומה לאזורים אחרים בעולם, יכיל מגוון רחב מאוד של שירותים
- שירותים חדשים ייפרסו גם באזור הישראלי
- האזור הישראלי יחובר לרשת הגלובלית של Google

Google Cloud

המבנה הארגוני עבור נימבוס

- ניהול לקוחות
  - צוות מנהלי לקוחות ייעודי
  - צוות פתרונות ענן וארכיטקטים ייעודי
- צוותי ניהול והקמת מרכזי הנתונים
- צוות אבטחת מידע
- צוותי תמיכה
- צוותי יישום
- צוות הדרכה
- ועוד...



Google Cloud

תוכנית הדרכות עבור Google Cloud בישראל

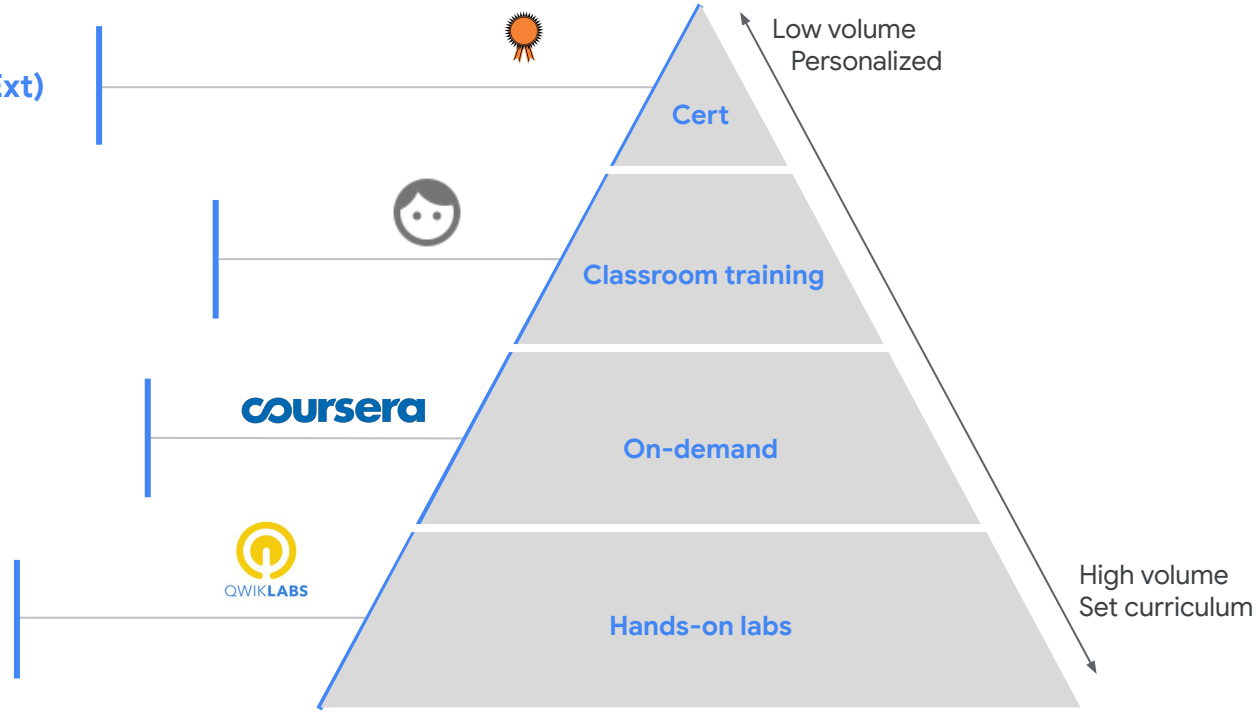
מודל ההדרכה עבור נימבוס

Google Cloud Certification (Ext)

Classroom - Instructor Led

On-demand Training

Hands-on Labs

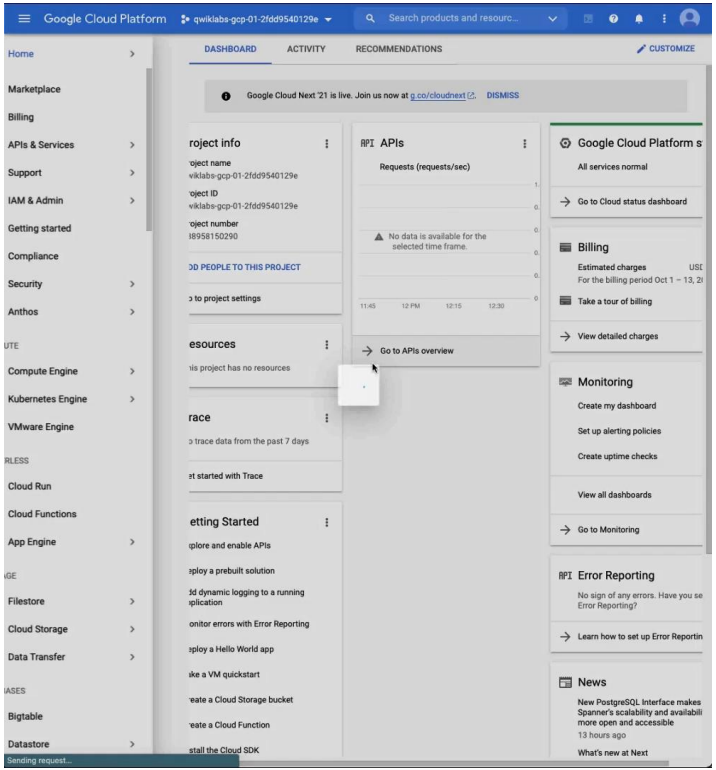


פתיחת חשבון ב- QWIKLABS

1. התחבר ל-https://google.qwiklabs.com (לא www)
2. הרשם באמצעות המייל הממשלתי (לדוגמה: israel.israeli@mox.gov.il)
3. בחרו מהקטלוג את הקורס הרצוי ולחצו על Start Lab
4. מעבדות מומלצות
   - GCP Essentials quest
   - Professional certifications
   - Data, machine learning, and AI

Demo

QWIKLABS



Google Cloud Resource Hierarchy and IAM

Nir Oz
Customer Engineer
Public Sector, Israel

Agenda

Google Cloud resource hierarchy

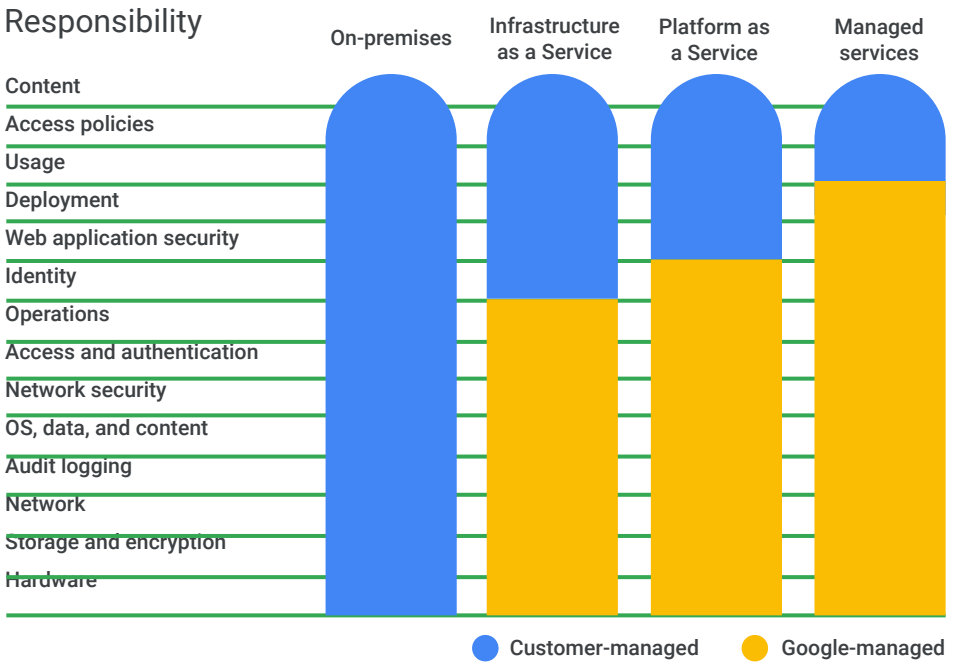
Identity and Access Management (IAM)

Cloud Identity

Demo

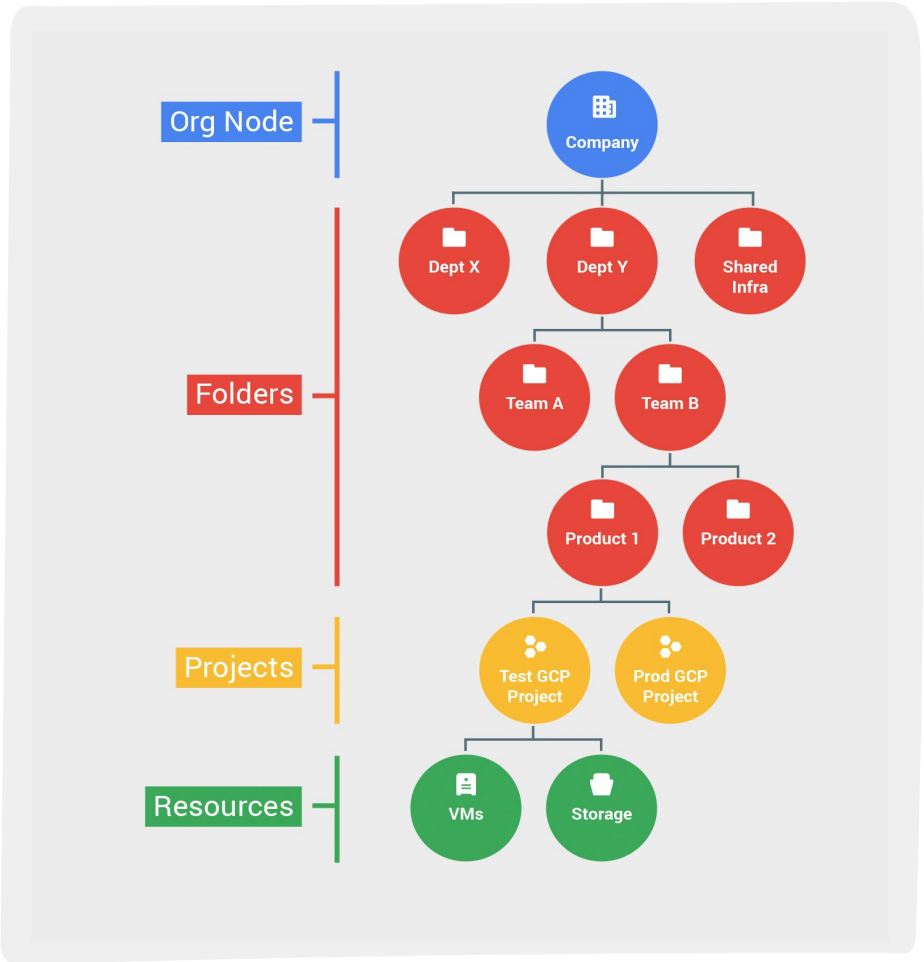
Shared responsibilities model

- 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.



Resource hierarchy levels define trust boundaries

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



Google Cloud

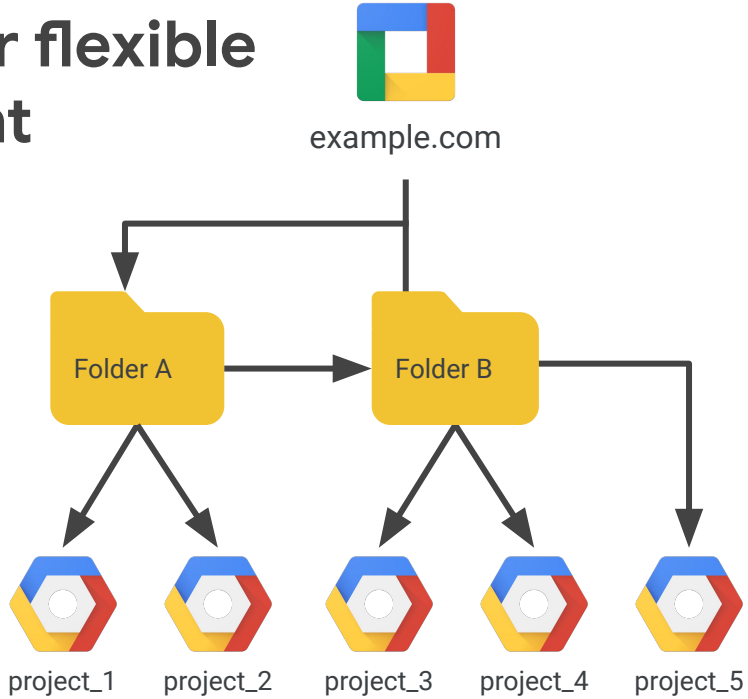
All Google Cloud services you use are associated with a project

- Track resource and quota usage.
- Enable billing.
- Manage permissions and credentials.
- Enable services and APIs.

Google Cloud

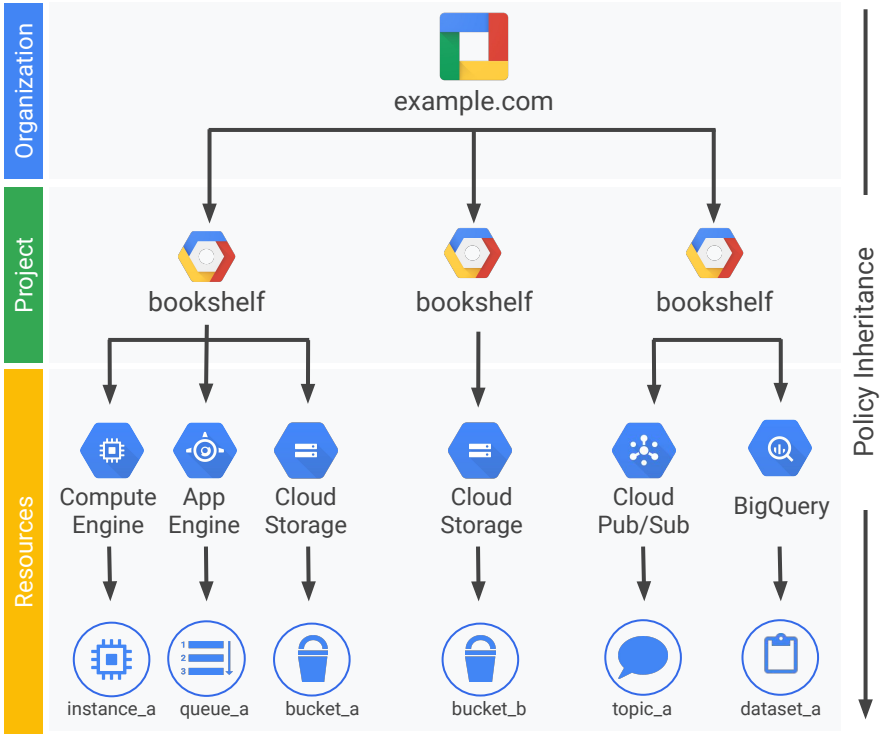
Folders offer flexible management

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



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.



Google Cloud

Agenda

Google Cloud resource hierarchy

Identity and Access Management (IAM)

Cloud Identity

Demo

Google Cloud Identity and Access Management defines...

Who

can do what

on which resource

Google Cloud

Who

IAM policies can apply to any of four types of principals

Google account or Cloud Identity user
test@gmail.com test@example.com

Service account
test@project_id.iam.gserviceaccount.com

Google group
test@googlegroups.com

Cloud Identity or Google Workspace domain
example.com

Google Cloud

Can do what

IAM roles are collections of related permissions

Can do what

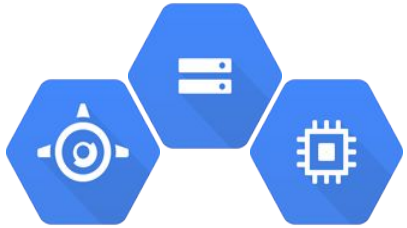
Instance Admin
Role

Service	Resource	Verb
compute	instances	list
compute	instances	delete
compute	instances	start
...		

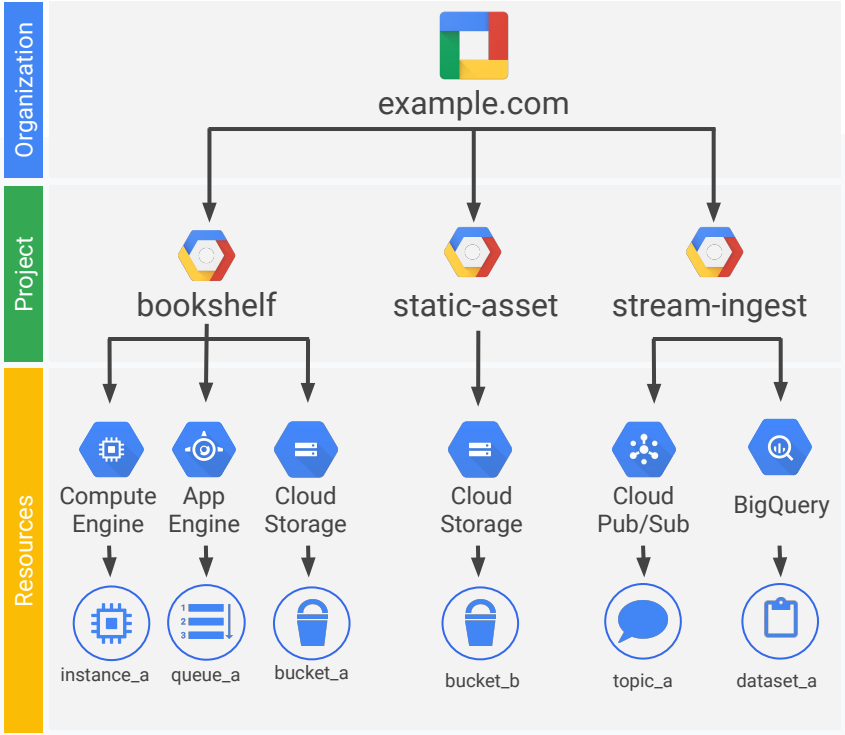
Google Cloud

On which resource

Users are assigned roles on specific items



On which resource



Google Cloud

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

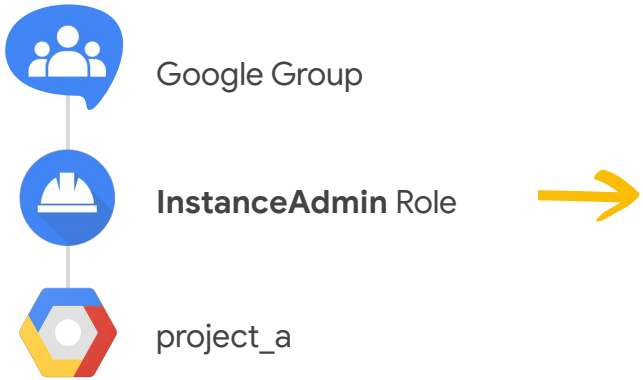
Billing Administrator

- Manage billing
- Add and remove administrators

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

Google Cloud

IAM predefined roles offer fine-grained permissions on particular services



- compute.instances.setMachineType
- compute.instances.delete
- compute.instances.get
- compute.instances.list
- compute.instances.start
- compute.instances.stop

...

Google Cloud

IAM custom roles let you define a precise set of permissions

Google Group

InstanceOperator Role

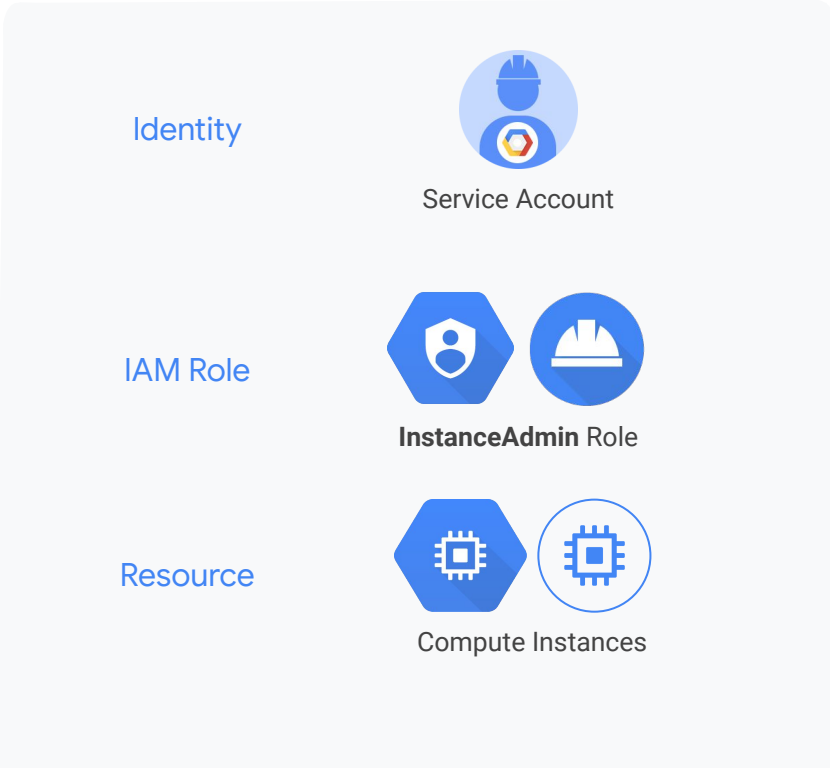
project_a

- ✓ compute.instances.get
- ✓ compute.instances.list
- ✓ compute.instances.start
- ✓ compute.instances.stop
- ...

Google Cloud

Service Accounts and IAM

- Service accounts authenticate using keys.
  - Google manages keys for Compute Engine and App Engine.
- You can assign a predefined or custom IAM role to the service account.



Google Cloud

Agenda

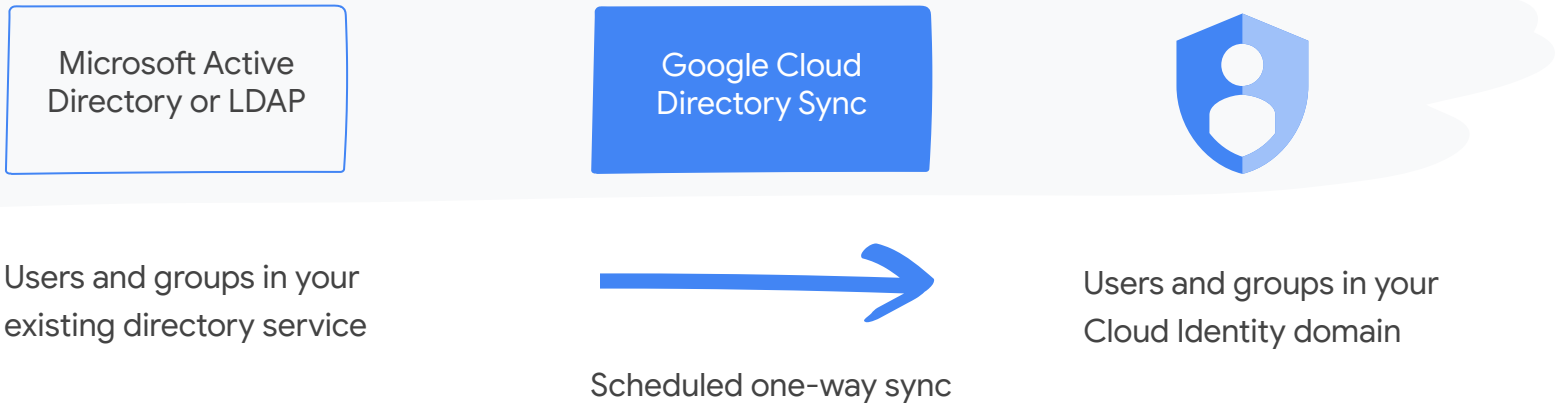
Google Cloud Platform resource hierarchy

Identity and Access Management (IAM)

Cloud Identity

Demo

What if you already have a different corporate directory?



Google Cloud

How Google Cloud Directory Sync works

1. Data is exported from your LDAP server or Active Directory.
2. GCDS connects to the Google domain and generates a list of Google uses, groups, and shared contacts that you specify.
3. GCDS compares these lists and updates your Google domain to match the data.
4. When the synchronization is complete, a report is emailed.

Google offers customer-friendly pricing

Billing in sub-hour increments

For compute, data processing and other services

Discounts for sustained use

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

Discounts for committed use

Pay less for steady, long-term workloads

Discounts for preemptible use

Pay less for interruptible workloads

Custom VM instance types

Pay only for the resources you need for your application

3 Type of Google Agreements for Cloud & Research

	Standard Pay-as-you-go	Traditional Commit Contract	Subscription Agreement for Research & Life Sciences
Inclusions	• List prices • Sustained use discounts on compute	• Fixed discount across all products • Discount % based on total commitment • Minimum contract term 12 months • Use of additional discounts (CUD's)	• Fixed price for the WHOLE predefined workload for a set period of time • Discounts applied to everything - One Upfront discount applied to the entire GCP platform (GCP price list) • No overage billing • Negotiate your cost for the whole year • Right to use all* GCP products for defined use case - one SKU for workload
Requirements	N/A	Scoped overall expected usage	Scoped Workloads specs (cloud solution, systems, usage patterns, # users)

** Currently Excludes Maps, Marketplace, Apigee, Looker, Bare Metal and Chronicle.*

Agenda

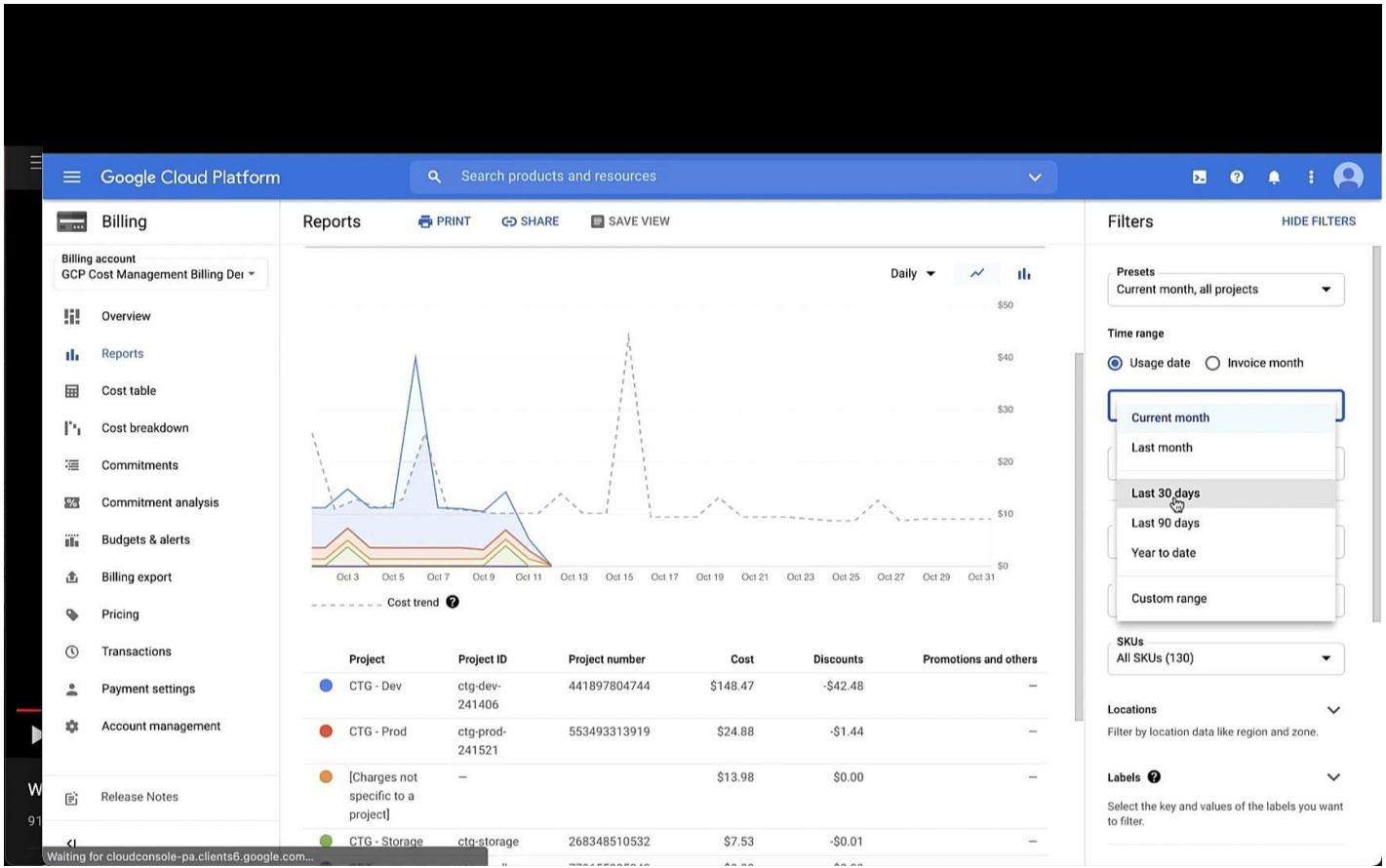
Google Cloud Platform resource hierarchy

Identity and Access Management (IAM)

Cloud Identity

Demo

הדגמת דו"ח הוצאות



Virtual Machines in the Cloud

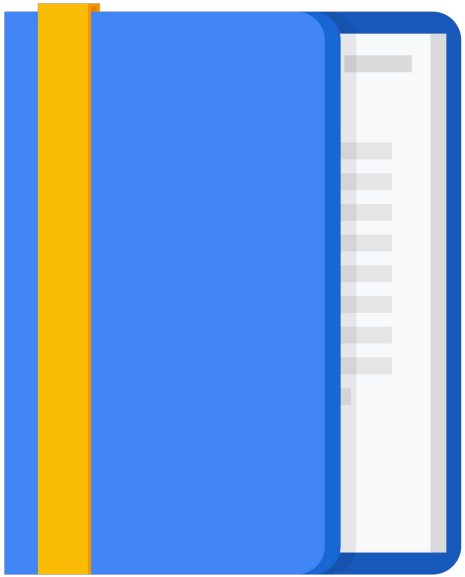
Nir Oz
Customer Engineer
Public Sector
Google Cloud

Agenda

Virtual Private Cloud (VPC) Network + Demo

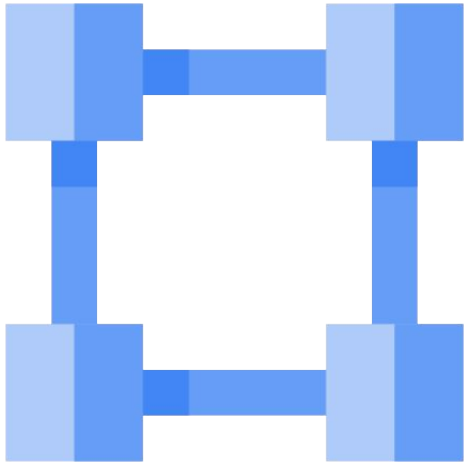
Compute Engine + Demo

Migration

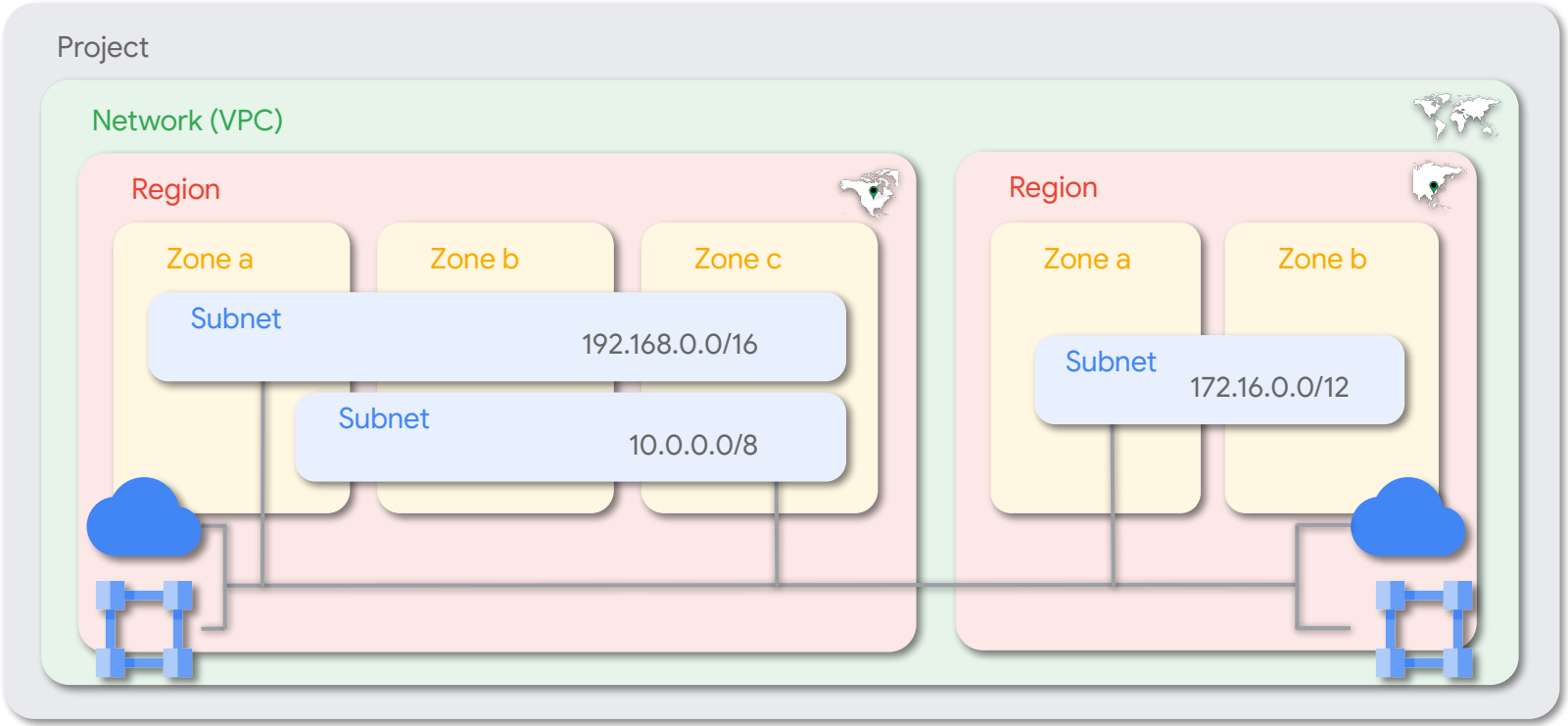


Virtual Private Cloud Networking

- Each VPC network is contained in a Google Cloud project.
- You can provision Google Cloud resources, connect them to each other, and isolate them from one another.



Network concepts



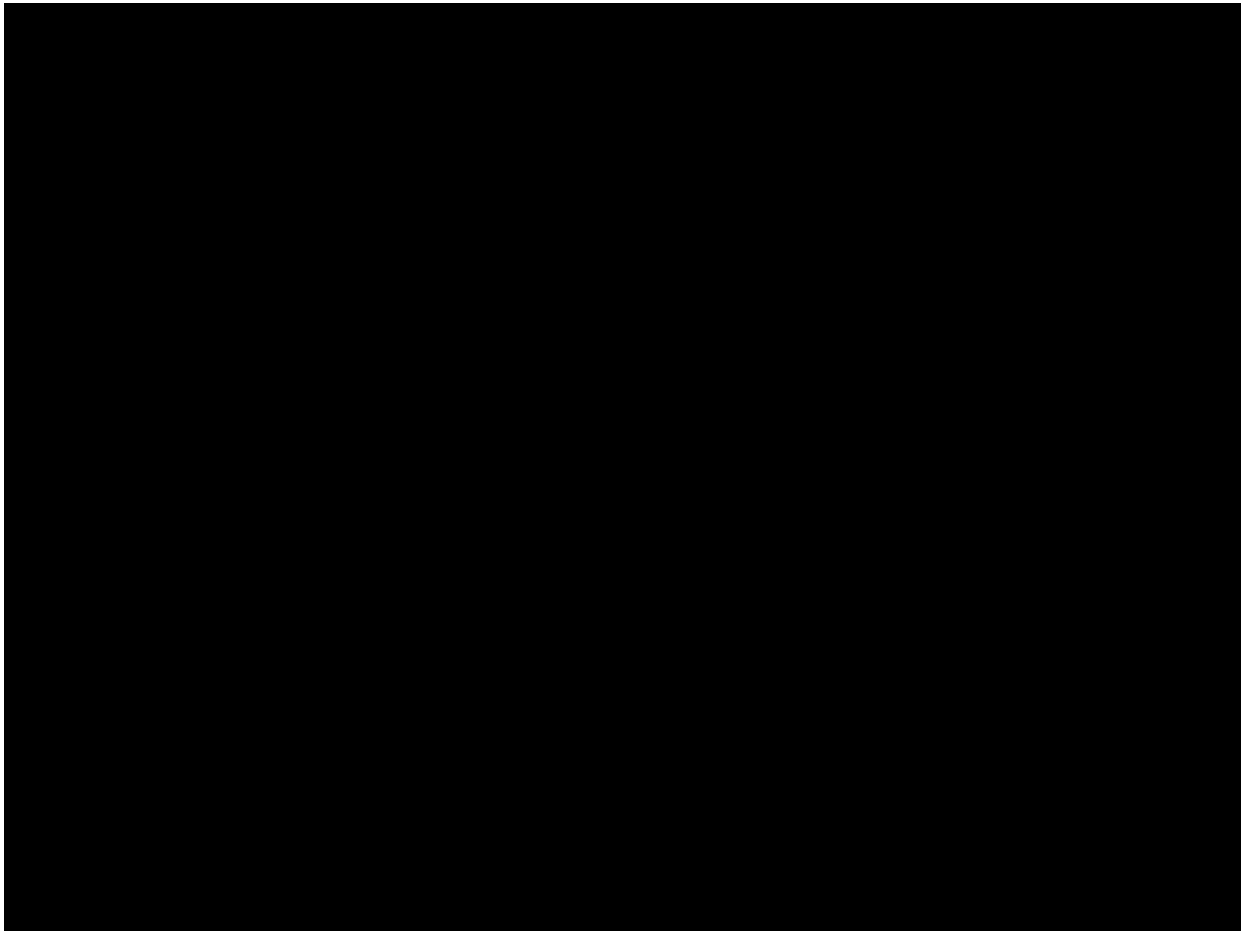
Google Cloud

Shared VPC key points

Cross-project communication	משאבים מפרויקטים שונים יכולים לתקשר כאילו הם באותו VPC
Network Administration	ניהול הרשת למספר פרויקטים נעשה בצורה מרוכזת ממקום אחד
Quotas and Limits	שליטה על ההגבלות שאני מכיל על הרשת ממקום אחד
Design Complexity	מוריד משמעותית את כמות הVPC ומפשט את הרשת הארגונית
Flexibility	נוכל לשתף את כל ה subnets בתוך הVPC בצורה נוחה

Google Cloud

VPC Demo



Google Cloud

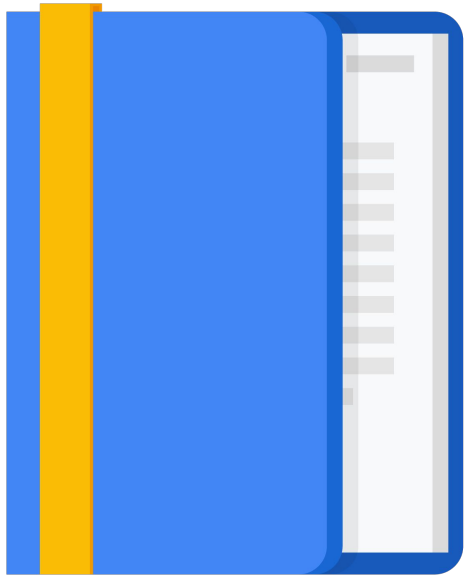
Agenda

Virtual Private Cloud (VPC) Network + Demo

Compute Engine + Demo

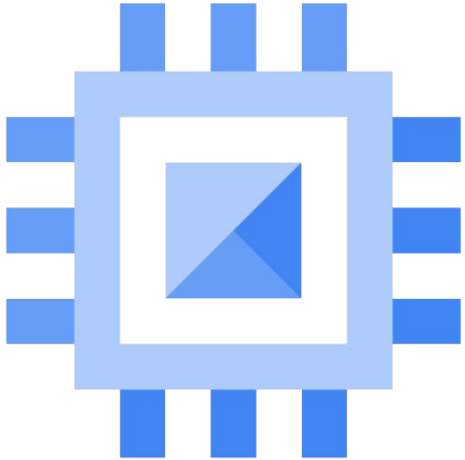
Migration

Demo



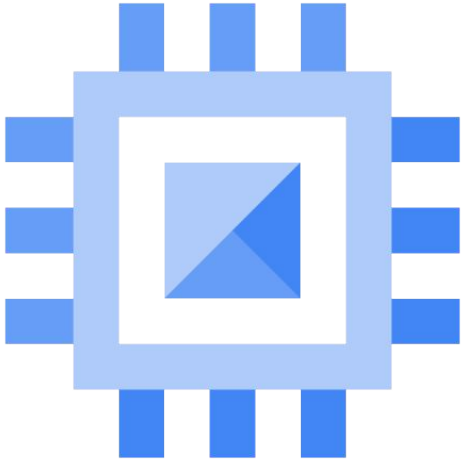
Compute Engine offers managed virtual machines

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



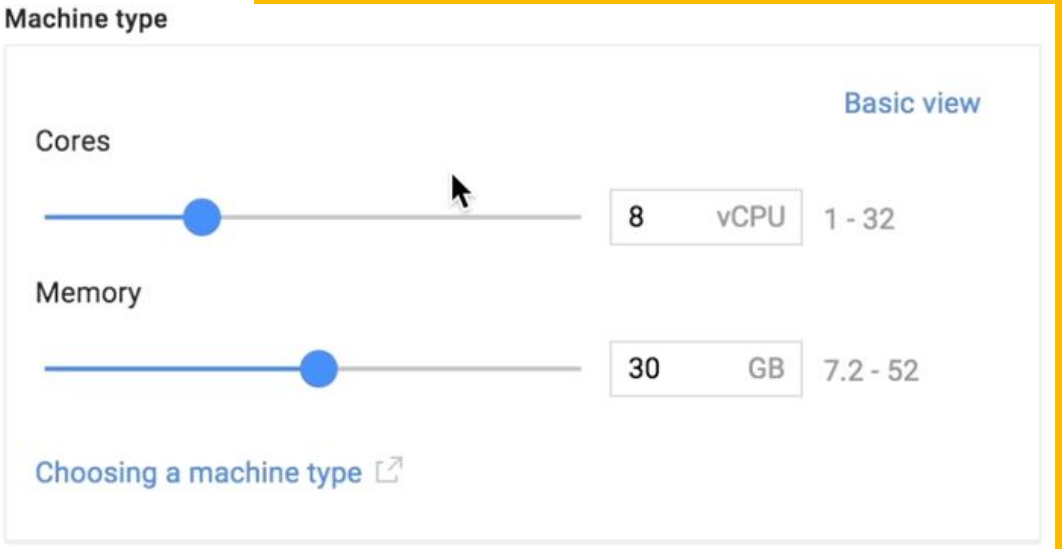
Compute Engine offers customer friendly pricing

- Per-second billing, sustained use discounts, committed use discounts.
- Preemptible instances.
- High throughput to storage at no extra cost.
- Custom machine types: Only pay for the hardware you need.



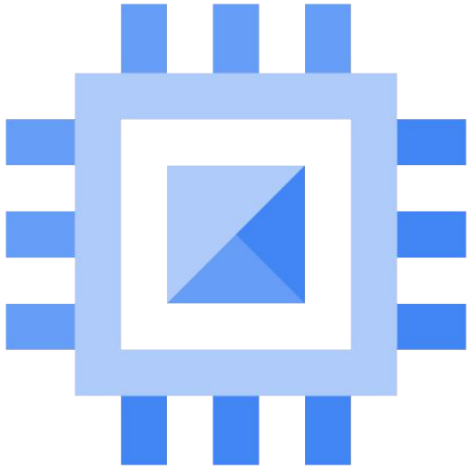
Custom machine types

You choose CPU & Memory

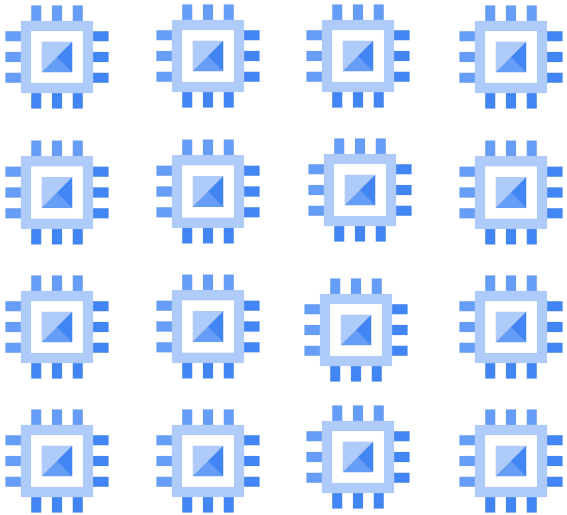


Google Cloud

Scale up or scale out with Compute Engine



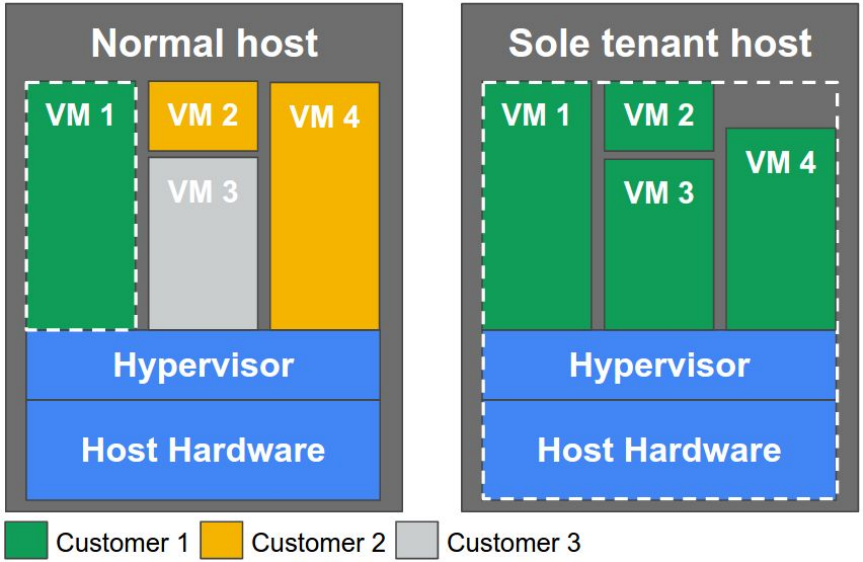
Use big VMs for memory- and compute-intensive applications



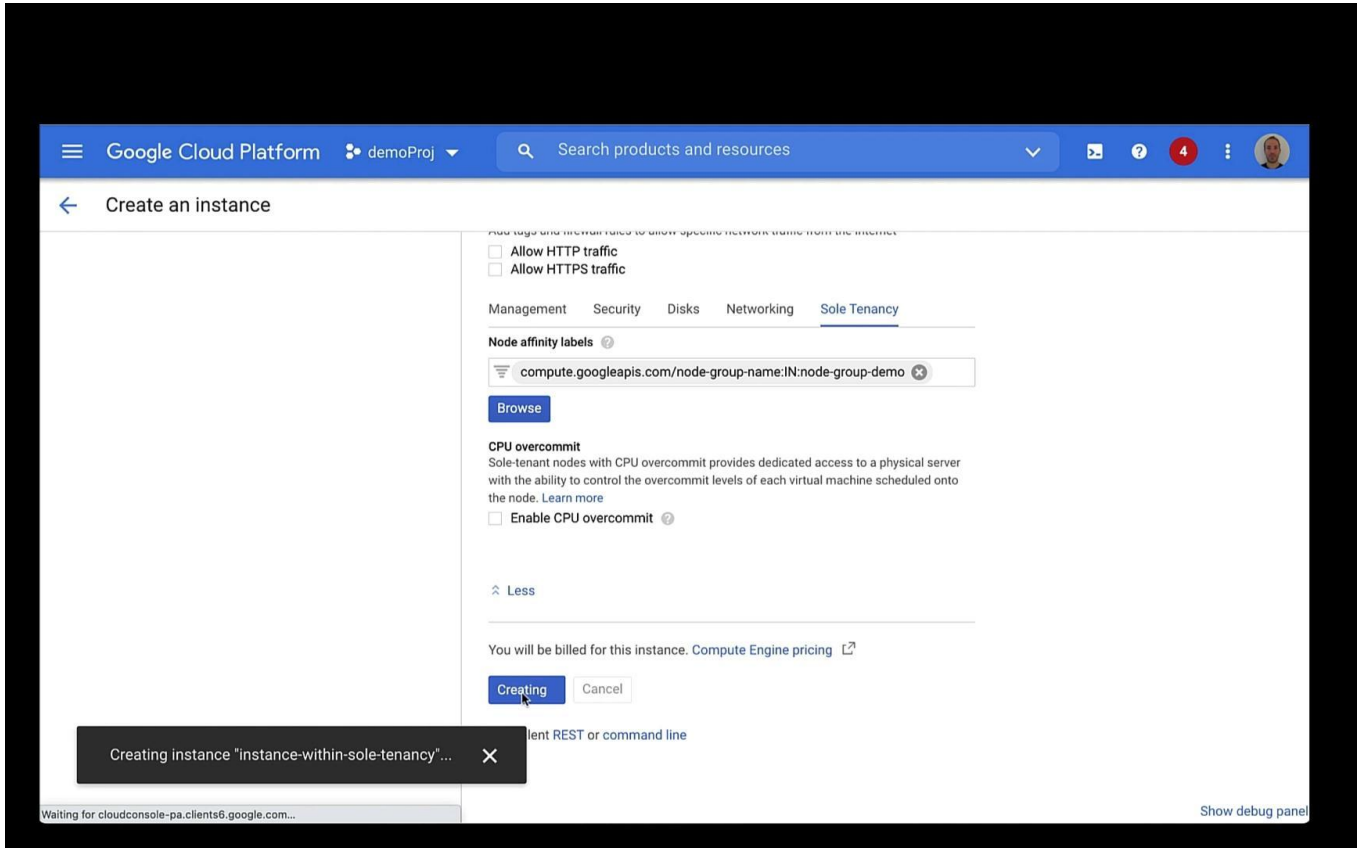
Use Autoscaling for resilient, scalable applications

Sole-tenant nodes

- Launch your instances on dedicated, physical servers
- Helps meet compliance requirements
- Supports live migration
- Use the placement algorithm or specify placement with labels
- Customize your machine types or “shapes” for best utilization
- Eligible for committed and sustained use discounts

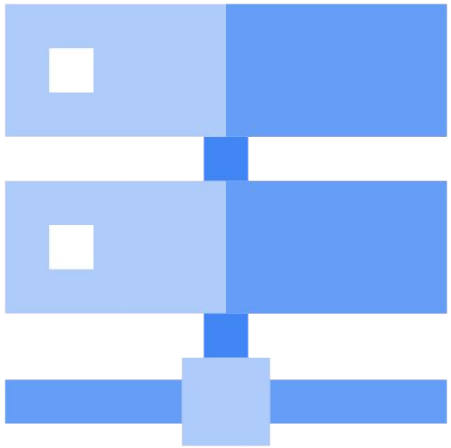


Sole Tenant Demo



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.



Cloud CDN

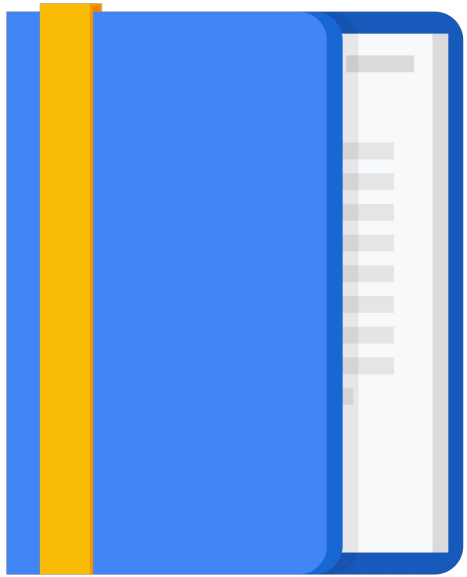
- Use Google's globally distributed edge caches to cache content close to your users.
- Or use CDN Interconnect if you'd prefer to use a different CDN.

Agenda

Virtual Private Cloud (VPC) Network + Demo

Compute Engine + Demo

Migration



Migration pain points

Ease migration

Move VMware workloads to the cloud as-is

No refactoring

Maintain continuity

Lower costs

Deliver efficiency

Leverage Google Cloud economies of scale

Run securely

Run with confidence

Provide best in class security

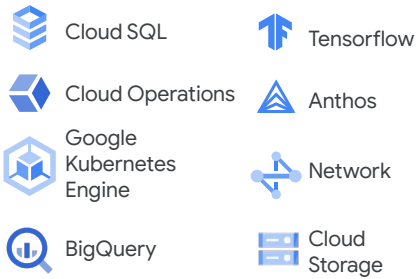
Create operational agility

Operational continuity

Unified management

Innovate

Build on Google Cloud services

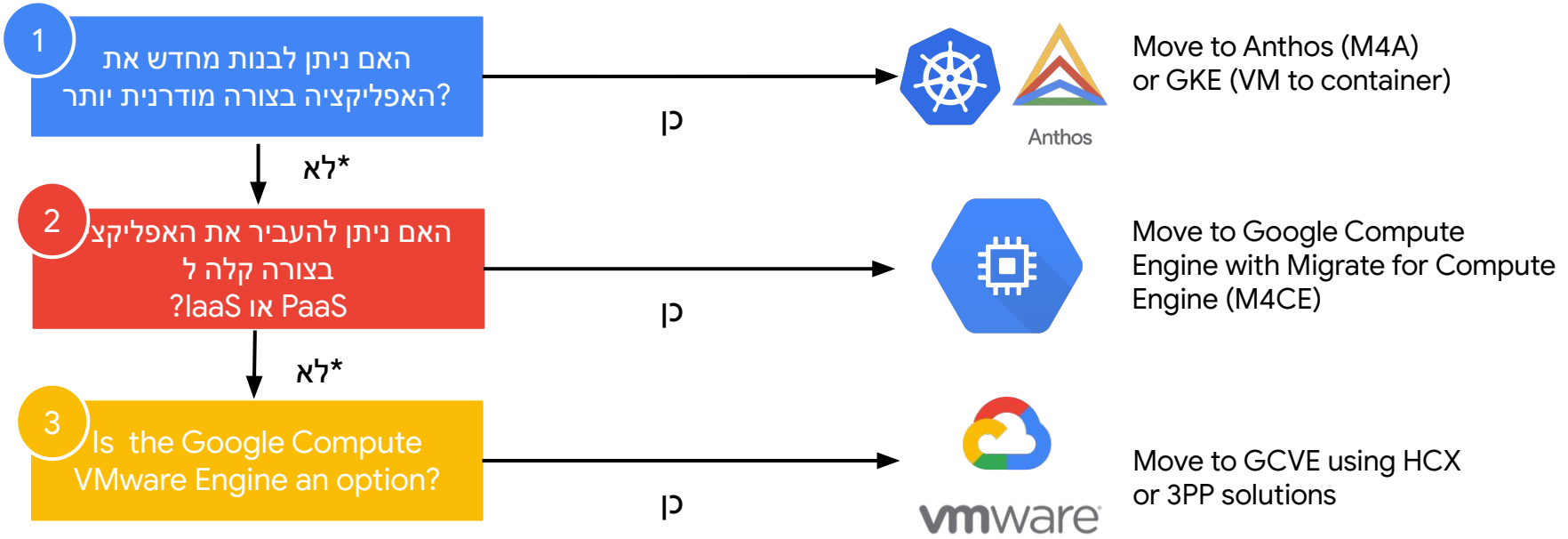


Migrate

Run

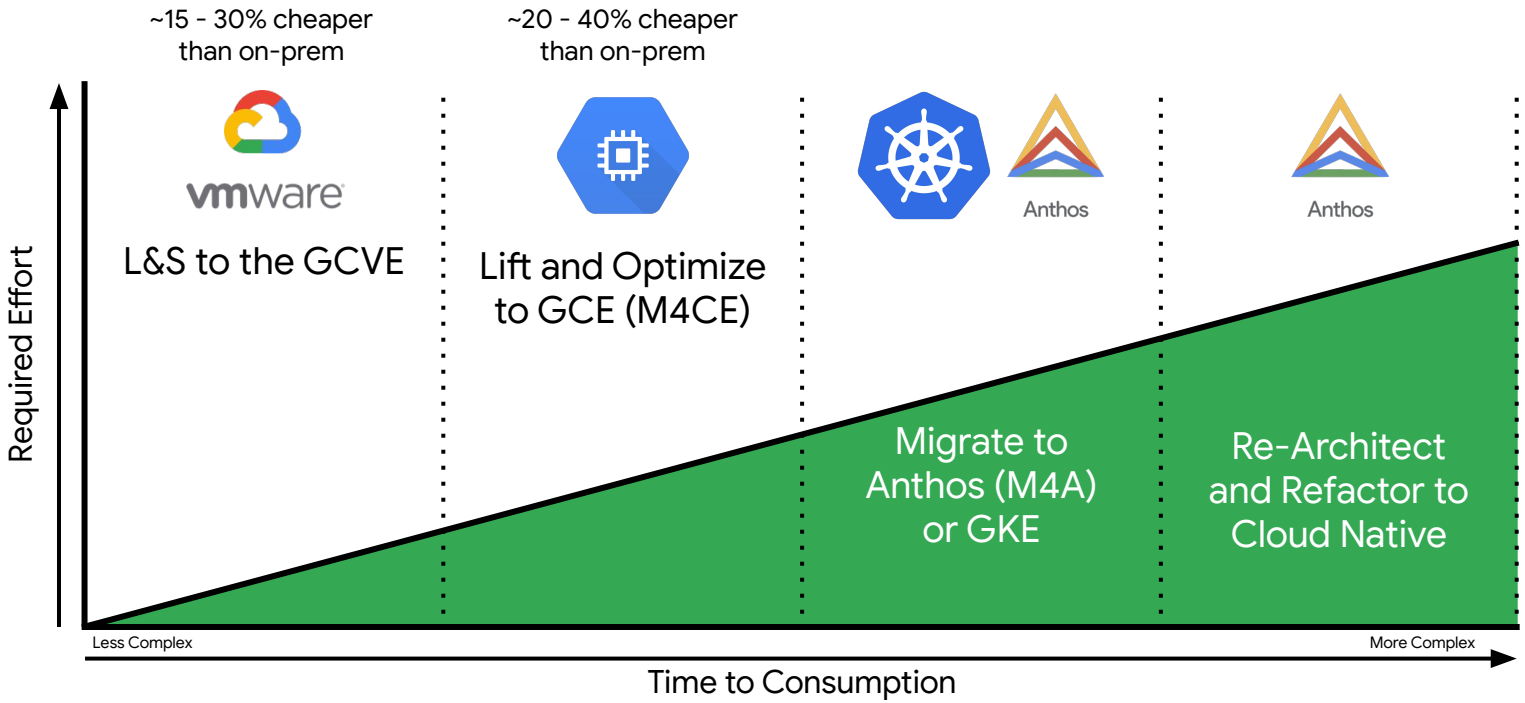
Innovate

Workload Migration Options



*no, or “yes, but the yes path is not viable right now”

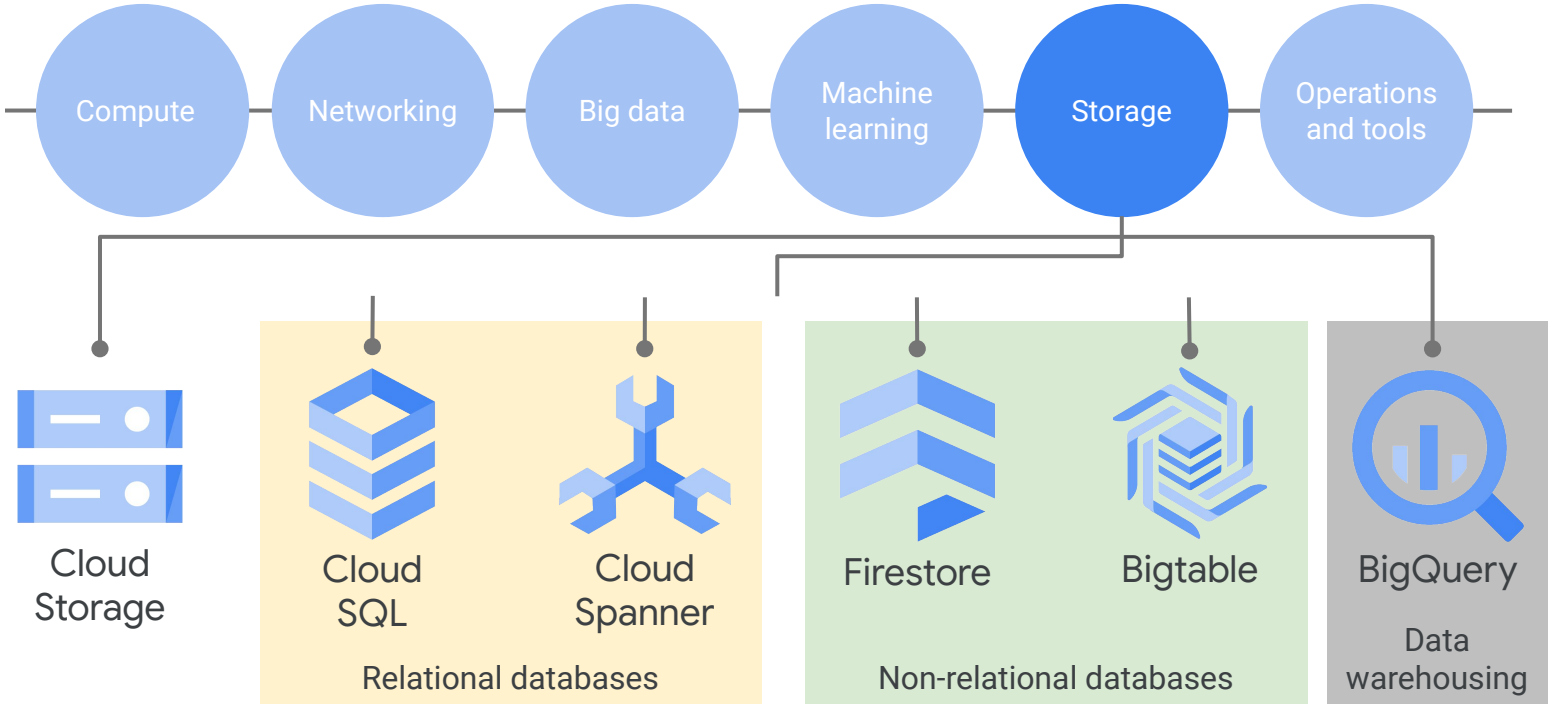
Migration Paths, and Timelines



Storage in the Cloud

Nir Oz
Customer Engineer
Public Sector
Google Cloud

Google Cloud has many storage options



Agenda

Cloud Storage

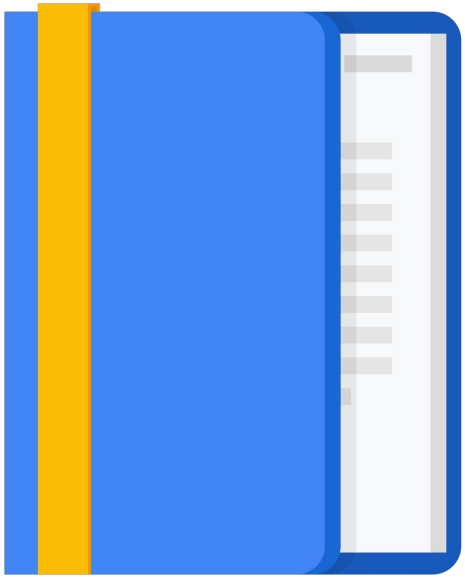
Cloud BigQuery

Cloud SQL and Cloud Spanner

Demo

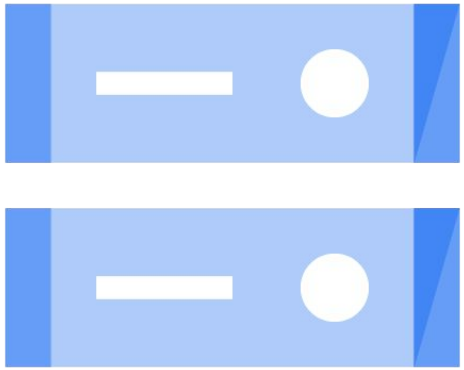
Firestore

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.



Choosing among Cloud Storage classes

Storage Class	Minimum duration	Availability SLA	Typical monthly availability	Use cases	Name for APIs and gsutil
Standard Storage	None	Multi-region 99.95% Dual-region 99.95% Region 99.9%	>99.99% availability in multi-regions and dual-regions; 99.99% in regions	Access data frequently ("hot" data) and/or store for brief periods • Serve website content • Stream videos • Interactive workloads • Mobile and gaming apps	`STANDARD`
Nearline Storage	30 days	Multi-region 99.9% Dual-region 99.9% Region 99.0%	99.95% availability in multi-regions and dual-regions; 99.9% in regions	Read/modify data ≤ once per month • Data backup • Serve long-tail multimedia content	`NEARLINE`
Coldline Storage	90 days			Read/modify data no more than once a quarter	`COLDLINE`
Archive Storage	365 days	None		Read/modify data < once a year • Cold data storage • Disaster recovery	`ARCHIVE`

There are several ways to bring data into Cloud Storage

Online transfer

Self-managed copies using command-line tools or drag-and-drop.

Storage Transfer Service

Scheduled, managed batch transfers.

Transfer Appliance

Rackable appliances to securely ship your data.

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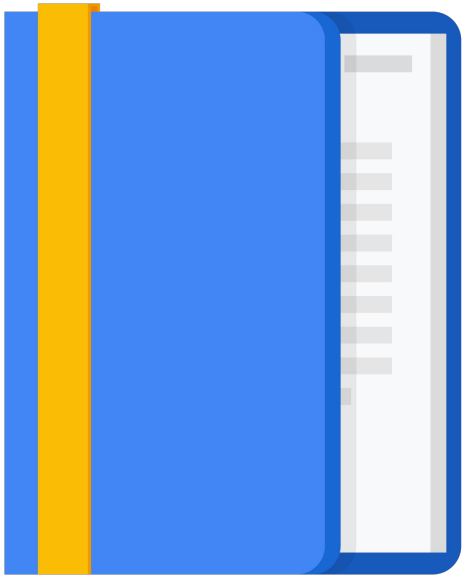


BigQuery

What is BigQuery

Google Cloud Platform

A highly scalable enterprise data warehouse solution

Google Cloud Platform's **enterprise data warehouse** for analytics

Gigabyte- to **petabyte-scale** storage and SQL queries

Encrypted, durable, And highly available

BigQuery

Fully managed and **serverless** for maximum agility and scale

Real-time insights from streaming data

Built-in **ML** for out-of-the-box predictive insights

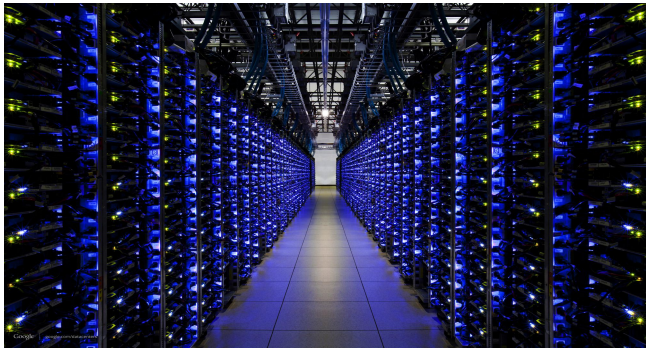
High-speed, in-memory **BI Engine** for faster reporting and analysis

Google Cloud

Big Data At Google

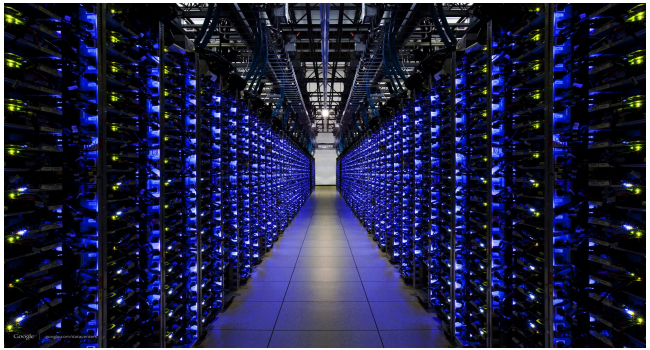
Google | Data Centers

איך אני מזהה שרתים
איטיים מתוך מיליארדים
של לוגים בשניות
בודדות?



Big Data At Google

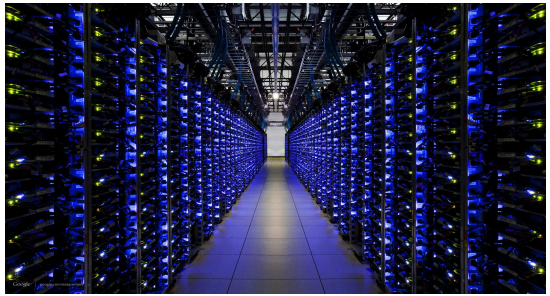
Google | Data Centers



```
SELECT
  count(*) AS count, source_machine AS machine
FROM product.product_log.live
WHERE
  elapsed_time > 4000
GROUP BY
  source_machine
ORDER BY
  count DESC
```

BigQuery @ Google

How do you find slow running servers from billions of log entries - in seconds?



Google | Data Centers

```
SELECT
  count(*) AS count, source_machine AS
machine
FROM product.product_log.live
WHERE
  elapsed_time > 4000
GROUP BY
  source_machine
ORDER BY
  count DESC
```

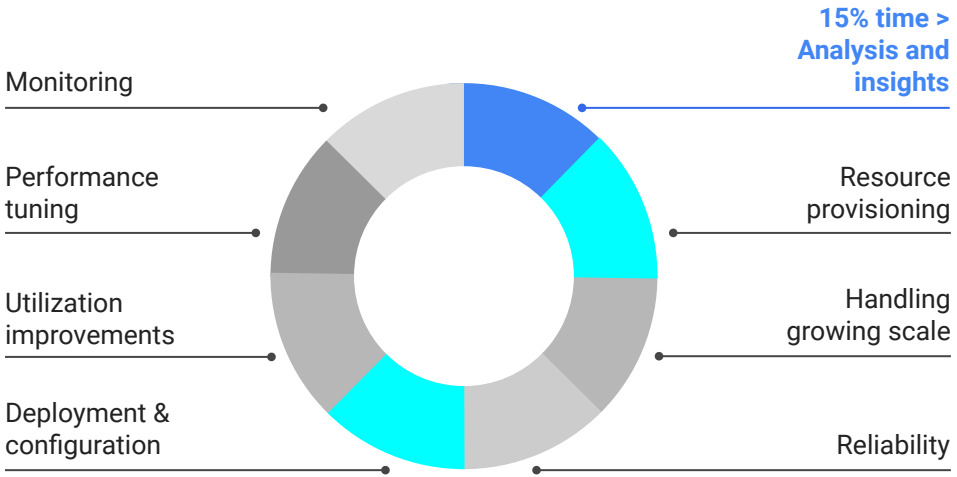
Query Stats

Result Size:	[215 rows, 17 columns]
Start Time:	Dec 29, 2014, 9:00:51 PM
End Time:	Dec 29, 2014, 9:01:11 PM
Num scanned rows:	1077869498
Total time:	19.864 seconds
Execution time:	3.571 seconds
CPU time:	18.202583333333333 minutes
IO time:	6.904836944444445 hours
Num bytes read:	33.76277268584818 GB
Num bytes transferred:	139.09356307983398 MB

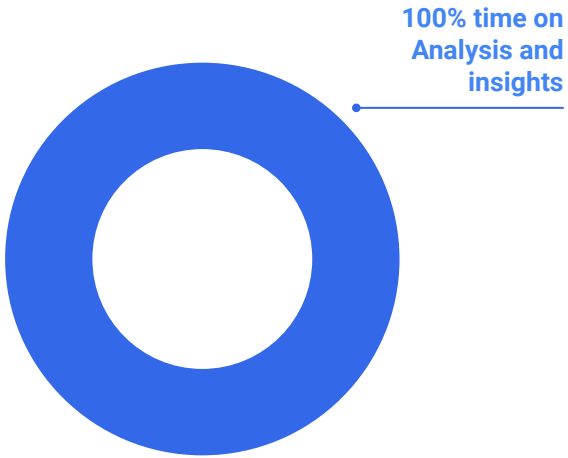
View all stats

BigQuery | Serverless data warehouse

Traditional data warehouses



BigQuery's serverless analytics



Agenda

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Cloud SQL and Cloud Spanner

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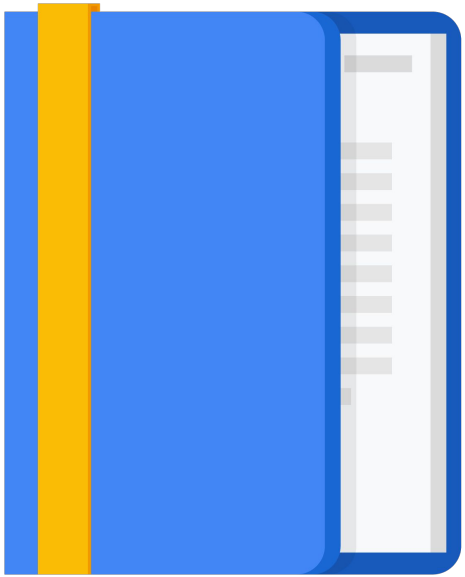
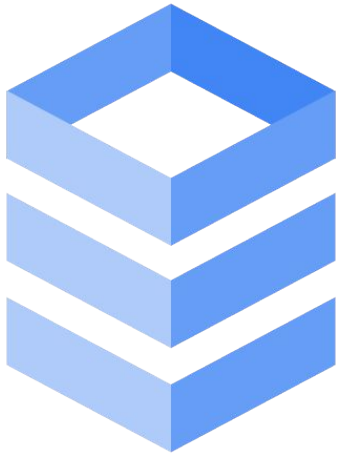
Firestore

Comparing Storage Options



Cloud SQL is a managed RDBMS

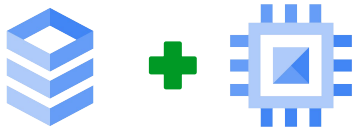
- Offers MySQL, PostgreSQL, and SQL Server databases as a service.
- Automatic replication
- Managed backups
- Vertical scaling (read and write)
- Horizontal scaling (read)
- Google security



You can use Cloud SQL with other Google Cloud services

Cloud SQL can be used with App Engine using standard drivers.

You can configure a Cloud SQL instance to follow an App Engine application.



Compute Engine instances can be authorized to access Cloud SQL instances using an external IP address.

Cloud SQL instances can be configured with a preferred zone.

Cloud SQL can be used with external applications and clients.

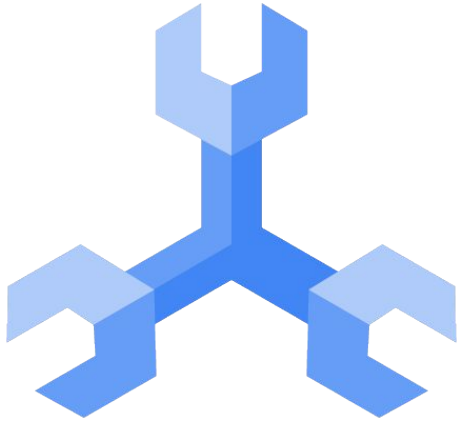
Standard tools can be used to administer databases.

External read replicas can be configured.

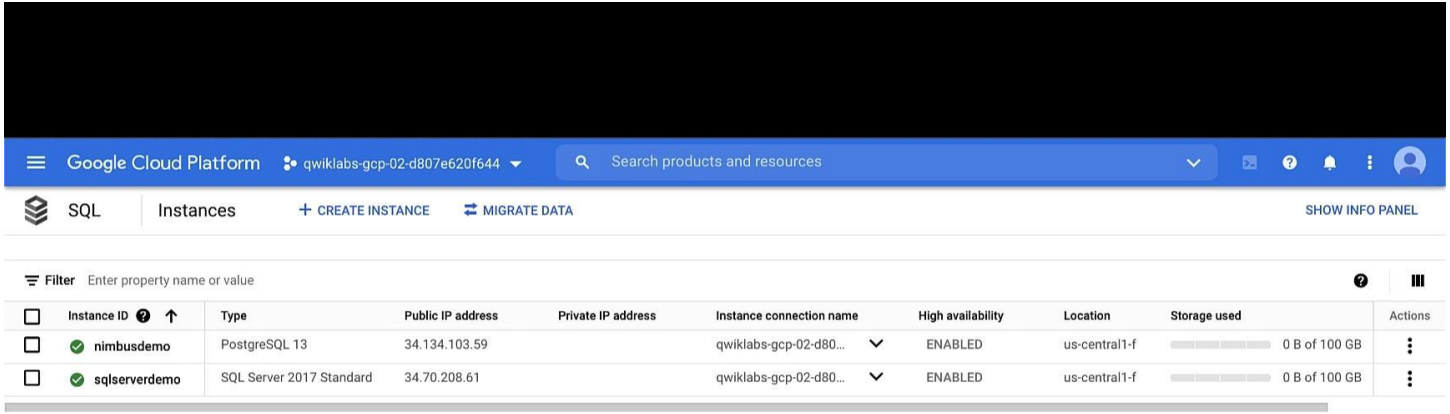
Cloud Spanner is a horizontally scalable RDBMS

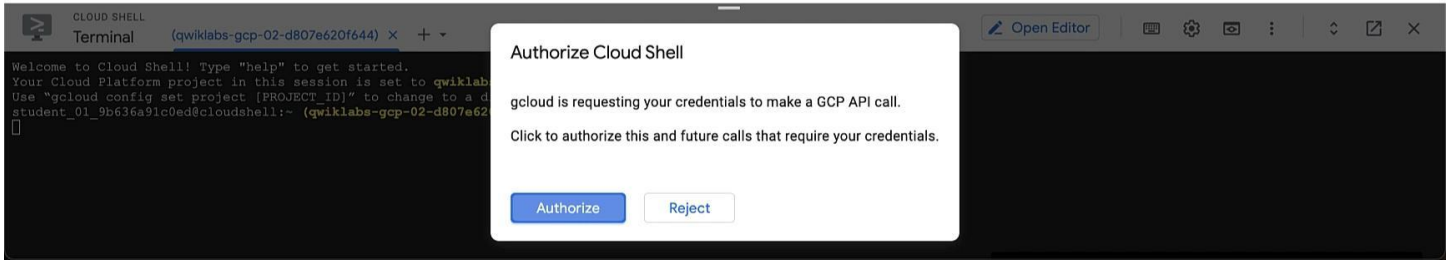
Cloud Spanner supports:

- Automatic replication.
- Strong global consistency.
- Managed instances with high availability.
- SQL (ANSI 2011 with extensions).



Cloud SQL Demo





Google Cloud

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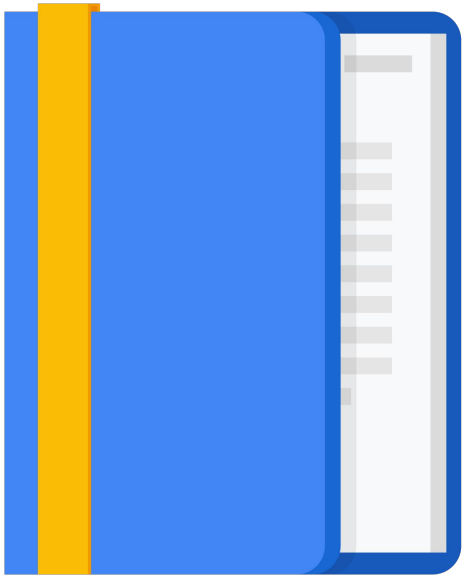
Cloud BigQuery

Cloud SQL and Cloud Spanner

Demo

Firestore

Comparing Storage Options



Firestore is a flexible, horizontally scalable NoSQL cloud database to store and sync data

Key capabilities:

- Flexibility
- Expressive querying
- Realtime updates
- Offline support
- Designed to scale

Agenda

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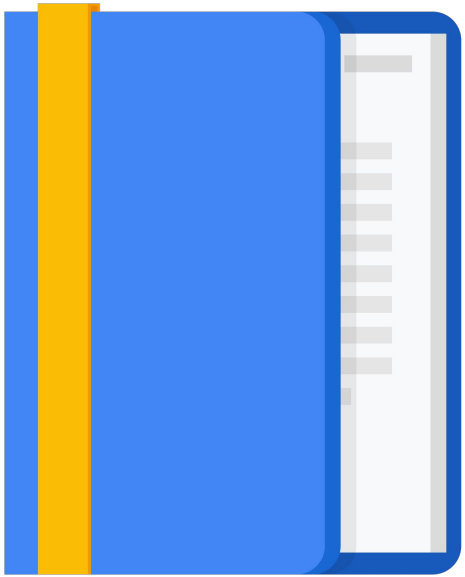
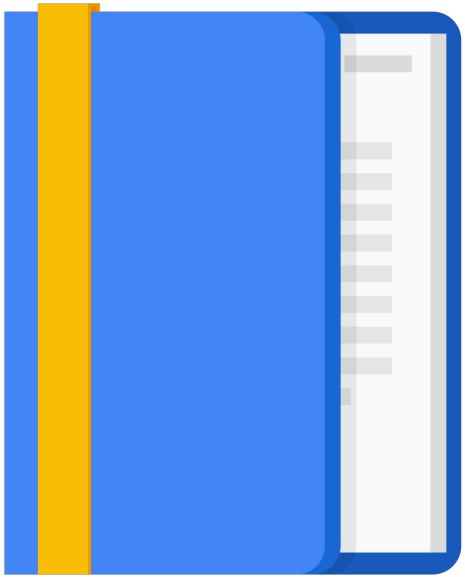


Comparing storage options: use cases

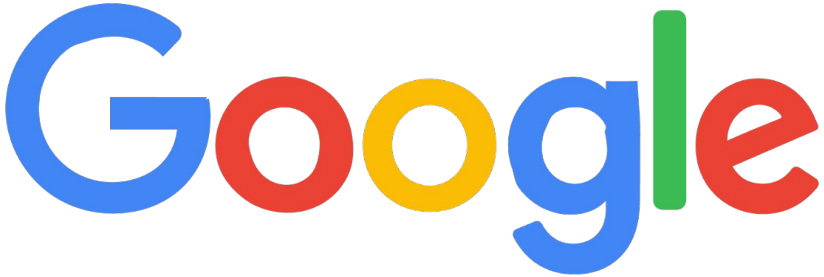
	Firestore	Cloud Bigtable	Cloud Storage	Cloud SQL	Cloud Spanner	BigQuery
Type	NoSQL document	NoSQL wide column	Blobstore	Relational SQL for OLTP	Relational SQL for OLTP	Relational SQL for OLAP
Best for	Storing, syncing, and querying data	"Flat" data, Heavy read/write, events, analytical data	Structured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

Break



New Google Training Portal for Nimbus

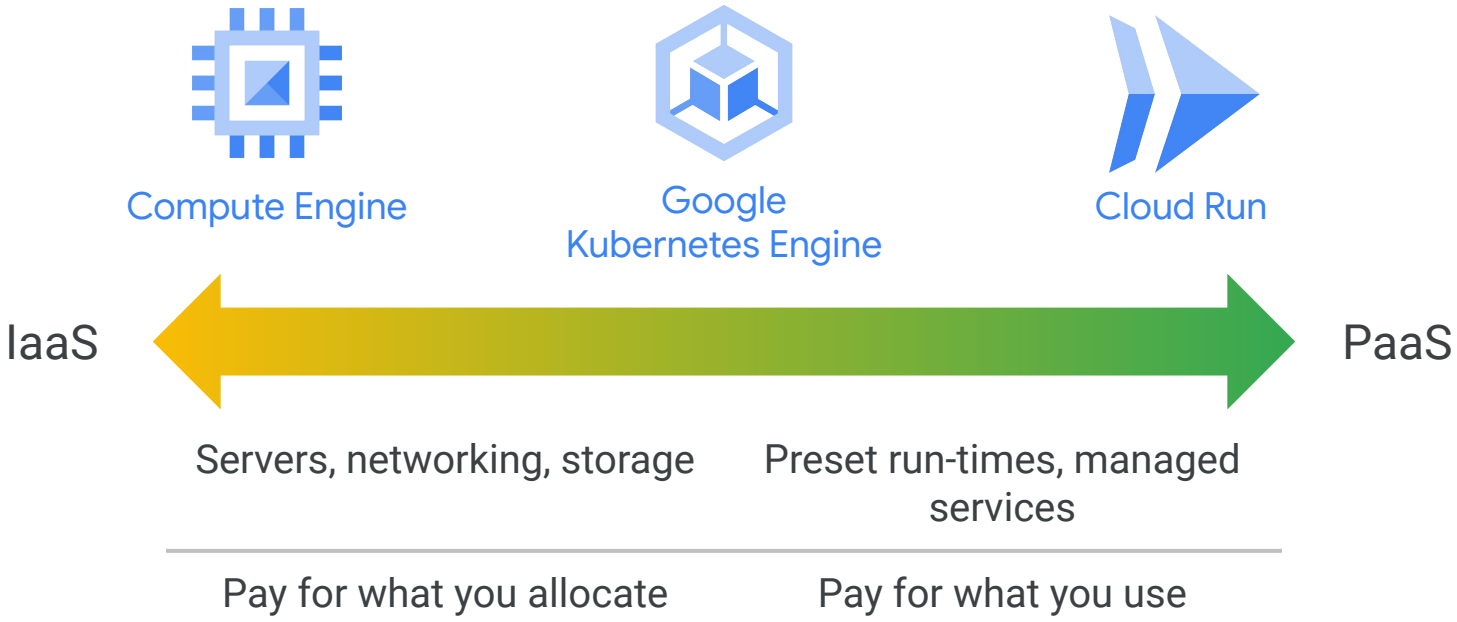
Bookmark!



Containers in the Cloud

Nir Oz
Customer Engineer
Public Sector
Google Cloud

תשתית כשירות לעומת פלטפורמה כשירות:

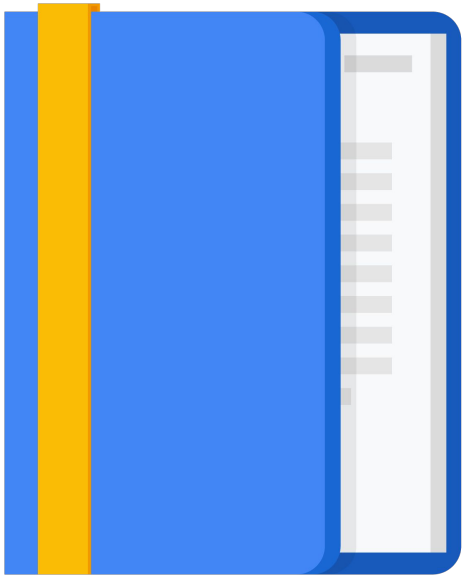


Agenda

Introduction to Containers

Kubernetes and Google Kubernetes Engine

Hybrid and Multi-Cloud



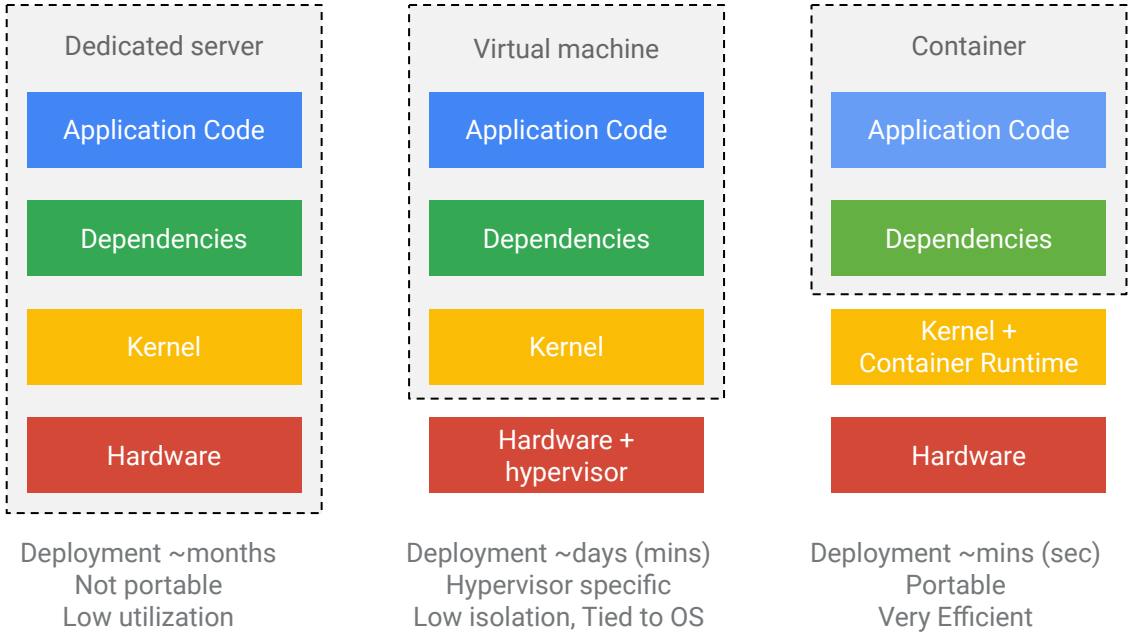
Container

Containers raise the abstraction one more level and virtualize the OS.

They are extremely portable and can be run locally or in the cloud without any changes.

Lightweight containers don't carry a full OS and can be packed tightly onto available resources.

Fast startup is no more than starting a process on the OS



Google Cloud

Containers

A better way to develop and deploy applications

Immutable infrastructure

Isolation

Faster deployments

Portability

Reusability

Introspection

Versioning

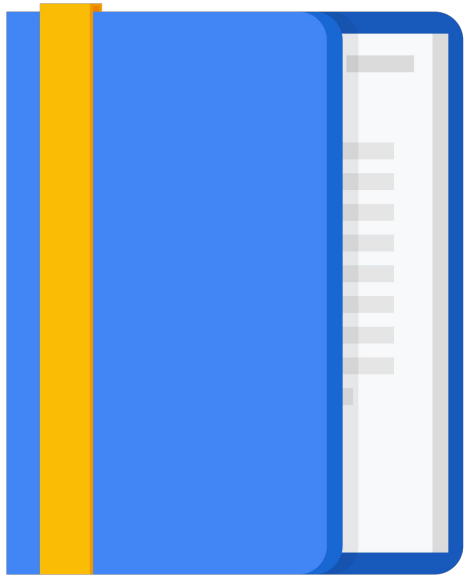
Ease of sharing

Agenda

Introduction to Containers

Kubernetes and Google Kubernetes Engine

Hybrid and Multi-Cloud



נשאל מדוע?

- At this point we have a **containerized application**, it can be simple, or complex. It can contain multiple services are working in concert to satisfy your business requirements.
- **Docker** executables like run and compose work, but what happens when you want to move to production?
- What Happens when you go beyond HelloWorld to something more realistic?

What is Kubernetes?

- A portable, open-source, **container-centric** management platform
- Built-in primitives for **deployments, rolling upgrades, scaling, monitoring, and more**
- Inspired by **Google's internal systems**
- Get true **workload portability** and increased **infrastructure efficiency**

Kubernetes Handles...

Scheduling:
Decide where my containers should run

Lifecycle and health:
Keep my containers running despite failures

Scaling:
Make sets of containers bigger or smaller

Naming and discovery:
Find where my containers are now

Load balancing:
Distribute traffic across a set of containers

Storage volumes:
Provide data to containers

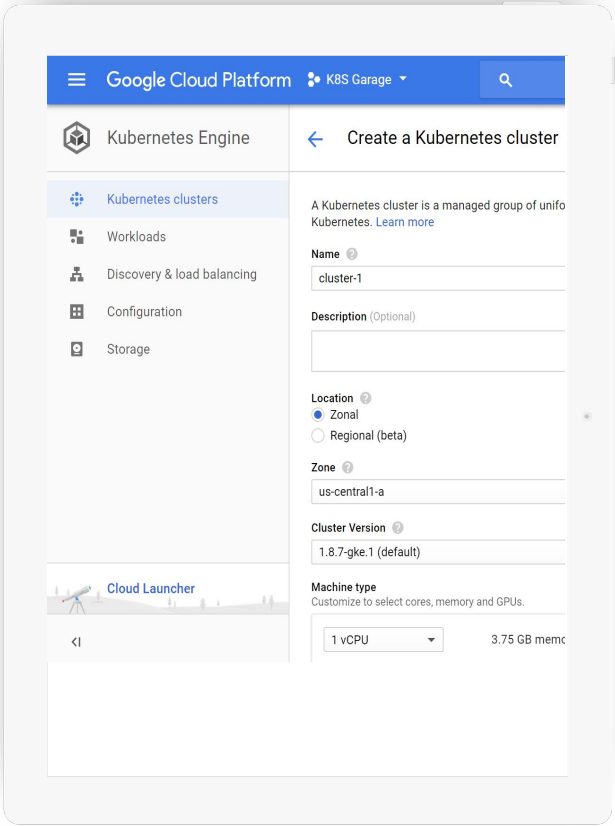
Logging and monitoring:
Track what's happening with my containers

Debugging and introspection:
Enter or attach to containers

Identity and authorization:
Control who can do things to my containers

GKE
Kubernetes the Easy Way

- Enterprise container management from Google
- Start a cluster with one-click
- View your clusters and workloads in a single pane of glass
- Google keeps your cluster up and running



Google Cloud

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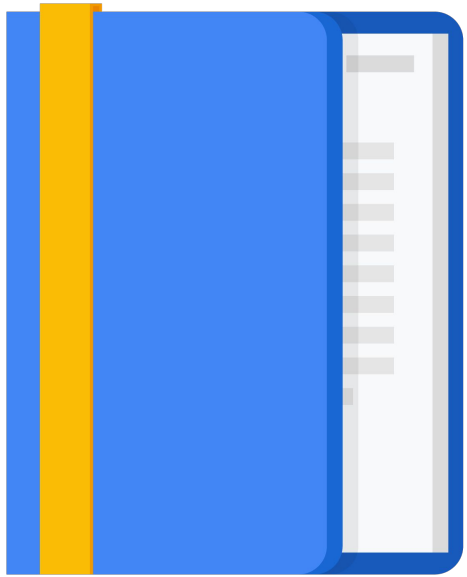
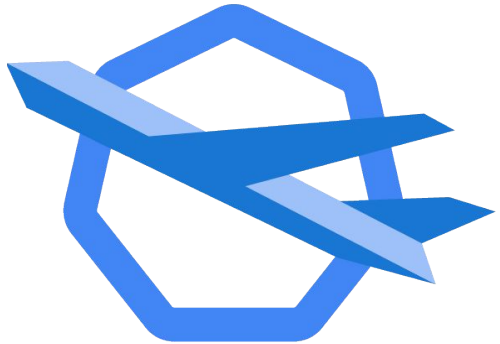


GKE Autopilot

Fully Managed and Optimized for Production

- Optimized for **production** by K8s experts
- SLA on control plane, nodes and Pods (all monitored by Google)
- **Secure by default** with **hardening** guidelines implemented
- Resources provisioned based on workload
- It's still **Kubernetes**, still **GKE**



Google Cloud

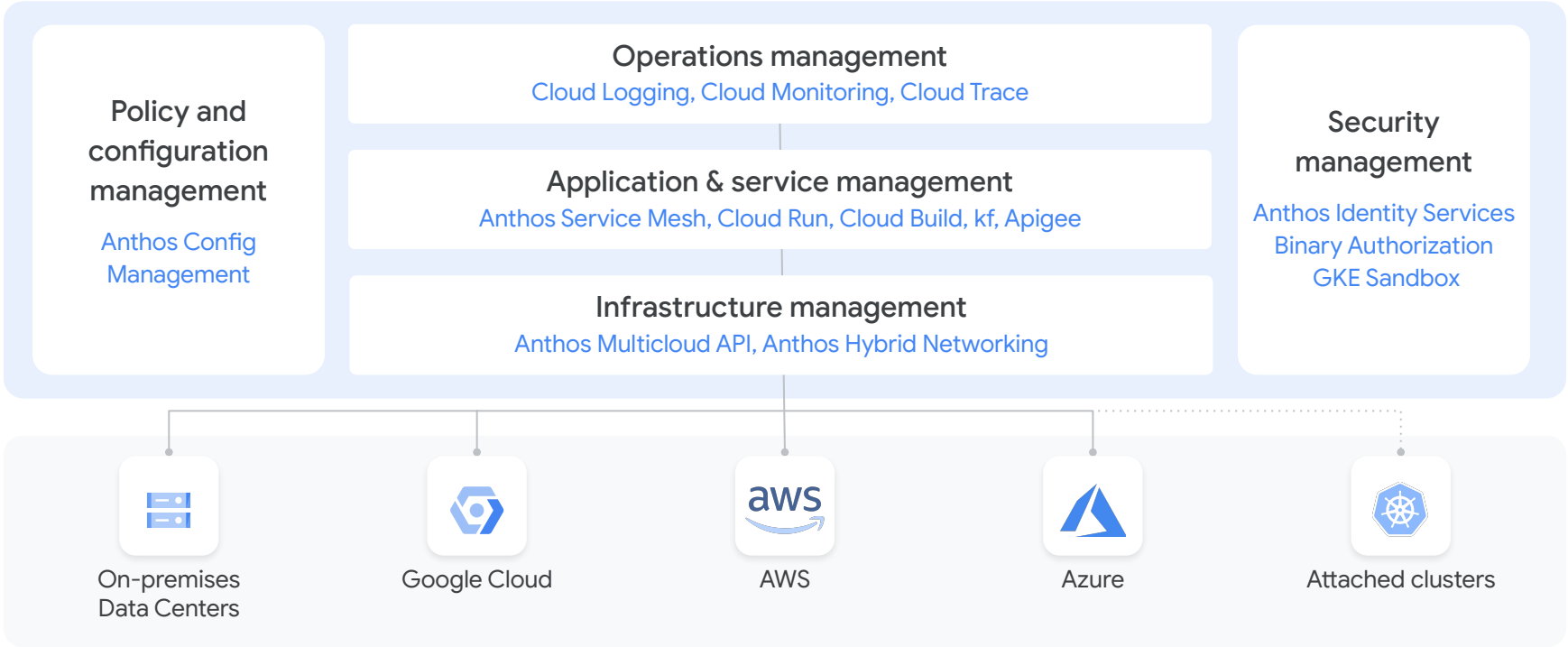
Why did we build Anthos?

GKE **with our best frameworks on top**, packaged for use on **any** public or private cloud with a managed control plane to dramatically simplify hybrid/multi-cloud K8s... and all from a single pane of glass (*or git/yaml*)

Google Cloud

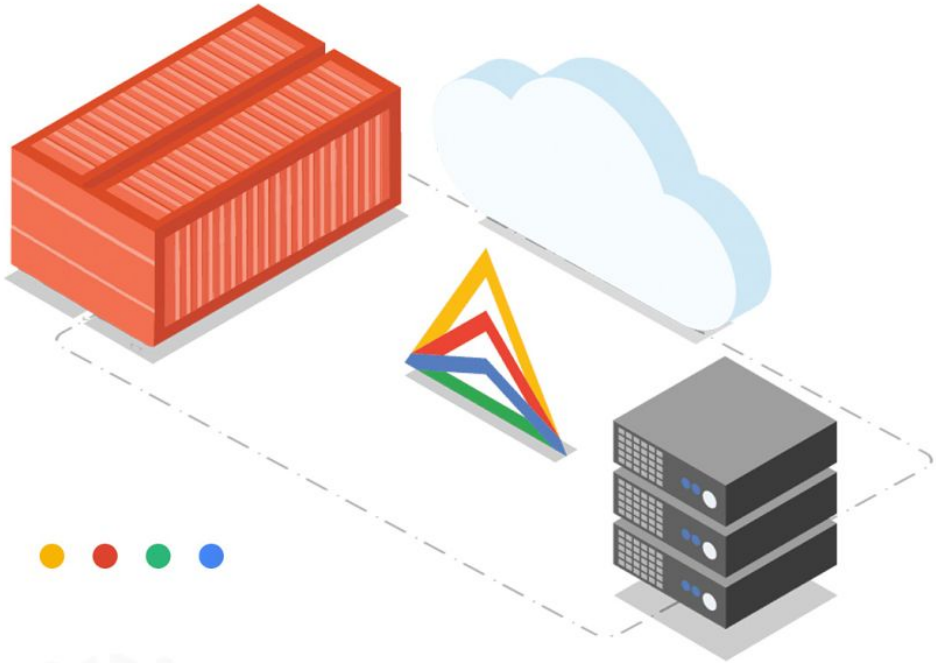
The Anthos Platform

In data centers and across multi-cloud environments



Google Cloud

1-Click
VM Migration



Migrate for Anthos brings the power of containerization to existing workloads

- Migrate VMs running on VMware, AWS, or Azure into containers managed by GKE in real-time
- Capitalize on increased resource utilization, unified logging and monitoring, and modern application lifecycle management tools
- Supports both legacy Linux and Windows VM applications

Google Cloud

Developing, Deploying, and Monitoring in the Cloud

Yonit Gruber-Hazani

Site Reliability Engineer
Waze Team

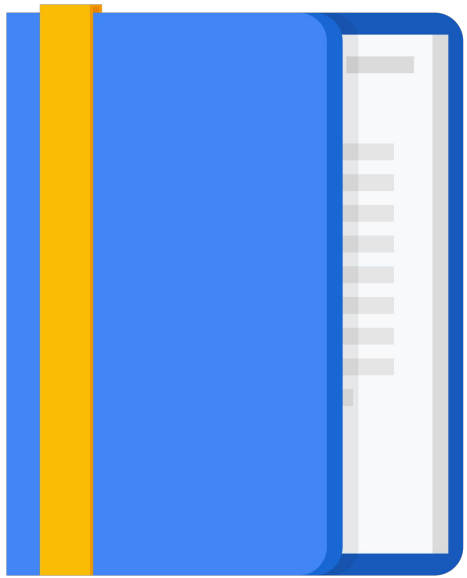
Agenda

פיתוח תוכנה בענן

פריסה: תשתית כקוד

Monitoring: זיהוי מוקדם

Demo

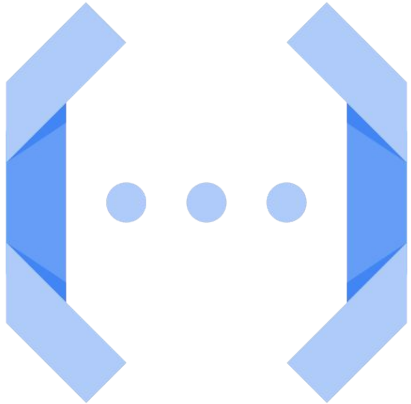


Cloud Source Repositories

- Fully featured Git repositories hosted on Google Cloud.
- Supports collaborative development of cloud apps.
- Includes integration with Cloud Debugger.
- Collaborates with Bitbucket or GitHub

Cloud Functions

- Create single-purpose functions that respond to events without a server or runtime.
    - Event examples: New instance created, file added to Cloud Storage, cloud scheduler, Pub/Sub.
- Written in Javascript (Node.js), Python or Go; execute in managed Node.js environment on Google Cloud.



Cloud Run

- Enables stateless containers.
- Abstracts away infrastructure management.
- Automatically scales up and down.
- Open API and runtime environment.

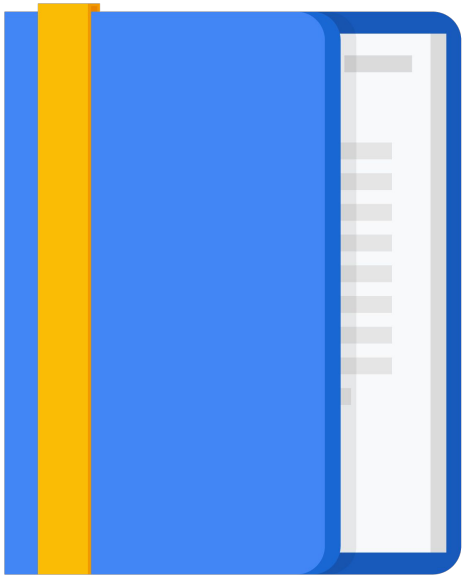
Agenda

פיתוח תוכנה בענן

פריסה: תשתית כקוד

Monitoring: זיהוי מוקדם

Demo



Terraform

- Infrastructure management open source.
- Create a .tf template describing your environment and use Terraform to create resources.
  - Vm instances
  - Network
  - Firewalls / DNS
  - Storage
- Provides repeatable deployments.

Infrastructure as Code

Code management	Check in and collaborate like with source code
Declarative	Specifies the desired state of infrastructure, not updates
Diff	Diff infrastructure between desired state and current state
Composable	Build reusable modules across an organization

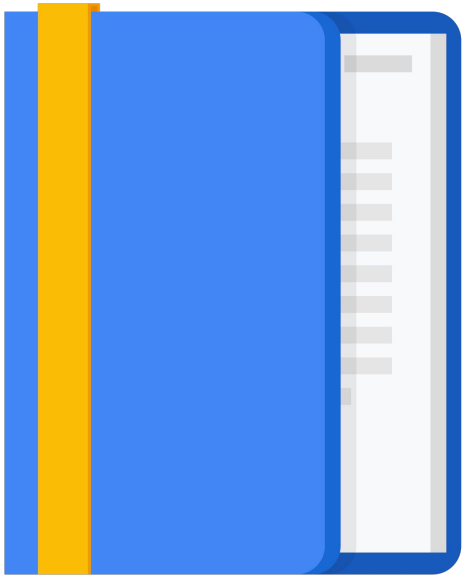
Agenda

פיתוח תוכנה בענן

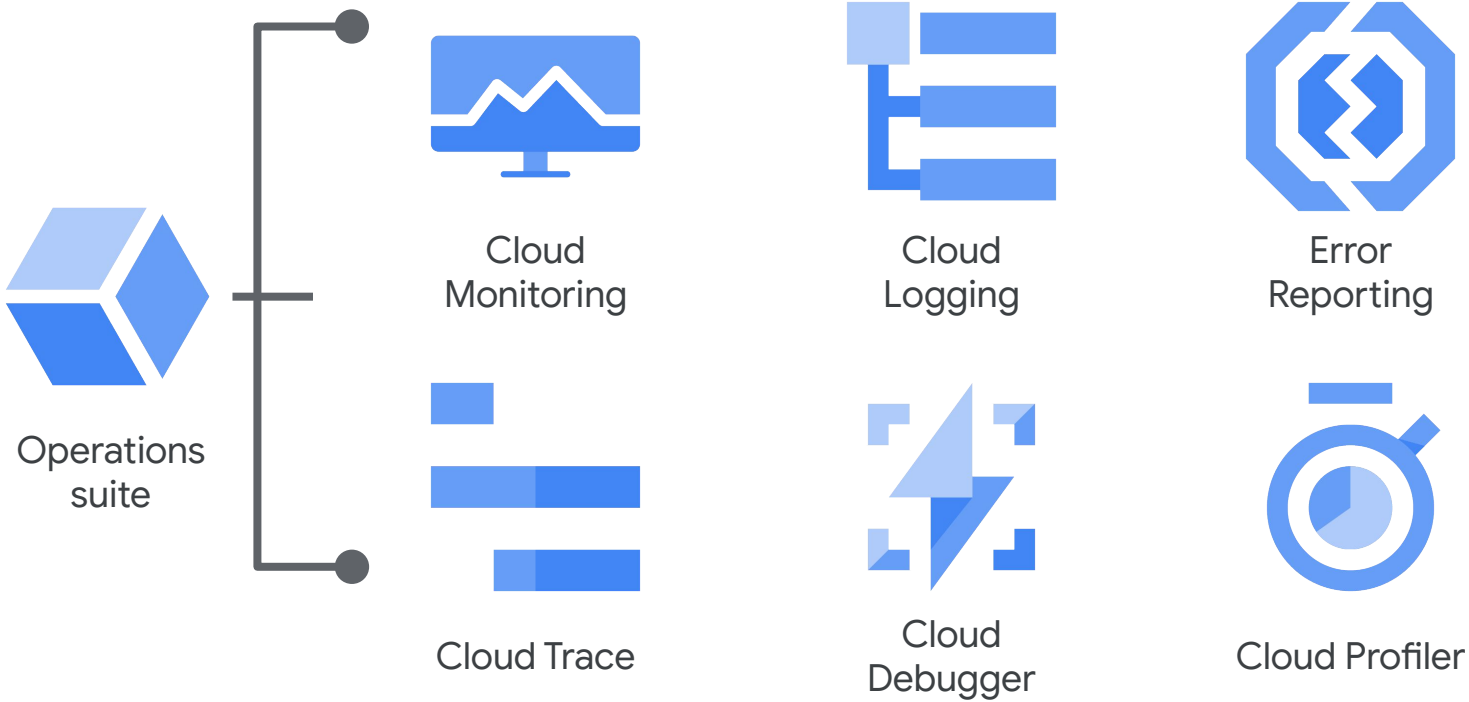
פריסה: תשתית כקוד

Monitoring: זיהוי מוקדם

Demo



Google Cloud's operations suite

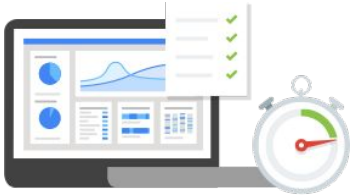


Cloud Monitoring

Identify trends, prevent issues

Reduce monitoring overhead

Improve signal-to-noise

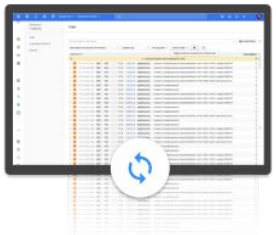


Fix problems faster

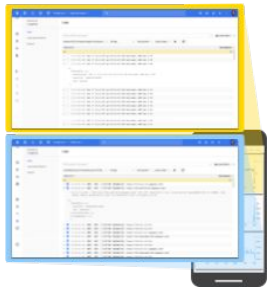
Google Cloud

Cloud Logging

Seamlessly resolve issues



Scalable and fully managed

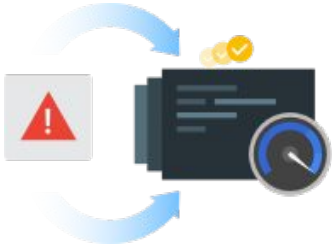


All cloud logs in one place

Real-time insights

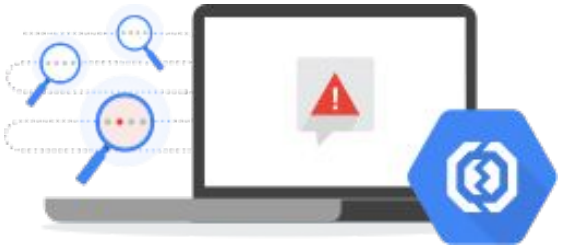
Google Cloud

Error Reporting



Quickly understand errors

Automatic and real-time

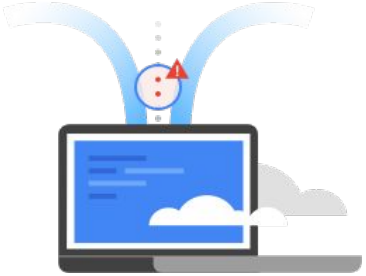


Instant error notification

Popular languages

Google Cloud

Cloud Trace



Find performance bottlenecks

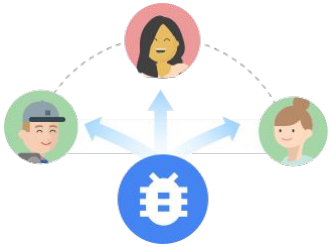
Fast, automatic issue detection

Broad platform support

Cloud Debugger

Debug in production

Multiple source options

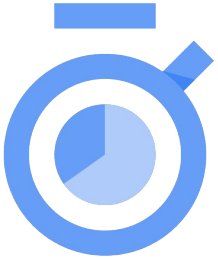


Collaborate while debugging

Use your workflows

Cloud Profiler

Low-impact production profiling



Broad platform support

Agenda

פיתוח תוכנה בענן

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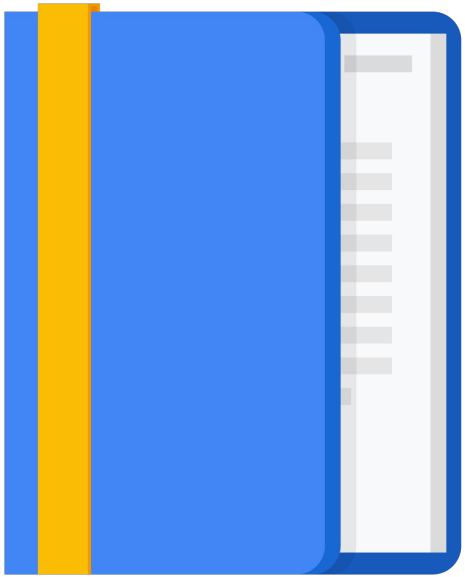
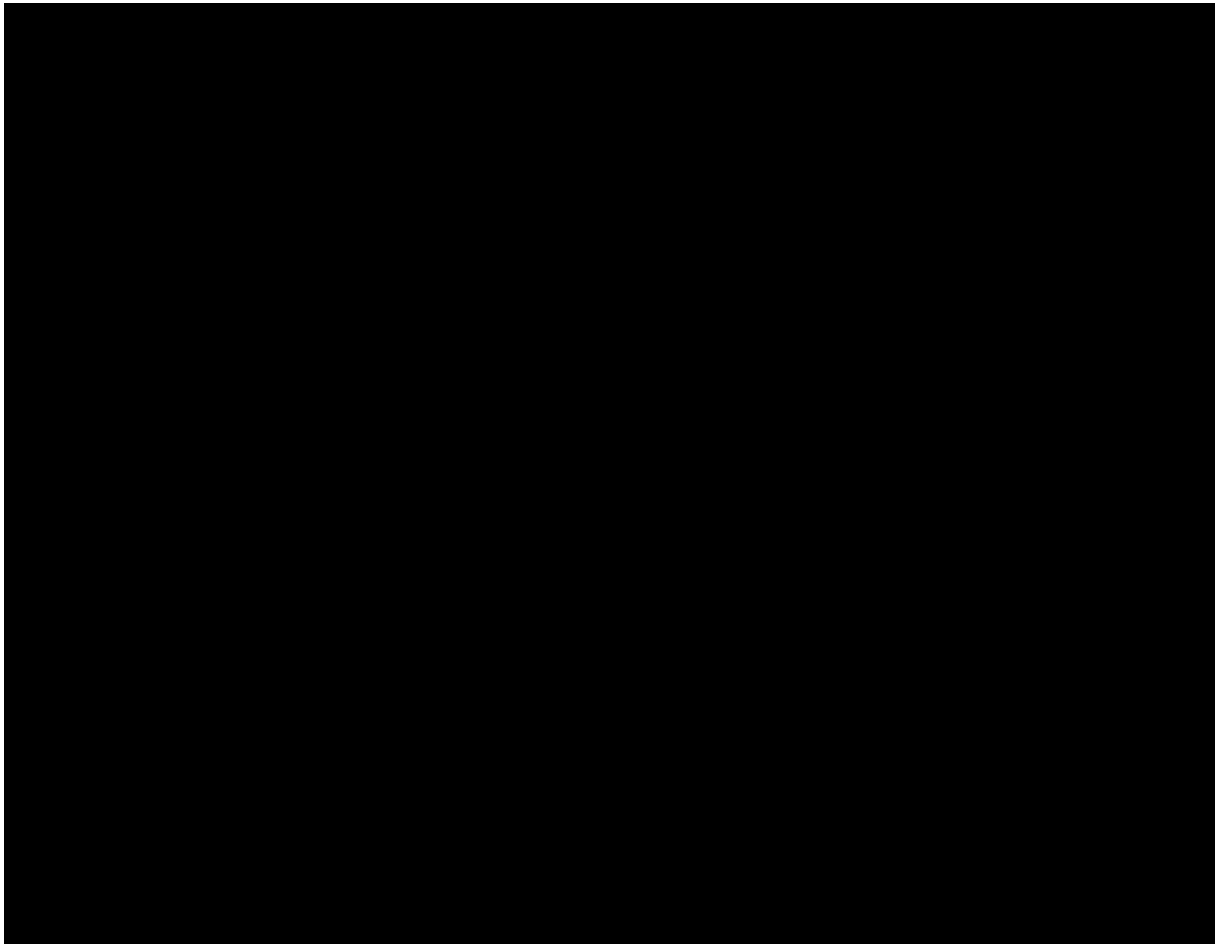
Monitoring: זיהוי מוקדם

Demo



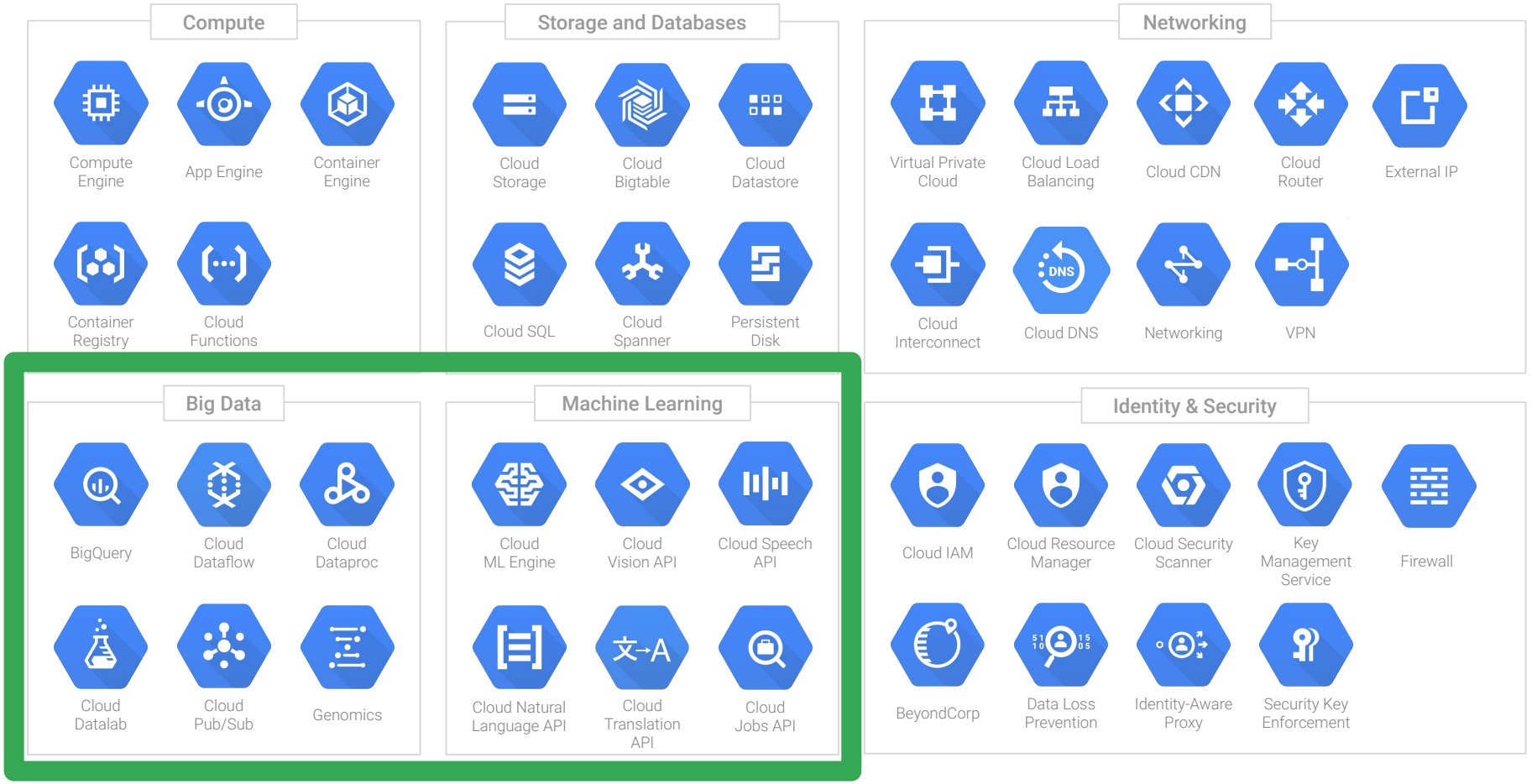
Monitoring Demo



Google Cloud

Google AI/ML & Data Management

GCP Cloud Services



מיסוך מידע באמצעות Cloud DLP

ID	Job Title	Phone	Comments
359740	Senior Engineer	307-964-0673	Please email them at jane@imadethisup.com
981587	VP, Engineer	713-910-6787	none
394091	Lawyer	692-398-4146	Updated phone to: 692-398-4146
986941	Senior Ops Manager	294-967-5508	none
490456	Junior Ops Manager	791-954-3281	Tried to verify account with their SSN 222-44-5555

...

Automated De-identification

...

Google Cloud

Google Cloud AI/ML

Machine Learning with Google

Use Our Models

Take advantage of Google's domain expertise

No tools or AI expertise required

Extend or customize with **AutoML**

OR

Train Your Own

Build on your own specialized domain expertise

Use Google tools for building and training models

Google Cloud

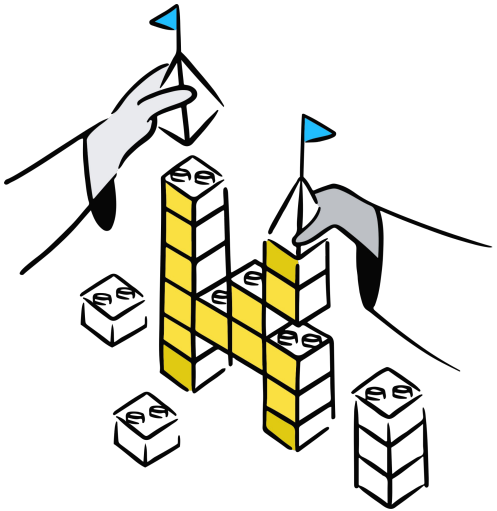
TensorFlow

Powered by Open source

kaggle

Users come to Kaggle to...

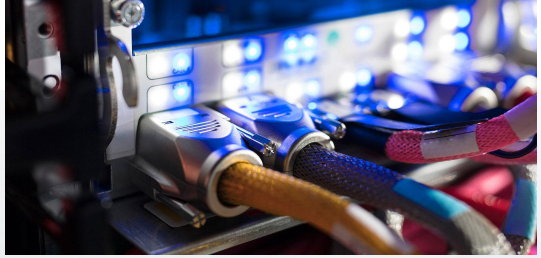
Learn by doing

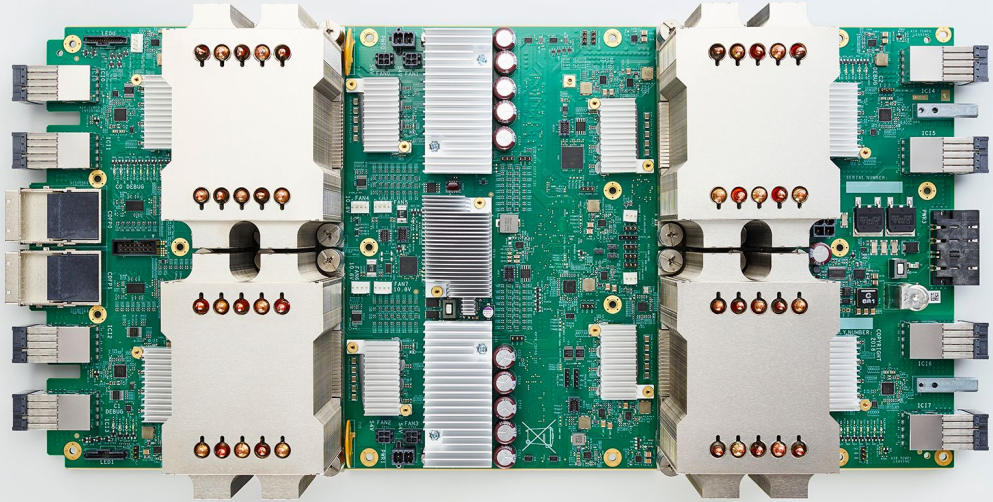


Using...

Competitions **Notebooks** **Datasets** **Courses**

Kaggle provides free access to NVidia K80 GPUs in kernels.





Hardware Accelerated AI

15-30x faster than conventional processors

30-80x operations per watt

Like fast-forwarding 7 years

Etsy

40 billion

Product images

Customer experience

Sorting **relevant reviews**, providing timely **recommendations**

15%

Increase in engineering productivity by scaling workloads with AI Platform Prediction

Spotify

248 million

Monthly active users

Personalization

Generating playlists **based on user's taste, suggest** new content

7x

Increase in ML experimentation by streamlining workloads with AI Platform Pipelines

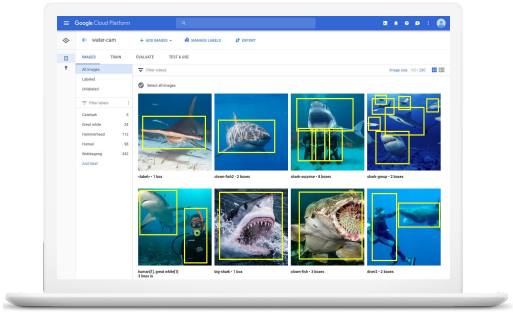
Google Cloud

AI Capabilities:

From Google Models, to your fully customised code

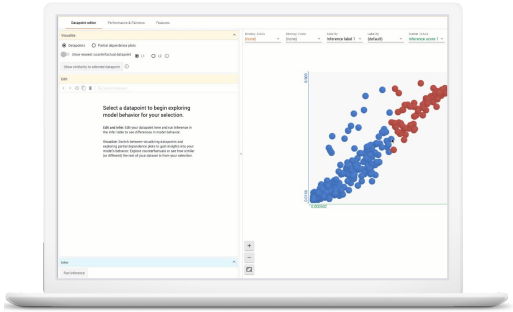
Pre-trained APIs

No training data needed,
get started right away



Custom AI with AutoML

Easily create custom models
(A **no-code** approach)

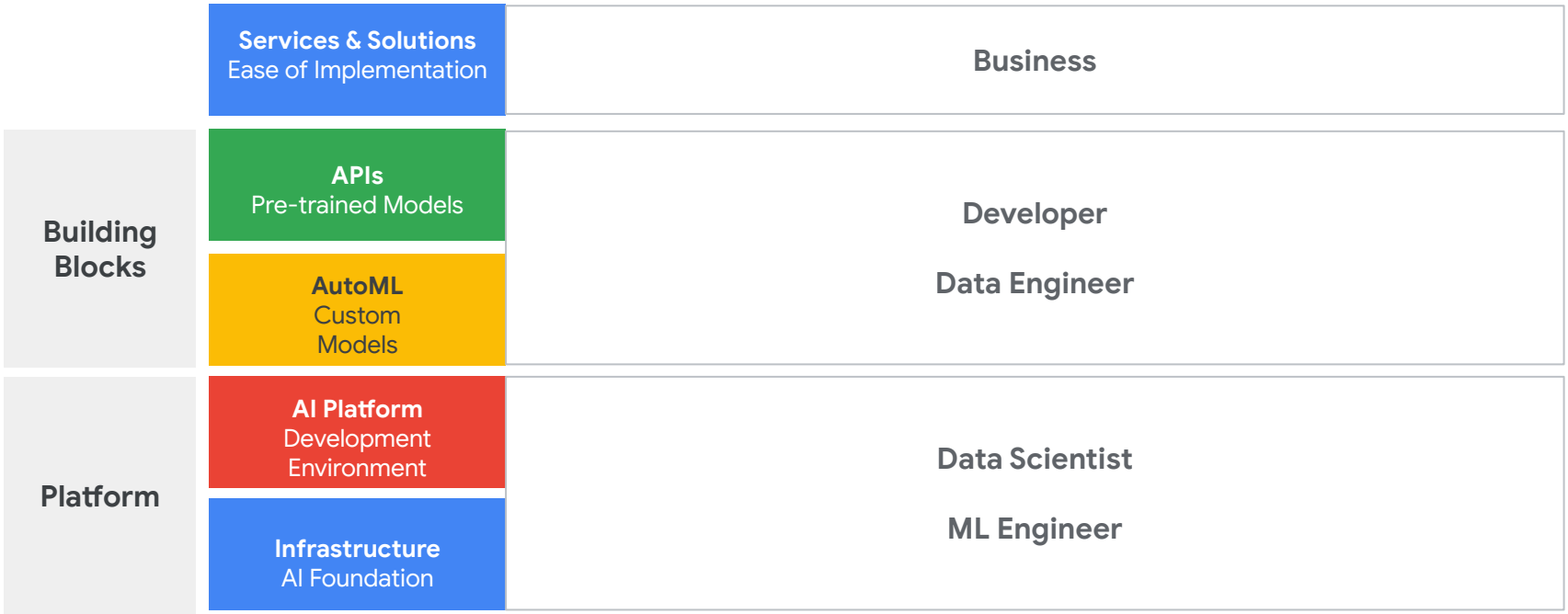


End-to-end AI with AI Platform Development Environment

Help data scientists and ML
engineers build and deploy AI

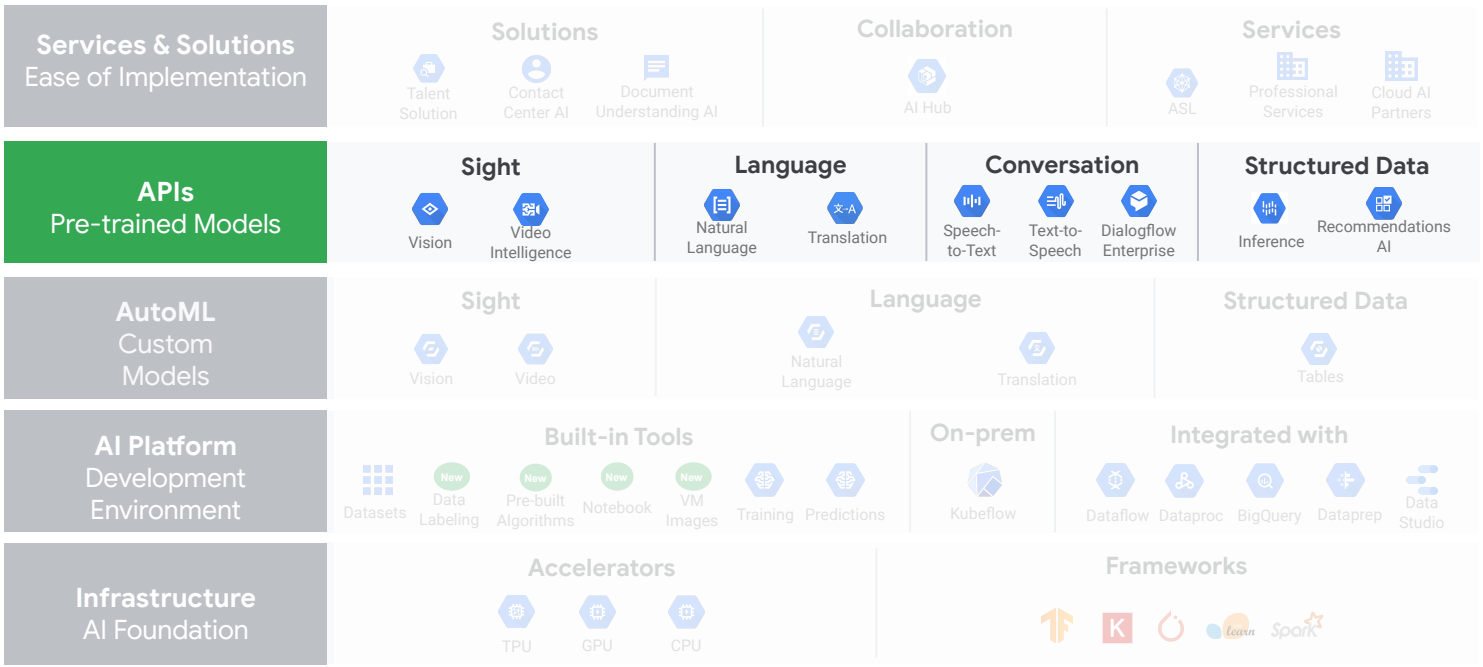
Google Cloud

AI for every level of expertise



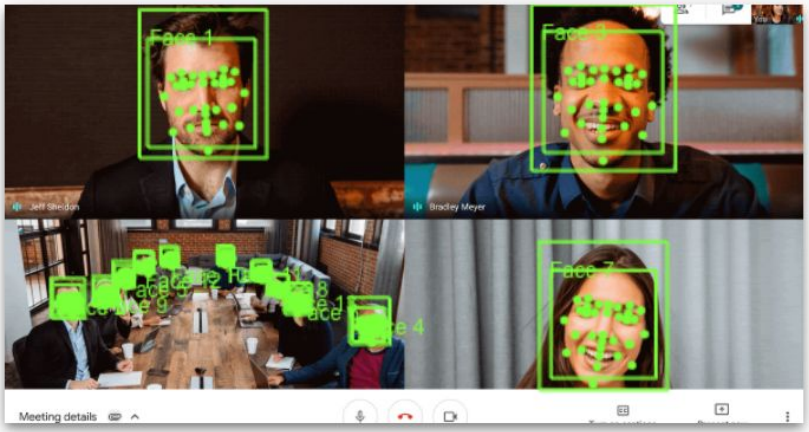
Google Cloud

AI for every level of expertise



Understand images with Vision API

Faces | Objects | Labels | Text | Properties | Safe Search



present a tab meet.gif

Face 1

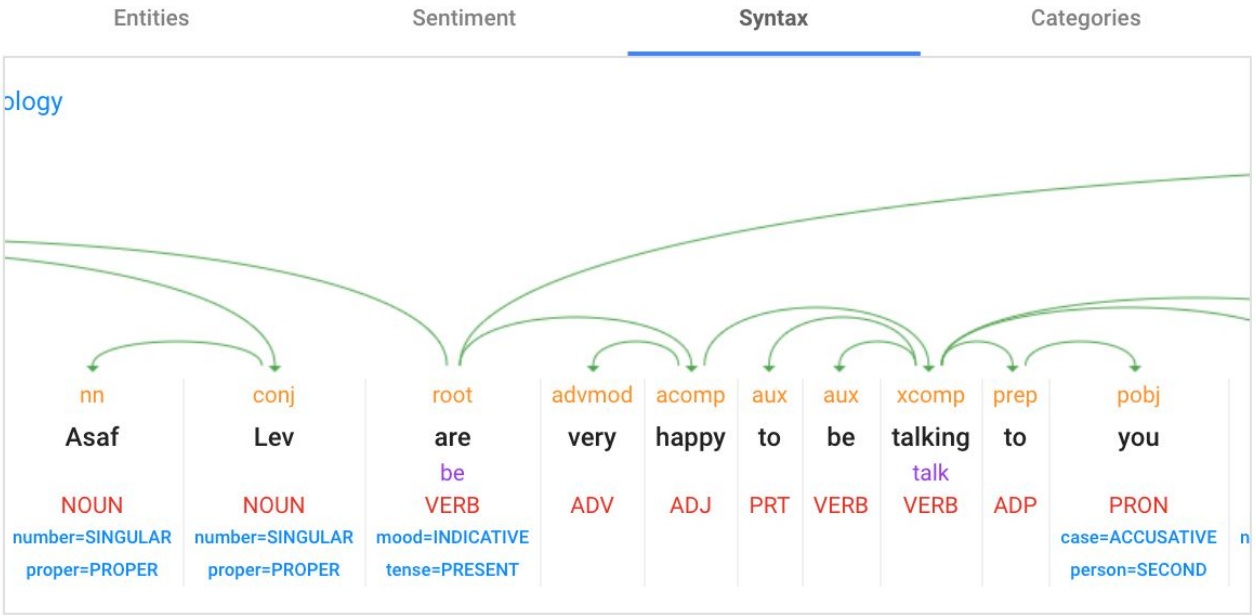
Joy	■■■□□	Possible
Sorrow	■□□□□	Very Unlikely
Anger	■□□□□	Very Unlikely
Surprise	■□□□□	Very Unlikely
Exposed	■□□□□	Very Unlikely
Blurred	■□□□□	Very Unlikely
Headwear	■□□□□	Very Unlikely

Roll: -4° Tilt: -6° Pan: 0°

Confidence 91%

Analyze text data with the NLP API

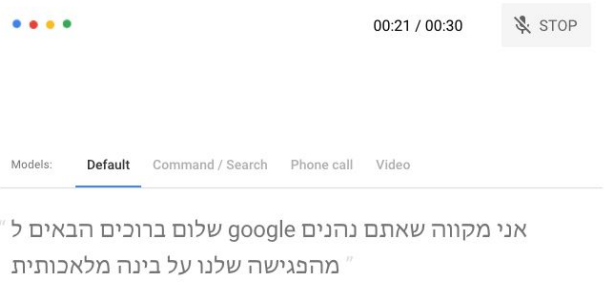
Ofra Shaltiel & Asaf Lev are very happy to be talking to you today about what Google can do in a partnership with you.



Analyze Speech-to-Text API

DEMO

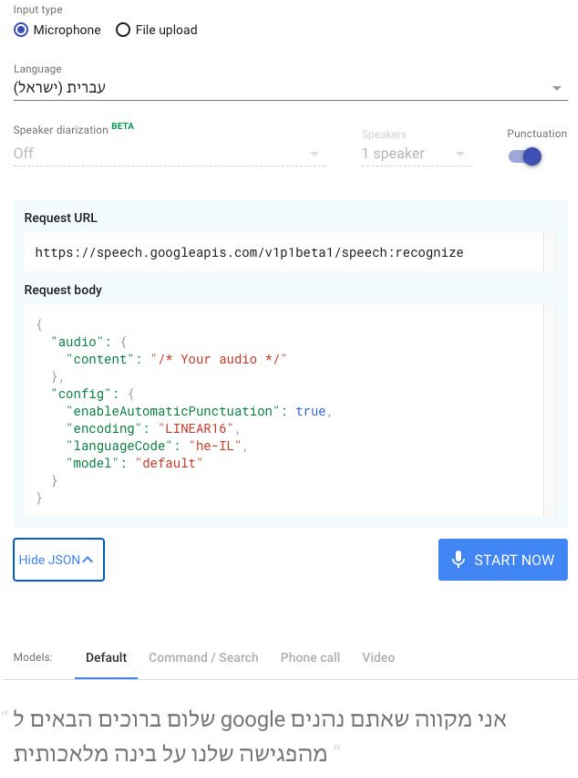
Put Speech-to-Text into action



Docs Demo

DEMO

Put Speech-to-Text into action



Analyze Text-to-Speech API

DEMO

Put Text-to-Speech into action

Type what you want, select a language then click "Speak It" to hear.

Text to speak:

Google Cloud Text-to-Speech enables developers to synthesize natural-sounding speech with 100+ voices, available in multiple languages and variants. It applies DeepMind's groundbreaking research in WaveNet and Google's powerful neural networks to deliver the highest fidelity possible. As an easy-to-use API, you can create lifelike interactions with your users, across many applications and devices.

text ssml

Language / locale: English (United States)

Voice type: WaveNet

Voice name: en-US-Wavenet-I

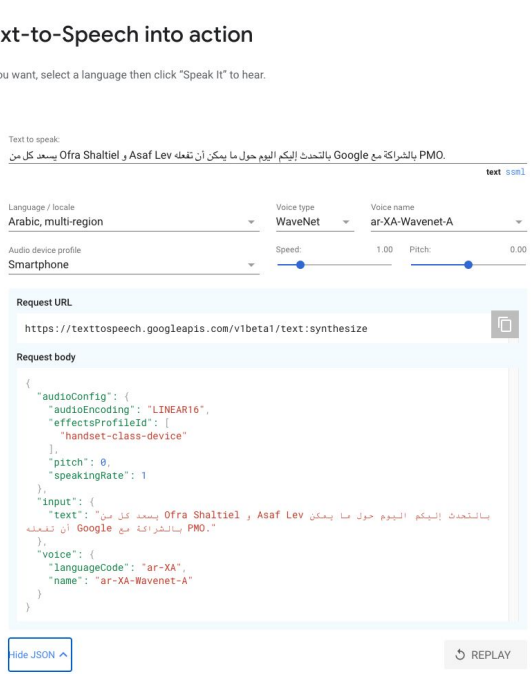
Audio device profile: Smartphone

Speed: 1.00

Pitch: 0.00

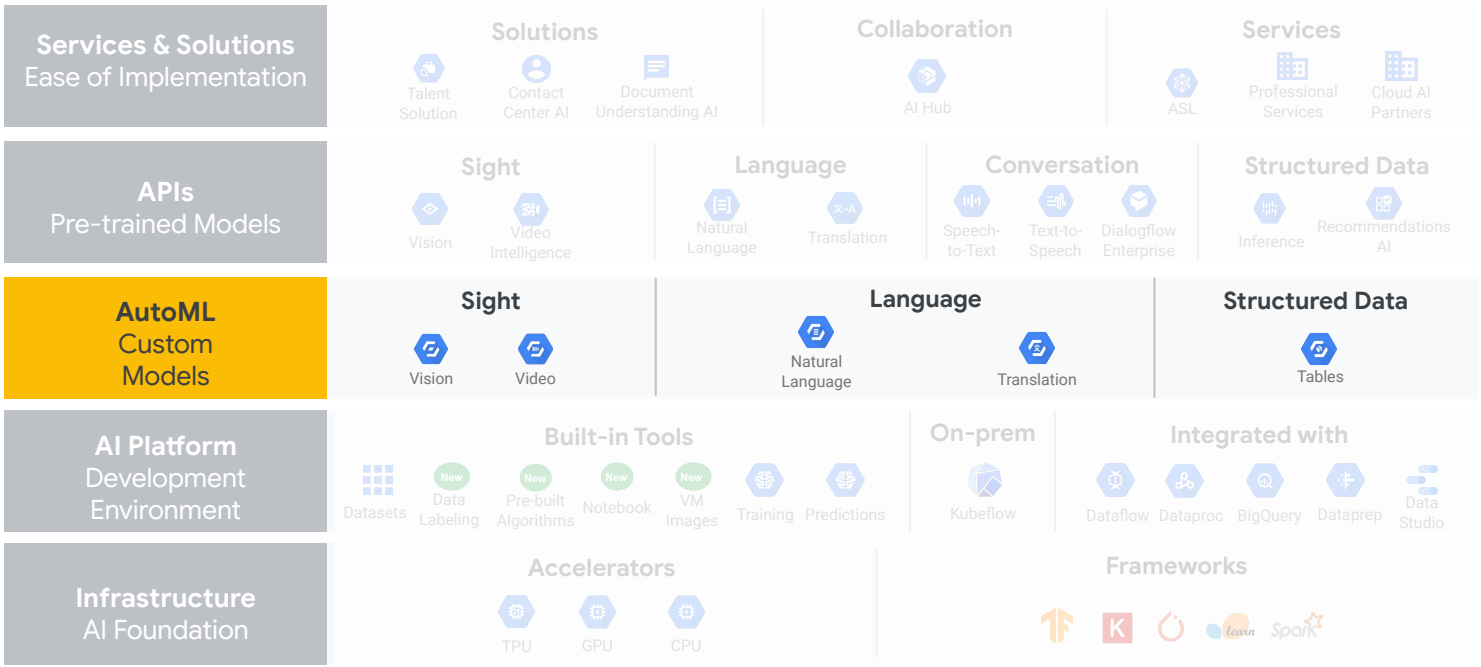
Show JSON

SPEAK IT

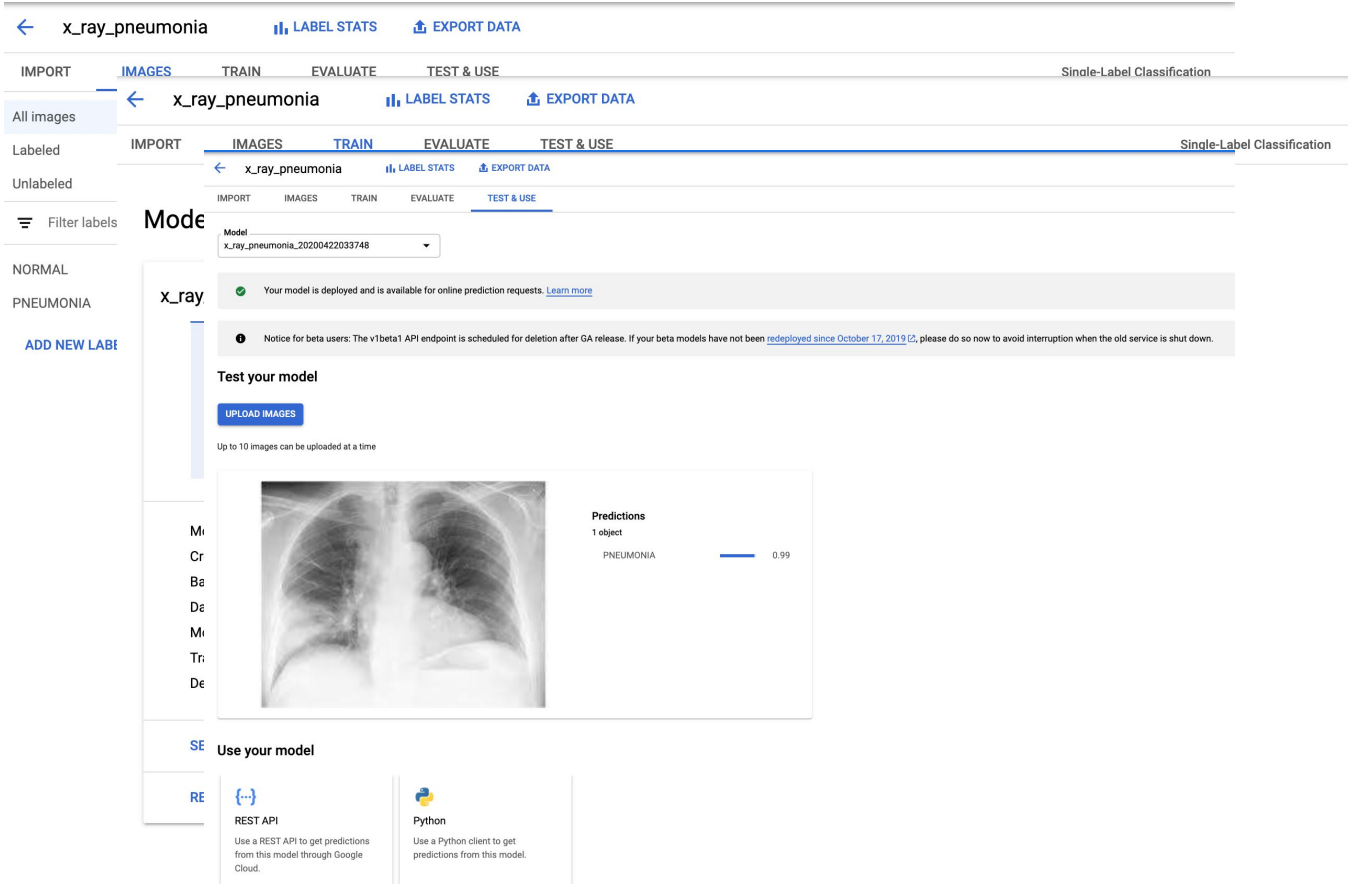


Video Recognition API

AI for every level of expertise



Auto ML Vision Demo



[simple]

United States Navy

(in partnership with Simple technology Solutions)

Challenge: The manual inspection of US Navy ships and vessels is a time-intensive, costly process that can drive up costs and slow down deployment. The US Navy was spending around $3 billion a year monitoring rust and corrosion.

US Navy deploys AI/ML drones to monitor rust and predict maintenance needs

With the help of Google Cloud and STS, the US Navy is now using drones to inspect the maintenance needs of its fleet along with AI/ML to help prioritize repairs. The AI tool will use images taken by inspection drones to identify maintenance needs—particularly rust and corrosion—and prioritize the most pressing repairs. Eventually, the tool will be expected to predict future maintenance needs, as well.

Billions of dollars in savings predicted

Examines tens of thousands of images to prioritize repairs

Identifies and predicts future repairs needed

> We selected Google Cloud AutoML because it allows our engineers to train and test high-quality models quickly. Google Cloud provides an unrivaled degree of specification to meet tough business objectives in compliance with FedRAMP High"

Aaron Kilinski
Chief Technology Officer, Simple Technology Solutions

Custom Vision models

Moorfields eye hospital (Explainable AI)

Using AutoML Vision to drive innovation in Public Health

Using Google Cloud AutoML Vision, clinicians without prior experience in coding were able to develop models to accurately detect common diseases from medical images. This was published in The Lancet Digital Health.

> *If this technology can be used more widely—in particular by healthcare professionals without computer programming experience—it will really speed up the development of [systems] with the potential for significant patient benefits.'*

Pearse Keane, Consultant Ophthalmologist at Moorfields Eye Hospital

Deep learning to analyze fundus images

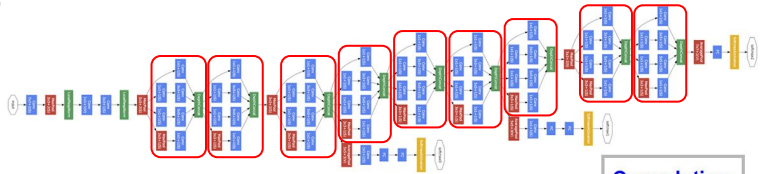
779X779

880k diagnoses

Labeling tool

54 ophthalmologists

130k images



Inception v4

No DR

Mild DR

Moderate DR

Severe DR

Proliferative DR

Image Quality

L/R eye

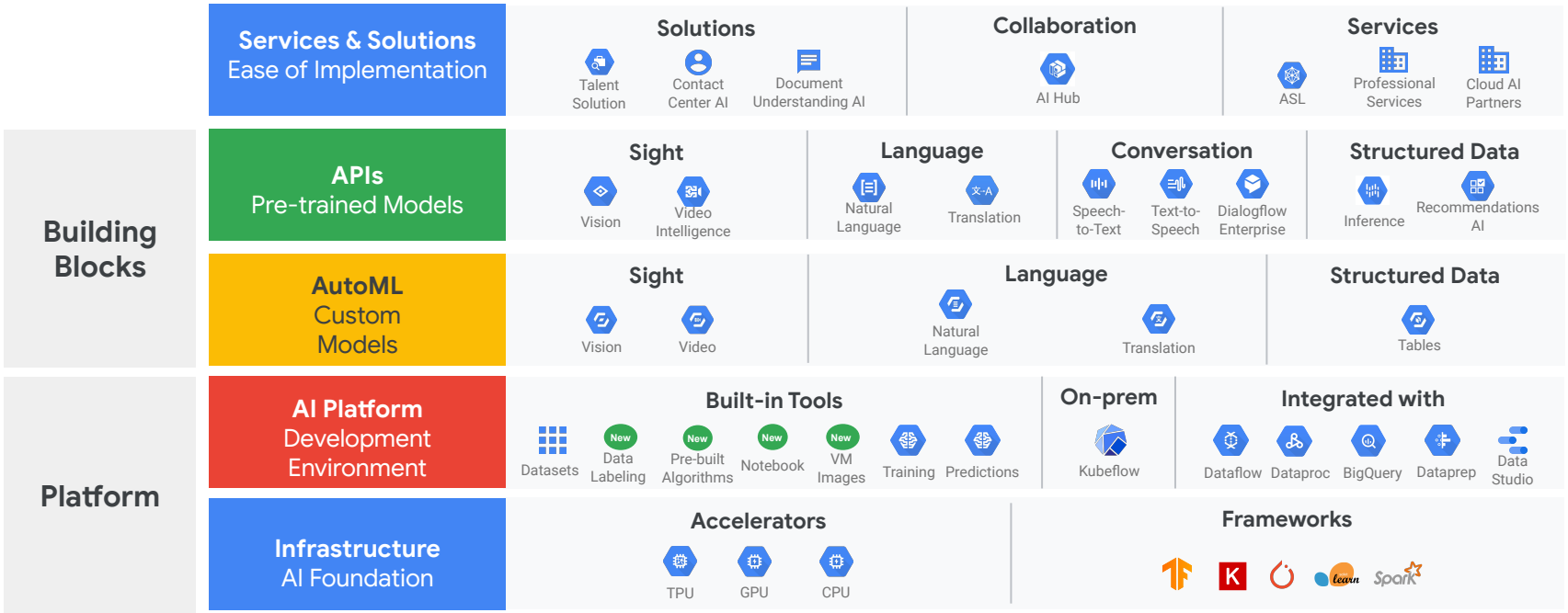
Field of View

Google

AutoML Tables

1:42

AI for every level of expertise



Google Cloud

Google Cloud Data Management

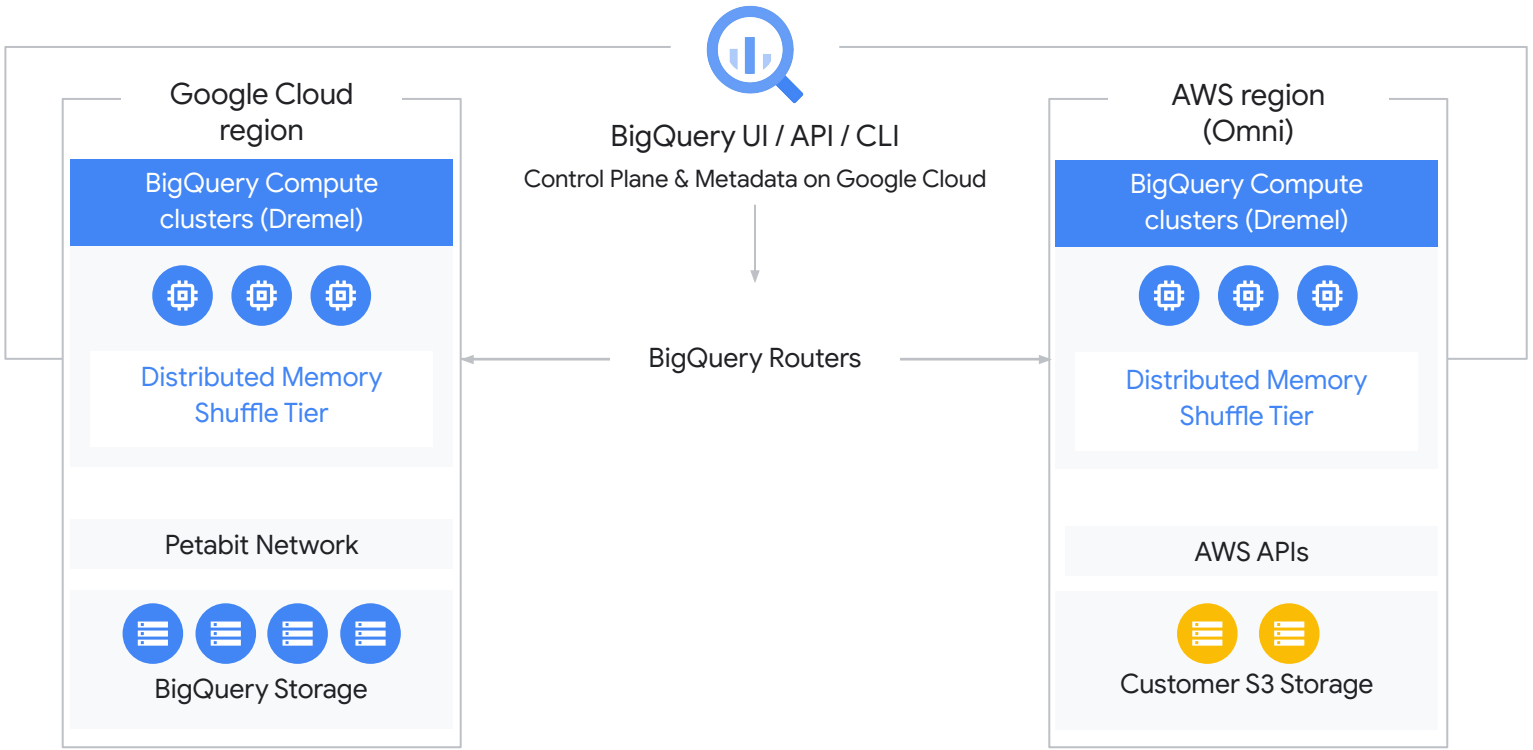

Google Cloud

Analyze GIS data in BigQuery with familiar SQL

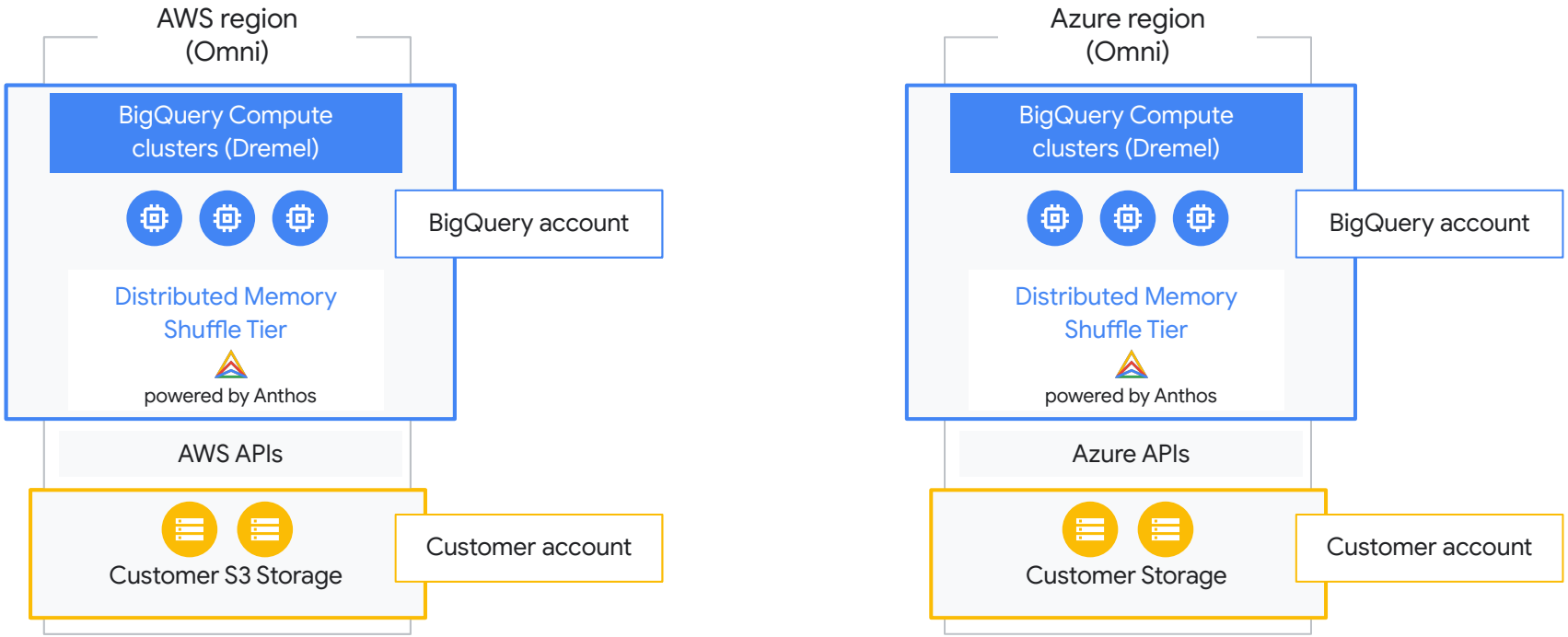
BigQuery GIS

With BigQuery GIS, you can use geographic location data types and standard SQL geographic location functions to analyze and visually view geospatial data in BigQuery.

BigQuery Omni under the hood



Architecture is the same across clouds



Data lifecycle

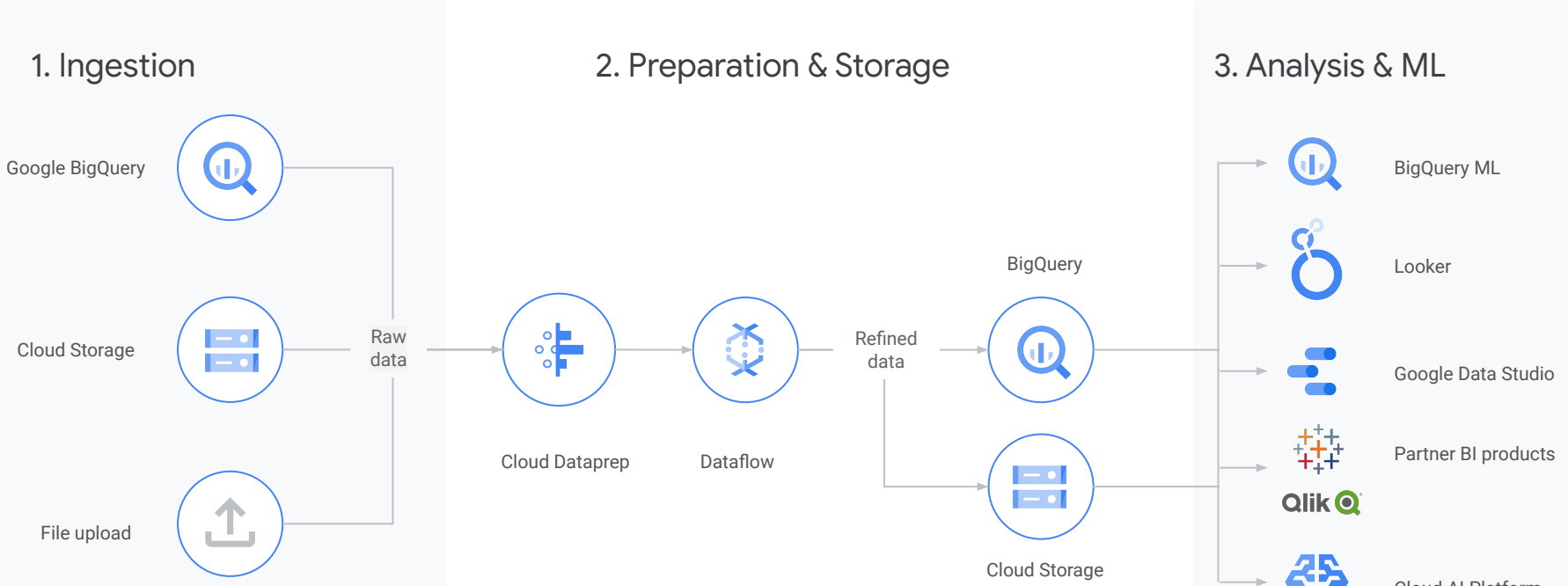
1. **Ingest**: The first stage is to pull in the raw data, such as streaming data from devices, on-premises batch data, app logs, or mobile-app user events and analytics.

2. **Store**: After the data has been retrieved, it needs to be stored in a format that is durable and can be easily accessed.

3. **Process and analyze**: In this stage, the data is transformed from raw form into actionable information.

4. **Explore and visualize**: The final stage is to convert the results of the analysis into a format that is easy to draw insights from and to share with colleagues and peers.

Data Management Example



Google Cloud

Serverless Simplicity | Fast Exploration | Easy Preparation

Data lifecycle - **ingest**

Applications

Stackdriver Logging

Good for: Centralized Log management solution

Such as: Log data from Applications

Cloud Pub/Sub

Good for: Global, Scalable MQ, durable, de-couple apps

Such as: IOT, User event, System metrics

Cloud SQL

Good for: Structured data, Web frameworks

Such as: Meta-data, Fintech, AdTech

Cloud Datastore

Good for: Hierarchical, Mobile, Web

Such as: User profile, Game states

Cloud Bigtable

Good for: Heavy read/write, events

Such as: IOT, User/system events, low latency systems

Cloud Firestore

Good for: Hierarchical, Mobile, Web

Such as: User profile, Game states

Cloud Spanner

Good for: RDBMS, SQL, Horizontal scaling

Such as: Meta-data, Fintech, AdTech

Streaming

Cloud Pub/Sub

Good for: Global, Scalable MQ, durable, de-couple apps

Such as: IOT, User event, System metrics

Batch

Cloud Transfer

Good for: Managed Bulk (arbitrary) data transfer

Such as: Cloud migration, backup, legacy data

Cloud Storage

Good for: Binary, Object data

Such as: Images, Media serving, Backup

Data lifecycle - **store**

Object

Cloud Storage

Good for: Binary or object data

Such as: Images, Media serving, backups

Key-value

App Engine Memcache

Good for: Web/mobile applications, gaming

Such as: Game state, user sessions

Non-relational

Cloud Datastore

Good for: Hierarchical, mobile, web

Such as: User profiles, Game State

Cloud Bigtable

Good for: Heavy read + write, events,

Such as: AdTech, Financial, IoT

Relational

Cloud SQL

Good for: Web frameworks

Such as: CMS, eCommerce

Cloud Spanner

Good for: RDBMS+scale, HA, HTAP

Such as: Transactions, Ad/Fin/MarTech

Warehouse

BigQuery

Good for: Enterprise Data Warehouse

Such as: Analytics, Dashboards

Data lifecycle - **process and analyze**

Large scale data processing

Cloud Dataproc

Good for: Managed hadoop eco-systems

Such as: Batch and streaming analytics over Big Data, Machine Learning

Cloud Dataflow

Good for: Unified abs. for batch & streaming data.

Such as: New pipelines, Windowing operations, Watermarking

Cloud Dataprep

Good for: UI Driven data preparation

Such as: Pre-step to Big data jobs (Dataproc/Data Flow), Machine Learning

Data Analysis

BigQuery

Good for: Enterprise Data Warehouse

Such as: Analytics, Dashboards, Business Intelligence, Basic Machine Learning

Task specific Machine Learning

AutoML Vision

Good for: Object/face detection, emotional facial attributes, Safe search, real time or batch, OCR

AutoML Video Intelligence

Good for: Video metadata, entity analysis, granularity of 1 frame per second, Video catalog (timestamped) entity search

AutoML NLP

Good for: Structure and meaning of text, sentiment analysis

AutoML Translation

Good for: Auto translation of 90 languages, language detection, both real time and batch

AutoML Tables

Good for: Analyse structured data, find data traits, data label and target feature selection

Custom ML

AI Platform

Good for: General purpose ML platform.

Such as: Data scientists, ML on Data warehouse

Cloud Dataproc

Good for: Managed hadoop eco-systems

Such as: ML Jobs using Mahour/Spark MLLib

Google Cloud

Data lifecycle - **explore and visualize**

Data Science

Cloud Datalab

Good for:
Jupyter notebooks for general purpose data visualization

Business Intelligence

Google Data Studio

Good for:
Drag and Drop report builder from Google Sheets, BigQuery, Cloud storage files, SQL

Looker

Good for:
Custom applications, embedded visualizations, data science workflows, Integrates with BigQuery

Spreadsheet

Connected Sheets

Good for:
Using Google App script ability to run BigQuery Query. Usually for quick short analysis on smaller datasets

Cloud Dataprep

Good for:
UI Driven data preparation and visualization. Also used as Pre-step to Big data jobs (Dataproc/DataFlow), Machine Learning

Database Management Portfolio on GCP

In-memory

Cloud Memorystore

Managed Redis & MemcacheD

Non-relational / NoSQL

Cloud Firestore

Serverless, scalable document store

Cloud Bigtable

Low latency, scalable wide column store

Relational

Cloud SQL

Managed MySQL, PostgreSQL, & SQL Server

Cloud Spanner

Scalable relational database

Object

Cloud Storage

Object storage, data lake

Strategic Partners

redis

mongoDB.

elastic

DATASTAX

influxdata

neo4j

confluent

Databases On GCE/GKE

SAP HANA
Microsoft SQL Server
Oracle
IBM Db2
MySQL
PostgreSQL
MariaDB
Non-relational

Built and managed by Google

Built and managed by Partners (as a service or Anthos)

Managed by you and/or Partners

Serverless Data Platform

Pub/Sub

Just send events

Dataflow & Fusion

Just write pipelines

BigQuery

Just run queries


Google Cloud