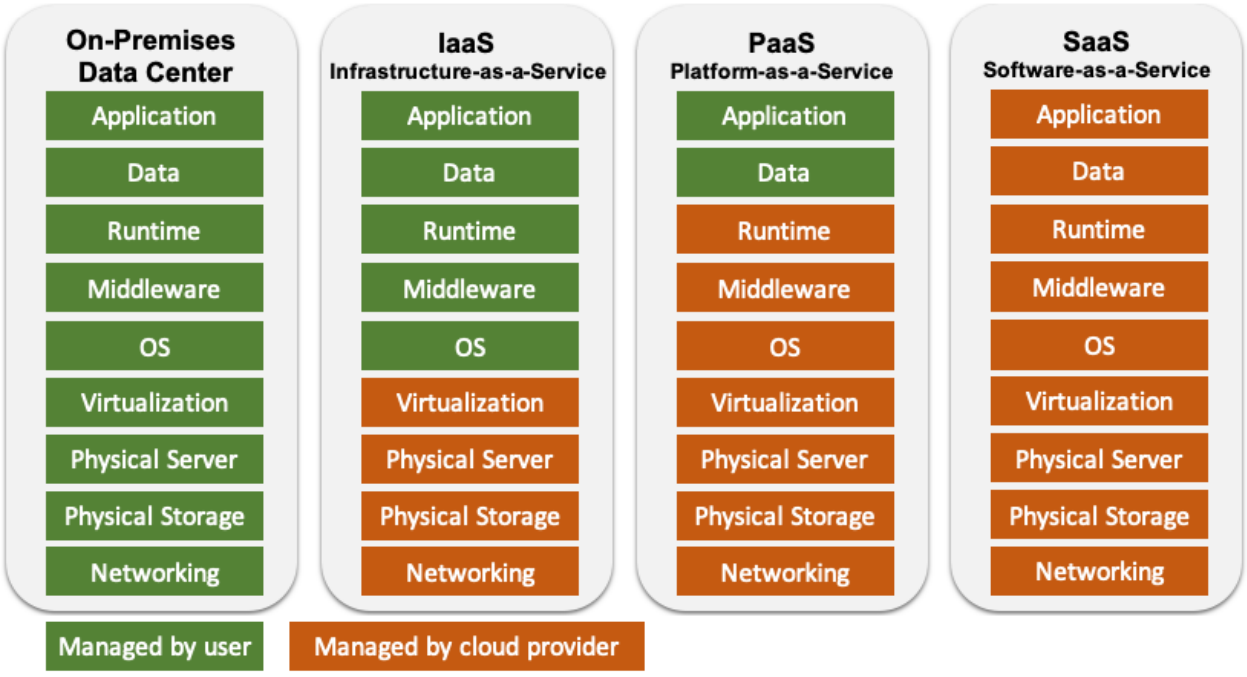
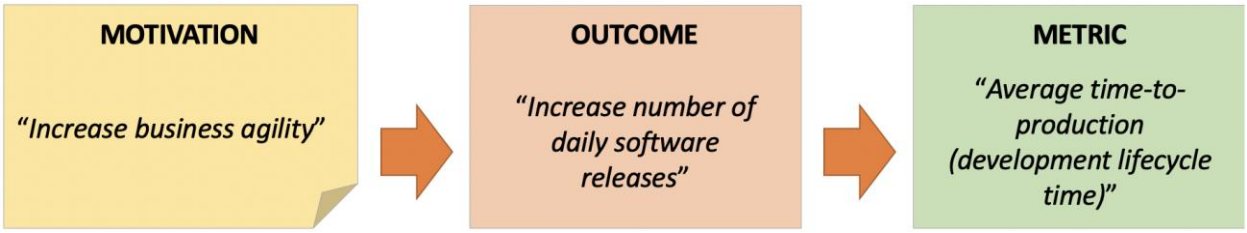
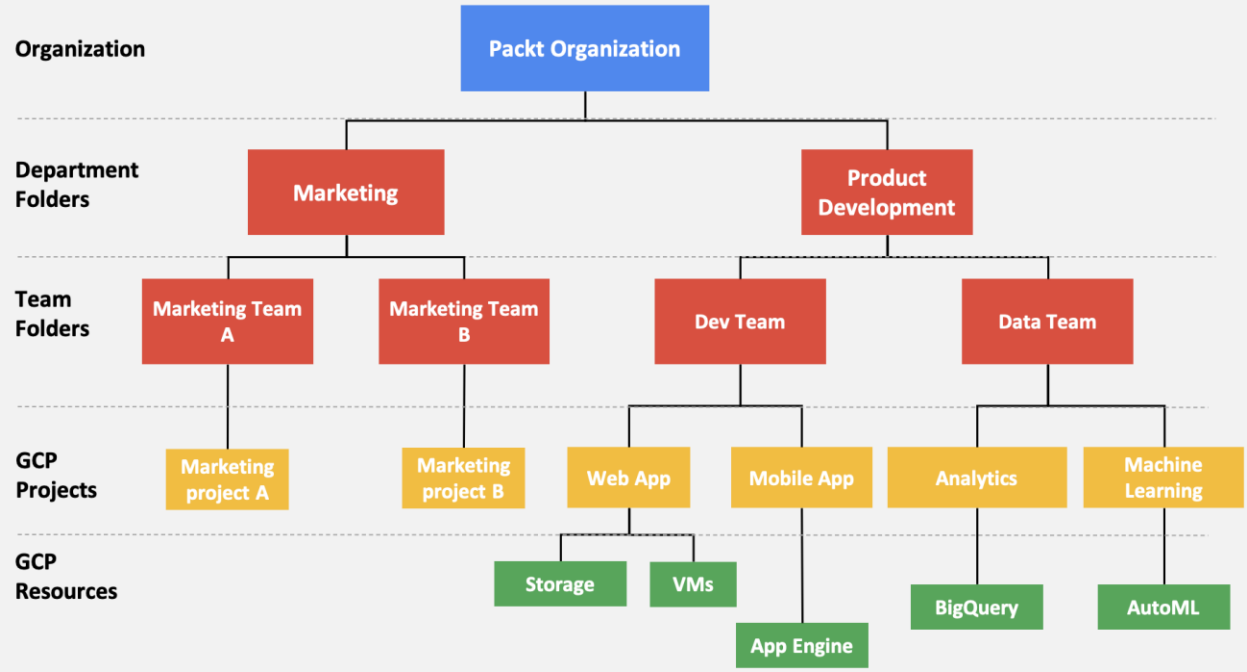
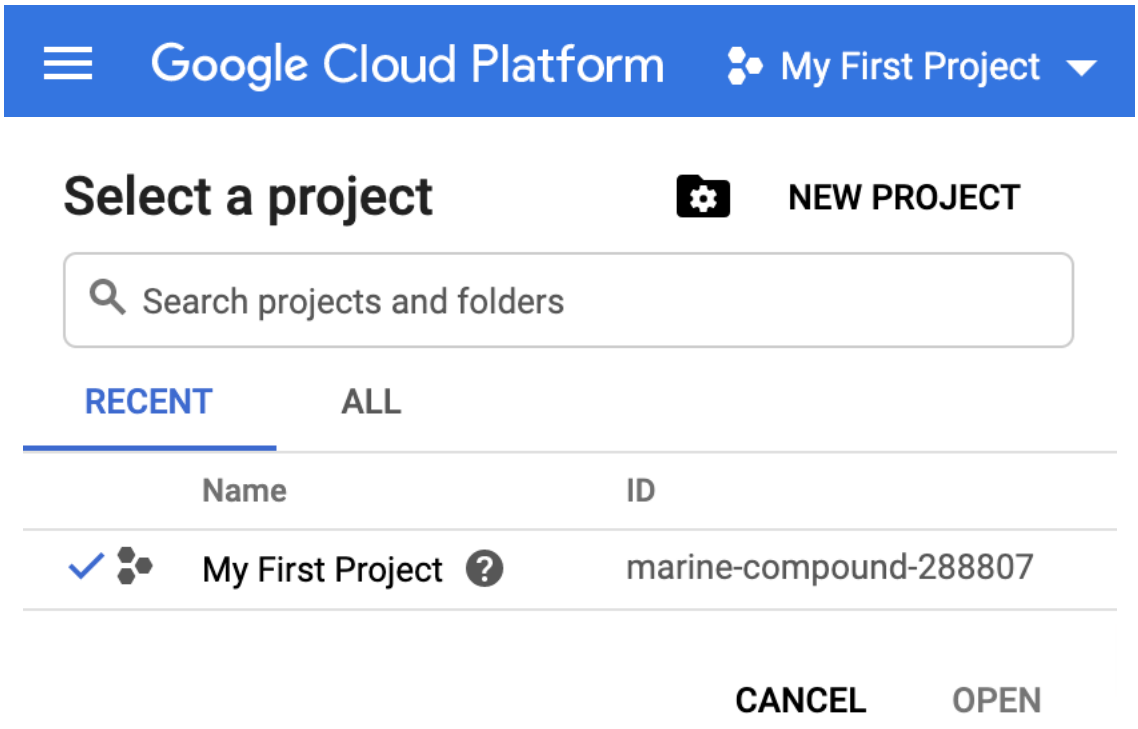
Chapter 1: An Introduction to Google Cloud for Architects





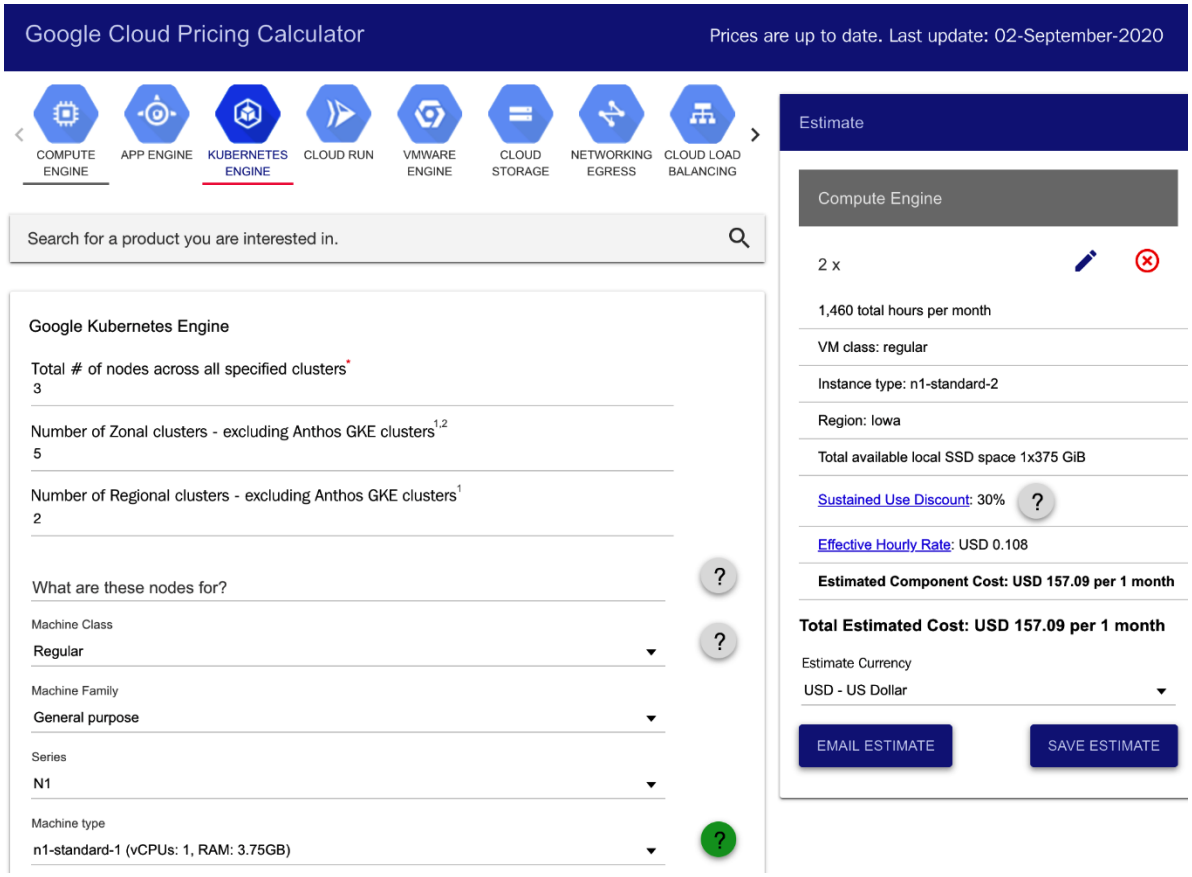

Organization
Packt Organization
Department Folders
Marketing
Product Development
Team Folders
Marketing Team A
Marketing Team B
Dev Team
Data Team
GCP Projects
Marketing project A
Marketing project B
Web App
Mobile App
Analytics
Machine Learning
GCP Resources
Storage
VMs
App Engine
BigQuery
AutoML

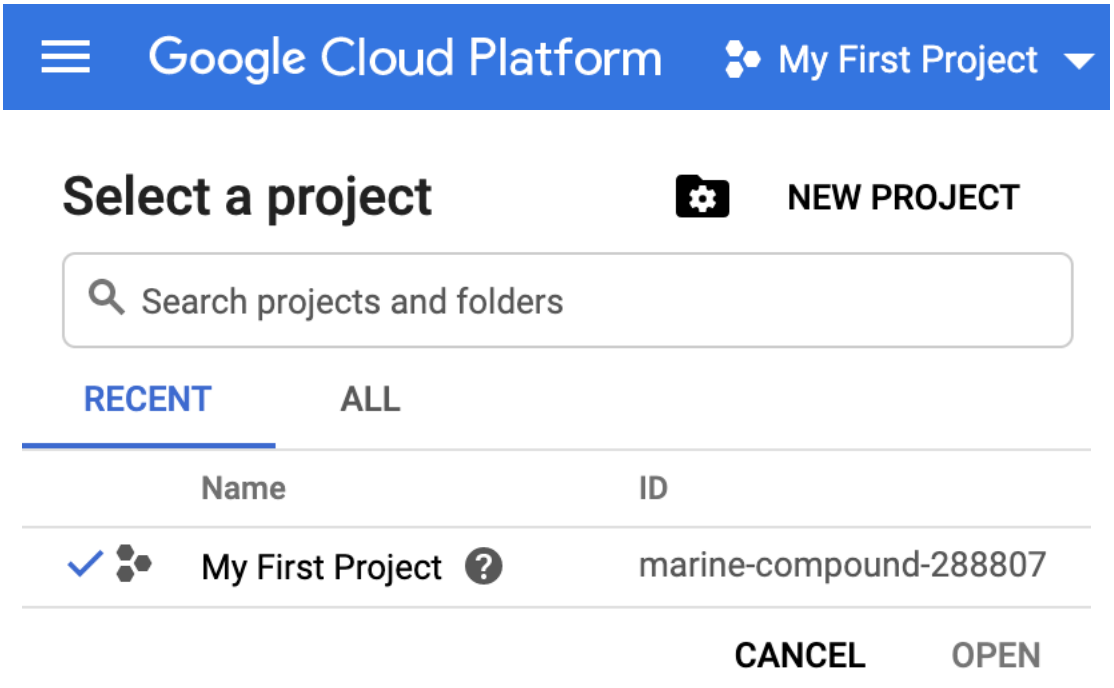

Google Cloud Platform
My First Project
Select a project
NEW PROJECT
Search projects and folders
RECENT
ALL
Name
ID
My First Project
marine-compound-288807
CANCEL
OPEN

```
GROUPS
    GROUP is one of the following:

     network-interfaces
        Read and manipulate Compute Engine VM instance network interfaces.

     os-inventory
        Read Compute Engine OS Inventory Data and Related Resources.

COMMANDS
    COMMAND is one of the following:

     add-access-config
        Create a Google Compute Engine virtual machine access configuration.

     add-iam-policy-binding
        Add IAM policy binding to a Google Compute Engine instance.

     add-labels
        Add labels to Google Compute Engine virtual machine instances.

     add-metadata
        Add or update instance metadata.

     add-resource-policies
        Add resource policies to Google Compute Engine VM instances.

     add-tags
        Add tags to Google Compute Engine virtual machine instances.

     attach-disk
        Attach a disk to an instance.

     create
        Create Google Compute Engine virtual machine instances.
```

title
Stratocumulus cloud
1970 Propane vapor cloud explosion in Port Hudson
The Raincloud Man
User talk:Wanderingclouds818
File:Chase the clouds.jpg
Chaos cloud
Wikipedia:Featured picture candidates/File:Noctilucent clouds bargerveen.jpg
Ceiling (cloud)
User talk:Finalcloud33
User talk:The-cloud-atlas
Talk:Altocumulus cloud
File:Wildfire in Yellowstone Natinal Park produces Pyrocumulus cloud.jpg
User talk:Deathcloud33
Formosan clouded leopard
Rock filled cloud
File:LA cloudbasin.jpg
Get off of my cloud
File:Actinoform cloud.jpg
Rope cloud
User:Biocloudy
User talk:Qcloudpromo
User:Arianne bustillo/Summary of killing time in st cloud
Wikipedia:Articles for deletion/Crystalclouds
Rainclouds over Wushan
File talk:Oort cloud Sedna orbit.svg
User talk:Nandcloud

Chapter 2: Mastering the Basics of Google Cloud





New Project

You have 11 projects remaining in your quota. Request an increase or delete projects. Learn more

MANAGE QUOTAS

Project name *

Pilot Project

Project ID *

pilot-project-2020

Project ID can have lowercase letters, digits, or hyphens. It must start with a lowercase letter and end with a letter or number.

Location *

No organization BROWSE

Parent organization or folder

CREATE CANCEL

Create Budget

1 Scope — 2 Amount — 3 Actions

A budget enables you to track your actual spend against your planned spend.

Name *
Pilot Budget

A budget can be scoped to focus on a specific set of resources.

Projects
1 out of 2 projects

Products
All products (1352)

NEXT CANCEL

✓ Scope — 2 Amount — 3 Actions

Set a monthly budget amount. Budgets begin on the first of the month, and reset at the beginning of each month.

Budget type
Specified amount

A fixed amount that your spend will be compared against.

Target amount
kr 500

☑ Include credits in cost

Include credits in cost is the total cost minus any applicable credit. Credit may include usage discounts, promotions, or grants to use Google Cloud Platform.

NEXT CANCEL

Set alert threshold rules

Send email alert notifications after the actual or forecasted spend exceeds a percent of the budget or a specified amount. Learn more.

Percent of budget	Amount	Trigger on
50 %	kr 250	Actual
80 %	kr 400	Actual

+ ADD THRESHOLD

Manage notifications

Send email alert notifications to billing admins and users of this billing account.

- [x] Email alerts to billing admins and users

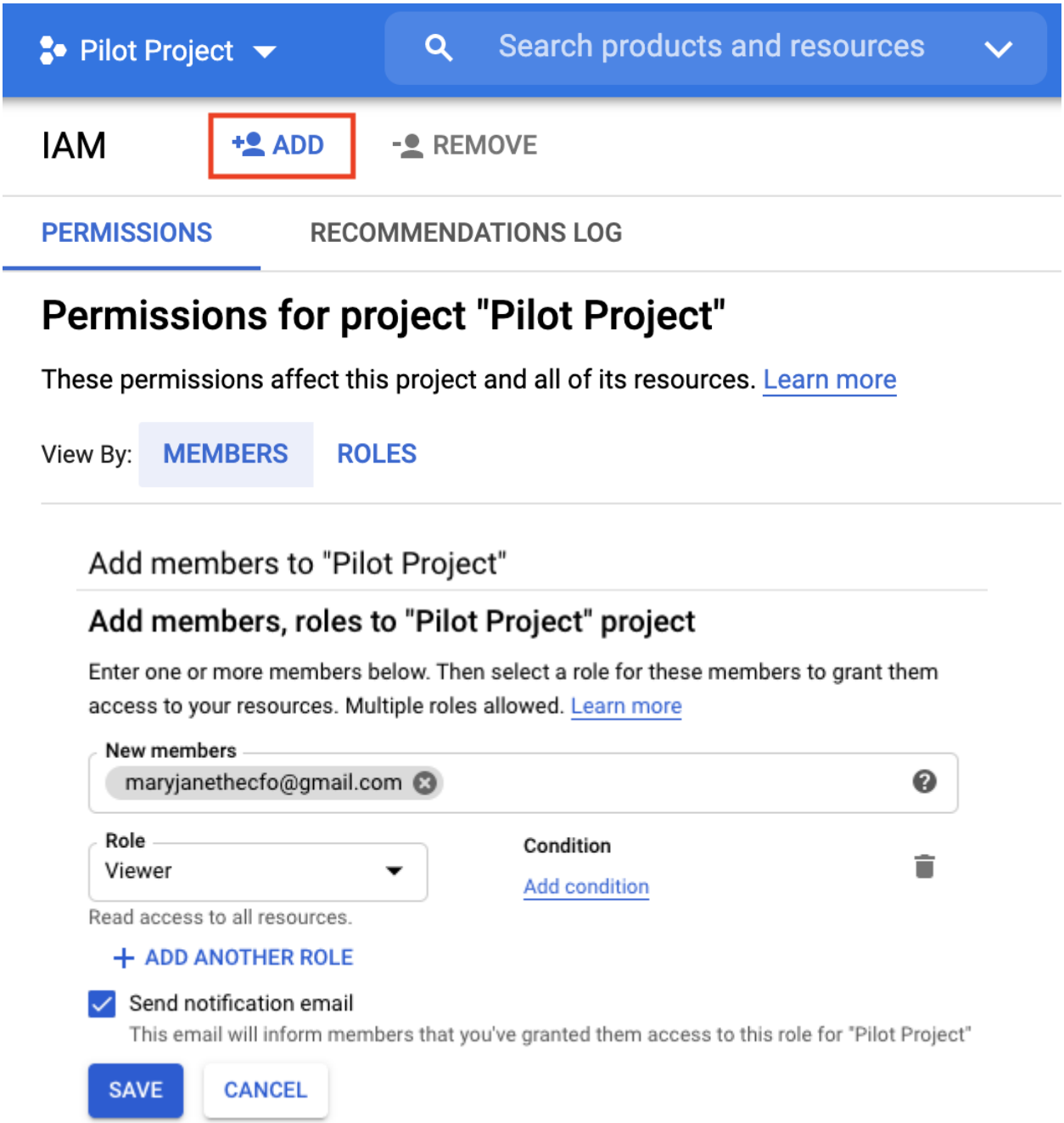
Allow Monitoring email notification channels to receive alerts when this budget reaches thresholds.

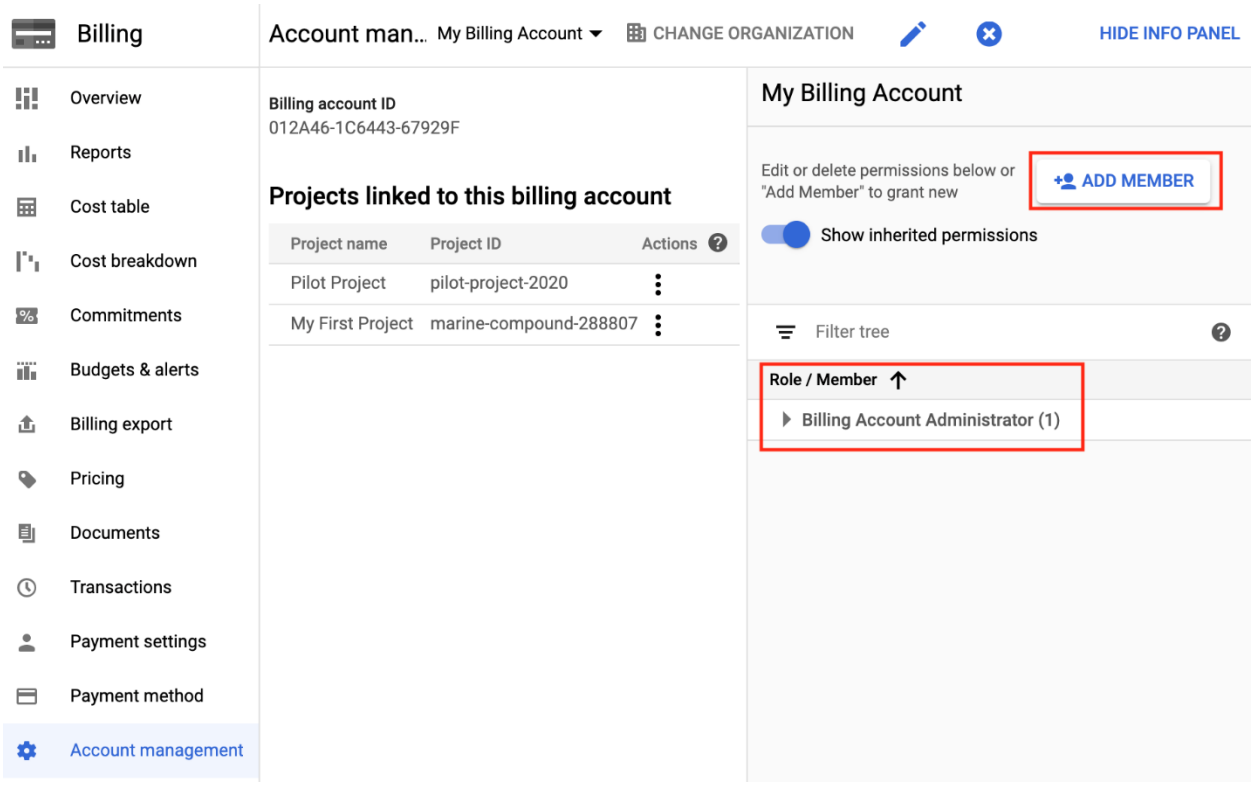
- [ ] Link Monitoring email notification channels to this budget
  Select a Monitoring workspace and maximum 5 Monitoring email notification channels.

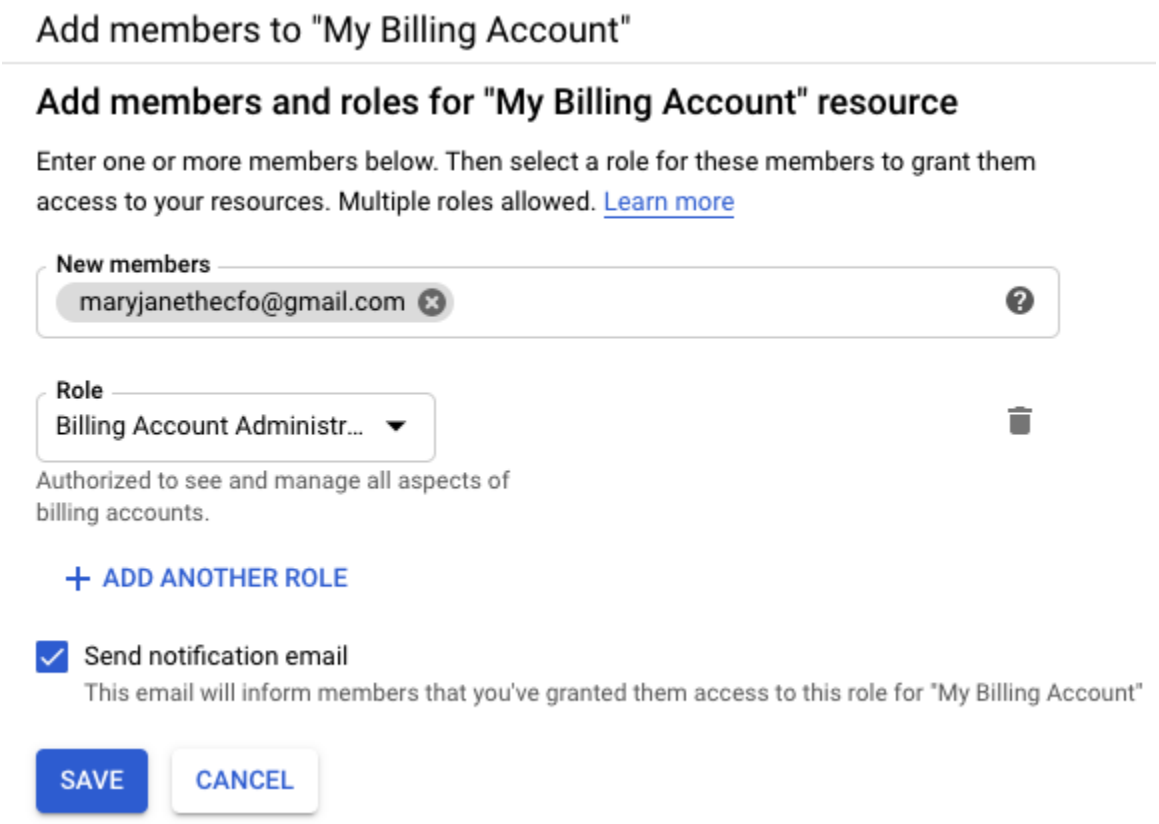
Use Pub/Sub notifications to programmatically receive spend updates about this budget.

- [ ] Connect a Pub/Sub topic to this budget
  Select a project and Pub/Sub topic. Anyone who can view this budget will also be able to view the project ID and the topic name.

FINISH CANCEL


Pilot Project
Search products and resources
IAM
ADD
REMOVE
PERMISSIONS
RECOMMENDATIONS LOG
Permissions for project "Pilot Project"
These permissions affect this project and all of its resources. Learn more
View By:
MEMBERS
ROLES
Add members to "Pilot Project"
Add members, roles to "Pilot Project" project
Enter one or more members below. Then select a role for these members to grant them access to your resources. Multiple roles allowed. Learn more
New members
maryjanethecfo@gmail.com
Role
Viewer
Read access to all resources.
Condition
Add condition
ADD ANOTHER ROLE
Send notification email
This email will inform members that you've granted them access to this role for "Pilot Project"
SAVE
CANCEL


Billing
Account man...
My Billing Account
CHANGE ORGANIZATION
HIDE INFO PANEL
Overview
Reports
Cost table
Cost breakdown
Commitments
Budgets & alerts
Billing export
Pricing
Documents
Transactions
Payment settings
Payment method
Account management
Billing account ID
012A46-1C6443-67929F
Projects linked to this billing account
Project name
Project ID
Actions
Pilot Project
pilot-project-2020
My First Project
marine-compound-288807
My Billing Account
Edit or delete permissions below or "Add Member" to grant new
ADD MEMBER
Show inherited permissions
Filter tree
Role / Member
Billing Account Administrator (1)


Add members to "My Billing Account"
Add members and roles for "My Billing Account" resource
Enter one or more members below. Then select a role for these members to grant them access to your resources. Multiple roles allowed. Learn more
New members
maryjanethecfo@gmail.com
Role
Billing Account Administr...
Authorized to see and manage all aspects of billing accounts.
ADD ANOTHER ROLE
Send notification email
This email will inform members that you've granted them access to this role for "My Billing Account"
SAVE
CANCEL

VM instances

You don't have permission to enable the API

Compute Engine

VM instances

Compute Engine lets you use virtual machines that run on Google's infrastructure. Create micro-VMs or larger instances running Debian, Windows, or other standard images. Create your first VM instance, import it using a migration service, or try the quickstart to build a sample app.

Create or Import or Take the quickstart

Add members to "Pilot Project"

Add members, roles to "Pilot Project" project

Enter one or more members below. Then select a role for these members to grant them access to your resources. Multiple roles allowed. Learn more

New members

johndoethepythonwizard2020@gmail.com

Role

App Engine Deployer

Necessary permissions to deploy new code to App Engine, and remove old versions.

Condition

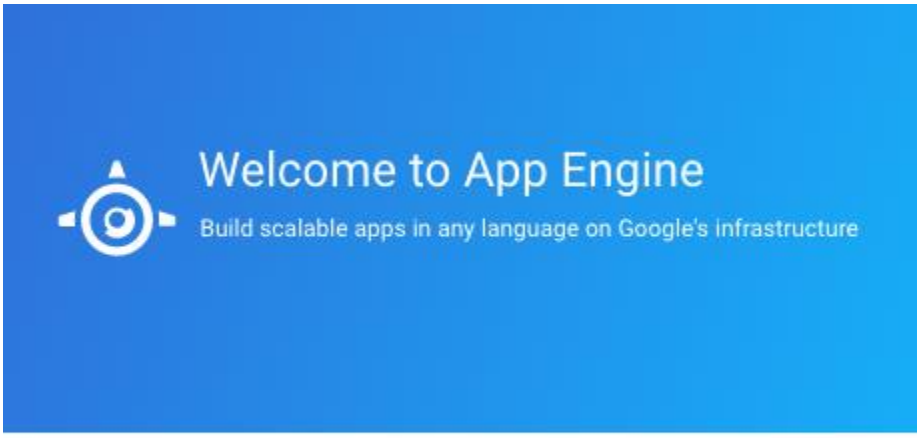
Add condition

+ ADD ANOTHER ROLE

Send notification email

This email will inform members that you've granted them access to this role for "Pilot Project"

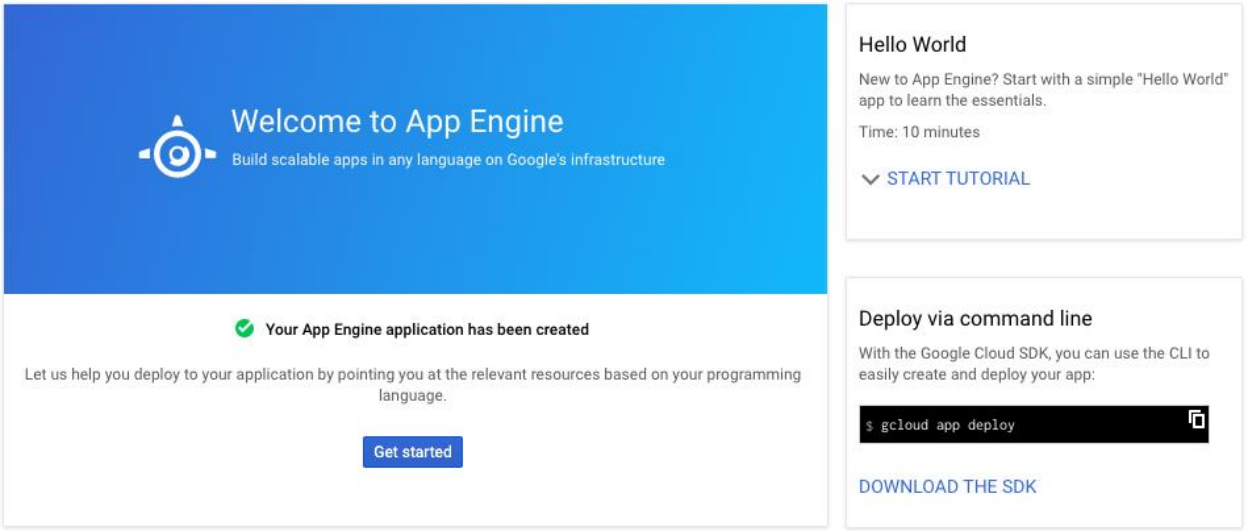
SAVE CANCEL



Create Application

You don't have permission to create an application.

```
You are creating an app for project [pilot-project-2020].
WARNING: Creating an App Engine application for a project is irreversible and the region
cannot be changed. More information about regions is at
<https://cloud.google.com/appengine/docs/locations>.

Please choose the region where you want your App Engine application
located:

 [1] asia-east2    (supports standard and flexible)
 [2] asia-northeast1 (supports standard and flexible)
 [3] asia-northeast2 (supports standard and flexible)
 [4] asia-northeast3 (supports standard and flexible)
 [5] asia-south1   (supports standard and flexible)
 [6] asia-southeast2 (supports standard and flexible)
 [7] australia-southeast1 (supports standard and flexible)
 [8] europe-west   (supports standard and flexible)
 [9] europe-west2  (supports standard and flexible)
 [10] europe-west3  (supports standard and flexible)
 [11] europe-west6  (supports standard and flexible)
 [12] northamerica-northeast1 (supports standard and flexible)
 [13] southamerica-east1 (supports standard and flexible)
 [14] us-central    (supports standard and flexible)
 [15] us-east1      (supports standard and flexible)
 [16] us-east4      (supports standard and flexible)
 [17] us-west2      (supports standard and flexible)
 [18] us-west3      (supports standard and flexible)
 [19] us-west4      (supports standard and flexible)
 [20] cancel
Please enter your numeric choice:  8

Creating App Engine application in project [pilot-project-2020] and region [europe-west]....done.
Success! The app is now created. Please use `gcloud app deploy` to deploy your first app.
```



App Engine | Next steps

Resources

Documentation for Python in App Engine.

Visit Github for code samples in standard Python

Deploy with Google Cloud SDK

Download the Cloud SDK

Initialize your SDK

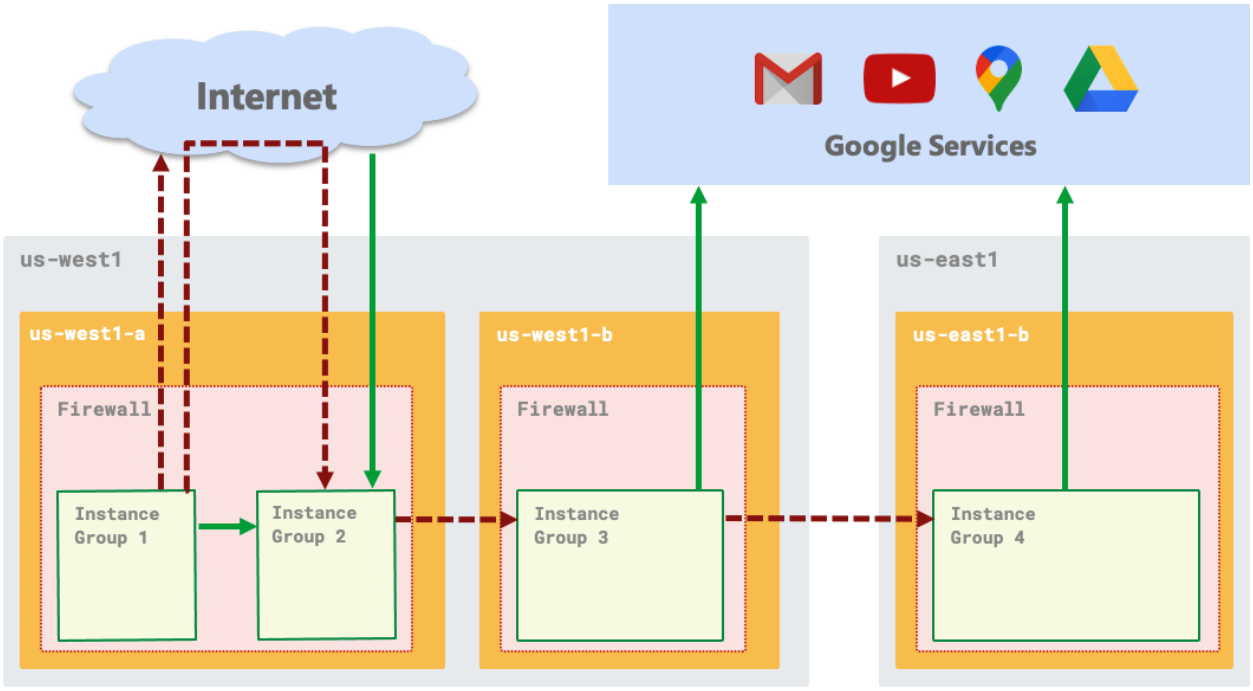
```
$ gcloud init
```

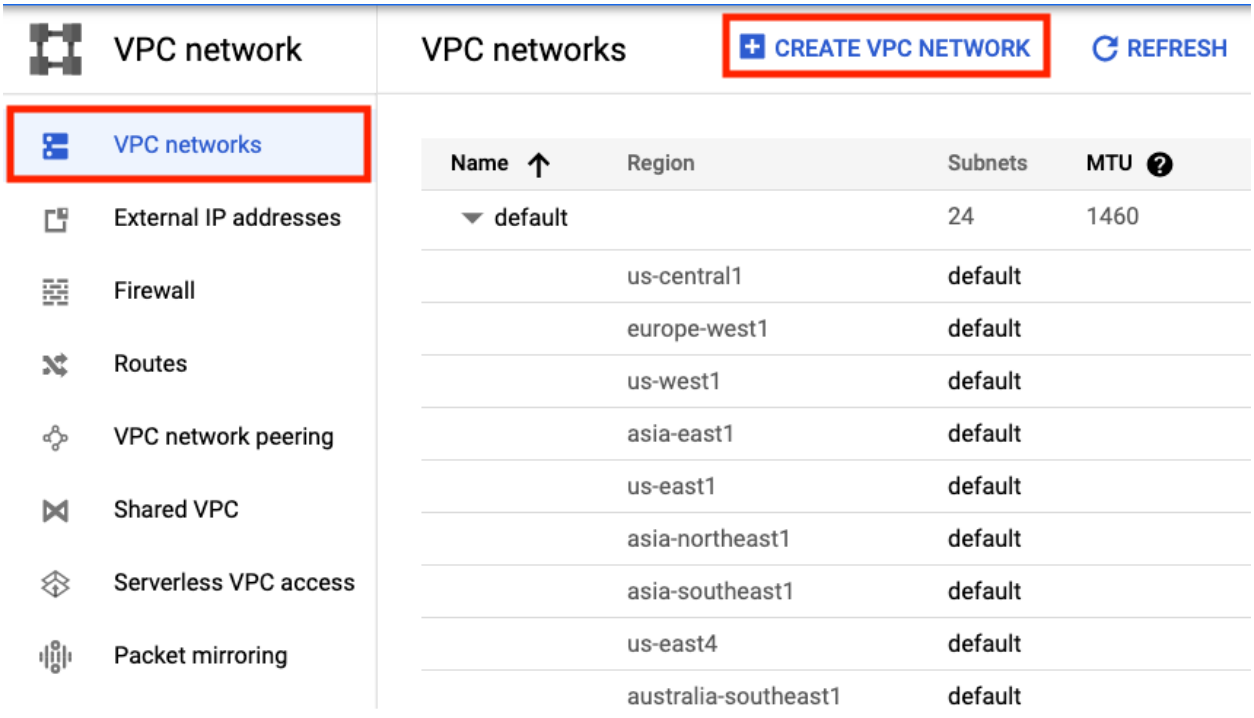
Deploy to App Engine

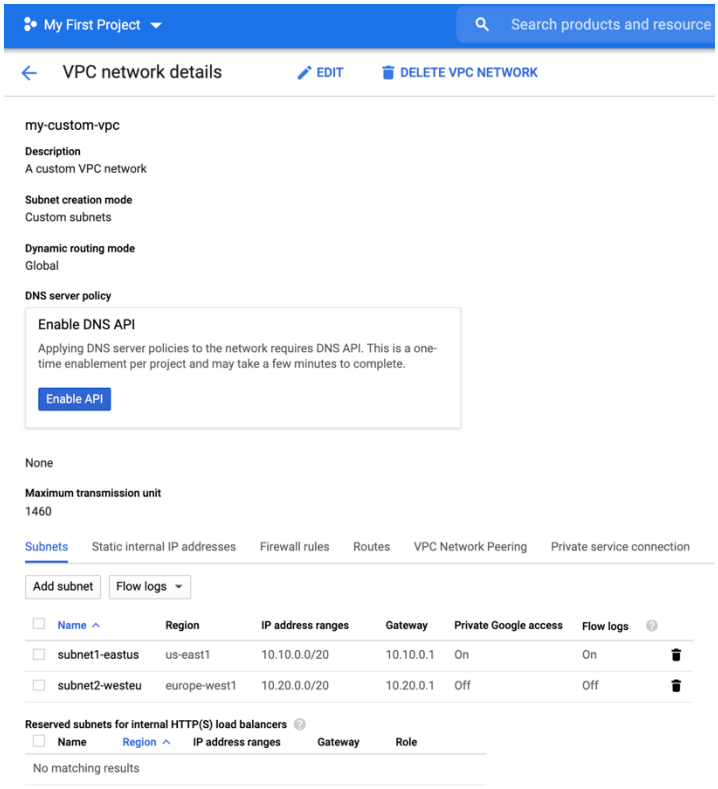
```
$ gcloud app deploy
```

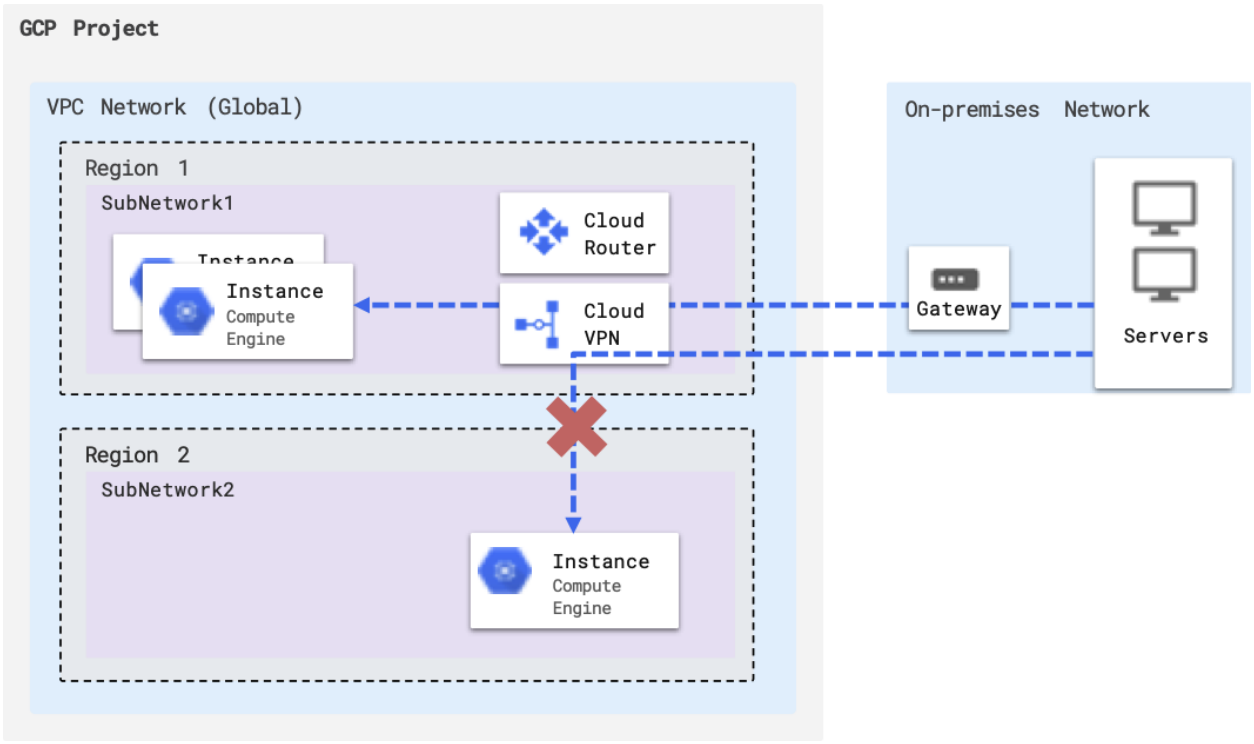
```
Services to deploy:

descriptor:      [/Users/vmehmeri/git/gcp/python-docs-samples/appengine/standard_python3/hello_world/app.yaml]
source:          [/Users/vmehmeri/git/gcp/python-docs-samples/appengine/standard_python3/hello_world]
target project:  [pilot-project-2020]
target service:  [default]
target version:  [20200911t085026]
target url:      [https://pilot-project-2020.ew.r.appspot.com]


Do you want to continue (Y/n)?  Y

Beginning deployment of service [default]...
Created .gcloudignore file. See `gcloud topic gcloudignore` for details.
╔════════════════════════════════════════════════════════════╗
╠═ Uploading 1 file to Google Cloud Storage                  ═╣
╚════════════════════════════════════════════════════════════╝
File upload done.
Updating service [default]...done.
Setting traffic split for service [default]...done.
Deployed service [default] to [https://pilot-project-2020.ew.r.appspot.com]
```

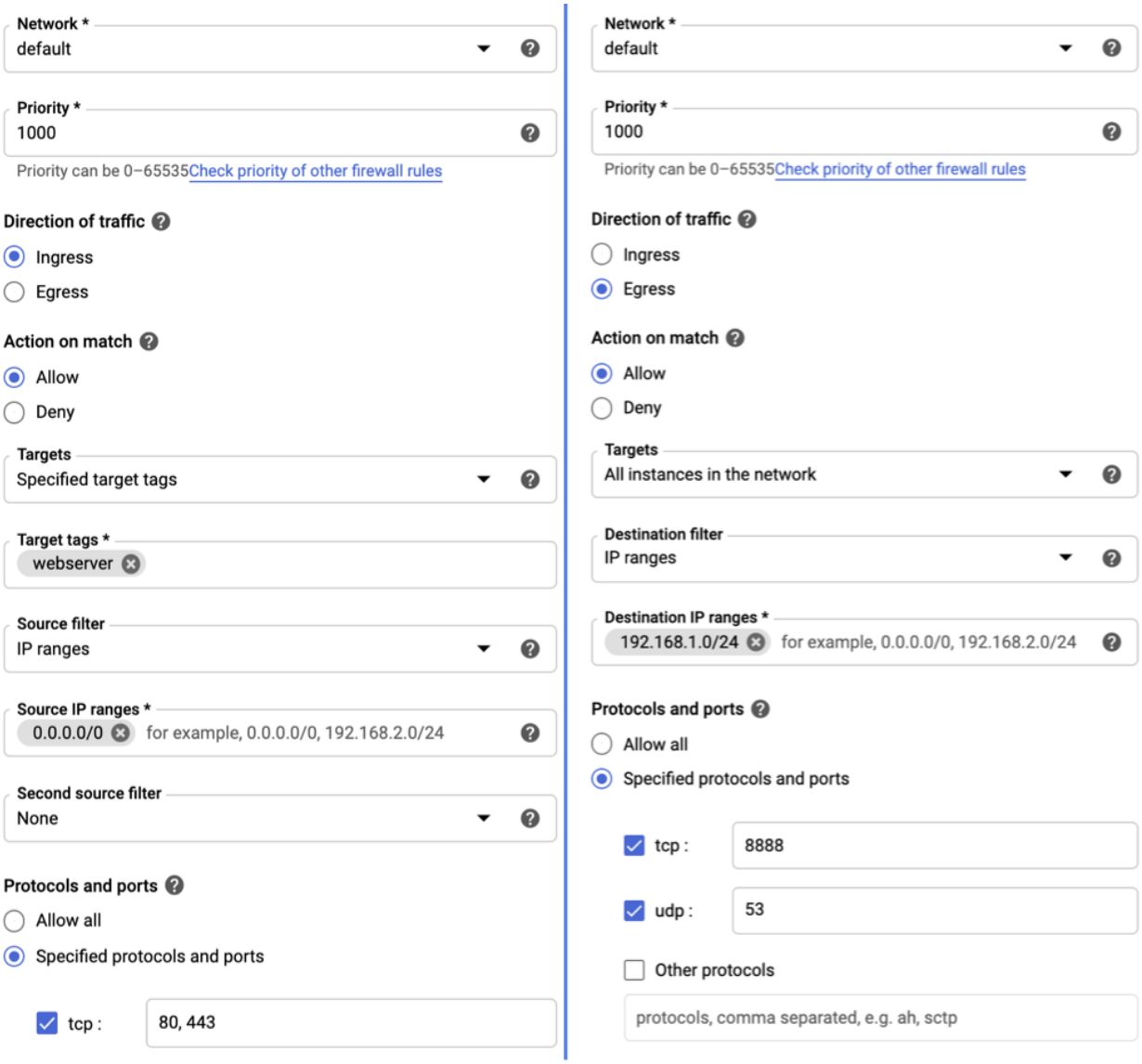
Chapter 3: Designing the Network

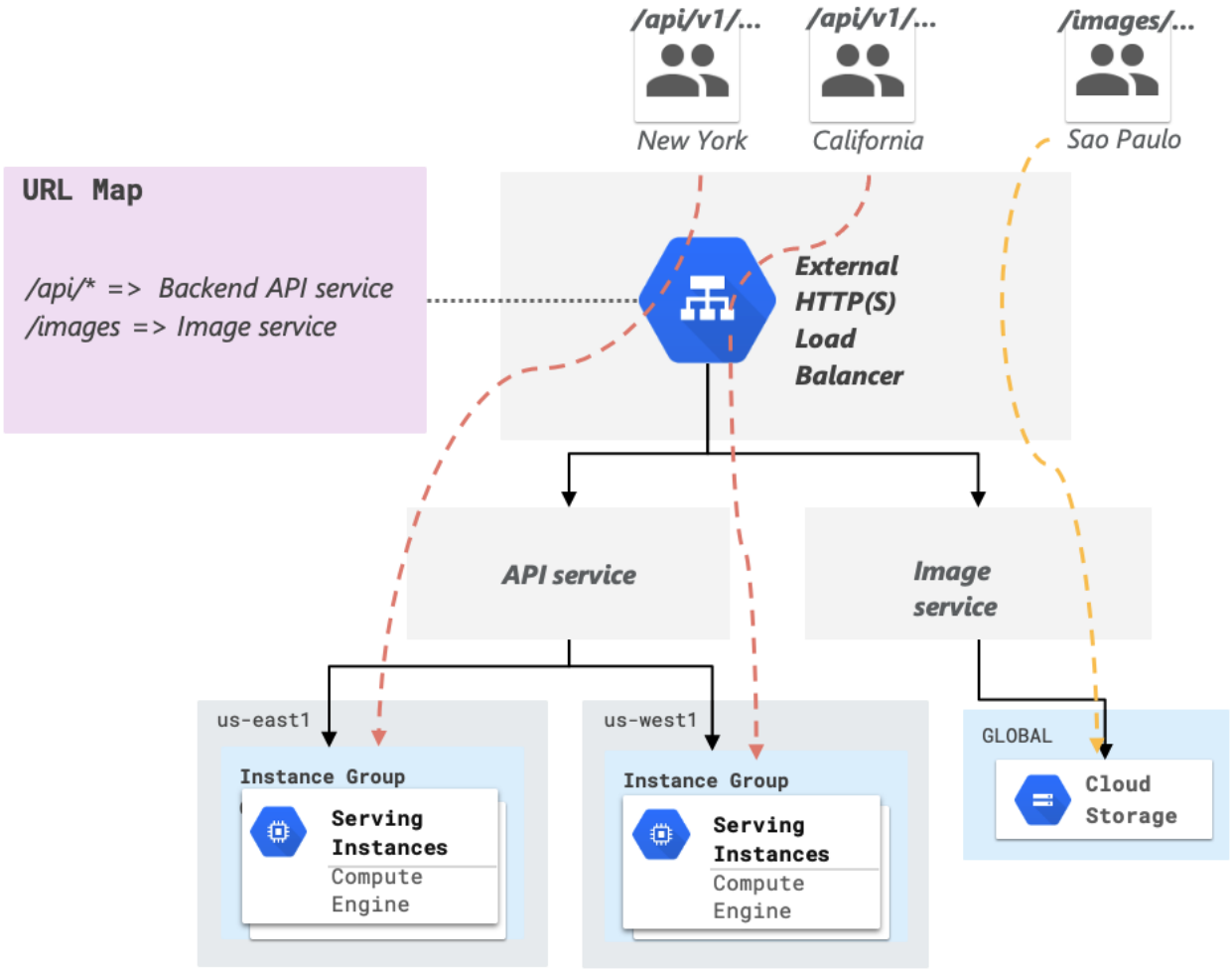


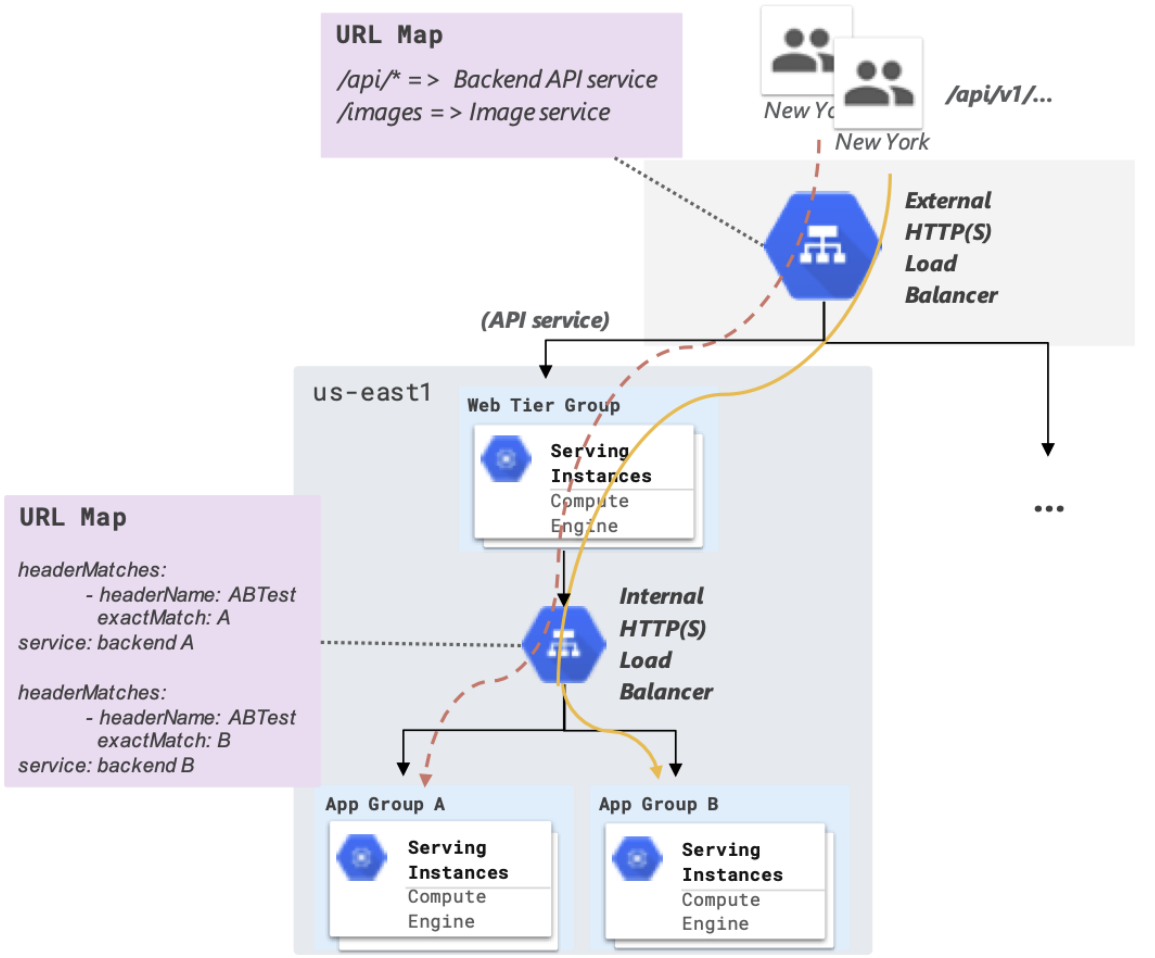


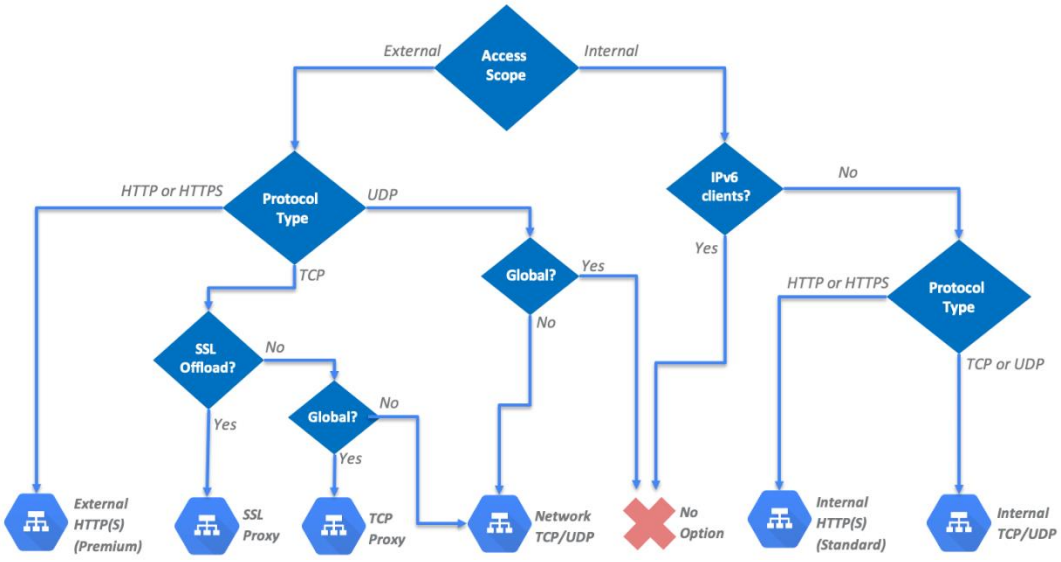

My First Project
Search products and resource
VPC network details
EDIT
DELETE VPC NETWORK
my-custom-vpc
Description
A custom VPC network
Subnet creation mode
Custom subnets
Dynamic routing mode
Global
DNS server policy
Enable DNS API
Applying DNS server policies to the network requires DNS API. This is a one-time enablement per project and may take a few minutes to complete.
Enable API
None
Maximum transmission unit
1460
Subnets
Static internal IP addresses
Firewall rules
Routes
VPC Network Peering
Private service connection
Add subnet
Flow logs
Name
Region
IP address ranges
Gateway
Private Google access
Flow logs
subnet1-eastus
us-east1
10.10.0.0/20
10.10.0.1
On
On
subnet2-westeu
europe-west1
10.20.0.0/20
10.20.0.1
Off
Off
Reserved subnets for internal HTTP(S) load balancers
Name
Region
IP address ranges
Gateway
Role
No matching results

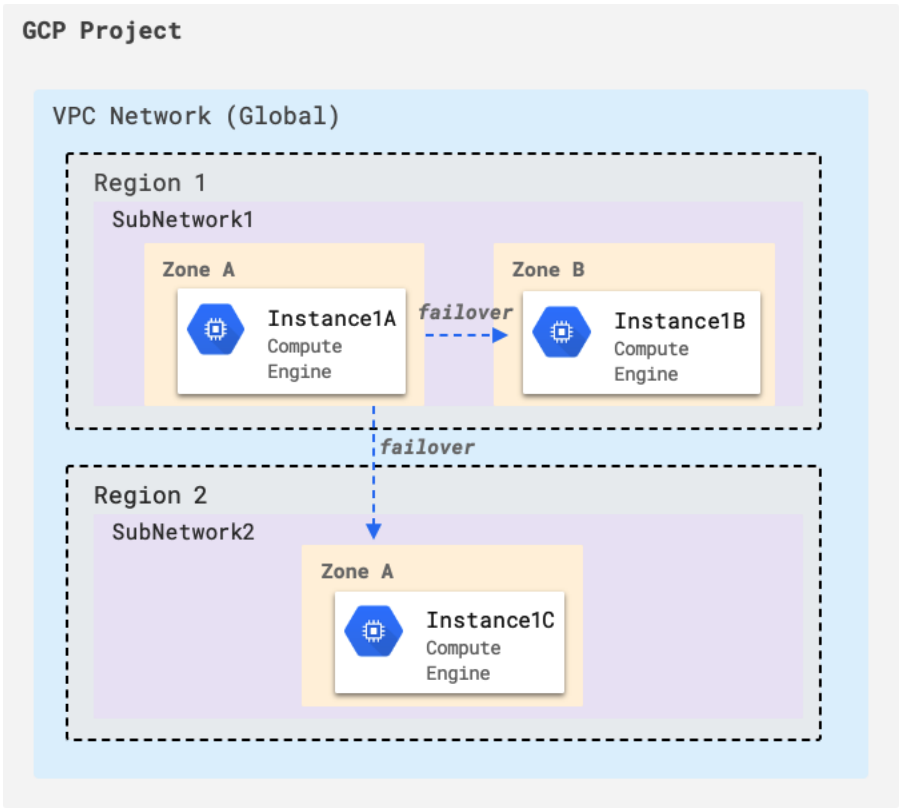

GCP Project
VPC Network (Global)
Region 1
SubNetwork1
Instance
Compute Engine
Cloud Router
Cloud VPN
Region 2
SubNetwork2
Instance
Compute Engine
On-premises Network
Gateway
Servers

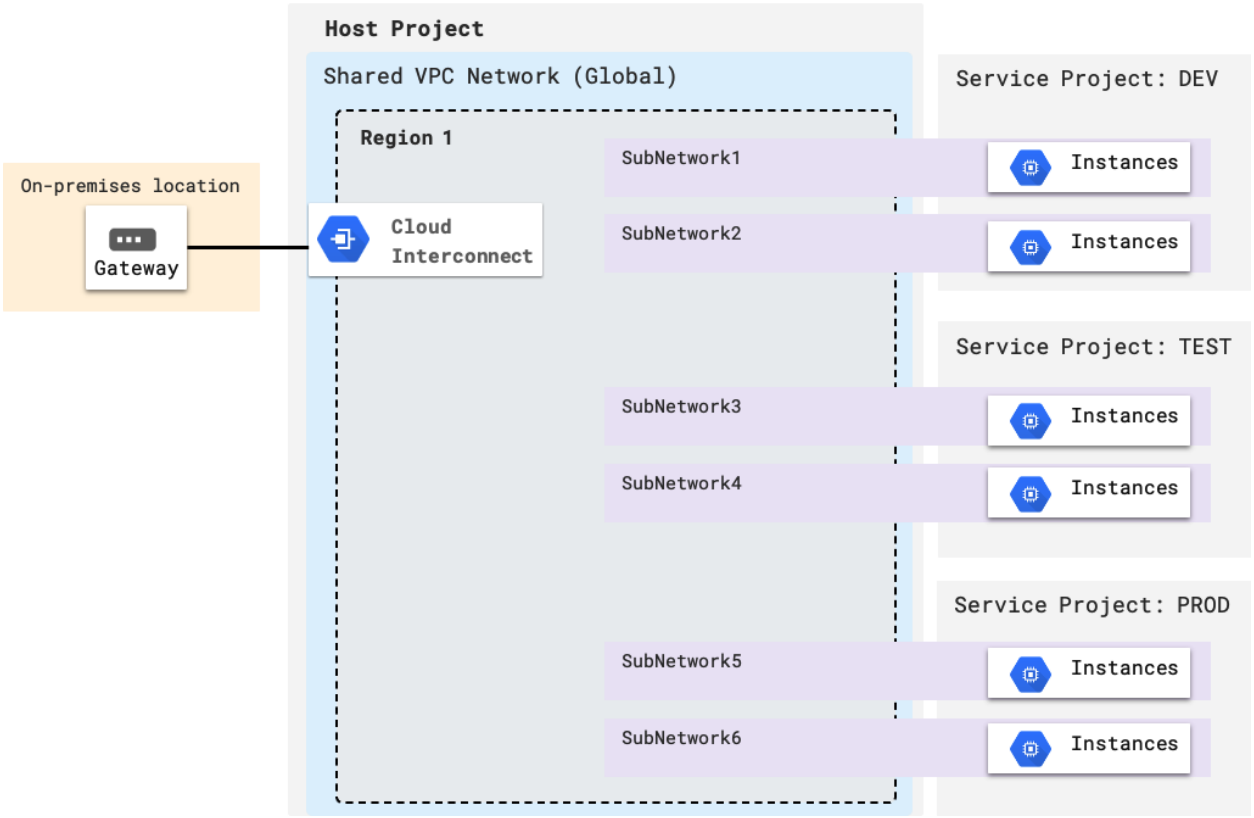

Network *
default
Priority *
1000
Priority can be 0–65535Check priority of other firewall rules
Direction of traffic
Ingress
Egress
Action on match
Allow
Deny
Targets
Specified target tags
Target tags *
webserver
Source filter
IP ranges
Source IP ranges *
0.0.0.0/0
for example, 0.0.0.0/0, 192.168.2.0/24
Second source filter
None
Protocols and ports
Allow all
Specified protocols and ports
tcp :
80, 443
Network *
default
Priority *
1000
Priority can be 0–65535Check priority of other firewall rules
Direction of traffic
Ingress
Egress
Action on match
Allow
Deny
Targets
All instances in the network
Destination filter
IP ranges
Destination IP ranges *
192.168.1.0/24
for example, 0.0.0.0/0, 192.168.2.0/24
Protocols and ports
Allow all
Specified protocols and ports
tcp :
8888
udp :
53
Other protocols
protocols, comma separated, e.g. ah, sctp

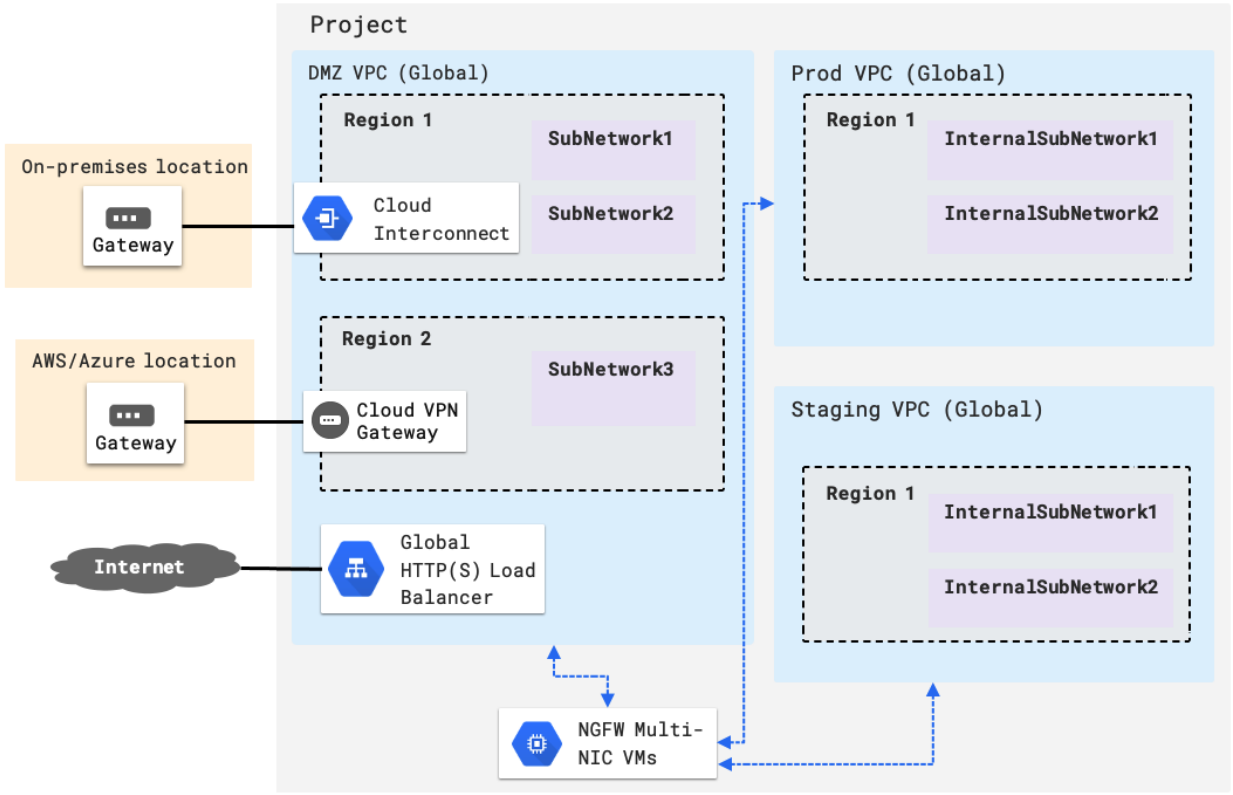

/api/v1/...
/api/v1/...
/images/...
New York
California
Sao Paulo
URL Map
/api/* => Backend API service
/images => Image service
External HTTP(S) Load Balancer
API service
Image service
us-east1
Instance Group
Serving Instances
Compute Engine
us-west1
Instance Group
Serving Instances
Compute Engine
GLOBAL
Cloud Storage


URL Map
/api/* => Backend API service
/images => Image service
New York
/api/v1/...
External HTTP(S) Load Balancer
(API service)
us-east1
Web Tier Group
Serving Instances
Compute Engine
URL Map
headerMatches:
- headerName: ABTest
exactMatch: A
service: backend A
headerMatches:
- headerName: ABTest
exactMatch: B
service: backend B
Internal HTTP(S) Load Balancer
App Group A
Serving Instances
Compute Engine
App Group B
Serving Instances
Compute Engine

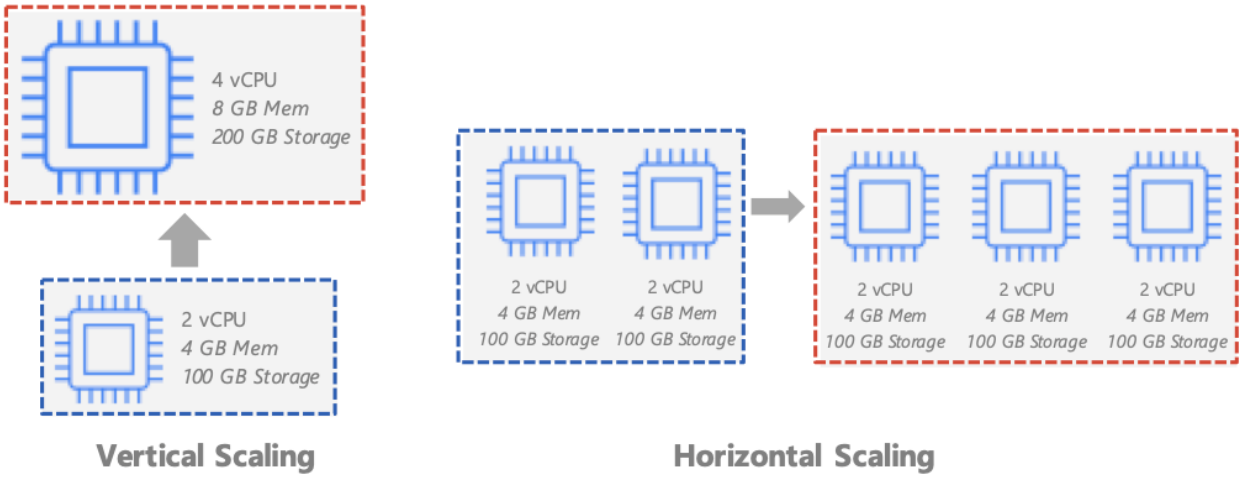

Access Scope
External
Internal
Protocol Type
HTTP or HTTPS
UDP
TCP
SSL Offload?
No
Yes
Global?
No
Yes
Global?
Yes
No
IPv6 clients?
No
Yes
Protocol Type
HTTP or HTTPS
TCP or UDP
External HTTP(S) (Premium)
SSL Proxy
TCP Proxy
Network TCP/UDP
No Option
Internal HTTP(S) (Standard)
Internal TCP/UDP

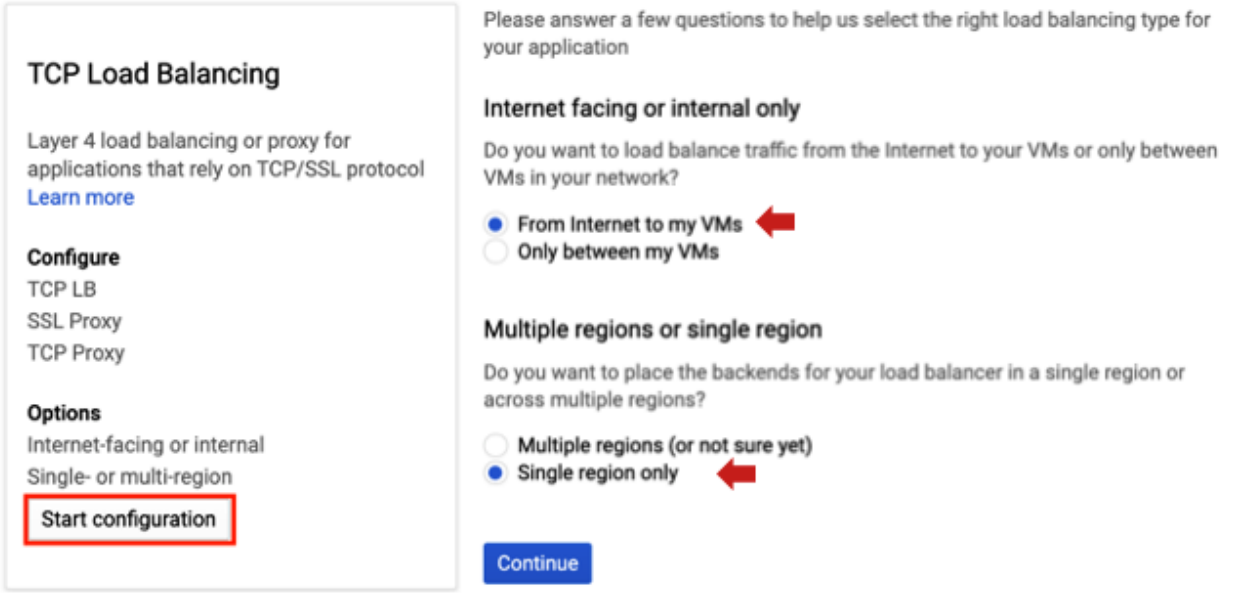

GCP Project
VPC Network (Global)
Region 1
SubNetwork1
Zone A
Instance1A
Compute Engine
failover
Zone B
Instance1B
Compute Engine
failover
Region 2
SubNetwork2
Zone A
Instance1C
Compute Engine

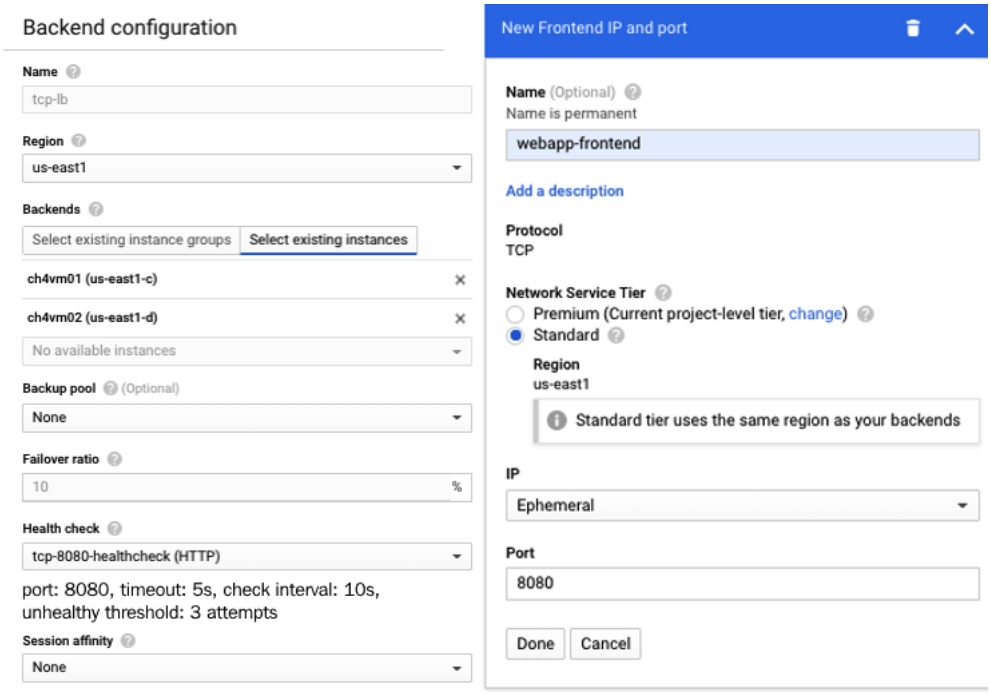

Host Project
Shared VPC Network (Global)
Region 1
On-premises location
Gateway
Cloud Interconnect
SubNetwork1
SubNetwork2
SubNetwork3
SubNetwork4
SubNetwork5
SubNetwork6
Service Project: DEV
Instances
Instances
Service Project: TEST
Instances
Instances
Service Project: PROD
Instances
Instances

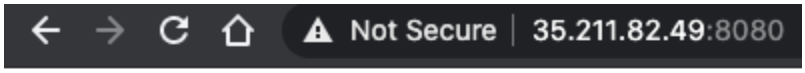

Project
DMZ VPC (Global)
Region 1
SubNetwork1
SubNetwork2
Cloud Interconnect
On-premises location
Gateway
Region 2
SubNetwork3
Cloud VPN Gateway
AWS/Azure location
Gateway
Internet
Global HTTP(S) Load Balancer
NGFW Multi-NIC VMs
Prod VPC (Global)
Region 1
InternalSubNetwork1
InternalSubNetwork2
Staging VPC (Global)
Region 1
InternalSubNetwork1
InternalSubNetwork2

Chapter 4: Architecting Compute Infrastructure



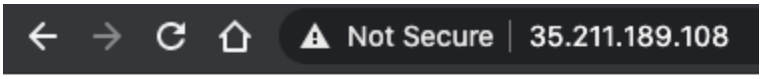






I am a webpage

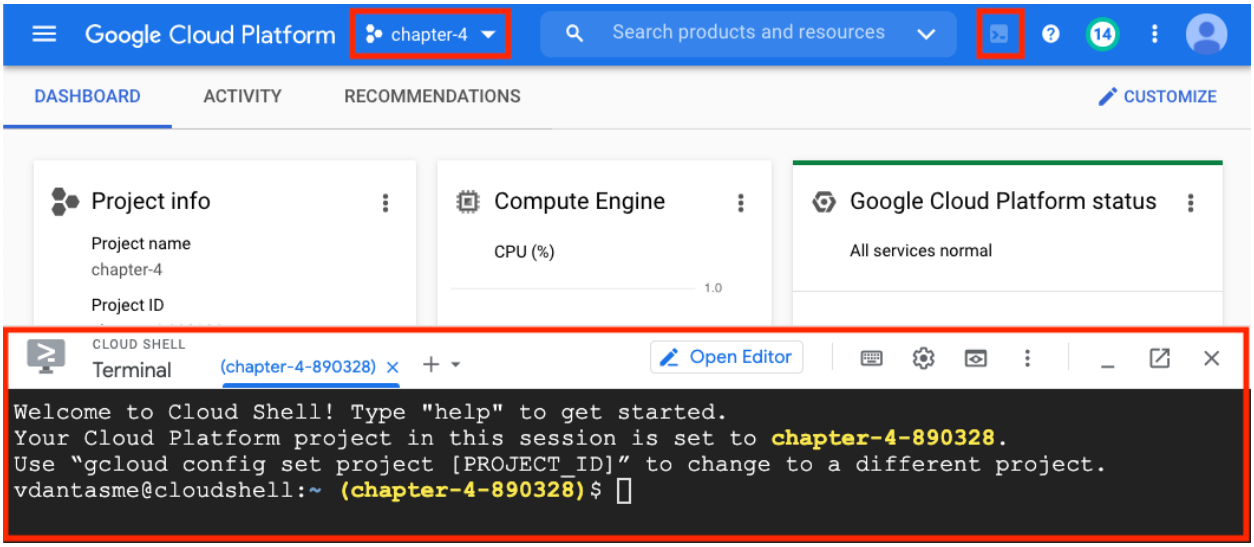
And I am being served by ch4vm01



I am a webpage

And I am being served by webserver-mig-eastus-xs53

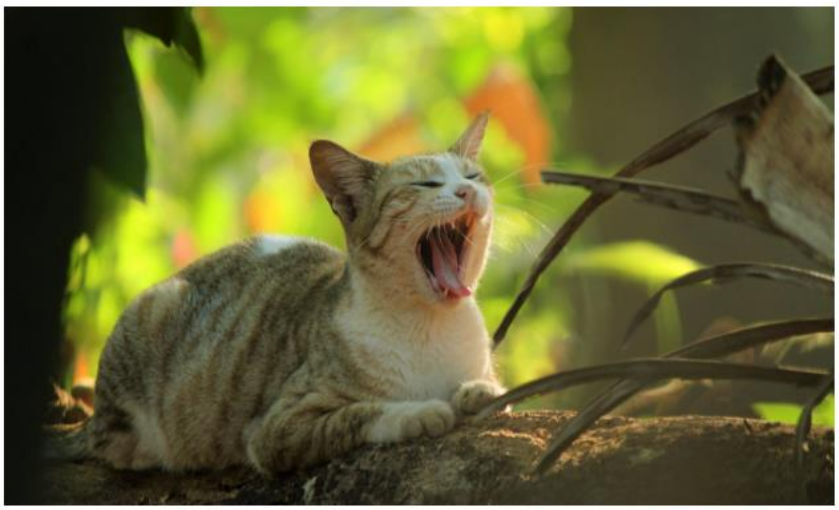
Name	Creation time	Template	Per instance config	Zone
webserver-mig-eastus-22tv	Nov 1, 2020, 5:04:15 PM	webserver-custom-templ		us-east1-c
webserver-mig-eastus-gcd0	Nov 1, 2020, 5:03:52 PM	webserver-custom-templ		us-east1-d
webserver-mig-eastus-xvlk	Nov 1, 2020, 4:54:17 PM	webserver-custom-templ		us-east1-b
webserver-mig-eastus-zlvs	Nov 1, 2020, 4:54:16 PM	webserver-custom-templ		us-east1-c



Hello There!

My instance id is **00c61b117c3412eade0cdeef6ecdacd935664fd192344f78126de22fe4b0745311e773a26d**.

I am running on **standard** environment. My Runtime is **python38**.

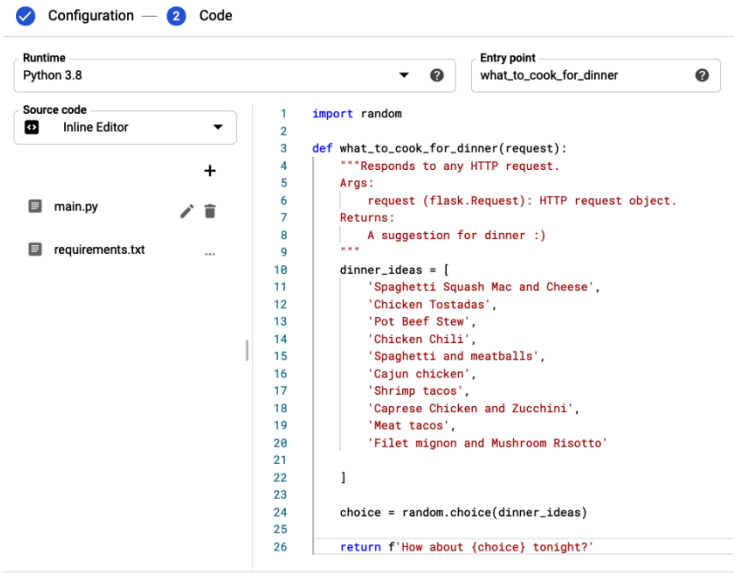


Here is the content of my app.yaml:

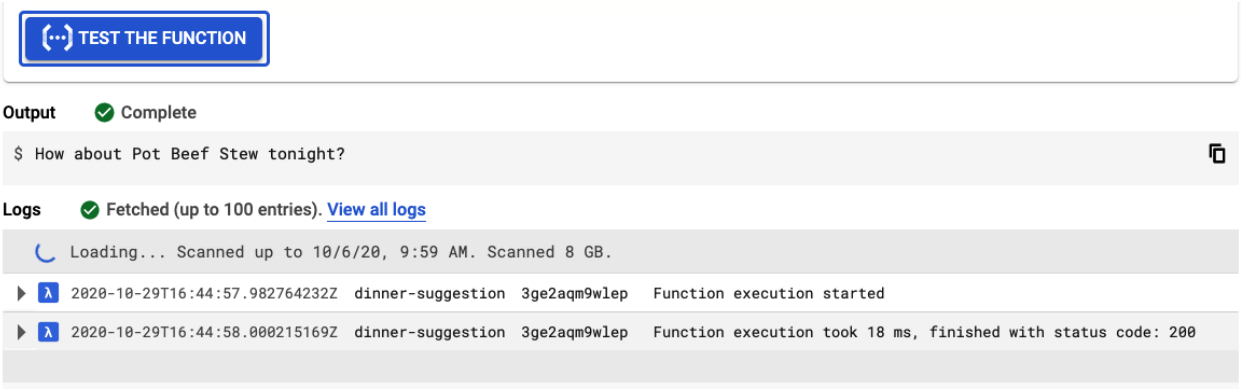
runtime: python38

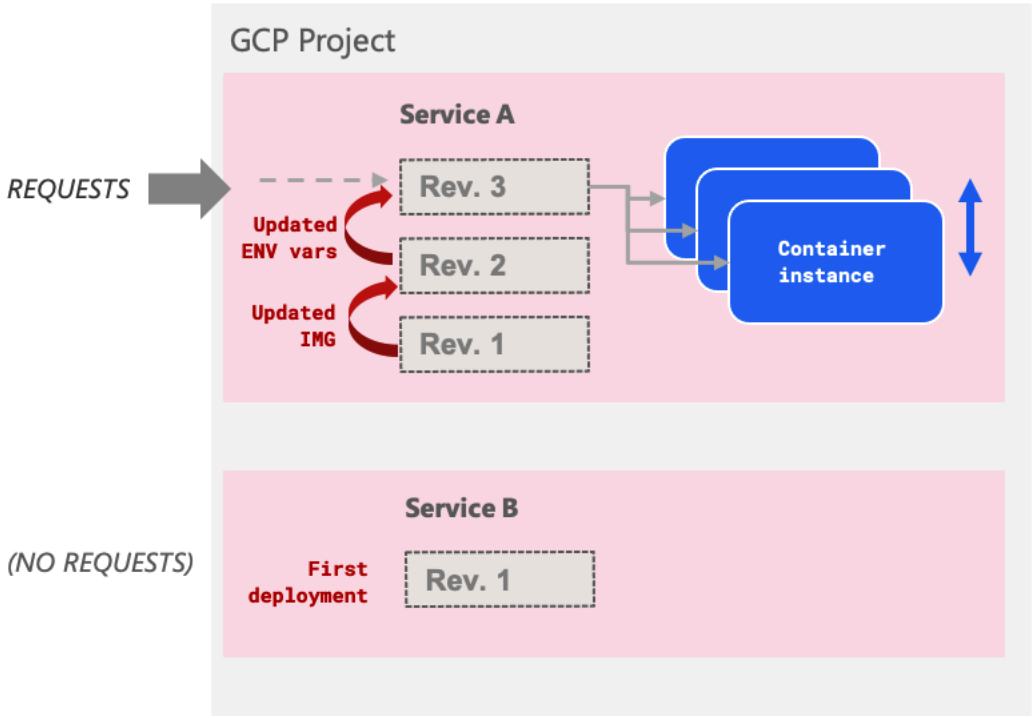
instance_class: F2

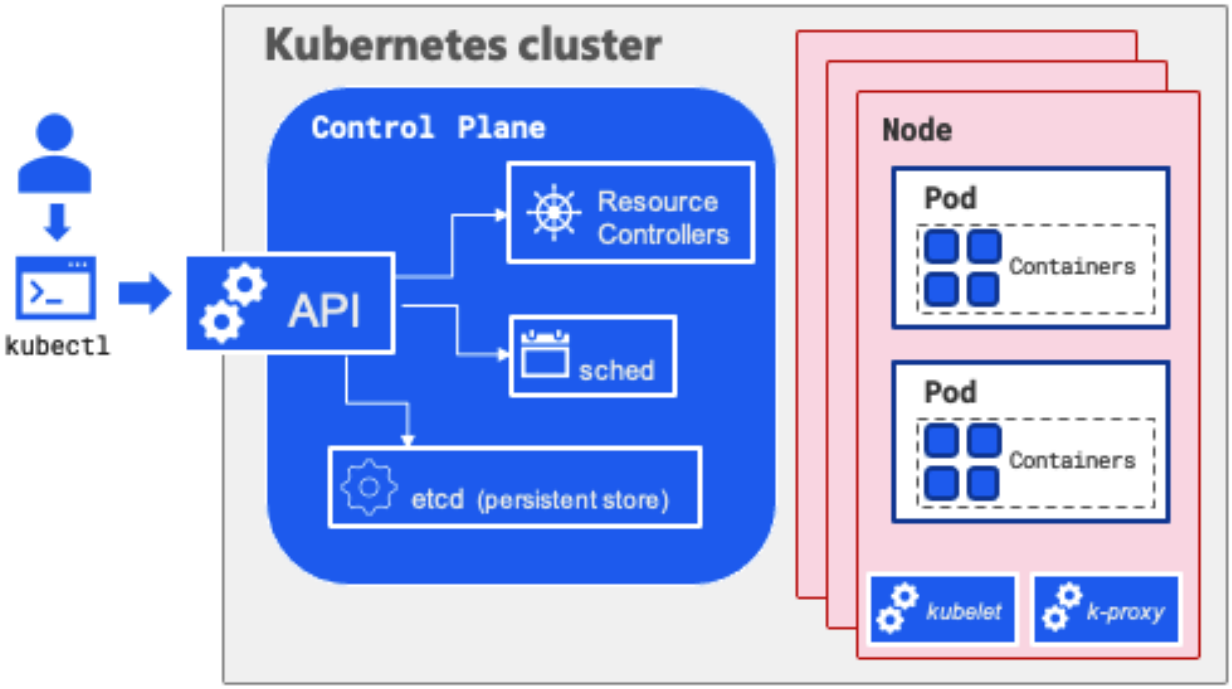
env_variables:
MY_CUSTOM_ENV_VAR: "https://upload.wikimedia.org/wikipedia/commons/8/86/Cat_yawning_in_park.jpg"


Configuration
2
Code
Runtime
Python 3.8
Entry point
what_to_cook_for_dinner
Source code
Inline Editor
main.py
requirements.txt
import random
def what_to_cook_for_dinner(request):
"""Responds to any HTTP request.
Args:
request (flask.Request): HTTP request object.
Returns:
A suggestion for dinner :)
"""
dinner_ideas = [
'Spaghetti Squash Mac and Cheese',
'Chicken Tostadas',
'Pot Beef Stew',
'Chicken Chili',
'Spaghetti and meatballs',
'Cajun chicken',
'Shrimp tacos',
'Caprese Chicken and Zucchini',
'Meat tacos',
'Filet mignon and Mushroom Risotto'
]
choice = random.choice(dinner_ideas)
return f'How about {choice} tonight?'

Name
Region
Trigger
Runtime
Memory allocated
Executed function
Last deployed
Authentication
Actions
dinner-suggestion
europe-west1
HTTP
Python 3.8
256 MiB
what_to_cook_for_dinner
Oct 29, 2020, 5:42:42 PM
Allow unauthenticated
Copy function
Test function
View logs
Delete


TEST THE FUNCTION
Output
Complete
$ How about Pot Beef Stew tonight?
Logs
Fetched (up to 100 entries). View all logs
Loading... Scanned up to 10/6/20, 9:59 AM. Scanned 8 GB.
2020-10-29T16:44:57.982764232Z dinner-suggestion 3ge2aqm9wlep Function execution started
2020-10-29T16:44:58.000215169Z dinner-suggestion 3ge2aqm9wlep Function execution took 18 ms, finished with status code: 200

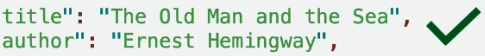

GCP Project
Service A
REQUESTS
Rev. 3
Updated ENV vars
Rev. 2
Updated IMG
Rev. 1
Container instance
Service B
(NO REQUESTS)
First deployment
Rev. 1


Kubernetes cluster
Control Plane
kubectl
API
Resource Controllers
sched
etcd (persistent store)
Node
Pod
Containers
Pod
Containers
kubelet
k-proxy

Chapter 5: Architecting Storage and Data Infrastructure

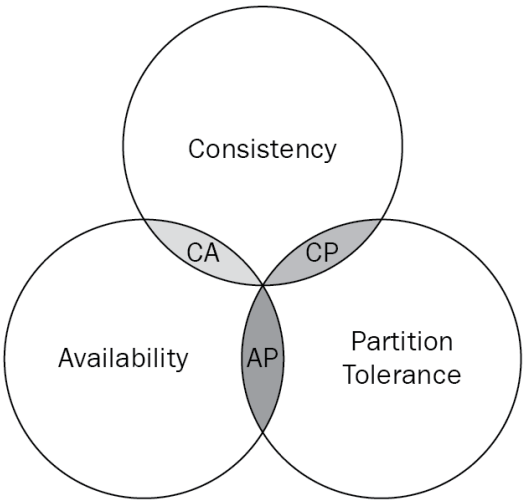
```json
{
  "title": "Book",
  "type": "object",
  "properties": {
    "title": {
      "type": "string",
      "description": "The book's title"
    },
    "author": {
      "type": "string",
      "description": "The book's author"
    },
    "numOfPages": {
      "description": "The total number of pages in the book",
      "type": "integer",
      "minimum": 0
    }
  }
}
```

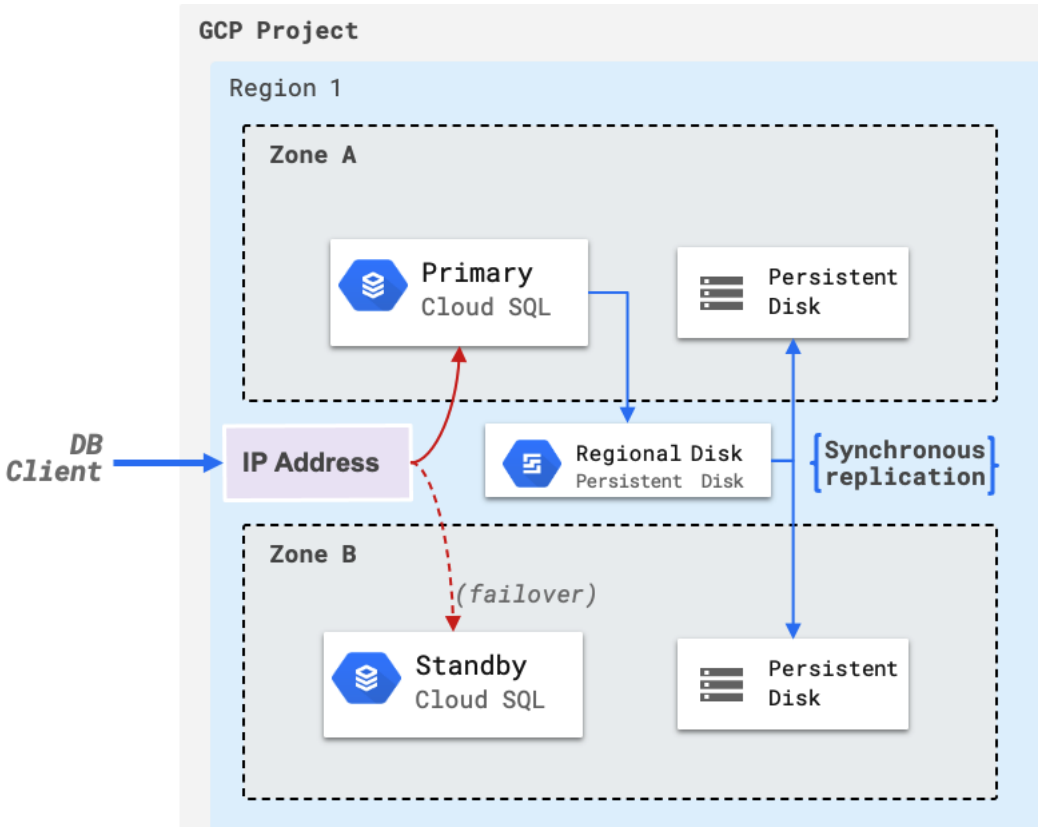
```json
{
  "title": "The Old Man and the Sea",
  "author": "Ernest Hemingway",
  "numOfPages": 127
}
```

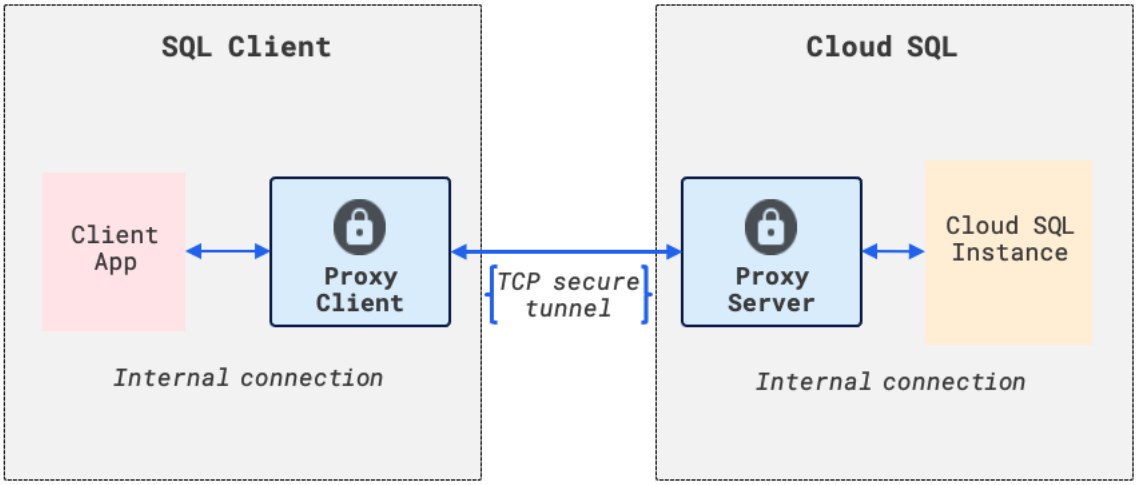


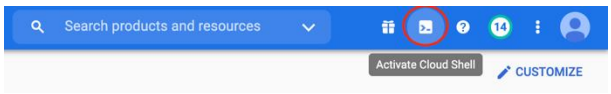
```json
{
  "title": "The Old Man and the Sea",
  "author": "Ernest Hemingway",
  "numOfPages": "127"
}
```

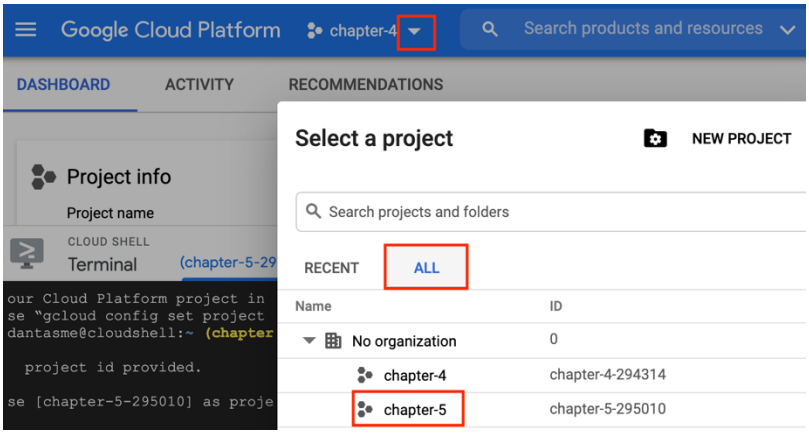
```json
{
  "title": "The Old Man and the Sea",
  "author": "Ernest Hemingway",
  "numOfPages": -1
}
```

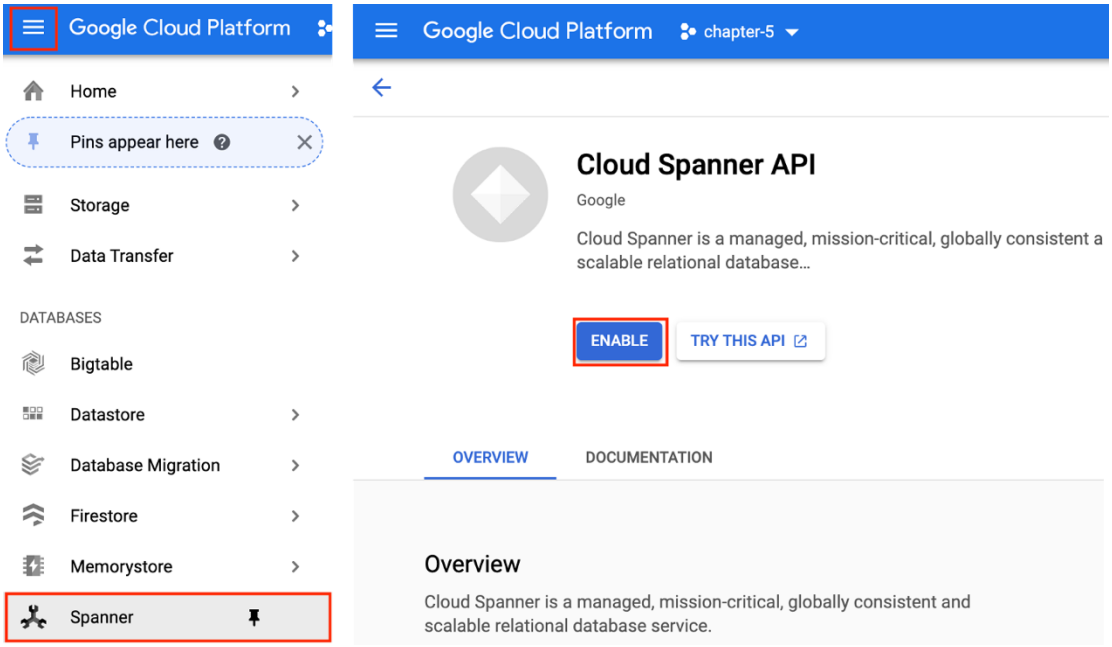


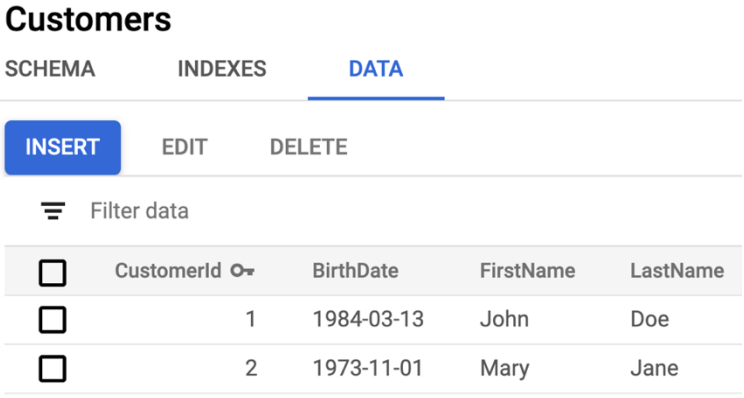

GCP Project
Region 1
Zone A
Primary
Cloud SQL
Persistent
Disk
DB
Client
IP Address
Regional Disk
Persistent Disk
Synchronous
replication
Zone B
(failover)
Standby
Cloud SQL
Persistent
Disk

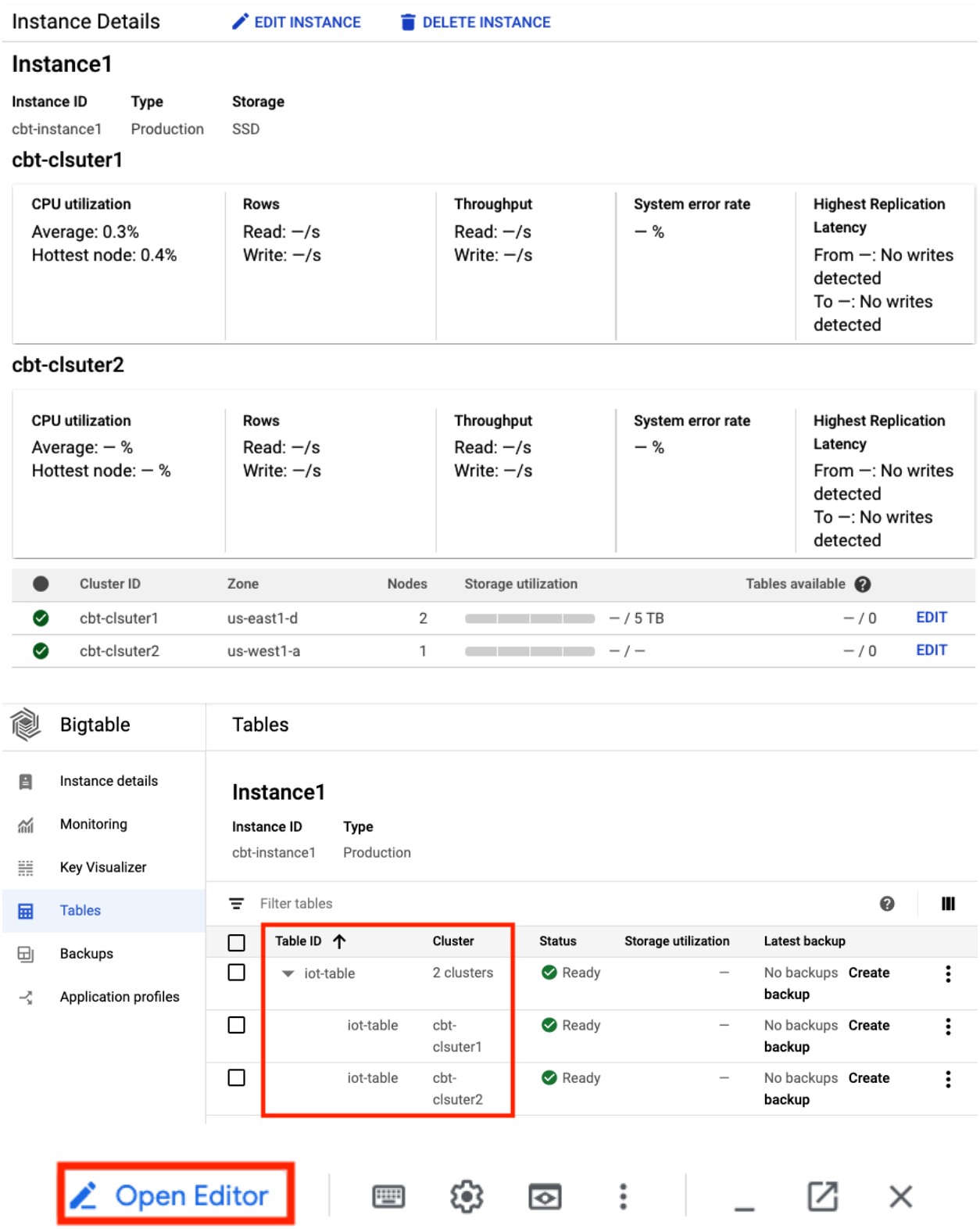

SQL Client
Cloud SQL
Client
App
Proxy
Client
TCP secure
tunnel
Proxy
Server
Cloud SQL
Instance
Internal connection
Internal connection

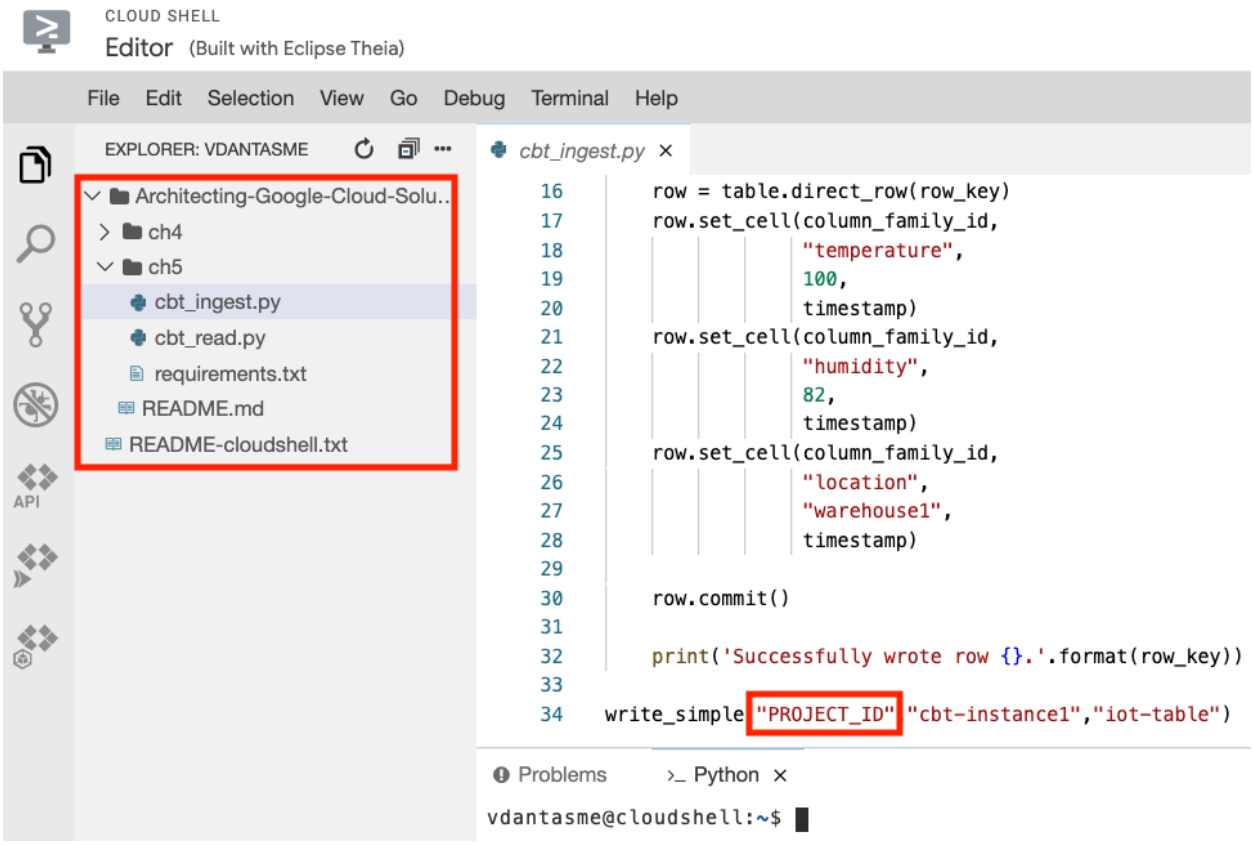

Search products and resources
Activate Cloud Shell
CUSTOMIZE

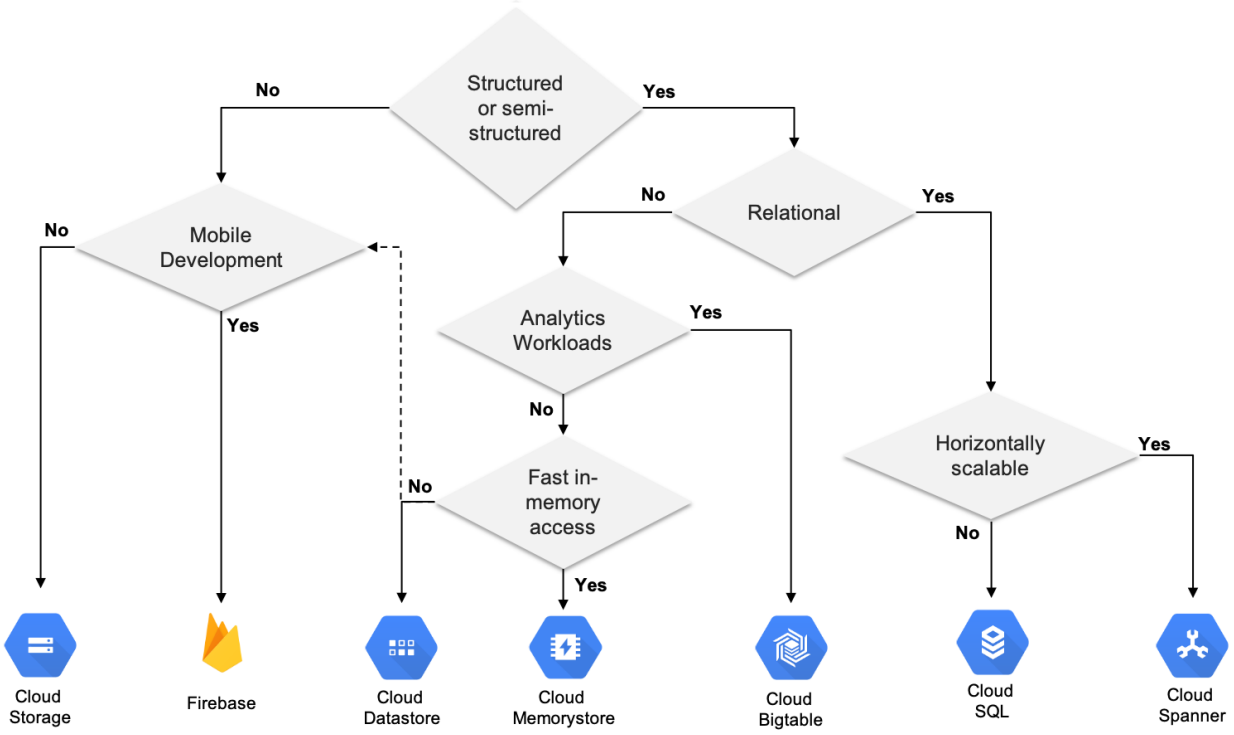

Google Cloud Platform
chapter-4
Search products and resources
DASHBOARD
ACTIVITY
RECOMMENDATIONS
Project info
Project name
CLOUD SHELL
Terminal
(chapter-5-29
our Cloud Platform project in
se "gcloud config set project
dantasme@cloudshell:~ (chapter
project id provided.
se [chapter-5-295010] as proje
Select a project
NEW PROJECT
Search projects and folders
RECENT
ALL
Name
ID
No organization
0
chapter-4
chapter-4-294314
chapter-5
chapter-5-295010


Google Cloud Platform
Home
Pins appear here
Storage
Data Transfer
DATABASES
Bigtable
Datastore
Database Migration
Firestore
Memorystore
Spanner
Google Cloud Platform
chapter-5
Cloud Spanner API
Google
Cloud Spanner is a managed, mission-critical, globally consistent a scalable relational database...
ENABLE
TRY THIS API
OVERVIEW
DOCUMENTATION
Overview
Cloud Spanner is a managed, mission-critical, globally consistent and scalable relational database service.

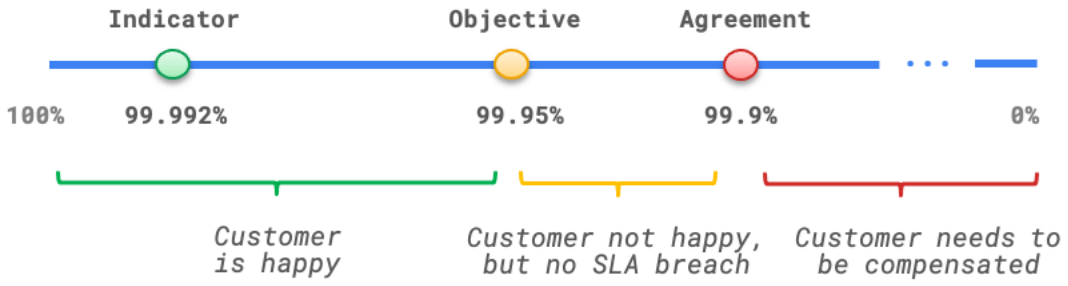

Customers
SCHEMA
INDEXES
DATA
INSERT
EDIT
DELETE
Filter data
CustomerId
BirthDate
FirstName
LastName
1
1984-03-13
John
Doe
2
1973-11-01
Mary
Jane


Instance Details
EDIT INSTANCE
DELETE INSTANCE
Instance1
Instance ID
Type
Storage
cbt-instance1
Production
SSD
cbt-clsuter1
CPU utilization
Average: 0.3%
Hottest node: 0.4%
Rows
Read: —/s
Write: —/s
Throughput
Read: —/s
Write: —/s
System error rate
— %
Highest Replication Latency
From —: No writes detected
To —: No writes detected
cbt-clsuter2
CPU utilization
Average: — %
Hottest node: — %
Rows
Read: —/s
Write: —/s
Throughput
Read: —/s
Write: —/s
System error rate
— %
Highest Replication Latency
From —: No writes detected
To —: No writes detected
Cluster ID
Zone
Nodes
Storage utilization
Tables available
cbt-clsuter1
us-east1-d
2
— / 5 TB
— / 0
EDIT
cbt-clsuter2
us-west1-a
1
— / —
— / 0
EDIT
Bigtable
Instance details
Monitoring
Key Visualizer
Tables
Backups
Application profiles
Tables
Instance1
Instance ID
Type
cbt-instance1
Production
Filter tables
Table ID
Cluster
Status
Storage utilization
Latest backup
iot-table
2 clusters
Ready
—
No backups Create backup
iot-table
cbt-clsuter1
Ready
—
No backups Create backup
iot-table
cbt-clsuter2
Ready
—
No backups Create backup
Open Editor


CLOUD SHELL
Editor (Built with Eclipse Theia)
File Edit Selection View Go Debug Terminal Help
EXPLORER: VDANTASME
Architecting-Google-Cloud-Solu..
ch4
ch5
cbt_ingest.py
cbt_read.py
requirements.txt
README.md
README-cloudshell.txt
cbt_ingest.py
row = table.direct_row(row_key)
row.set_cell(column_family_id,
"temperature",
100,
timestamp)
row.set_cell(column_family_id,
"humidity",
82,
timestamp)
row.set_cell(column_family_id,
"location",
"warehouse1",
timestamp)
row.commit()
print('Successfully wrote row {}.'.format(row_key))
write_simple("PROJECT_ID","cbt-instance1","iot-table")
Problems
Python
vdantasme@cloudshell:~$


Structured or semi-structured
No
Yes
Mobile Development
Relational
Analytics Workloads
Fast in-memory access
Horizontally scalable
Cloud Storage
Firebase
Cloud Datastore
Cloud Memorystore
Cloud Bigtable
Cloud SQL
Cloud Spanner

Chapter 6: Configuring Services for Observability



DASHBOARD ACTIVITY RECOMMENDATIONS

11/20/20

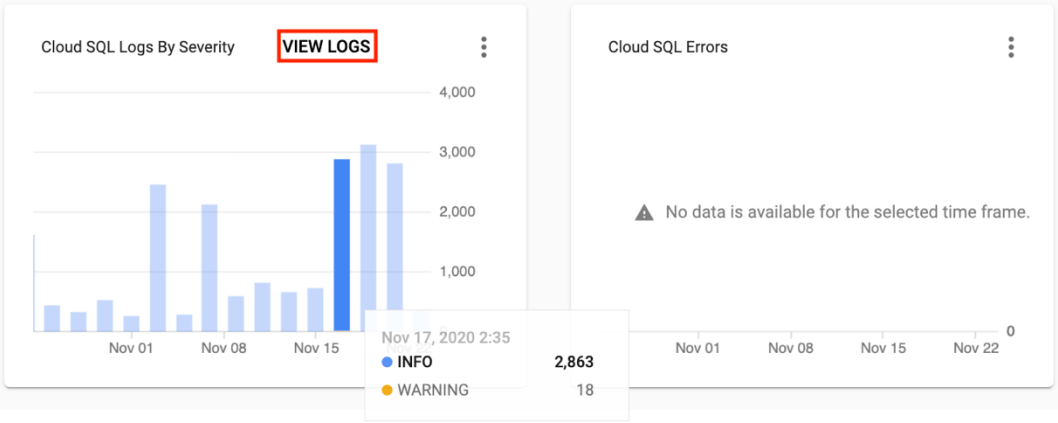
Completed:google.api.servicemanagement.v1.ServiceManager.ActivateServices

[redacted]@gmail.com has executed google.api.servicemanagement.v1.ServiceManager.ActivateServices on [compute.googleapis.com]
November 20, 2020 at 2:22:27 PM GMT+1

User	[redacted]@gmail.com
Resource name	projects/654123017586/services/[compute.googleapis.com]
Request	
Consumer project id	pilot-project-2020
Service names	compute.googleapis.com
Response > settings	
Response > settings 1	
Service name	compute.googleapis.com
Usage settings > consumer enable status	ENABLED

2:21 PM Set IAM policy on project service-agent-manager@system.gserviceaccount.com assigned role editor to serviceAccount:6541230...

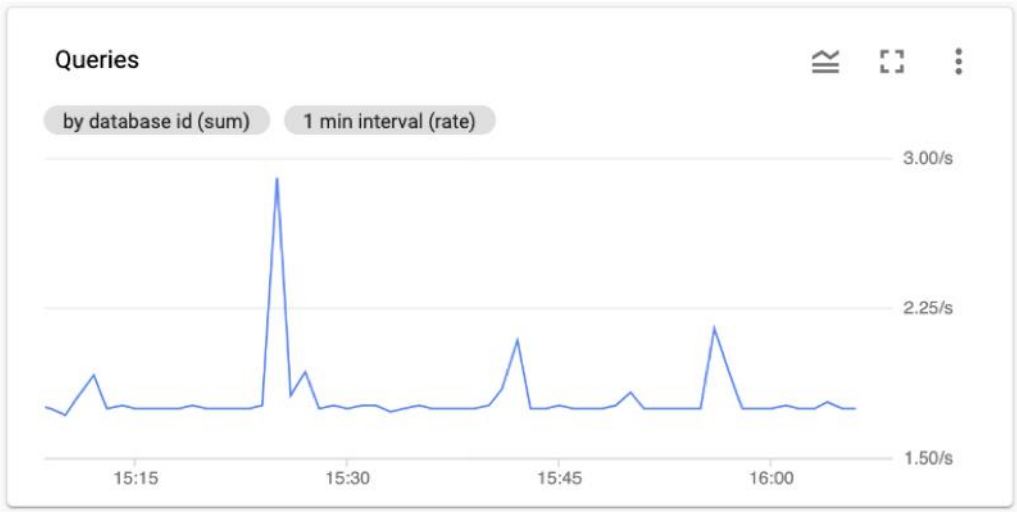
2:21 PM Set IAM policy on project service-agent-manager@system.gserviceaccount.com assigned role compute.serviceAgent to service...



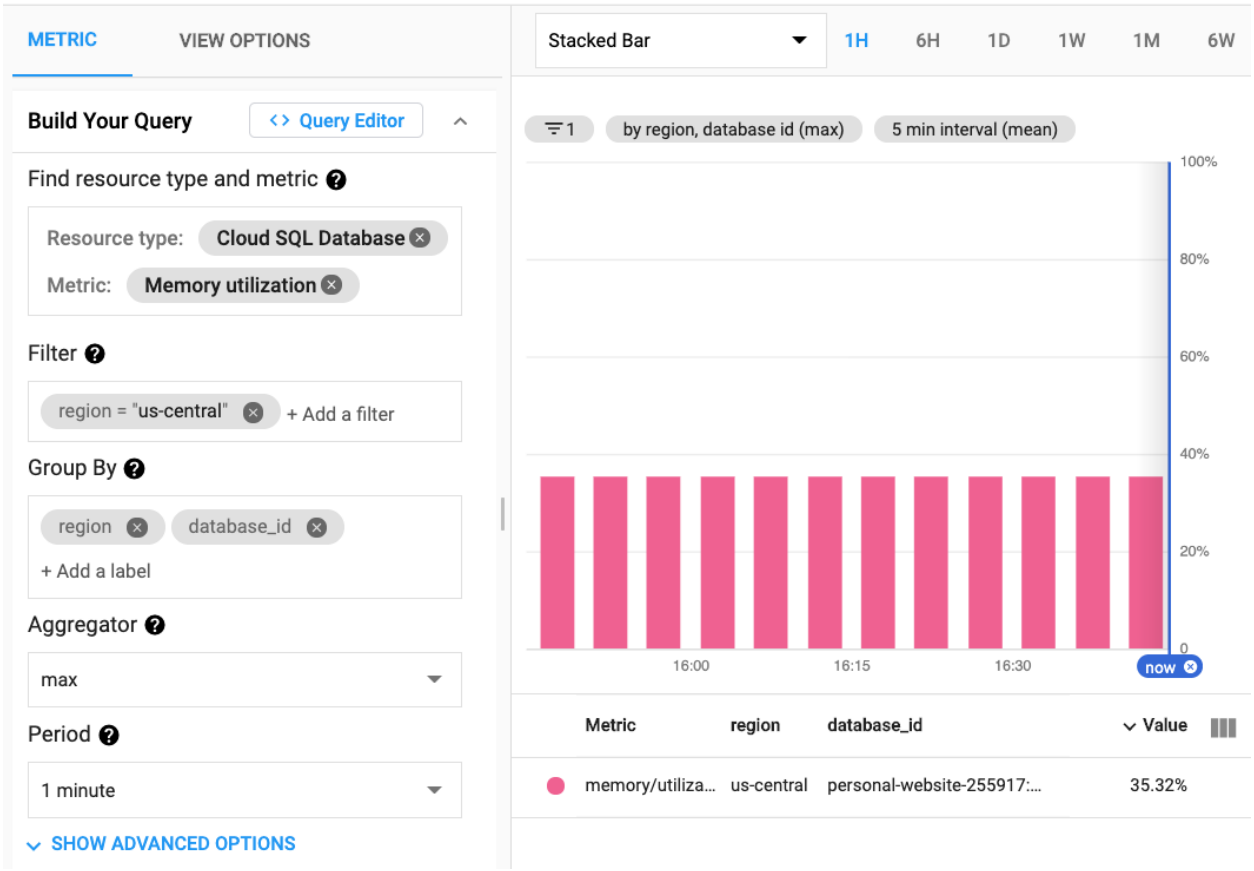
`database/mysql/queries` GA

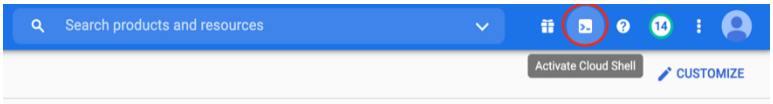
Queries

DELTA, INT64, 1 **cloudsql_database**	*Delta count of statements executed by the server. Sampled every 60 seconds. After sampling, data is not visible for up to 210 seconds.*



Metrics explorer



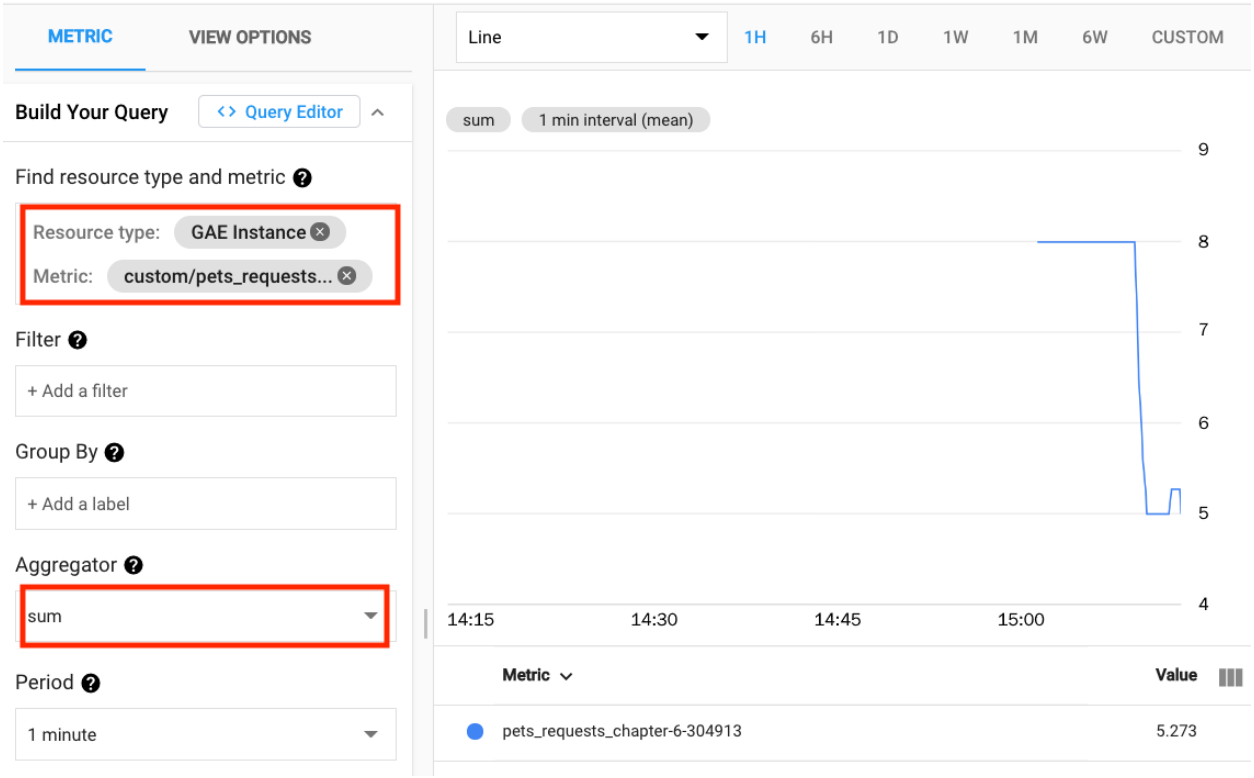


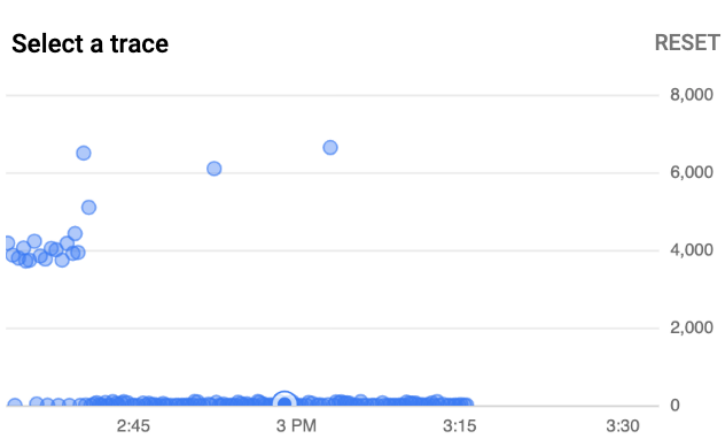
Hello There!

This is the main page

SEVERITY	TIMESTAMP	CET	SUMMARY					
>	2020-11-25 10:42:05.492 CET		GET	404	395 B	7 ms	Chrome 86.0.…	/dummy
>	2020-11-25 10:42:25.240 CET		GET	404	395 B	105 ms	Chrome 86.0.…	/dummy
>	2020-11-25 10:42:26.816 CET		GET	404	395 B	5 ms	Chrome 86.0.…	/dummy
>	2020-11-25 10:42:57.714 CET		GET	404	395 B	4 ms	Chrome 86.0.…	/dummy
>	2020-11-25 10:42:58.798 CET		GET	404	395 B	46 ms	Chrome 86.0.…	/dummy

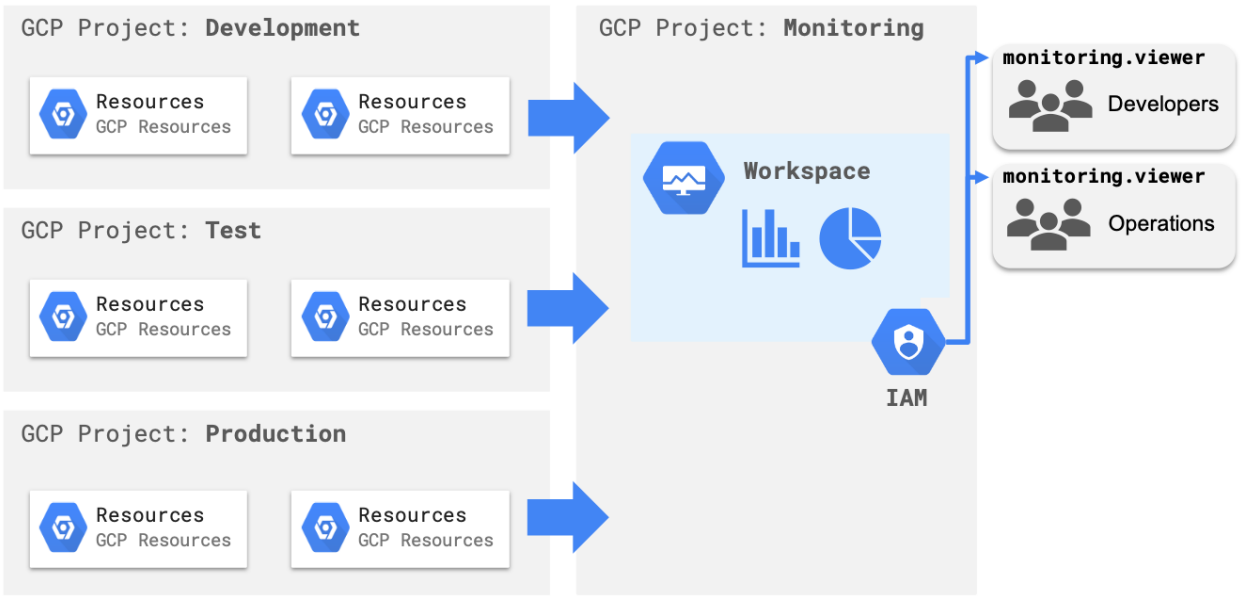
Metrics explorer

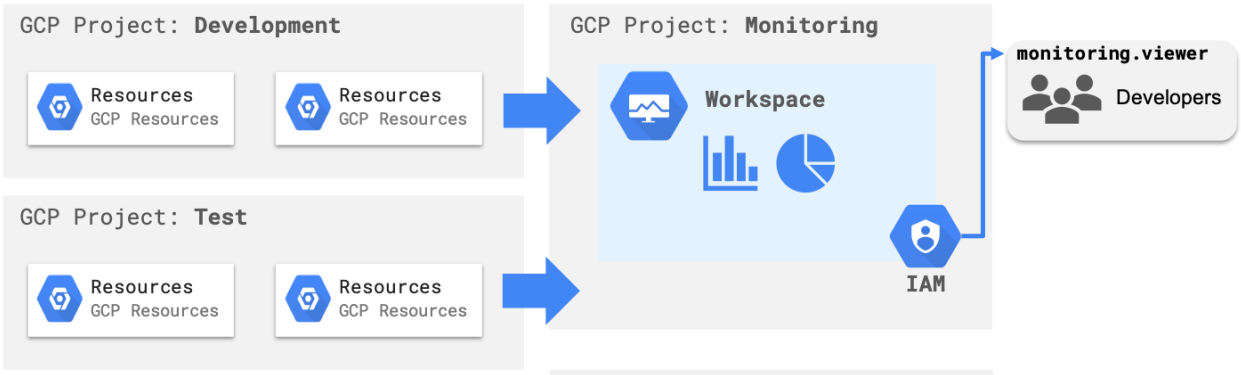


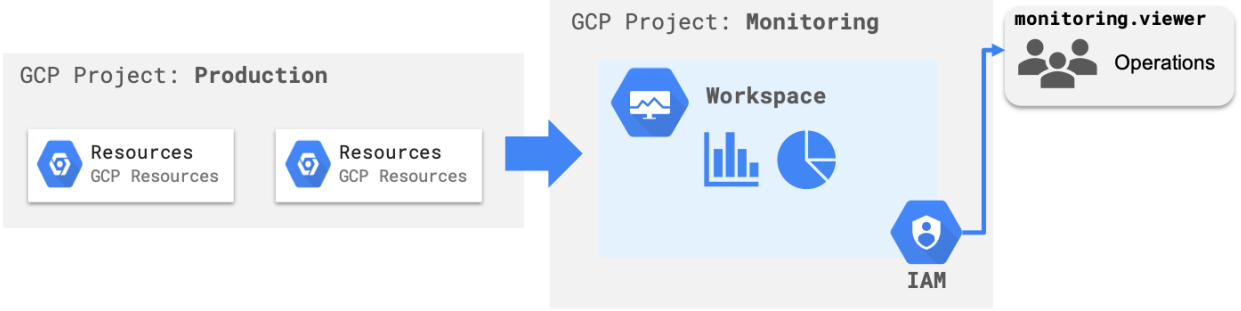


Latency	HTTP Method	URL ↓	Time
37 ms		/dog	44 mi...
38 ms		/dog	56 mi...
56 ms		/cat	50 mi...
5 ms	GET	/	23 mi...
5 ms	GET	/	24 mi...
5 ms	GET	/	26 mi...
5 ms	GET	/	30 mi...

1 – 7 of 154

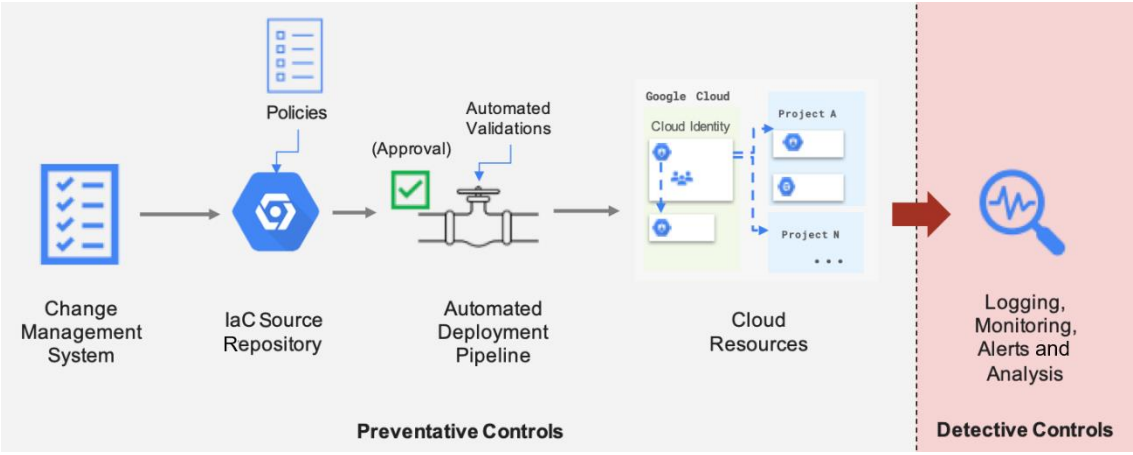

GCP Project: Development
Resources
GCP Resources
Resources
GCP Resources
GCP Project: Test
Resources
GCP Resources
Resources
GCP Resources
GCP Project: Production
Resources
GCP Resources
Resources
GCP Resources
GCP Project: Monitoring
Workspace
IAM
monitoring.viewer
Developers
monitoring.viewer
Operations

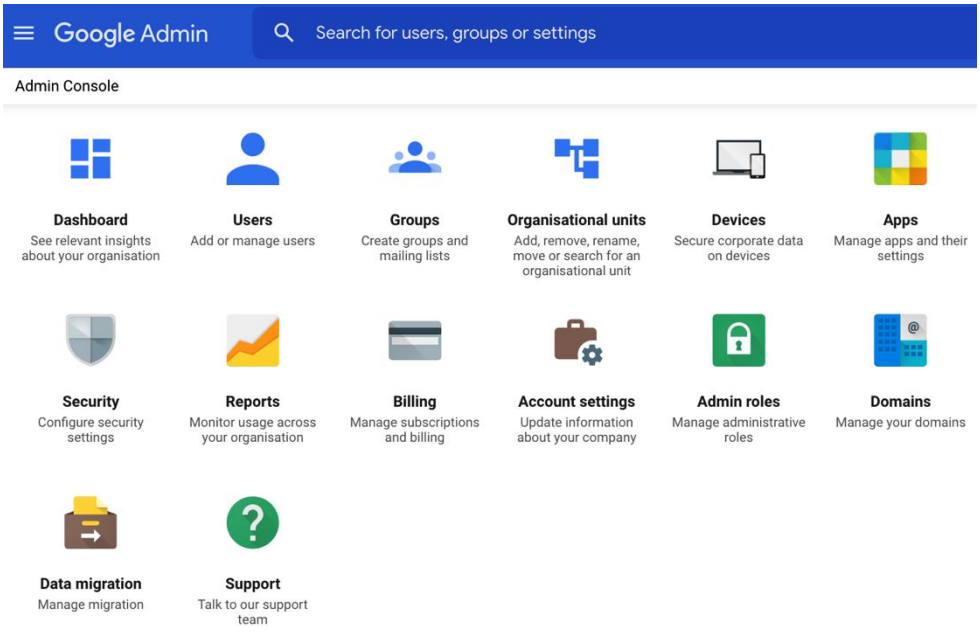

GCP Project: Development
Resources
GCP Resources
Resources
GCP Resources
GCP Project: Test
Resources
GCP Resources
Resources
GCP Resources
GCP Project: Monitoring
Workspace
IAM
monitoring.viewer
Developers

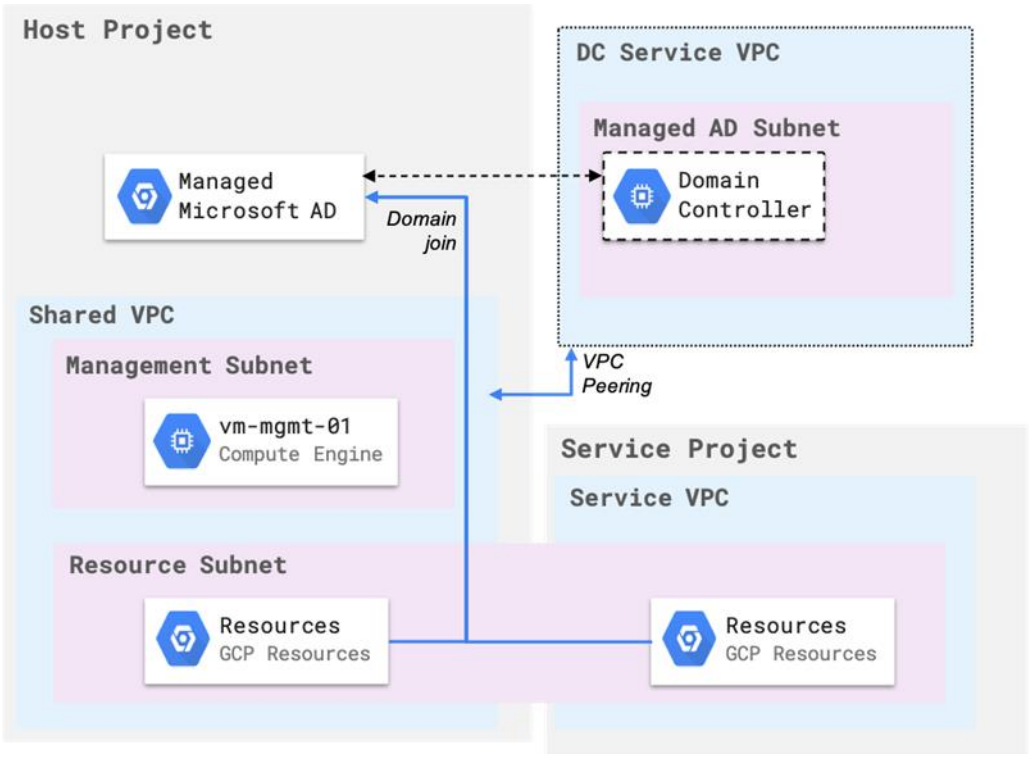

GCP Project: Production
Resources
GCP Resources
Resources
GCP Resources
GCP Project: Monitoring
Workspace
IAM
monitoring.viewer
Operations

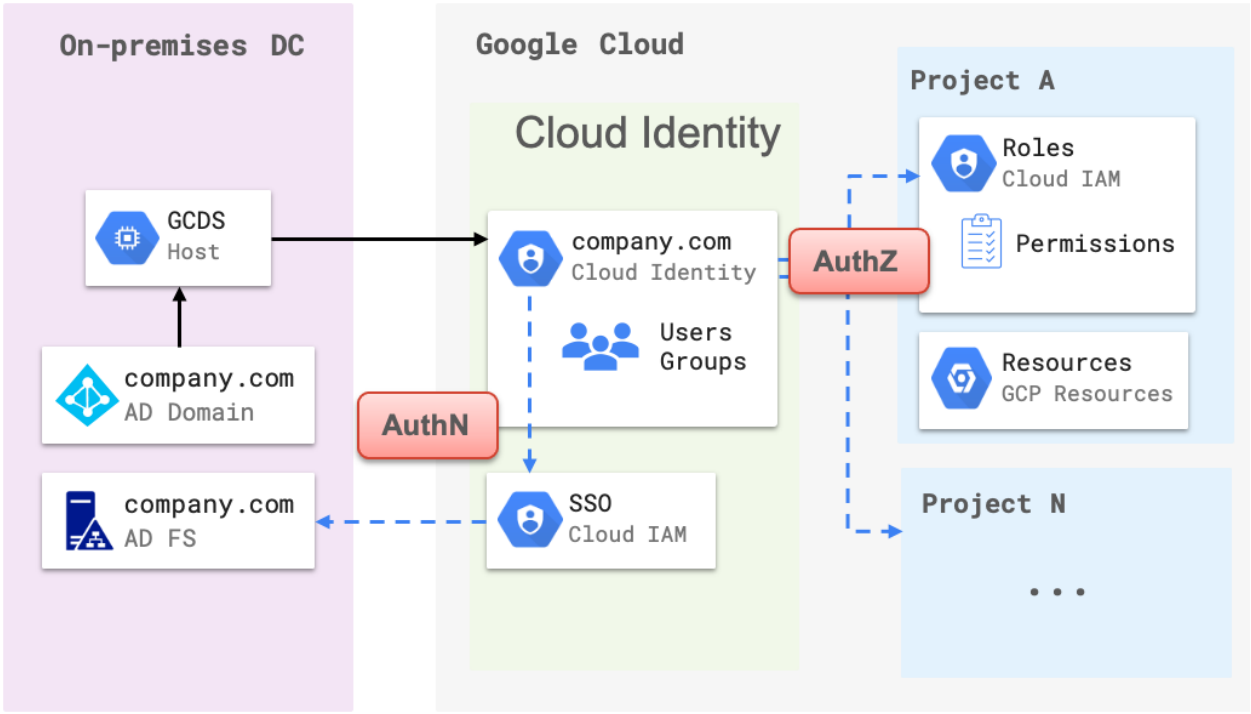
Alert Triage
Incident Declared
Incident Response Process
Document and Learn
Postmortem Analysis / Report

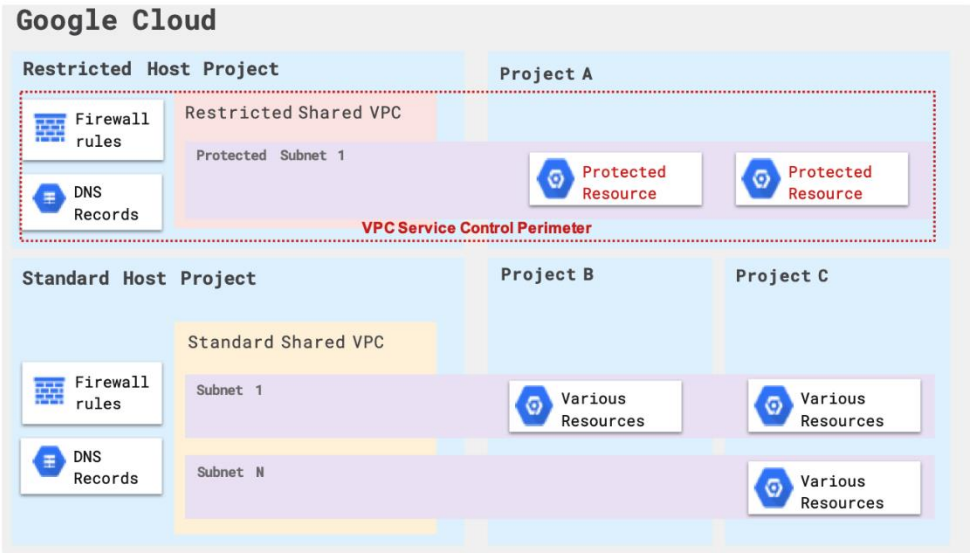
Chapter 7: Designing for Security and Compliance

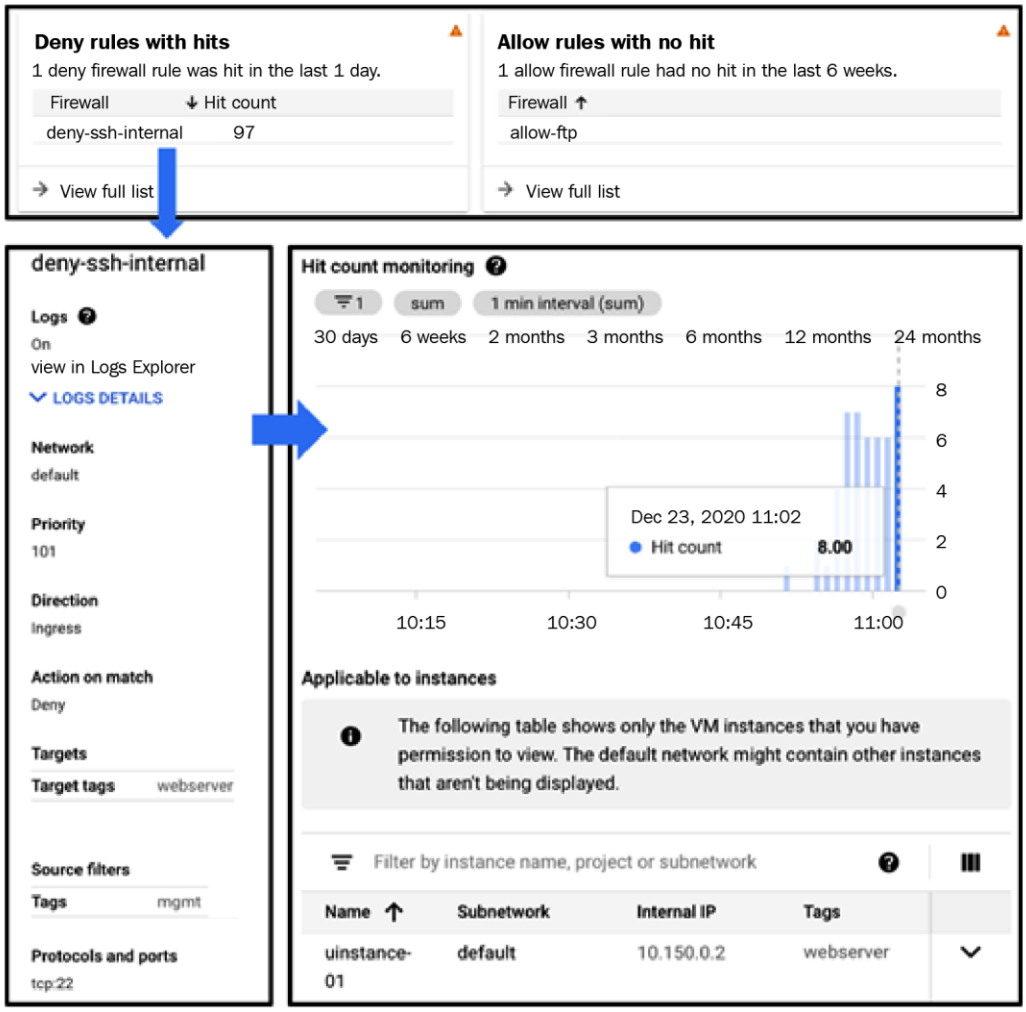


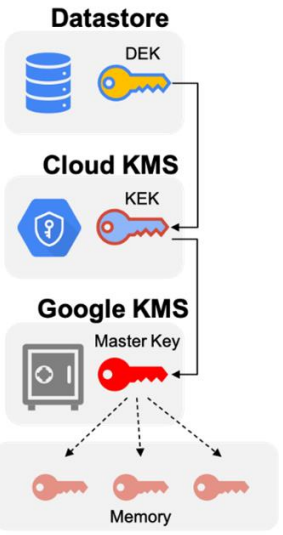


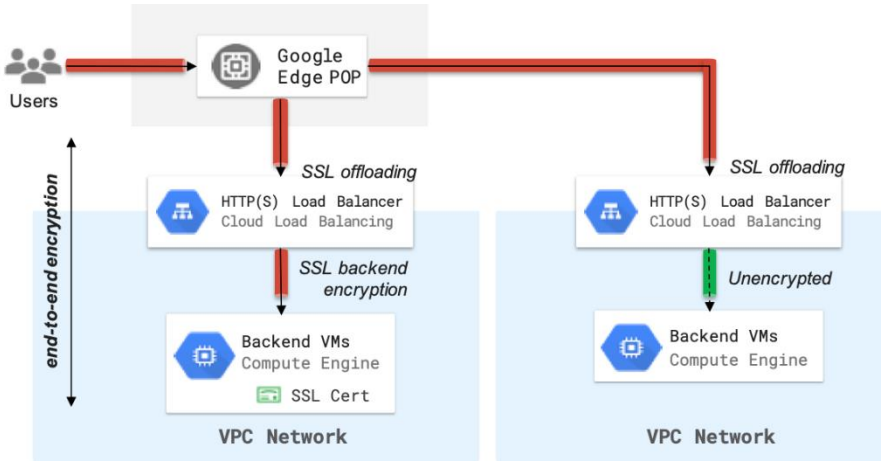

Host Project
DC Service VPC
Managed AD Subnet
Managed Microsoft AD
Domain Controller
Domain join
Shared VPC
Management Subnet
vm-mgmt-01
Compute Engine
VPC Peering
Service Project
Service VPC
Resource Subnet
Resources
GCP Resources
Resources
GCP Resources

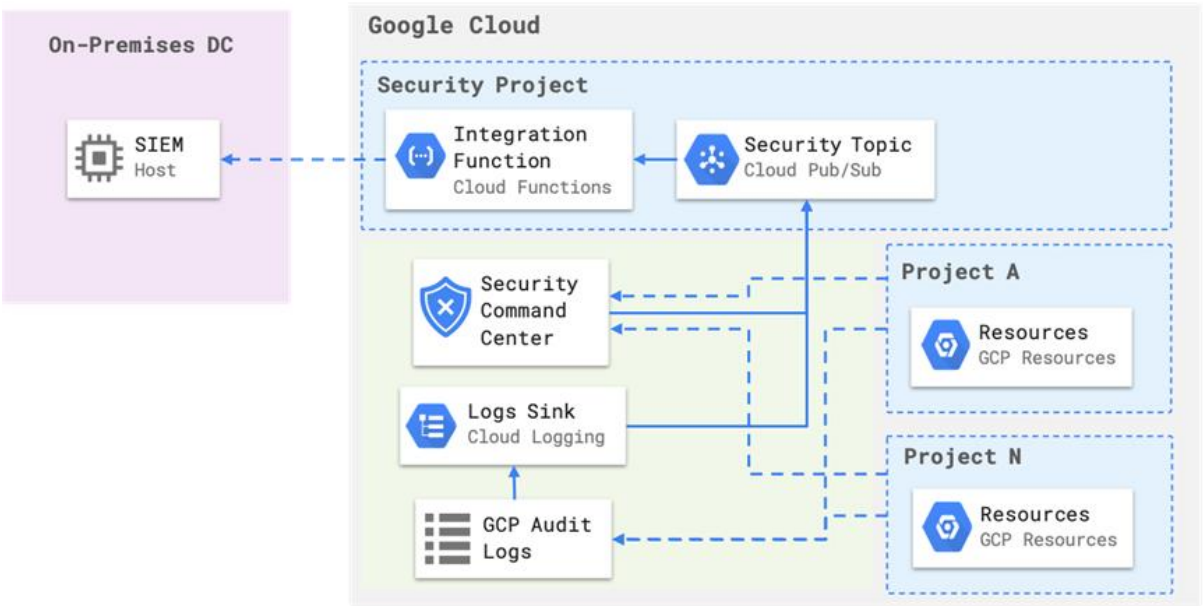

On-premises DC
Google Cloud
Project A
Cloud Identity
GCDS
Host
company.com
Cloud Identity
AuthZ
Roles
Cloud IAM
Permissions
Users
Groups
company.com
AD Domain
AuthN
Resources
GCP Resources
company.com
AD FS
SSO
Cloud IAM
Project N
. . .


Google Cloud
Restricted Host Project
Firewall rules
DNS Records
Restricted Shared VPC
Protected Subnet 1
Protected Resource
Protected Resource
VPC Service Control Perimeter
Project A
Standard Host Project
Firewall rules
DNS Records
Standard Shared VPC
Subnet 1
Subnet N
Various Resources
Various Resources
Various Resources
Project B
Project C

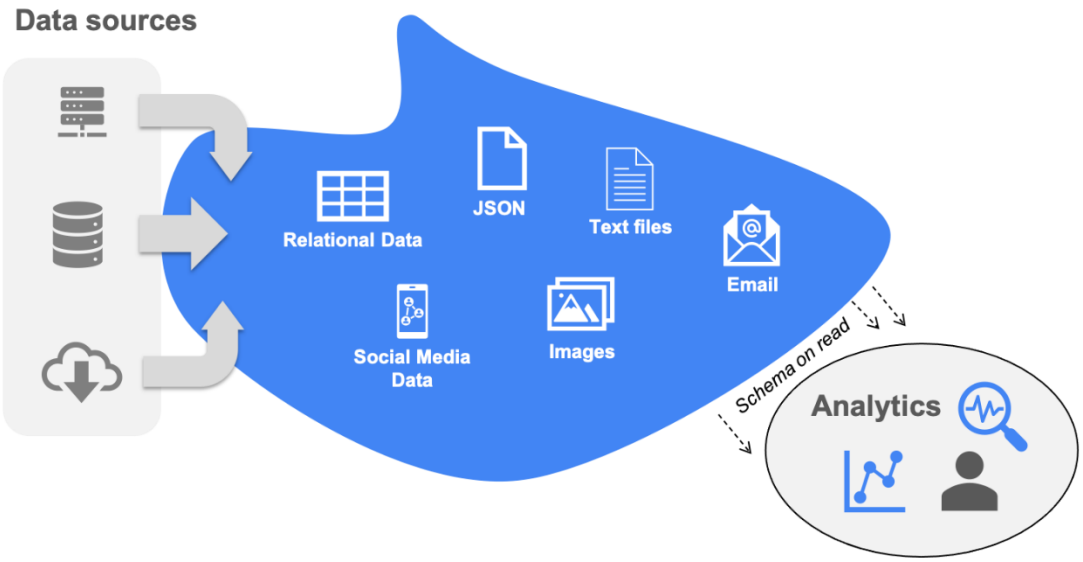

Deny rules with hits
1 deny firewall rule was hit in the last 1 day.
Firewall
Hit count
deny-ssh-internal
97
View full list
Allow rules with no hit
1 allow firewall rule had no hit in the last 6 weeks.
Firewall
allow-ftp
View full list
deny-ssh-internal
Logs
On
view in Logs Explorer
LOGS DETAILS
Network
default
Priority
101
Direction
Ingress
Action on match
Deny
Targets
Target tags
webserver
Source filters
Tags
mgmt
Protocols and ports
tcp:22
Hit count monitoring
1
sum
1 min interval (sum)
30 days
6 weeks
2 months
3 months
6 months
12 months
24 months
8
6
4
2
0
Dec 23, 2020 11:02
Hit count
8.00
10:15
10:30
10:45
11:00
Applicable to instances
The following table shows only the VM instances that you have permission to view. The default network might contain other instances that aren't being displayed.
Filter by instance name, project or subnetwork
Name
Subnetwork
Internal IP
Tags
uinstance-01
default
10.150.0.2
webserver

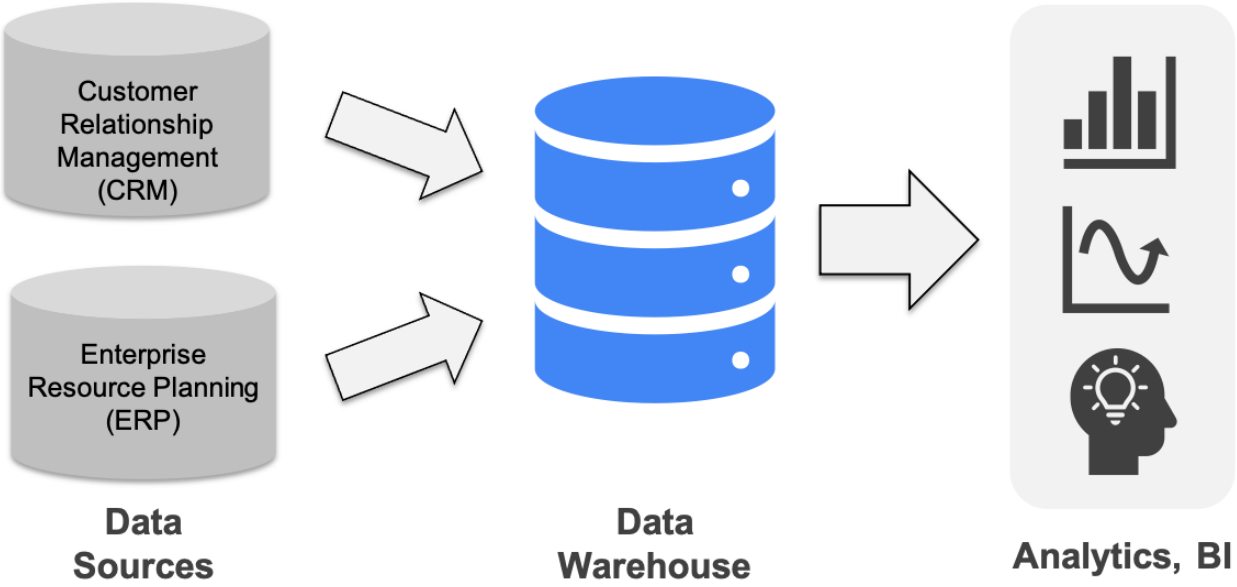

Datastore
DEK
Cloud KMS
KEK
Google KMS
Master Key
Memory

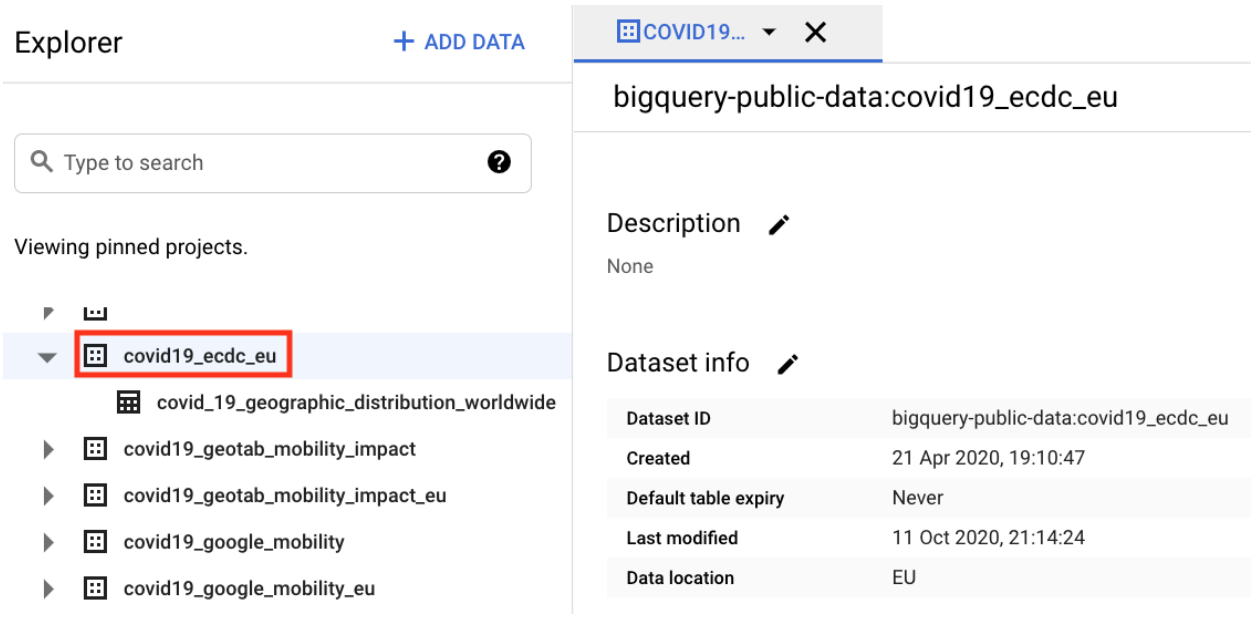

Users
Google
Edge POP
SSL offloading
HTTP(S) Load Balancer
Cloud Load Balancing
SSL backend
encryption
Backend VMs
Compute Engine
SSL Cert
VPC Network
SSL offloading
HTTP(S) Load Balancer
Cloud Load Balancing
Unencrypted
Backend VMs
Compute Engine
VPC Network
end-to-end encryption

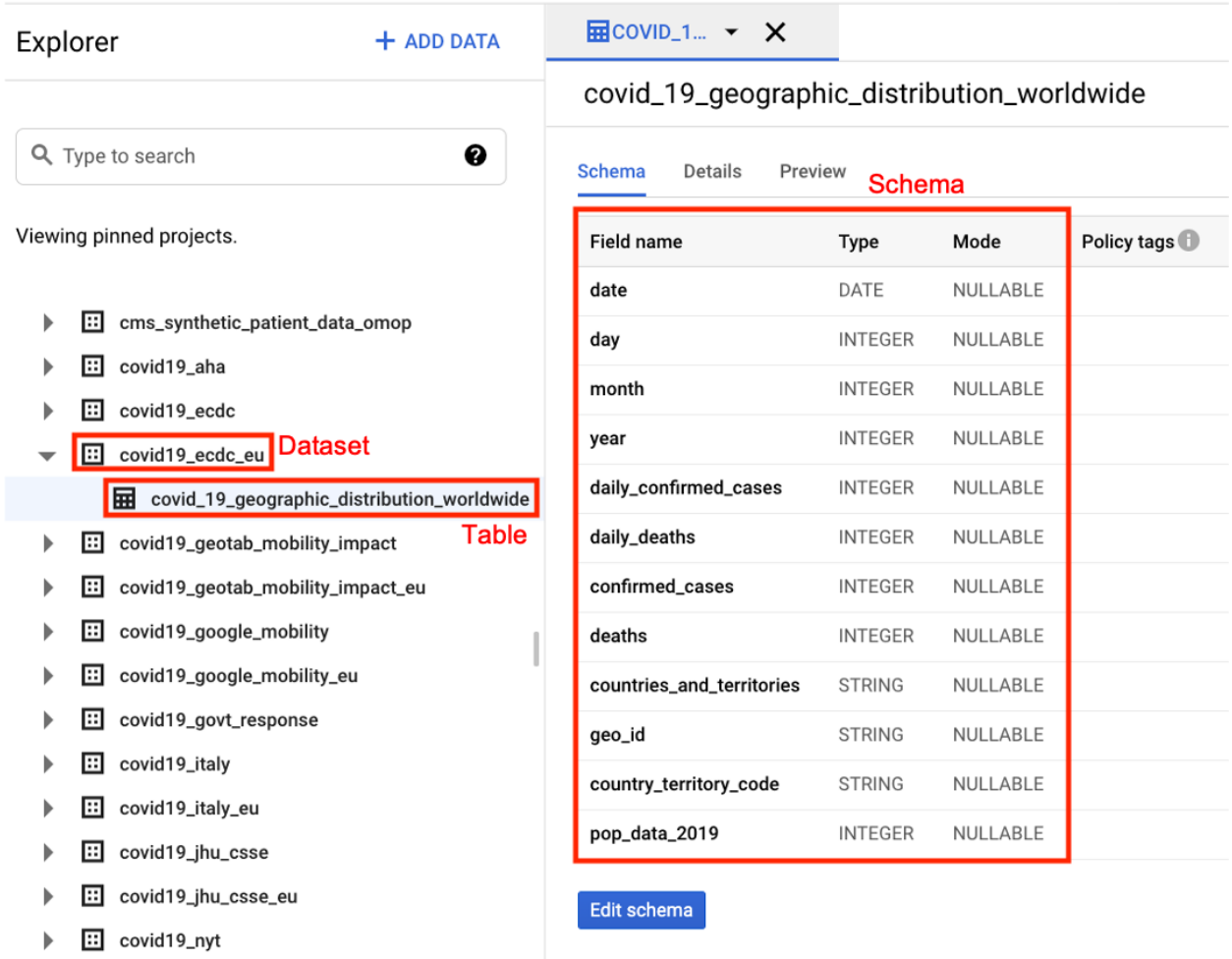

On-Premises DC
SIEM
Host
Google Cloud
Security Project
Integration
Function
Cloud Functions
Security Topic
Cloud Pub/Sub
Security
Command
Center
Logs Sink
Cloud Logging
GCP Audit
Logs
Project A
Resources
GCP Resources
Project N
Resources
GCP Resources

Chapter 8: Approaching Big Data and Data Pipelines






Explorer
+ ADD DATA
Type to search
Viewing pinned projects.
covid19_ecdc_eu
covid_19_geographic_distribution_worldwide
covid19_geotab_mobility_impact
covid19_geotab_mobility_impact_eu
covid19_google_mobility
covid19_google_mobility_eu
COVID19...
bigquery-public-data:covid19_ecdc_eu
Description
None
Dataset info
Dataset ID
bigquery-public-data:covid19_ecdc_eu
Created
21 Apr 2020, 19:10:47
Default table expiry
Never
Last modified
11 Oct 2020, 21:14:24
Data location
EU


Explorer
+ ADD DATA
Type to search
Viewing pinned projects.
cms_synthetic_patient_data_omop
covid19_aha
covid19_ecdc
covid19_ecdc_eu
Dataset
covid_19_geographic_distribution_worldwide
Table
covid19_geotab_mobility_impact
covid19_geotab_mobility_impact_eu
covid19_google_mobility
covid19_google_mobility_eu
covid19_govt_response
covid19_italy
covid19_italy_eu
covid19_jhu_csse
covid19_jhu_csse_eu
covid19_nyt
COVID_1...
covid_19_geographic_distribution_worldwide
Schema
Details
Preview
Schema
Field name
Type
Mode
Policy tags
date
DATE
NULLABLE
day
INTEGER
NULLABLE
month
INTEGER
NULLABLE
year
INTEGER
NULLABLE
daily_confirmed_cases
INTEGER
NULLABLE
daily_deaths
INTEGER
NULLABLE
confirmed_cases
INTEGER
NULLABLE
deaths
INTEGER
NULLABLE
countries_and_territories
STRING
NULLABLE
geo_id
STRING
NULLABLE
country_territory_code
STRING
NULLABLE
pop_data_2019
INTEGER
NULLABLE
Edit schema

COVID_1... *UNSAVE... COMPOSE NEW QUERY

RUN SAVE SCHEDULE MORE This query will process 5.4 MiB when run.

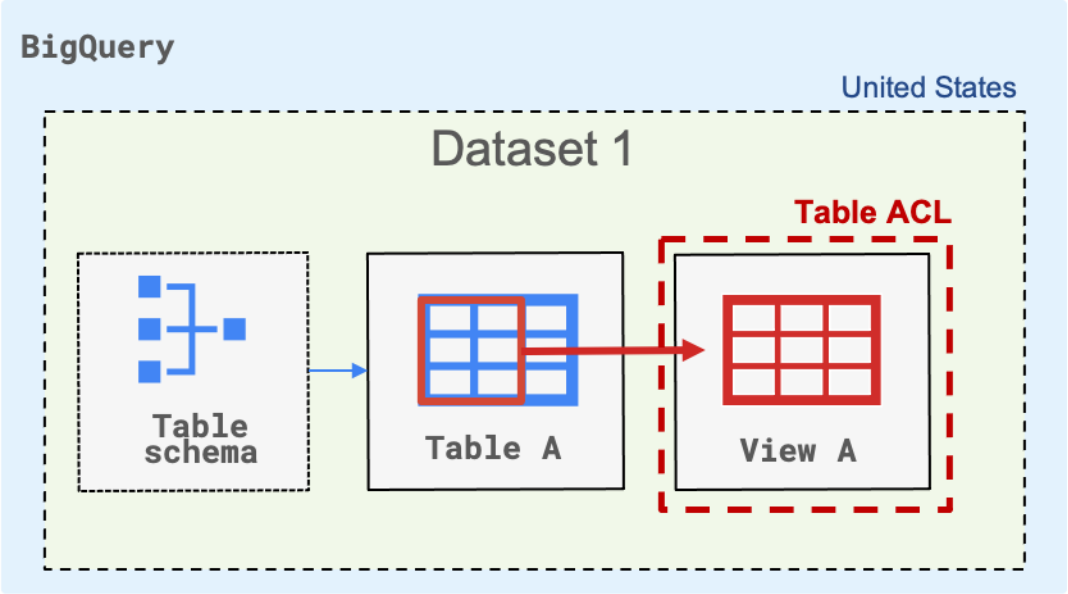
```
1  SELECT * FROM `bigquery-public-data.covid19_ecdc_eu.covid_19_geographic_distribution_worldwide`
2  WHERE countries_and_territories='Brazil' LIMIT 1000
```

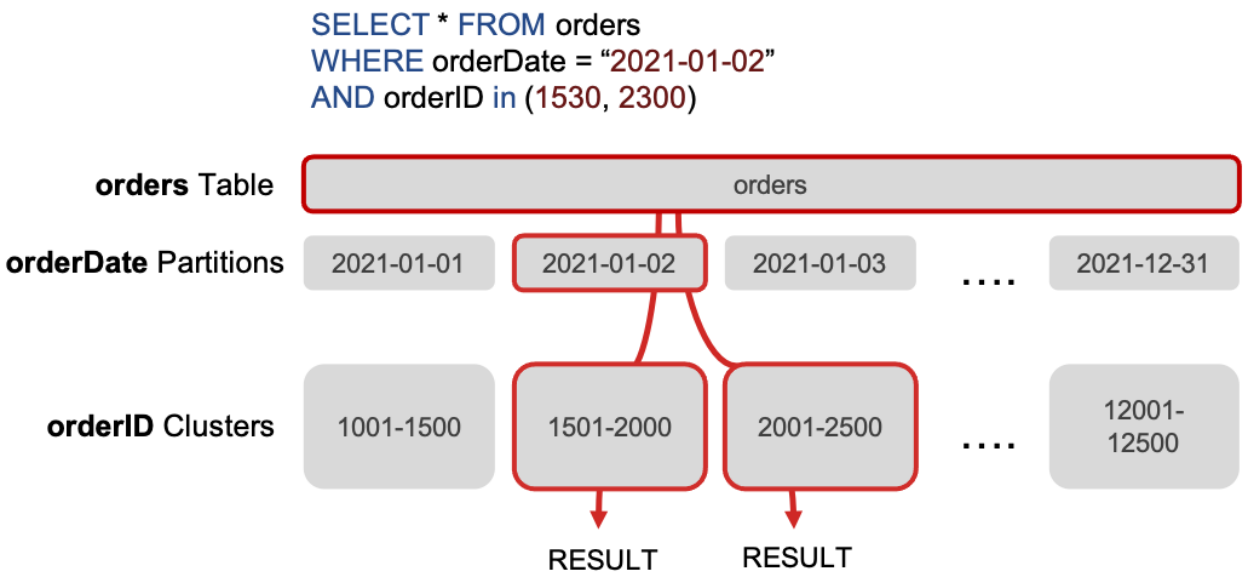
Query results SAVE RESULTS EXPLORE DATA

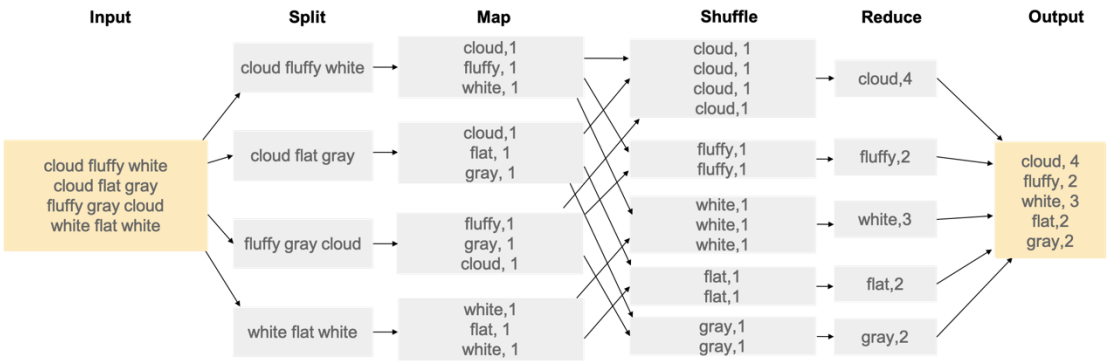
Query complete (0.2 sec elapsed, 5.4 MB processed)

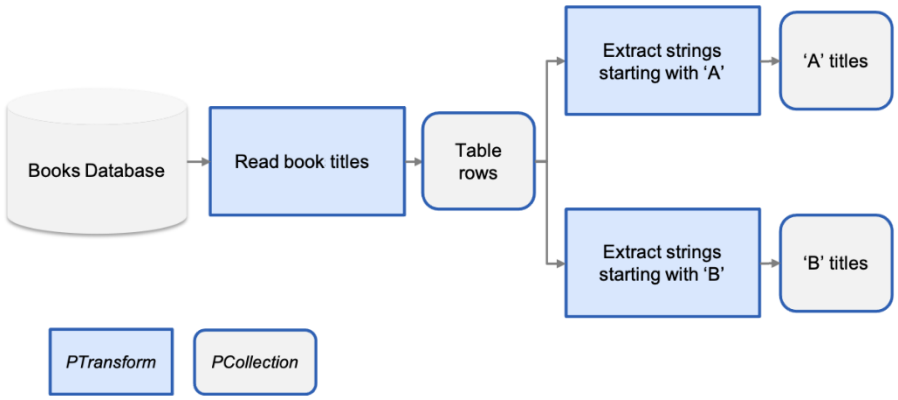
Job information | Results | JSON | Execution details

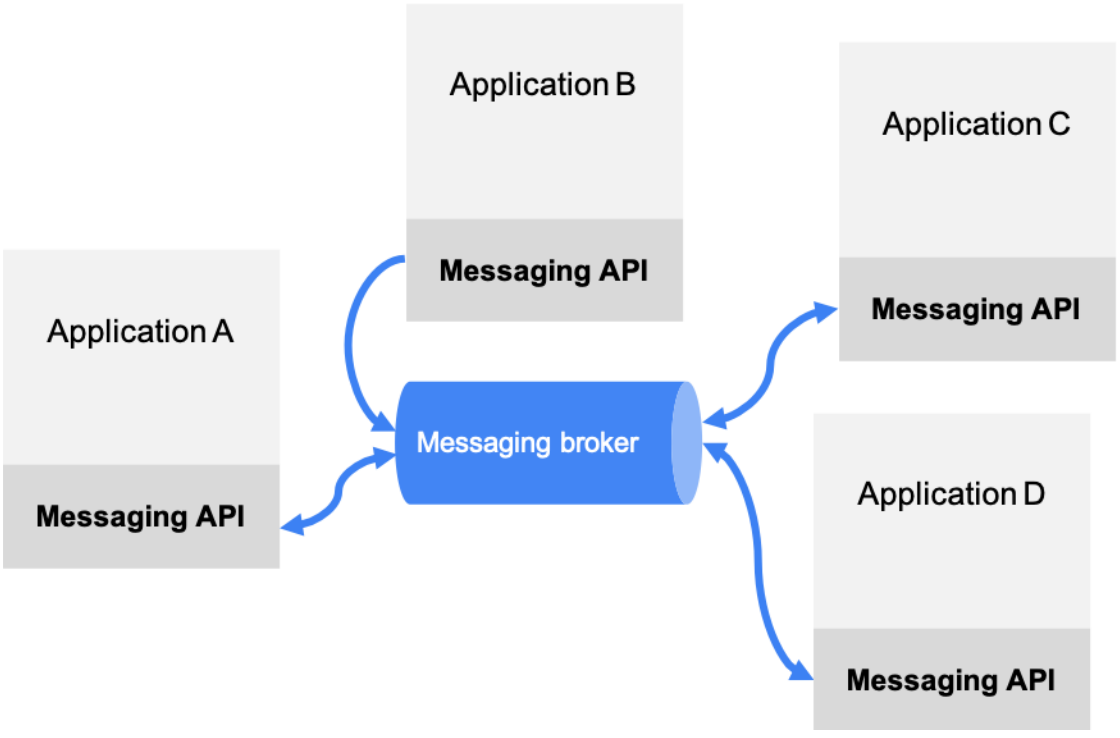
Row	date	day	month	year	daily_confirmed_cases	daily_deaths	confirmed_cases	deaths	countries_and_territories	geo_id	country_territory_code	pop_data_2019
1	2020-03-27	27	3	2020	482	20	2915	77	Brazil	BR	BRA	211049519
2	2020-03-28	28	3	2020	502	15	3417	92	Brazil	BR	BRA	211049519
3	2020-03-29	29	3	2020	487	22	3904	114	Brazil	BR	BRA	211049519
4	2020-03-30	30	3	2020	352	22	4256	136	Brazil	BR	BRA	211049519
5	2020-03-31	31	3	2020	323	23	4579	159	Brazil	BR	BRA	211049519

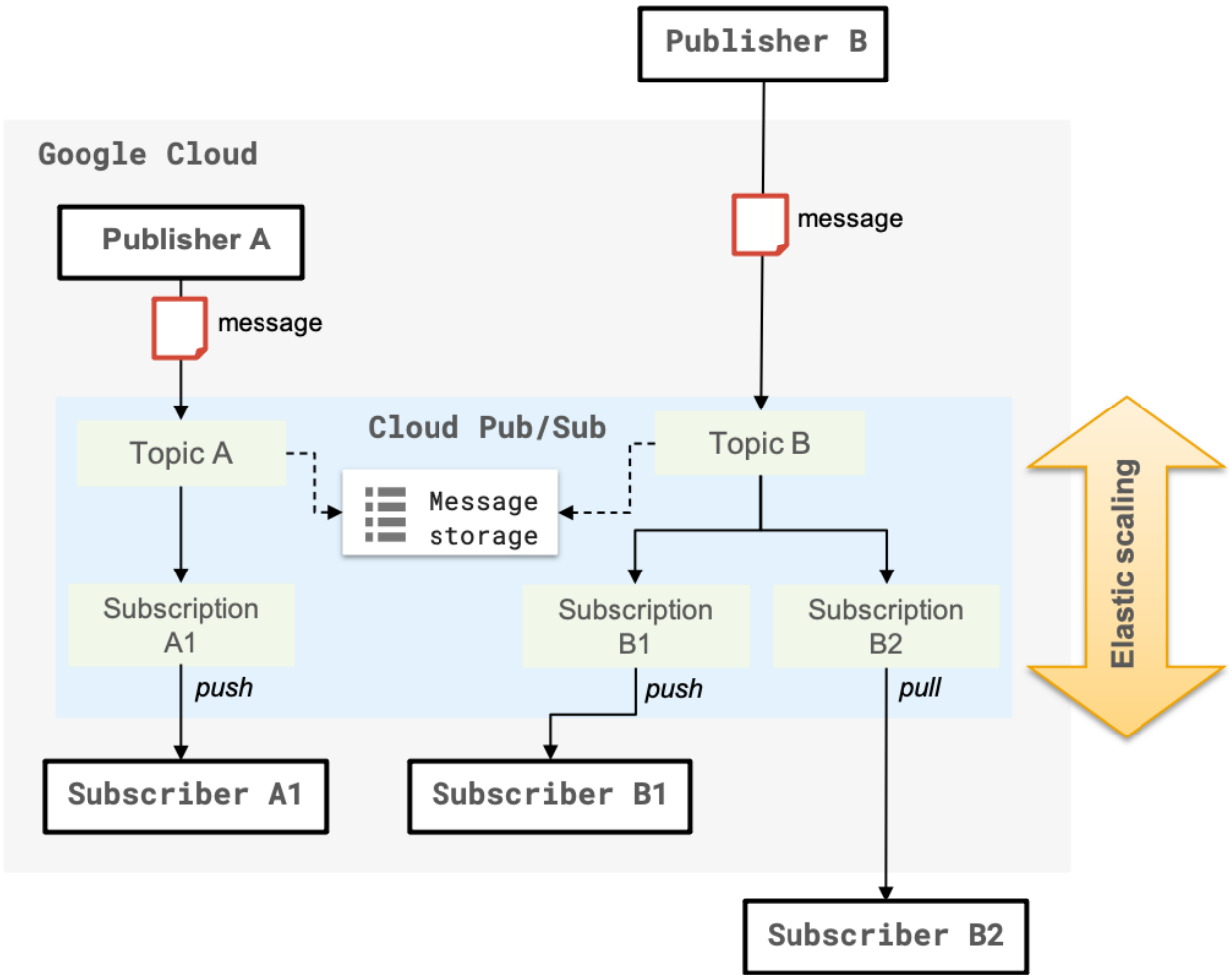


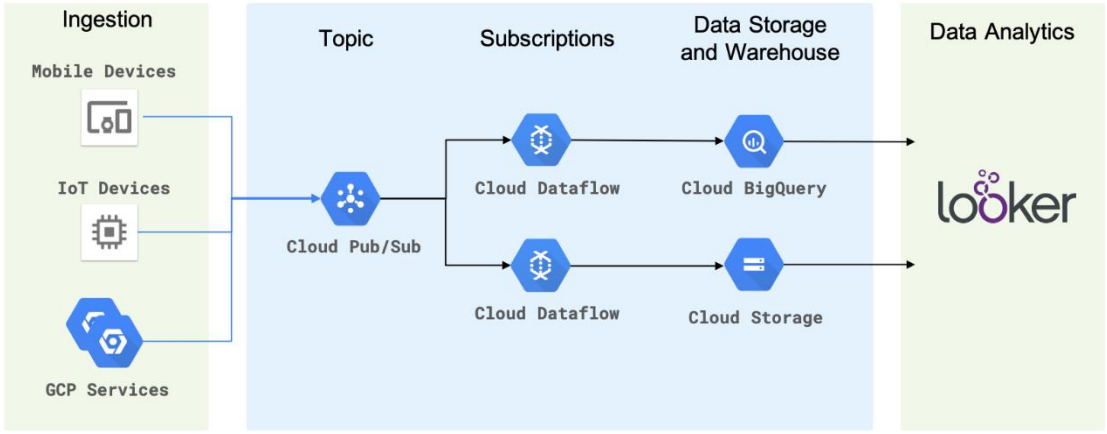


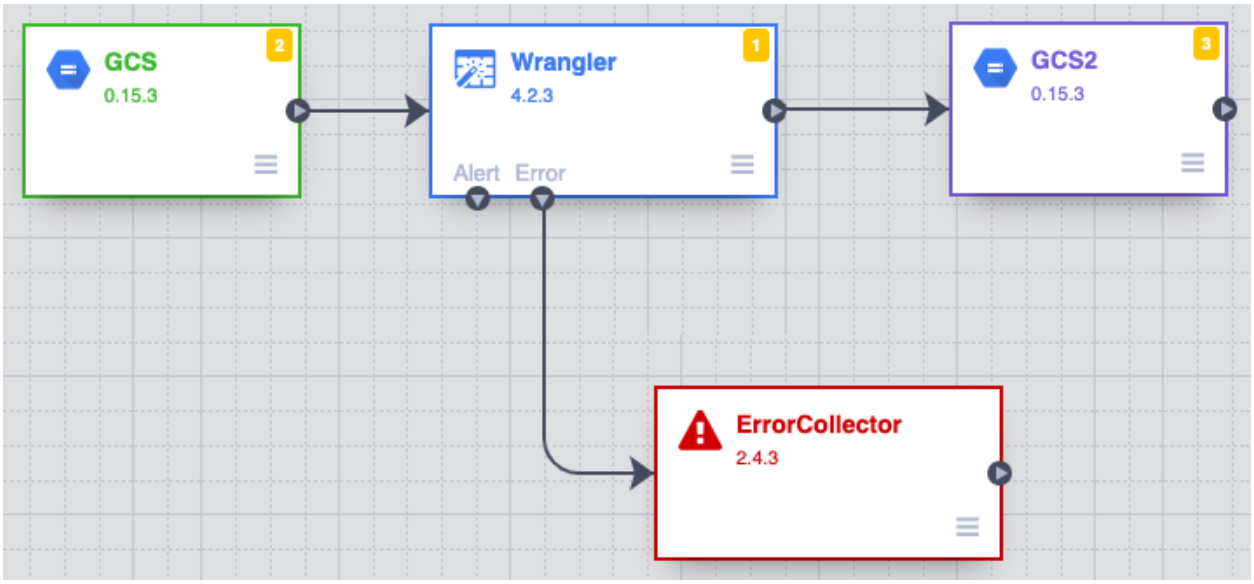

Input
Split
Map
Shuffle
Reduce
Output
cloud fluffy white
cloud flat gray
fluffy gray cloud
white flat white
cloud fluffy white
cloud flat gray
fluffy gray cloud
white flat white
cloud,1
fluffy, 1
white, 1
cloud,1
flat, 1
gray, 1
fluffy,1
gray, 1
cloud, 1
white,1
flat, 1
white, 1
cloud, 1
cloud, 1
cloud, 1
cloud,1
fluffy,1
fluffy,1
white,1
white,1
white,1
flat,1
flat,1
gray,1
gray,1
cloud,4
fluffy,2
white,3
flat,2
gray,2
cloud, 4
fluffy, 2
white, 3
flat,2
gray,2

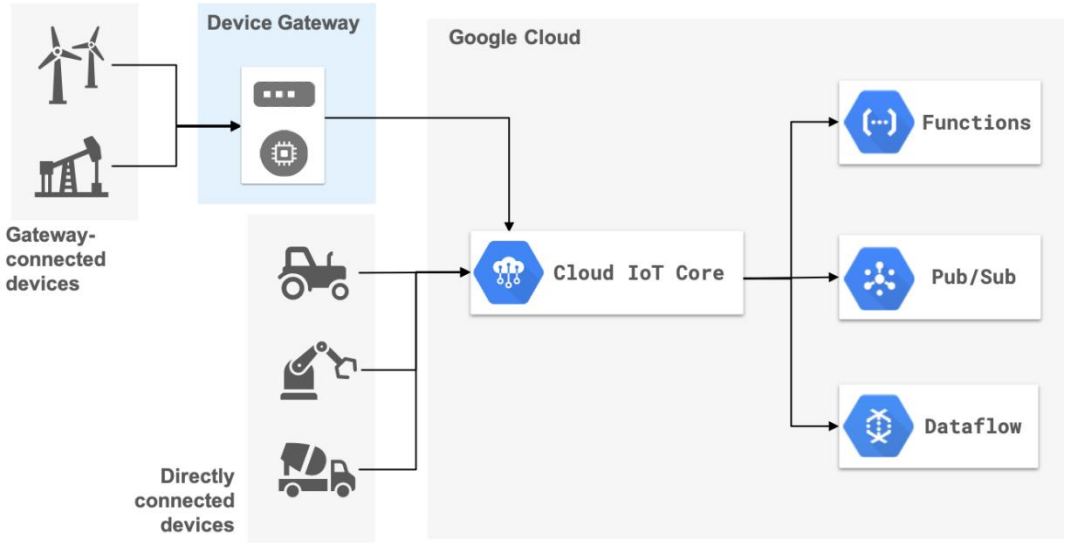

Books Database
Read book titles
Table rows
Extract strings starting with 'A'
'A' titles
Extract strings starting with 'B'
'B' titles
PTransform
PCollection

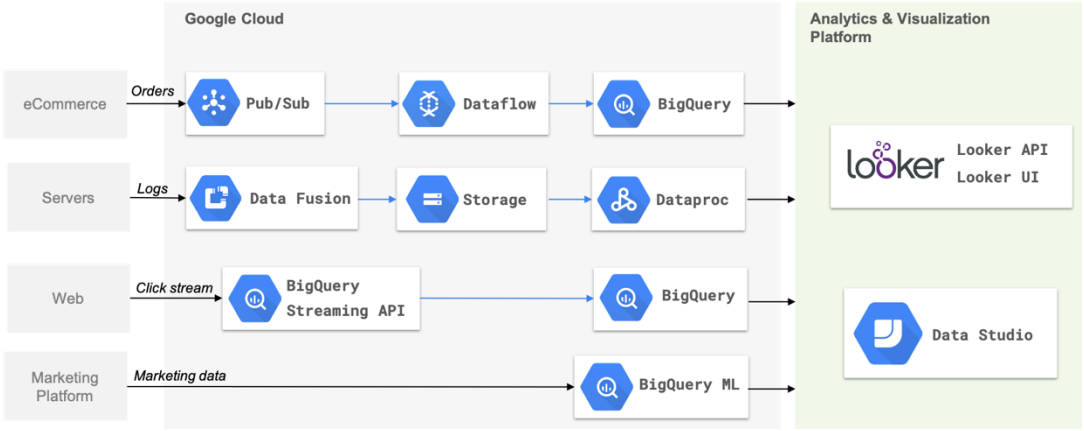

Application A
Messaging API
Application B
Messaging API
Application C
Messaging API
Messaging broker
Application D
Messaging API

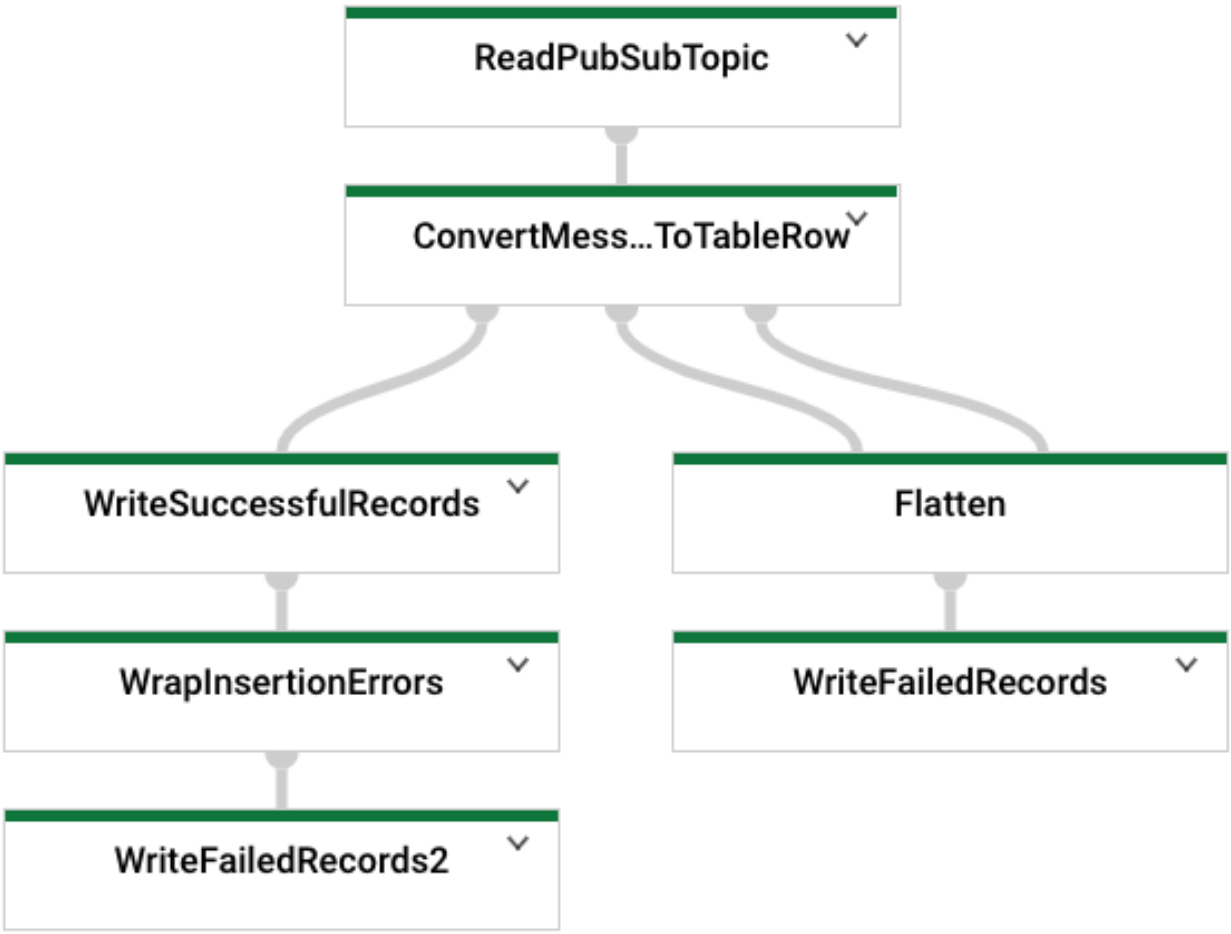

Publisher B
Google Cloud
Publisher A
message
message
Cloud Pub/Sub
Topic A
Topic B
Message storage
Subscription A1
Subscription B1
Subscription B2
push
push
pull
Elastic scaling
Subscriber A1
Subscriber B1
Subscriber B2


Ingestion
Mobile Devices
IoT Devices
GCP Services
Topic
Cloud Pub/Sub
Subscriptions
Cloud Dataflow
Cloud Dataflow
Data Storage and Warehouse
Cloud BigQuery
Cloud Storage
Data Analytics
looker


GCS
0.15.3
2
Wrangler
4.2.3
1
Alert
Error
GCS2
0.15.3
3
ErrorCollector
2.4.3


Device Gateway
Google Cloud
Gateway-connected devices
Directly connected devices
Cloud IoT Core
Functions
Pub/Sub
Dataflow


Google Cloud
Analytics & Visualization Platform
eCommerce
Orders
Pub/Sub
Dataflow
BigQuery
Servers
Logs
Data Fusion
Storage
Dataproc
Web
Click stream
BigQuery Streaming API
BigQuery
Marketing Platform
Marketing data
BigQuery ML
looker
Looker API
Looker UI
Data Studio


ReadPubSubTopic
ConvertMess…ToTableRow
WriteSuccessfulRecords
Flatten
WrapInsertionErrors
WriteFailedRecords
WriteFailedRecords2

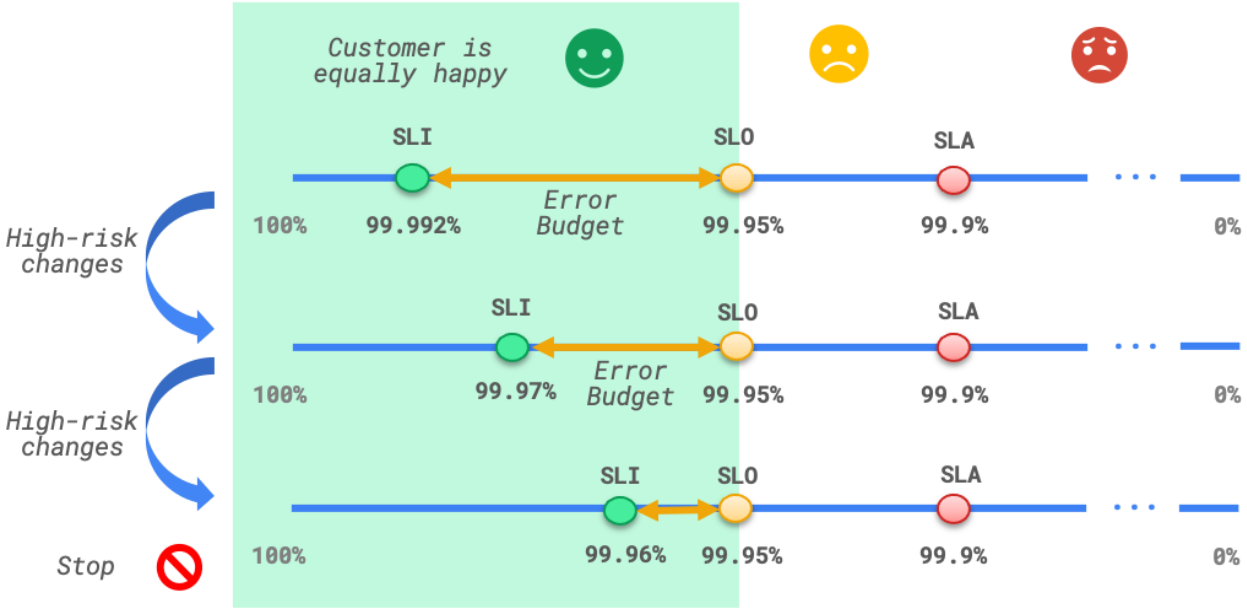
Query results SAVE RESULTS EXPLORE DATA

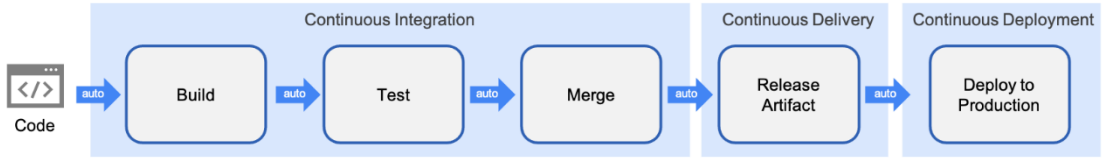
Query complete (0.3 sec elapsed, 0 B processed)

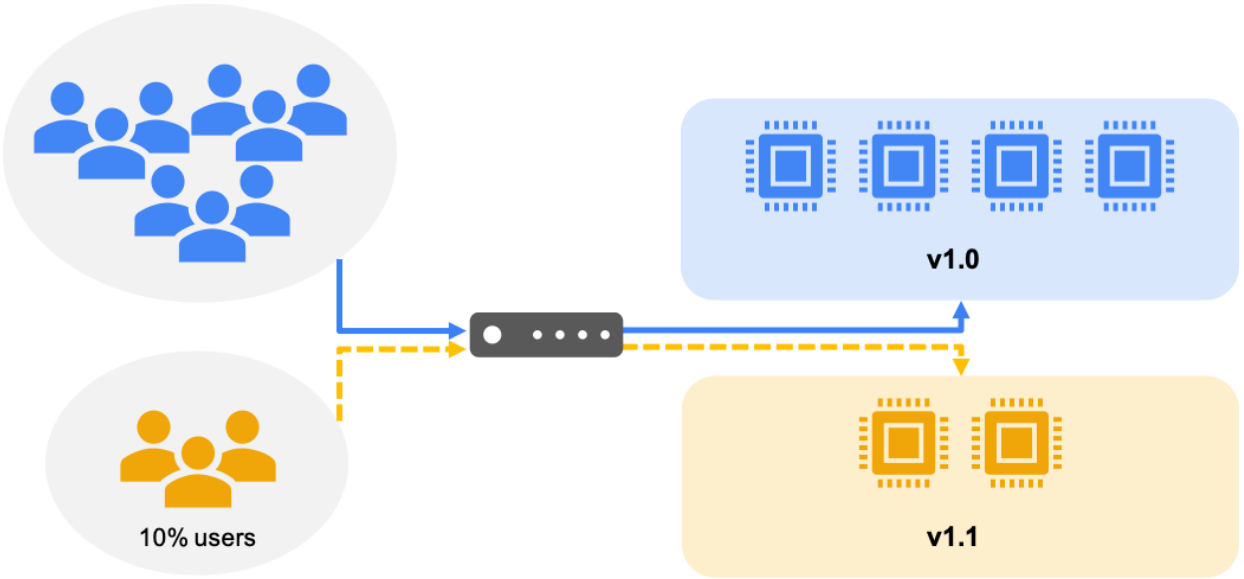
Job information | Results | JSON | Execution details

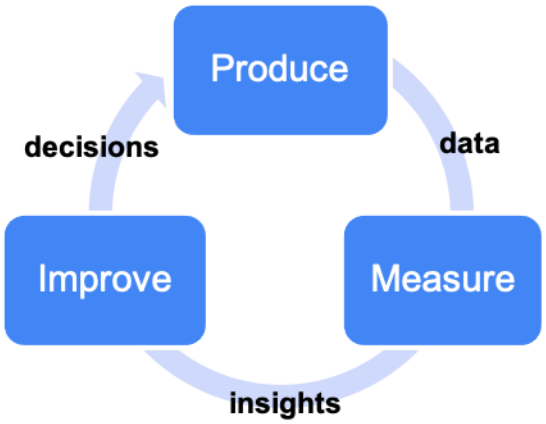
9	2020-12-21 10:55:33 UTC	temp-sensor-01	27.181961019821465
10	2020-12-21 10:55:32 UTC	temp-sensor-01	27.194767729571428
11	2020-12-21 10:55:32 UTC	temp-sensor-02	12.097457428586903
12	2020-12-21 10:55:31 UTC	temp-sensor-02	12.10684226867139
13	2020-12-21 10:55:31 UTC	temp-sensor-01	27.196290155611887
14	2020-12-21 10:55:30 UTC	temp-sensor-02	12.119587090169198
15	2020-12-21 10:55:30 UTC	temp-sensor-01	27.215637292523738
16	2020-12-21 10:55:29 UTC	temp-sensor-02	12.12317403367955

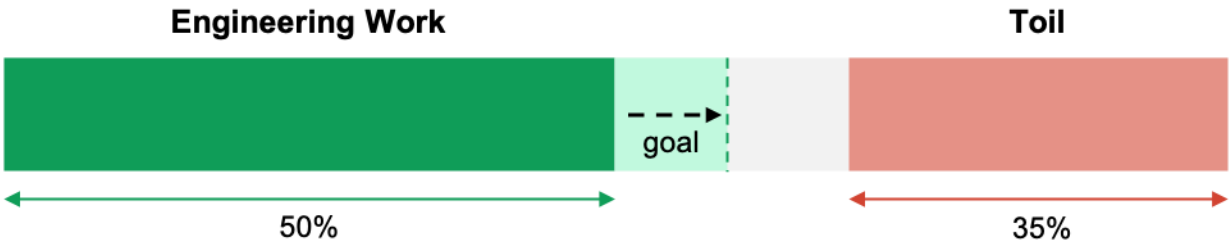
Chapter 9: Jumping on the DevOps Bandwagon with Site Reliability Engineering (SRE)











Filter repositories

Select all repositories

Edit repositories on GitHub

Architecting-Google-Cloud-Solutions

I understand that GitHub content for the selected repositories will be transferred to this GCP project to provide the connected service. Members of this GCP project with sufficient permissions will be able to create and run triggers on these repositories, based on transferred GitHub content. I also understand that content from all GitHub app triggers in this GCP project may be transferred to GitHub in order to provide functionality like showing trigger names in GitHub build results. This will apply to all existing and future GitHub App triggers in this project. Learn more

Connect repository Cancel

Build configuration

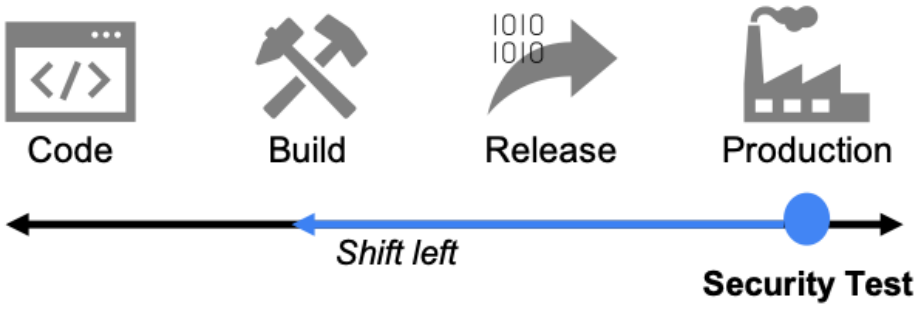
File type

- ○ Autodetected
  A cloudbuild.yaml or Dockerfile will be detected in the repository
- ◉ Cloud Build configuration file (YAML or JSON)
- ○ Dockerfile

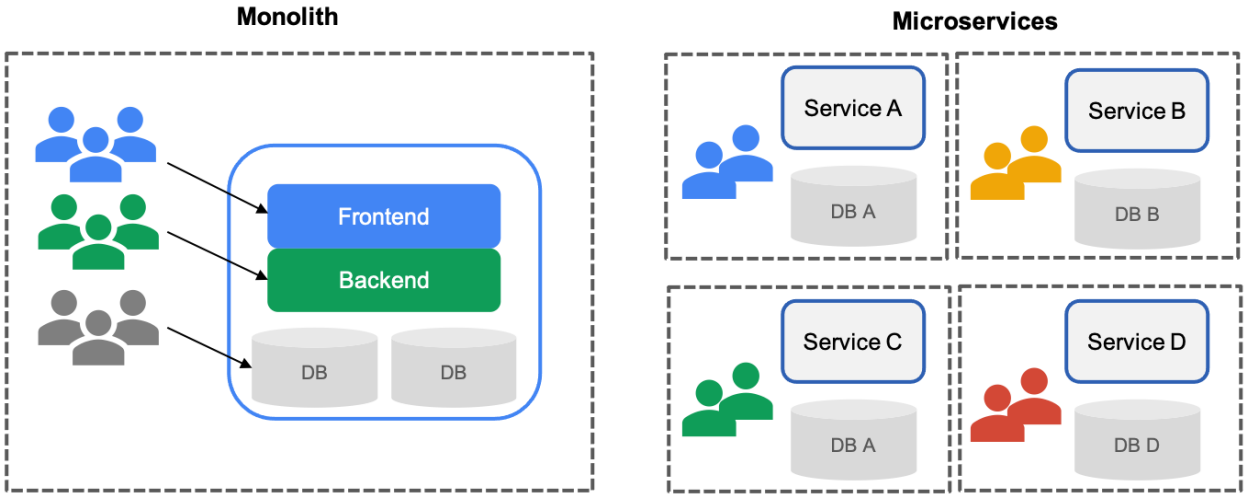
Cloud Build configuration file location *

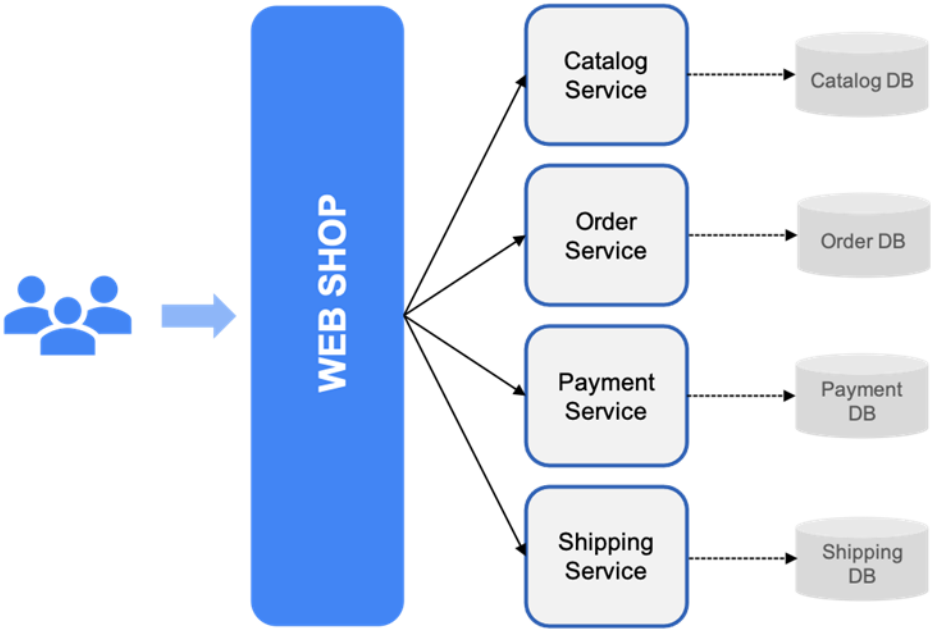
/ ch9/cloud-build/cloudbuild.yaml

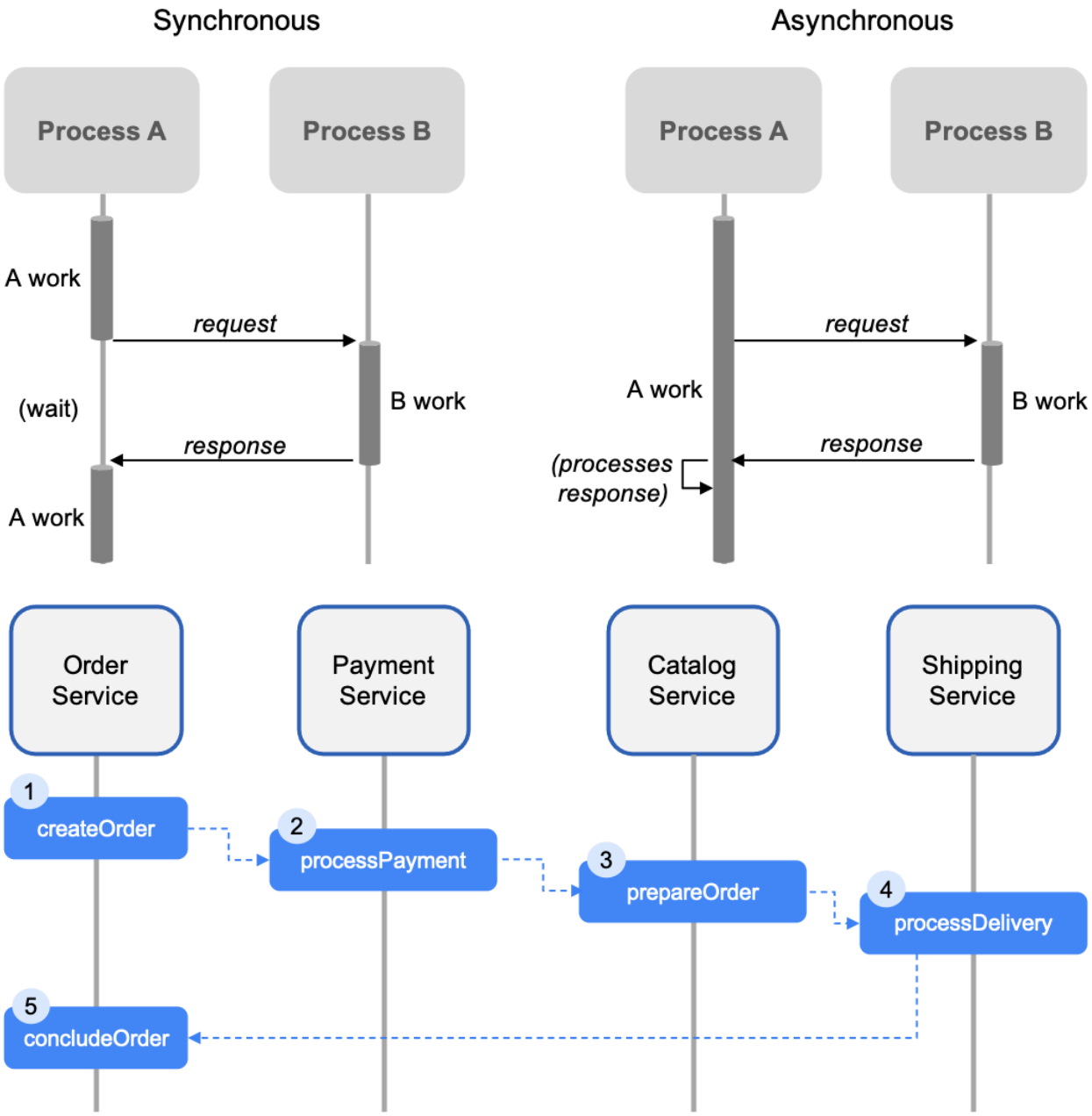
Specify the path to a Cloud Build configuration file in the Git repo Learn more

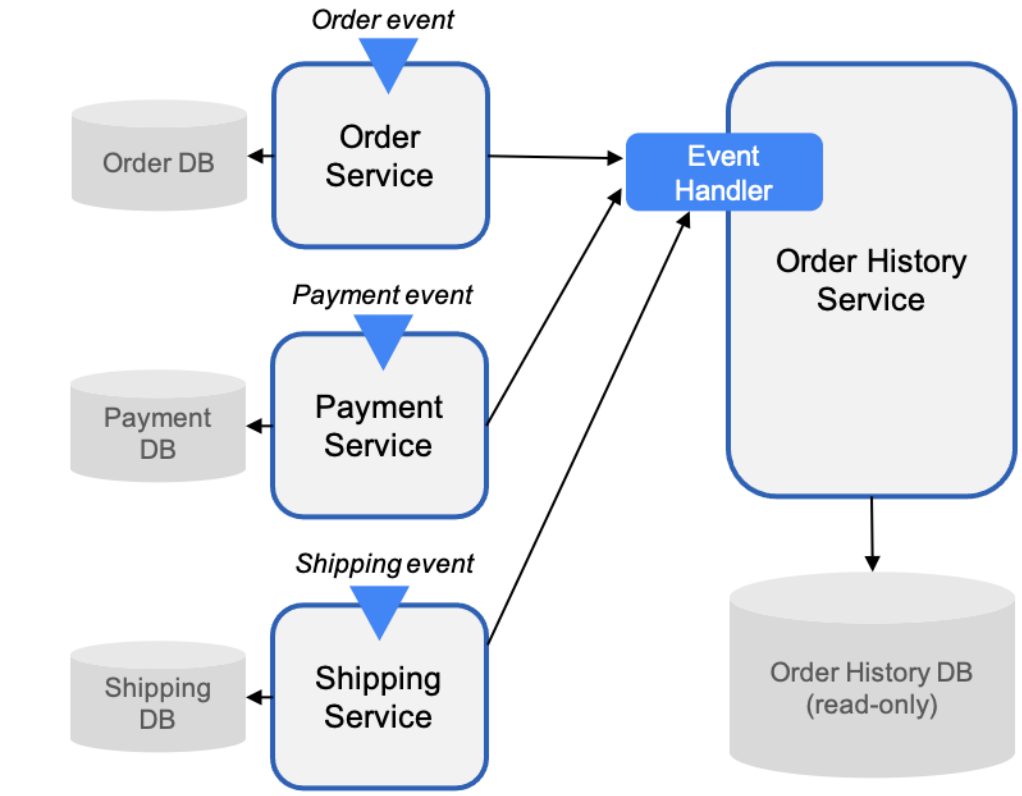


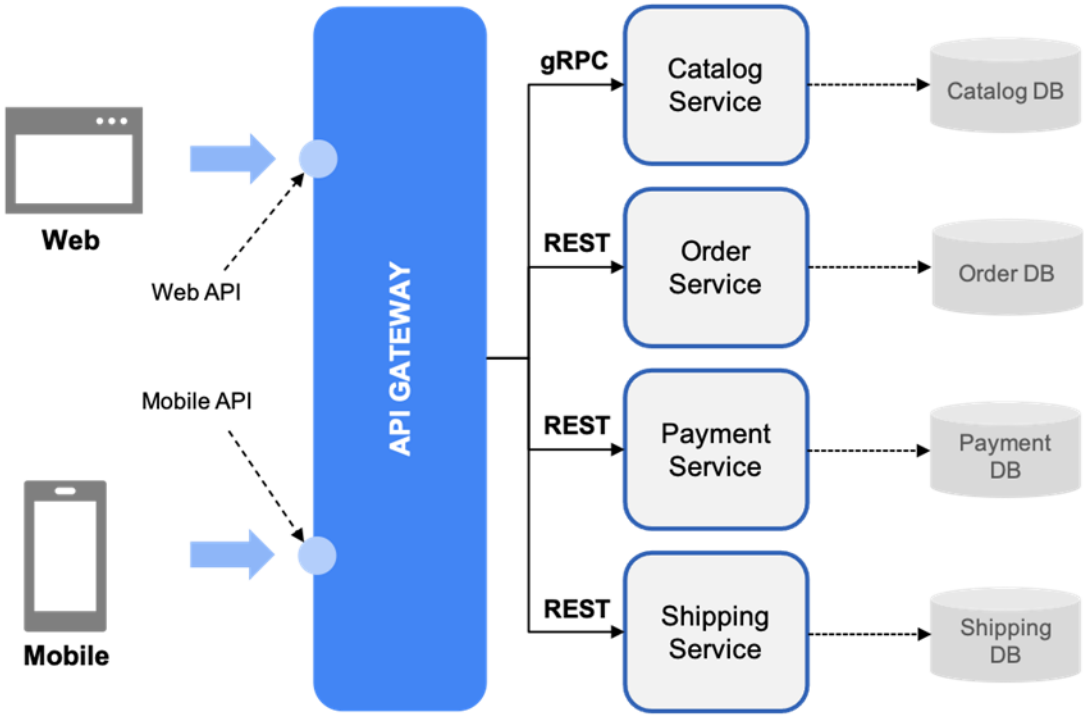
Chapter 10: Re-Architecting with Microservices

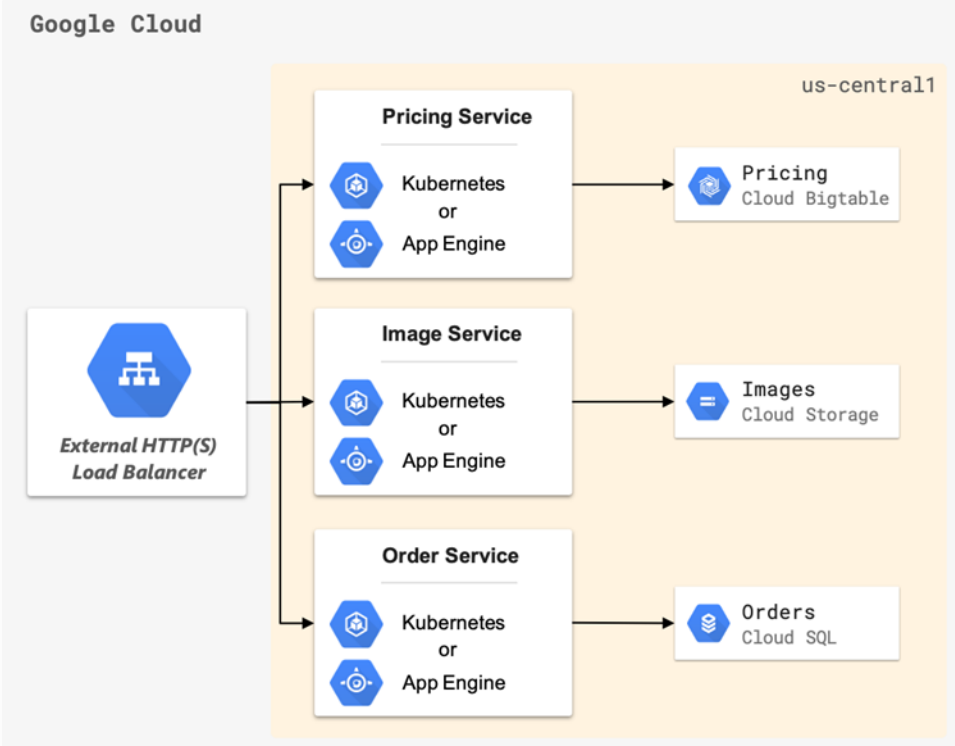


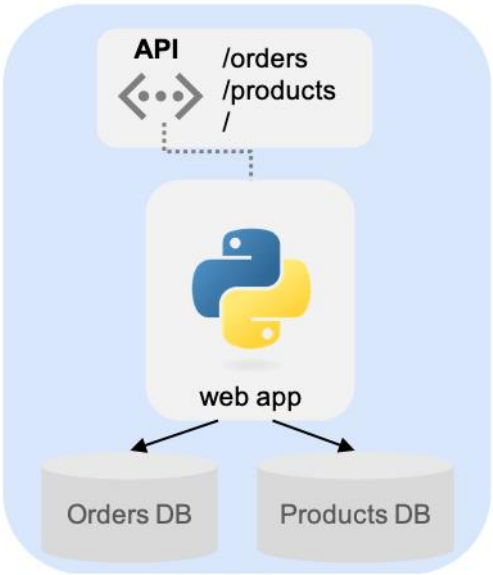


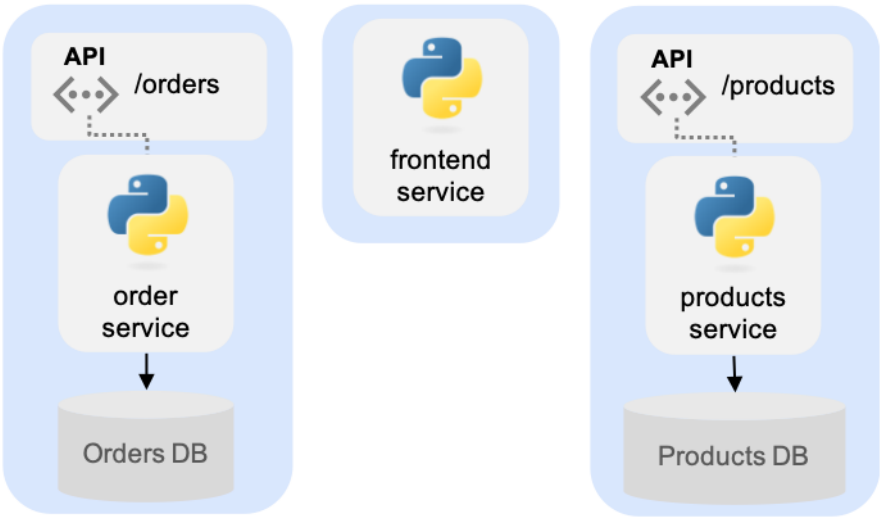

Synchronous
Process A
Process B
A work
request
(wait)
B work
response
A work
Asynchronous
Process A
Process B
request
A work
B work
response
(processes response)
Order Service
Payment Service
Catalog Service
Shipping Service
1
createOrder
2
processPayment
3
prepareOrder
4
processDelivery
5
concludeOrder

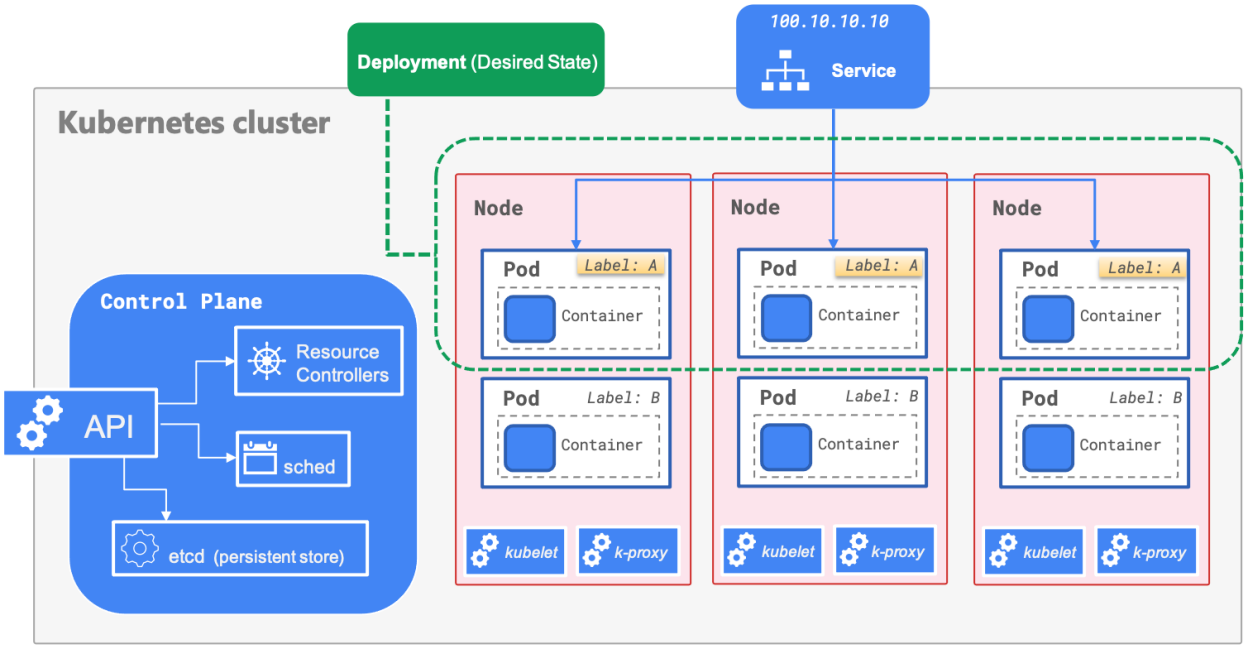

Order event
Order DB
Order Service
Event Handler
Order History Service
Payment event
Payment DB
Payment Service
Shipping event
Shipping DB
Shipping Service
Order History DB (read-only)

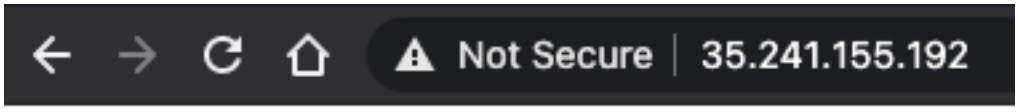

Web
Web API
Mobile API
Mobile
API GATEWAY
gRPC
Catalog Service
Catalog DB
REST
Order Service
Order DB
REST
Payment Service
Payment DB
REST
Shipping Service
Shipping DB


Google Cloud
us-central1
Pricing Service
Kubernetes
or
App Engine
Pricing
Cloud Bigtable
Image Service
Kubernetes
or
App Engine
Images
Cloud Storage
External HTTP(S)
Load Balancer
Order Service
Kubernetes
or
App Engine
Orders
Cloud SQL

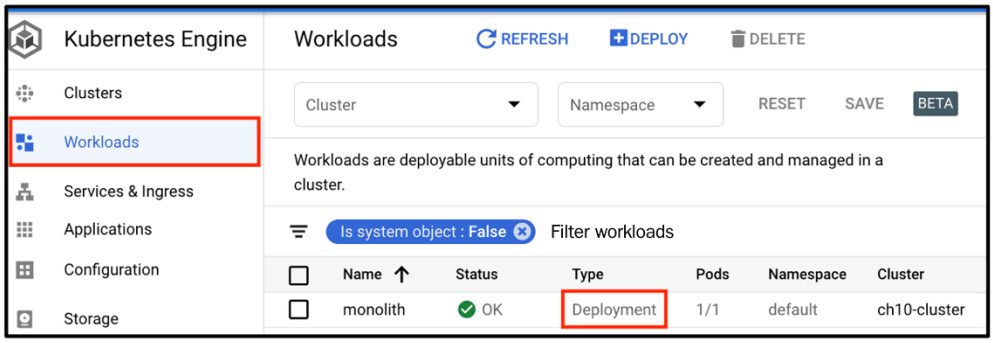

API
/orders
/products
/
web app
Orders DB
Products DB

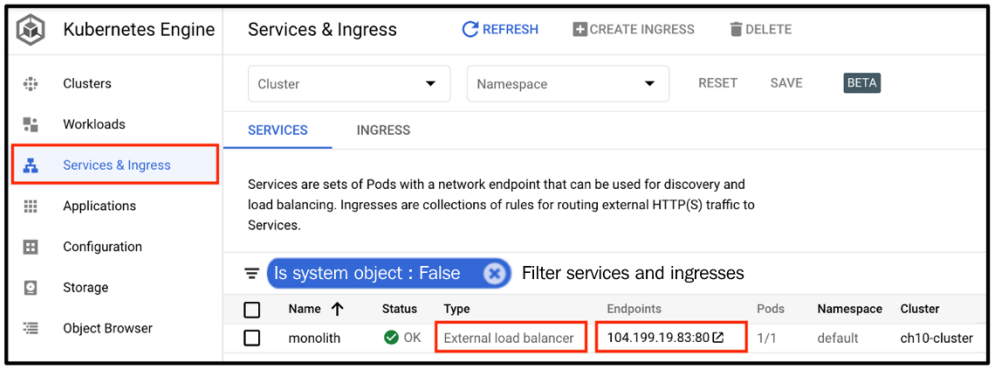

API
/orders
order service
Orders DB
frontend service
API
/products
products service
Products DB


Deployment (Desired State)
100.10.10.10
Service
Kubernetes cluster
Node
Pod
Label: A
Container
Pod
Label: B
Container
kubelet
k-proxy
Control Plane
API
Resource Controllers
sched
etcd (persistent store)


Not Secure
35.241.155.192

Hello There!



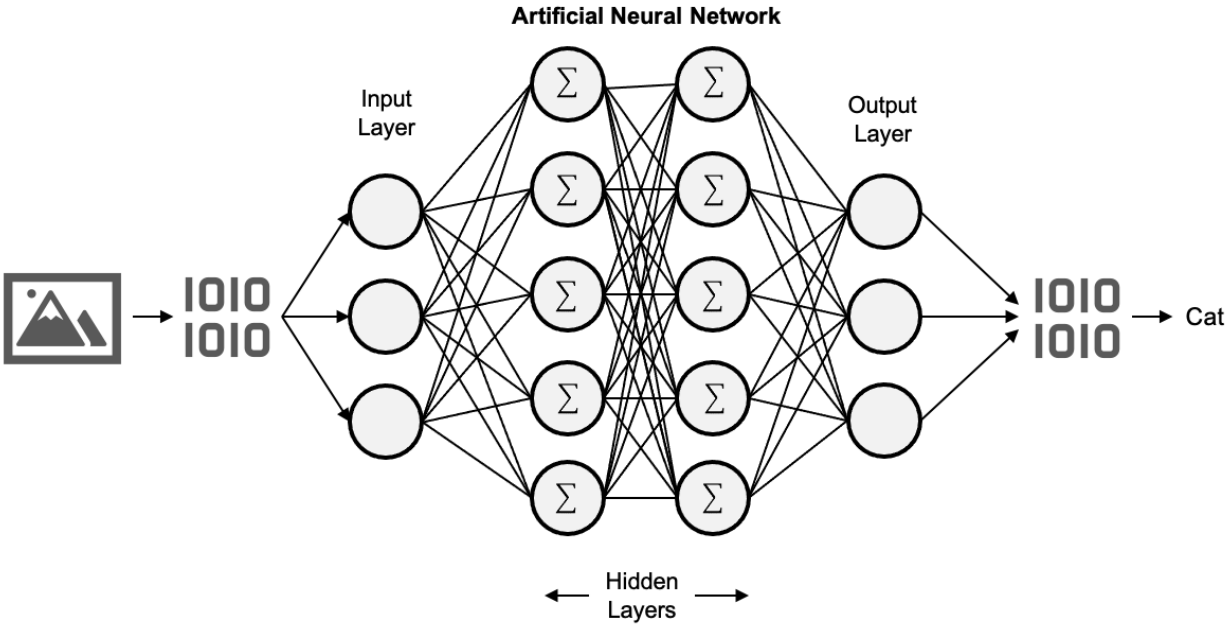


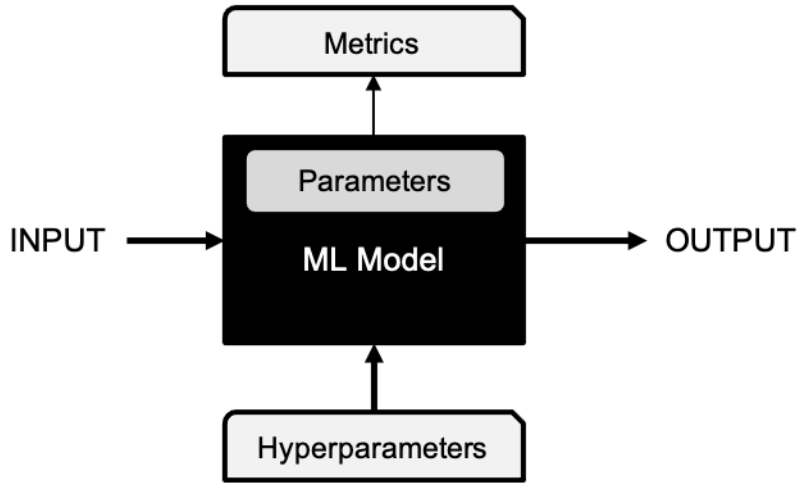

```
NAME                                READY   STATUS    RESTARTS   AGE
frontend-66cc44cb8d-kgh7v           1/1     Running   0          65s
monolith-74486b59d8-qg984           1/1     Running   0          9m53s
orders-8d9cb544c-8k7f5              1/1     Running   0          60s
products-694d7fb476-rb9jk           1/1     Running   0          59s
```

```
NAME         TYPE           CLUSTER-IP      EXTERNAL-IP      PORT(S)        AGE
frontend     LoadBalancer   10.107.240.183  35.241.133.27    80:30139/TCP   2m34s
kubernetes   ClusterIP      10.107.240.1    <none>           443/TCP        20m
monolith     LoadBalancer   10.107.243.212  35.241.155.192   80:31212/TCP   11m
orders       LoadBalancer   10.107.247.43   34.76.33.217     80:30421/TCP   2m30s
products     LoadBalancer   10.107.251.22   34.78.231.63     80:31428/TCP   2m29s
```

{ "orders": [{ "id": "1", "date": "3/28/2019", "cost": 9.99, "items": ["1"] }, { "id": "2", "items": ["2", "3"] }, { "id": "5", "date": "2/08/2021", "cost": 19.98, "items": ["1", "5"]

Chapter 11: Applying Machine Learning and Artificial Intelligence





Language / locale
English (United States)

Voice type
WaveNet

Voice name
en-US-Wavenet-D

Audio device profile
Default

Speed: 1.00

Pitch: 0.00

Request URL

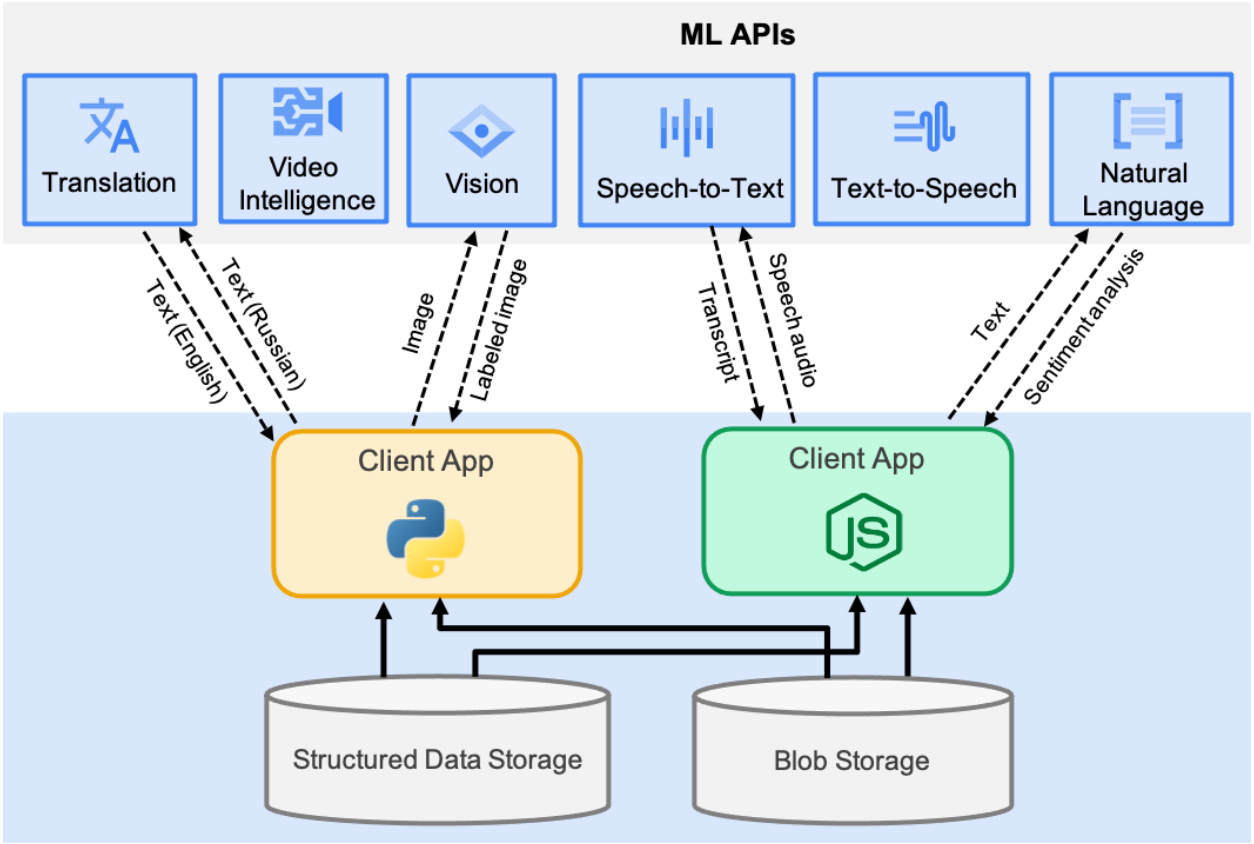
```
https://texttospeech.googleapis.com/v1beta1/text:synthesize
```

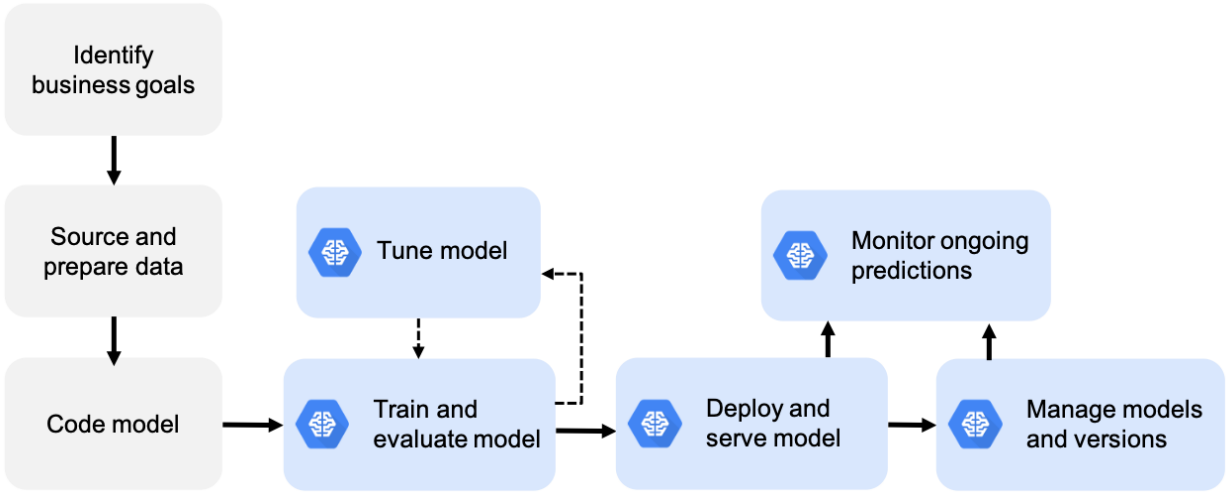
Request body

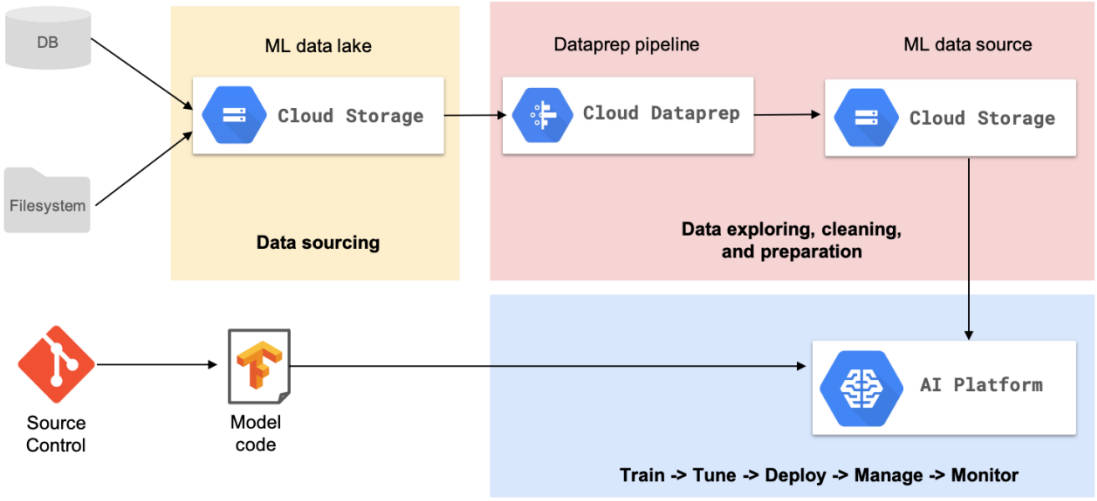

```
{
  "audioConfig": {
    "audioEncoding": "LINEAR16",
    "pitch": 0,
    "speakingRate": 1
  },
  "input": {
    "text": "Google Cloud Text-to-Speech enables developers to synthesize natural-s
ounding speech with 100+ voices, available in multiple languages and variants. It a
pplies DeepMind's groundbreaking research in WaveNet and Google's powerful neural n
etworks to deliver the highest fidelity possible. As an easy-to-use API, you can cr
eate lifelike interactions with your users, across many applications and devices."
  },
  "voice": {
    "languageCode": "en-US",
    "name": "en-US-Wavenet-D"
  }
}
```

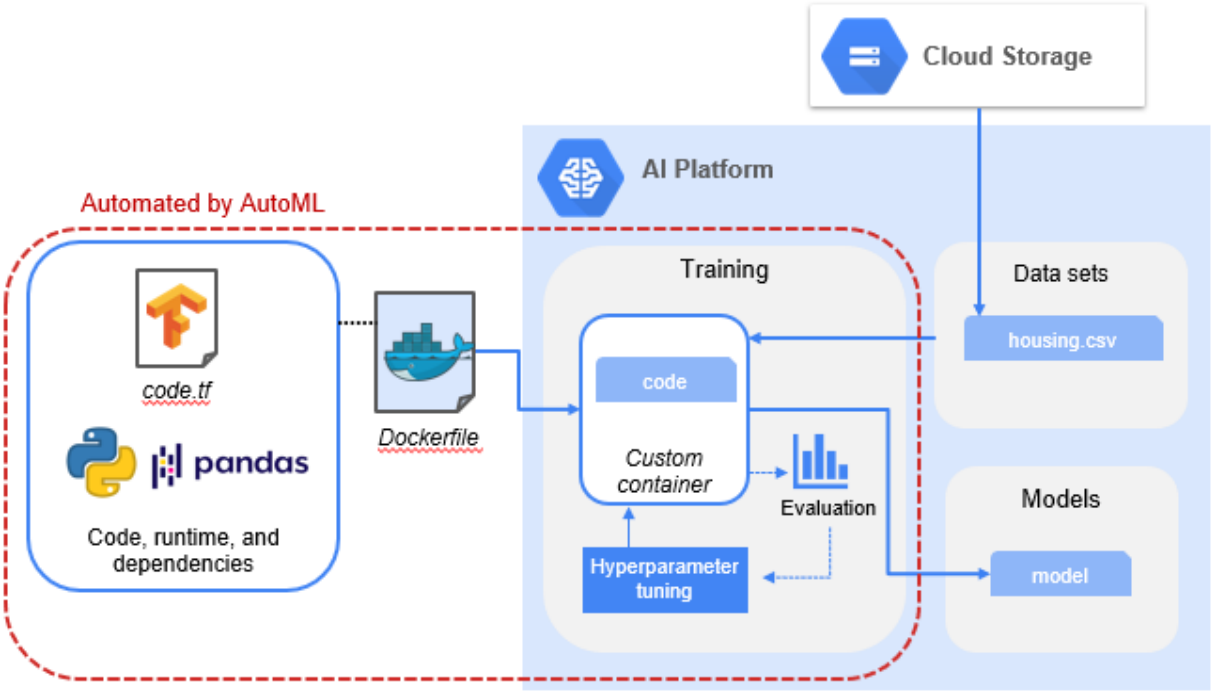

Hide JSON

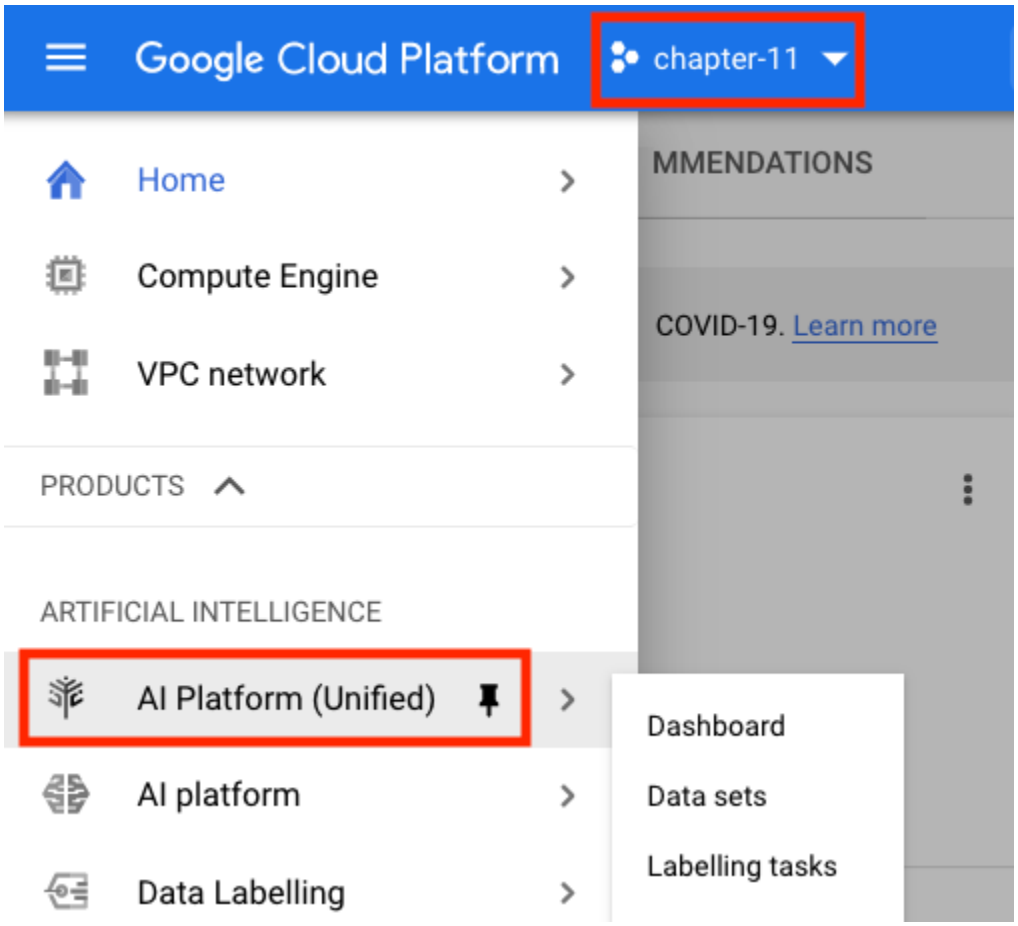
▶ SPEAK IT




Identify business goals
Source and prepare data
Code model
Tune model
Train and evaluate model
Deploy and serve model
Monitor ongoing predictions
Manage models and versions


DB
Filesystem
ML data lake
Cloud Storage
Data sourcing
Dataprep pipeline
Cloud Dataprep
ML data source
Cloud Storage
Data exploring, cleaning, and preparation
Source Control
Model code
AI Platform
Train -> Tune -> Deploy -> Manage -> Monitor


Cloud Storage
AI Platform
Automated by AutoML
Training
Data sets
code.tf
pandas
Code, runtime, and dependencies
Dockerfile
code
Custom container
housing.csv
Evaluation
Models
Hyperparameter tuning
model


Google Cloud Platform
chapter-11
Home
Compute Engine
VPC network
PRODUCTS
ARTIFICIAL INTELLIGENCE
AI Platform (Unified)
AI platform
Data Labelling
MMENDATIONS
COVID-19. Learn more
Dashboard
Data sets
Labelling tasks

Optimization objective

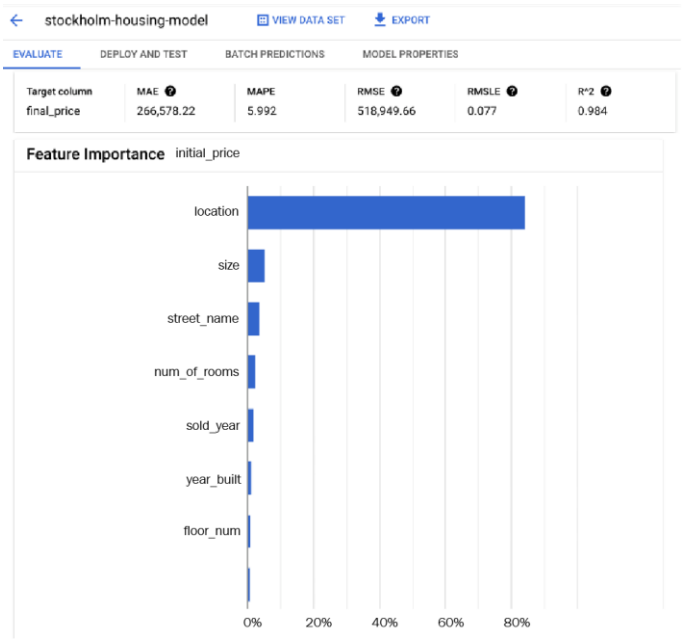
- ○ **RMSE (Default)**
  Capture more extreme values accurately

- ◉ **MAE**
  View extreme values as outliers with less impact on the model

- ○ **RMSLE**
  Penalize error on relative size rather than absolute value. Especially helpful when both predicted and actual values can be quite large. It is undefined when the predicted or ground truth is less than 0.

SHOW LESS

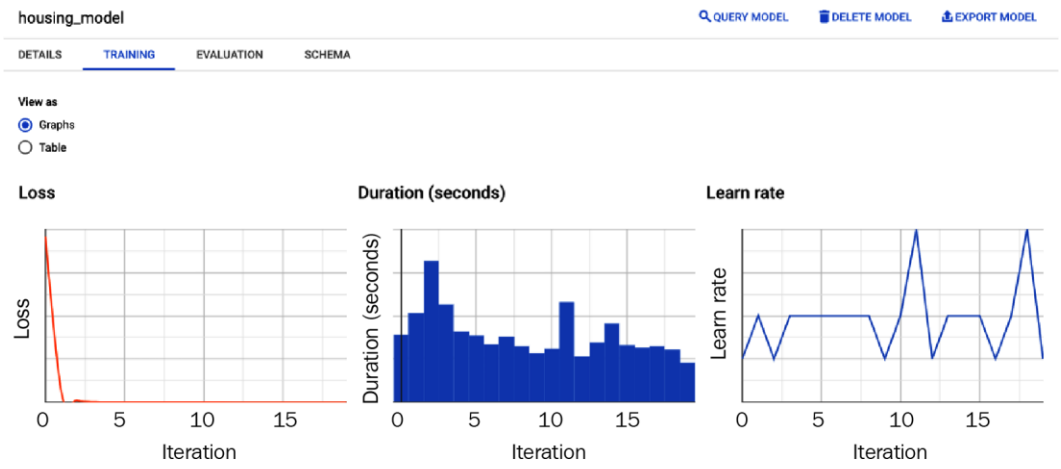
CONTINUE



Filter endpoints

		Endpoint	ID	Models	Region	Last updated	API
☐	✓	stockholm-housing-endpoint	4804426008730009600	1	europe-west4	29 Jan 2021, 15:46:53	Sample request


```
{
  "predictions": [
    {
      "upper_bound": 3090748.75,
      "value": 2471487.5,
      "lower_bound": 2097346.25
    },
    {
      "value": 3782161.75,
      "upper_bound": 4434672,
      "lower_bound": 3270429.75
    }
  ],
  "deployedModelId": "5508817137948426 24"
}
```

housing_model

DETAILS | TRAINING | EVALUATION | SCHEMA

Mean absolute error	2.9599
Mean squared error	16.9703
Mean squared log error	0
Median absolute error	2.1254
R squared	1

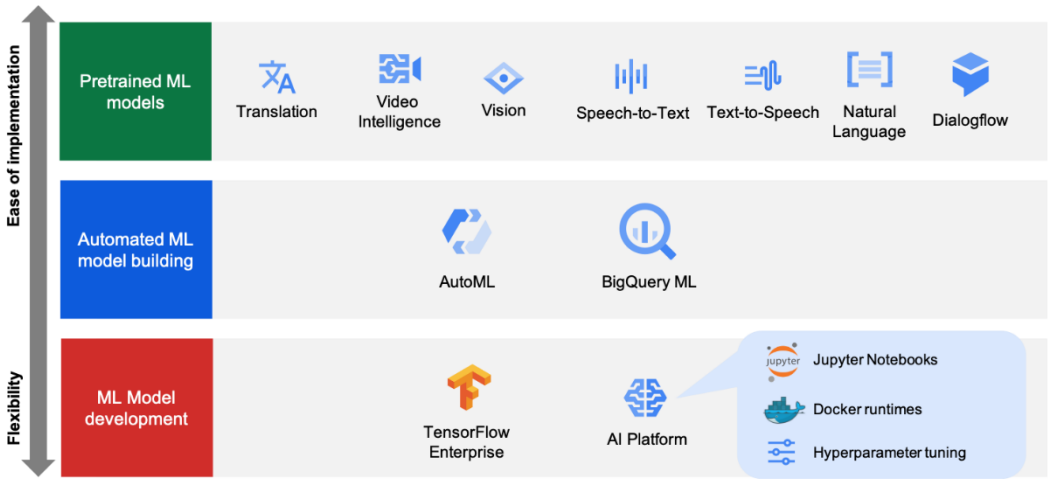
Query results

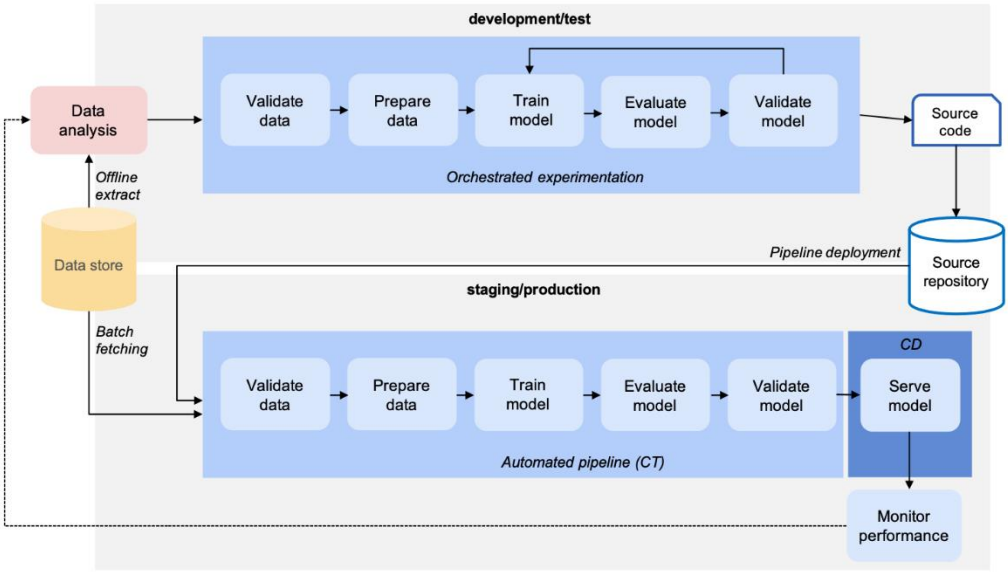
SAVE RESULTS | EXPLORE DATA

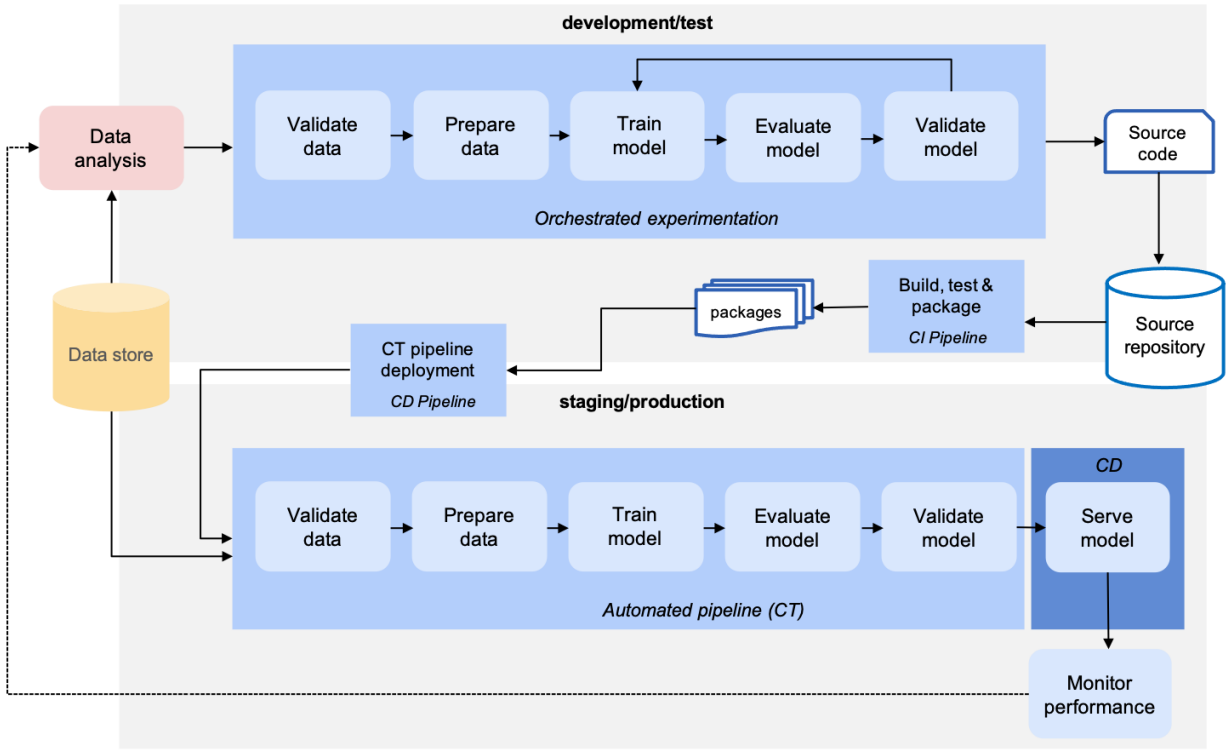
Query complete (0.5 sec elapsed, 1.7 KB processed)

Job information | Results | JSON | Execution details

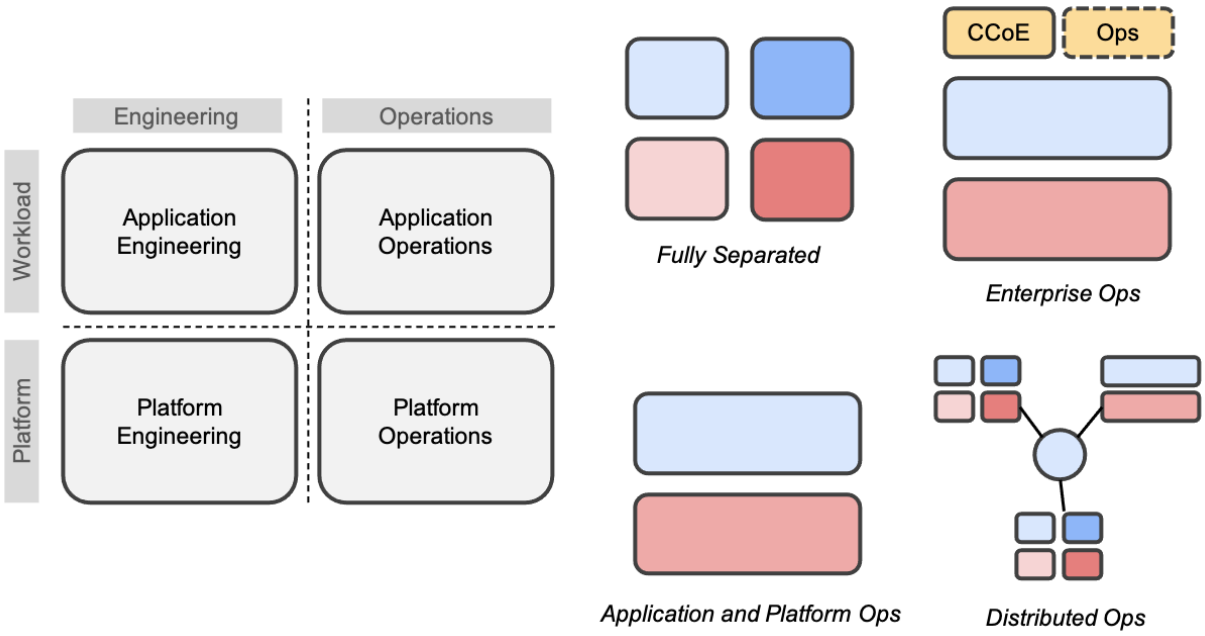
Row	predicted_final_price
1	749432.6180297049
2	1100762.0305350644

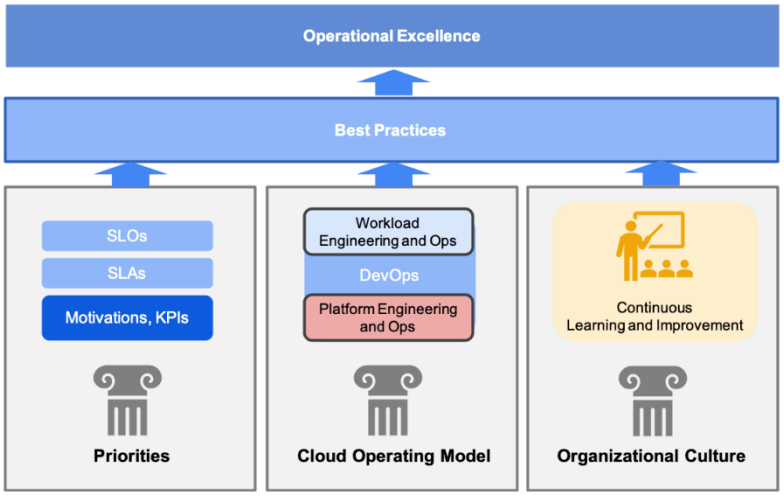


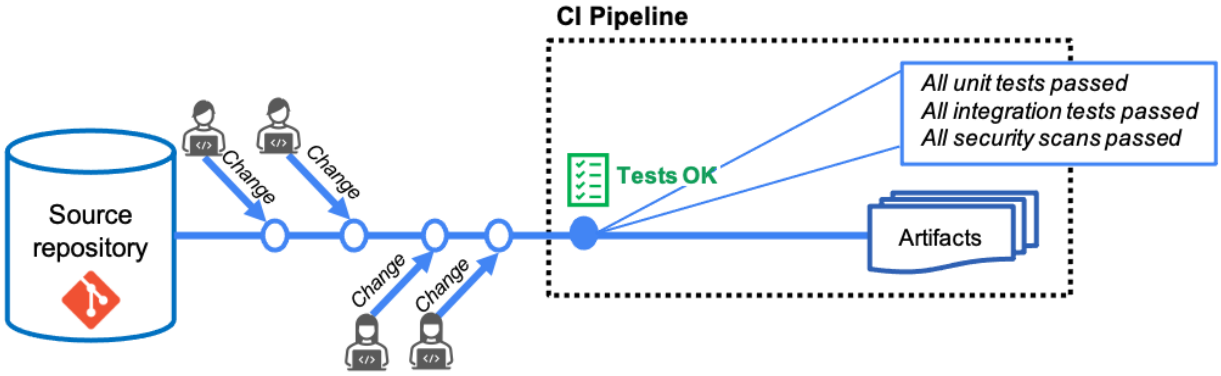

development/test
Data analysis
Validate data
Prepare data
Train model
Evaluate model
Validate model
Orchestrated experimentation
Source code
Offline extract
Data store
Pipeline deployment
Source repository
staging/production
Batch fetching
CD
Validate data
Prepare data
Train model
Evaluate model
Validate model
Serve model
Automated pipeline (CT)
Monitor performance

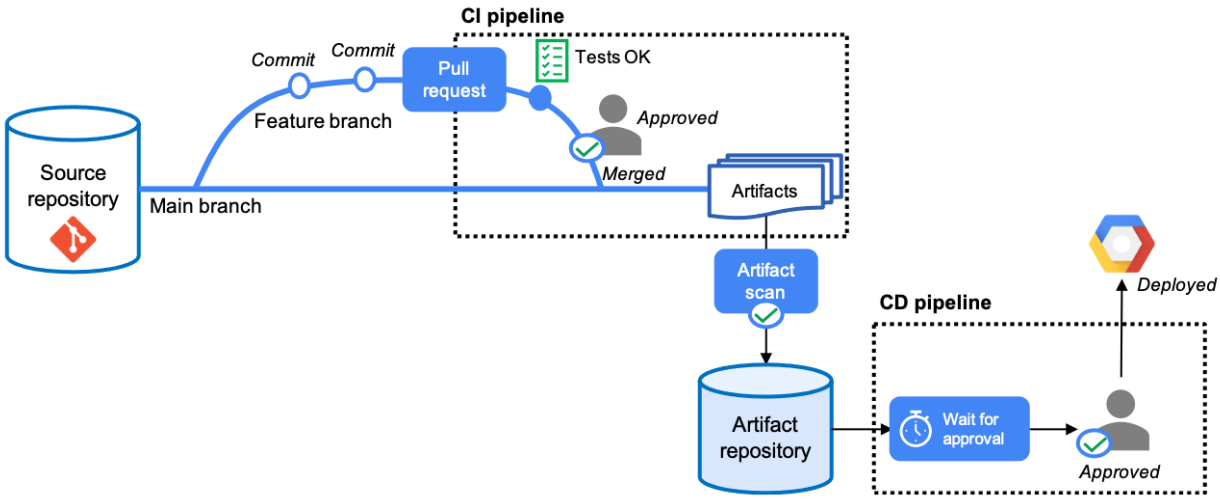

development/test
Data analysis
Validate data
Prepare data
Train model
Evaluate model
Validate model
Orchestrated experimentation
Source code
Data store
packages
Build, test & package
CI Pipeline
Source repository
CT pipeline deployment
CD Pipeline
staging/production
CD
Validate data
Prepare data
Train model
Evaluate model
Validate model
Serve model
Automated pipeline (CT)
Monitor performance

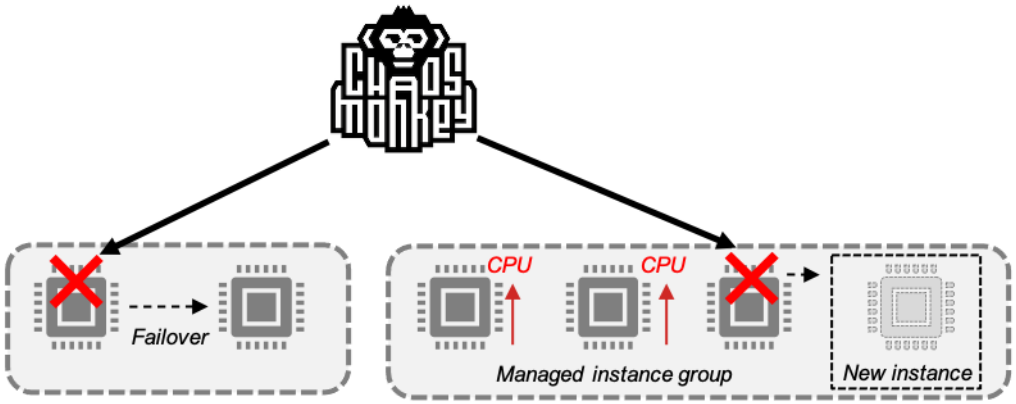
Chapter 12: Achieving Operational Excellence



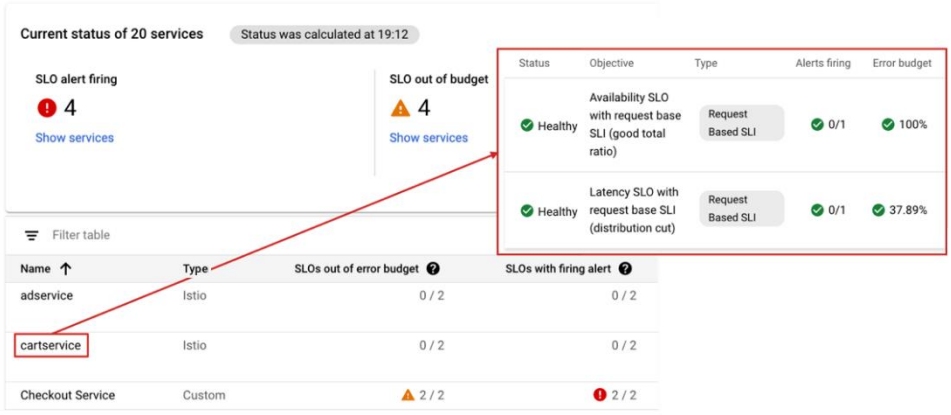





CI pipeline
Commit
Commit
Pull request
Tests OK
Feature branch
Approved
Source repository
Main branch
Merged
Artifacts
Artifact scan
Deployed
CD pipeline
Artifact repository
Wait for approval
Approved


Failover
CPU
CPU
Managed instance group
New instance

Cart Service Dashboard
SEND FEEDBACK
DASHBOARD EDITOR
OFF
TIME
1H
6H
1D
1W
1M
6W
CUSTOM
EDIT
Group By
Filter...
gRPC Calls OK Status - Cart Service
2 1 min interval (rate)
20/s
15/s
0
Feb 10, 2021 18:49
hipstershop.CartService/GetCart 13.88/s
hipstershop.CartService/AddItem 2.56/s
hipstershop.CartService/EmptyCart 0.35/s
18:00
18:15
18:30
18:45
Server Request Count - Cart Service
2 1 min interval (rate)
15.0/s
7.5/s
0
Server Response Lantencies, 99th Percentile - Cart Service
2 99th percentile interval (rate)
1000ms
800ms
600ms
400ms
200ms
0
gRPC Calls Errors - Cart Service
2 1 min interval (rate)
1.0/s
0.8/s
0.6/s
0.4/s
0.2/s
0
No data is available for the selected time frame


Current status of 20 services
Status was calculated at 19:12
SLO alert firing
4
Show services
SLO out of budget
4
Show services
Status
Objective
Type
Alerts firing
Error budget
Healthy
Availability SLO with request base SLI (good total ratio)
Request Based SLI
0/1
100%
Healthy
Latency SLO with request base SLI (distribution cut)
Request Based SLI
0/1
37.89%
Filter table
Name
Type
SLOs out of error budget
SLOs with firing alert
adservice
Istio
0 / 2
0 / 2
cartservice
Istio
0 / 2
0 / 2
Checkout Service
Custom
2 / 2
2 / 2

HOST
http://104.198.133.1

STATUS
RUNNING
100 users
Edit

RPS
22.3

FAILURES
59%

STOP | Reset Stats

Statistics | Charts | Failures | Exceptions | Download Data

Type	Name	# Requests	# Fails	Median (ms)	90%ile (ms)	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	Current RPS	Current Failures/s
GET	/	3907	2110	75	460	199	34	5281	8804	3.4	3.4
GET	/cart	2598	1590	74	3900	1431	34	7245	5258	1.7	1.7
POST	/cart	6080	3774	39	4000	1454	34	18685	6129	3.6	3.6
POST	/cart/checkout	989	628	75	4400	1557	48	7197	2110	0.7	0.7
POST	/cart/empty	647	394	75	450	199	34	2664	7490	0.7	0.7