

DevOps & CI/CD on Google Cloud

Building the CI/CD Pipeline using Cloud Build

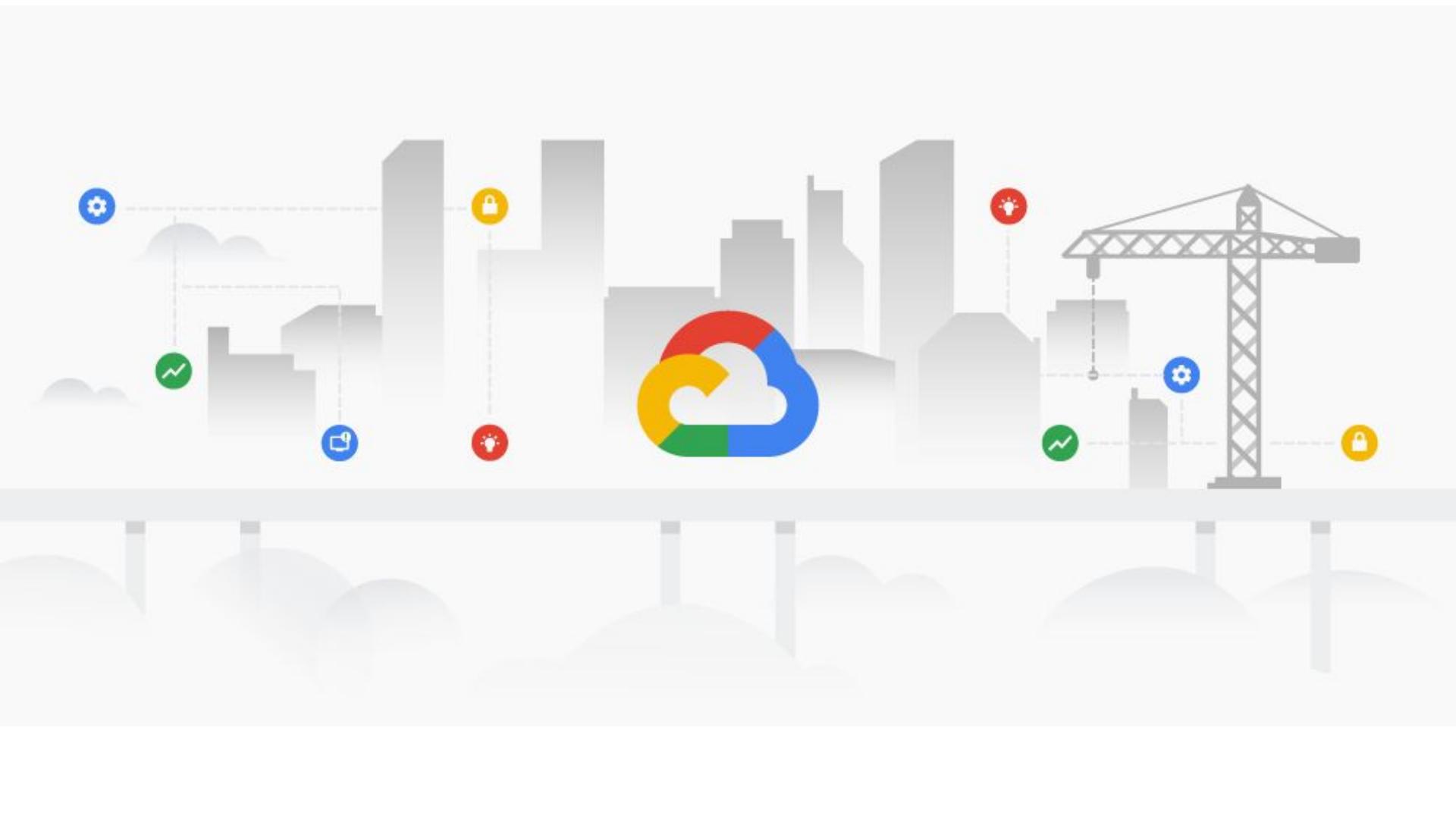
Agenda

- Introduction DevOps
- Continuous Integration (CI)
- Continuous Deployment (CD)
- Demonstration
- Re-cap



Intro





Best-in-class security from device to data center

Secure by design

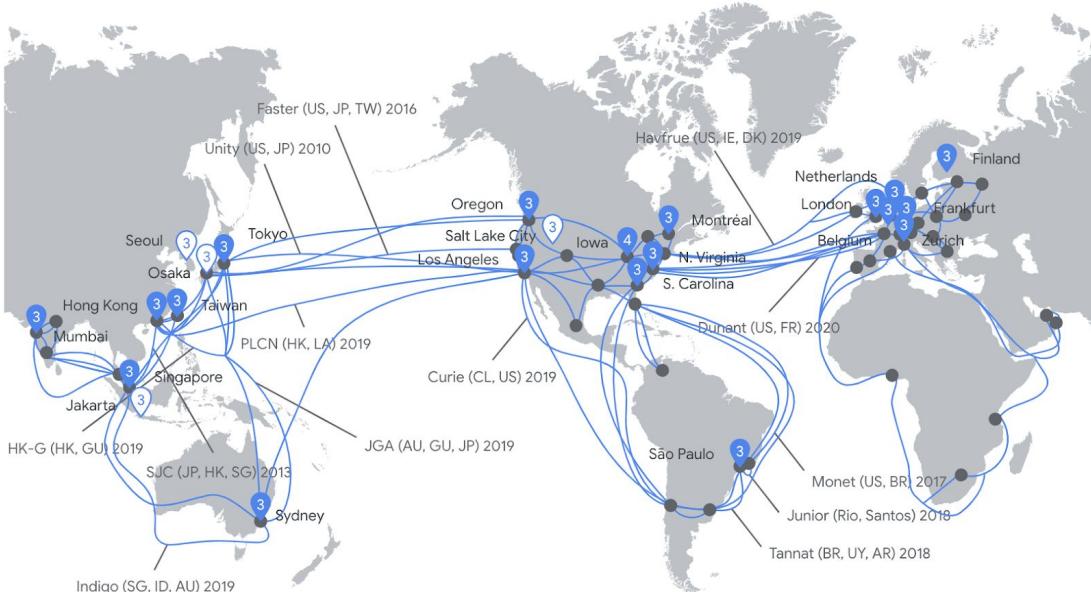
One of the largest privately managed network with 100,000+ miles of fiber optic cable - **2x** of AWS and Azure

Data protection

Redact sensitive data with **90+** predefined detectors, unlike AWS and Azure

Secure by default

Only cloud that encrypts data at rest **by default**



“ Google is a **Leader** in Public Cloud Platform Native Security

The Forrester Wave™: Public Cloud Platform Native Security, Q2 2018

What makes Google Cloud different

Best-in-class Security



Protect systems,
data, and users

Hybrid and Multi-Cloud



Enables choice

Fully Managed No Ops



Ease of use
with serverless

Embedded AI and ML



Intelligence in
everything

Best of Google



Bringing culture of innovation
to customers and partners

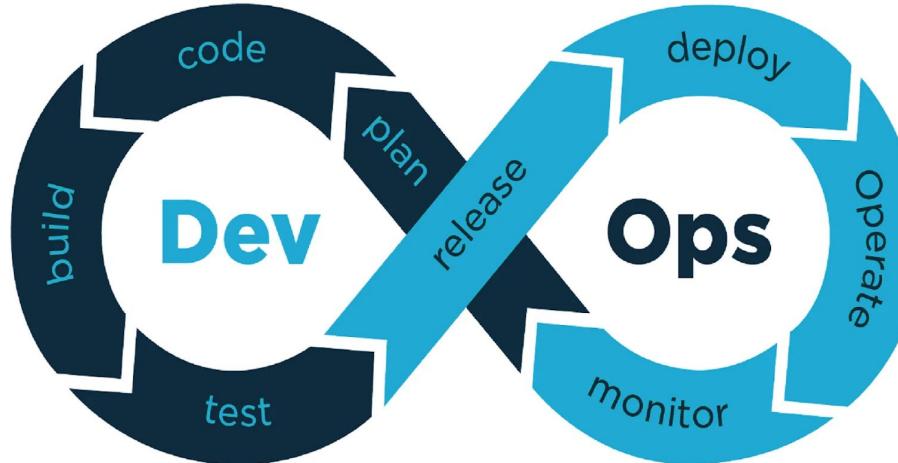


DevOps

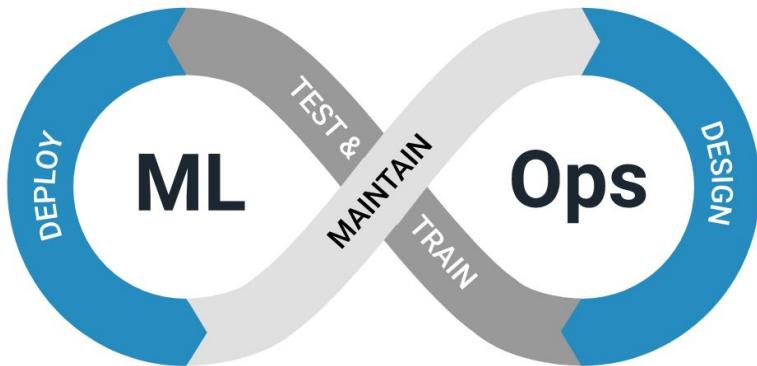
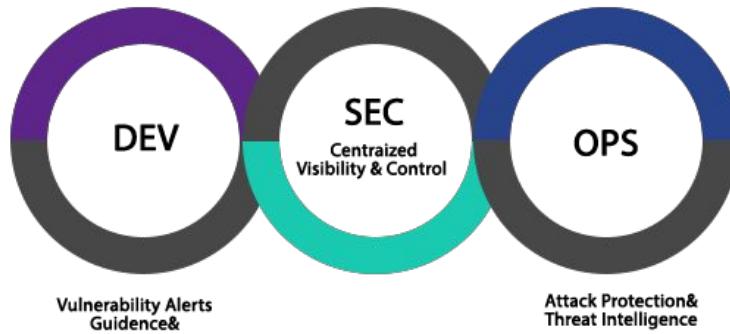
d1

DevOps

- Development and Operations Process

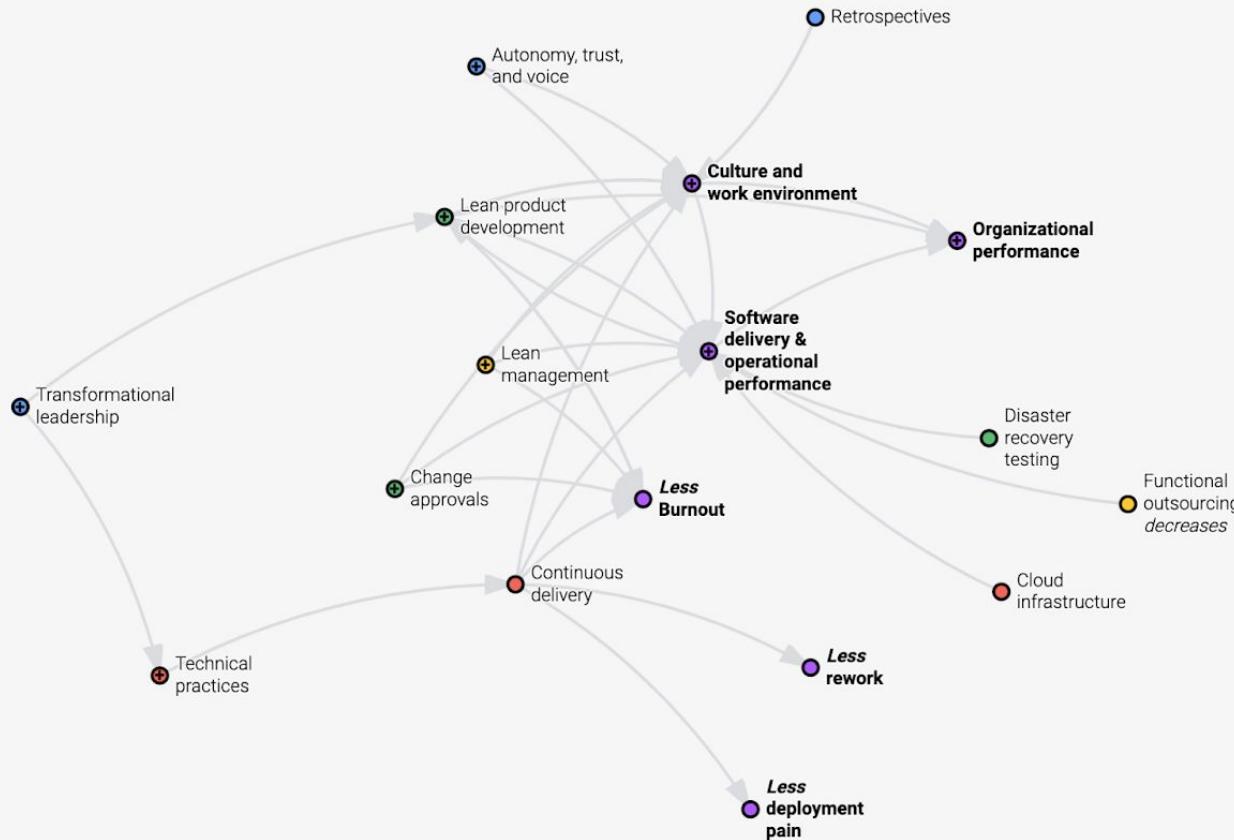


Other



Reference

- <https://crosser.io/blog/posts/2019/november/edge-mlops/>
- <https://www.liatrio.com/blog/gitops-enterprise-application-delivery>
- <https://anchore.com/blog/what-is-devsecops/>



[Explore DORA's research program](#)

DevOps

- Technical DevOps capabilities
- Process capabilities
- Measurement capabilities
- Cultural capabilities

Quick Check

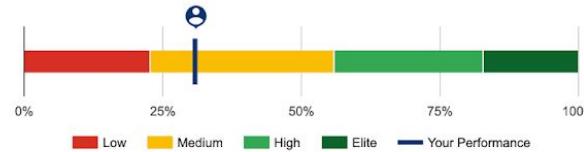
Take the DORA DevOps Quick Check

Your software delivery performance

Your performance:

Medium

You're performing better than 31% of [State of DevOps Survey](#) respondents. ⓘ



[Share results](#)

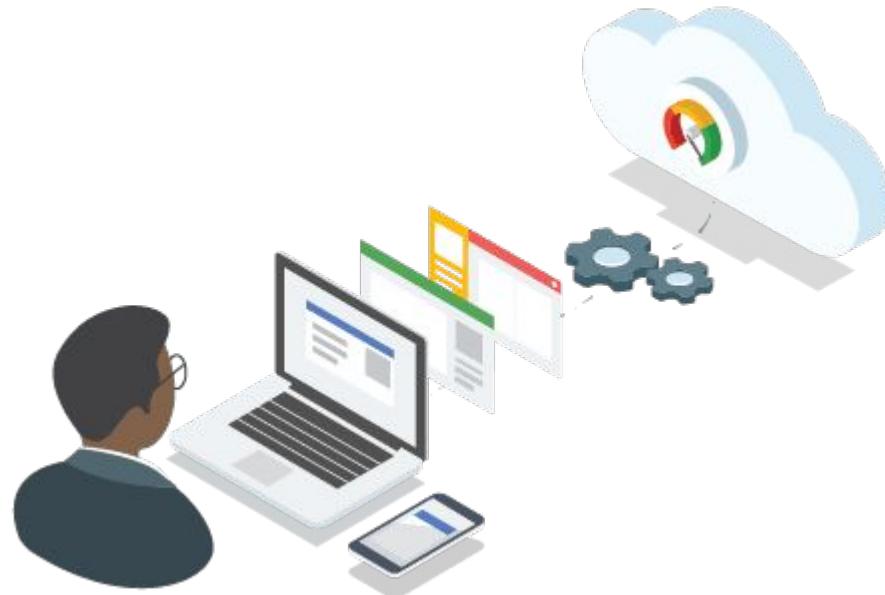
[Start over](#)

[IMPROVEMENT AREAS](#)

PERFORMANCE COMPARISON

MEDIUM PERFORMERS

DevOps CI/CD on Google Cloud



DevOps on Google Cloud

Google Cloud solutions for DevOps

Explore DevOps solutions to ship with greater speed, security, and stability.

Infrastructure as code

Automate repeatable tasks for one machine or millions.

Configuration management

Automate deployment, architecture, and compliance for all your servers.

Secrets management

Encrypt, store, manage, and audit infrastructure and application-level secrets.

Serverless computing

Free your developers to focus on writing code, not managing infrastructure.

Continuous delivery (CD)

End-to-end automation from source to production.

Continuous integration (CI)

Fast feedback on code changes at scale.

Google Cloud Marketplace CI/CD tools

Jenkins



Jenkins is one of the earliest open-source continuous integration servers and remains the most common option in use today.



Spinnaker

Spinnaker is an open-source, multi-cloud, continuous delivery platform that helps you release software changes with high velocity and confidence.

GitLab CI



GitLab CI is a continuous integration tool built into GitLab, a git repository hosting and development tools platform.



Cloud Build

Define custom workflows for building, testing, and deploying across multiple environments.



Artifact Registry

Store, manage, and secure your container images and language packages.



Binary Authorization

Ensure only trusted container images are deployed on Google Kubernetes Engine.



Tekton

Open source framework for creating continuous integration and delivery (CI/CD) systems.



Spinnaker

Open source, multicloud continuous delivery platform.



Operations Suite

Monitor, troubleshoot, and improve infrastructure and app performance.

Before CI/CD

Developer runs all tests, creates all artifacts, and generates all documentation on local machine.

- 1 Run local tests and push code to code repository
- 2 Push deployment artifact to prod

Advantages

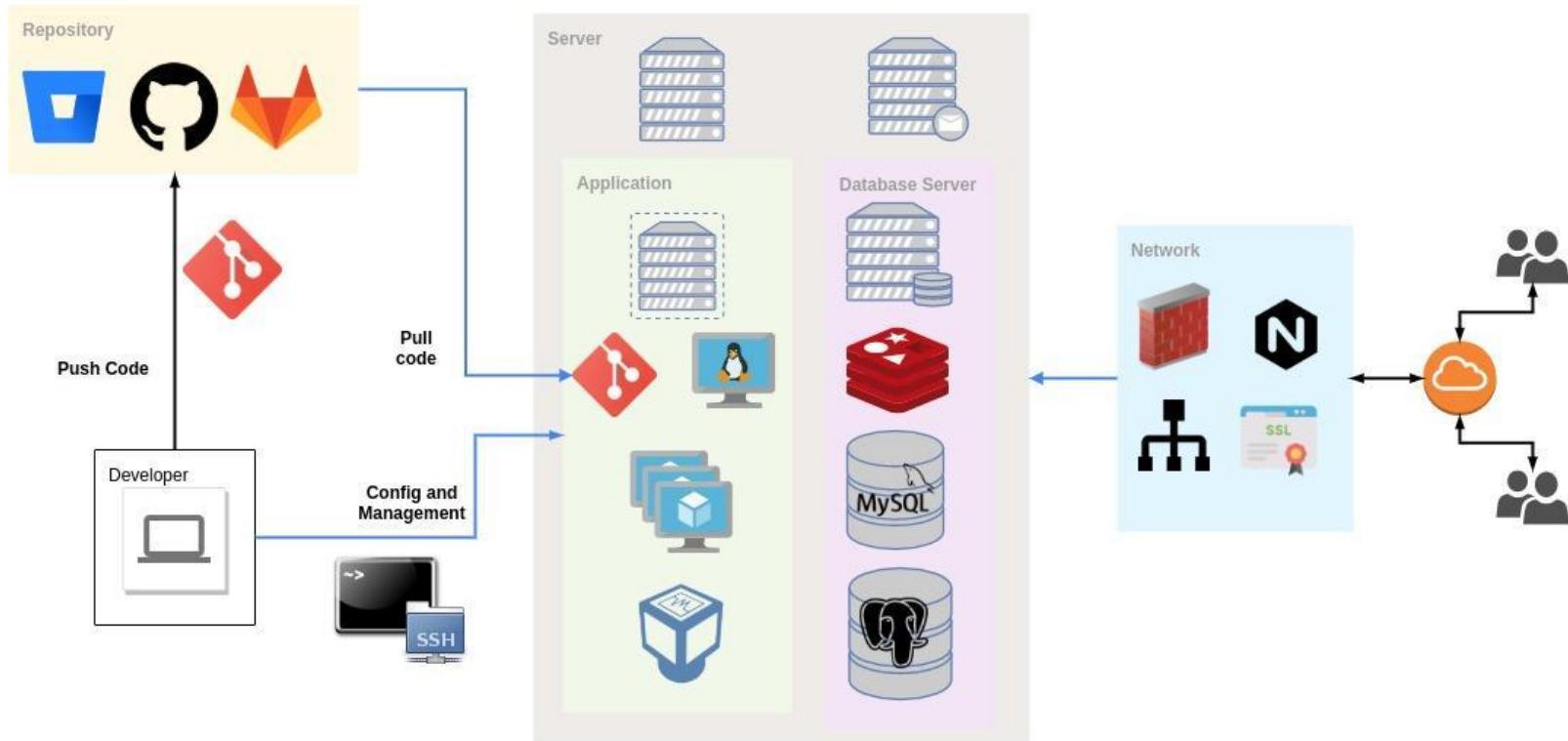
- Simple installation
- Simple deployment of code
- Best for single contributor projects
- Secured within private datacenter

Disadvantages

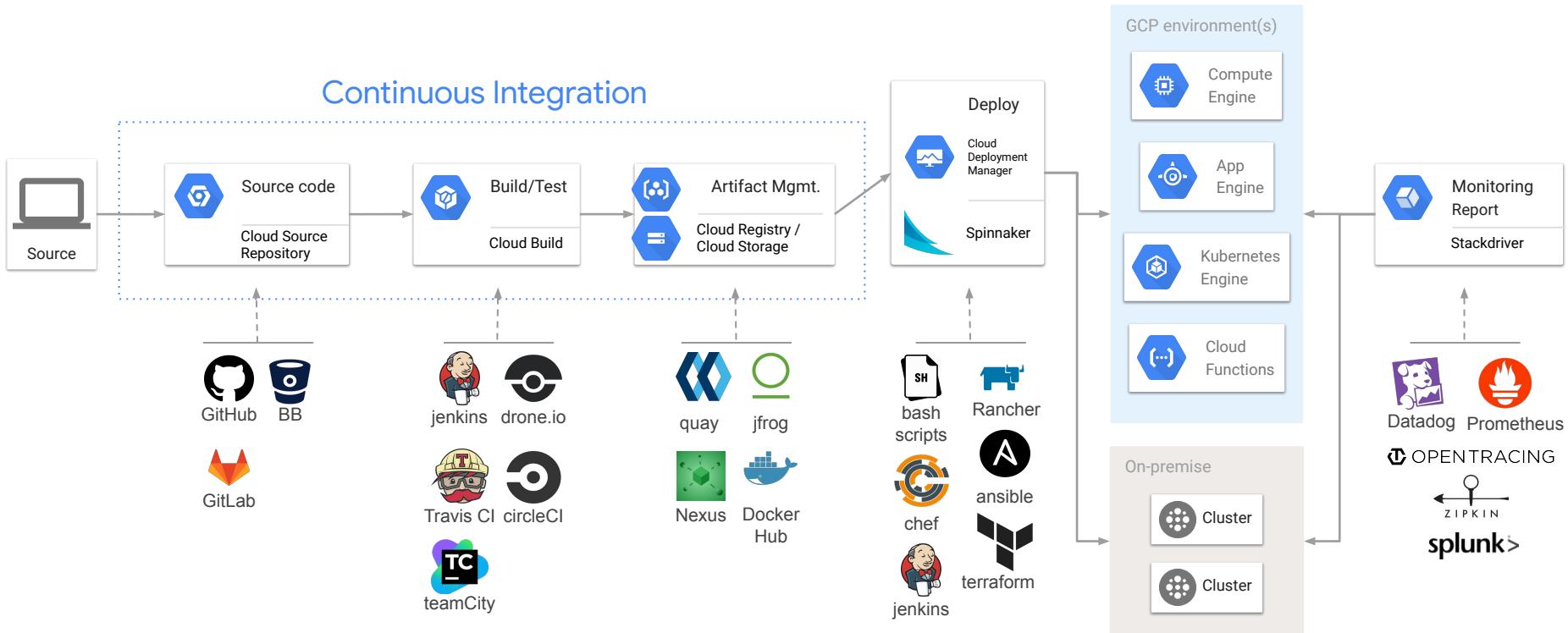
- Slow deployments
- Error prone
- No fail-overs
- Geographically limited to datacenter



Fully Self-Management



Continuous Integration and Delivery on GCP



GCP CI/CD deployments

An example CI/CD deployment strategy on Google Cloud Platform products

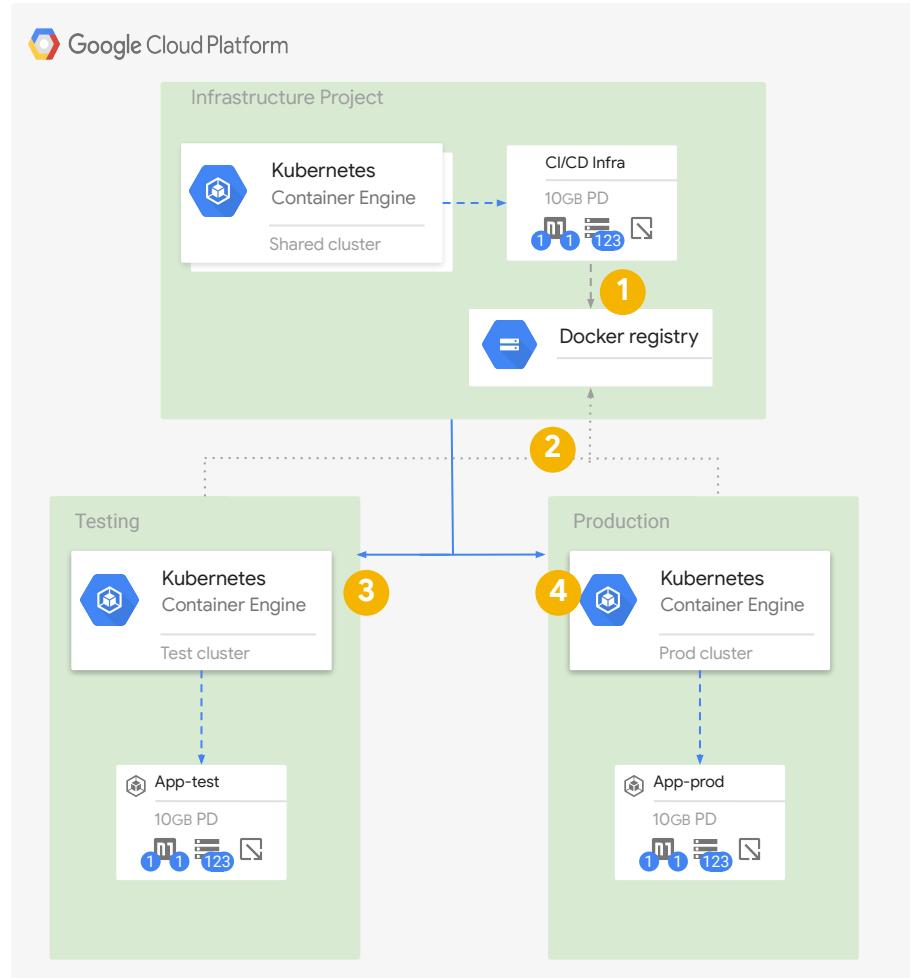
- 1 Push to Docker registry
- 2 Pull from docker registry
- 3 Deploy to testing environment
- 4 Deploy to production environment

Advantages

- Fast deployments
- No single point of failure

Disadvantages

- Additional resource usage



Cloud Source Repositories: Qwik Start

30 minutes

1 Credit



GSP121



Google Cloud Self-Paced Labs

Continuous Integration



Continuous Integration (CI)

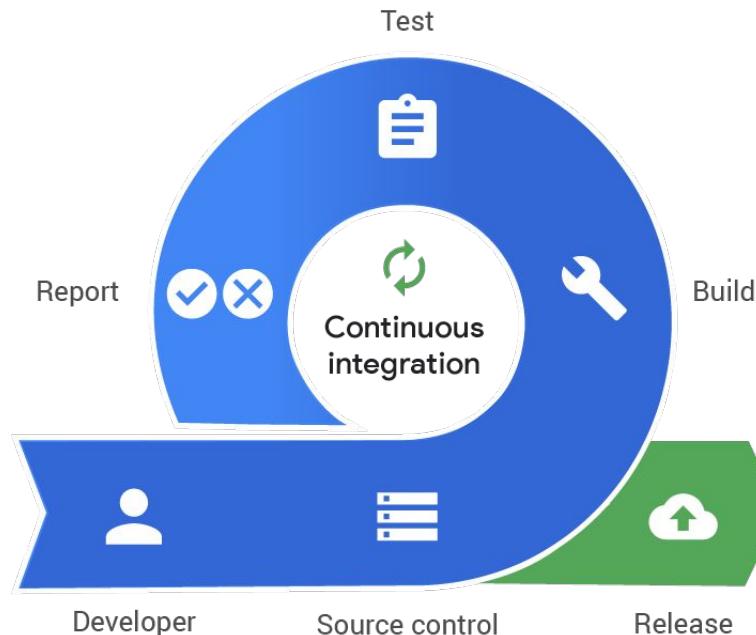
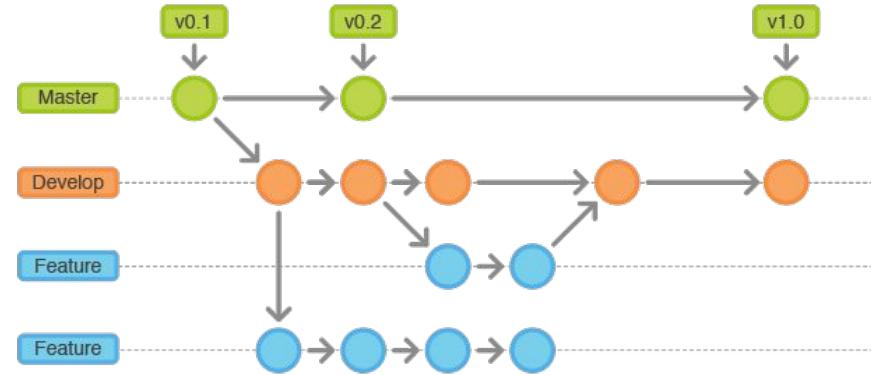


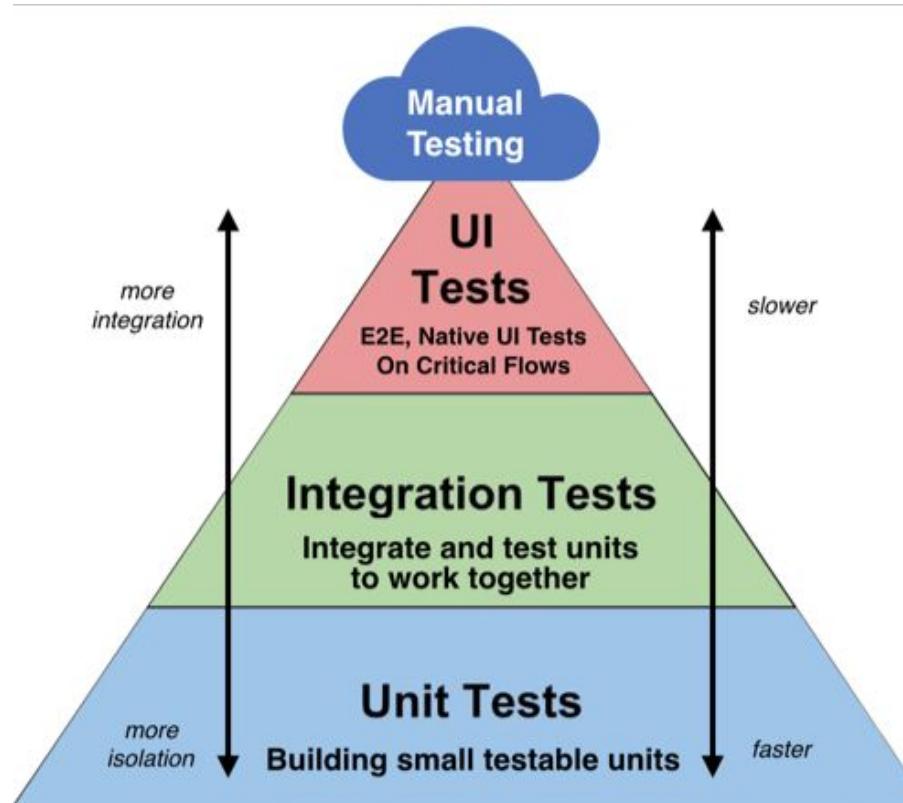
Image from Google

Git / Version Control



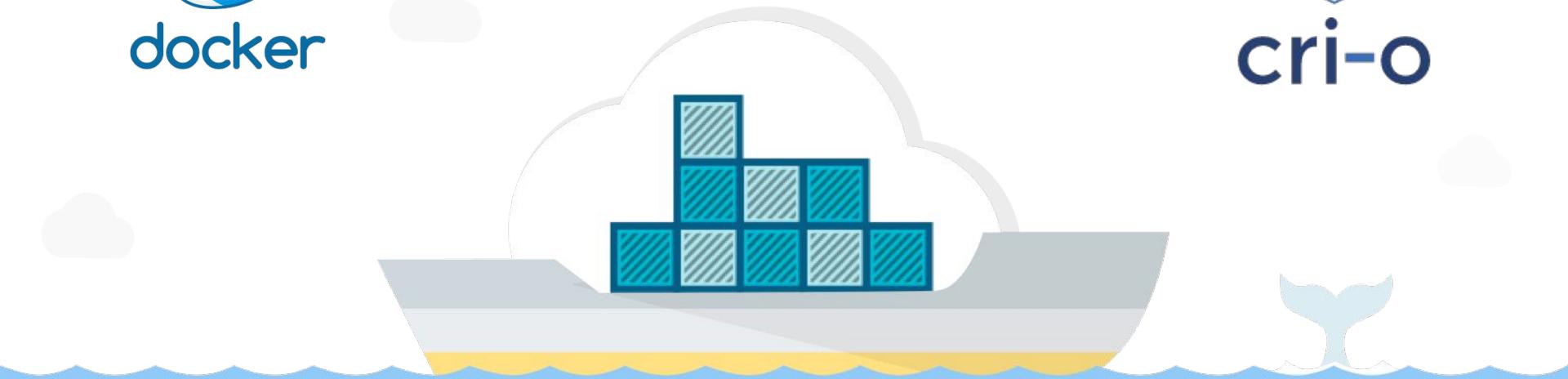
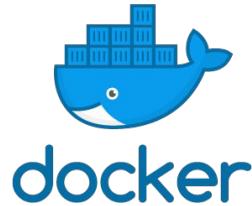
Ref : <https://medium.com/avocoders/github-and-bitbucket-accounts-in-a-same-pc-5f8c67fd89d2>
Ref : <http://bartoz.no-ip.org/archives/3056>

Testing

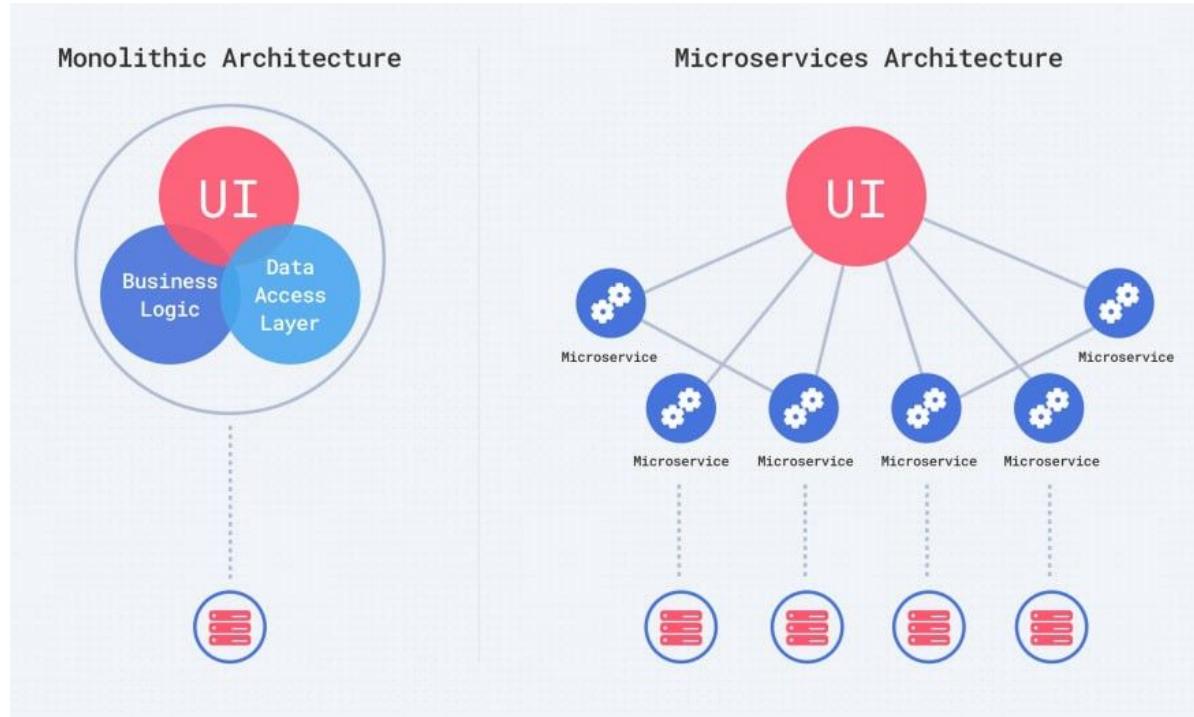


Container

containerd



Software Architecture



Ref: https://dev.to/alex_barashkov/microservices-vs-monolith-architecture-4l1m

Continuous Integration On Google Cloud

GCP Components for Continuous Integration (CI) Process



Cloud Build



Cloud Source
Repositories



Container Registry

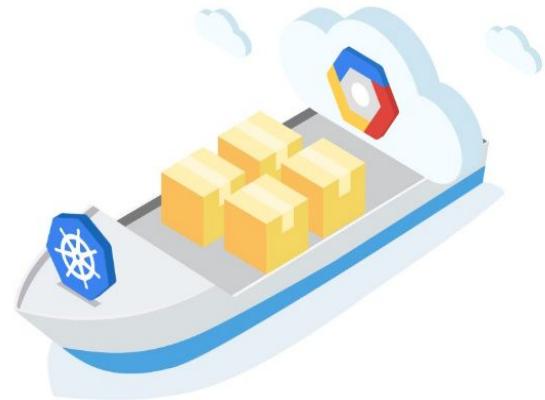
Cloud Build



Cloud Build

Build, test, and deploy on our serverless CI/CD platform.

- ✓ Build software quickly across all programming languages, including Java, Go, Node.js, and more
- ✓ Get complete control over defining custom workflows for building, testing, and deploying
- ✓ Deploy across multiple environments such as VMs, serverless, Kubernetes, or Firebase
- ✓ Perform deep security scans as part of your CI/CD pipeline
- ✓ Package source into containers or non-container artifacts such as Maven, Gradle, Go, or Bazel



Cloud Build



Commit to deploy in minutes



Choose what to build



Extremely fast builds



Automate your deployments



Define your custom workflow



Unparalleled privacy

Cloud Build

Machine type	Virtual CPUs	Quick Start ¹	Price (USD)
n1-standard-1	1	✓	\$0.003 / build-minute. First 120 builds-minutes per day are free. ²
n1-highcpu-8	8		\$0.016 / build-minute
n1-highcpu-32	32		\$0.064 / build-minute

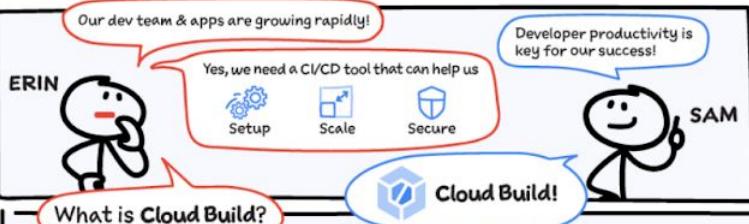


Cloud Build #GCPSketchnote

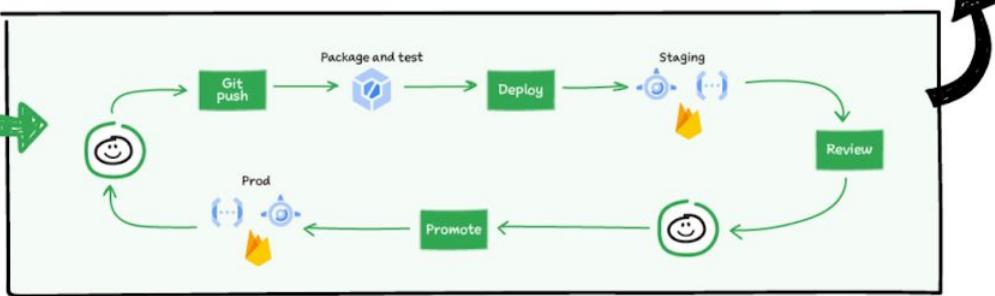
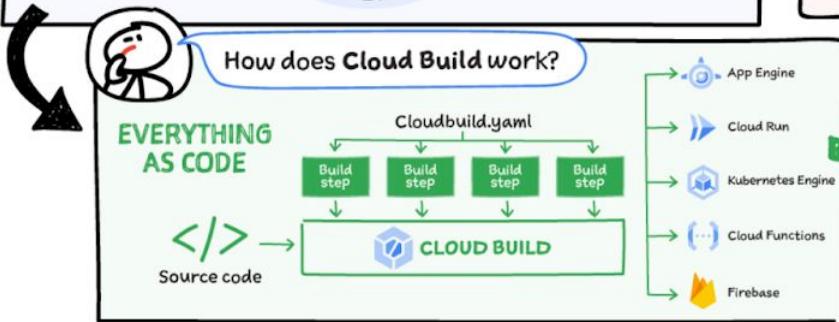
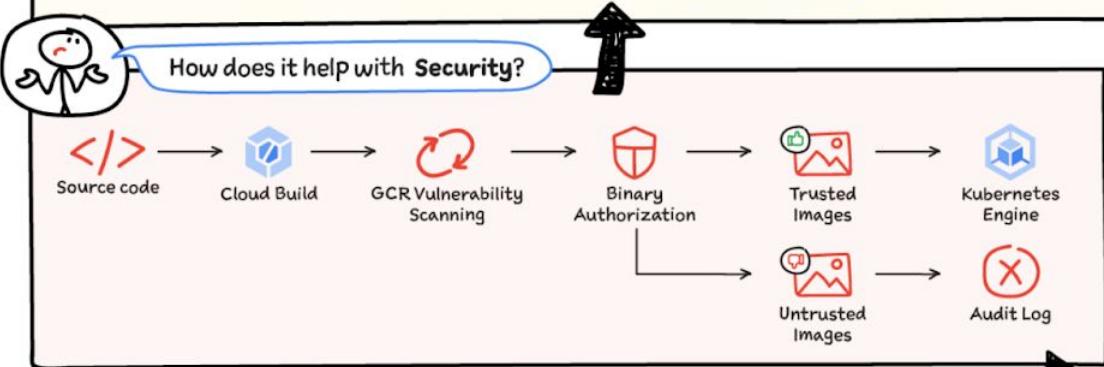
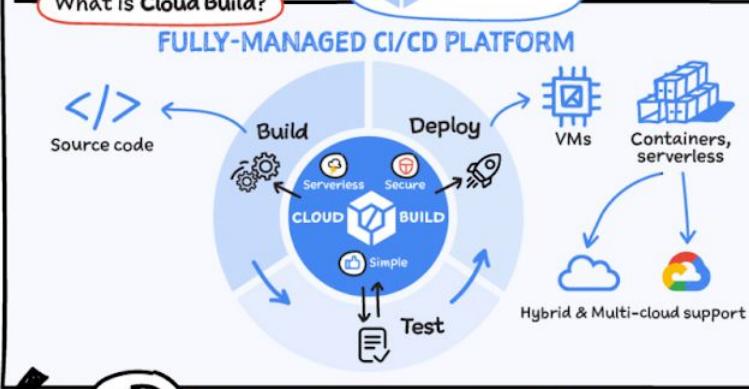
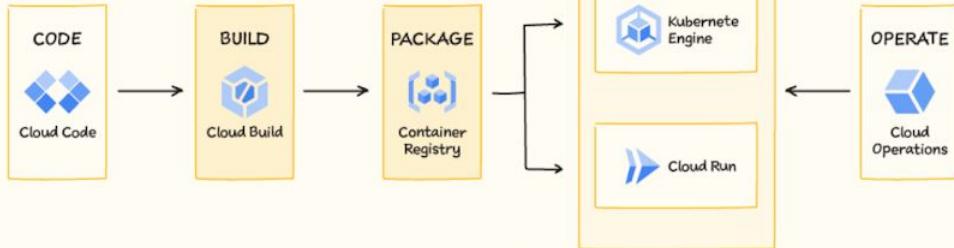
@PVERGADIA THECLOUDGIRL.DEV 11.16.2020



How do I create a cloud native CI/CD pipeline for containers?



CI/CD FOR CONTAINERS WITH GCP



CI/CD Workflow

Source:  [CATH-Team/fastapi-cicd](#) 

[View triggered builds](#)

Name *

fastapi-develop-cloud-run

Must be unique within the project

Description

Event

Repository event that invokes trigger

- Push to a branch
- Push new tag
- Pull request (GitHub App only)

Source

Branch *

^develop\$

Use a regular expression to match to a specific branch [Learn more](#)

Invert Regex

Matches the branch: develop

CI/CD Workflow

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 *

/cloudbuild-develop-cr.yaml

Specify the path to a Cloud Build configuration file in the Git repo [Learn more](#)

Substitution variables

Substitutions allow re-use of a cloudbuild.yaml file with different variable values. [Learn more](#)

Variable

Value

_MY_VAR

Value



[+ ADD VARIABLE](#)

CI/CD Workflow

Successful: 6d3ee472

Started on Jun 12, 2020, 10:42:03 AM

Trigger: fastapi-develop-cloud-run | Source: CATH-Team/fastapi-ci-cd | Branch: develop | Commit: 26e07fc

Steps	Duration	BUILD LOG	EXECUTION DETAILS	BUILD ARTIFACTS	EXPAND	VIEW RAW	
Build Summary 4 Steps	00:01:41						
0: Test -c pip install -r dev-requirements.txt && pytest	00:00:26	<input type="checkbox"/> Wrap lines <input type="checkbox"/> Show newest entries first ↗ ↘		91 Step #0 - "Test": Collecting h11==0.9.0 92 Step #0 - "Test": Downloading h11-0.9.0-py2.py3-none-any.whl (53 kB) 93 Step #0 - "Test": Collecting httptools==0.1.1 94 Step #0 - "Test": Downloading httptools-0.1.1-cp36-cp36m-manylinux1_x86_64.whl (216 kB) 95 Step #0 - "Test": Collecting idna==2.9 96 Step #0 - "Test": Downloading idna-2.9-py2.py3-none-any.whl (58 kB) 97 Step #0 - "Test": Collecting importlib-metadata==1.6.1 98 Step #0 - "Test": Downloading importlib_metadata-1.6.1-py2.py3-none-any.whl (31 kB) 99 Step #1 - "Build": Fetched 8355 kB in 4s (2058 kB/s) 100 Step #0 - "Test": Collecting more-itertools==8.3.0 101 Step #0 - "Test": Downloading more_itertools-8.3.0-py3-none-any.whl (44 kB) 102 Step #0 - "Test": Collecting packaging==20.4 103 Step #0 - "Test": Downloading packaging-20.4-py2.py3-none-any.whl (37 kB) 104 Step #0 - "Test": Collecting pluggy==0.13.1 105 Step #0 - "Test": Downloading pluggy-0.13.1-py2.py3-none-any.whl (18 kB) 106 Step #0 - "Test": Collecting py==1.8.1 107 Step #0 - "Test": Downloading py-1.8.1-py2.py3-none-any.whl (83 kB) 108 Step #0 - "Test": Collecting pydantic==1.5.1 109 Step #0 - "Test": Downloading pydantic-1.5.1-cp36-cp36m-manylinux2014_x86_64.whl (7.4 MB) 110 Step #0 - "Test": Collecting pyparsing==2.4.7 111 Step #0 - "Test": Downloading pyparsing-2.4.7-py2.py3-none-any.whl (67 kB) 112 Step #1 - "Build": Reading package lists... 113 Step #0 - "Test": Collecting pytest==5.4.3 114 Step #0 - "Test": Downloading pytest-5.4.3-py3-none-any.whl (248 kB) 115 Step #0 - "Test": Collecting requests==2.23.0 116 Step #0 - "Test": Downloading requests-2.23.0-py2.py3-none-any.whl (58 kB)			
1: Build build-t gcr.io/cath-ci-cd/fastapi-ci-cd:develop-26e07fc .	00:00:41						
2: Push push gcr.io/cath-ci-cd/fastapi-ci-cd:develop-26e07fc	00:00:14						
3: Deploy to Cloud Run run deploy fastapi-develop-ci-cd --image gcr.io/cath-ci-cd/f...	00:00:36						

```
# [START cloudbuild]
steps:
  # This step runs the tests on the app
  - name: 'golang'
    id: Integration Test
    args: ['go','test','-v']

    # This step builds the container image.
    # The PROJECT_ID and SHORT_SHA $REPO_NAME $BRANCH_NAME variables are automatically
    - name: 'gcr.io/cloud-builders/docker'
      id: Build Image
      args:
        - 'build'
        - '-t'
        - 'gcr.io/$PROJECT_ID/$REPO_NAME:$BRANCH_NAME-$SHORT_SHA'
        - '.'
      # waitFor: ['-']

    # This step pushes the image to Container Registry
    # The PROJECT_ID and SHORT_SHA $REPO_NAME $BRANCH_NAME variables are automatically
    # replaced by Cloud Build.
    - name: 'gcr.io/cloud-builders/docker'
      id: Push Image
      args:
        - 'push'
        - 'gcr.io/$PROJECT_ID/$REPO_NAME:$BRANCH_NAME-$SHORT_SHA'

    # # Deploy image to Cloud Run Managed Google Cloud Deploy
    - name: 'gcr.io/cloud-builders/gcloud'
      id : Deploy Image to Cloud Run for Anthos
      args:
        - 'run'
        - 'deploy'
        - 'test-devops'
        - '--image'
        - 'gcr.io/$PROJECT_ID/$REPO_NAME:$BRANCH_NAME-$SHORT_SHA'
        - '--region'
        - 'asia-southeast1'
        - '--allow-unauthenticated'
        - '--platform'
        - 'managed'
```

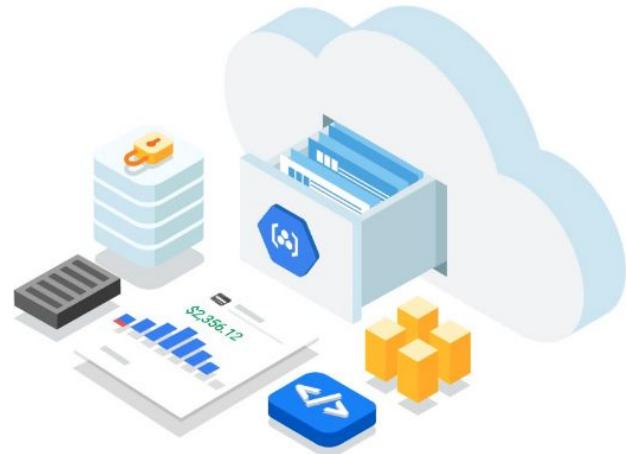
Container Registry



Container Registry

More than a private Docker repository

Container Registry is a single place for your team to manage Docker images, perform vulnerability analysis, and decide who can access what with fine-grained access control. Existing CI/CD integrations let you set up fully automated Docker pipelines to get fast feedback.



Container Registry



Container Registry



Secure, private Docker registry



Build and deploy automatically



In-depth vulnerability scanning



Lock down risky images



Native Docker support



Fast, high-availability access

Deploy a Hugo Website with Cloud Build and Firebase Pipeline

1 hour

1 Credit

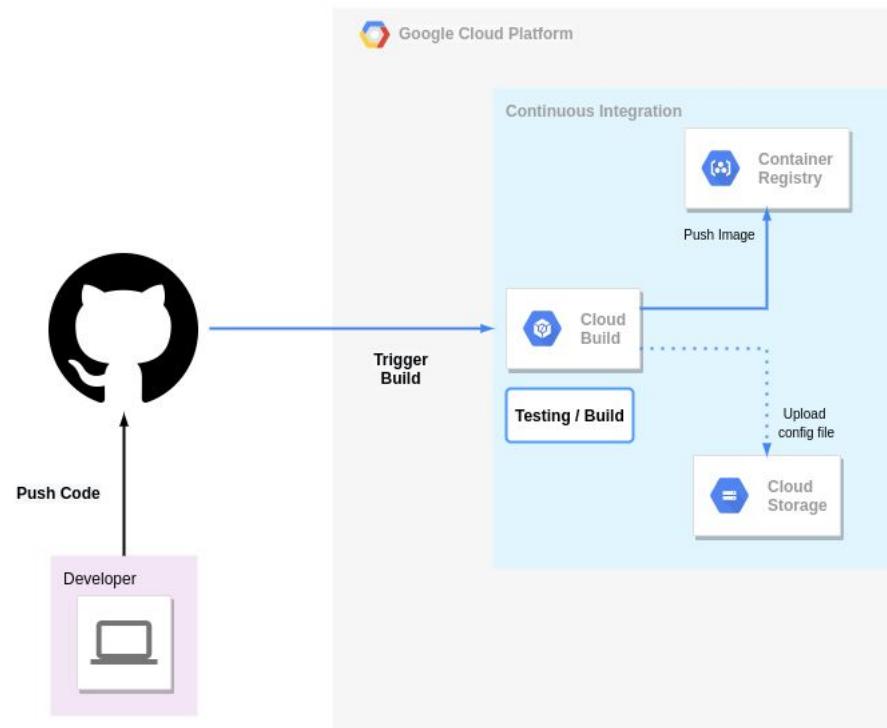


GSP747

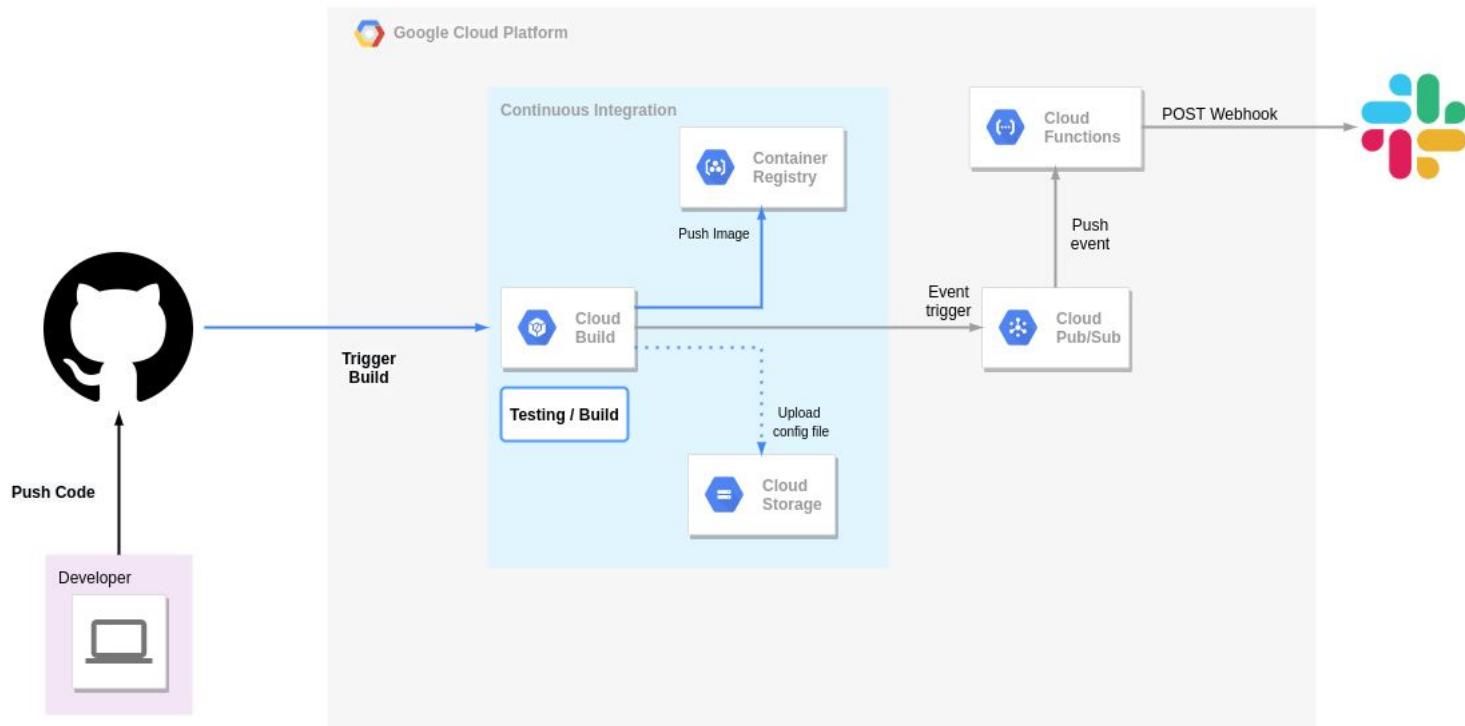


Google Cloud Self-Paced Labs

CI Workflow



CI Workflow

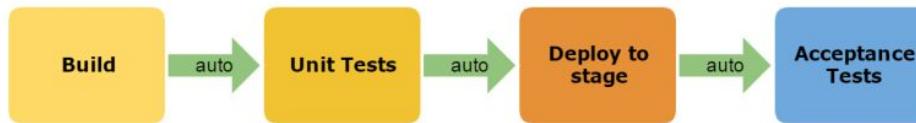


Continuous Deployment

d3

DevOps

Continuous Integration



Continuous Delivery



Continuous Deployment



Compute Instance



App Engine



Compute Engine



Container-Optimized OS



Kubernetes Engine

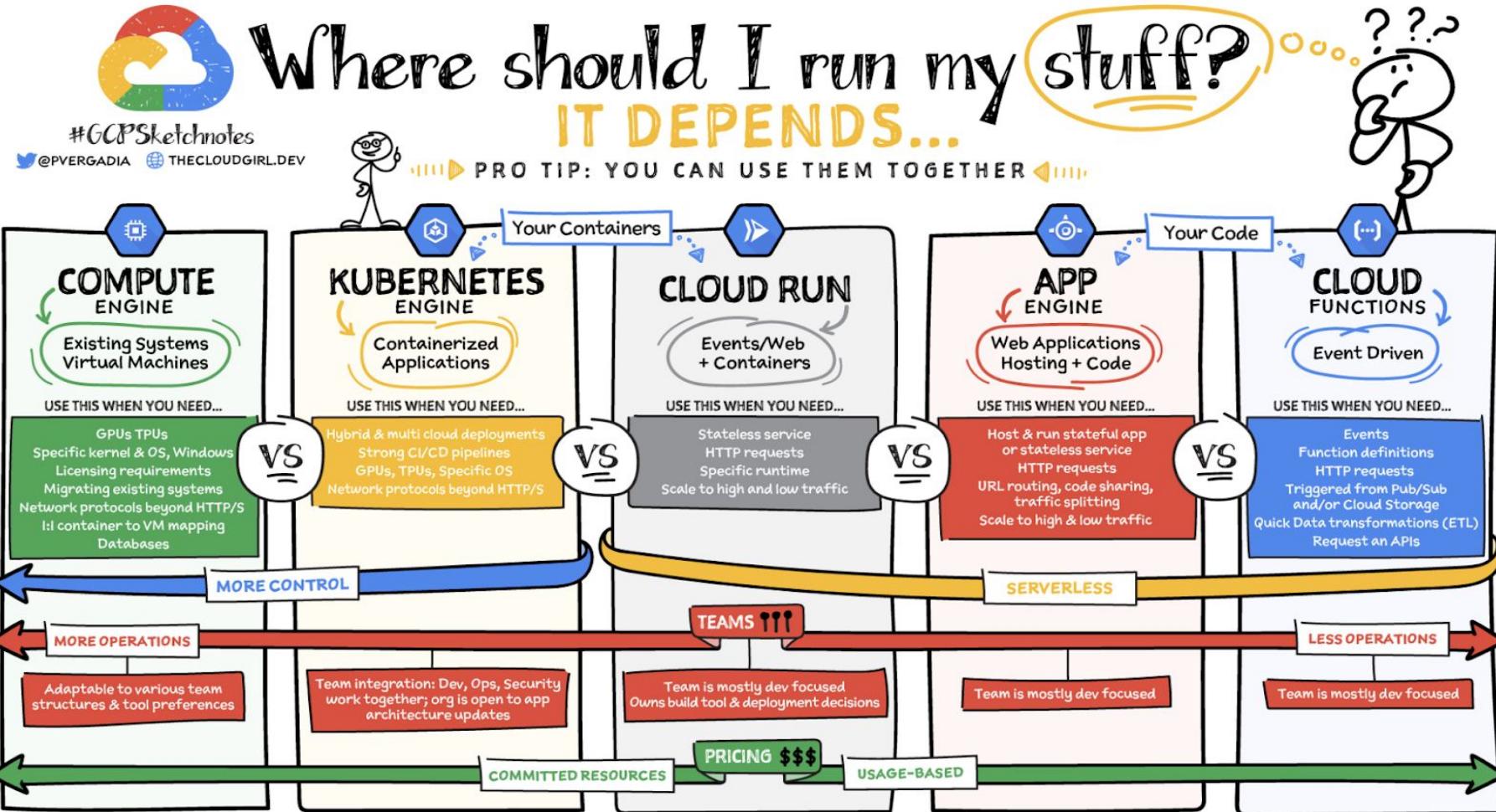


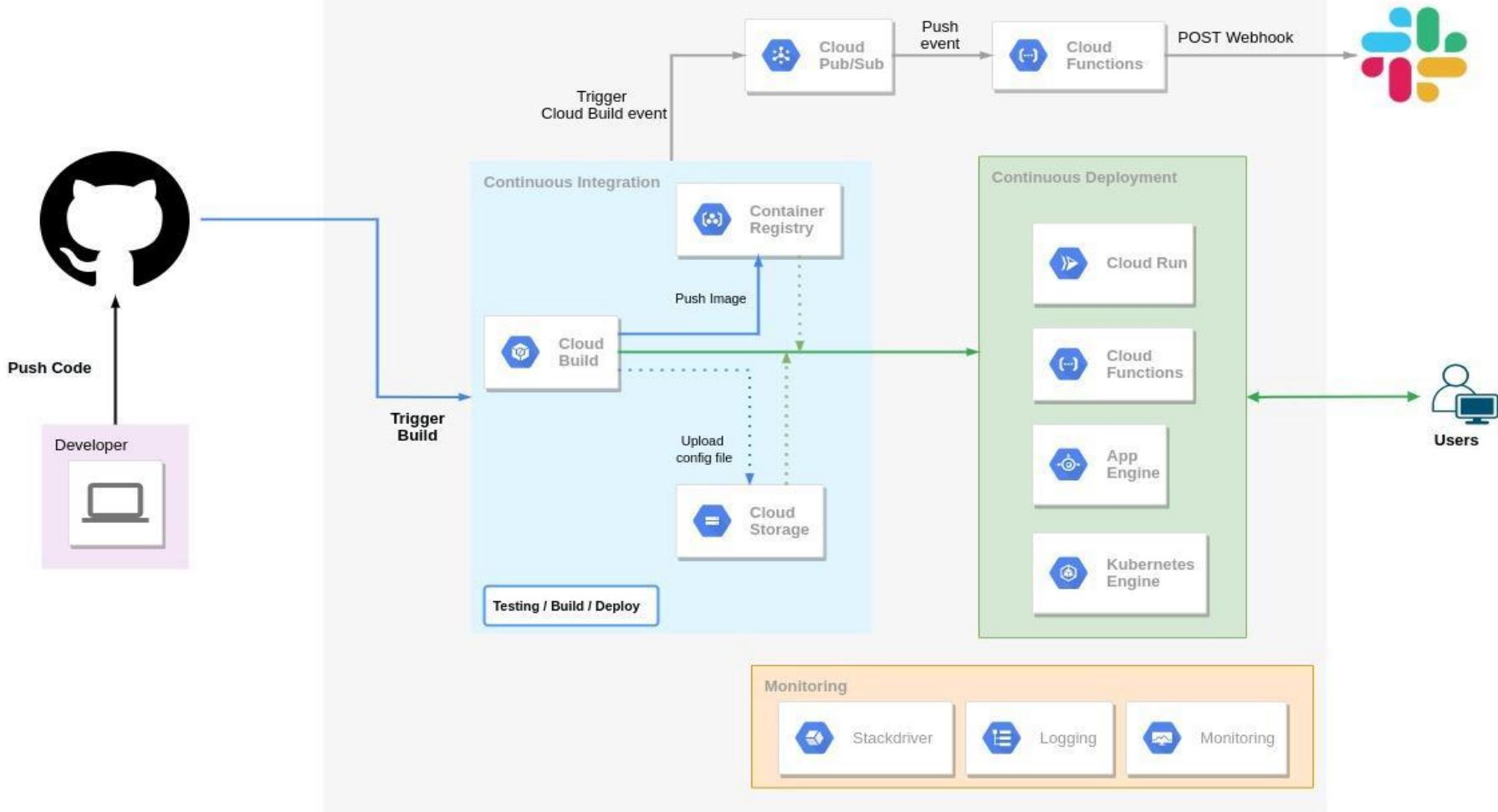
Cloud Run



Cloud Functions

Where should I run my stuff?





Monitoring



Stackdriver



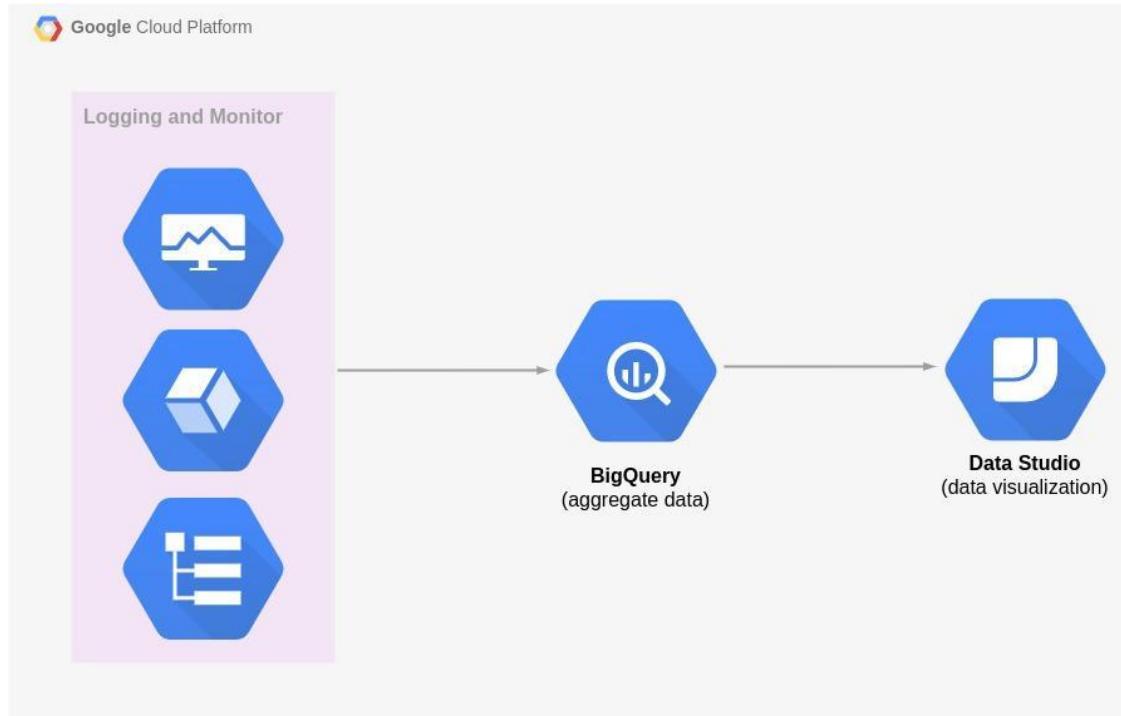
Monitoring



Logging



Monitoring



Monitoring

Google BigQuery

COMPOSE QUERY

Query History
Job History

Filter by ID or label

CamillaAmi Project

- cloudflare_logs
- cloudflare_logs_17415

Public Datasets

- bigrquery-public-data:hacker_news
- bigrquery-public-data:moais_gmod
- bigrquery-public-data:samples
- bigrquery-public-data:usa_names
- gdelt-bq:hatitrustbooks
- gdelt-bq:internetarchivebooks
- lookerdata:cdd
- nyc-tlc:green
- nyc-tlc:yellow

New Query ?

```

1 ↵ SELECT
2   EdgeResponseStatus,
3   ClientIP,
4   ClientRequestURI
5   FROM `cloudflare_logs_17415.cloudflare_ele_17415`
6   WHERE
7     EdgeResponseStatus = 404
8   LIMIT
9   1000
10
    
```

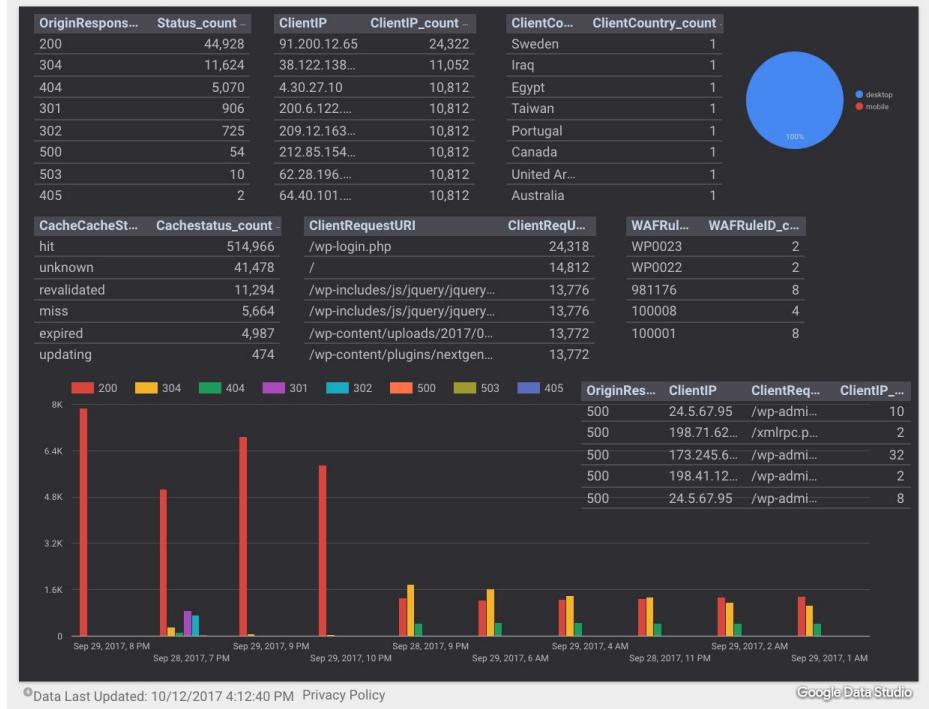
SQL

RUN QUERY Save Query Save View Format Query Show Options Query complete (1.6s elapsed, 5.09 MB processed) ?

Results Explanation Job Information Download as CSV Download as JSON Save as Table Save to Google Sheets

Row	EdgeResponseStatus	ClientIP	ClientRequestURI
1	404	24.5.67.95	/favicon.ico
2	404	46.161.9.4	/wp-content/plugins/cherry-plugin/admin/js/cherry-admin-plugin.js
3	404	95.85.37.46	/robots.txt
4	404	157.55.39.10	/robots.txt
5	404	157.55.39.10	/robots.txt

Table JSON First < Prev Rows 1 - 5 of 299 Next > Last



Ref : <https://blog.cloudflare.com/using-google-cloud-platform-to-analyze-cloudflare-logs/>

Re-cap

- DevOps
- Continuous Integration (CI)



Container Registry



Cloud Build



Cloud Source
Repositories

- Continuous Deployment (CD)



Cloud Build

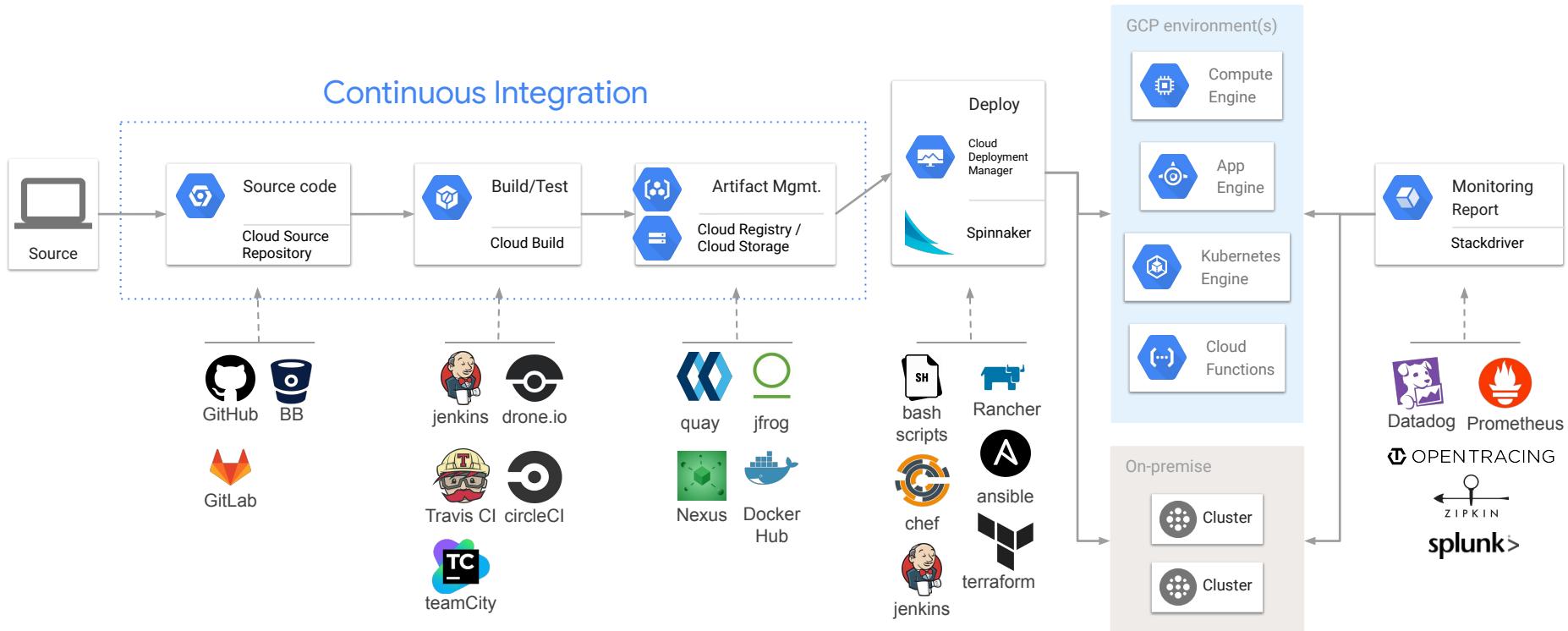


Kubernetes Engine



Cloud Run

Continuous Integration and Delivery on GCP



Continuous Delivery with Jenkins in Kubernetes Engine

1 hour 15 minutes

5 Credits



GSP051



Google Cloud Self-Paced Labs