Grand Valley State University
www.gvsu.edu

Cloud Computing
Cloud Build / Cloud Run

CIS437
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Adapted from Google Cloud Computing Foundations, Overview of Cloud Computing (Wufka & Canonico)

LET'S BUILD!

RUN!!!
RUN FOR YOUR LIVES!!!

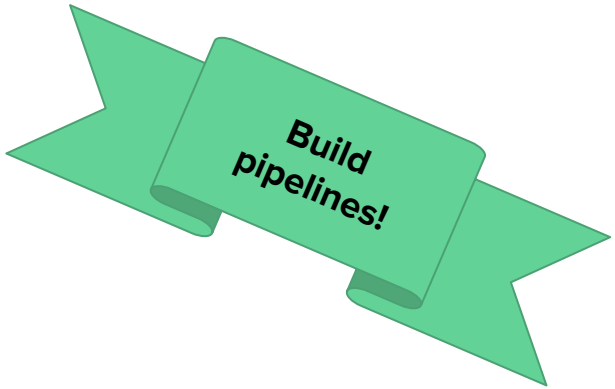
A bit of an interim step

These two resources seem to have very few "official" documentation resources outside of Google's doc pages

- Yet, they make up a good portion of things behind the scenes
- Let's talk about them!

Cloud Build / Cloud Run

Analogue: AWS CodeBuild / AWS App Runner



Cloud Build:

- Build
- Test
- Deploy

Cloud Run:

- Run <previously built> application via containers
  - Frontend/backend
  - LLMs
  - Workloads
  - ...

Cloud Build

Extensive overview:
https://medium.com/@williamwarley/guide-for-gcp-cloud-build-c2ea264a7f97

"Fully managed CI/CD platform"

- Integrates with all the Google Cloud services
- Essentially, setup a push and auto-build/test pipeline via config (YAML) files

```
Add to cloudbuild.yaml in Automate:
options:
  logging: CLOUD_LOGGING_ONLY
```

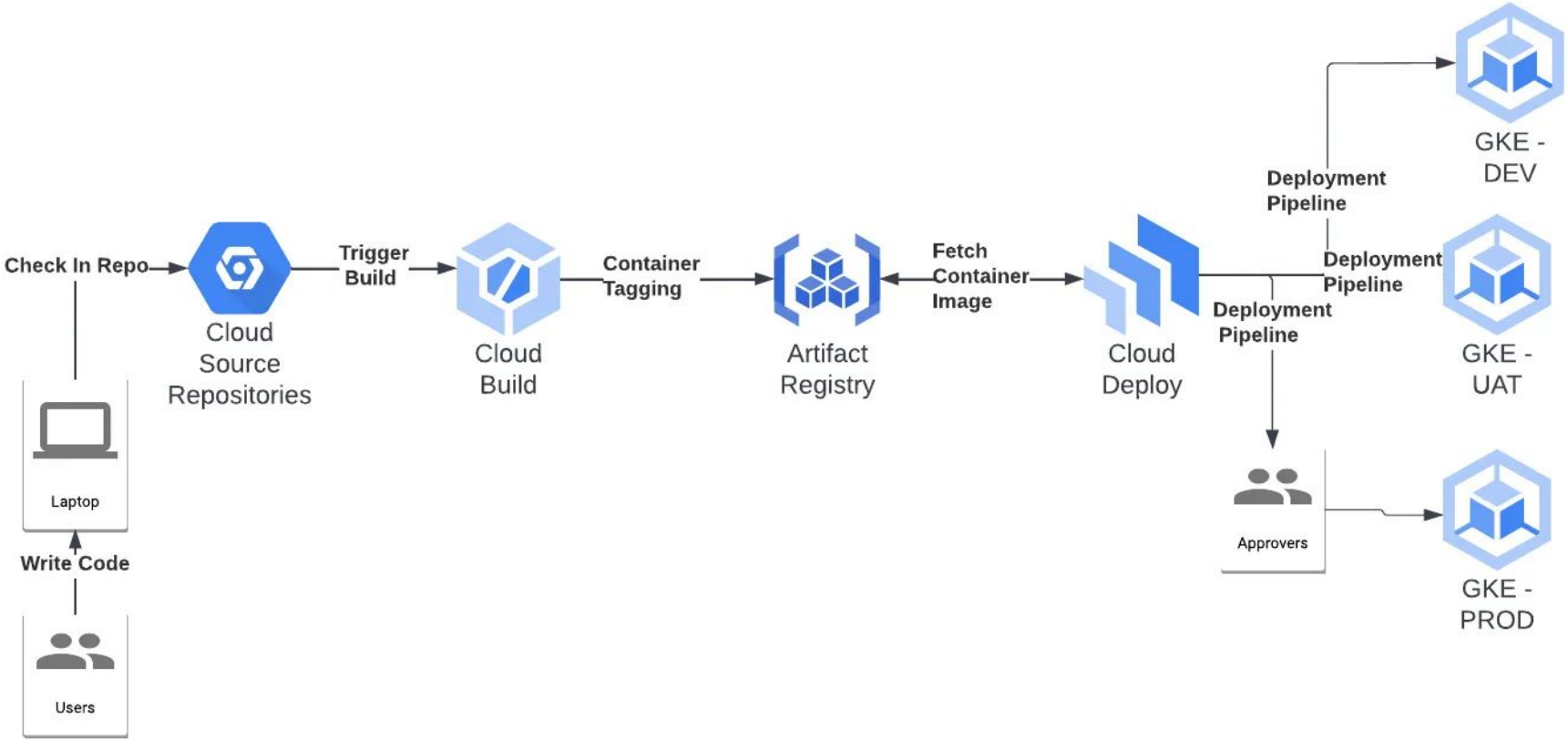
Cloud Build

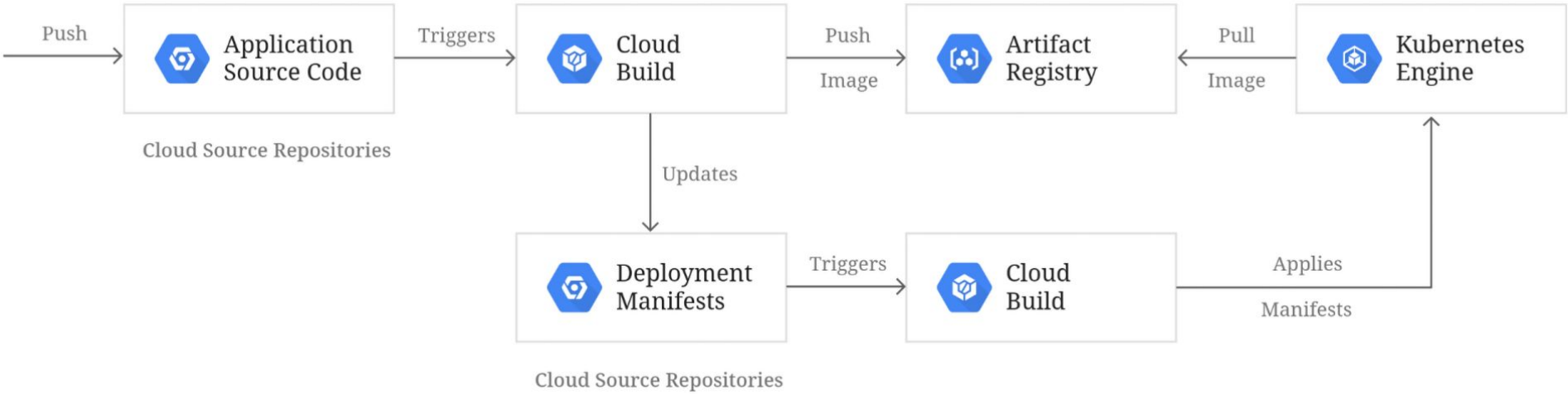
Create containerized application with Docker
- Ensure it runs first!
- Push to Artifact Registry and build

Application is now ready to be deployed!

To where?
- Cloud Run...
- App Engine, Cloud Functions, GKE, Compute, ...
  - Anywhere that can take a Docker image, really

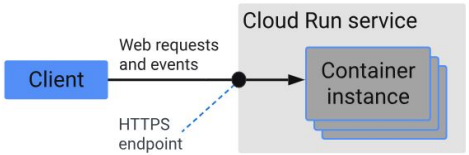
https://cloud.google.com/build/docs/build-push-docker-image


Check In Repo
Cloud Source Repositories
Trigger Build
Cloud Build
Container Tagging
Artifact Registry
Fetch Container Image
Cloud Deploy
Deployment Pipeline
GKE - DEV
Deployment Pipeline
GKE - UAT
Deployment Pipeline
Approvers
GKE - PROD
Laptop
Write Code
Users


Push
Application Source Code
Triggers
Cloud Build
Push
Image
Artifact Registry
Pull
Image
Kubernetes Engine
Cloud Source Repositories
Updates
Deployment Manifests
Triggers
Cloud Build
Applies
Manifests
Cloud Source Repositories

Cloud Run

Service to run/deploy jobs in the Artifact Registry
- Or whatever it is eventually replaced with



https://www.youtube.com/watch?v=1t94tdyojs0

Cloud Run *services*

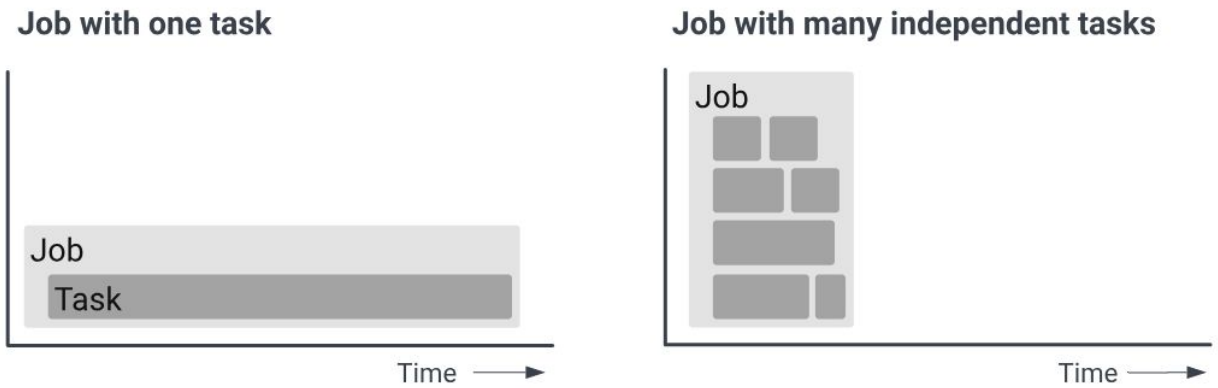
Use when:

- Website/web app
- API/microservices
- Streaming data processing
- Asynchronous workloads
- AI inference

Cloud Run *jobs*

Use when:

- Scripts/tools
- Array jobs (think - high-performance computing)
- Scheduled jobs



Limitations

https://cloud.google.com/run/docs/fit-for-run

"In order to be a good fit for Cloud Run, your app needs to meet all of the following criteria.

- Serves requests, streams, or events delivered via HTTP, HTTP/2, WebSockets, or gRPC, or executes to completion.
- Does not require a local persistent file system, but either a local ephemeral file system or a network file system.
- Is built to handle multiple instances of the app running simultaneously.
- Does not require more than 8 CPU and 32 GiB of memory per instance."

And don't forget

Cloud Functions ➜ Cloud *Run* Functions

Serverless now part of the Cloud Run ecosystem

- Still transitioning, however

Demo - CI/CD

Push to GitHub
Notification to Google Cloud
Auto build/deploy

https://cloud.google.com/run/docs/continuous-deployment-with-cloud-build

➜ https://cloud.google.com/run/docs/quickstarts/deploy-continuously ➜

A full course on Cloud Run

~~https://www.cloudskillsboost.google/course_templates/371~~

https://www.skills.google/course_templates/559?catalog_rank=%7B%22rank%22%3A3%2C%22num_filters%22%3A1%2C%22has_search%22%3Atrue%7D&search_id=59145636

Kubernetes

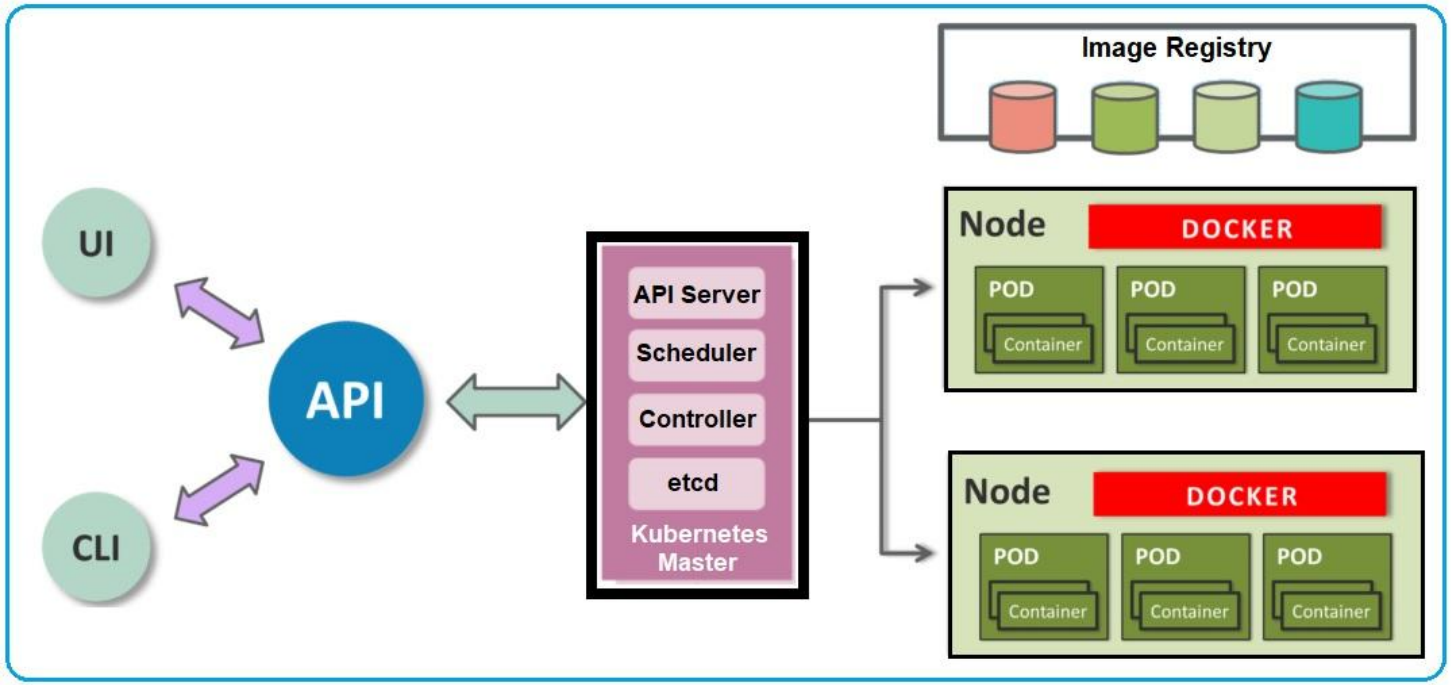


Image Registry
UI
CLI
API
API Server
Scheduler
Controller
etcd
Kubernetes Master
Node
DOCKER
POD
Container
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Container
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Container
Node
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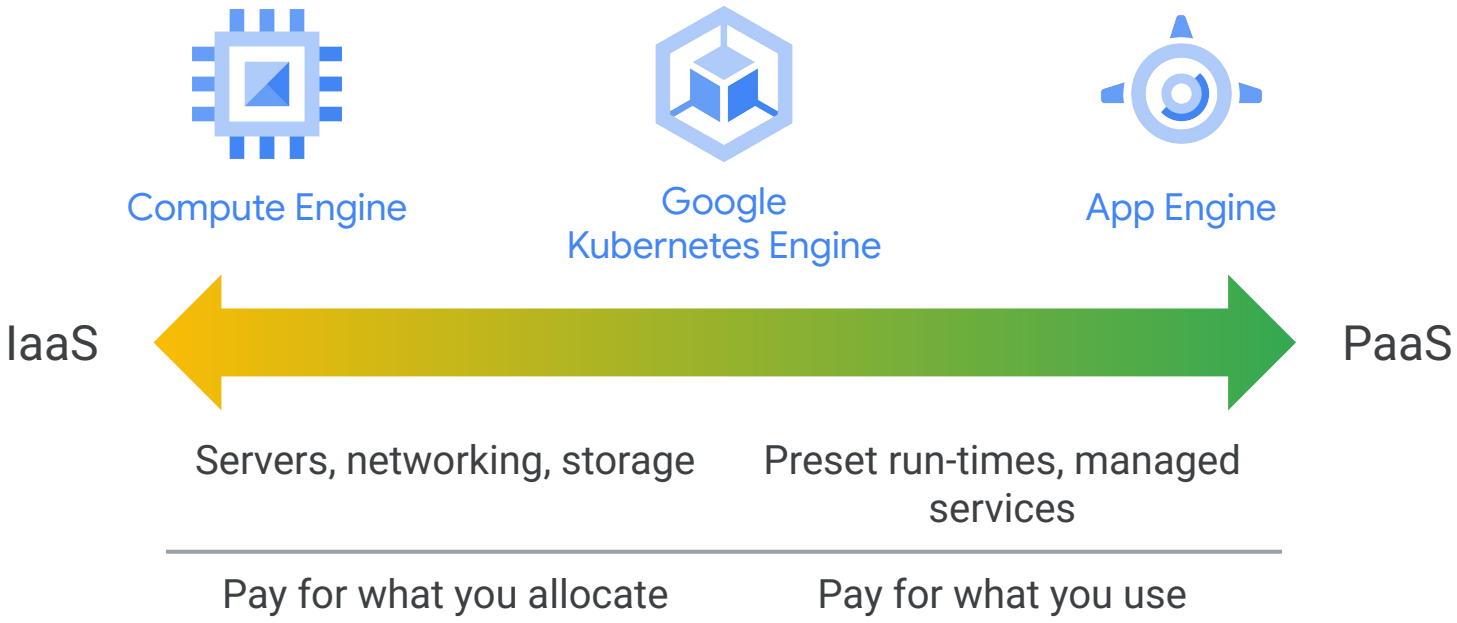
IaaS to PaaS comparison



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Where GKE fits within Google Cloud

Compute Engine

IaaS

Virtual machines with industry-leading price/performance

App Engine

PaaS

A flexible, zero ops platform for building highly available apps

Cloud Functions

Serverless logic

A lightweight fully managed serverless execution environment for building and connecting cloud services

Google Kubernetes Engine

Hybrid

Cluster manager and orchestration engine built on Google's container experience

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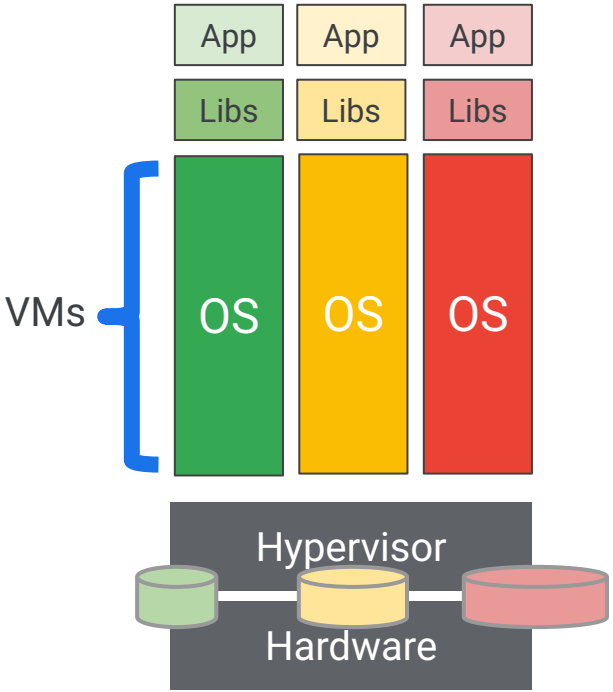
IaaS virtualizes the hardware



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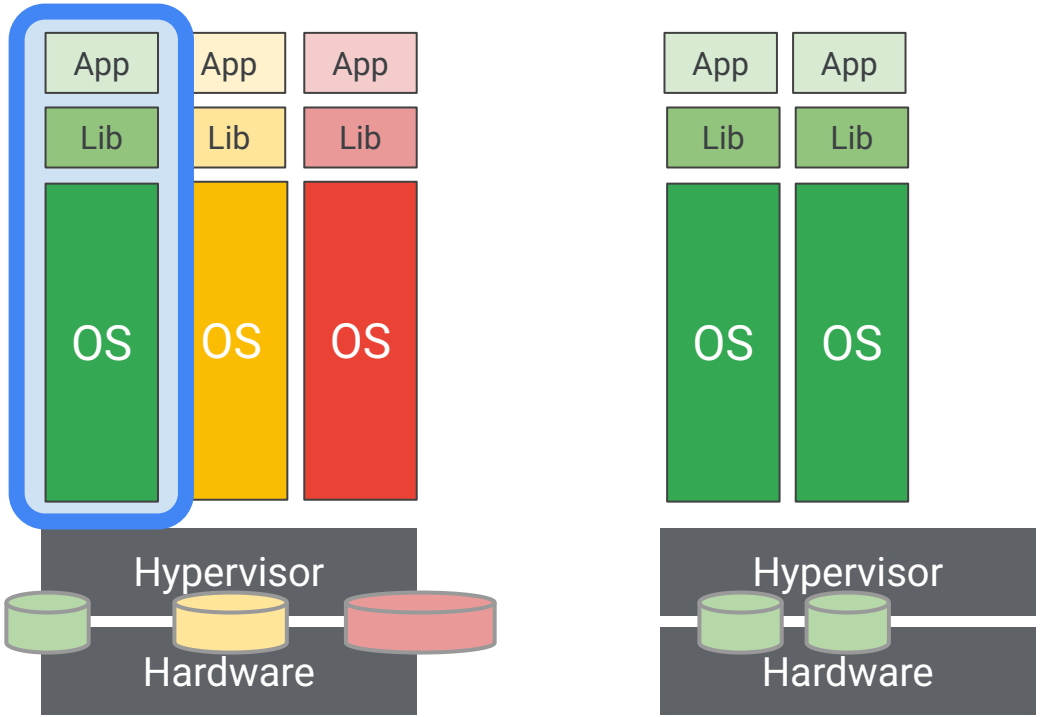
Virtualizing the hardware costs time and resources



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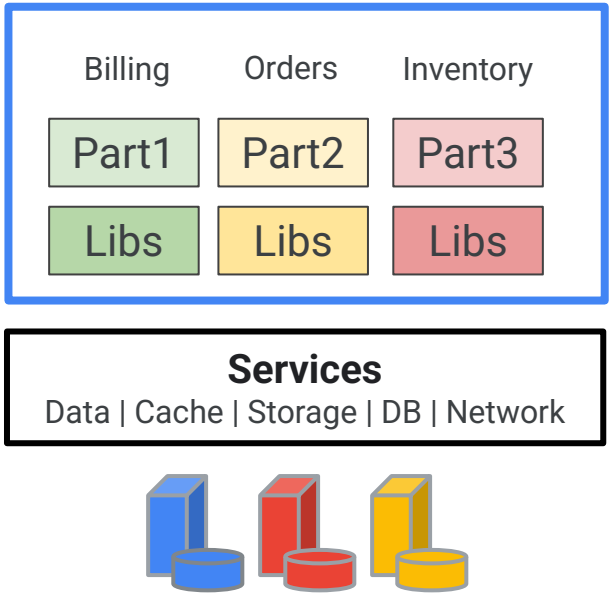
Using PaaS provides hosted services and an environment that can scale workloads independently

- Write code in self-contained workloads and include any libraries.
- Decouple code easily.



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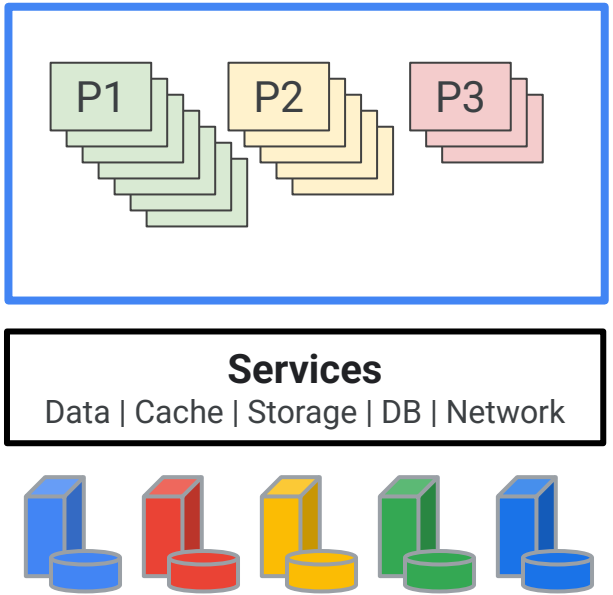
The platform scales to meet demand

Build your apps as decoupled microservices.

You may not be able to fine-tune the underlying architecture to save cost.



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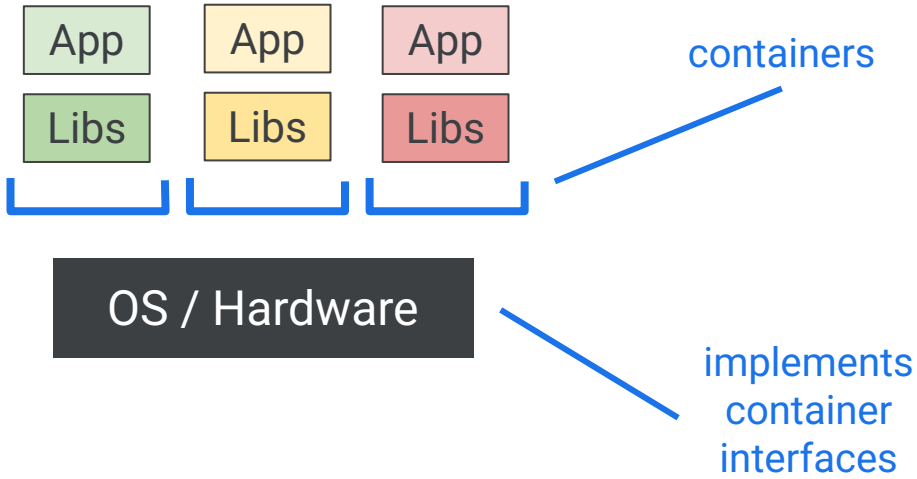
Leveraging containers offer the IaaS flexibility with PaaS scalability



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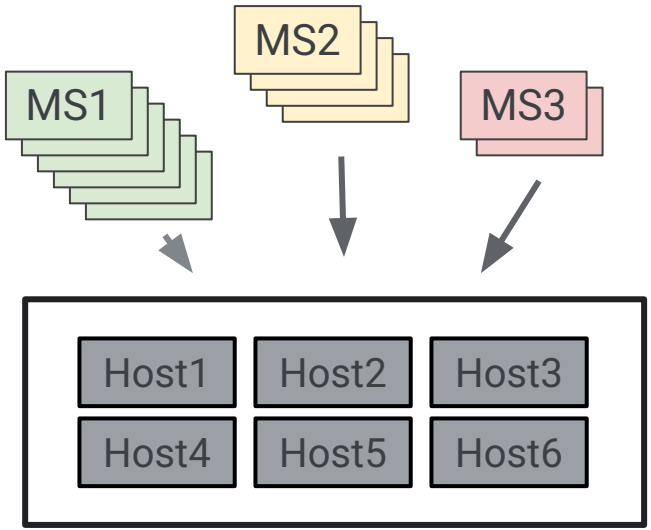
Using a common host configuration, you can deploy hundreds of containers on a group of servers



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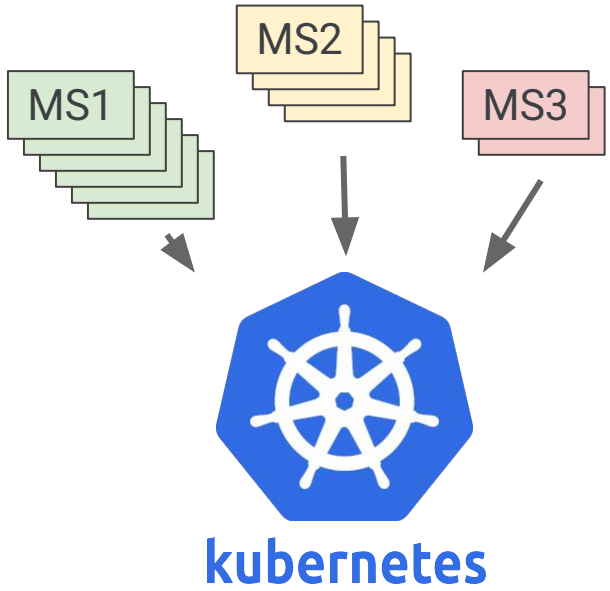
Kubernetes makes it easy to orchestrate many containers on many hosts

An open-source container management platform



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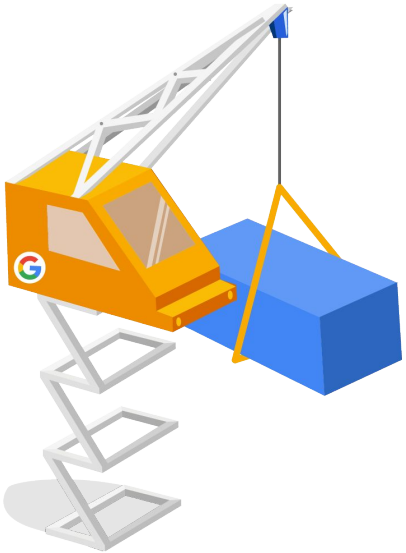
The relationship between containers, Docker, and Kubernetes



docker

certified kubernetes

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GKE is a managed environment for deploying containerized apps

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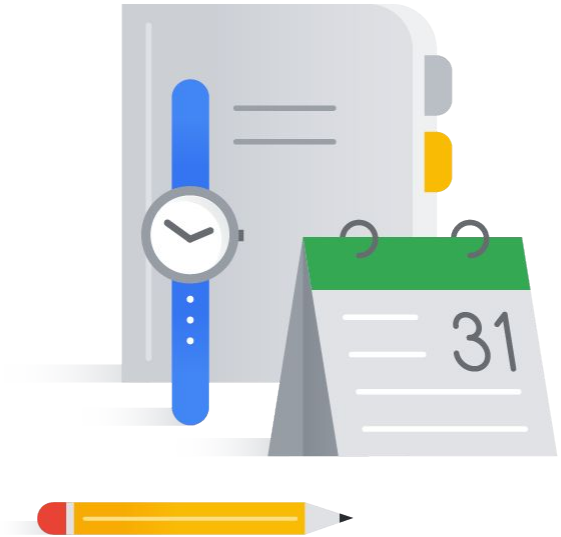
Agenda

Event Driven Programs with Cloud Functions

Lab: Cloud Functions: Qwik Start - Command Line

Containerizing and Orchestrating Apps with GKE

Lab: Kubernetes Engine: Qwik Start



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Lab Intro

Kubernetes Engine: Qwik Start

Get hands on practice with container creation and application deployment with GKE.

~~The lab can be found here.~~

Google Kubernetes Engine Pipeline using Cloud Build

https://www.cloudskillsboost.google/focuses/52829?catalog_rank=%7B%22rank%22%3A1%2C%22num_filters%22%3A0%2C%22has_search%22%3Atrue%7D&parent=catalog&search_id=39619962