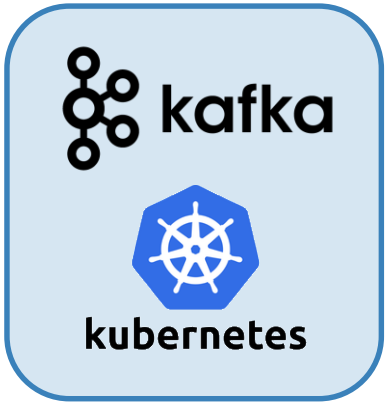
Running Kafka on Kubernetes GCP



Just because you *can* do it,
... *should you* be doing this?

Simon Aubury
linkedin.com/in/**simonaubury**

Hello!

I am Simon Aubury

Principal Data Engineer @ ThoughtWorks

I am here because I love streaming

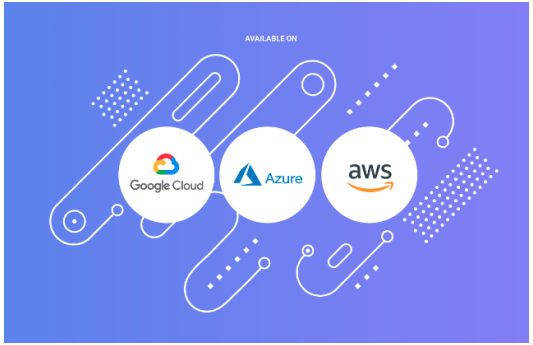
(& really don't like ops)

Let's start with a confession ...

- I'm wasting your time
- Use a managed service for Kafka
- Let's talk about plan "B"

Principle 3: Favor managed services

Cloud is more than just infrastructure. Most cloud providers offer a rich set of managed services, providing all sorts of functionality that relieve you of the headache of managing the backend software or infrastructure. However, many organizations are cautious about taking advantage of these services because they are concerned about being 'locked in' to a given provider. This is a valid concern, but managed services can often save the organization hugely in time and operational overhead.

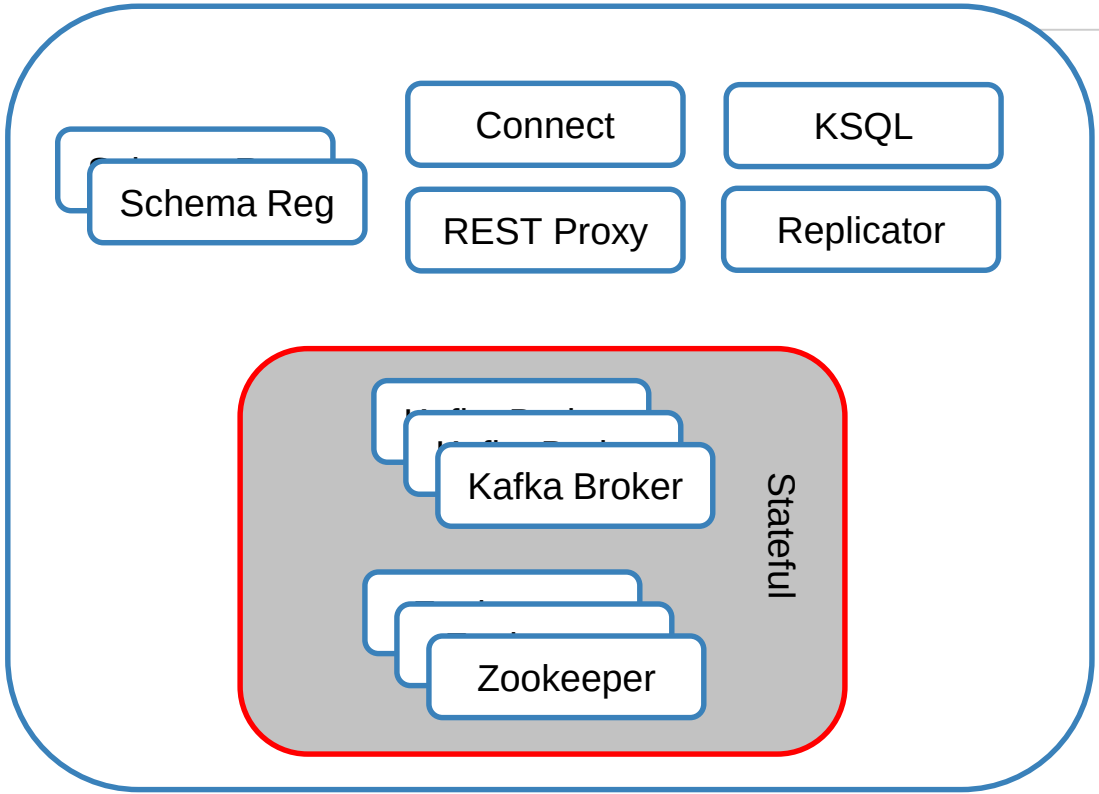


https://cloud.google.com/blog/products/application-development/5-principles-for-cloud-native-architecture-what-it-is-and-how-to-master-it

The Kafka typical build … has changed

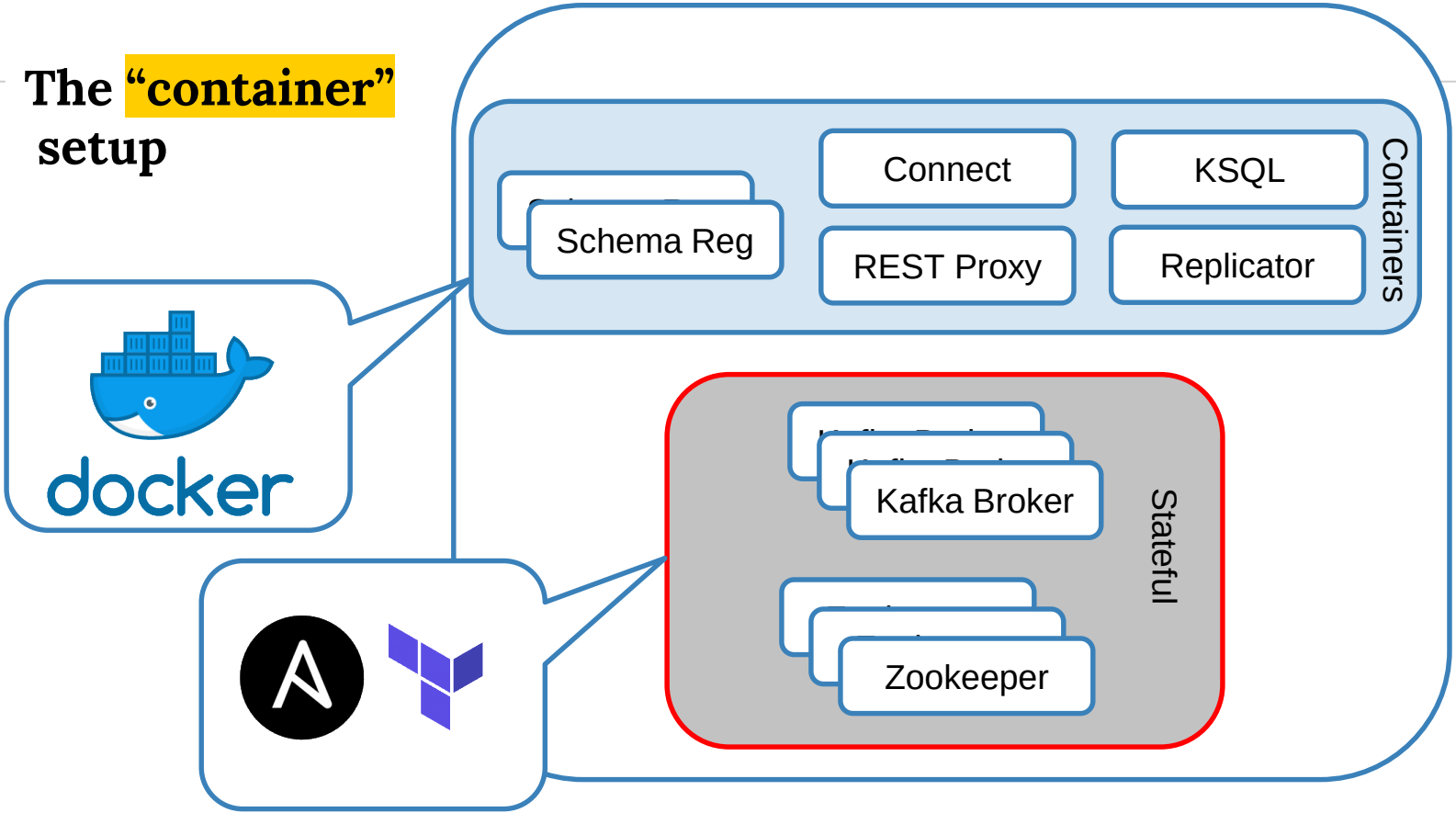
- Apache Kafka is a distributed event streaming platform
- What you “used to” do
- Stateful apps meet containers
- Kubernetes Operators

The usual setup



Managing state is hard

The “container” setup

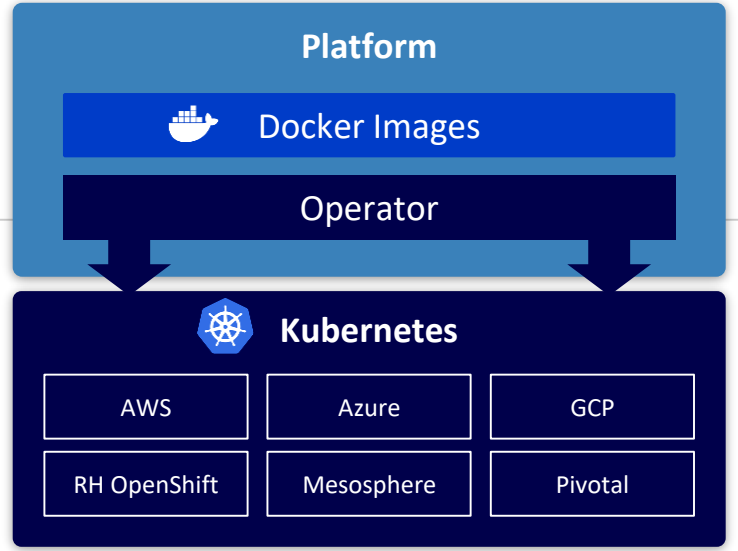


Kubernetes state problem …

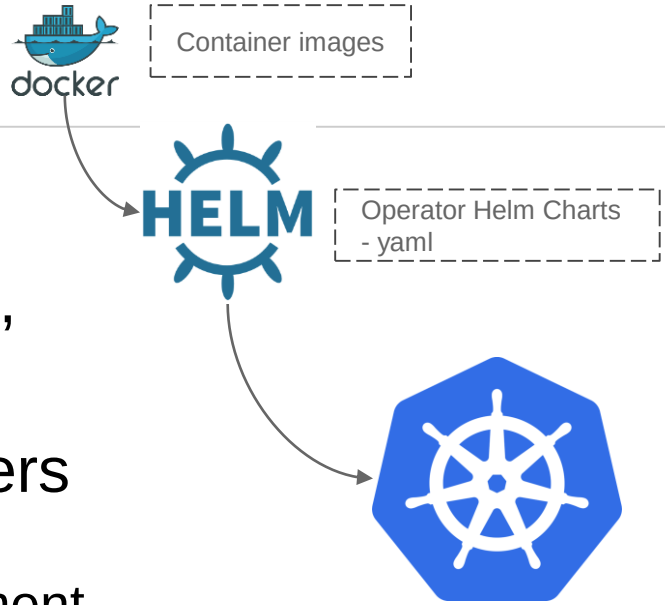
- Kubernetes has become the standard for orchestrating containerized applications
- Running stateful applications such as Kafka can be “challenging”

What's an Operator ?

- Is a method of packaging, deploying & managing a k8s application
- Run complex (stateful) cloud-native apps on k8s
  - Adding a brokers or upgrade a cluster
  - Security and authentication
  - Networking
  - Configure storage!

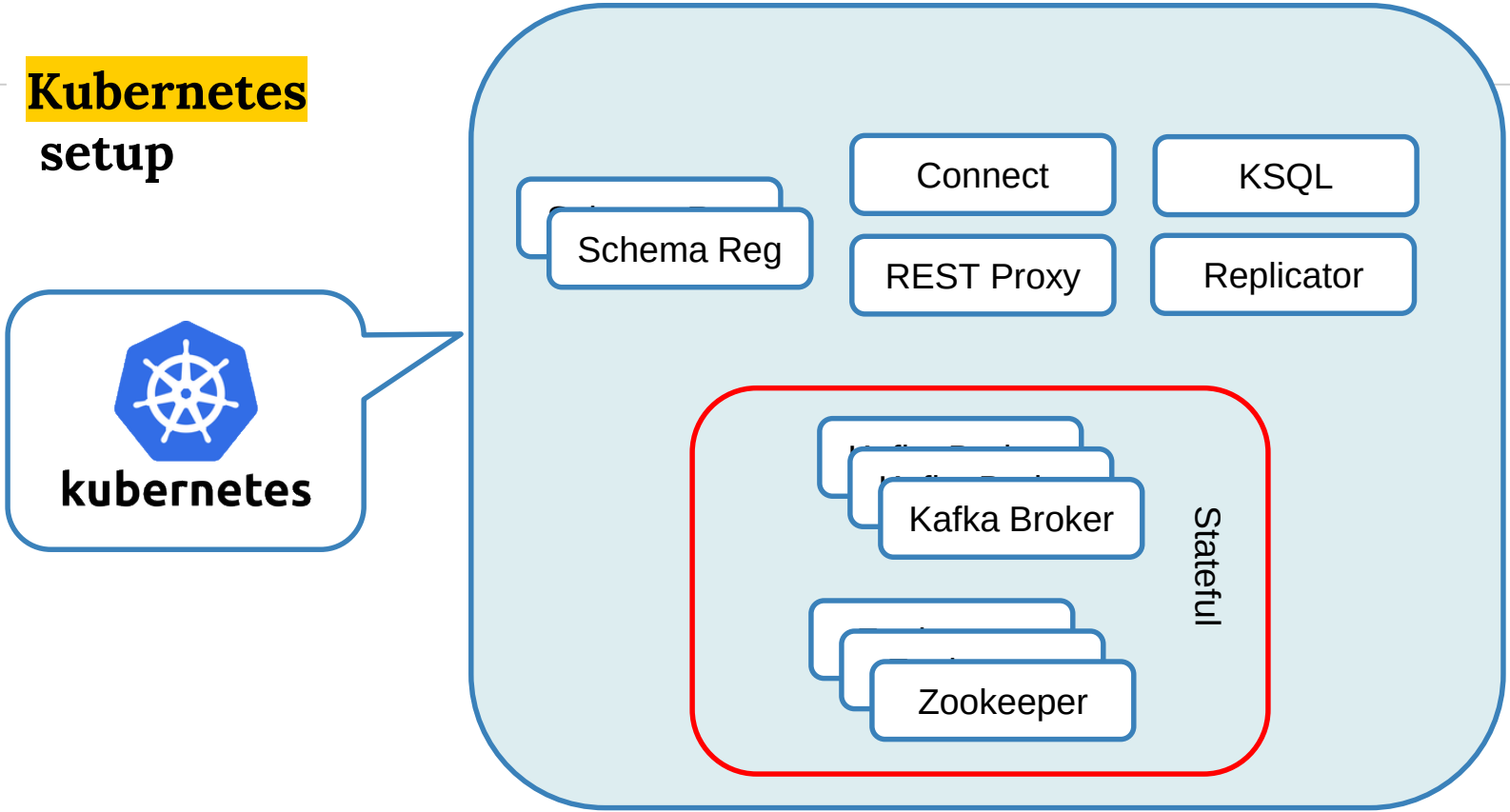


And a good operator should ...



- Do sensible things in a scalable, repeatable way
- Eg., rolling upgrade Kafka brokers
  - Stop the broker, upgrade Kafka
  - Wait for partition leader reassignment
  - Start the upgraded broker
  - Wait for zero under-replicated partitions
  - Upgrade the next broker

Kubernetes setup



Try this yourself …

http://bit.ly/**kafkak8s**

- Kubernetes CLI setup -
- Google Cloud SDK –and setup CLI
  - Initialize
  - Set compute region & zone
  - Get credentials for cluster
- Download Operator – eg., Confluent Platform

Test scaling ...

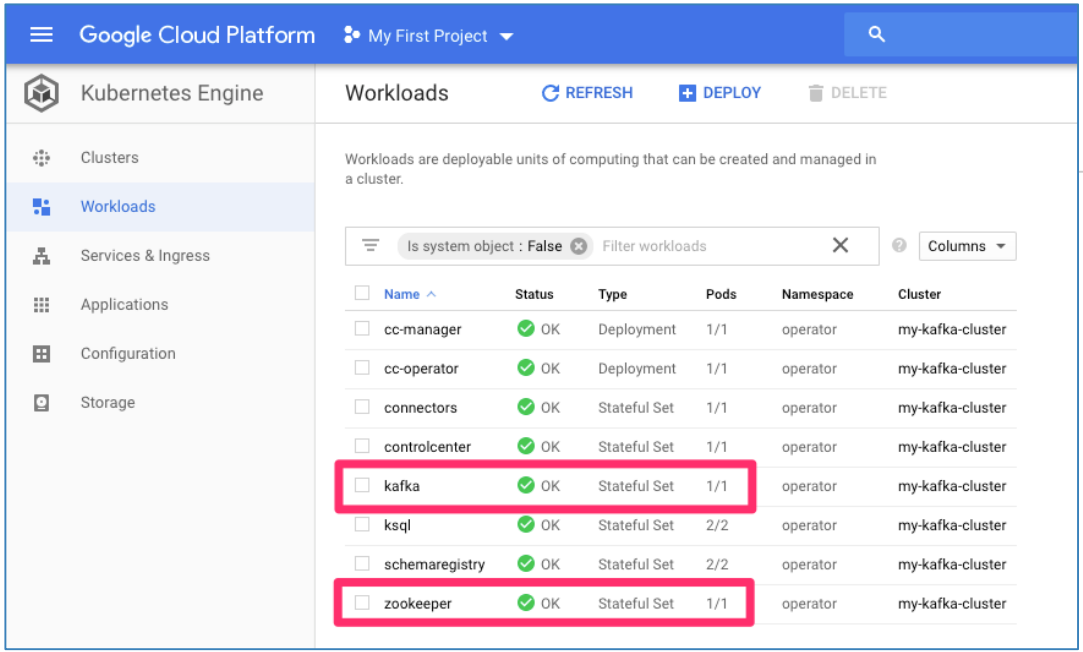
- Initial single broker Kafka cluster

./providers/gcp.yaml

```
## Kafka Cluster
##
kafka:
  name: kafka
  replicas: 1
  resources:
    cpu: 200m
    memory: 1Gi
  loadBalancer:
    enabled: true
    domain: "mydevplatform.gcp.cloud"
  tls:
    enabled: false
```

```
helm install -f ./providers/gcp.yaml \
  --name kafka --namespace operator \
  --set kafka.enabled=true ./confluent-operator
```

```
kubectl get pods -n operator | grep kafka
kafka-0                          1/1     Running   0          47m
```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Workloads are deployable units of computing that can be created and managed in a cluster.
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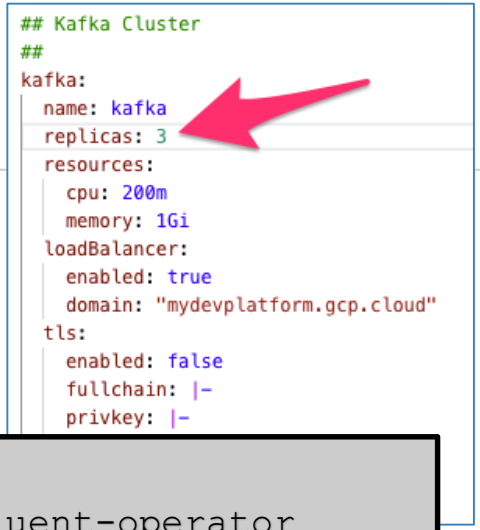
Filter workloads
Columns
Name
Status
Type
Pods
Namespace
Cluster
cc-manager OK Deployment 1/1 operator my-kafka-cluster
cc-operator OK Deployment 1/1 operator my-kafka-cluster
connectors OK Stateful Set 1/1 operator my-kafka-cluster
controlcenter OK Stateful Set 1/1 operator my-kafka-cluster
kafka OK Stateful Set 1/1 operator my-kafka-cluster
ksql OK Stateful Set 2/2 operator my-kafka-cluster
schemaregistry OK Stateful Set 2/2 operator my-kafka-cluster
zookeeper OK Stateful Set 1/1 operator my-kafka-cluster

Now Scale!

- Let's scale to 3

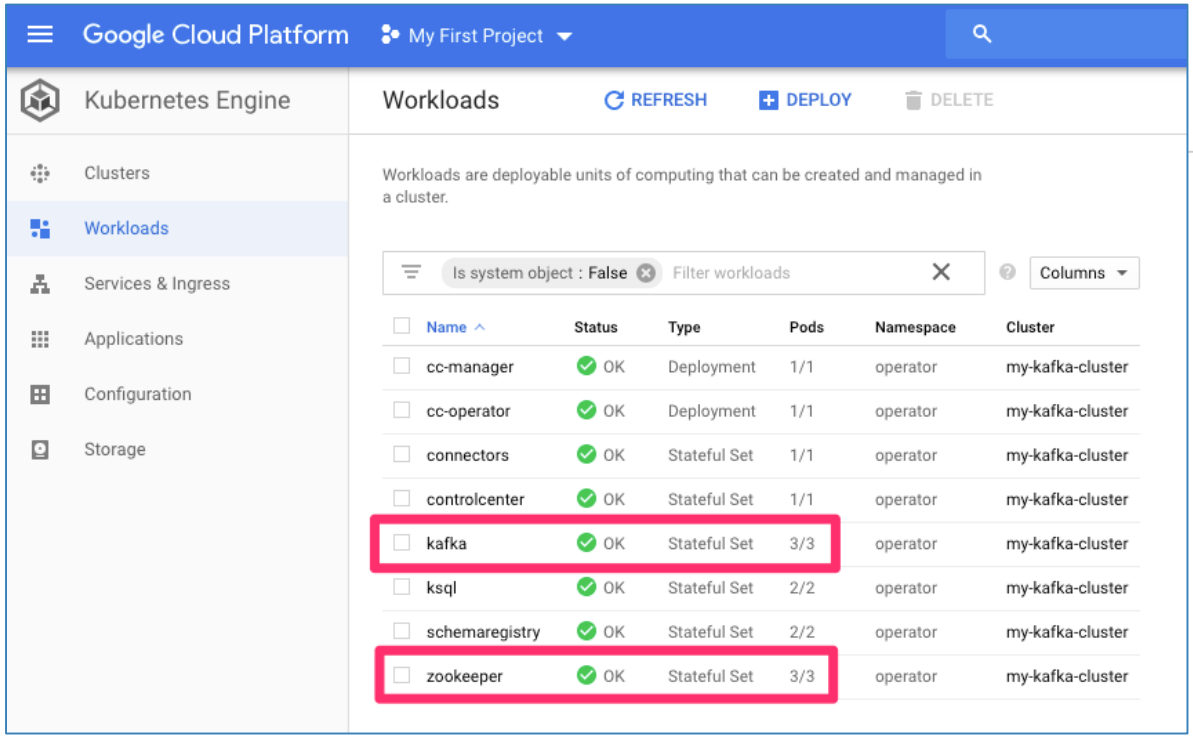
./providers/gcp.yaml



```
## Kafka Cluster
##
kafka:
  name: kafka
  replicas: 3
  resources:
    cpu: 200m
    memory: 1Gi
  loadBalancer:
    enabled: true
    domain: "mydevplatform.gcp.cloud"
  tls:
    enabled: false
    fullchain: |-
    privkey: |-
```

```
helm upgrade -f ./providers/gcp.yaml \
   --set zookeeper.enabled=true zookeeper ./confluent-operator
```

```
kubectl get pods -n operator | grep kafka
kafka-0                          1/1     Running   0          68m
kafka-1                          1/1     Running   0          5m57s
kafka-2                          1/1     Running   0          4m36s
```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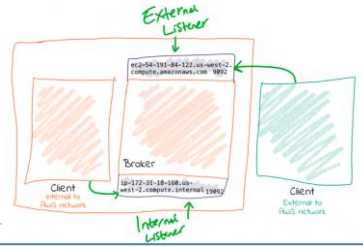
Broker connection strings and listeners ...

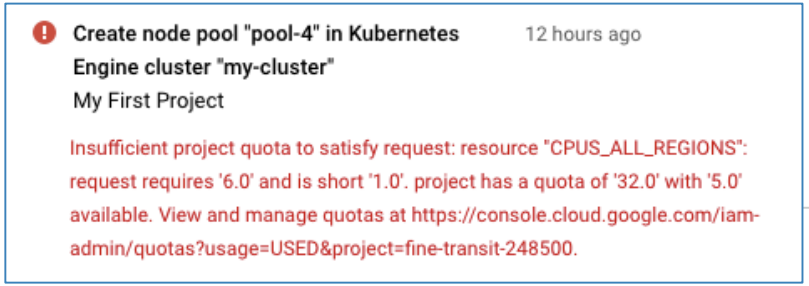



```
## Kafka Cluster
##
kafka:
  name: kafka
  replicas: 3
  resources:
    cpu: 200m
    memory: 1Gi
  loadBalancer:
    enabled: true
    domain: "mydevplatform.gcp.cloud"
  tls:
    enabled: false
    fullchain: |-
    privkey: |-
    cacerts: |-
  metricReporter:
    enabled: false
```

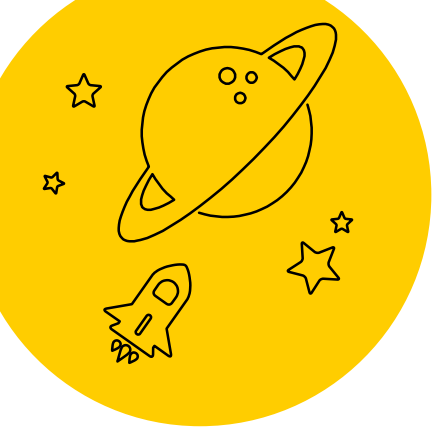
- Data in Kafka read from and written to the leader
  - A client (producer/consumer) will request metadata about which broker is the leader
  - The metadata returned will include the endpoints
  - The client will then use those endpoints
- TL;DR – Kafka broker need to know it's internal ***and*** external end-points

https://www.confluent.io/blog/kafka-listeners-explained

And the issues ...



- Could not provision enough resource due to a quota on CPUs.
  - Navigate to IAM Admin Quotas and increase the Compute Engine API CPUs maximum
- Unable to schedule pods
  - Add a lot of capacity
  - I found 16 nodes of 2 vCPU’s was enough to get going



So in *summary* …

- Use a managed service for Kafka
- If you can’t – use a Kubernetes Operator
  - Saves a lot of time!
- Test & get familiar with
  - Scaling and upgrades
  - Security and authentication
  - Networking

Thanks!

Any questions ?

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