

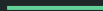
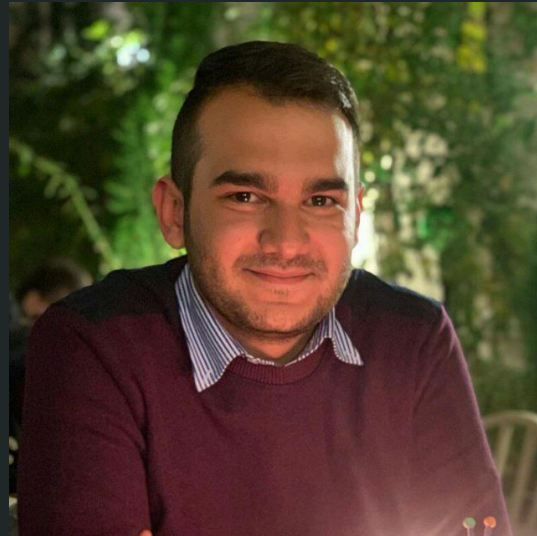
Kubernetes challenges

February 25, 2021

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Overview

Main Content

Kubernetes in real world

- Infrastructure as Code
 - Kubernetes Network Optimization
 - Kubernetes Storage
 - Monitoring In Kubernetes
 - Log Gathering In Kubernetes
 - CI/CD In kubernetes
 - Application Auto Scaling
 - Deployment practices
 - Backup plan
-

Infrastructure as code

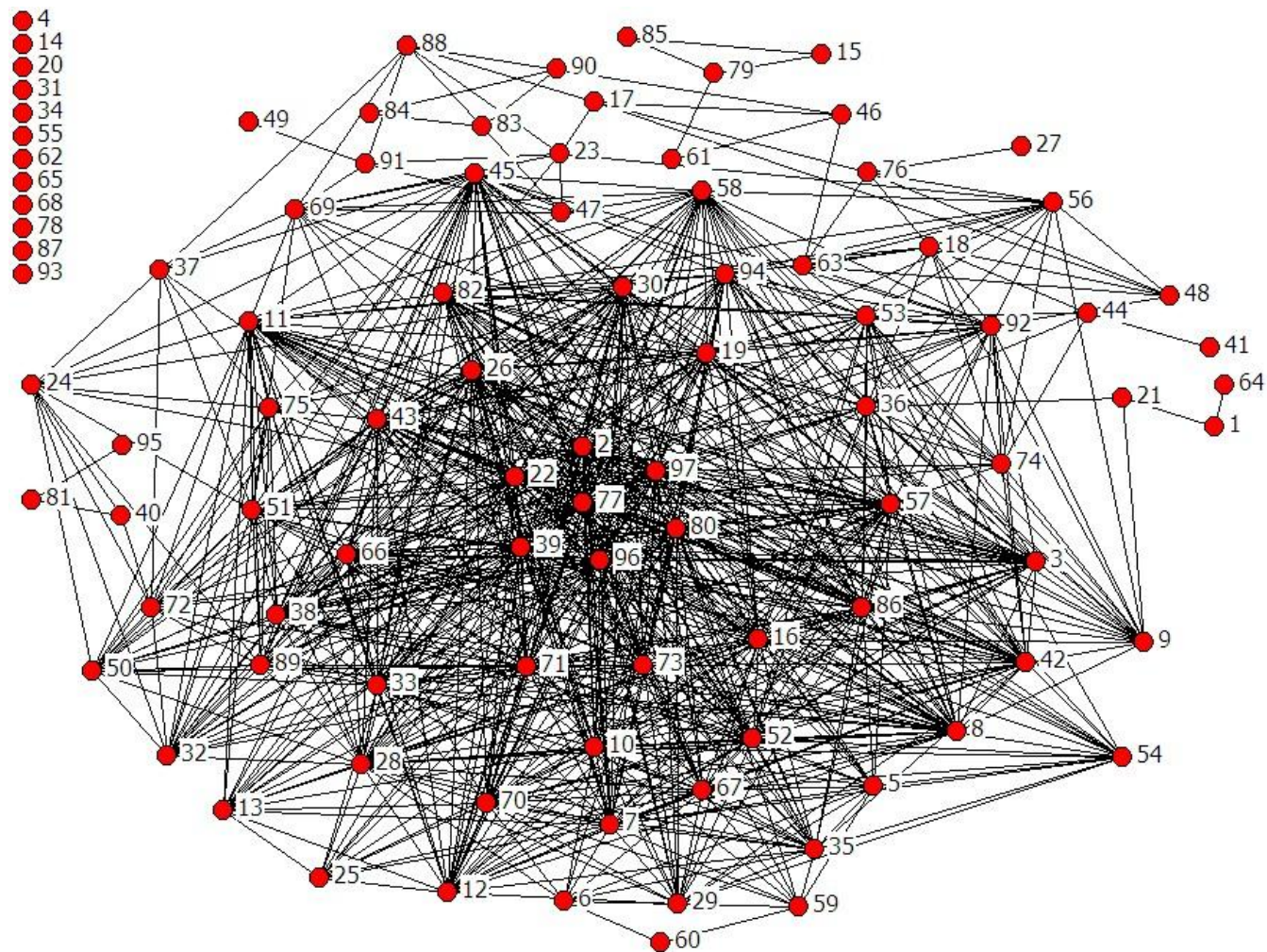
Why we need Infrastructure as Code?

- Reproducible config
- Test, Lint
- Review
- Change management
- Documentation

```
31 def __init__(self):
32     self.file = None
33     self.fingerprints = set()
34     self.logdups = True
35     self.debug = debug
36     self.logger = logging.getLogger(__name__)
37     if path:
38         self.file = open(os.path.join(path, 'requests.log'),
39                           'a')
40         self.file.seek(0)
41         self.fingerprints.update(self.request_fingerprint(request))
42
43 @classmethod
44 def from_settings(cls, settings):
45     debug = settings.getbool('SUPERFINGER_DEBUG')
46     return cls(job_dir(settings), debug)
47
48 def request_seen(self, request):
49     fp = self.request_fingerprint(request)
50     if fp in self.fingerprints:
51         return True
52     self.fingerprints.add(fp)
53     if self.file:
54         self.file.write(fp + os.linesep)
55
56 def request_fingerprint(self, request):
57     return request_fingerprint(request)
```

Kubernetes architecture

Don't be khafan!



Then how can i define my architecture?

Current application resources

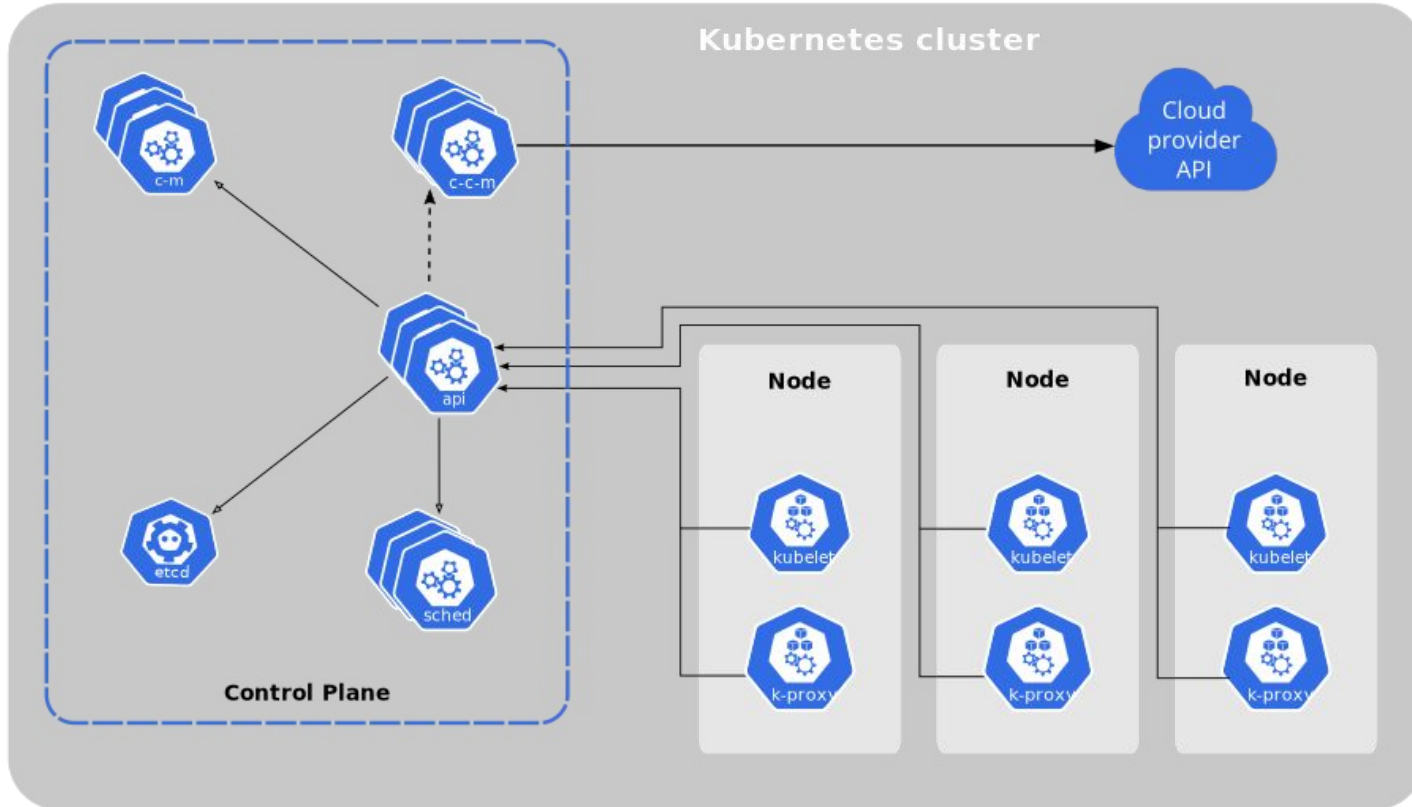
Environment differences

Small servers with more count

Tier servers

Tune based on resources



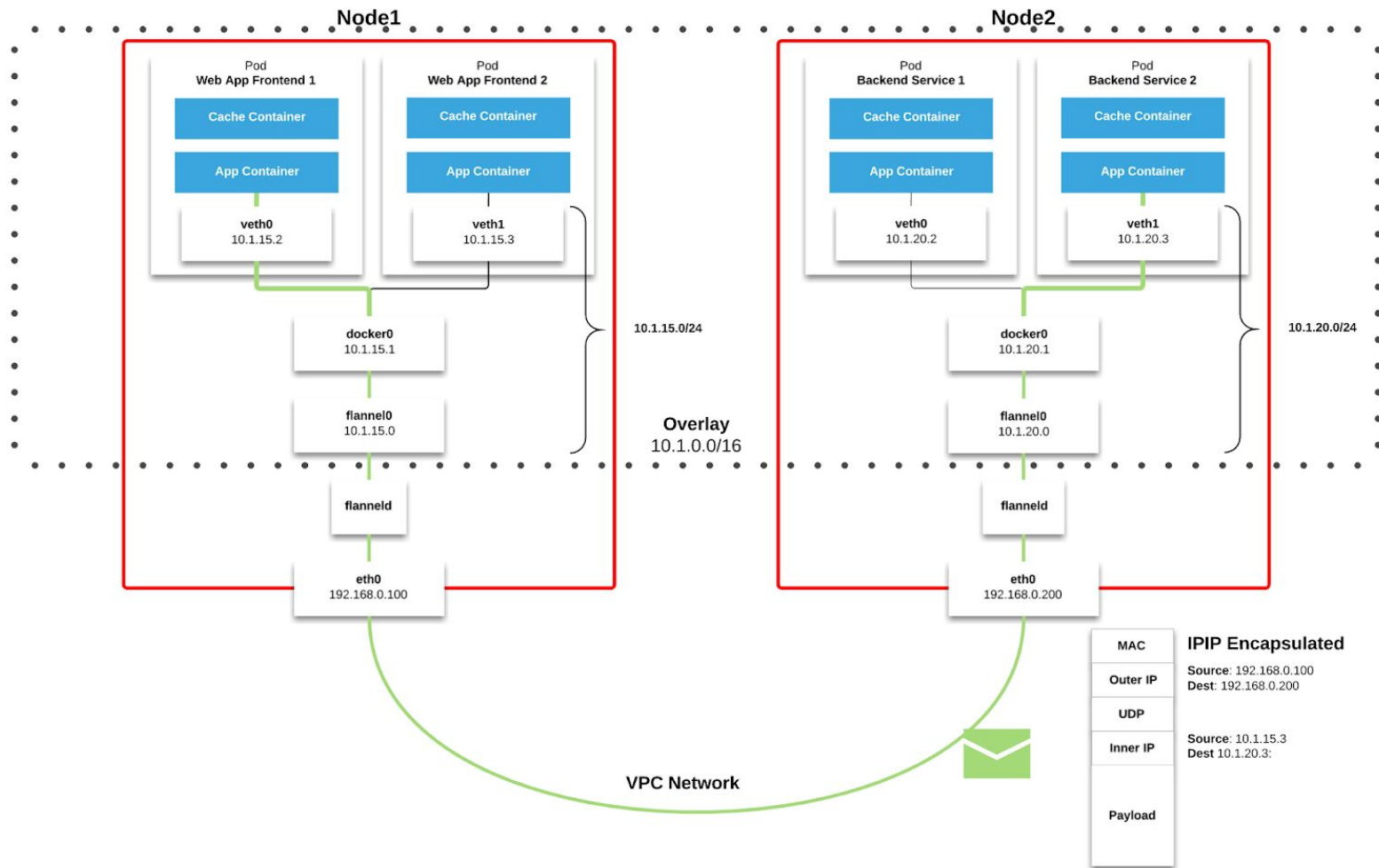


Infrastructure services

Dependency loop

Kubernetes Network

SDN, Overlay, CNI



What matters?

Scale

Multi Zone support

Environment

Policies

Number of hops

Traffic shape



Network Plugins

Flannel

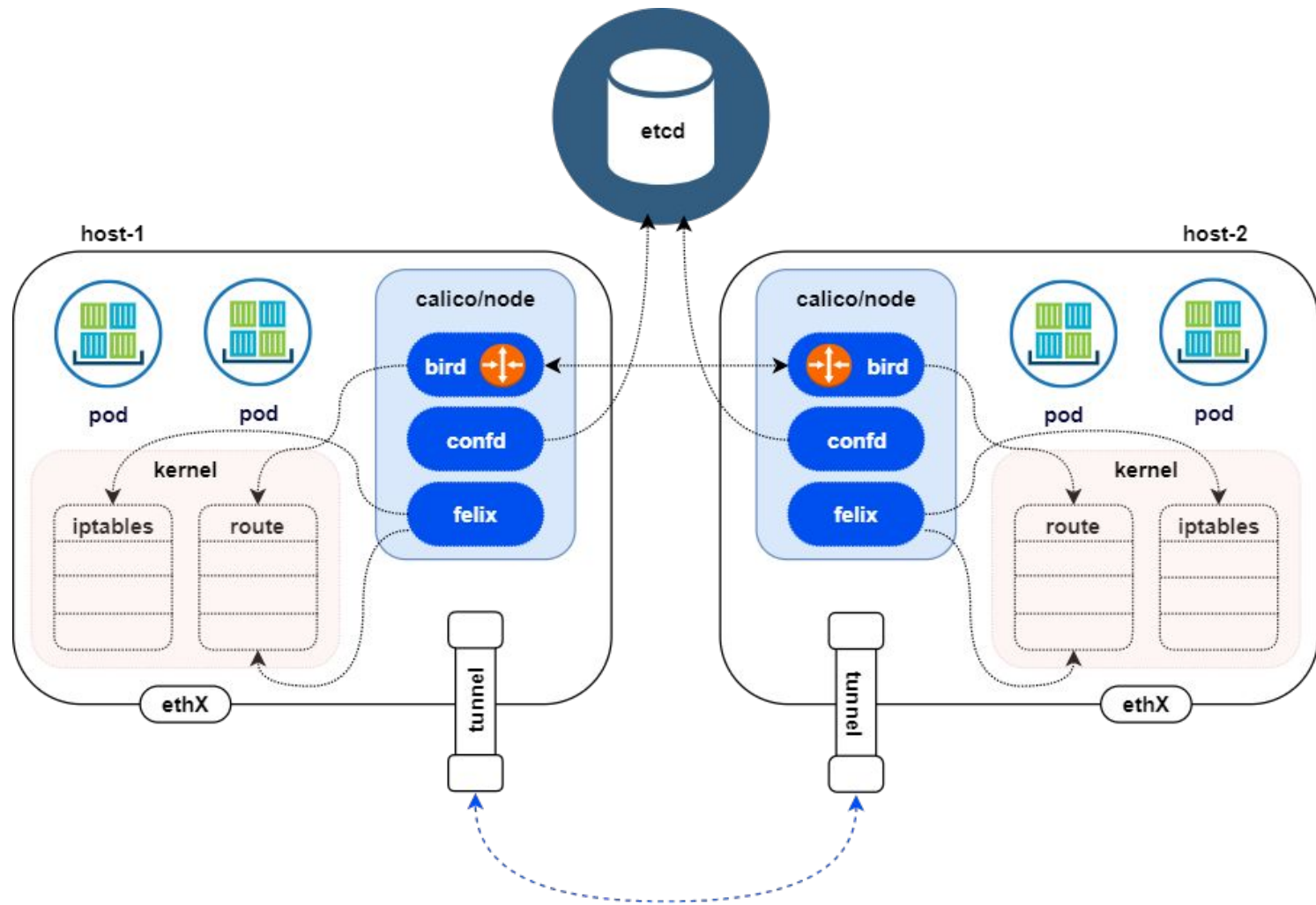
Flannel runs a small, single binary agent called flanneld on each host, and is responsible for allocating a subnet lease to each host out of a larger, preconfigured address space. Flannel uses either the Kubernetes API or etcd directly to store the network configuration, the allocated subnets, and any auxiliary data (such as the host's public IP). Packets are forwarded using one of several backend mechanisms including VXLAN and various cloud integrations.

Calico

Calico is an open source networking and network security solution for containers, virtual machines, and native host-based workloads. Calico supports a broad range of platforms including Kubernetes, OpenShift, Docker EE, OpenStack, and bare metal services.

Weave Net

Weave creates a mesh overlay network between each of the nodes in the cluster, allowing for flexible routing between participants. This, coupled with a few other unique features, allows Weave to intelligently route in situations that might otherwise cause problems.



Kubernetes Storage

Cluster

App

Persistent Volume Claim (PVC)

Persistent Volume (PV)

Physical storage

- StorageClass
- PVC
- PV

Storage support

- Host
- NFS
- SAN
- Gluster
- Ceph

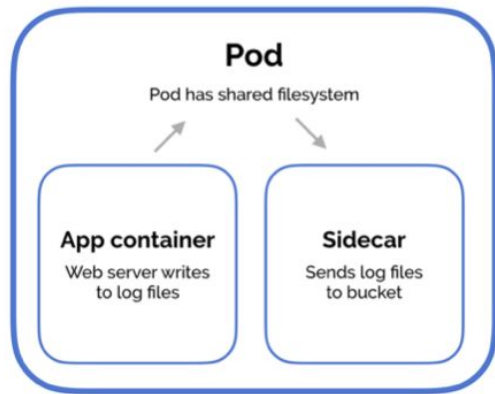




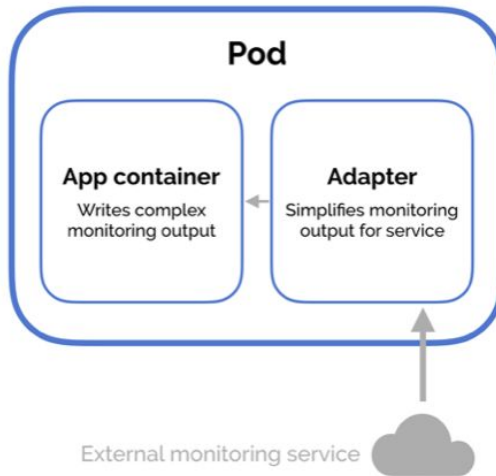
Design Patterns

- Sidecar
 - Ambassador
-

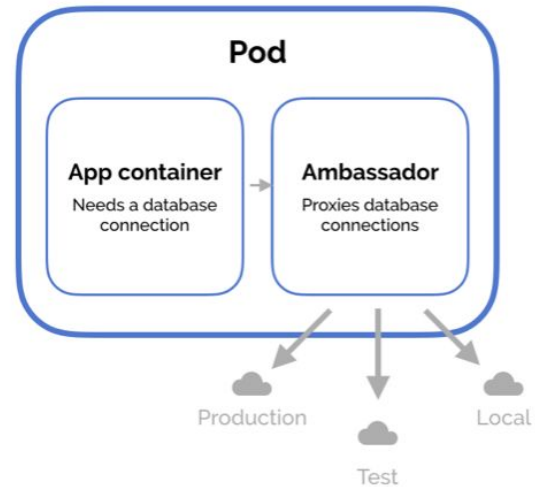
Sidecar



Adapter



Ambassador

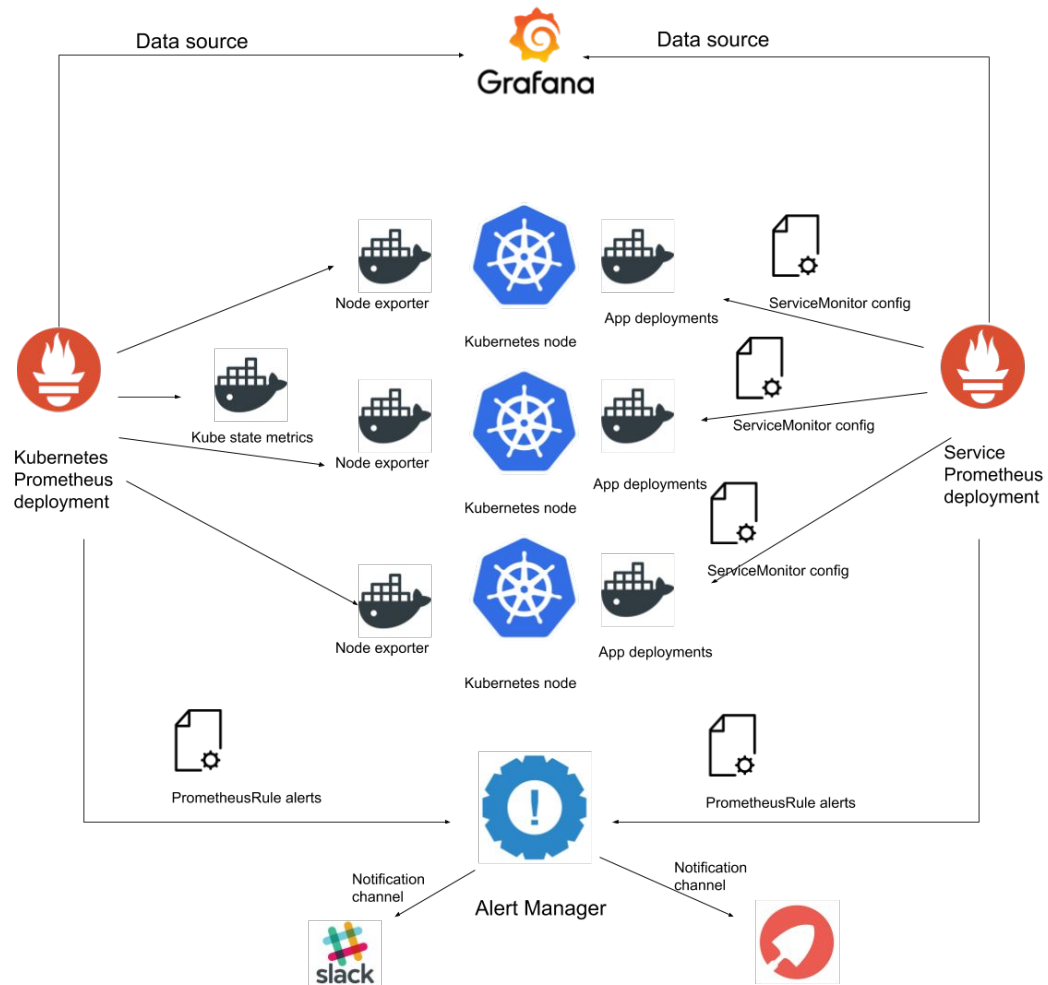


Monitoring

Don't be blind!

Automate More
As Much
As You Can!





Monitoring Stack

- Prometheus
- Alert Manager
- Grafana
- Exporter

Prometheus Operator, Sidecar, Service Monitor

Influx? Zabbix? Cacti? ...?

Log

Where to store?

How to store?

What is my challenges?

- Build a fast & reliable log platform
- Dynamic collection
- Batch logs
- Break log processes
- Collect less and simple
- Process more logs



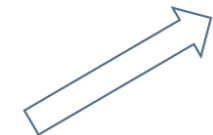
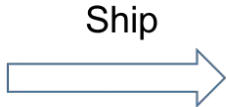
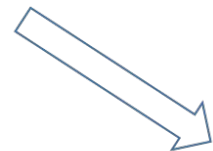
beats



beats



beats



logstash

Parse, filter
and transform



kibana



Visualize

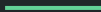


elasticsearch

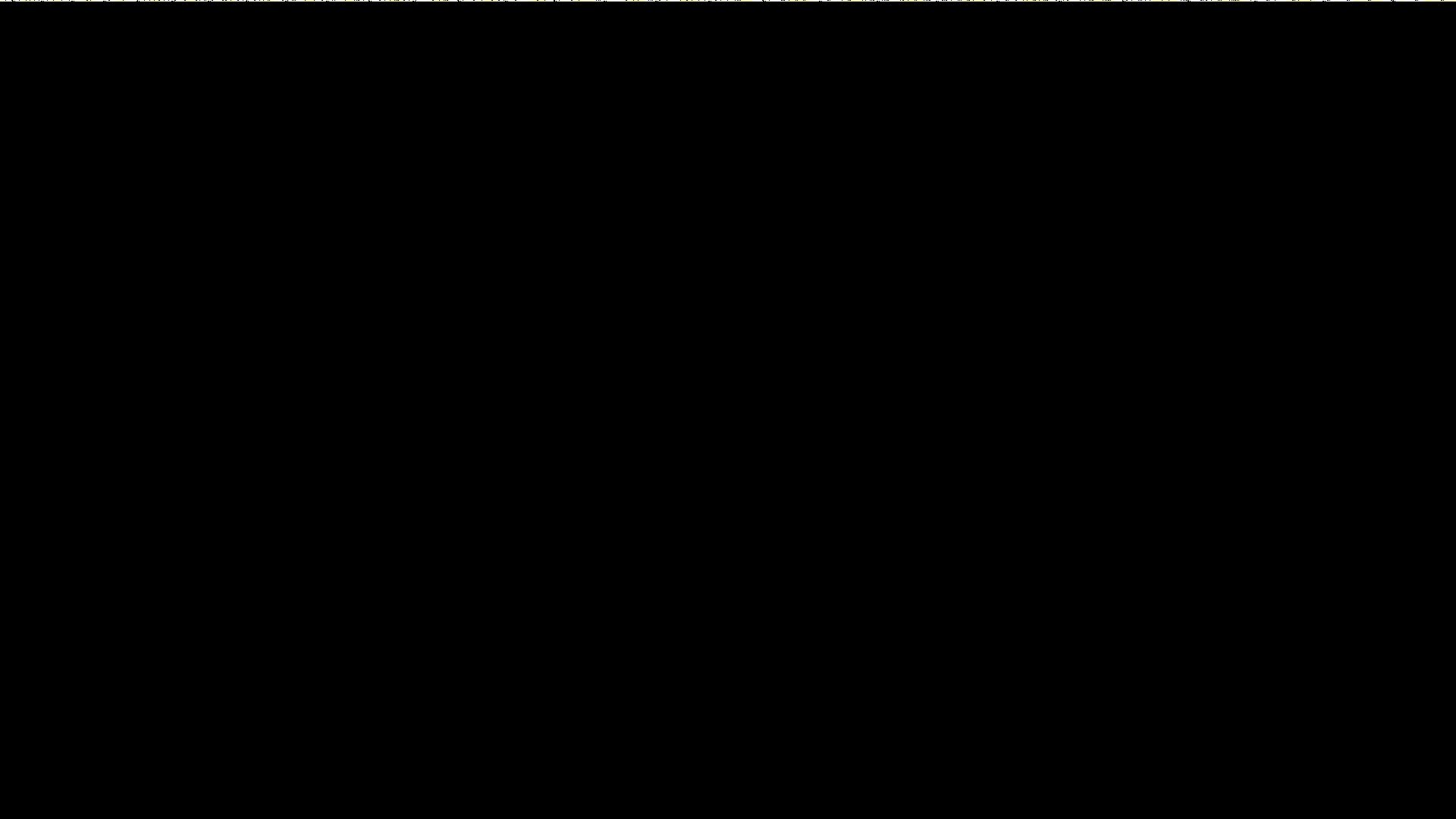
Ehsan Rahmanpour

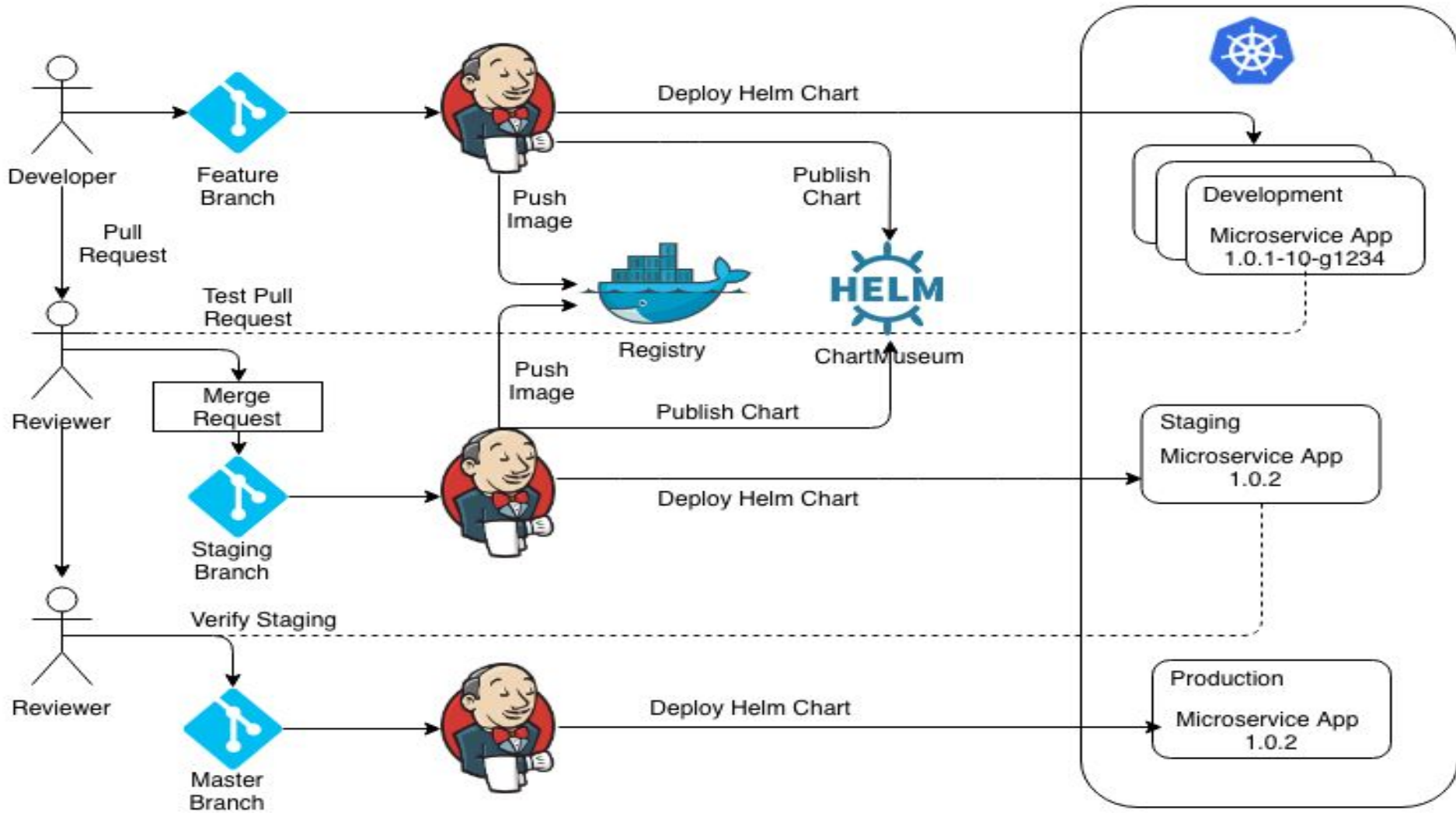
DevOps Engineer at Digikala

[linkedin.com/in/ehsanrahmanpour/](https://www.linkedin.com/in/ehsanrahmanpour/)

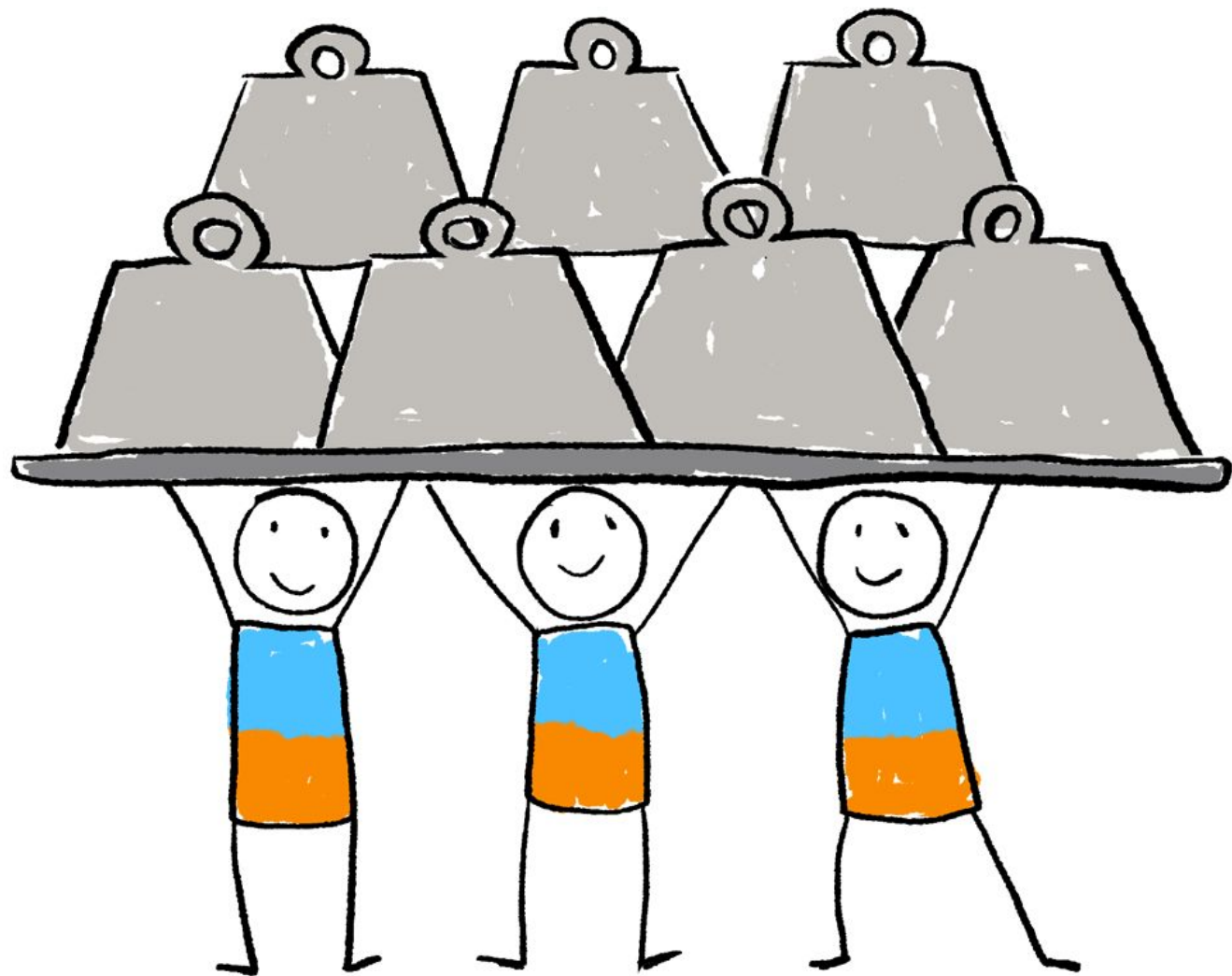


CI/CD In kubernetes





Application Auto Scaling



Concepts

- Replication Controller
- Replicaset
- Deployment
- Horizontal pod autoscaler (HPA)



BANZAI CLOUD

HPA Operator

Deployment

Metrics Agregator

Metrics Server

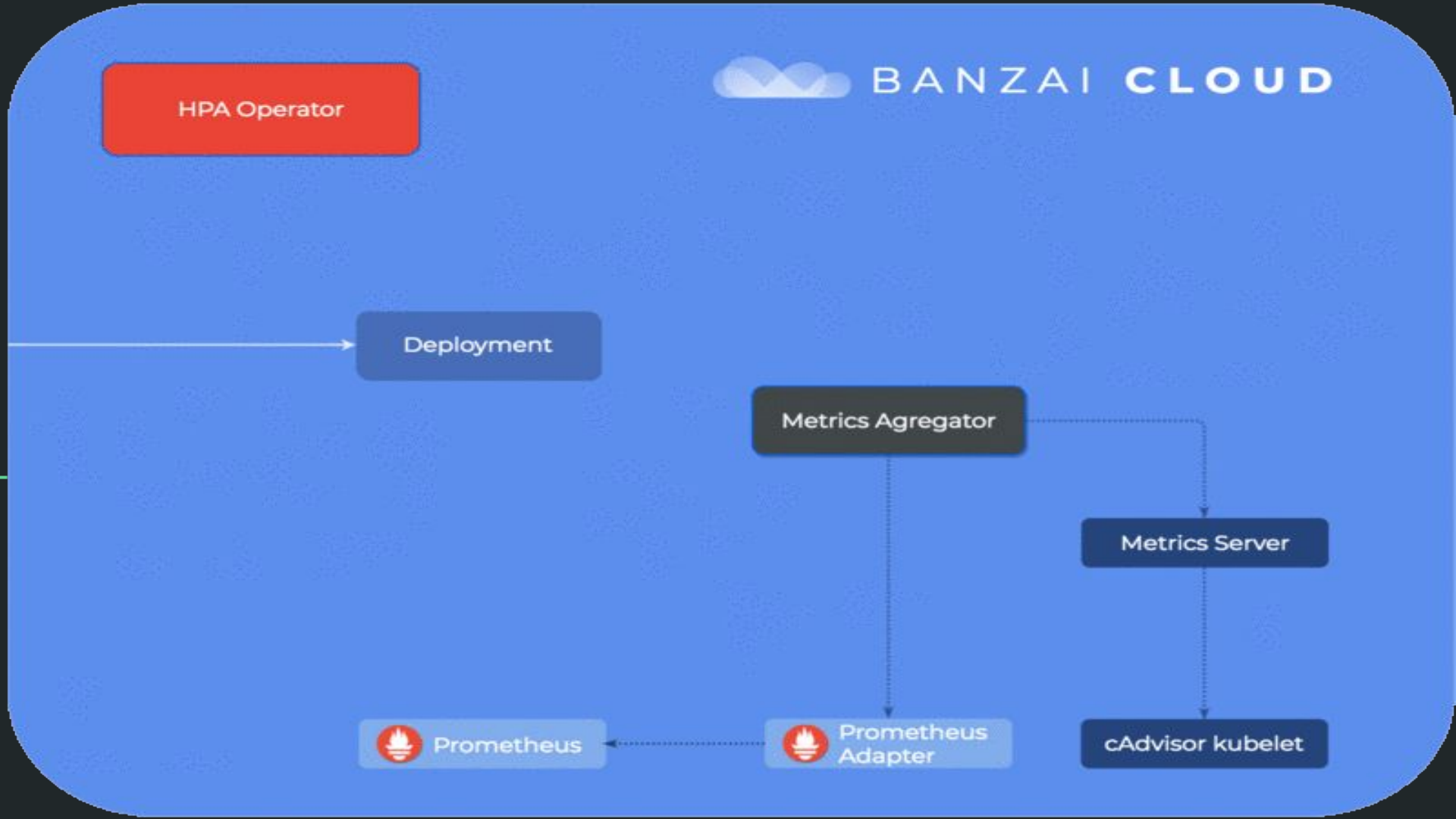


Prometheus



Prometheus
Adapter

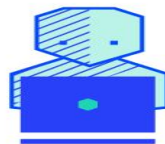
cAdvisor kubelet



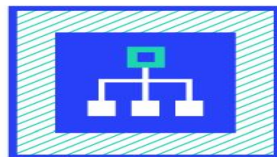
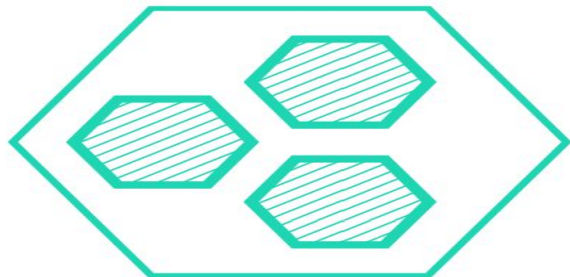
Deployment practices

Concepts

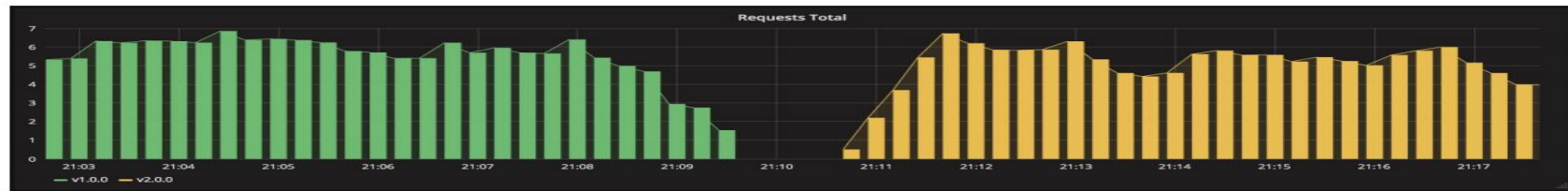
- Recreate
- Rolling Update
- Blue And Green
- Canary



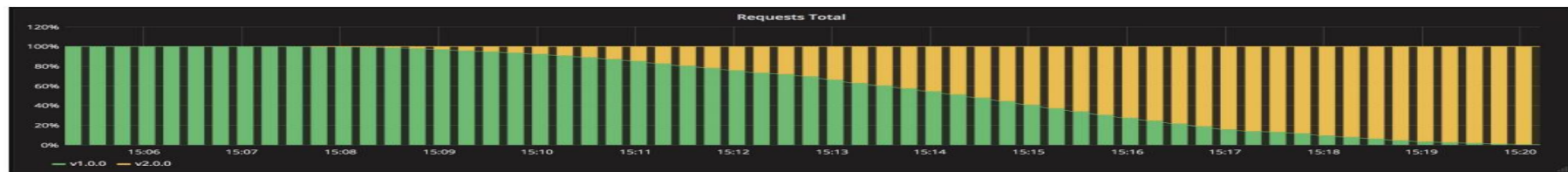
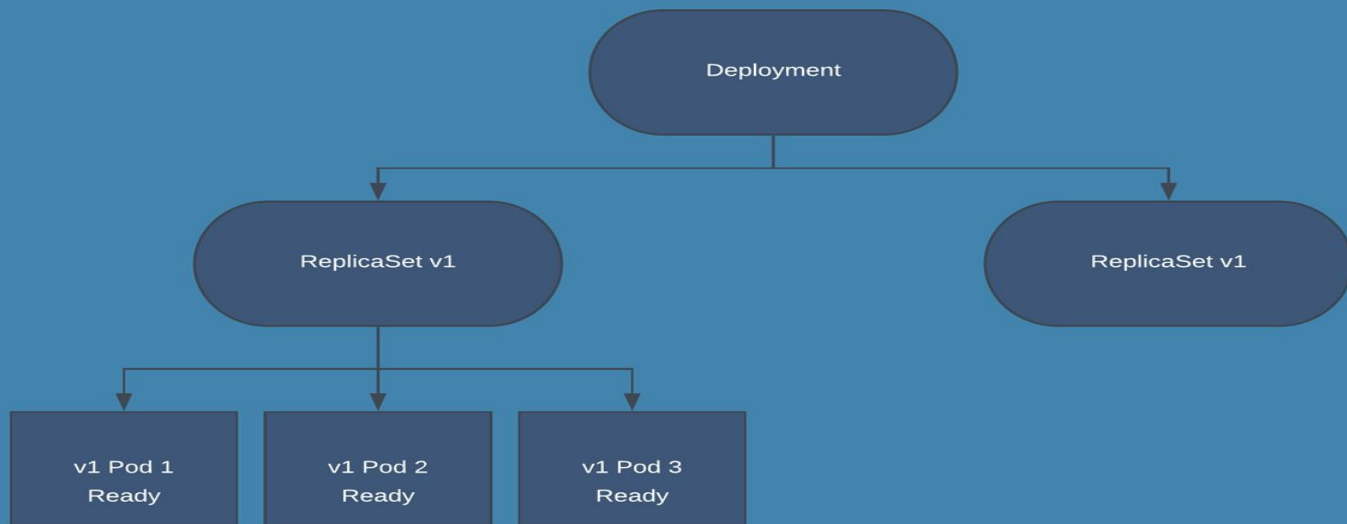
V1



LB

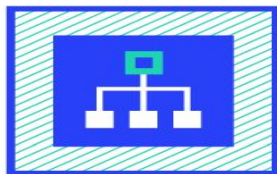
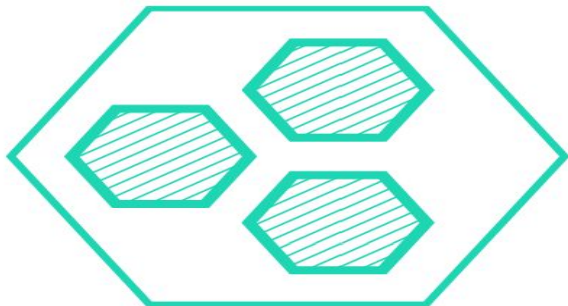


Service unavailable

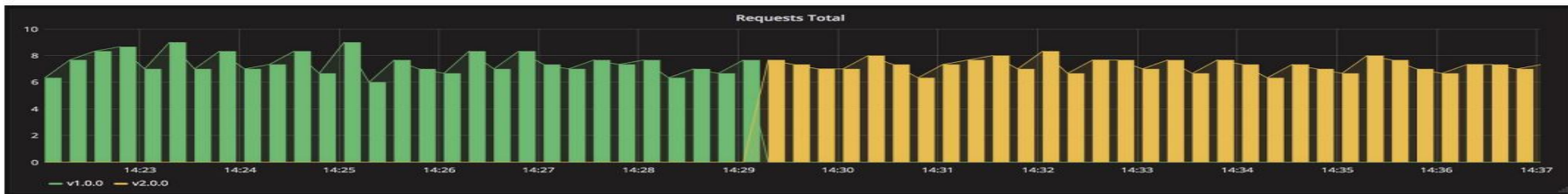




V1

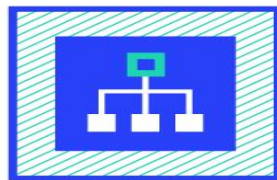
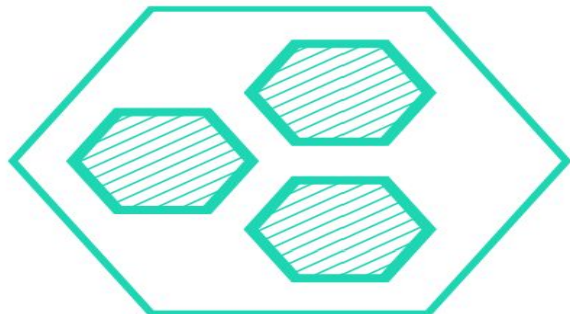


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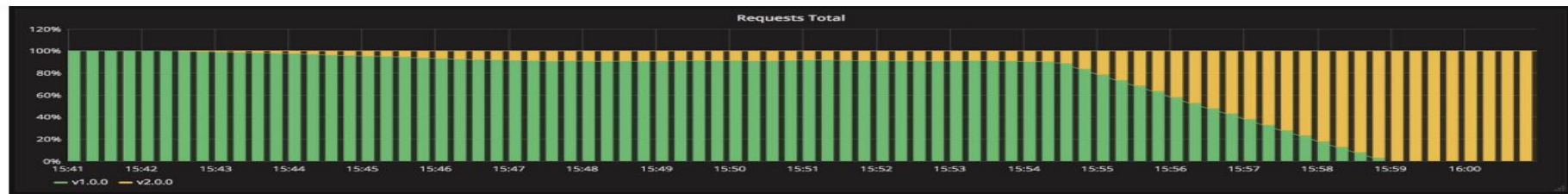




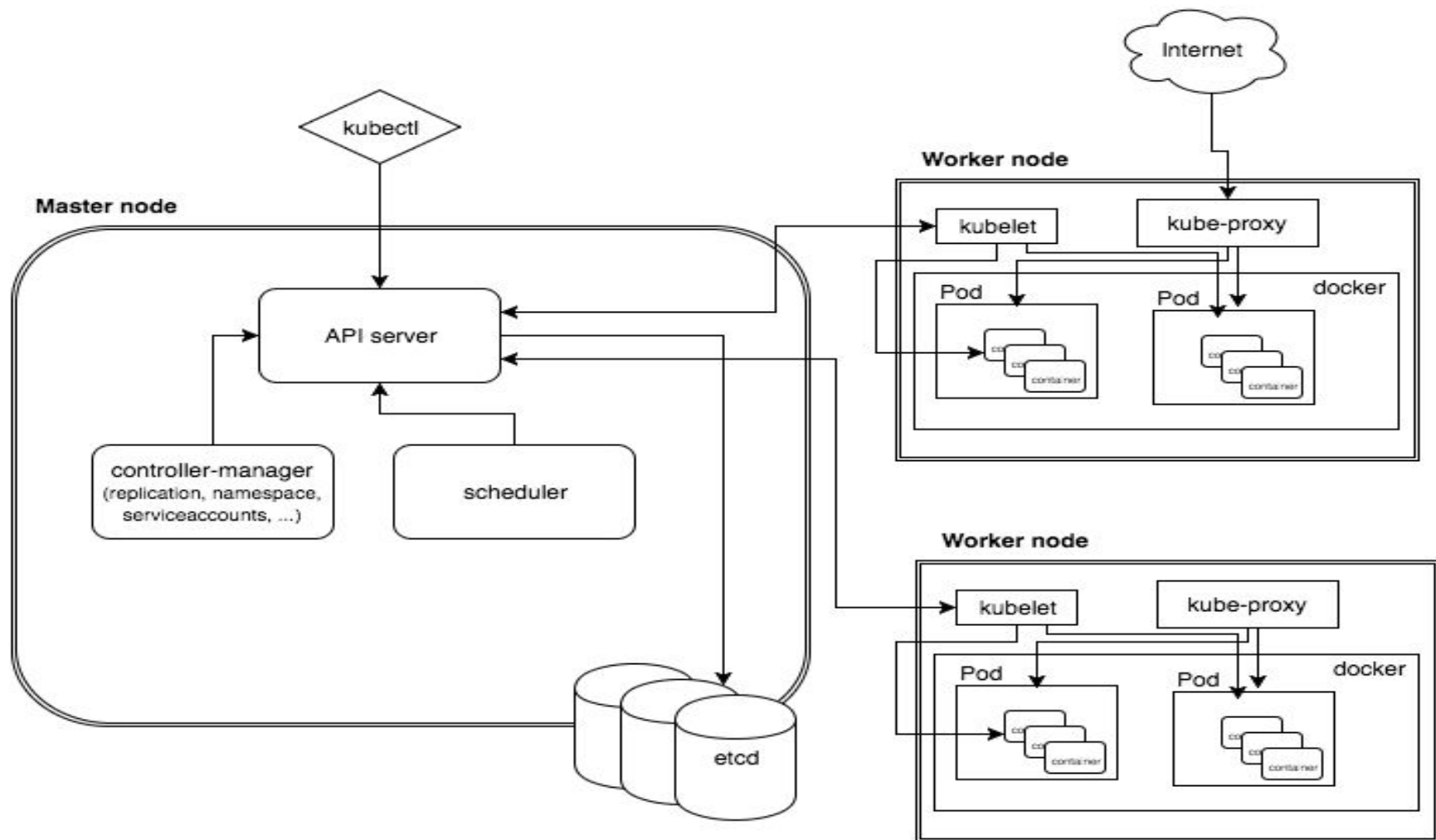
V1



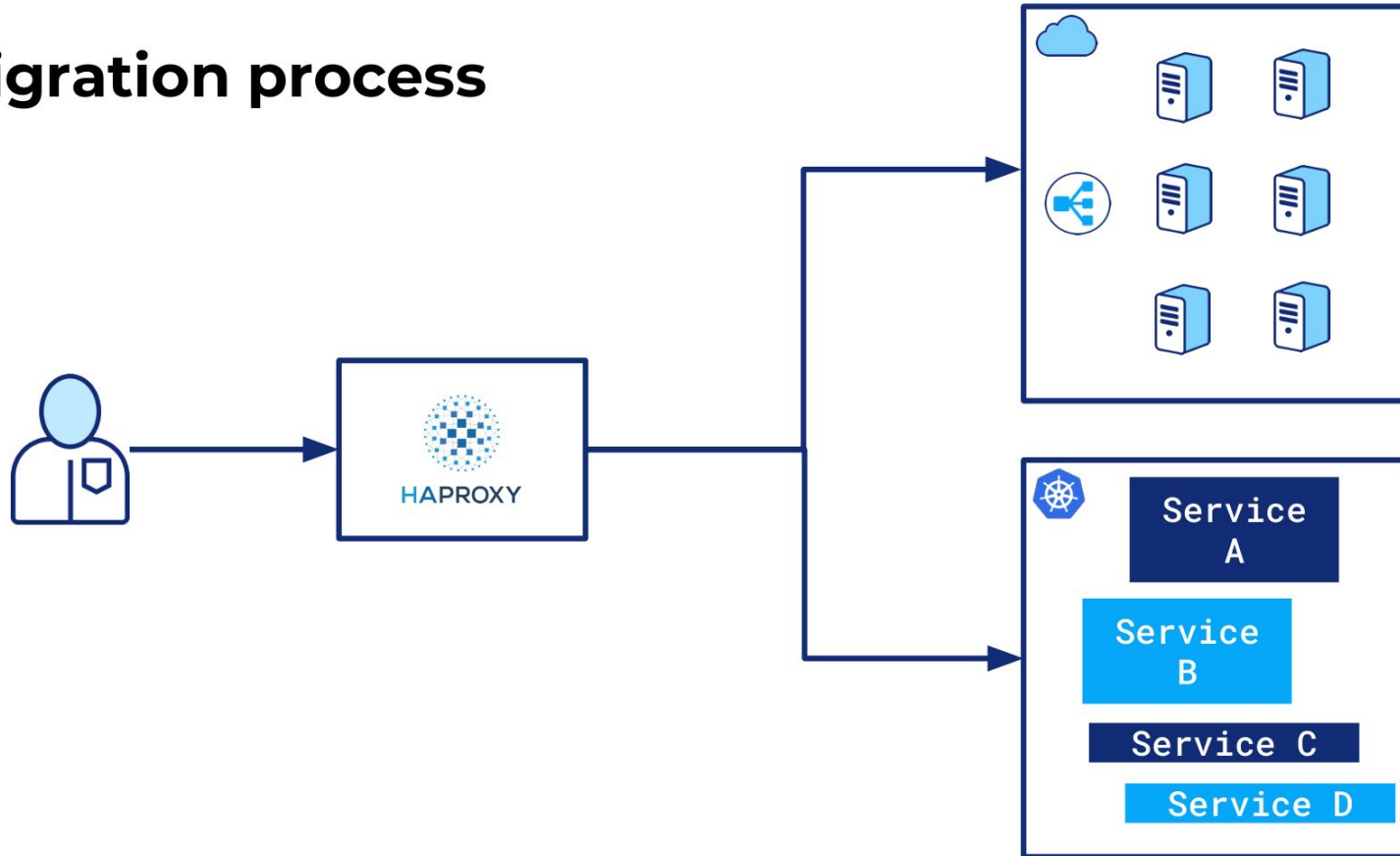
LB



Backup plan



Migration process



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