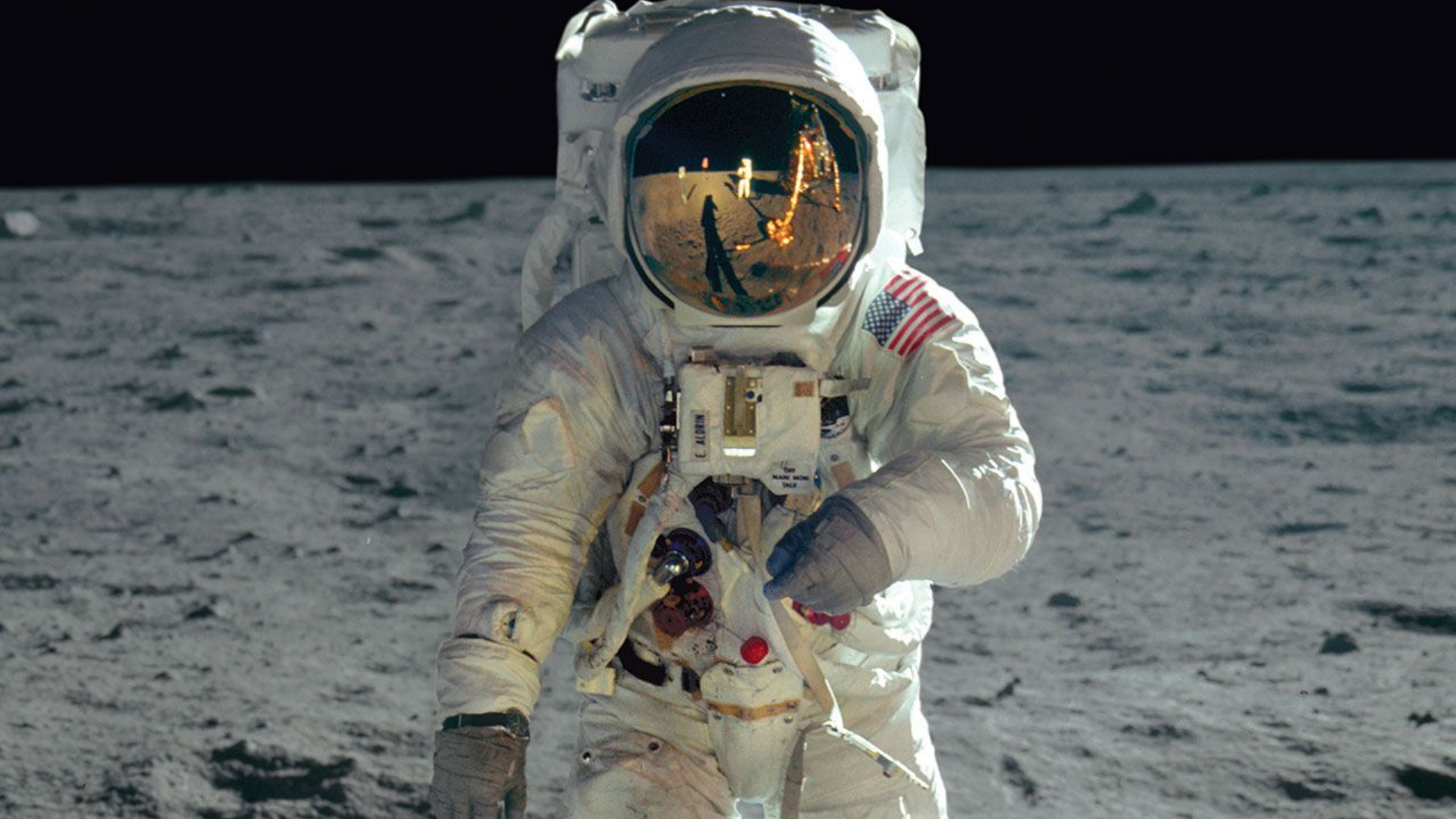
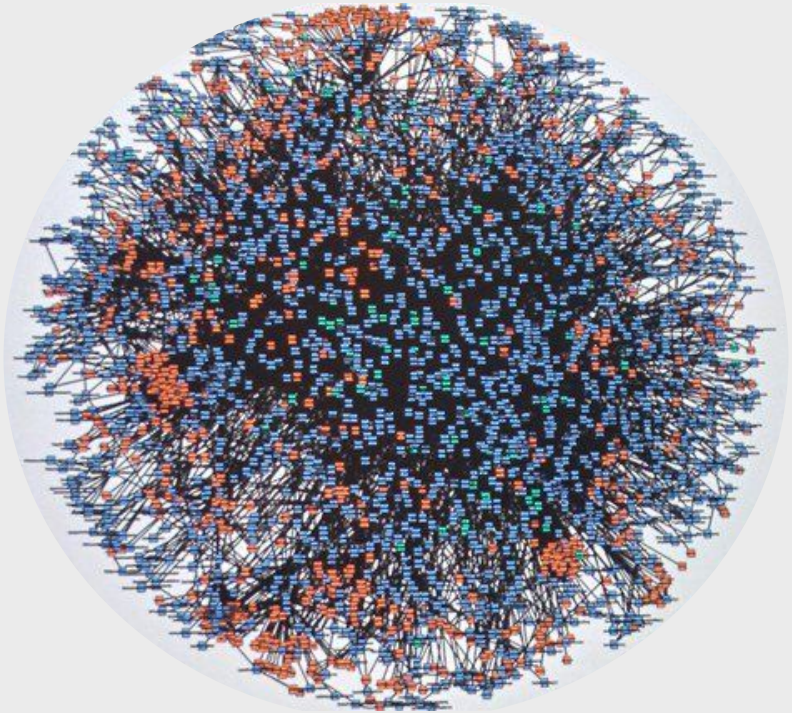
Improve Reliability of any Application using Kubernetes and Patterns

Davy Jones

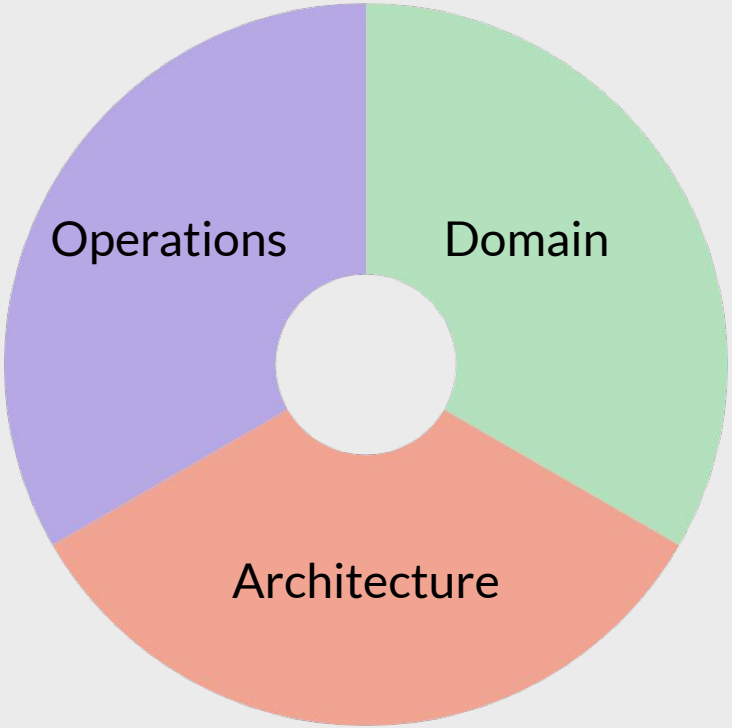
iZettle

@OpsDavy

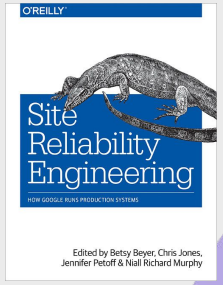




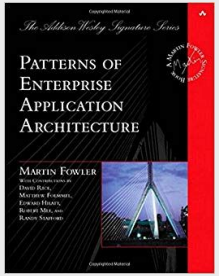
Complexity

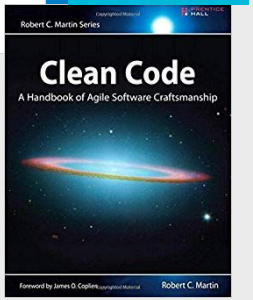


Complexity

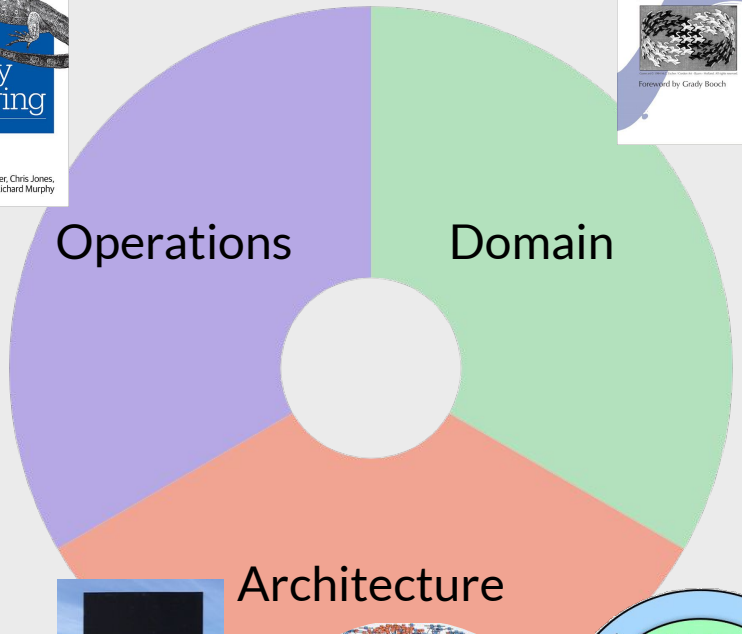

O'REILLY
Site Reliability Engineering
HOW GOOGLE RUNS PRODUCTION SYSTEMS
Edited by Betsy Beyer, Chris Jones, Jennifer Petoff & Niall Richard Murphy

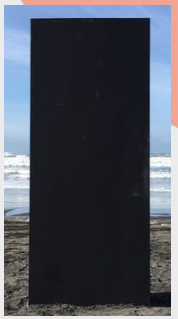

Design Patterns
Elements of Reusable Object-Oriented Software
Erich Gamma
Richard Helm
Ralph Johnson
John Vlissides
Foreword by Grady Booch
Domain-Driven DESIGN
Eric Evans

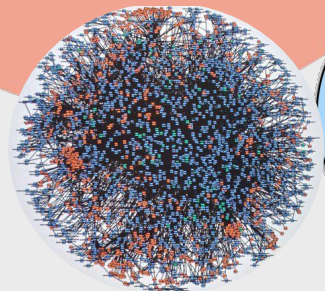

PATTERNS OF ENTERPRISE APPLICATION ARCHITECTURE
MARTIN FOWLER

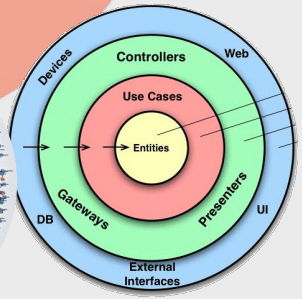

Robert C. Martin Series
Clean Code
A Handbook of Agile Software Craftsmanship
Robert C. Martin

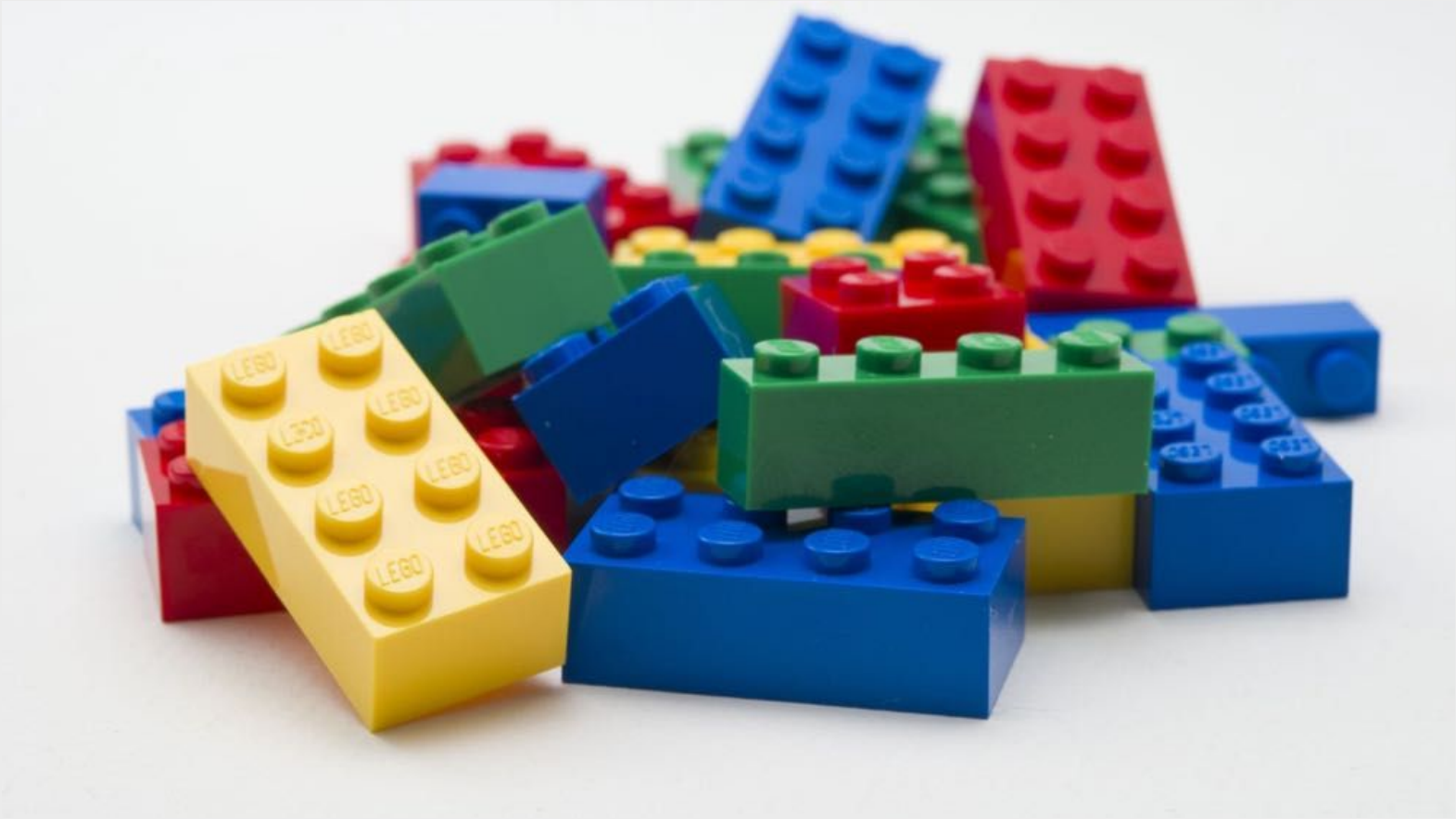

Release It!
Second Edition
Design and Deploy Production-Ready Software
Michael T. Nygard


Operations
Domain
Architecture



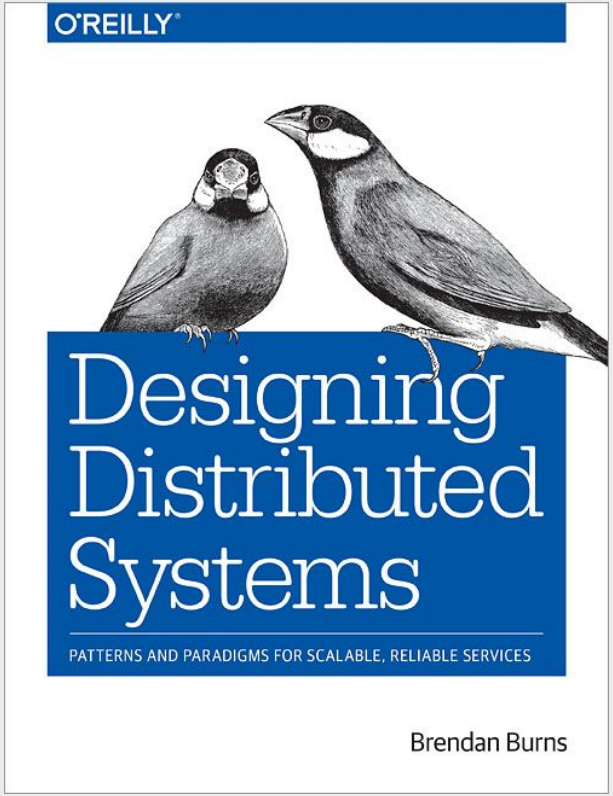



Devices
Controllers
Web
Use Cases
Entities
Gateways
Presenters
DB
UI
External Interfaces


LEGO

Design patterns for container-based distributed systems

Brendan Burns *David Oppenheimer*
Google



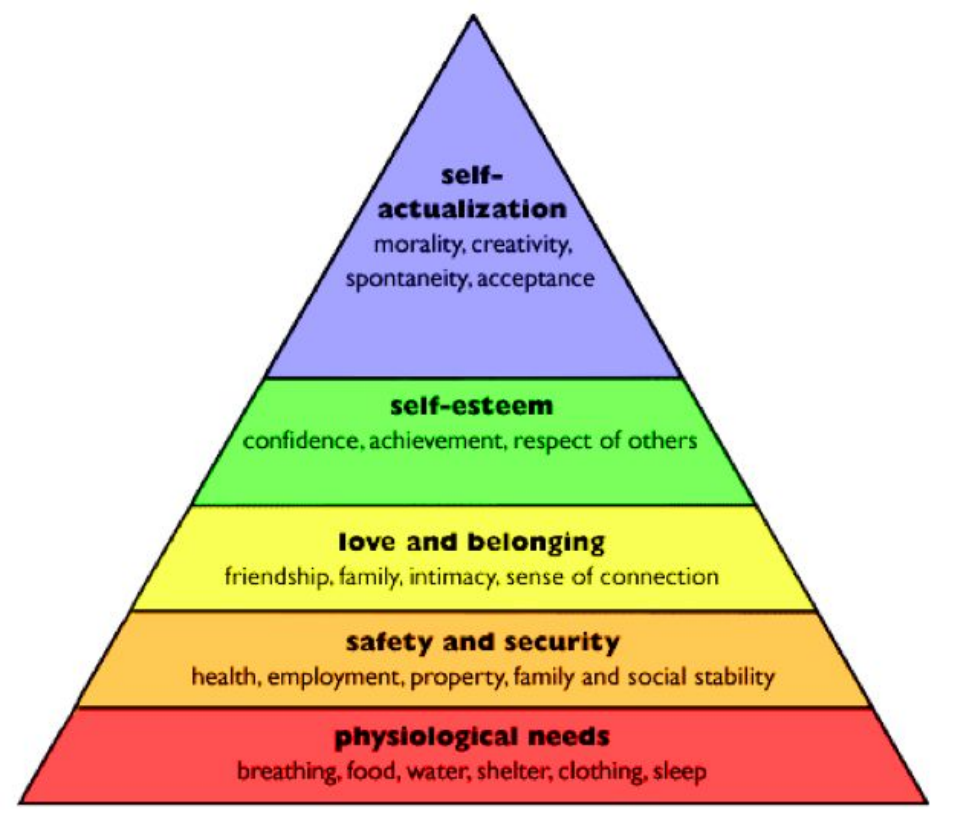

£25.00
iZettle


RELIABILITY

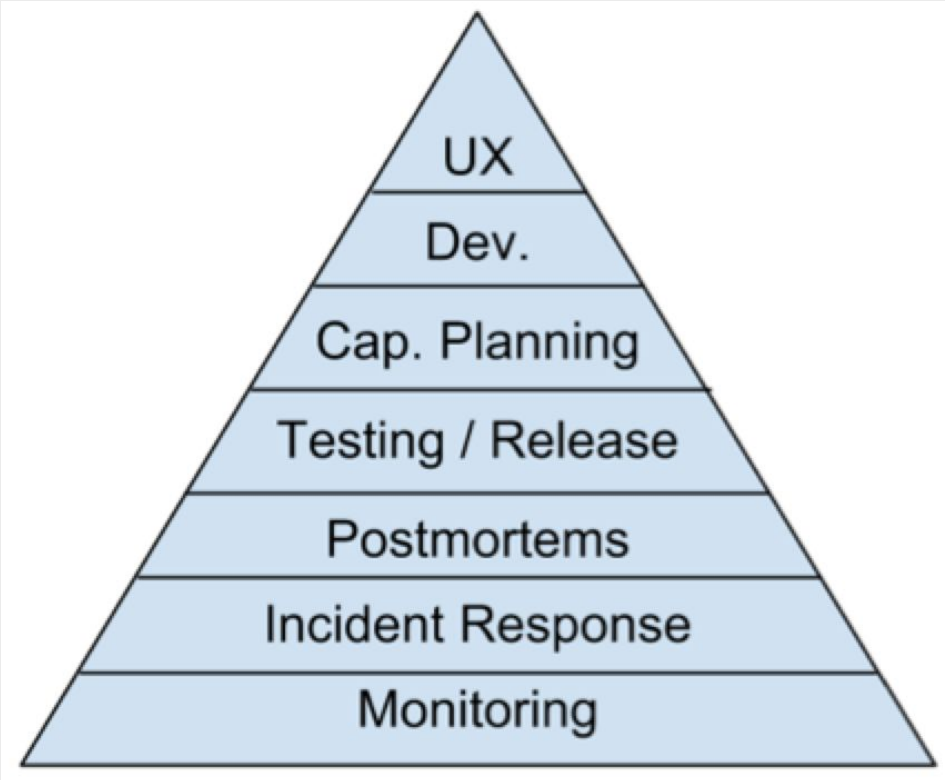
Your software is under attack from the moment you release it.

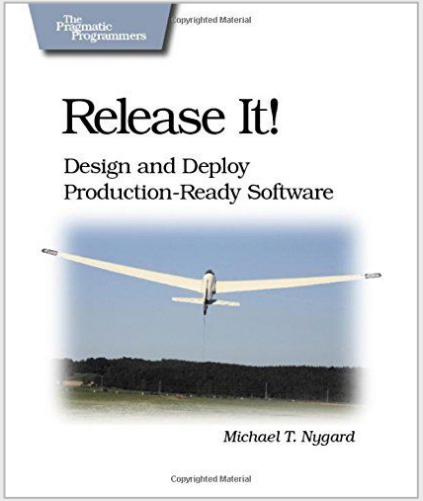
- Michael Nygard

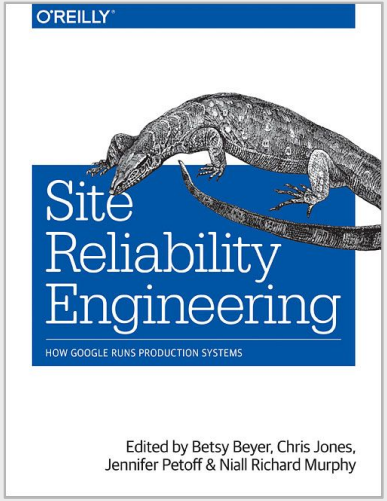
Human Needs

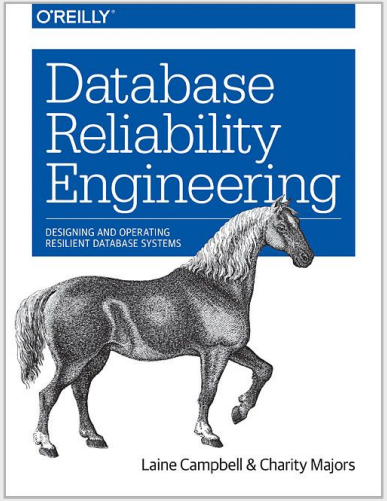

self-actualization
morality, creativity, spontaneity, acceptance
self-esteem
confidence, achievement, respect of others
love and belonging
friendship, family, intimacy, sense of connection
safety and security
health, employment, property, family and social stability
physiological needs
breathing, food, water, shelter, clothing, sleep

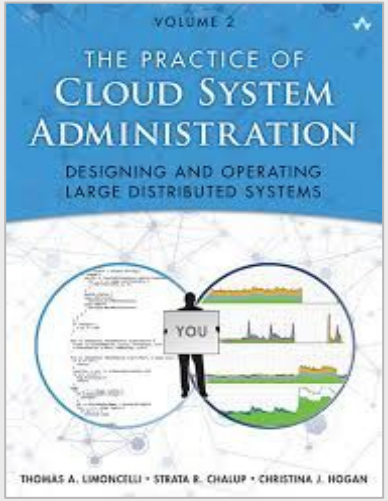
Reliability









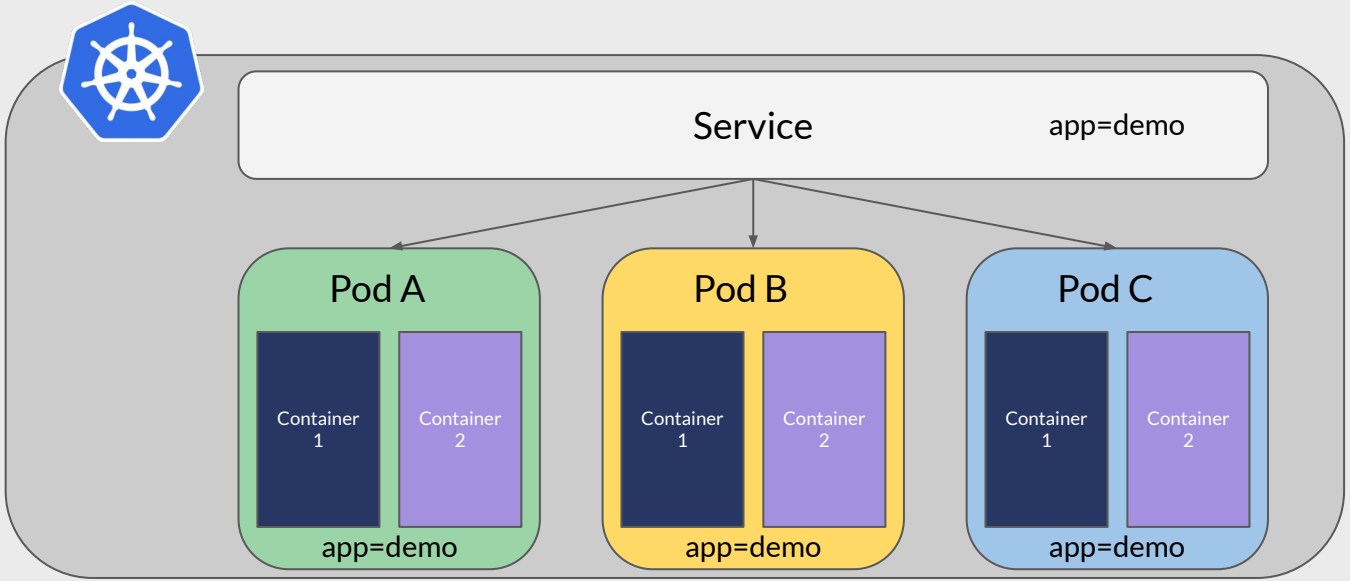


http://bit.ly/DavyGopherconUK

kubernetes

Kubernetes Pod

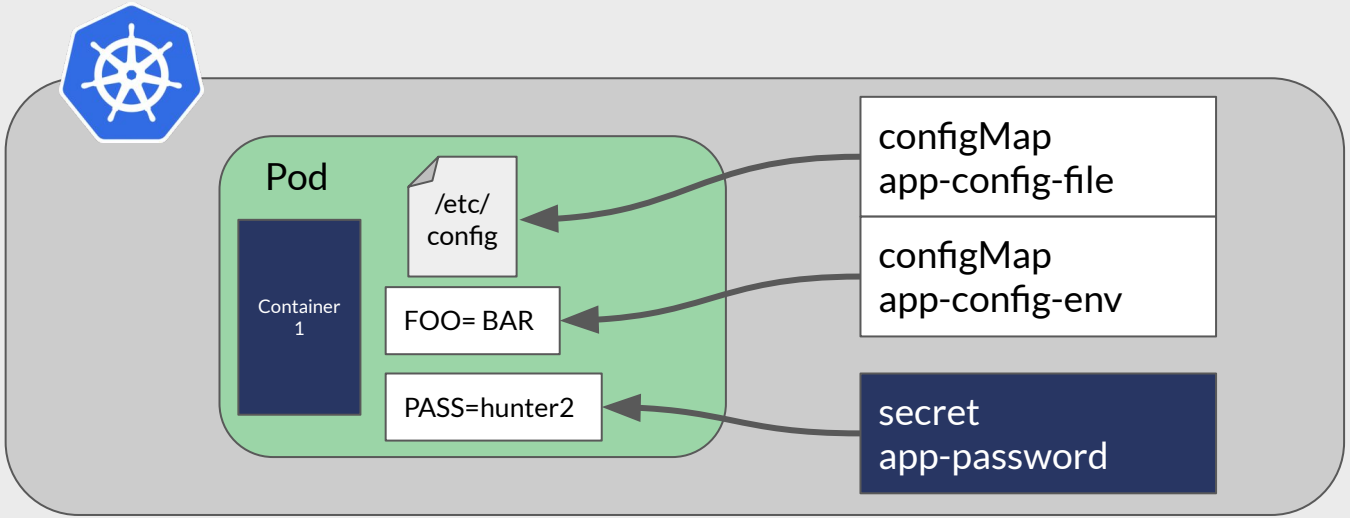
A *Pod* (as in a pod of whales or pea pod) is a **group of one or more containers**, with shared storage/network, and a specification for how to run the containers



ConfigMaps and Secrets

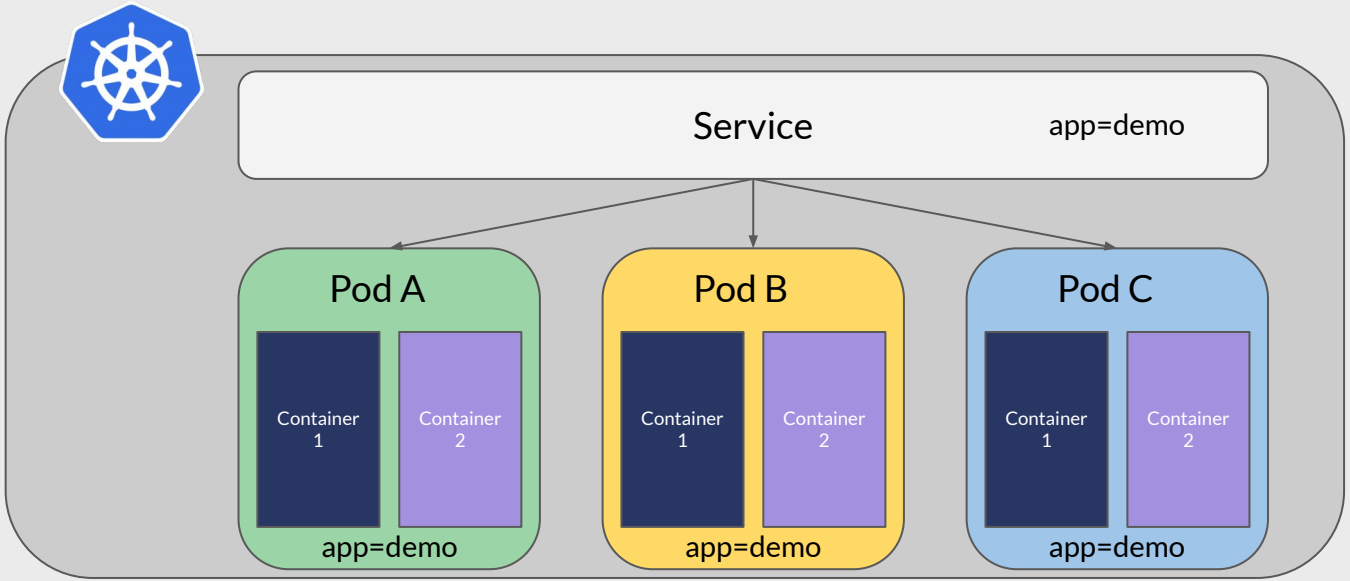
ConfigMap defines configuration that is added to a Pod as environment variables or mounted as a file

Secrets are encrypted ConfigMaps



Kubernetes Services

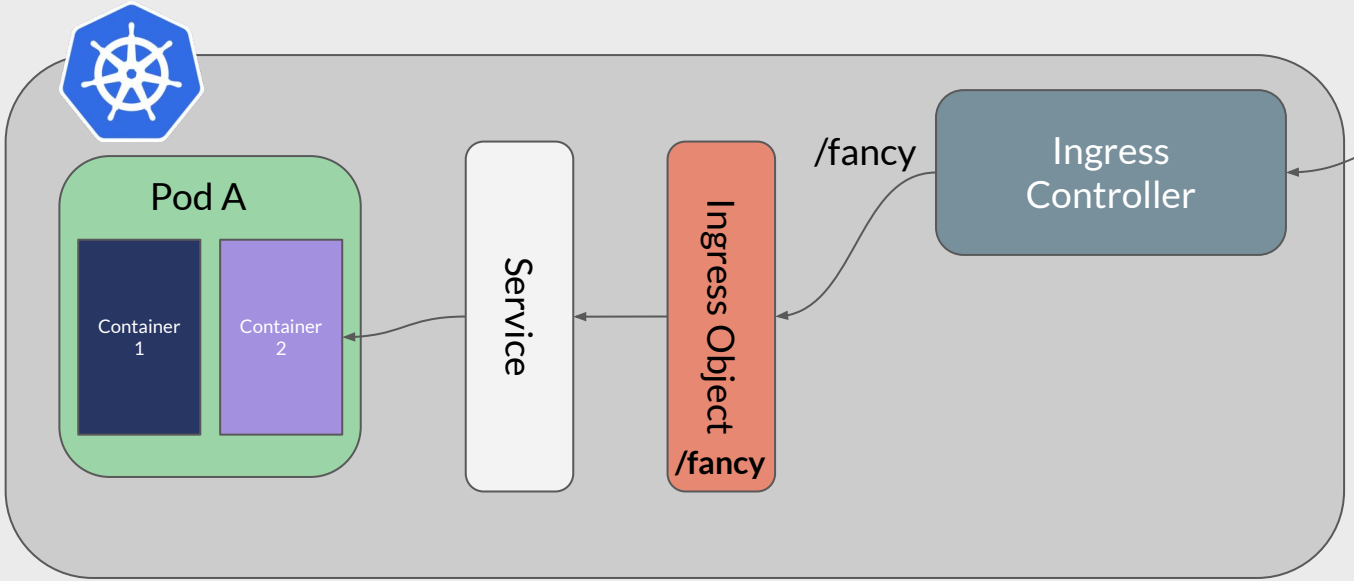
Defines a logical set of pods using label selectors and provides a way to access them in a load balanced way over a Virtual IP.



Fancy Gopher, by Renée French

Kubernetes Ingress

Manages external access to your services. Can provide TLS Termination and name based virtual hosting



Fancy Gopher, by Renée French

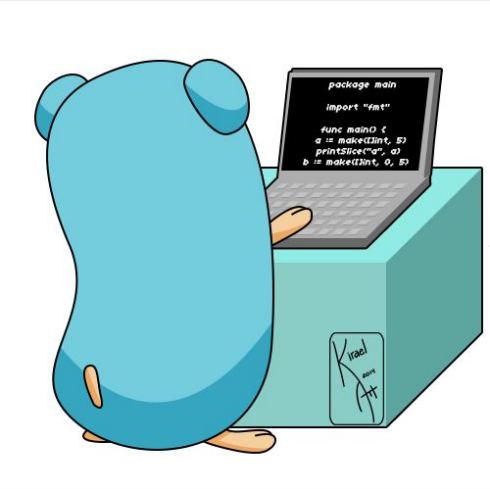
Custom Resource Definitions and Operator Pattern

CRDs allow you to extend Kubernetes.

e.g. Cert Manager allows for automated TLS Cert Provisioning

Operators allows you to encapsulate and automate some of the Operations work of using a tool.

e.g. Prometheus Operator



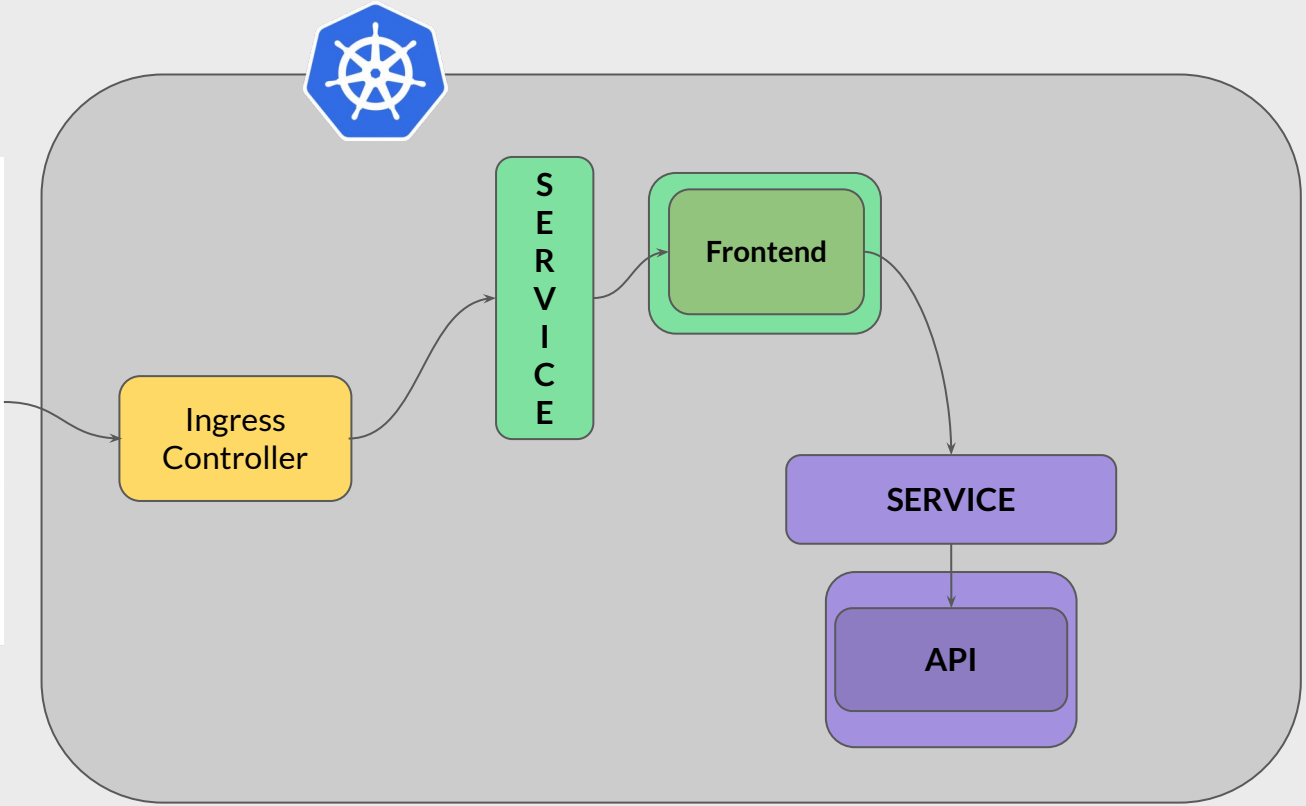


Image source:
https://www.deviantart.com/kirael-art/art/Go-lang-Mascot-458285682

API Initial Version

```yaml
apiVersion: apps/v1beta1
kind: Deployment
metadata:
  name: feelgood-api
  labels:
    app: feelgood-api
    release: gophercon
    version: initial
spec:
  replicas: 1
  template:
    metadata:
      labels:
        app: feelgood-api
        release: gophercon
    spec:
      containers:
        - name: feelgood
          image: 'awesome-corp/feelgood-api:0.0.3'
          ports:
            - containerPort: 8080
```

```yaml
apiVersion: v1
kind: Service
metadata:
  name: feelgood-api
  labels:
    app: feelgood-api
    release: gophercon
    version: initial
spec:
  selector:
    app: feelgood-api
    release: gophercon
  ports:
    - name: http
      protocol: TCP
      port: 80
      targetPort: 8080
  type: ClusterIP
```

Frontend Initial Version

```yaml
apiVersion: apps/v1beta1
kind: Deployment
metadata:
  name: frontend
  labels:
    app: frontend
    release: gophercon
    version: initial
spec:
  replicas: 1
  template:
    metadata:
      labels:
        app: frontend
        release: gophercon
    spec:
      containers:
        - name: frontend
          image: 'davyj0nes/gophercon-frontend:v0.4.0'
          ports:
            - containerPort: 4200
          envFrom:
            - configMapRef:
                name: frontend-config
```

```yaml
apiVersion: v1
kind: Service
metadata:
  name: frontend-service
  labels:
    app: frontend
    release: gophercon
    version: initial
spec:
  selector:
    app: frontend
    release: gophercon
  ports:
    - name: http
      protocol: TCP
      port: 80
      targetPort: 4200
```

Frontend Initial Version

```yaml
---
apiVersion: v1
kind: ConfigMap
metadata:
  name: frontend-config
  namespace: default
  labels:
    version: initial
data:
  PORT: "4200"
  GO_ENV: "development"
  API_ADDR: "http://feelgood-api"
```

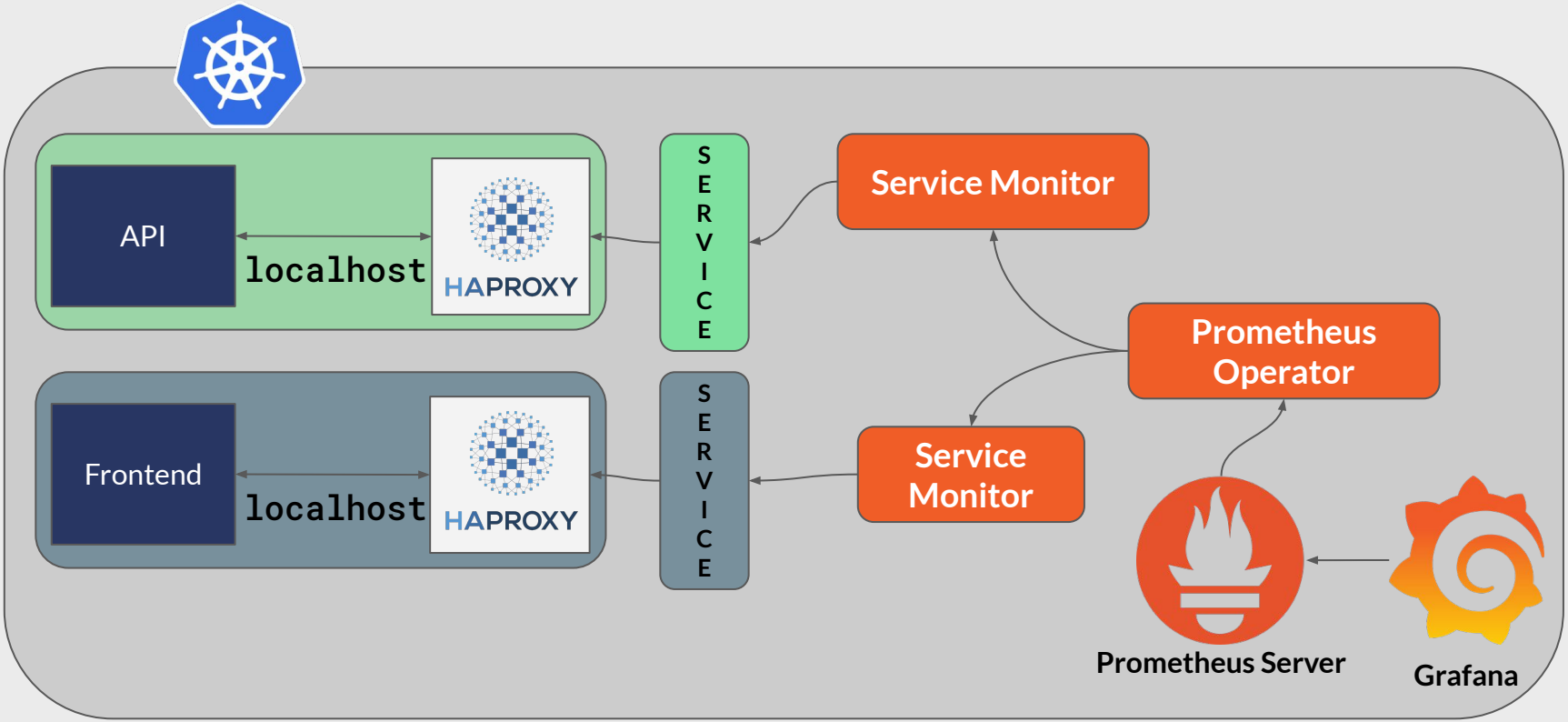
Patterns

- Sidecar

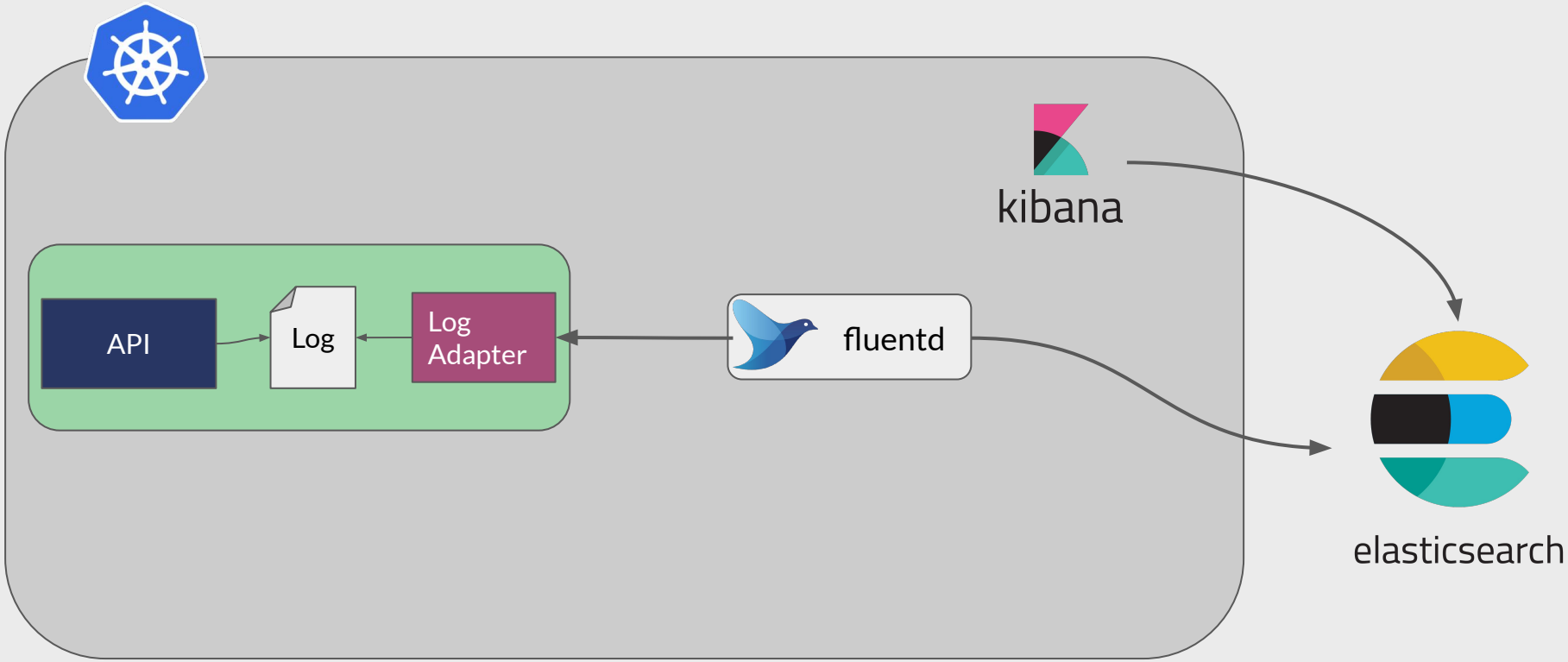
- Adapter

- Ambassador

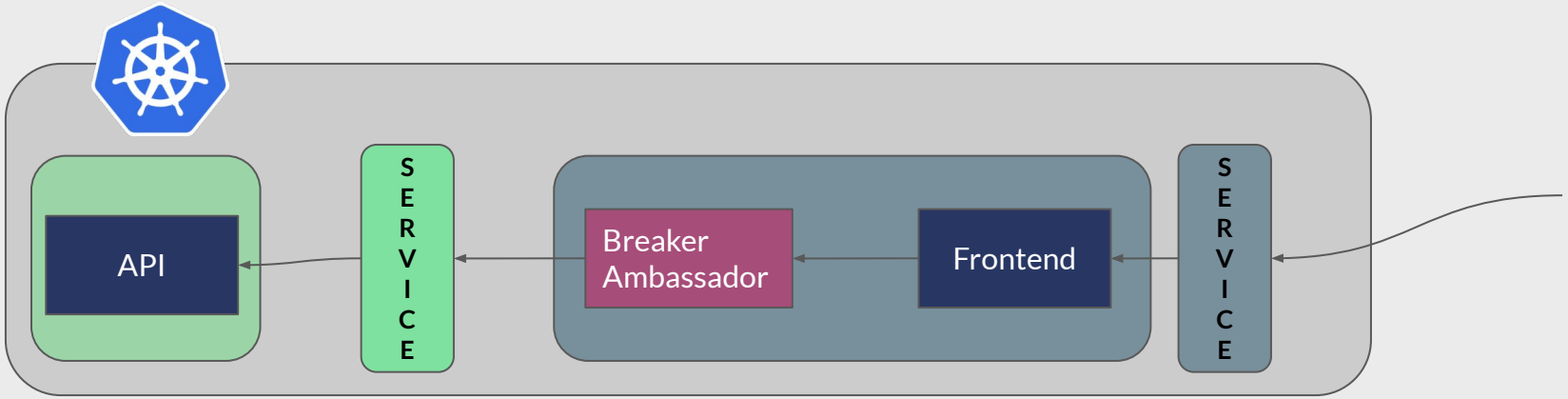
Proxy Sidecar



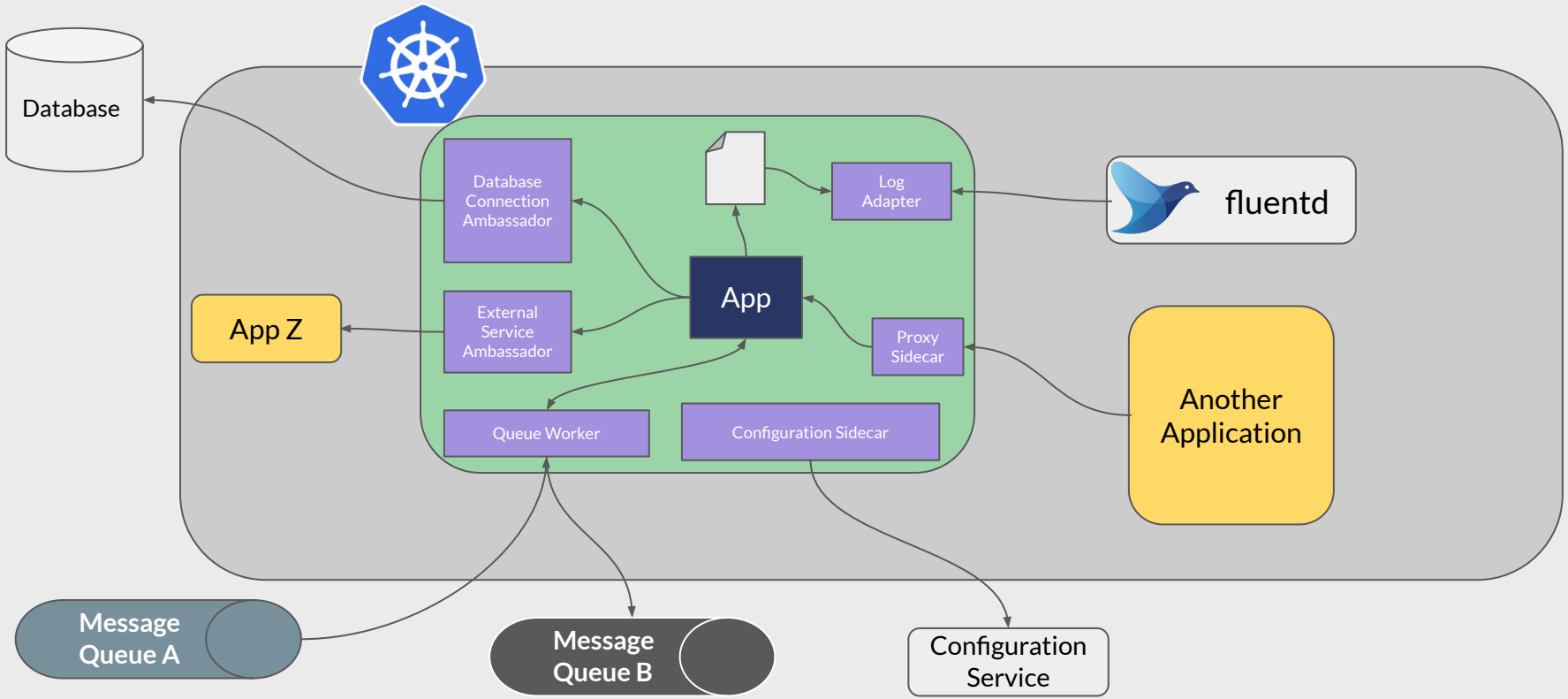
Log Adapter



Circuit Breaker Ambassador



Circuit Breaker

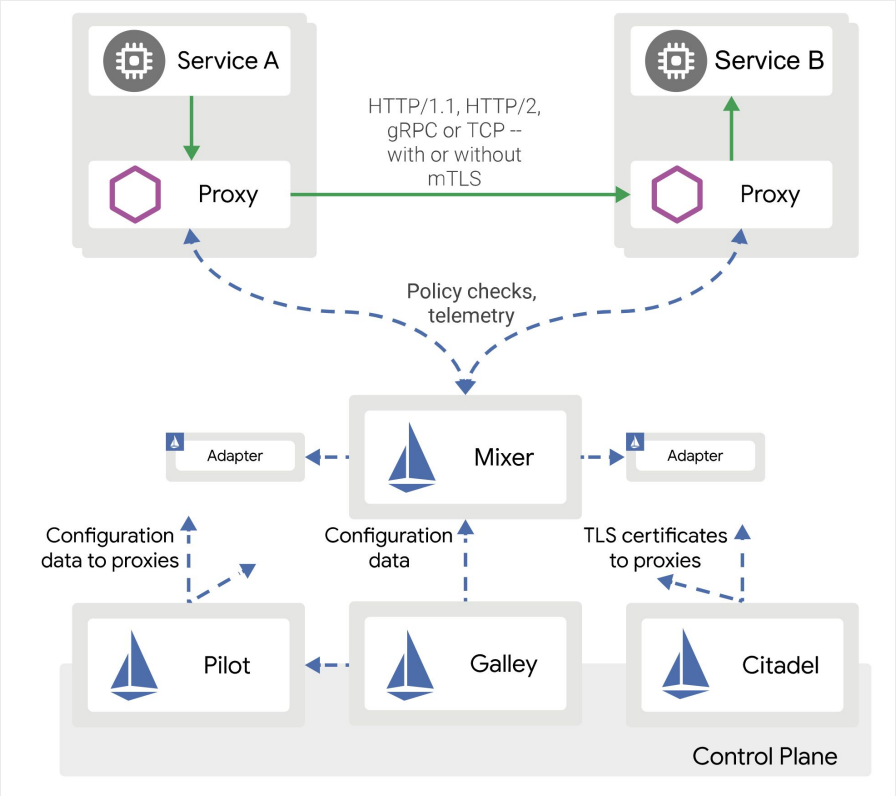

Database
Database Connection Ambassador
Log Adapter
fluentd
App
App Z
External Service Ambassador
Proxy Sidecar
Another Application
Queue Worker
Configuration Sidecar
Message Queue A
Message Queue B
Configuration Service

Service Meshes

linkerd

Istio

Service Meshes



Summary

Thank you!

Any questions?

Slides

http://bit.ly/DavyGopherconUK
https://github.com/DavyJ0nes/talks

iZettle

@OpsDavy

Links

- Example Code for Talk
- PagerDuty Incident Response Docs
- Burns, Oppenheimer - Design patterns for container-based distributed systems
- Mikey Dickerson Velocity NY 2014 Keynote: "One Year After healthcare.gov..."
- Resilience Engineering Youtube Playlist - Allspaw
- The Container Operators Manual - Goldfuss
- Resilience Roundup - Thai Wood
- Monitoring Weekly - Mike Julian
- SRE Weekly - Lex Neva

Links

- The SRE Book - Beyer et al
- SRE Workbook - Beyer et al
- Seeking SRE - Blank-Edelman
- Practice of Cloud Systems Admin - Limoncelli
- Release It! - Nygard
- Database Reliability Engineering - Campbell, Majors
- How Complex Systems Fail - Cook
- Alerting on SLOs like Pros - Soundcloud
- The RED Method - Weaveworks
- Large Cluster Management at Google with Borg - Verma et al

Links

- Kubernetes Docs
- Kubernetes Operator Pattern
- Prometheus Operator
- Cert Manager CRD
- Istio
- Linkerd
- Prometheus
- Jaeger
- OpenTelemetry