Kubernetes Pattern

Adopted From Roland Huss Presentaion on Devoxx Morocco 2018

Introduction

- My Name is Fitrah Elly Firdaus
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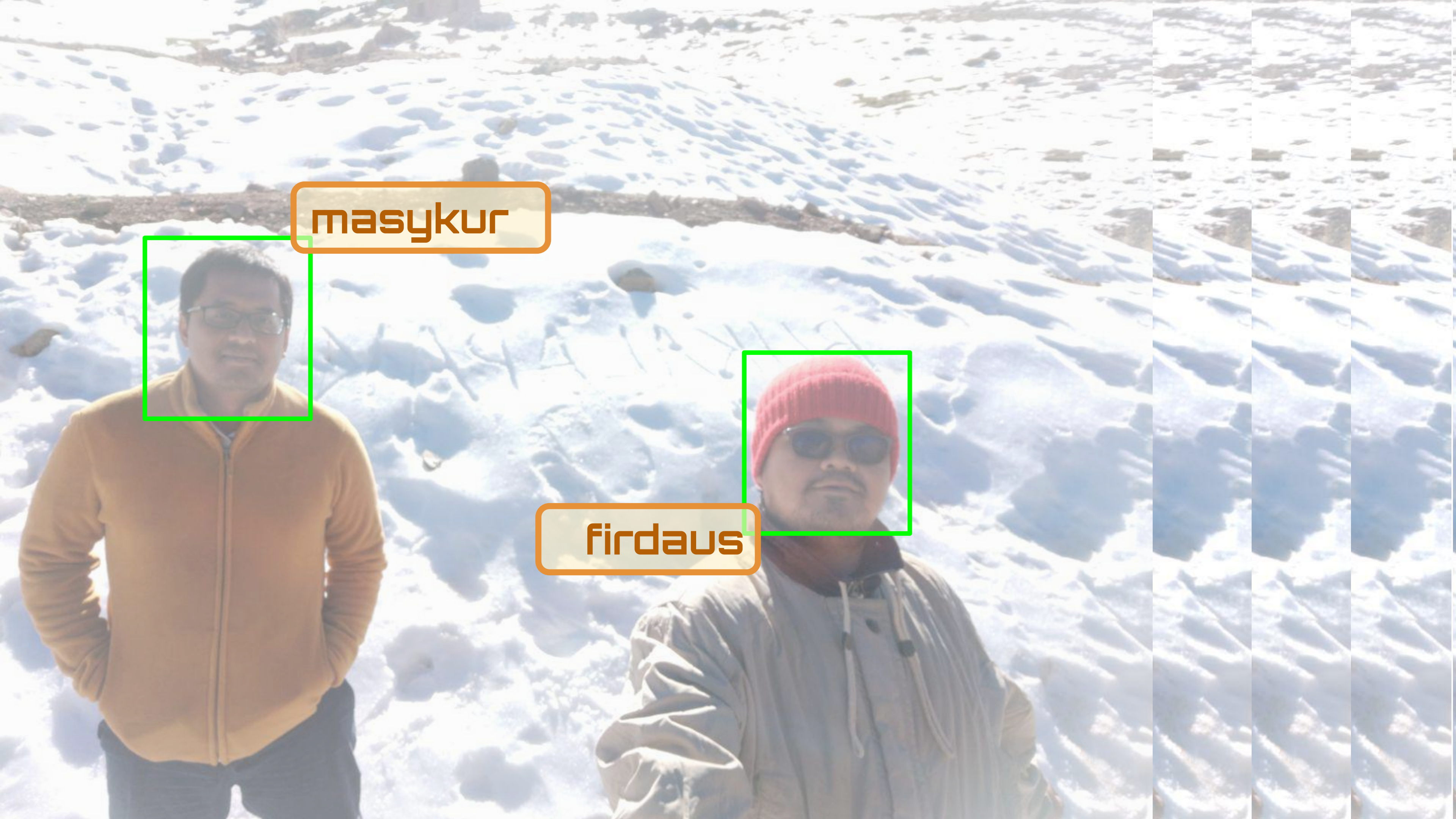
- @FEF339
- Ex-Traveloka

Background

- I and My Colleague Attend Devoxx Morocco 2018 (It’s All Free, Ticket + Accomodation + Admission charged to Bukalapak)
- Forced By Imre 😂😂😂


masykur
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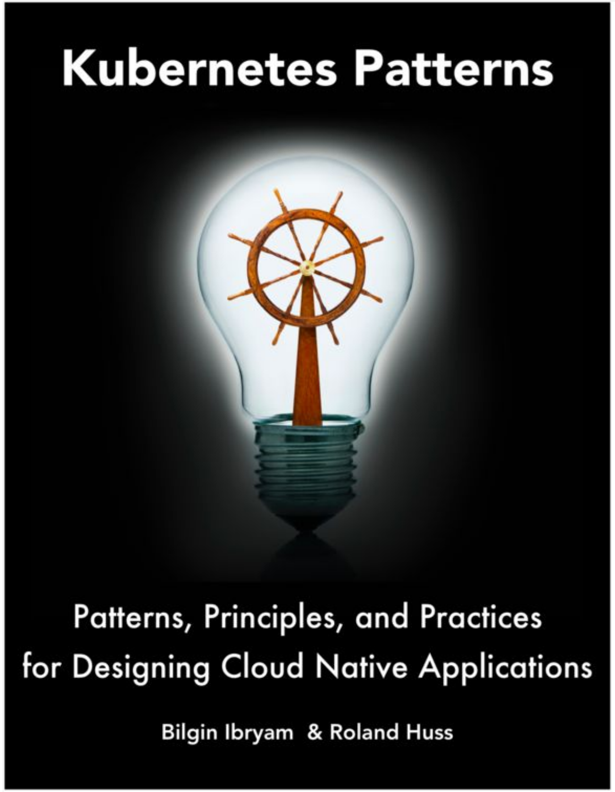
Kubernetes

- Open Source Container Orchestration System
  - Scheduling
  - Self-Healing
  - Horizontal Scaling
  - Service Discovery
  - Rollout and Rollback
- Declarative resource-centric REST API

Design Pattern

A Design Pattern describes a repeatable solution to software engineering problem



Kubernetes Patterns

Patterns, Principles, and Practices
for Designing Cloud Native Applications

Bilgin Ibryam & Roland Huss

https://leanpub.com/k8spatterns

Categories

- Foundational Patterns
- Structural Patterns
- Configurational Patterns
- Advanced Patterns

Foundational Patterns

Automatable Unit

How can We create and manage applications with kubernetes?

- **Pods**: Atomic unit of containers
- **Services**: Entry point to pods
- **Replica Set**: Responsible for managing pods
- Grouping via **Labels, Annotations, Namespaces**

Predictable Demands

How can We handle resource requirements deterministically?

- Requirements should be declared to help in
  - Matching infrastructure services
  - Scheduling decisions
  - Capacity Planning

Runtime Dependencies

- Persistent Volumes
- Host Ports
- Configuration via ConfigMaps and Secrets

Resource Profiles

- Resources:
  - CPU, Network
  - Memory
- App: Declaration of resource **requests** and **limits**
- Platform: Resource quotas and limit ranges

QOS Classes

- Best Effort
  - No Requests or limits
- Burstable
  - Requests < limits
- Guaranteed
  - Requests == limits

Declarative Deployment

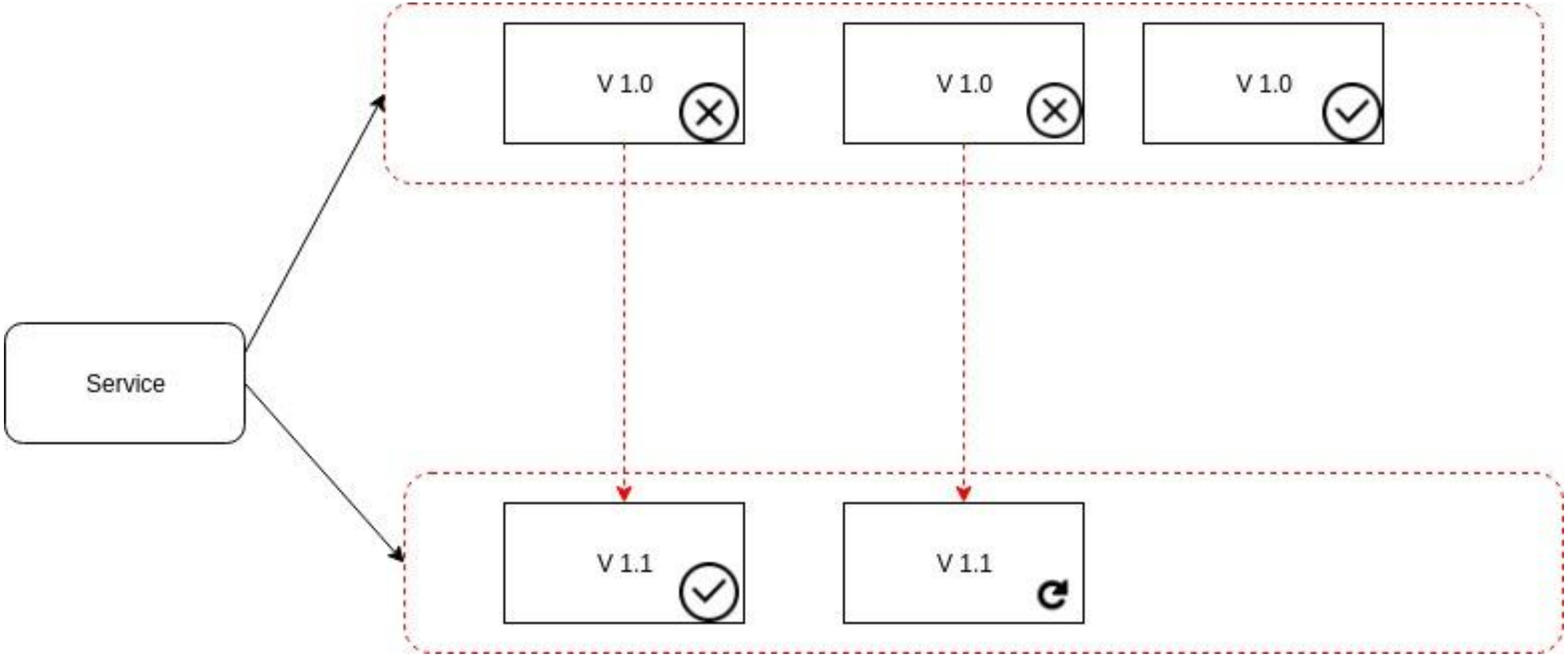
How can applications be deployed and updated?

- Declarative versus Imperative deployment
- Various Update strategies

Deployment

- Holds template for Pod
- Create ReplicaSet on the fly
- Allows rollback
- Update strategies declarable
- Inspired by DeploymentConfig from OpenShift

Rolling



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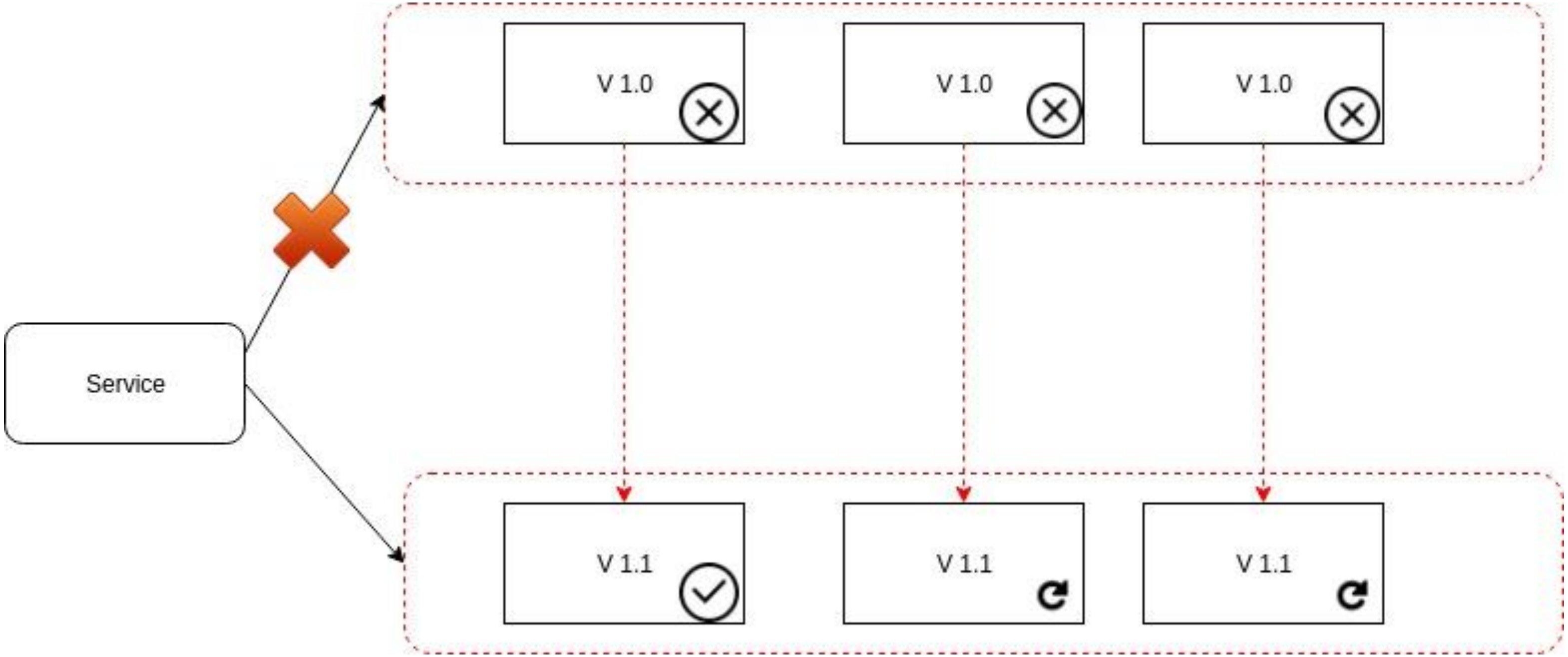
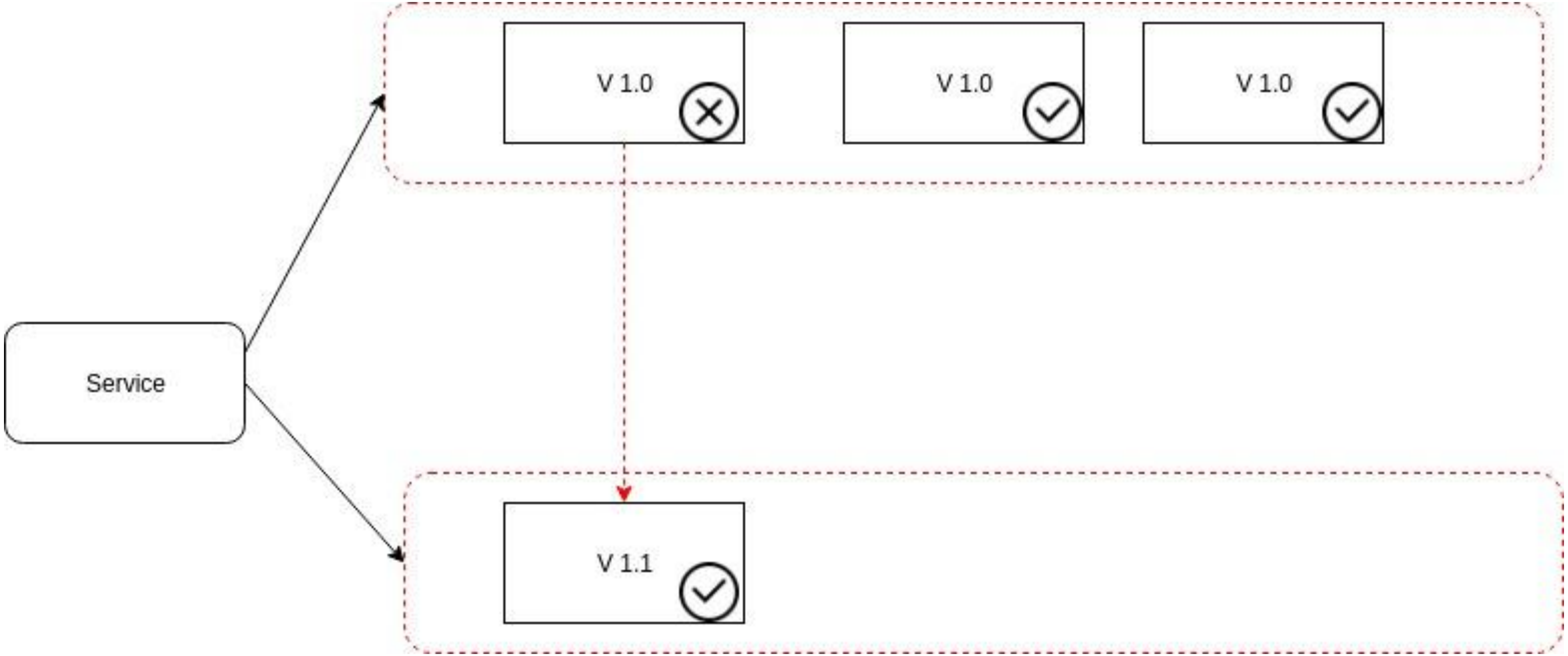
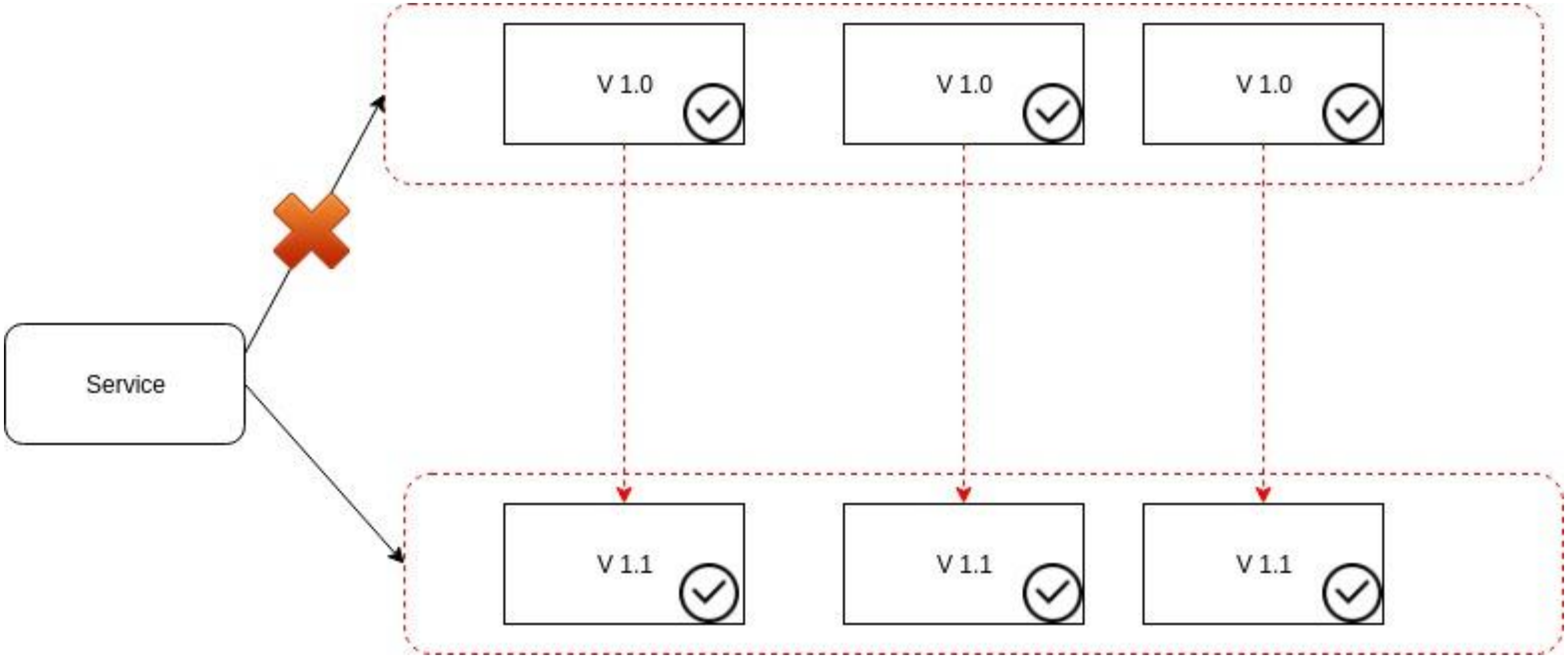


Canary



Blue-Green



Structural Patterns

Initializer

How can I initialize my containerized applications?

- **Init Container:**
  - Part of Pod
  - One shot action before Pod starts
  - Needs to be idempotent
  - Has own resource requirements

Sidecar

How can I extend the functionality of an existing container?

- Runtime collaboration of containers
- Connected via shared resources
  - Network
  - Volumes

Ambassador

How to decouple a container’s access **to** the outside world?

- Also known as **Proxy**
- Specialization of a Sidecar
- E.g. infrastructure services
  - Circuit Breaker
  - Tracing

Adapter

How to decouple a container's access **from** the outside world?

- Opposite of Ambassador
- Uniform access to application
- Examples
  - Monitoring
  - Logging

Configurational Patterns

EnvVar Configuration

- Universal Applicable
- Recommended by Twelve Factor App Manifesto
- Can be only set during startup of application

Configuration Resource

- **ConfigMap** and **Secret** : Intrinsic K8s Resources
- Can be used in two ways:
    - Reference for environment variables
    - Files mapped to volume

Configuration Template

- **ConfigMap** not suitable for large configuration
- Managing similar configuration
- Ingredients:
  - Init-container with template processor and templates
  - Parameters from a ConfigMap volume
- https://kubernetes.io/blog/2018/05/29/introducing-kustomize-template-free-configuration-customization-for-kubernetes/

Immutable Configuration

- Configuration is put into container itself
- Configuration container is linked to application container during runtime

Advanced Patterns

Controller

How can I extend the platform itself without changing it?

- Watching resources by registering for Kubernetes events
- Reacting on changes in resource declarations
- Managed pod listening for Kubernetes API events
- State Reconciliation: Make the current state like the declared desired state

Operator

How can I introduce domain specific resources and react on them?

- Custom Resource Definition (CRD) managed by kubernetes
- Accessible via the Kubernetes API
- Watched by Controllers

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