

# Playing with Operators

Overview, Deploying Applications, Administration



# kubernetes

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Oktober 2021

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# Agenda



- 1 What's kubernetes?
- 2 Operator, WTF?
- 3 Operator, How?
- 4 Operator, Where?



## My Job

- ▶ Get Container (& Kubernetes) running in your Company
- ▶ Get Your App into a container
- ▶ Get Your App running on Kubernetes

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## You know

- ▶ kubernetes exists
- ▶ Kubernetes operates apps
- ▶ Kubernetes likes container

## Your like

- ▶ Simpler Kubernetes app operation
- ▶ New, fancy stuff

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# Whats a container?

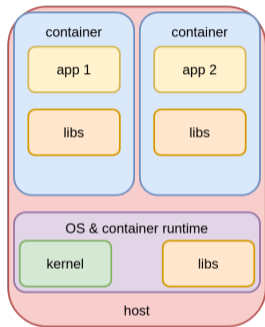


Figure: A Host running two container

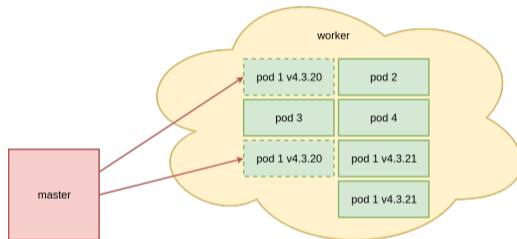


Figure: an orchestrator running some pods

# How do I run an app on kubernetes?

1. Deploy
2. Run
2. Run
2. Run
3. Sundown

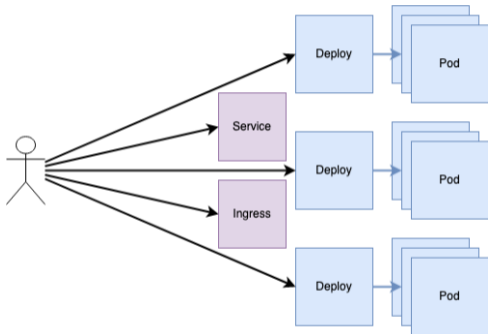


Figure: Maintain your complex App



# The issue



Tasks are

- ▶ complex
- ▶ repetitive

But we want

- ▶ simple work
- ▶ automate everything

⇒ we want a software operating our apps

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# The kubernetes api?

1. Kubernetes uses an API-Server
2. the API-Server is serving API-Objects
3. [System-]Apps may read those Objects

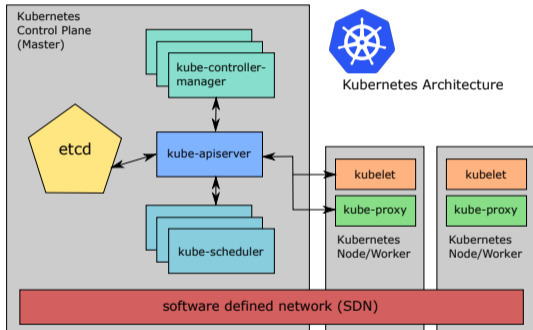


Figure: Kubernetes Overview

# CRD? What's that?



TODO: short example of kubernetes CRD

## Custom **R**esource **D**efinition

- ▶ extend Kubernetes api
- ▶ defined by apps
- ▶ used to save kubernetes-related information  
(textbfonly for kubernetes related information)

# A CRD Example



```
1  apiVersion: apiextensions.k8s.io/v1
2  kind: CustomResourceDefinition
3  metadata:
4    name: kubeinvaders.osad-munich.osad-munich.org
5  spec:
6    group: osad-munich.osad-munich.org
7    [...]
8    versions:
9      - name: v1alpha1
10      schema:
11        openAPIV3Schema:
12          properties:
13            spec:
14              properties:
15                defenders:
16                  properties:
17                    count:
18                      format: int32
```

# A CRD Example



```
1  apiVersion: osad-munich[...].org/v1alpha1
2  kind: KubeInvader
3  metadata:
4    name: crd-sample
5  spec:
6    invaders:
7      - count: 4
8        namespace: "invaders"
9        image: "nginx"
10   defenders:
11     count: 1
12     namespace: "defenders"
13     host: "localhost"
```

# What's an operator?



- ▶ App managing Kubernetes Apps
- ▶ Use CRD for definition
- ▶ may create apps on cluster
- ▶ may control apps while running
- ▶ may sundown controlled apps

See also: Operator Pattern

# How does it work?

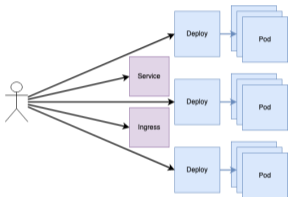


Figure: \*

Self-managed K8s App

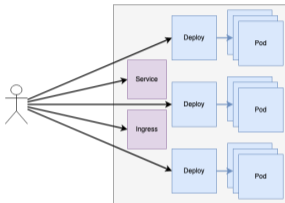


Figure: \*

Self-managed, grouped K8s app

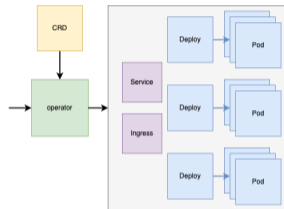


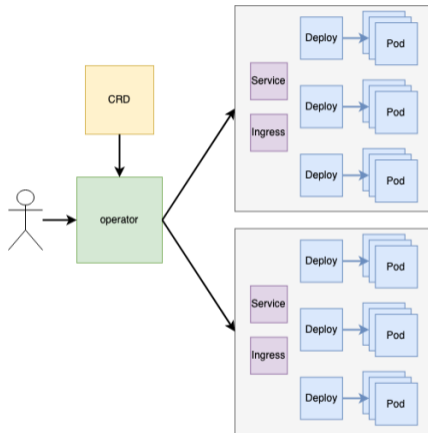
Figure: \*

Self-managed, grouped K8s app



# What can operators do for me?

- ▶ Simplify
  - ▶ Deployment
  - ▶ Maintaining
- ▶ Minimal need of human interaction



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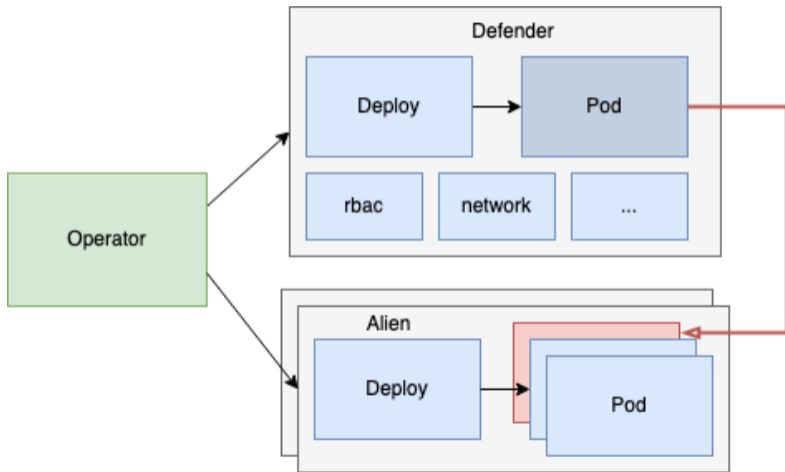
# How do I build an operator?



0. Choose your framework
1. Code your operator
2. Deploy your operator
3. be happy!
4. if something fails, go back to ,2.'



# Lets build our own



- ▶ Chaos-Engineering App
  - ▶ watches namespaces
  - ▶ Randomly 'shoots' Pod-Aliens
- ▶ Helm-Chart based
- ▶ Fun to watch



Figure: \*

src [kubernetes.io/blog/2020/01/22/](https://kubernetes.io/blog/2020/01/22/)

[kubeinvaders-gamified-chaos-engineering-tool-for-kubernetes/](https://kubernetes.io/blog/2020/01/22/kubeinvaders-gamified-chaos-engineering-tool-for-kubernetes/)

## Our Operator should

- ▶ Auto-Setup for
  - ▶ Defense (kubeinvader)
  - ▶ Aliens (some pods)
- ▶ Watch config Changes
- ▶ Sundown App

## What we have

- ▶ Kubeflow Helm-Chart
- ▶ Self-Healing of Kubernetes

showtime

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# A Bug Feature Comparison



+

- ▶ Manage complex apps
- ▶ Manage multiple instances of an app

-

- ▶ Hidden Complexity
- ▶ more code necessary

- Manage complex apps with operators
- leave simple apps as they are

# Operators, Where?



Where do I get some Operator?

- ▶ There is a hub for you  
<https://operatorhub.io/>
- ▶ or just build your own

- ▶ [kubernetes.io/blog/2020/01/22/kubeinvaders-gamified-chaos-engineering-tool-for-kubernetes/](https://kubernetes.io/blog/2020/01/22/kubeinvaders-gamified-chaos-engineering-tool-for-kubernetes/)
- ▶ [kubernetes.io/docs/concepts/extend-kubernetes/operator/](https://kubernetes.io/docs/concepts/extend-kubernetes/operator/)

