PRAQMA

An introduction to Kubernetes

About Praqma

Offices:

- Allerød
- Copenhagen
- Aarhus
- Odense
- Oslo
- Stockholm
- Gothenburg
- Malmö

Technologies:

- CI / CD
- Docker partner
- GitHub partner
- Kubernetes
- Atlassian experts

Meetups / conferences:

- code-conf.com
- Docker Aarhus
- Automation Nights
- Day of Containers
- CoDe Academy

Pssst… We're hiring!

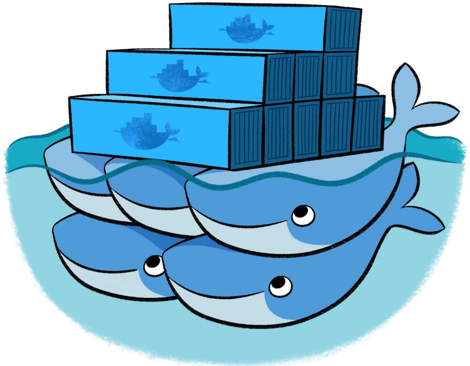
Running containers - now what?

- Situation: Everyone loves Containers
  - You’re willing to kill your pets, and grow some cattle.
- Problem: How to manage large sets of containers and services
  - Networking
  - Deployment / Updating / Scheduling
  - Replication / Availability
  - Resilience
  - Storage

Container orchestration

Mesos + Aurora /
Marathon

Kubernetes



SwarmKit

Why choose an orchestration tool?

Solving problems regarding containers in production, by giving you:

- Availability - scale as defined in your desired state
- Resilience - if a container exits, a new one is created
- Storage - Local, NFS, iSCSI, GCEP, AWS EBS and more
- Deployments - with Canary pattern
- Updates - with Rolling Updates
- Networking and Cluster DNS
- Service Discovery

Why choose Kubernetes

- It’s made in parts that are exchangeable and optimizable
- It’s extendable, no second class plugins
- Canary deployments, Rolling Updates, Events and more
- Relies on years of experience from Google’s production system - Borg

TECTONIC by CoreOS

OPENSHIFT

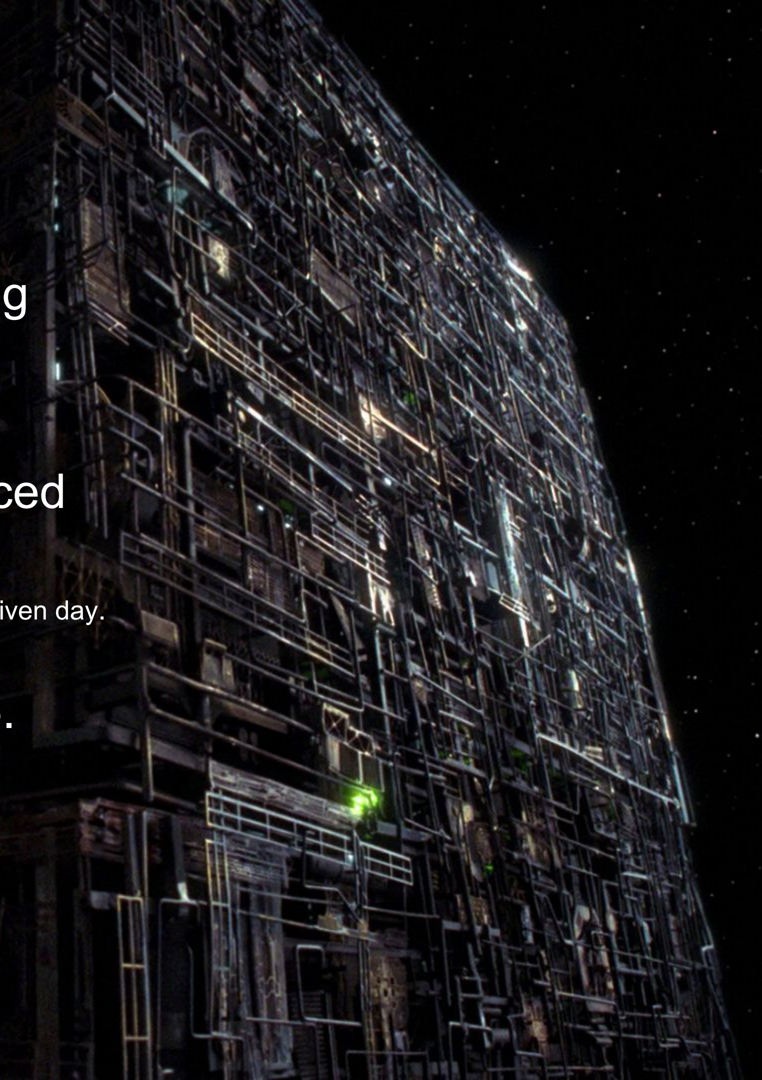
RANCHER

A history of Kubernetes

- Founded by Joe Beda, Brendan Burns and Craig McLuckie in 2014.

- It’s development and design are heavily influenced by Google's Borg system.
  - It schedules and launches approximately 7,000 containers a second on any given day.

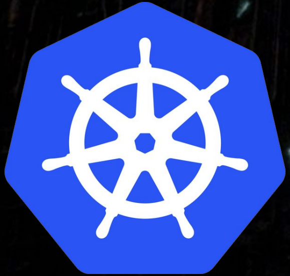
- Kubernetes v1.0 was released on July 21, 2015.



A history of Kubernetes (bonus info)

- Kubernetes logo has seven sides
- The borg who joined the federation is called “Seven of Nine”

Seven of Nine is a former Borg drone who joins the crew of the Federation starship Voyager.



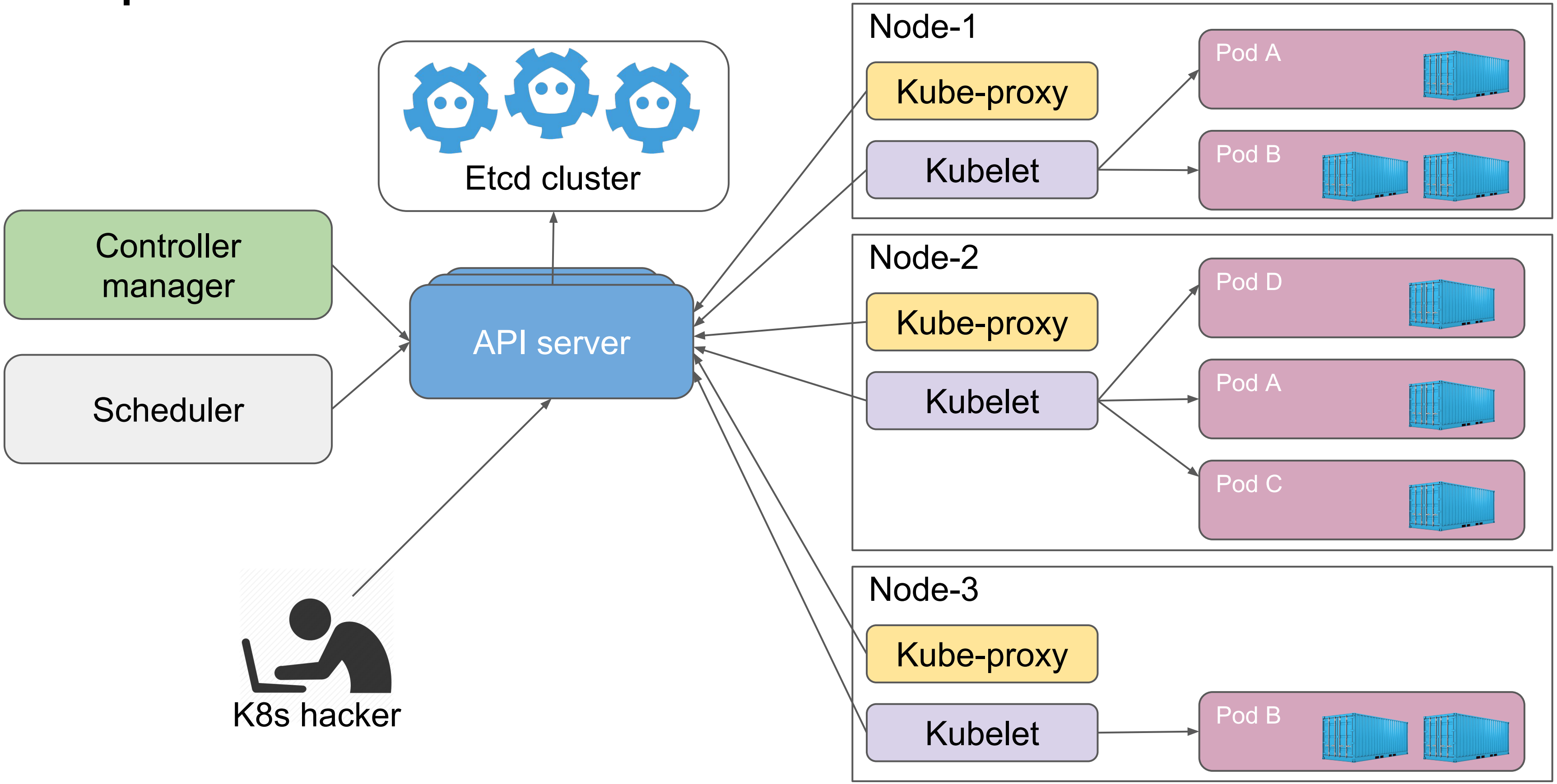
Seven of Nine, along with three other drones, crashed on a planet and they were separated from the Borg Collective. This caused their individualities to resurface over time, which caused Seven to panic and created a temporary hive mind between the four of them until they were retrieved by the Borg.

NK

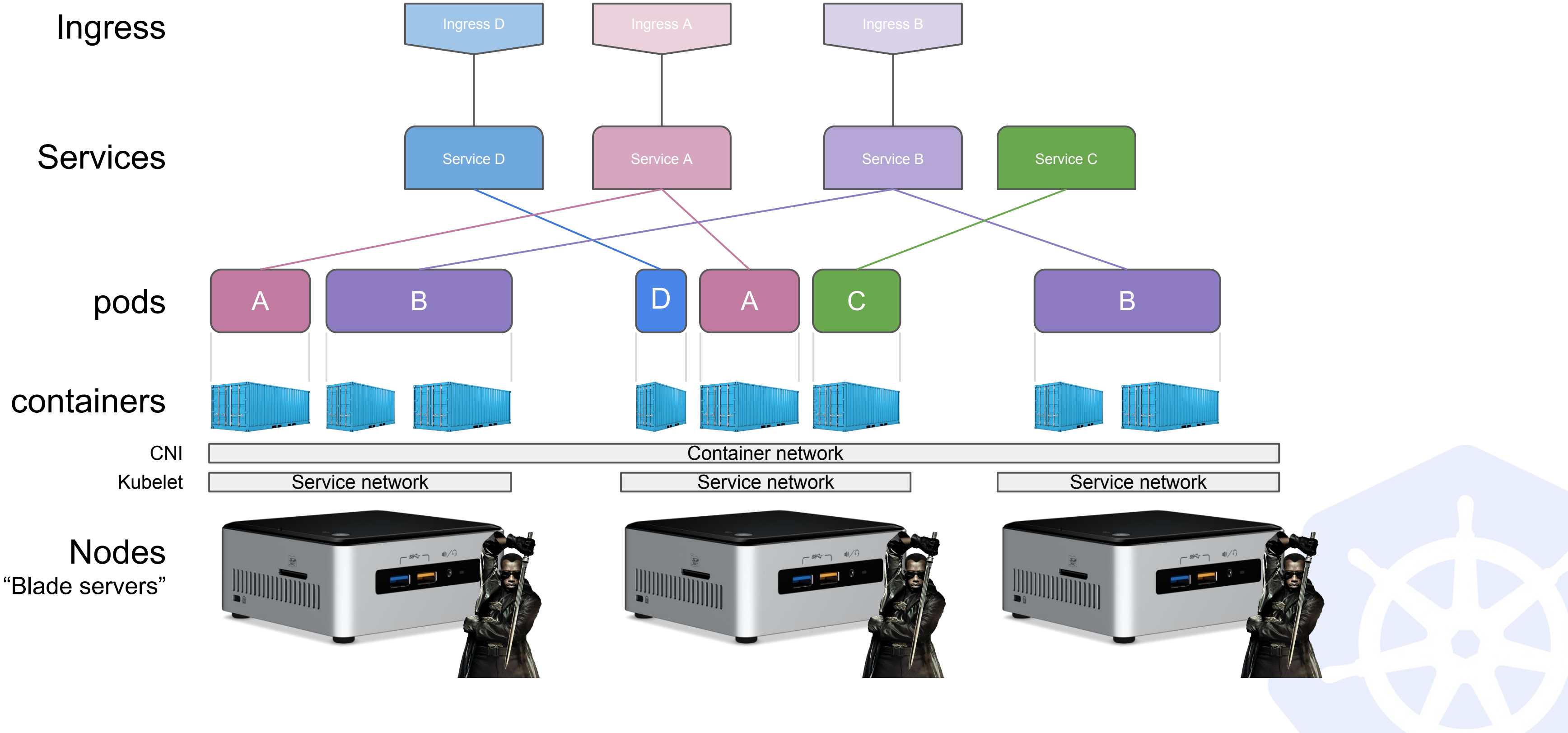
NERD

KINGDOM

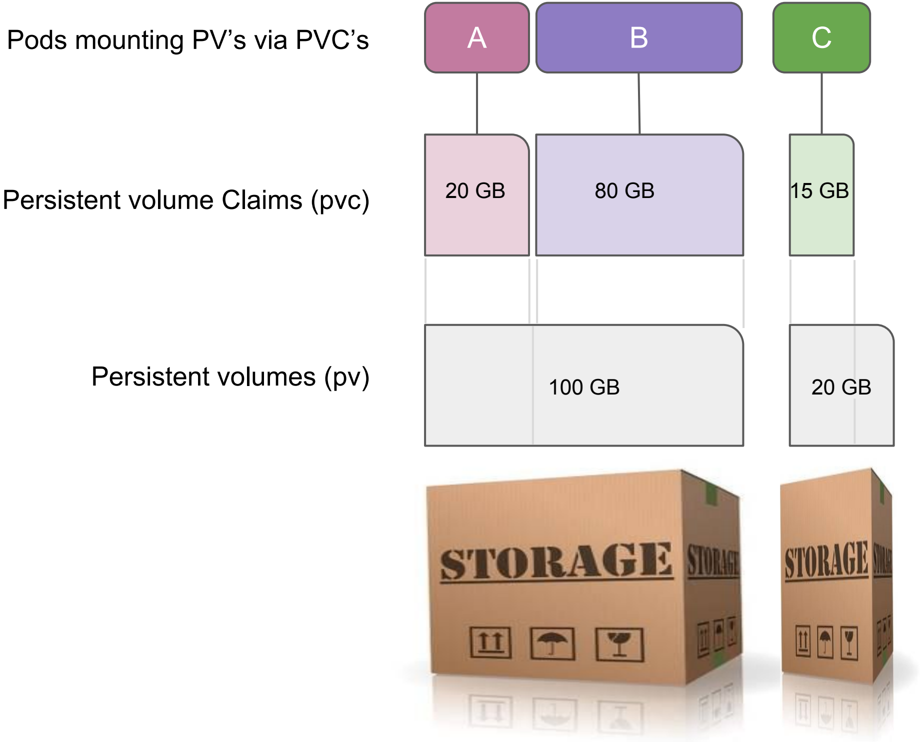
Components of Kubernetes



Objects in Kubernetes



Objects in Kubernetes - Storage

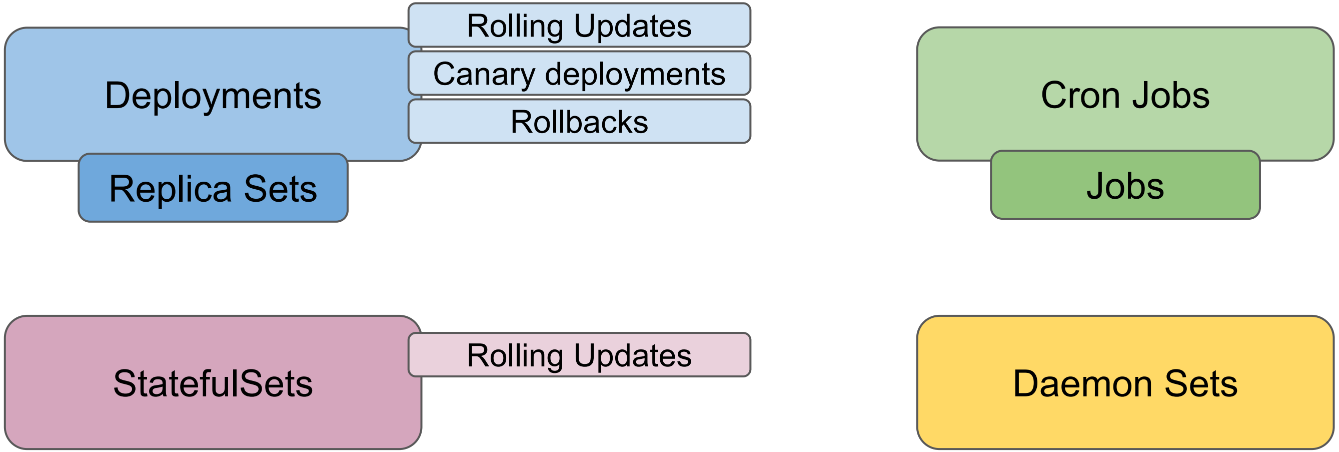


Pods mounting PV’s via PVC’s

Persistent volume Claims (pvc)

Persistent volumes (pv)

Controllers in Kubernetes - Different breeds



Deployments

Rolling Updates

Canary deployments

Rollbacks

Replica Sets

Cron Jobs

Jobs

StatefulSets

Rolling Updates

Daemon Sets

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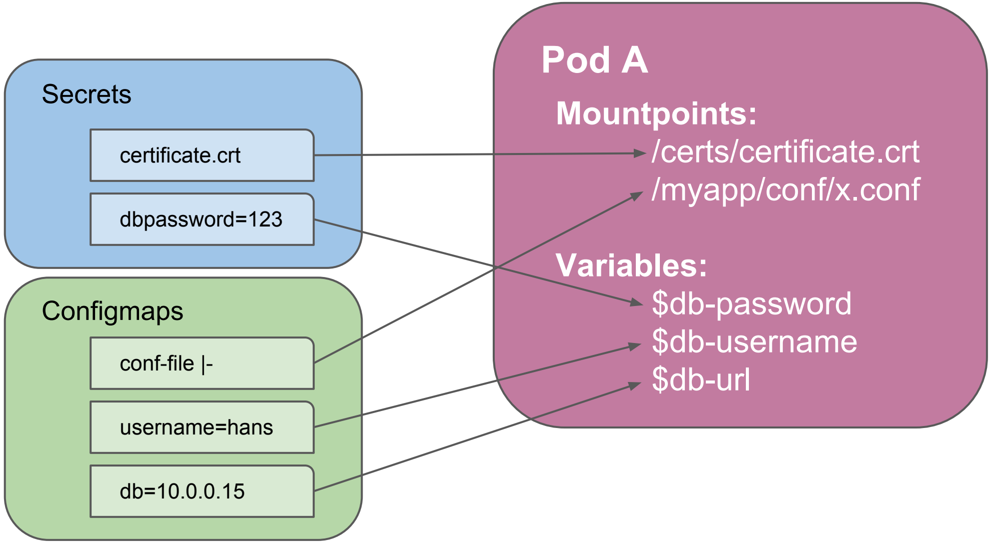
Objects in Kubernetes - Configmaps and Secrets



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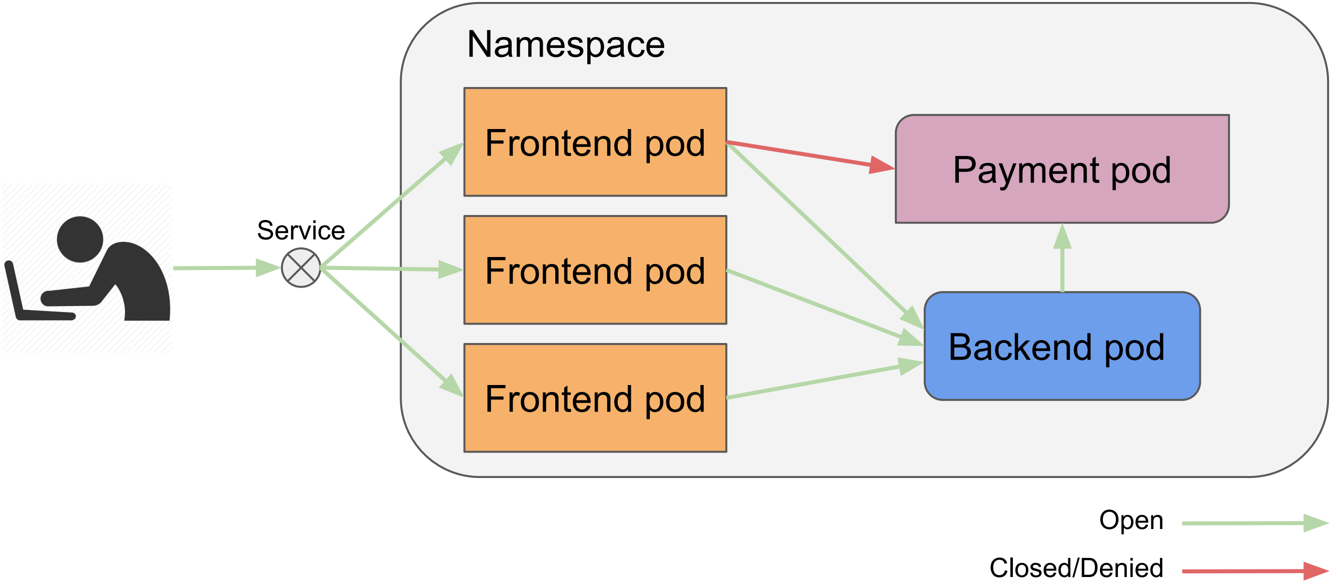
Enforcing network policies



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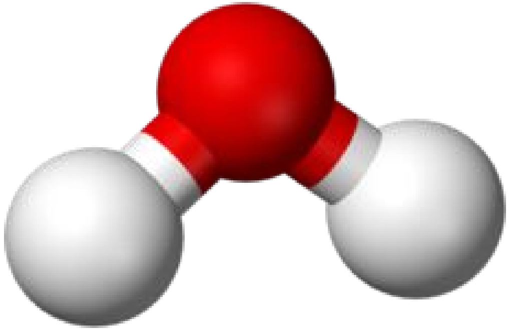
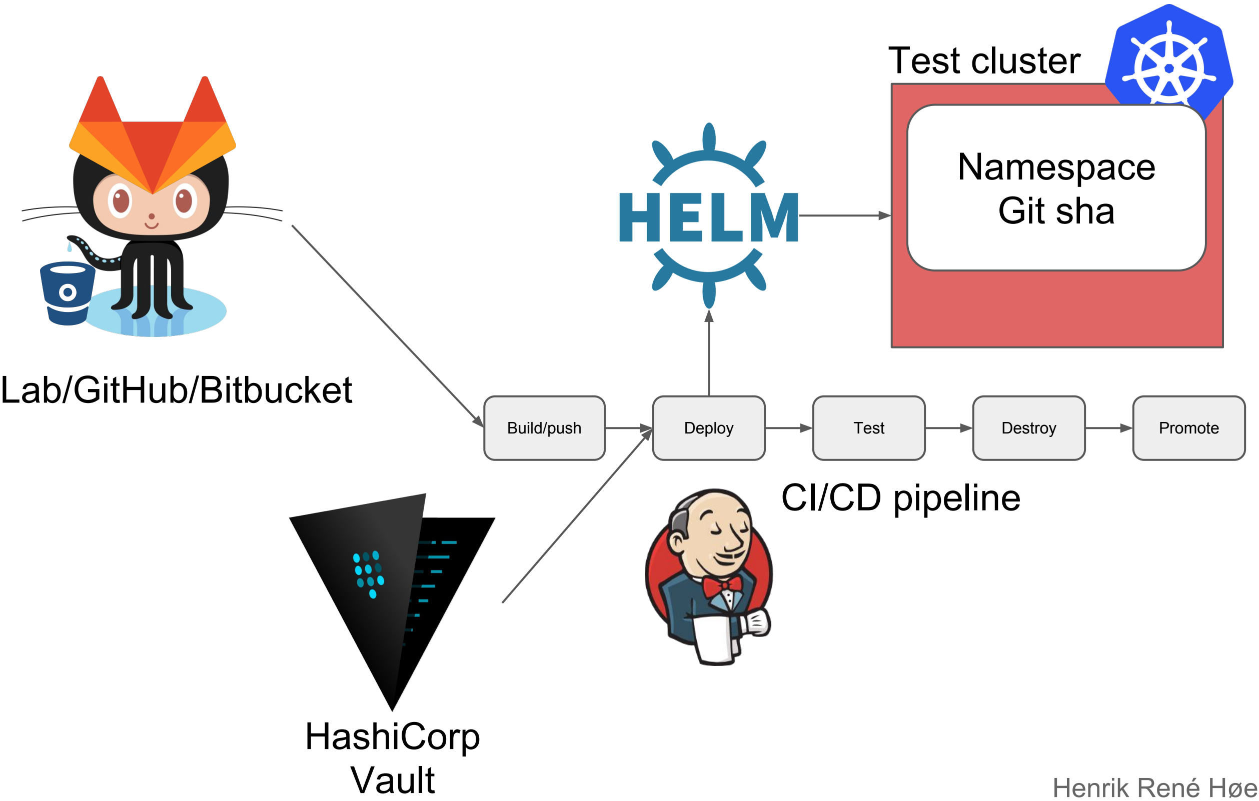
What to put in a pod

A pod is a collection of containers, like a molecule made of individual atoms (1 x Oxygen and 2 x Hydrogen). They live together, and die together.



Handling secrets



Test cluster

Namespace
Git sha

GitLab/GitHub/Bitbucket

Build/push

Deploy

Test

Destroy

Promote

CI/CD pipeline

HashiCorp
Vault

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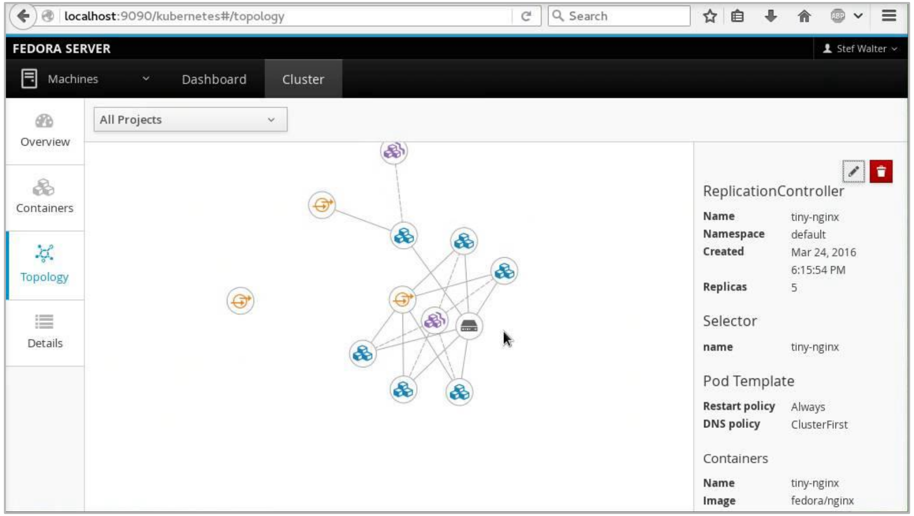
How to interact with Kubernetes

- Cli with `kubectl`
- Webclient like dashboard or Cockpit from cockpit-project.org
- Own program that talks to the API server



ReplicationController

Name	tiny-nginx
Namespace	default
Created	Mar 24, 2016 6:15:54 PM
Replicas	5

Selector

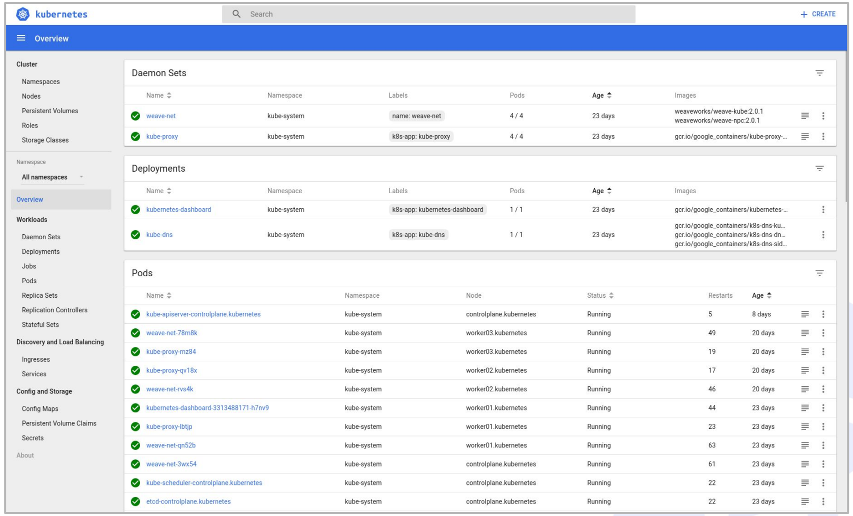
name	tiny-nginx

Pod Template

Restart policy	Always
DNS policy	ClusterFirst

Containers

Name	tiny-nginx
Image	fedora/nginx



Daemon Sets

Name	Namespace	Labels	Pods	Age	Images
weave-net	kube-system	name: weave-net	4 / 4	23 days	weaveworks/weave-kube:2.0.1 weaveworks/weave-npc:2.0.1
kube-proxy	kube-system	k8s-app: kube-proxy	4 / 4	23 days	gcr.io/google_containers/kube-proxy-...

Deployments

Name	Namespace	Labels	Pods	Age	Images
kubernetes-dashboard	kube-system	k8s-app: kubernetes-dashboard	1 / 1	23 days	gcr.io/google_containers/kubernetes-...
kube-dns	kube-system	k8s-app: kube-dns	1 / 1	23 days	gcr.io/google_containers/k8s-dns-ku... gcr.io/google_containers/k8s-dns-dn... gcr.io/google_containers/k8s-dns-sid...

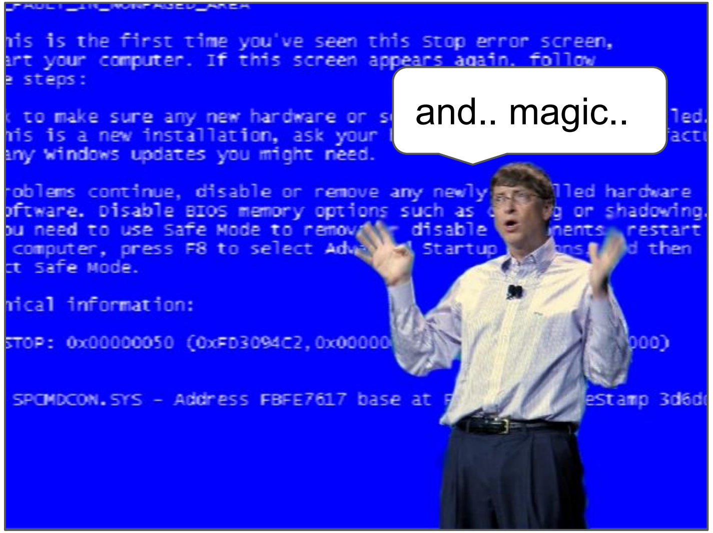
Pods

Name	Namespace	Node	Status	Restarts	Age
kube-apiserver-controlplane.kubernetes	kube-system	controlplane.kubernetes	Running	5	8 days
weave-net-78m8k	kube-system	worker03.kubernetes	Running	49	20 days
kube-proxy-rnz84	kube-system	worker03.kubernetes	Running	19	20 days
kube-proxy-qv18x	kube-system	worker02.kubernetes	Running	17	20 days
weave-net-rvs4k	kube-system	worker02.kubernetes	Running	46	20 days
kubernetes-dashboard-3313488171-h7nv9	kube-system	worker01.kubernetes	Running	44	23 days
kube-proxy-lbtjp	kube-system	worker01.kubernetes	Running	23	23 days
weave-net-qn52b	kube-system	worker01.kubernetes	Running	63	23 days
weave-net-3wx54	kube-system	controlplane.kubernetes	Running	61	23 days
kube-scheduler-controlplane.kubernetes	kube-system	controlplane.kubernetes	Running	22	23 days
etcd-controlplane.kubernetes	kube-system	controlplane.kubernetes	Running	22	23 days

Time for some demos

What could go wrong

- Deploying and exposing a service.
- Deploying nginx with a configmap.
- A simple pipeline POC.


and.. magic..
his is the first time you've seen this Stop error screen,
art your computer. If this screen appears again, follow
e steps:
to make sure any new hardware or s
his is a new installation, ask your
any Windows updates you might need.
roblems continue, disable or remove any newly
oftware. Disable BIOS memory options such as
ou need to use Safe Mode to remove or disable
computer, press F8 to select Adv Startup
ct Safe Mode.
nical information:
STOP: 0x00000050 (0xFD3094C2,0x00000
SPCMDCON.SYS - Address FBFE7617 base at

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How to get started

Use Minikube

https://github.com/kubernetes/minikube

KubeAdm

https://kubernetes.io/docs/setup/independent/create-cluster-kubeadm/

Run script provided by kubernetes:

```
curl -sS https://get.k8s.io | bash
```

Install it manually (if you are suicidal)

https://github.com/kelseyhightower/kubernetes-the-hard-way

https://kubernetes.io/docs/getting-started-guides/scratch/

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Bonus projects to consider

Metrics

Prometheus + Grafana

Ingress controller

træfik

Logs

fluentd + elasticsearch + kibana

Secure secrets

Vault

Meetup resources and links

- The Illustrated Children's Guide to Kubernetes:
  - https://www.youtube.com/watch?v=4ht22ReBjno
- Kubernetes bootcamp:
  - https://kubernetesbootcamp.github.io/kubernetes-bootcamp/
- Everything “Kelsey Hightower” on youtube:
  - https://www.youtube.com/results?search_query=kelsey+hightower+kubernetes
- Danish CloudNative slack channel:
  - http://cloudnative-dk.slack.com

Objects in Kubernetes - cheat sheet

```
Get list of nodes:
        kubectl get nodes

Get information on specific node:
        kubectl describe node worker01.kubernetes

Get node object as yaml:
        Kubectl get node worker01.kubernetes -o yaml

Get list of pods in all namespaces:
        kubectl get pods -o wide --all-namespaces

Get pod information on specific pod:
        kubectl describe pod kube-proxy-9cj1p --namespace kube-system

Get logs from pod:
        kubectl logs kube-proxy-9cj1p --namespace kube-system [container-name]

Get pod definition as yaml:
        kubectl get pod kube-proxy-9cj1p -o yaml --namespace kube-system

Get list of services in all namespaces:
        kubectl get services --all-namespaces

Get service information:
        kubectl describe service kubernetes-dashboard --namespace kube-system
```

```
Get list of ingress:
        kubectl get ingress

Get information on specific ingress:
        kubectl describe ingress confluence --namespace default

Get ingress object as yaml:
        Kubectl get ingress confluence -o yaml

Get list of cronjobs:
        kubectl get cronjobs --all-namespaces

Get information on cronjob:
        kubectl describe cronjob vault-keeper --namespace vault

Get list of jobs:
        kubectl get jobs --all-namespaces

Get job log:
        kubectl describe jobs vault-keeper-1503487920 --namespace vault

Get list of Deployments:
        kubectl get deployments --all-namespaces

Get list of Statefulsets:
        kubectl get statefulsets --all-namespaces
```

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рахмат
danke
謝謝
ngiyabonga
spas
Баярлалаа
mersi
kia ora
barka
welalin
tack
teşekkür ederim
mahalo
tapadh leat
спасибо
faafetai lava
vinaka
blagodaram
dank je
misaotra
matondo
paldies
grazzi
спасибі
thank you
gracias
хвала
kiitos
dankie
nanni
nandri
dhanyavad
asante
manana
obrigada
tenki
bedankt
hvala
maururu
köszönöm
bayarlalaa
gràçie
dankon
aĉiŭ
akun
djiere dieuf
tau
mochchakkeram
murakoze
enkosi
dziękuję
дякую
mamnun
chokrane
chnorakaloutioun
gratias ago
gràcies
sulpáy
taiku
go raibh maith agat
sobodi
děkuji
sagolun
sukriya
kop khun krap
obrigado
arigatô
takk
dakujem
trugarez
mèsi
ありがとう
didi madloba
najis tuke
tanemirt
grazie
terima kasih
rahmet
shukriya
mercê
мерси
kam sah hamnida
rahmat
diolch
dhanyavadagalu
তোমাকে ধন্যবাদ
감사합니다
xièxie
ευχαριστώ
merci