



Introduction to Kubernetes

For Developers

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#Zarf at <https://slack.kubernetes.io>



@defenseunicorns



Defense Unicorns

Agenda

Kubernetes

Concepts

Tools

Where can I get Started?

Kitchen Sink

What Else?

What is Kubernetes



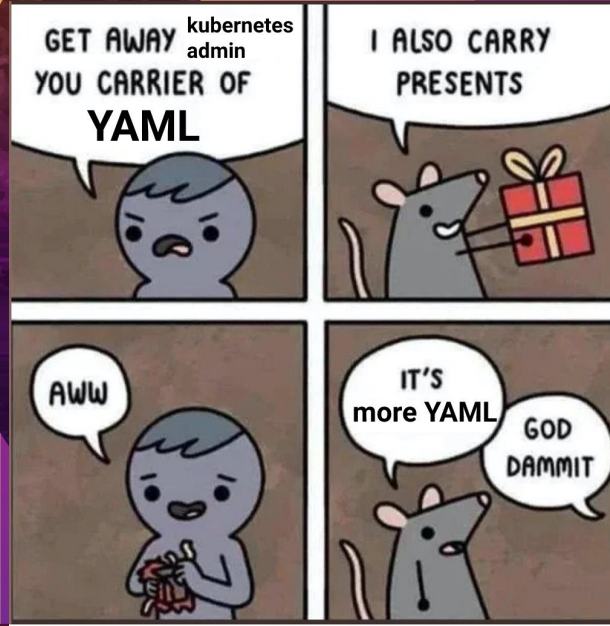
- Orchestrates Containers
- That's it? That's all it does!

It Is Complex



- Scale
- Kubernetes Reference API
- What is Kubernetes Physically Speaking?

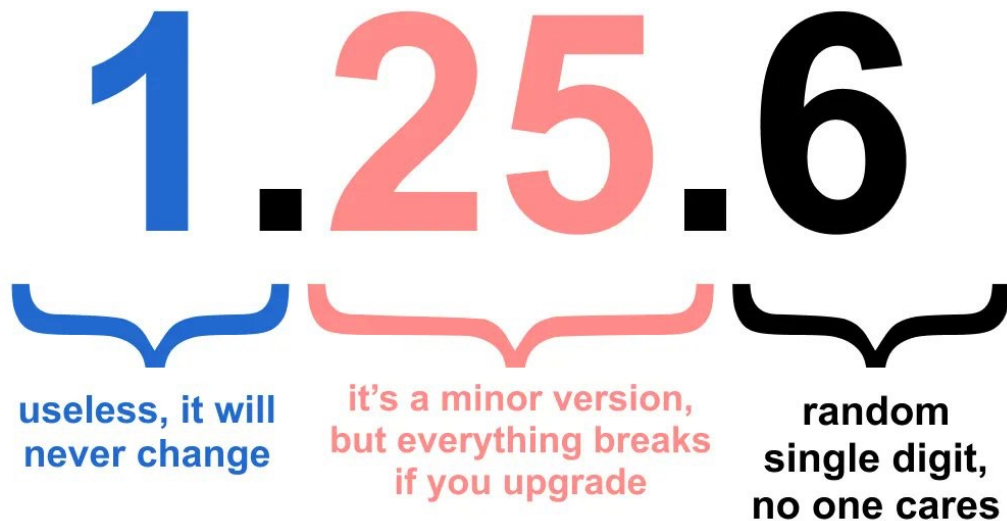
It Is Complex



<https://twitter.com/memenetes/status/1633876132855709697>

It Is Complex

KUBERNETES “SEMANTIC” VERSIONING EXPLAINED



<https://twitter.com/memenetes/status/1631339227785969664>

Why Should Developers care?

- Containerized Applications
- Breaking the Monolith
- It's the Substrate

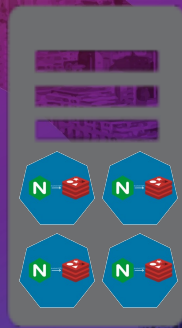


Pod

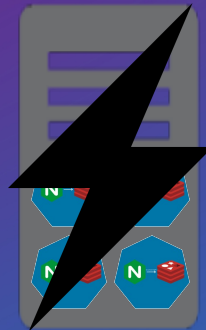
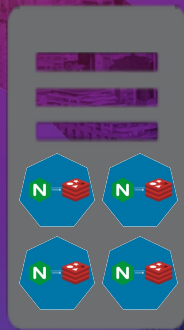


- Co-scheduled
- Shared Network Namespace
- Shared Files System

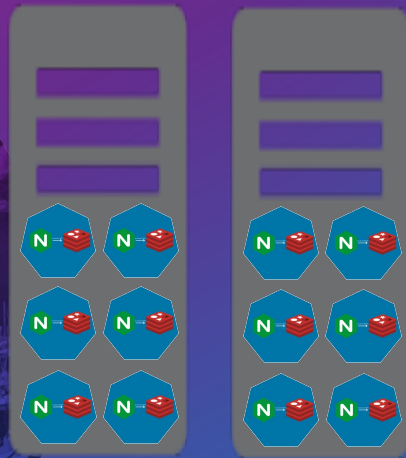
ReplicaSet



ReplicaSet



ReplicaSet



Deployments



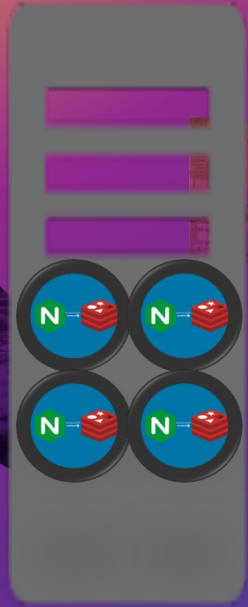
Deployments



Deployments



Deployments



Deployments



How are these Connected?

Deployment

ReplicaSet

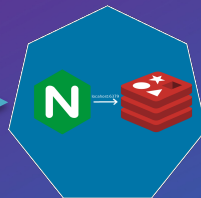
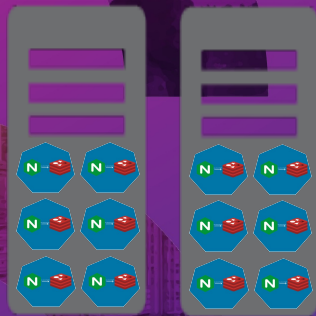
Manages

Manages

Pod

Manages

Containers



How are these Connected?

Deployment

ReplicaSet

Pod

Selector
app=nginx

Labels
app=nginx

Selector
app=nginx

Labels
app=nginx

Containers



How are these Connected?

Deployment

ReplicaSet

Pod

Selector
app=nginx

Labels
app=nginx

Selector
arbitrary=whatever

Labels
arbitrary=whatever

Containers



Let's Take a look

Deployment

ReplicaSet

Pod

```
kubectl create deploy --image=nginx
```



Containers



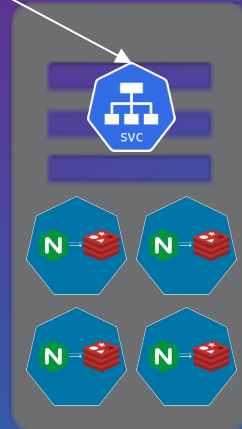
Services

- Define a DNS entry that can be used to refer to a group of pods
- Provide a consistent endpoint for the group of pods
- Different types: nodePort, clusterIP, loadbalancer

Services (Node Port)



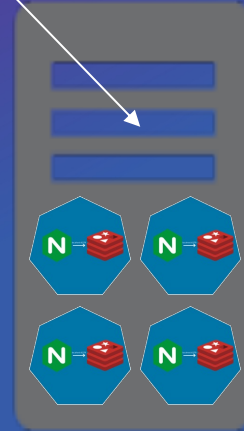
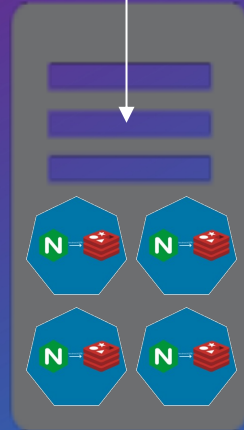
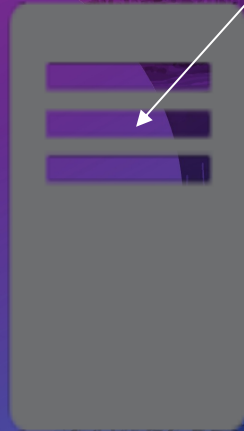
192.168.0.[1-3]:32000



Services (Load Balancer)



Public IP:80



Config Maps & Secrets

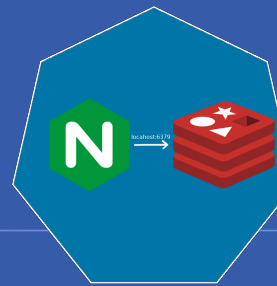
- Allow storing of arbitrary configuration values and files
- Exposed in pods as either environment variables or as local storage
- Decoupled storage of configuration from pod spec

Config Maps & Secrets

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: dev-config
  namespace: default
data:
  Item1: dev-stuff
  Item2: more dev stuff
```

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: qa-config
  namespace: default
data:
  Item1: qa-stuff
  Item2: more qa stuff
```

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: prod-config
  namespace: default
data:
  Item1: prod-stuff
  Item2: more prod stuff
```



Ingresses

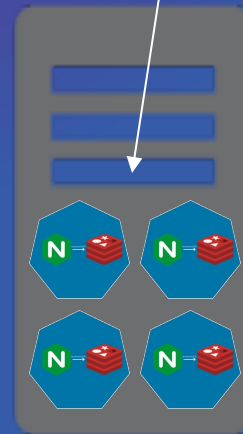
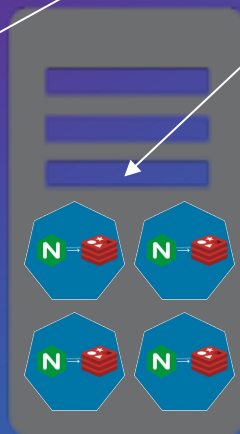
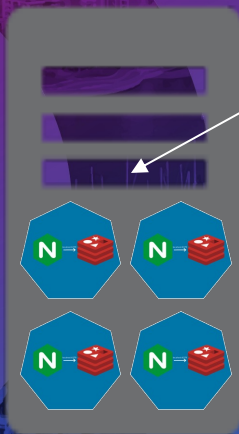
- Define how traffic outside the cluster is routed to inside the cluster
- Used to expose Kubernetes services to the world
- Route traffic to internal services based on factors such as host and path
- Ingress is usually implemented by a load balancer (Nginx, HAProxy, AWS ELB, etc...)

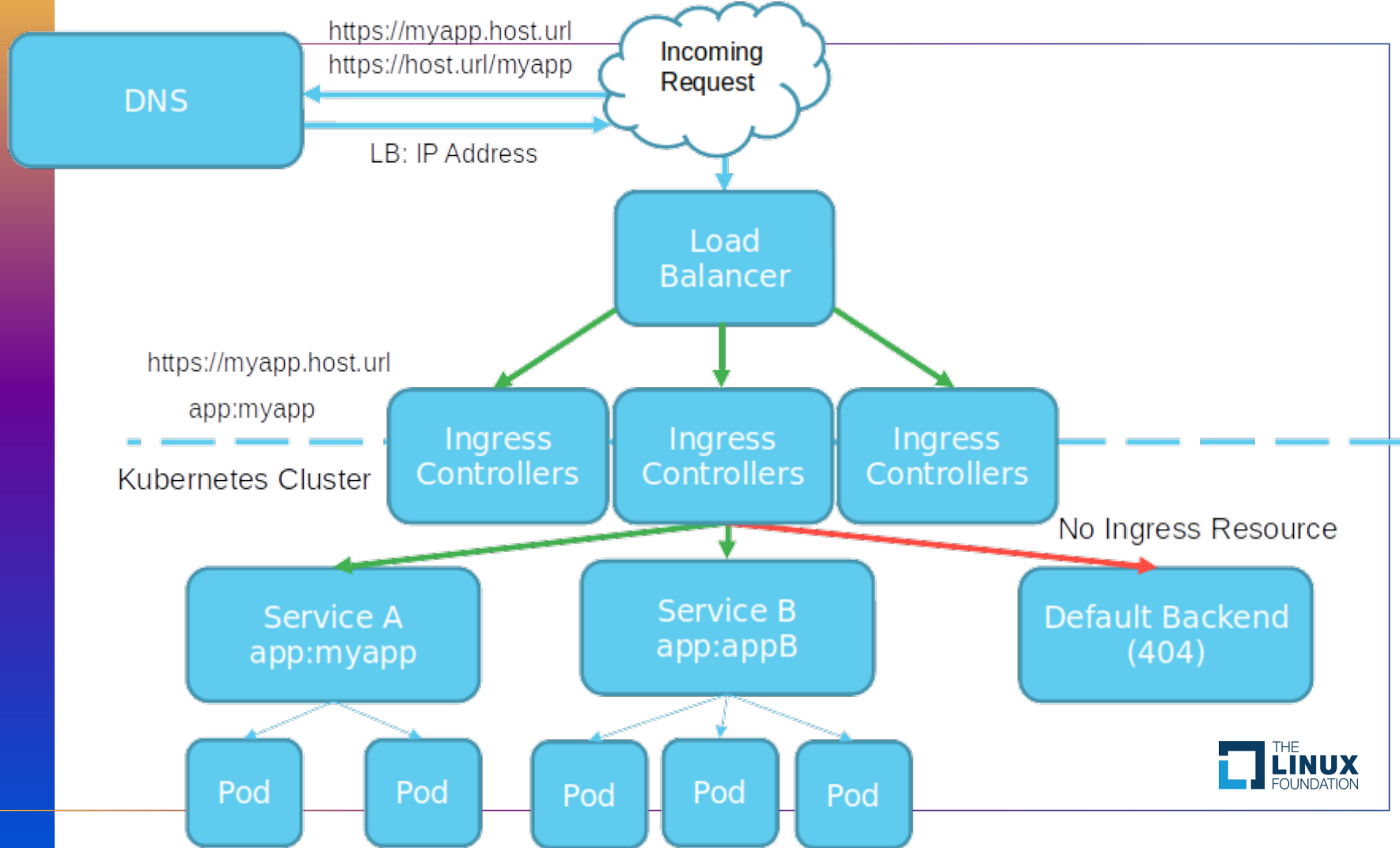
Ingresses



<https://my-nginx-app.cluster.com>
<https://cluster.com/my-nginx-app>

Ingress Controller





Tools

- Running Kubernetes Locally
- Running Kubernetes In The Cloud
- Dealing with Scale

Running Kubernetes Locally

- K3d
- K9s
- Rancher
- Docker
- Kind
- KWOK

Running Kubernetes In the Cloud

- AKS
- EKS
- GKE
- Digital Ocean
- Linode

Dealing with Scale

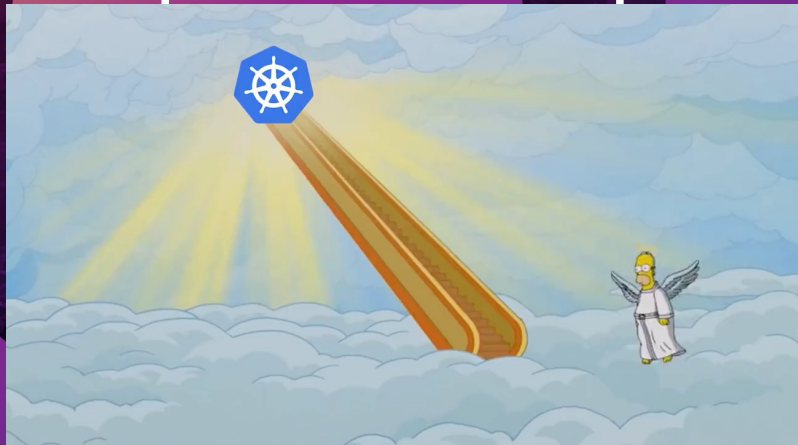
- Find a framework you like
- ELK
- PLG
- Don't Over Alert

Packaging and Supply Chain Security

- Chainguard
- Zarf

The Kitchen Sink

- <https://landscape.cncf.io/>



<https://twitter.com/memenetes/status/1637861860039876624>

Get In Touch



#Zarf at <https://slack.kubernetes.io>



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THANK YOU

Get This Powerpoint



<https://github.com/JasonvanBrackel/OSS2023.git>

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Check out Zarf!



<https://zarf.dev/>