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# Using CFCR to manage your Kubernetes Clusters

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# Introduction

## Oleksandr Slynko

- Staff Software Engineer at Pivotal
- Joined the Kubo team before it was called Kubo in December 2016
- Moved to Pivotal Container Service team after team split

## Brendan Nolan

- Principal Software Engineer at Pivotal
- Joined the CFCR team in May of 2017
- Currently working on Pivotal Container Service team

# Agenda

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What is CFCR

Why?

What problem is it trying to solve?

Powered by BOSH

CFCR Demo

Vision for CFCR

Pivotal Container Service (PKS)

Q+A

# What is CFCR?



- An Open Source Software project part of Cloud Foundry
- Allows the deployment of vanilla kubernetes clusters using BOSH
- Pivotal, Google, VMWare and Swisscom are major contributors

# Why not application runtime?



- Cloud Foundry customers have been using Application Runtime to deploy Cloud Native applications
- It is a highly opinionated framework
- It is not suited to all types of workloads
  - Legacy applications
  - Third party applications delivered as containers
  - Applications with complex network or persistence requirements

# Why Kubernetes?



For these types of workloads Kubernetes is the obvious choice

# Why inside Cloud Foundry?

- Customers love the Cloud Foundry operator experience
- They want the same experience they get operating CFAR for Kubernetes
- A simple way to deploy
- A simple way to upgrade
- A simple way to apply security patches
- A simple way to maintain VM infrastructure



CLOUDFOUNDRY

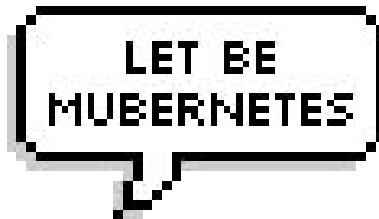
# What problems is CFCR trying to solve?

- Installation of Kubernetes is pretty straight forward.
- Day 2 is not so easy
  - How to you upgrade clusters?
  - How do you deal with CVEs in your operating systems running clusters?
  - Kubernetes keeps your applications running but what keep Kubernetes running.
  - High availability doesn't come out of the box.



Powered by BOSH

CLOUDFOUNDRY



CLOUDFOUNDRY



**CONTAINER  
RUNTIME**



# Powered by BOSH

**BOSH is a tool for release engineering, deployment, lifecycle management and monitor of distributed systems.**

- Teams can create their own software releases that are deployable in a repeatable fashion.
- Operators can deploy these software releases in a consistent and reproducible manner and they can do so quickly.
- Multi IaaS via Cloud Provider Interfaces (CPI)
- Uses OS Stemcells to standardize deployments and quickly patch CVEs
- Operation Teams are incredibly efficient using



# Powered by BOSH

## What does BOSH mean for CFCR

- CFCR is a BOSH release of Kubernetes
  - Each release is for a specific Kubernetes version
  - CFCR will keep up-to-date with latest Kubernetes releases.
- It plans to track the Kubernetes version in use by GKE.
- High Availability / VM Healing
- Scaling
- Upgrades



# Demo

- Day 1 - Installation
  - Initial cluster installation
- Day 2
  - Capacity issue - Show scaling of worker VMS
- Day 2
  - Software update - Kubernetes version upgrade
  - OS CVE - Stemcell upgrade

# Powered by BOSH

## Deployment

- Running system
  - Releases
  - VMs with disks
  - Network configuration
  - Process instances
- Monitored by BOSH

# Powered by BOSH

## Deployment manifest

- Declarative
- VM Layout
- Versioned Software packages - Releases
- Versioned base OS images - Stemcell
- Configuration parameters
- Cloud agnostic

# Powered by BOSH

## Release

- Versioned
- Software packages
- Scripts required to start
- Definition of properties
- Can be rebuilt from source at any time
- Made of jobs

# Powered by BOSH

## Jobs

- Describes single service
- Start/Stop scripts
- Monitoring (using monit)
- Configuration
- Hooks: pre-start, post-start, post-deploy, and drain



# Powered by BOSH

## Stemcell

- Disk image with installed system software on it
- Same versions of all software in all infrastructures
- Managed by Cloud Foundry BOSH team
- CVE patched in 2 days

# Powered by BOSH

## Credhub

- Have all your credentials in one place
- Generate new credentials for each deployment
- Easily rotate credentials

# Vision for Cloud Foundry Container Runtime

To make CFCR the defacto standard for deploying and managing Kubernetes clusters.

- We want to delight users of CFCR when deploying, managing and upgrading Kubernetes clusters.
- Automate with Day 2 operations in mind.
- Vanilla Kubernetes
  - Conformance
  - GKE compatibility



# Container Runtime 0.10

- Service catalog integration
- Guaranteed release upgrades
- Tested Resurrection in pipelines

# Future

## What CFCR team plan to work on next

- Security - Working with the Cloud Foundry Security Enablement team and adopting CIS suggestions
- Availability - Focusing on making multi-AZ work for master nodes
- Defining processes around 48hr CVE patches
- Defining processes around one week K8s upgrades



Pivotal  
**Container Service™**

# Pivotal Container Service (PKS)

## Build for Day 2 operations

- On Demand Provisioning
- Open Source Kubernetes
- Multicloud

# Pivotal Container Service (PKS)

## Enterprise Ready

- VMWare Integration
  - NSX-T Integration
  - Harbour
  - vRealize
- All the operation efficiencies offered by BOSH
- Controlled access BETA will be available mid December



# Links

- Docs
  - <http://docs-cfcr.cfapps.io/>
  - <https://www.cloudfoundry.org/container-runtime/>
  - <https://bosh.io/docs/>
- Code
  - <https://github.com/cloudfoundry-incubator/kubo-release>
  - <https://github.com/cloudfoundry-incubator/kubo-deployment>
- Slack:
  - <https://cloudfoundry.slack.com/messages/cfcr>
- Demo:
  - <https://github.com/bstick12/kubecon>



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