

# Introducing k3s - a Lightweight Kubernetes Distribution







# Shannon Williams

Co-Founder/VP Sales & Marketing  
Rancher Labs

 @smw355



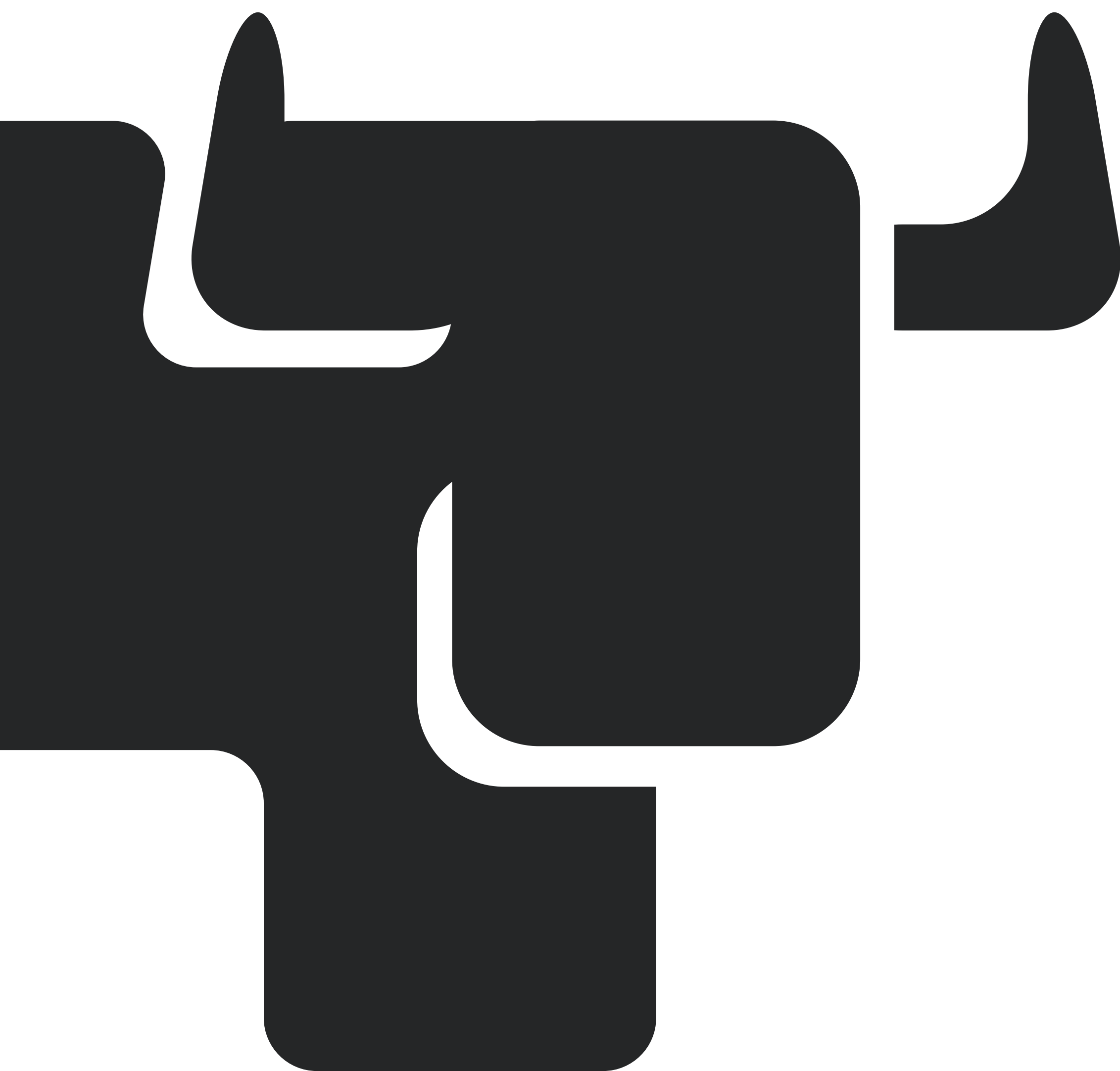
# Darren Shepherd

Co-Founder/Chief Architect  
Rancher Labs

 @ibuildthecloud

First things first...

This is a  not a  !

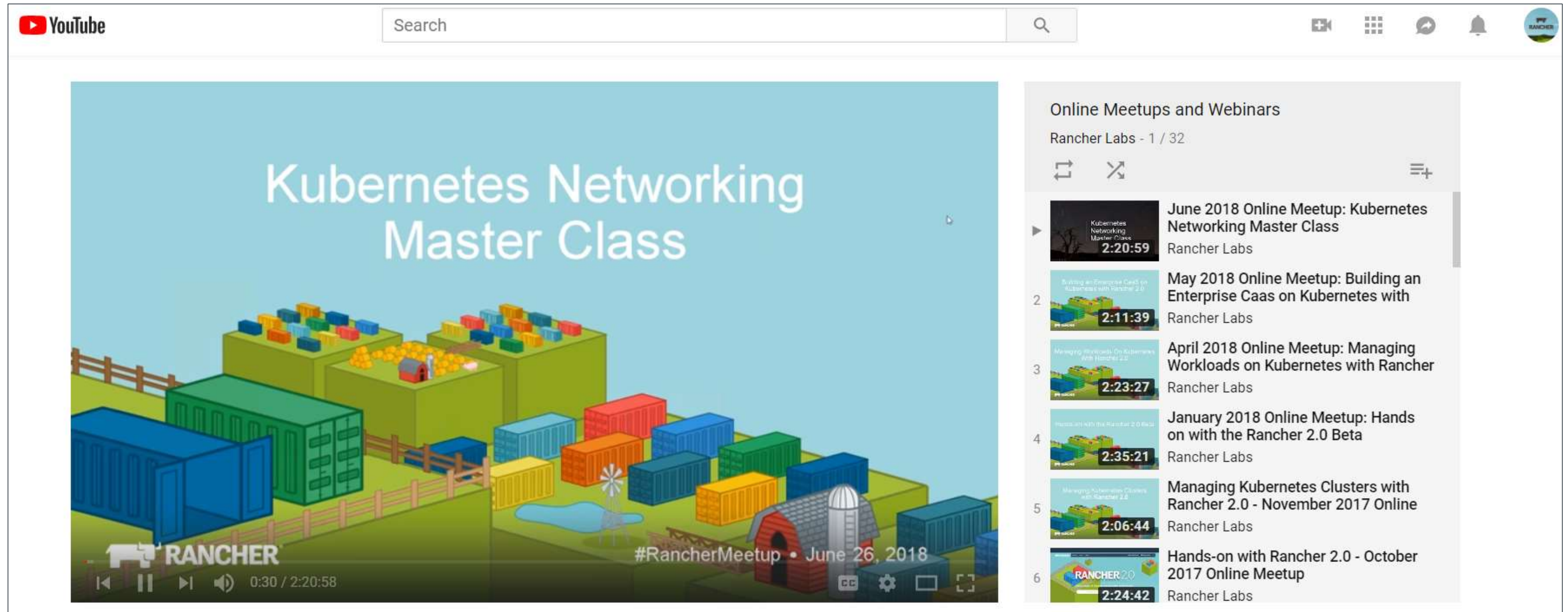


## There are rules for a meetup!

- We won't be done on time
- Questions are always welcome
- There are no bad questions
- Demo, then demo some more
- Things will break, be patient



# This meetup is being recorded!



YouTube

Search

Kubernetes Networking Master Class

RANCHER

#RancherMeetup • June 26, 2018

0:30 / 2:20:58

Online Meetups and Webinars

Rancher Labs - 1 / 32

June 2018 Online Meetup: Kubernetes Networking Master Class  
Rancher Labs  
2:20:59

May 2018 Online Meetup: Building an Enterprise Caas on Kubernetes with  
Rancher Labs  
2:11:39

April 2018 Online Meetup: Managing Workloads on Kubernetes with Rancher  
Rancher Labs  
2:23:27

January 2018 Online Meetup: Hands on with the Rancher 2.0 Beta  
Rancher Labs  
2:35:21

Managing Kubernetes Clusters with Rancher 2.0 - November 2017 Online  
Rancher Labs  
2:06:44

Hands-on with Rancher 2.0 - October 2017 Online Meetup  
Rancher Labs  
2:24:42

<http://youtube.com/c/rancher>



# Join the conversation on Twitter

## #RancherMeetup





Slack - Rancher Users

17

Rancher Users

smw355

Ctrl+1

1

All Unreads

New Threads

Ctrl+2

10

Channels

# general

ghost

gitlab

# k3s

kubecon-berlin

# kubernetes

# masterclass

# onlinemeetup

# os

rancher-suse

rancherinternal

# random

# rio

samsungsds

Direct Messages

Slackbot

smw355 (you)

alena

Dowler

Eamon


ekristen

#onlinemeetup

84 | 0

Monthly Online Meetups (also check out #onlinetraining for our weekly trainings, and #events for upcoming in person events)

Yesterday



today, we announced another open source project, Submariner: Multi-Cluster Network Connectivity for Kubernetes. We'll be discussing and demoing submariner in next week's online meetup: <https://info.rancher.com/meetup-introducing-submariner-multicloud-networking>

info.rancher.com

Introducing Submariner: Multi-Cluster Network Connectivity

In this meetup, Rancher co-founder Shannon Williams and Rancher Engineer Chris Kim will be on hand to discuss and demonstrate Rancher's newest open-source project called Submariner, which provides network connectivity between multiple Kubernetes clusters.

Today

Rob

5:02 AM

joined #onlinemeetup.

smw355

8:36 AM

We are starting the next meetup in 90 minutes or so. If you've not registered yet: [here you go.](https://info.rancher.com/meetup-k3s-lightweight-kubernetes)

info.rancher.com

k3s - The Lightweight Kubernetes Distribution Built for the Edge

In this free online meetup, Rancher Co-founders Darren Shepherd and Shannon Williams will introduce and demonstrate k3s' features and discuss what you need to run k3s on the edge and how to manage hundreds of micro-clusters using k3s (5 kB)

#RancherMeetup

7

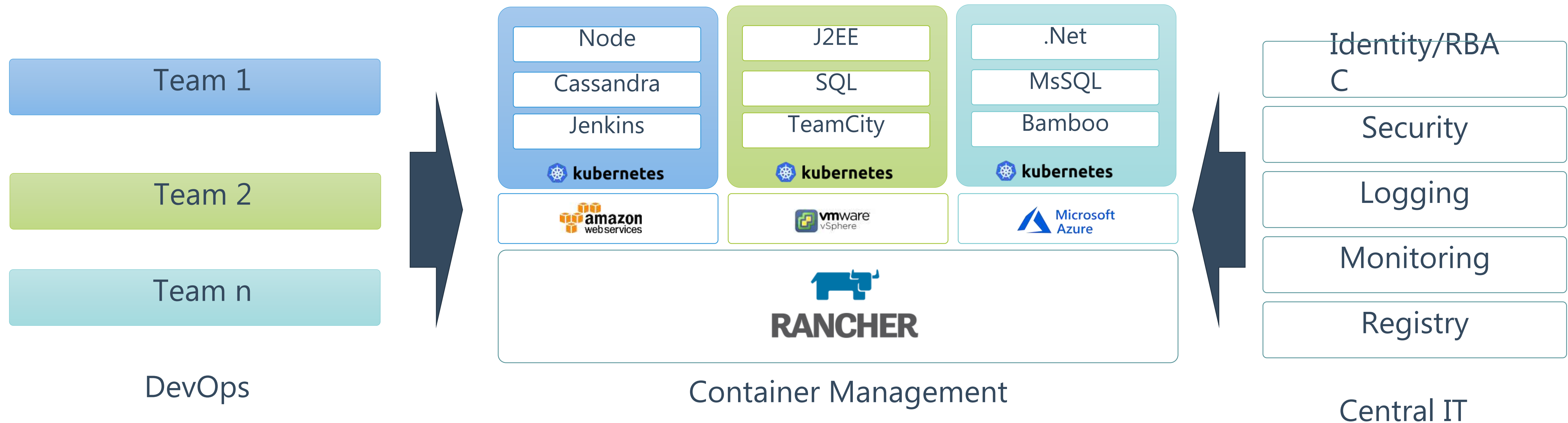
# Agenda

1. Rancher Introduction - Shannon
2. Increasing demand for an edge-optimized Kubernetes - Shannon
3. Introducing k3s – a micro-distribution of Kubernetes - Darren
4. Demo - Darren
5. Questions and Getting Started





# Rancher is an Open Source Container Management Platform





# Rancher is an Open Source Container Management Platform



## Self Service Kubernetes Environments

- User Interface
- Service Catalog
- CI/CD
- Monitoring
- Logging
- Alerting

## Unified Cluster Operations

- Provisioning
- Auth/RBAC
- Policy
- Security
- Capacity
- Cost

DevOps

Central  
IT



RKE

vmware®

RKE



EKS



Google  
Cloud Platform

GKE



Microsoft  
Azure

AKS




Any


Infrastructure



# Introducing Submariner.io


 RANCHER LABS

See what else [Rancher](#) is up to




## Introducing Submariner: Multi-Cluster Network Connectivity for Kubernetes

Online Meetup - March 20, 2019



**Shannon Williams**  
VP of Marketing,  
Rancher Co-Founder  
[Twitter](#)



**Chris Kim**  
Submariner Developer

As more organizations benefit from the increased availability and security offered by multi-cluster Kubernetes, the release of Submariner now enables containers in different clusters to establish a direct network connection with each other.

Join Rancher co-founder Shannon Williams and Submariner's lead engineer Chris Kim to discover:

- Example uses cases for Submariner.
- What you need to run Submariner across clusters.
- How to develop an architectural design for clusters connected using Submariner
- How to setup and manage high availability microservices connected through Submariner.

**Date:** Wednesday, March 20, 2019  
**Time:** 1:00 PM (US Eastern Time)

### Register for the Meetup

**First Name\***

**Last Name\***

**Company Name\***

**Job Title\***

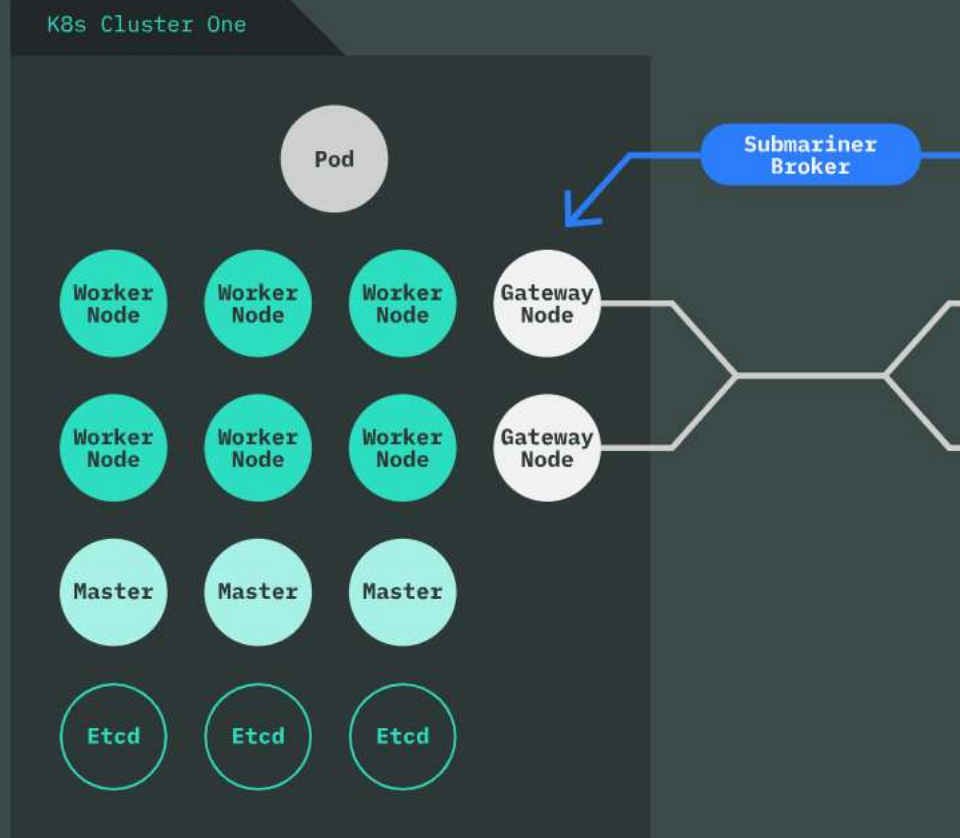
**Email\***


**Country\***


Would you like us to auto-enroll you in all future Rancher online meetups?  
☒ **Subscribe**


<https://info.rancher.com/meetup-introducing-submariner-multicluster-networking>

### How it Works





 GITHUB



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0 Projects 0 Wiki Insights

no matter where they are in the world. <https://submariner.io>

1 branch 1 release 1 contributor Apache-2.0

Create new file Upload files Find File Clone or download

Latest commit f9acd40 a day ago

architecture diagram

a day ago

ial commit of Submariner to rancher/submariner

a day ago

Initial commit of Submariner to rancher/submariner

a day ago

Initial commit of Submariner to rancher/submariner

a day ago

Initial commit of Submariner to rancher/submariner

a day ago

Initial commit of Submariner to rancher/submariner

a day ago

Initial commit of Submariner to rancher/submariner

a day ago

add license

a day ago





Introducing K3s



# In the last year we've seen a major increase in the demand for Kubernetes outside the datacenter

## Bare Metal K8s Clustering at Chick-fil-A Scale



Chick-fil-A Tech Blog [Follow](#)  
Jun 25, 2018 · 6 min read

by [Brian Chambers](#), [Caleb Hurd](#), and Alex Crane



# kubernetes

<https://www.youtube.com/watch?v=8edDcy3oeUo>

At full scale Chick-fil-A will be running Kubernetes at the Edge in each of our 2000 restaurants. That means roughly 6000 devices at the Edge running Kubernetes.

One of the biggest challenges associated with this is **bare metal clustering** on-the-fly, in-restaurant.

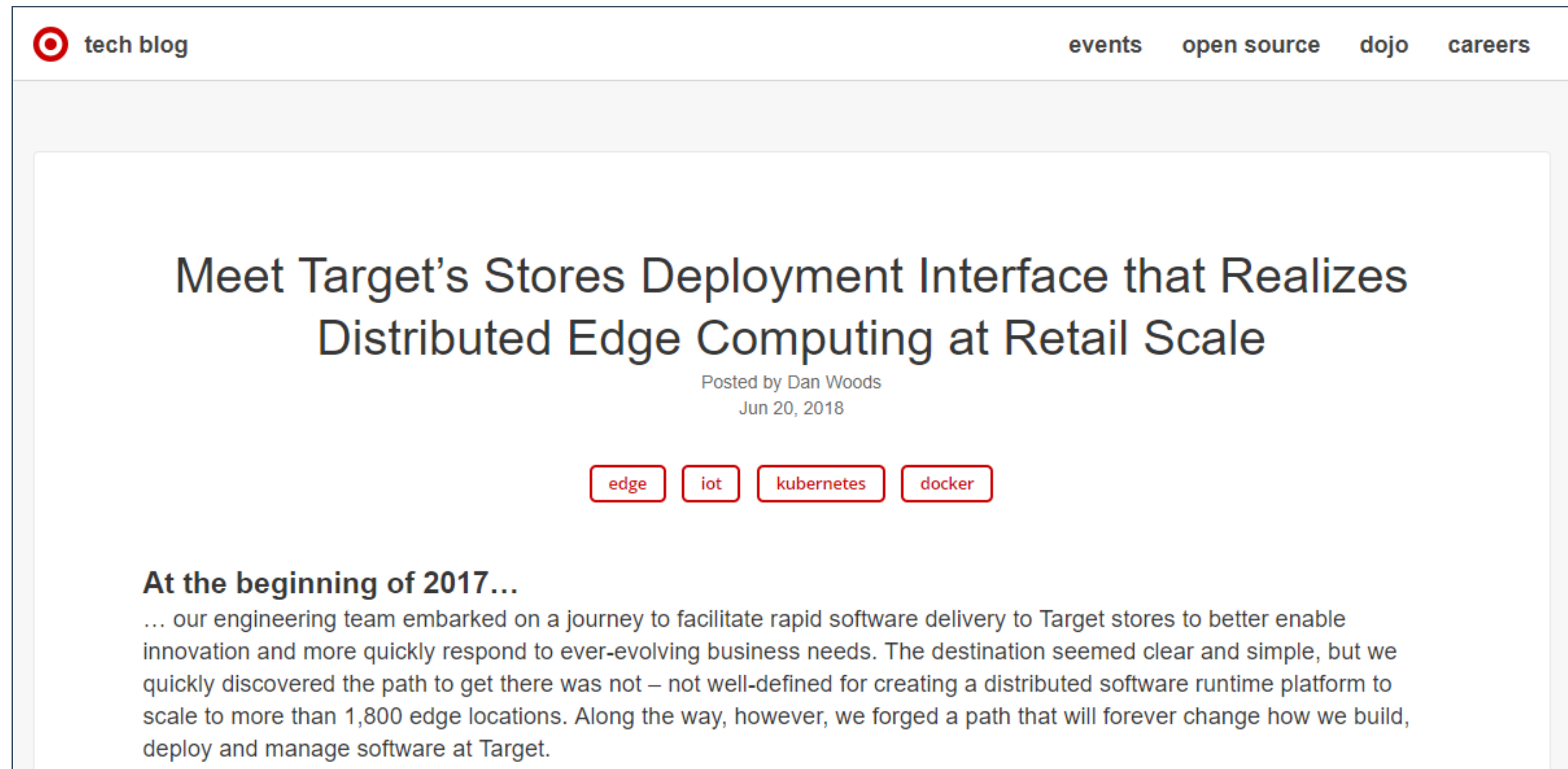
While most Kubernetes deployments are in the cloud or benefit from skilled technicians that are physically located near their deployments (or at least equipped with remote access), our deployments are completed by installers who focus only on initial hardware installations. They never connect to the compute devices directly—rather they connect ethernet and power cords, and then look at an app to check the status of the cluster as it self-bootstrap. Replacements are completed by restaurant Owner/Operators or their teams, which are sometimes less technical.

On top of that, our Edge deployments are not exactly in a “datacenter environment”.





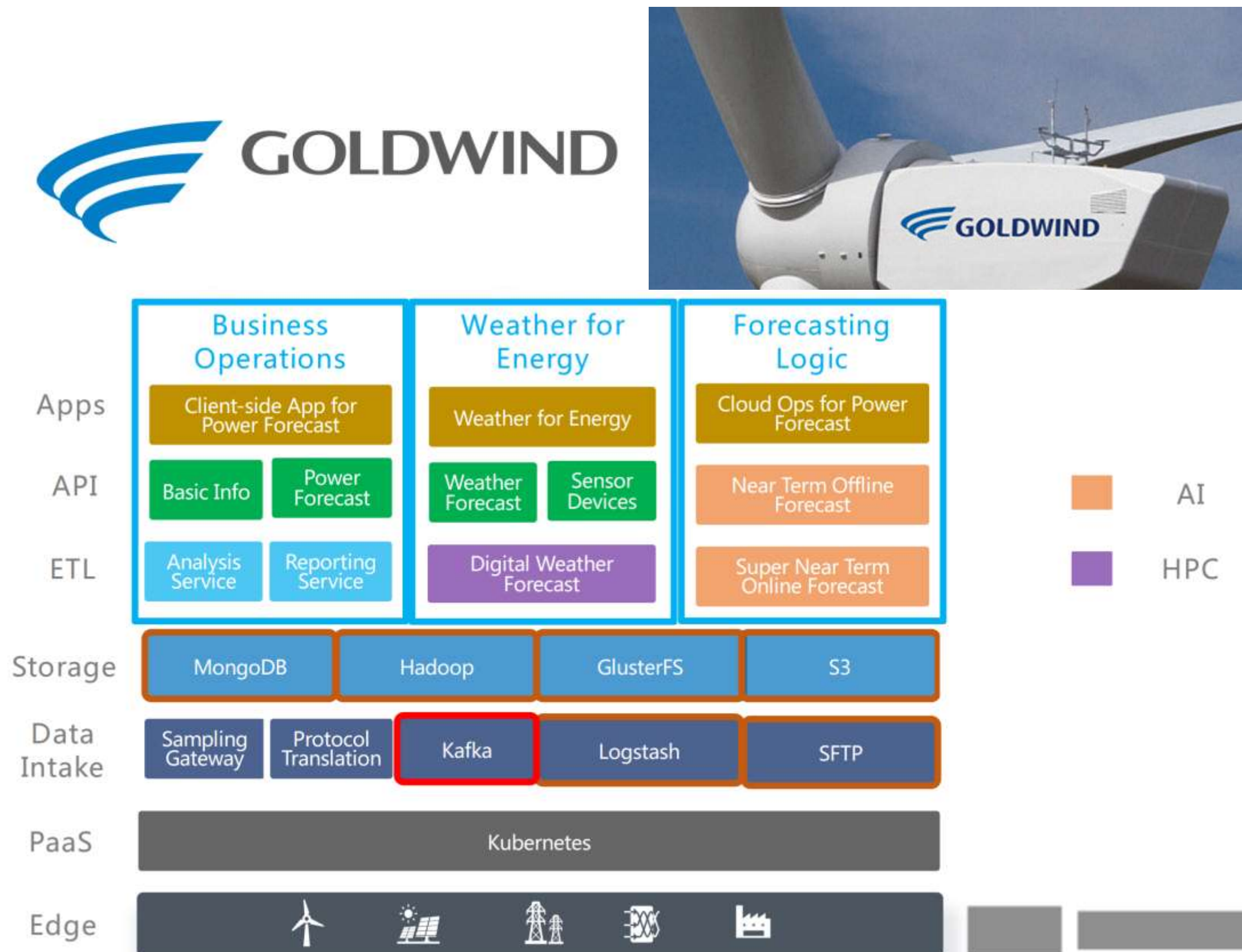
# In the last year we've seen a major increase in the demand for Kubernetes outside the datacenter



<https://tech.target.com/infrastructure/2018/06/20/enter-unimatrix.html>



# In the last year we've seen a major increase in the demand for Kubernetes outside the datacenter



<https://kccncchina2018english.sched.com/event/FzEF?iframe=no>



# Containers and Kubernetes are an excellent choice for deploying complex software to the edge

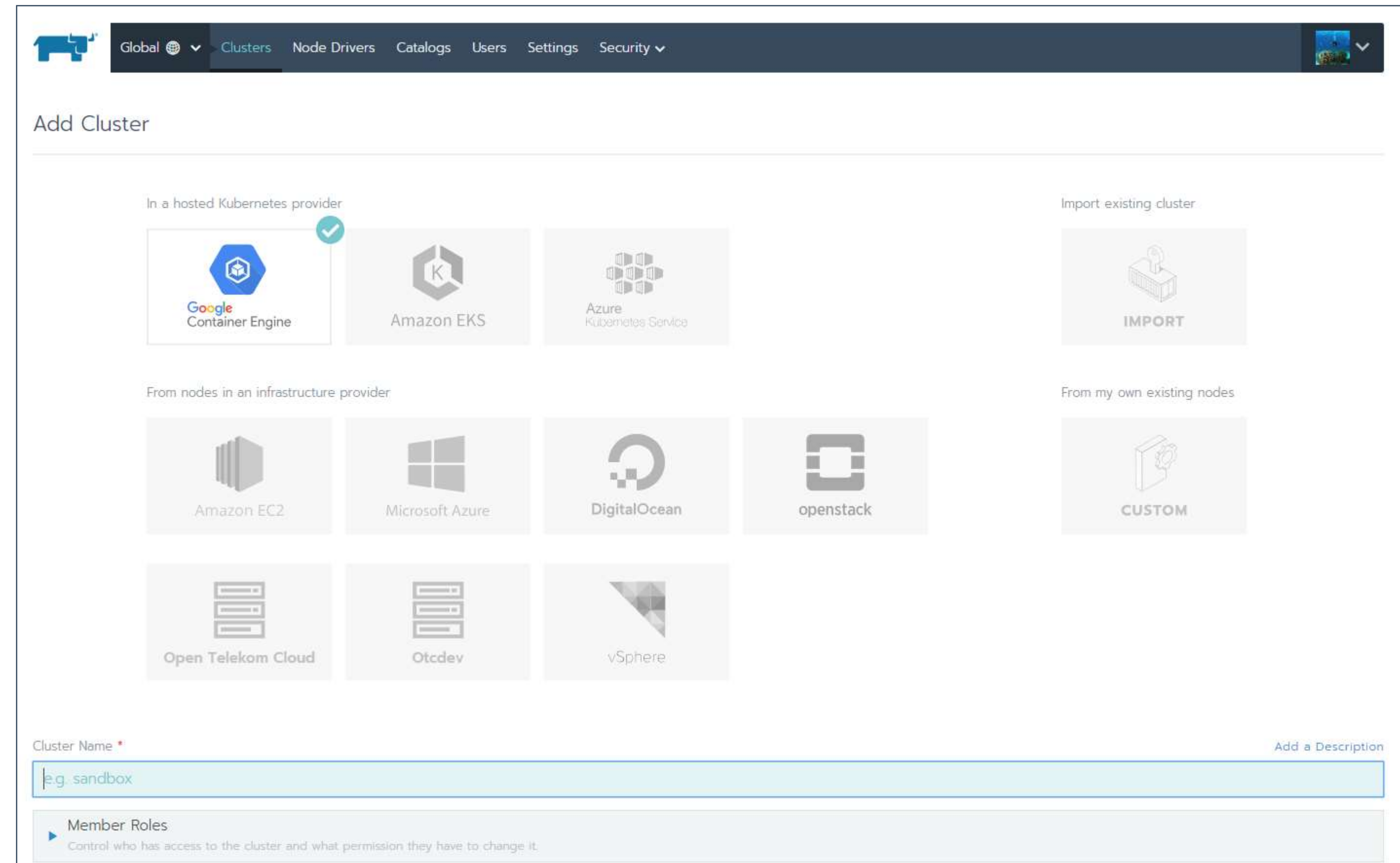
- Containers are awesome
- Consistent across a wide variety of infrastructure
- Capable of standalone or clustered operations
- Easy to upgrade and/or replace containers
- Support for different infrastructure configs (storage, cpu, etc)
- Strong ecosystem (monitoring, logging, CI, management, etc)



# Our journey to building an edge-optimized k8s distro started with Rancher



- Open source
- Multi-cluster management
- Deploy k8s anywhere
- Manage any k8s cluster





# In late 2017, we pulled out RKE our Kubernetes installer



- Open-source k8s installer and distribution
- Externally define cluster config
- Launch services and add-ons as part of deployment

```
./rke --version
rke version v0.0.6-dev

./rke --help
NAME:
  rke - Rancher Kubernetes Engine, Running kubernetes cluster in the cloud

USAGE:
  rke [global options] command [command options]

VERSION:
  v0.0.6-dev

AUTHOR(S):
  Rancher Labs, Inc.

COMMANDS:
  up           Bring the cluster up
  remove      Teardown the cluster
  version     Show cluster Kubernetes version
  config, c   Setup cluster configuration
  help, h     Shows a list of commands or help for one command

GLOBAL OPTIONS:
  --debug, -d   Debug logging
  --help, -h    show help
  --version, -v print the version
```

```
---
nodes:
  - address: 192.168.1.5
    user: ubuntu
    role: [controlplane]
  - address: 192.168.1.6
    user: ubuntu
    role: [worker]
  - address: 192.168.1.7
    user: ubuntu
    role: [etcd]

services:
  etcd:
    image: quay.io/coreos/etcd:latest
  kube-api:
    image: rancher/k8s:v1.8.3-rancher2
  kube-controller:
    image: rancher/k8s:v1.8.3-rancher2
  scheduler:
    image: rancher/k8s:v1.8.3-rancher2
  kubelet:
    image: rancher/k8s:v1.8.3-rancher2
  kubeproxy:
    image: rancher/k8s:v1.8.3-rancher2
```

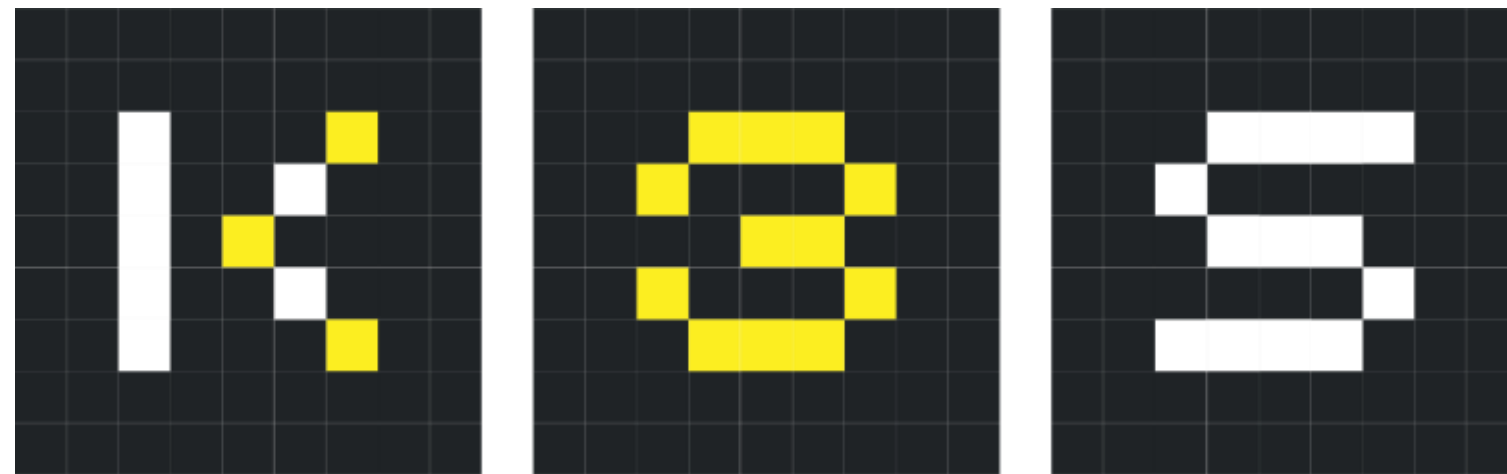


# However, running Kubernetes on the edge left us with some challenges

- Most Kubernetes distributions don't support ARM
- Kubernetes could easily consume up to 4gb of RAM
- Kubernetes wasn't built for embedded or offline management
- Need for simplified operations



# Introducing k3s



- Lightweight certified Kubernetes distro
- Built for production operations
- 40MB binary, 512MB memory consumption
- Single process w/ integrated Kubernetes master, Kubelet, and containerd
- SQLite in addition to etcd
- Simultaneously released for x86\_64, ARM64, and ARMv7
- Open source project, not yet a Rancher product



# To build k3s we removed unnecessary code and made a few enhancements

## Removes

Legacy and non-default features

---

Alpha features

---

In-tree cloud providers

---

In-tree storage drivers

---

Docker (optional)

---

## Adds

Simplified installation

---

SQLite3 support in addition to etcd

---

TLS management

---

Automatic Manifest and Helm Chart management

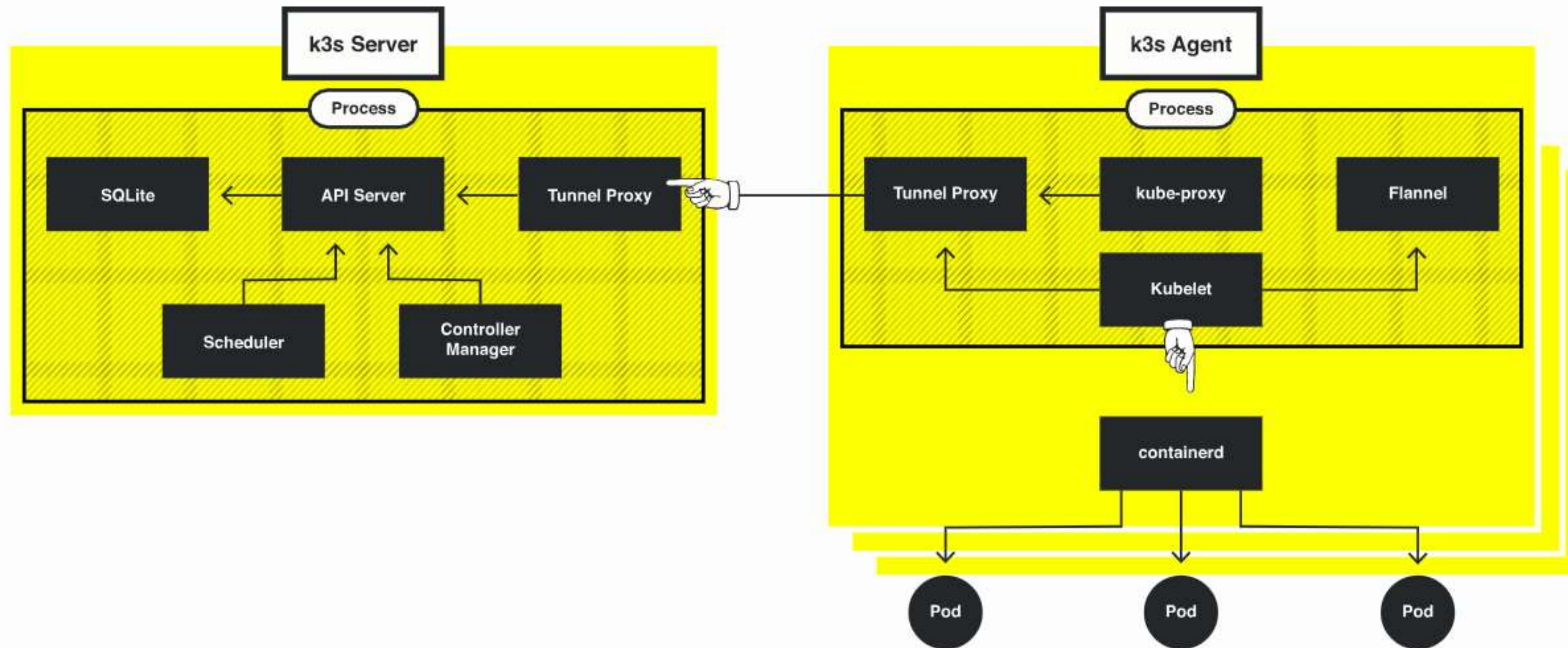
---

containerd, CoreDNS, Flannel

---



# How k3s works





# K3s use cases

1. Edge computing and Embedded systems
2. IOT Gateway
3. CI environments
4. Single-App Clusters



# Get started with k3s in two easy steps

## Quick Start

1. Download k3s - [latest release](#), x86\_64, ARMv7, and ARM64 are supported
2. Run server

```
sudo k3s server &  
# Kubeconfig is written to /etc/rancher/k3s/k3s.yaml  
sudo k3s kubectl get node  
  
# On a different node run the below. NODE_TOKEN comes from /var/lib/rancher/k3s/server/node-token  
# on your server  
sudo k3s agent --server https://myserver:6443 --token ${NODE_TOKEN}
```



# Demo



# Fleet Management for Edge Clusters

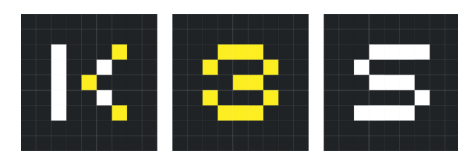
1. Multi-cluster operations (monitoring, logging, etc.)
2. Centralized access control and user management
3. Centralized security policies
4. Multi-cluster application templates
5. CI environments



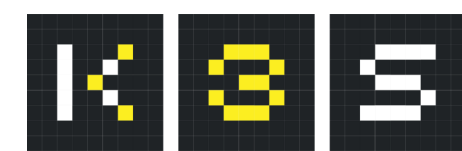
# Building Operations for 1000s of clusters

## Centralized Operations

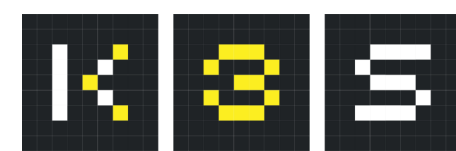
- Cluster Ops
- OS Management
- Application Management
- Monitoring
- Logging
- Alerting
- Policy
- Security
- Capacity
- Offline Clusters



k3s



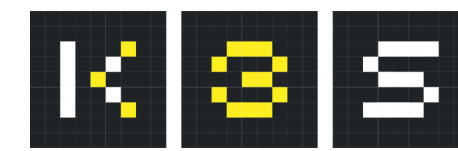
k3s



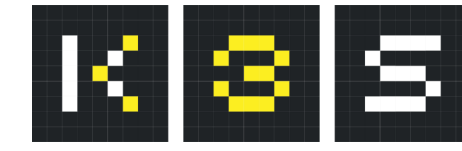
k3s



k3s



k3s




k3s

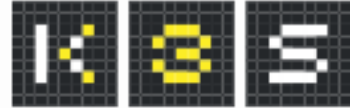
Infrastructure




<http://k3s.io>

 RANCHER LABS

See what else [Rancher](#) is up to



Docs  Github

# Lightweight Kubernetes

Easy to install 40 MB binary that runs in less than 512 MB of RAM.

This shouldn't take long...

```
curl -sL https://get.k3s.io | sh -  
kubect1 get node
```

For detailed installation, [refer to the docs](#)

Great For


Edge

IoT

CI

ARM

<https://github.com/rancher/k3s>

 Search or jump to... / Pull requests Issues Marketplace Explore

rancher / k3s

Watch 43 Star 1,118 Fork 27

<> Code

Issues 12

Pull requests 2

Projects 1

Wiki

Insights

Lightweight Kubernetes. 5 less than k8s. <https://k3s.io>

kubernetes

k8s

57 commits

3 branches

42 releases

3 contributors

Apache-2.0

Branch: master


New pull request

Create new file

Upload files

Find file

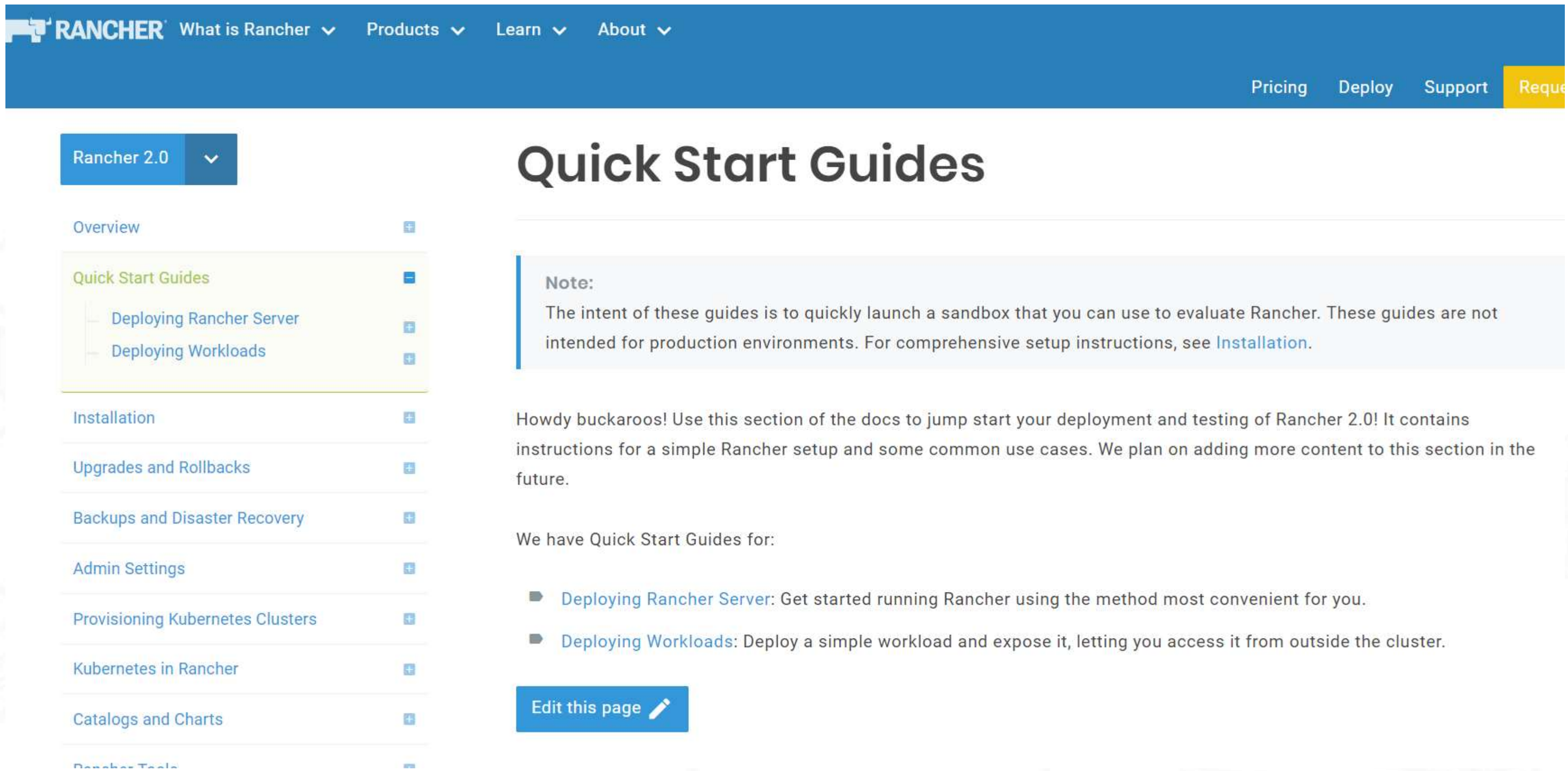
Clone or download

 erikwilson and ibuildthecloud Fix asset lookup of HOME directory ... Latest commit 91251aa 14 hours ago

cmd	Fix asset lookup of HOME directory	9 hours ago
manifests	Fix ingress	12 days ago
package	Get ARM CI working	21 days ago
pkg	Set /proc/sys/net/ipv4/ip_forward on agent start	2 days ago
scripts	Fix version printing on startup	18 days ago
types	Update generated code	18 days ago



# Rancher Quick Start Guide



The screenshot shows the Rancher website's navigation bar with links for 'What is Rancher', 'Products', 'Learn', 'About', 'Pricing', 'Deploy', 'Support', and 'Request Demo'. The left sidebar lists various documentation topics, with 'Quick Start Guides' highlighted. The main content area is titled 'Quick Start Guides' and includes a 'Note' about the guides' purpose, a brief introduction, and a list of two guides: 'Deploying Rancher Server' and 'Deploying Workloads'. An 'Edit this page' button is located at the bottom of the main content area.

Rancher 2.0 ▾

Overview

Quick Start Guides

- Deploying Rancher Server
- Deploying Workloads

Installation

Upgrades and Rollbacks

Backups and Disaster Recovery

Admin Settings

Provisioning Kubernetes Clusters

Kubernetes in Rancher

Catalogs and Charts

Rancher Tools

## Quick Start Guides

**Note:**

The intent of these guides is to quickly launch a sandbox that you can use to evaluate Rancher. These guides are not intended for production environments. For comprehensive setup instructions, see [Installation](#).

Howdy buckaroos! Use this section of the docs to jump start your deployment and testing of Rancher 2.0! It contains instructions for a simple Rancher setup and some common use cases. We plan on adding more content to this section in the future.

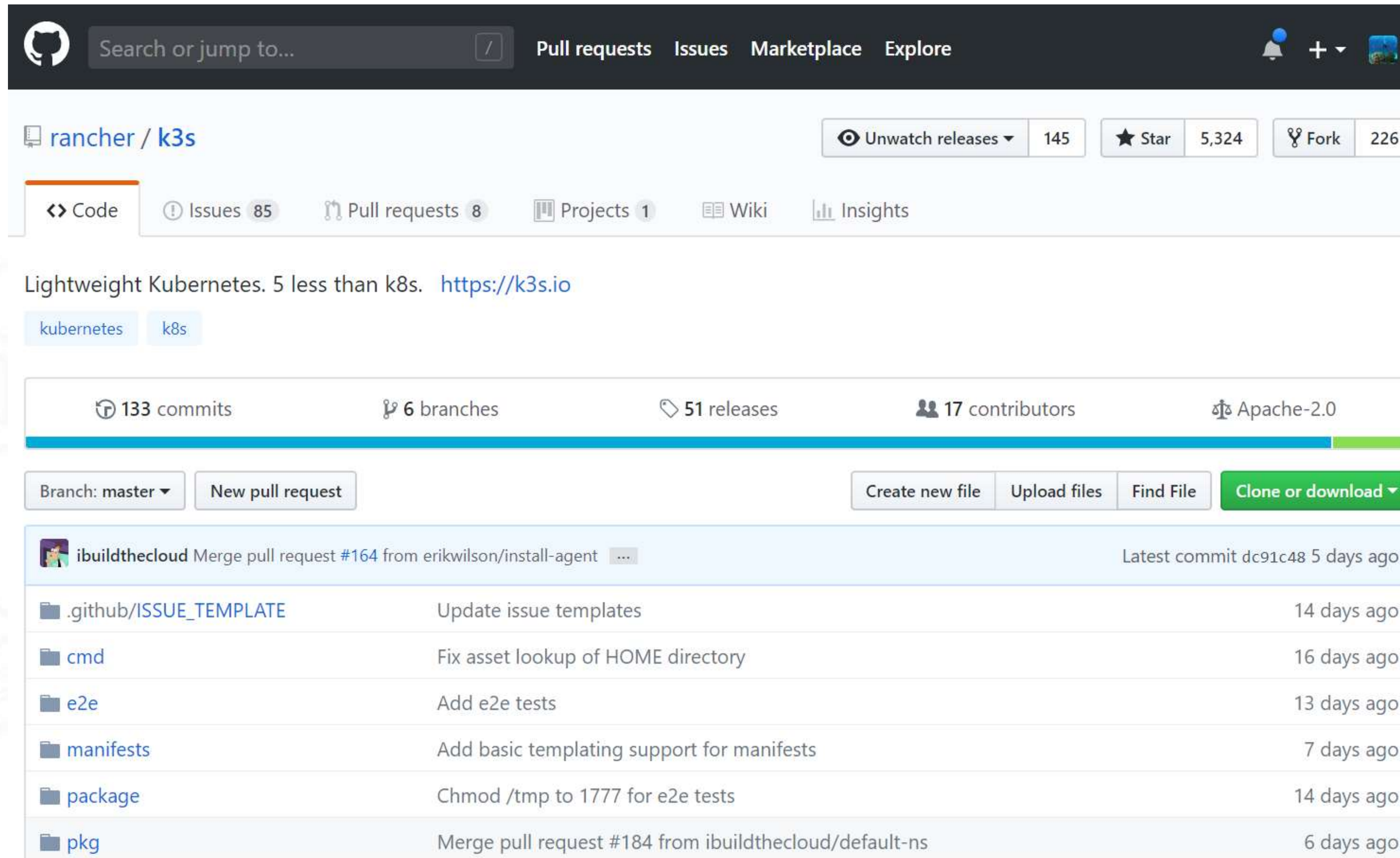
We have Quick Start Guides for:

- Deploying Rancher Server: Get started running Rancher using the method most convenient for you.
- Deploying Workloads: Deploy a simple workload and expose it, letting you access it from outside the cluster.

Edit this page

<https://rancher.com/docs/rancher/v2.x/en/quick-start-guide/>

# Rancher, RancherOS, k3s, RKE are in GitHub



The screenshot shows the GitHub repository page for `rancher/k3s`. The repository is described as "Lightweight Kubernetes. 5 less than k8s." and includes a link to <https://k3s.io>. It has 145 releases, 5,324 stars, and 226 forks. The repository is licensed under Apache-2.0 and has 17 contributors. The commit history shows several recent updates, including updates to issue templates, asset lookup, e2e tests, and manifest templating support.

Search or jump to... Pull requests Issues Marketplace Explore

rancher / k3s Unwatch releases 145 ★ Star 5,324 Fork 226

Code Issues 85 Pull requests 8 Projects 1 Wiki Insights

Lightweight Kubernetes. 5 less than k8s. <https://k3s.io>

kubernetes k8s

133 commits 6 branches 51 releases 17 contributors Apache-2.0

Branch: master New pull request Create new file Upload files Find File Clone or download

ibuildthecloud Merge pull request #164 from erikwilson/install-agent Latest commit dc91c48 5 days ago

.github/ISSUE_TEMPLATE	Update issue templates	14 days ago
cmd	Fix asset lookup of HOME directory	16 days ago
e2e	Add e2e tests	13 days ago
manifests	Add basic templating support for manifests	7 days ago
package	Chmod /tmp to 1777 for e2e tests	14 days ago
pkg	Merge pull request #184 from ibuildthecloud/default-ns	6 days ago





# Thank you

@Rancher\_Labs · #RancherMeetup