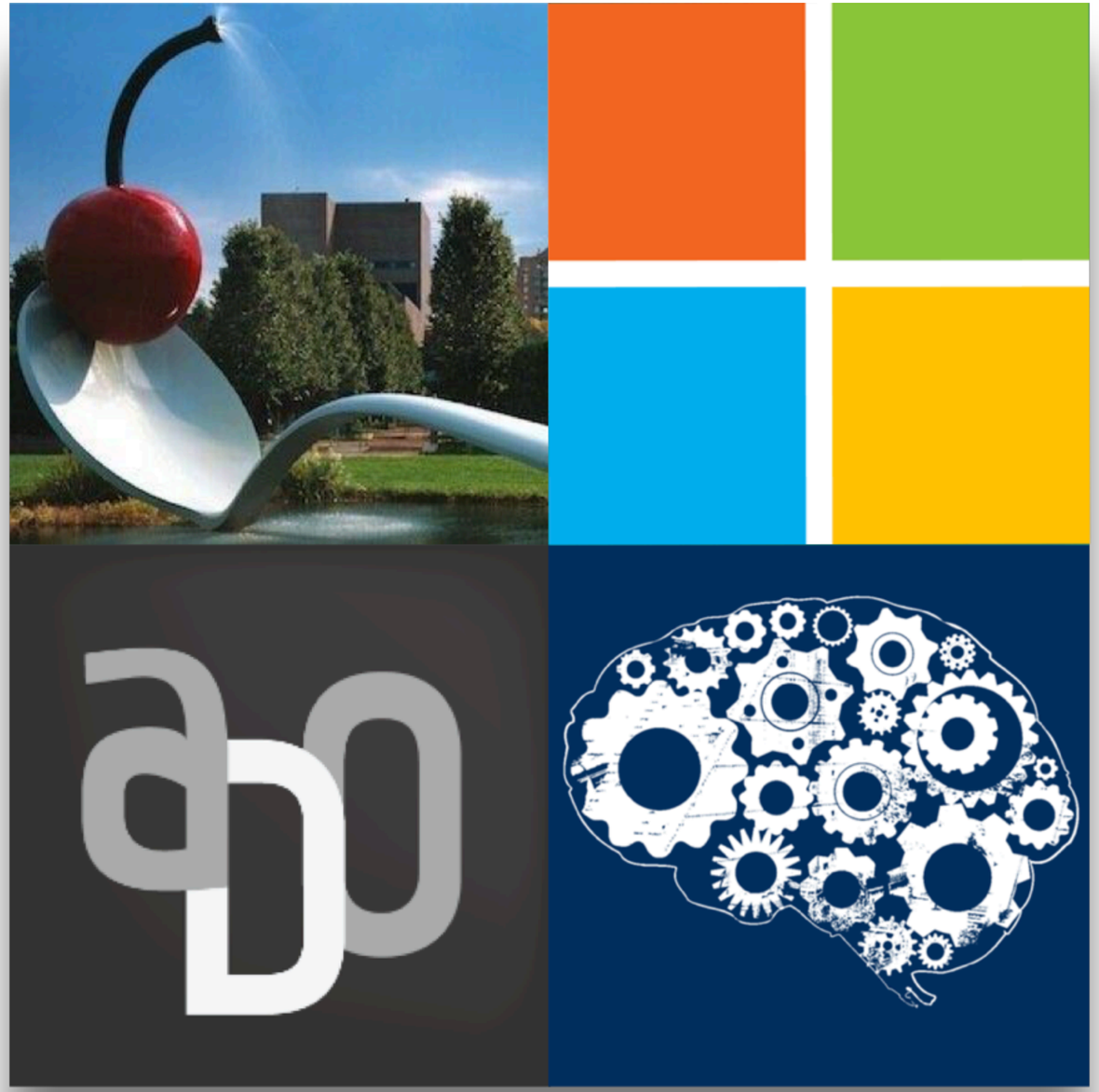
day 2 k8s
tools for operability
@bridgetkromhout
#qconsf

Bridget Kromhout

lives:
Minneapolis,
Minnesota



works:
Microsoft

podcasts:
Arrested
DevOps

organizes:
devopsdays

Outline

1. what even are containers & k8s?
2. tools in the k8s ecosystem
3. the future

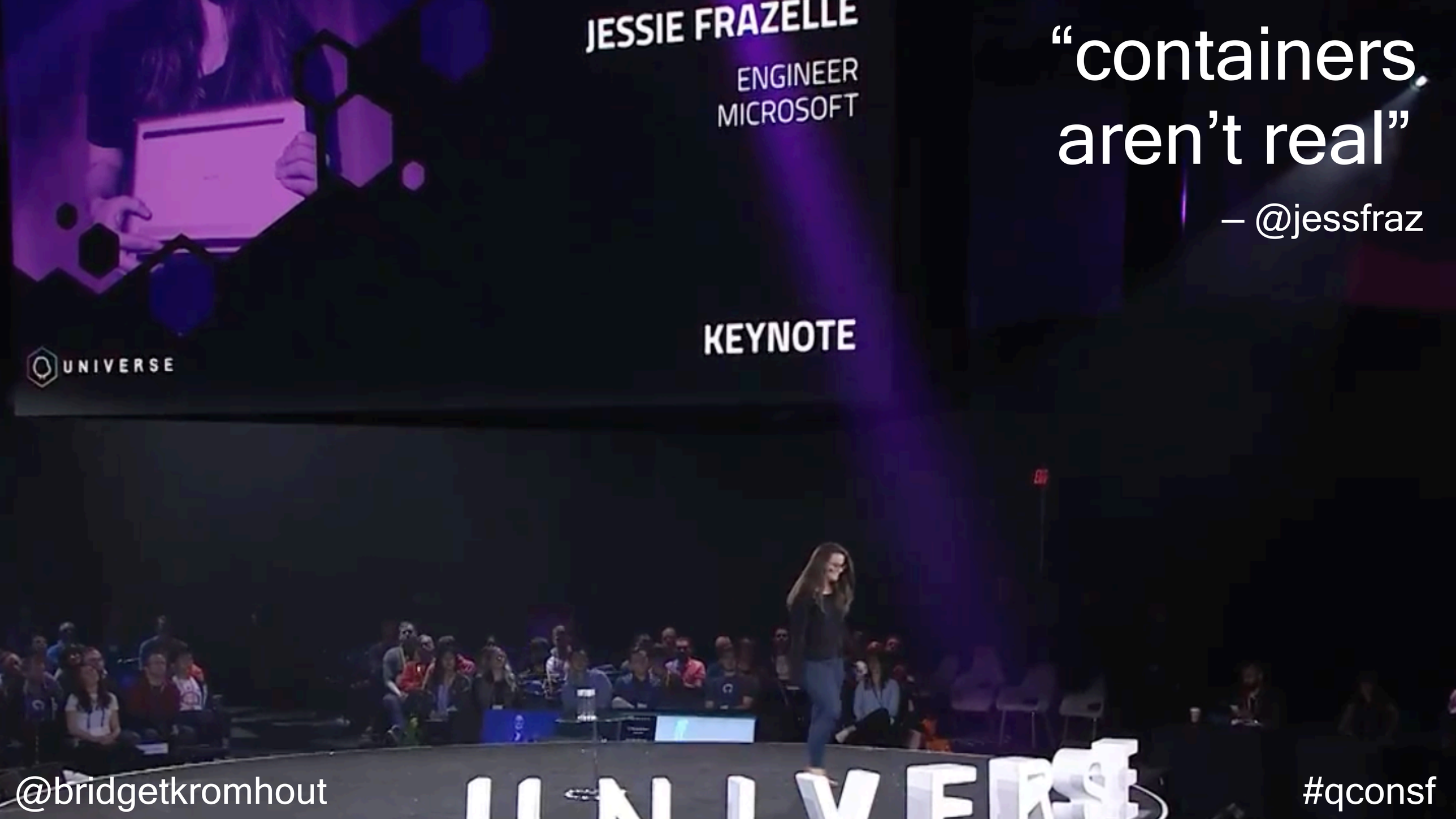
Spoilers

1. what even are containers & k8s?
2. tools in the k8s ecosystem
3. the future

what even are containers & k8s?

“And you may ask yourself, ‘Well… how did I get here?’”

Talking Heads — Once in a Lifetime



“containers aren’t real”

– @jessfraz

What is a container?

Not a real thing. An application delivery mechanism with **process isolation** based on several **Linux kernel** features.

Namespaces

(what a process can see)

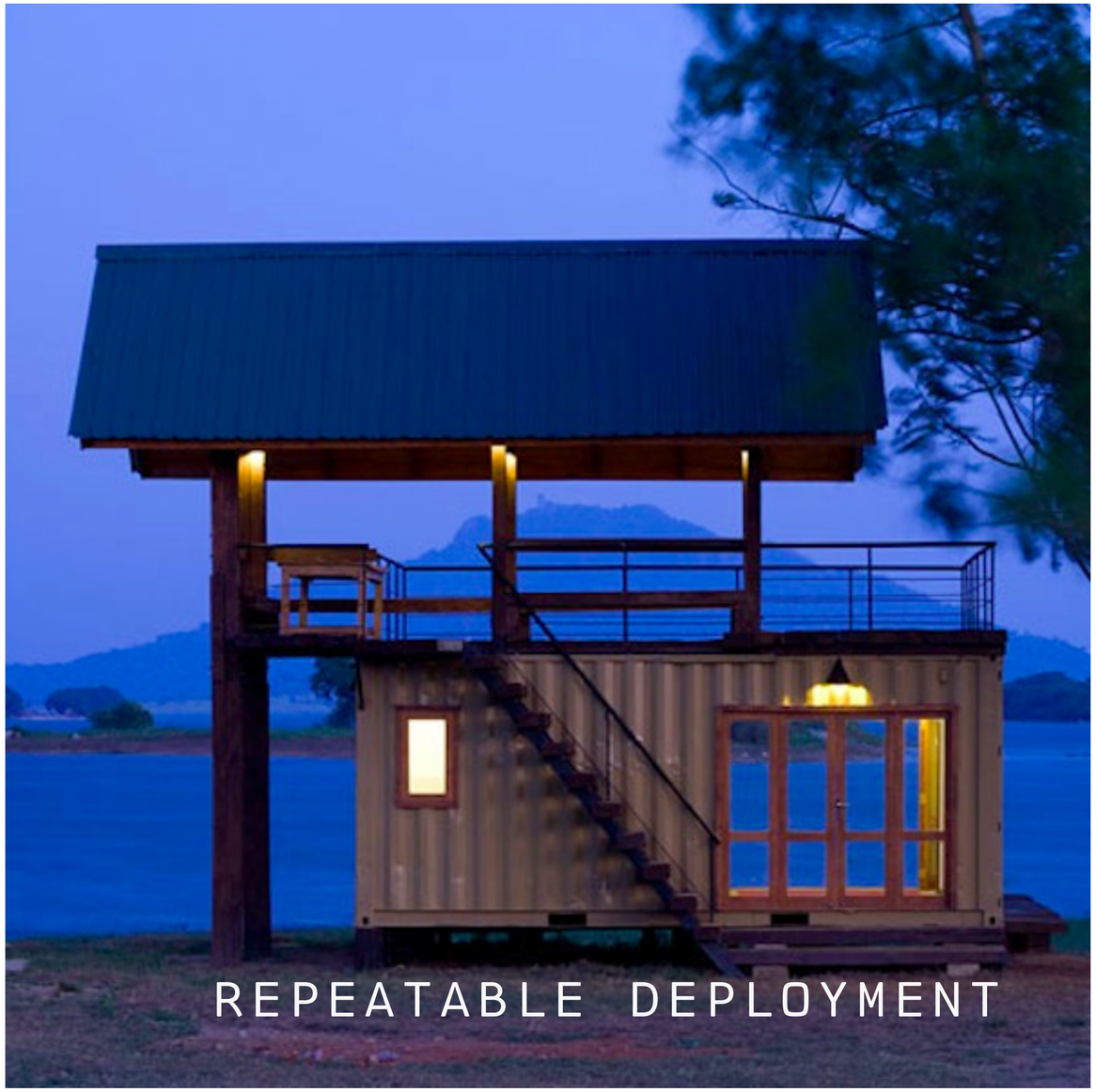
- PID
- Mount
- Network
- UTS
- IPC
- User
- Cgroup

Cgroups

(what a process can use)

- Memory
- CPU
- Blkio
- Cpuacct
- Cpuset
- Devices
- Net_prio
- Freezer

containers solve problems

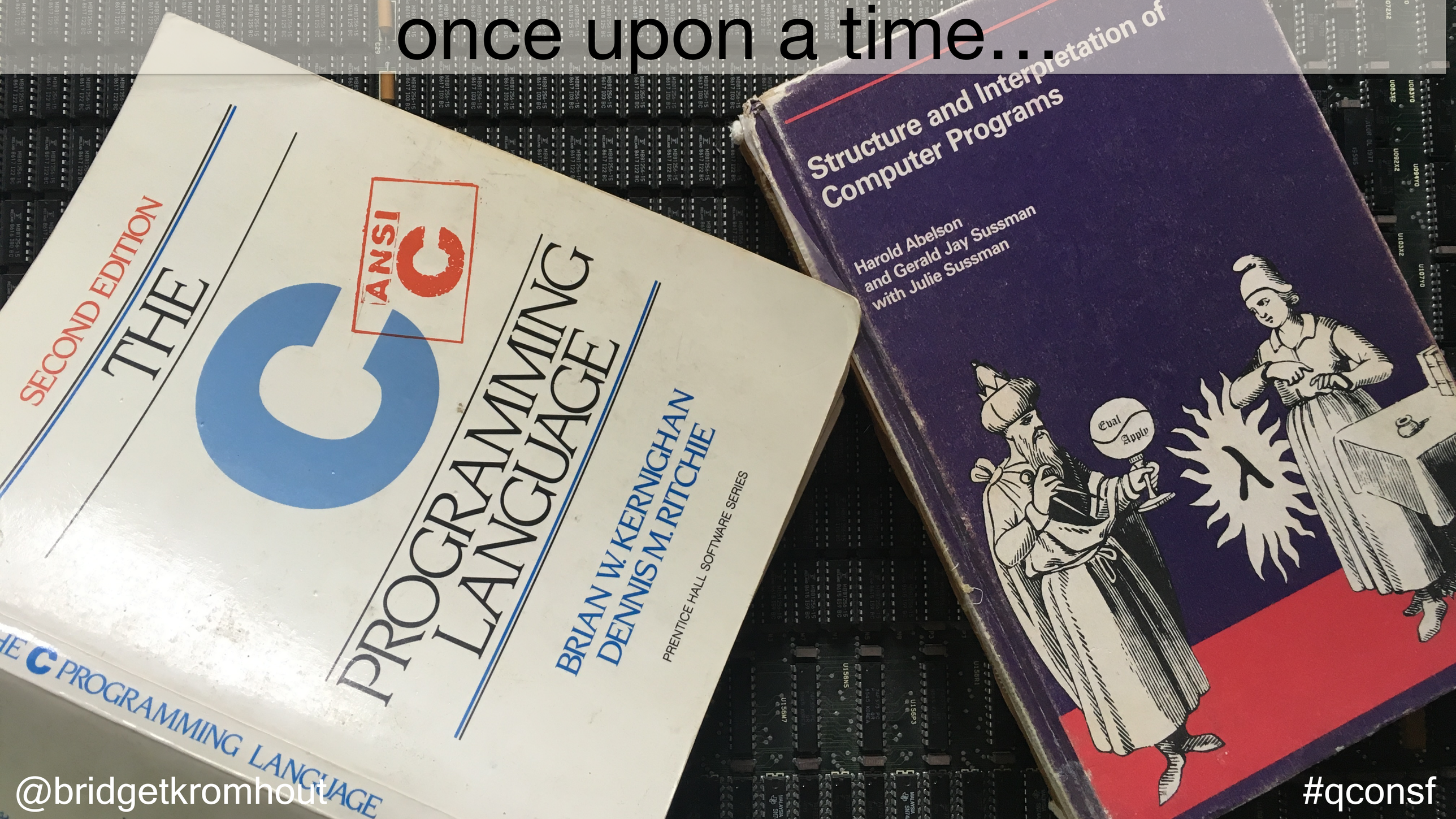


containers don't solve all problems

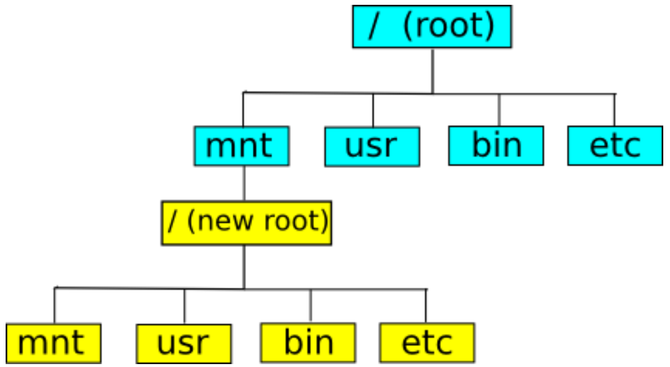
@bridgetkromhout

#qconsf

once upon a time…



containers: early days



chroot

1979 (Version 7)
1982 (BSD)

FreeBSD jails

2000

Solaris Zones

2004

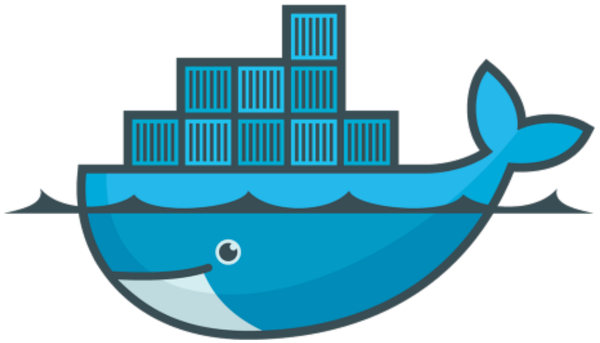
LXC

2008

containers: becoming mainstream

Cloud Foundry

2011



Docker

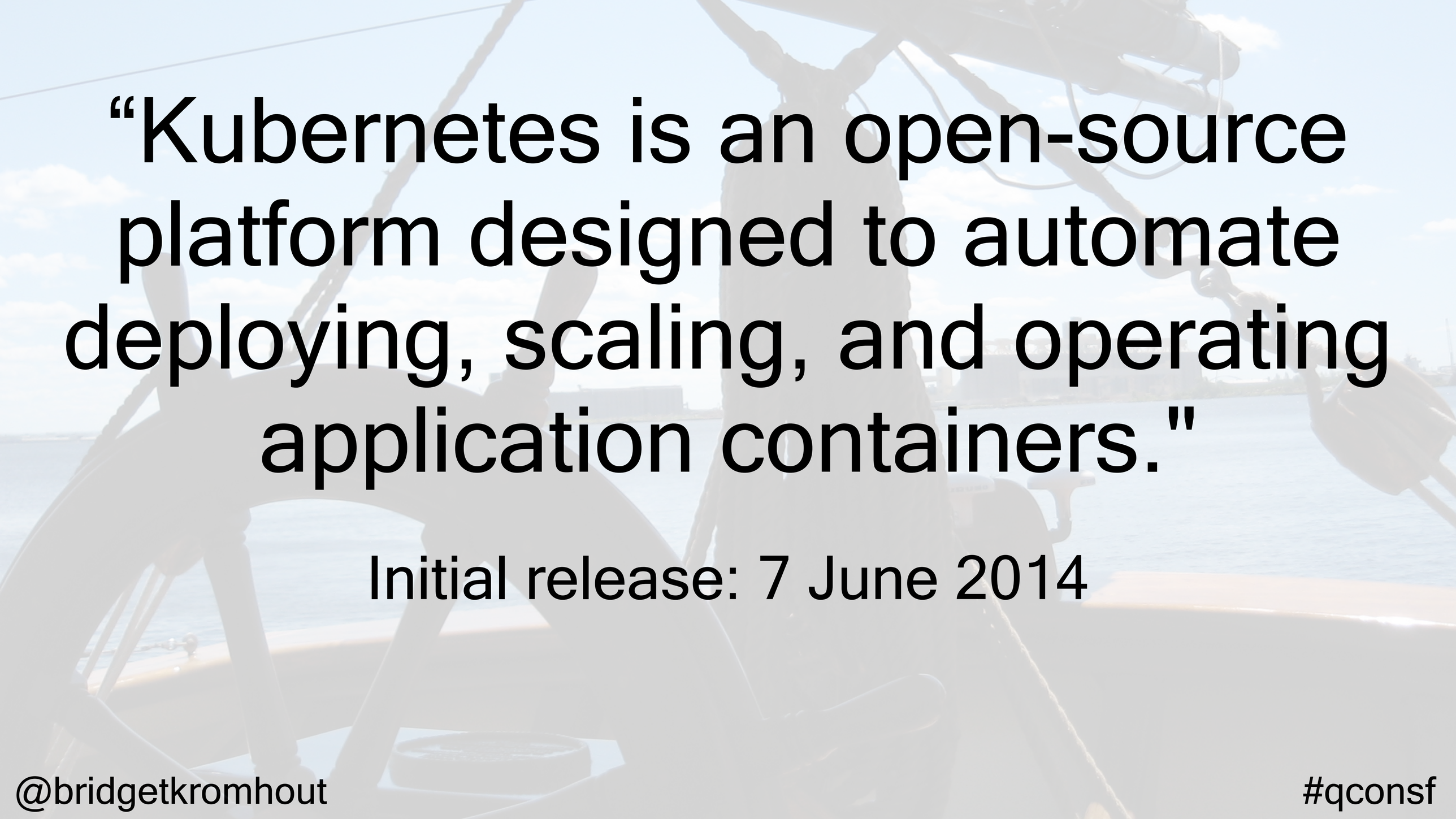
2013

Rocket (later rkt)

2014

OCI

2015



“Kubernetes is an open-source platform designed to automate deploying, scaling, and operating application containers."

Initial release: 7 June 2014

orchestrating containers: a tool, not a goal

tools in the k8s ecosystem

“If you are confused, check with the sun
Carry a compass to help you along”

R.E.M. — Stand

Honest Status Page
@honest_update
Follow
We replaced our monolith with micro services so that every outage could be more like a murder mystery.
6:10 PM - 7 Oct 2015
3,016 Retweets 2,464 Likes
DINING HALL
BILLIARD ROOM
DRAWING ROOM
FOYER
CHEAPASS Games
© 2015
Harlan Frogbundle
Image credit: James Ernest
@bridgetkromhout
#qconsf

elements of orchestration

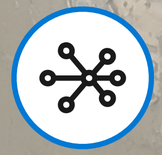
Scheduling

Affinity/
anti-affinity

Health
monitoring

Failover

Scaling



Networking

Service
discovery

Coordinated
app upgrades

Kubernetes: a choice for orchestration

Portable

Public, private, hybrid, multi-cloud

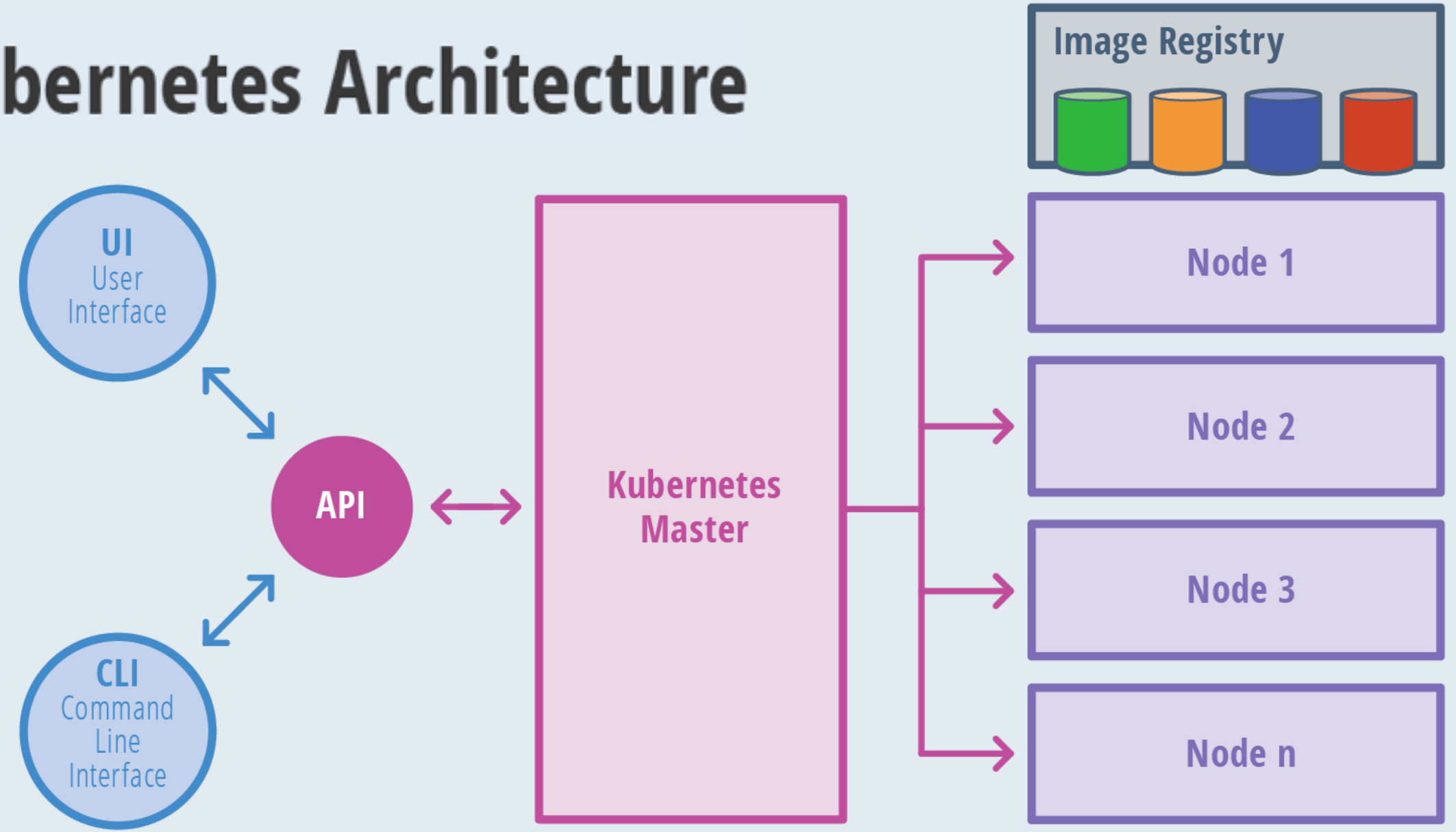
Extensible

Modular, pluggable, hookable, composable

Self-healing

Auto-placement, auto-restart, auto-replication, auto-scaling

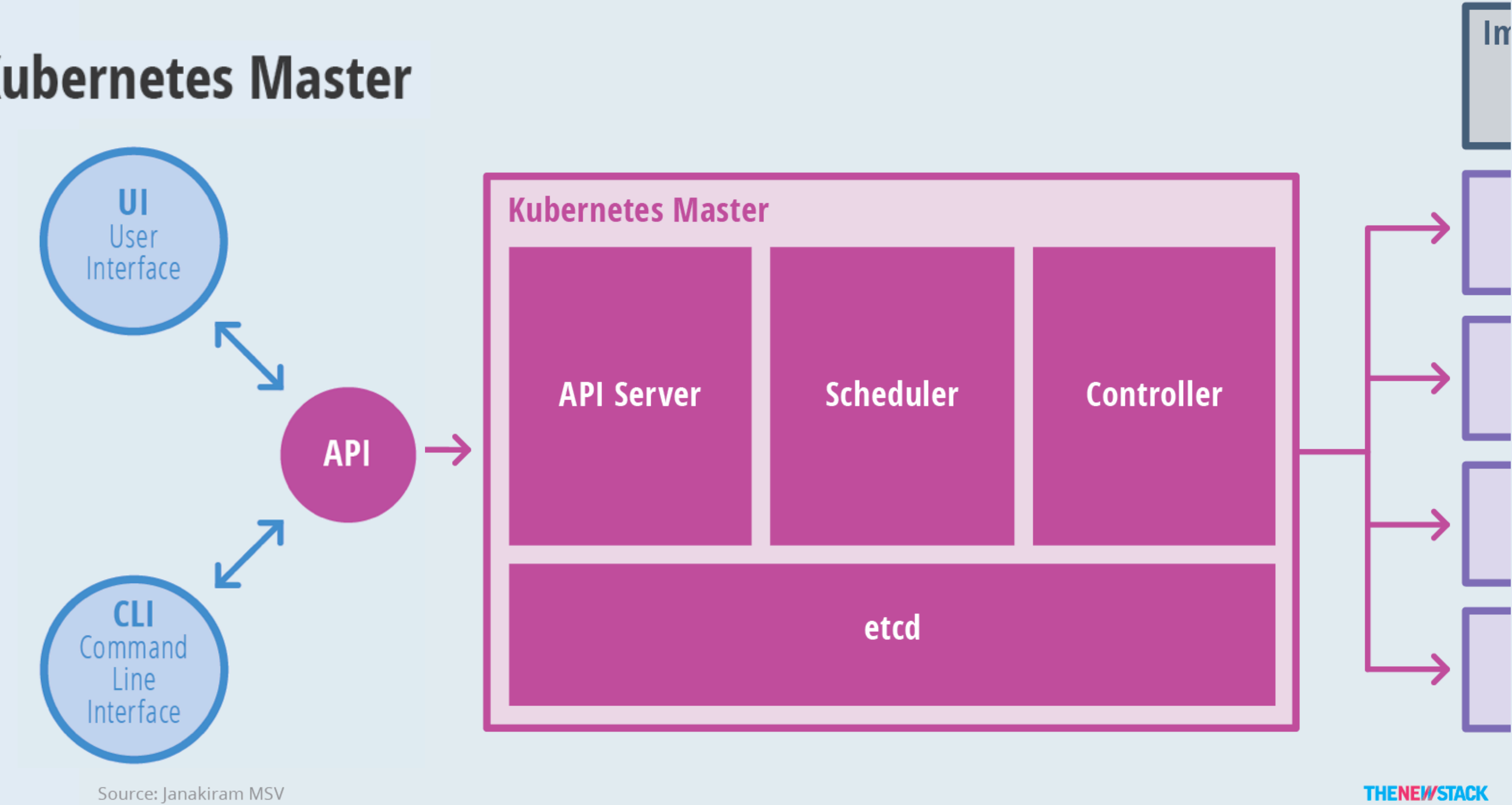
Kubernetes Architecture



Source: Janakiram MSV

THENEWSTACK

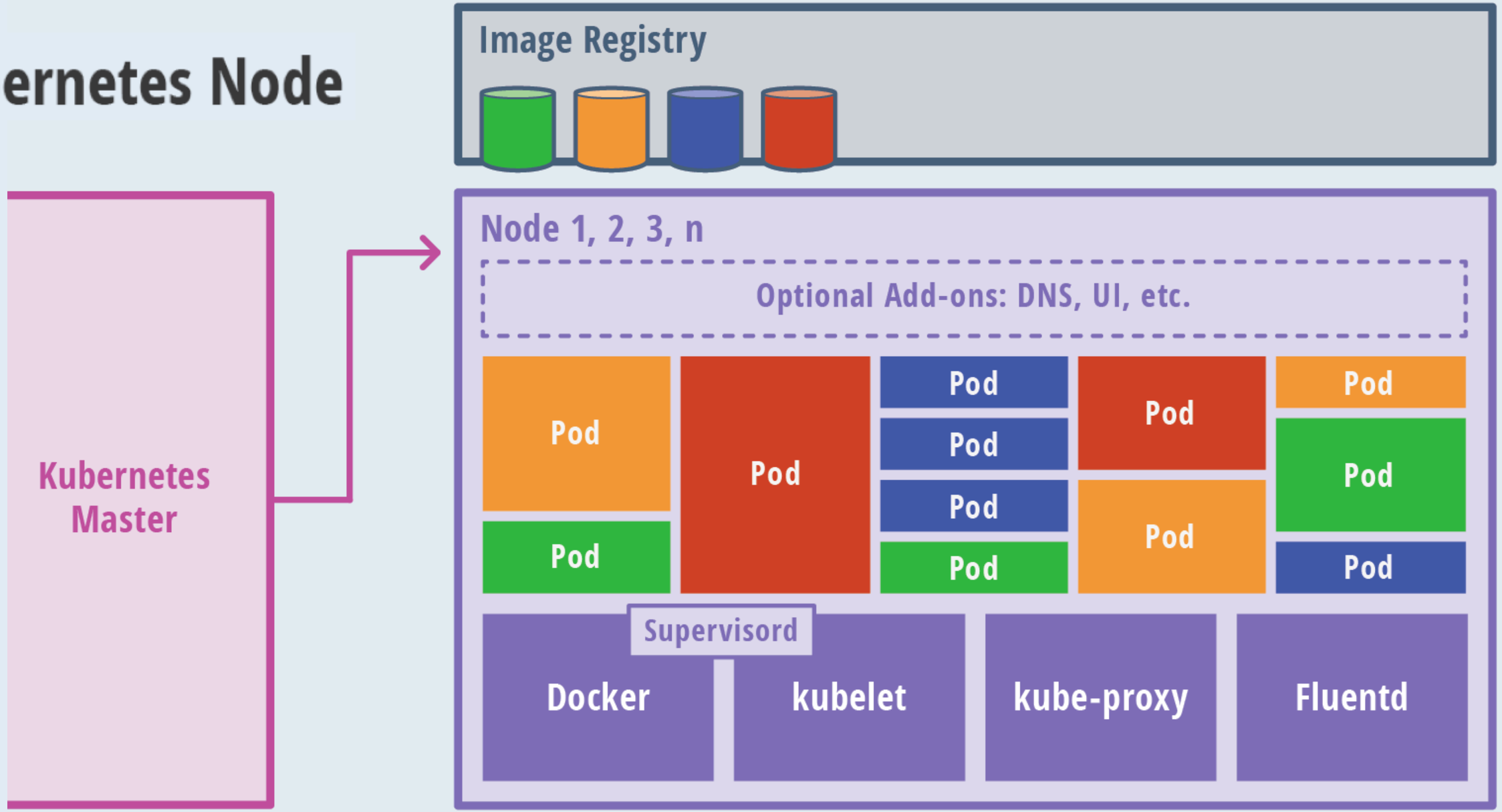
Kubernetes Master



Source: Janakiram MSV

THENEWSTACK

Kubernetes Node



Source: Janakiram MSV

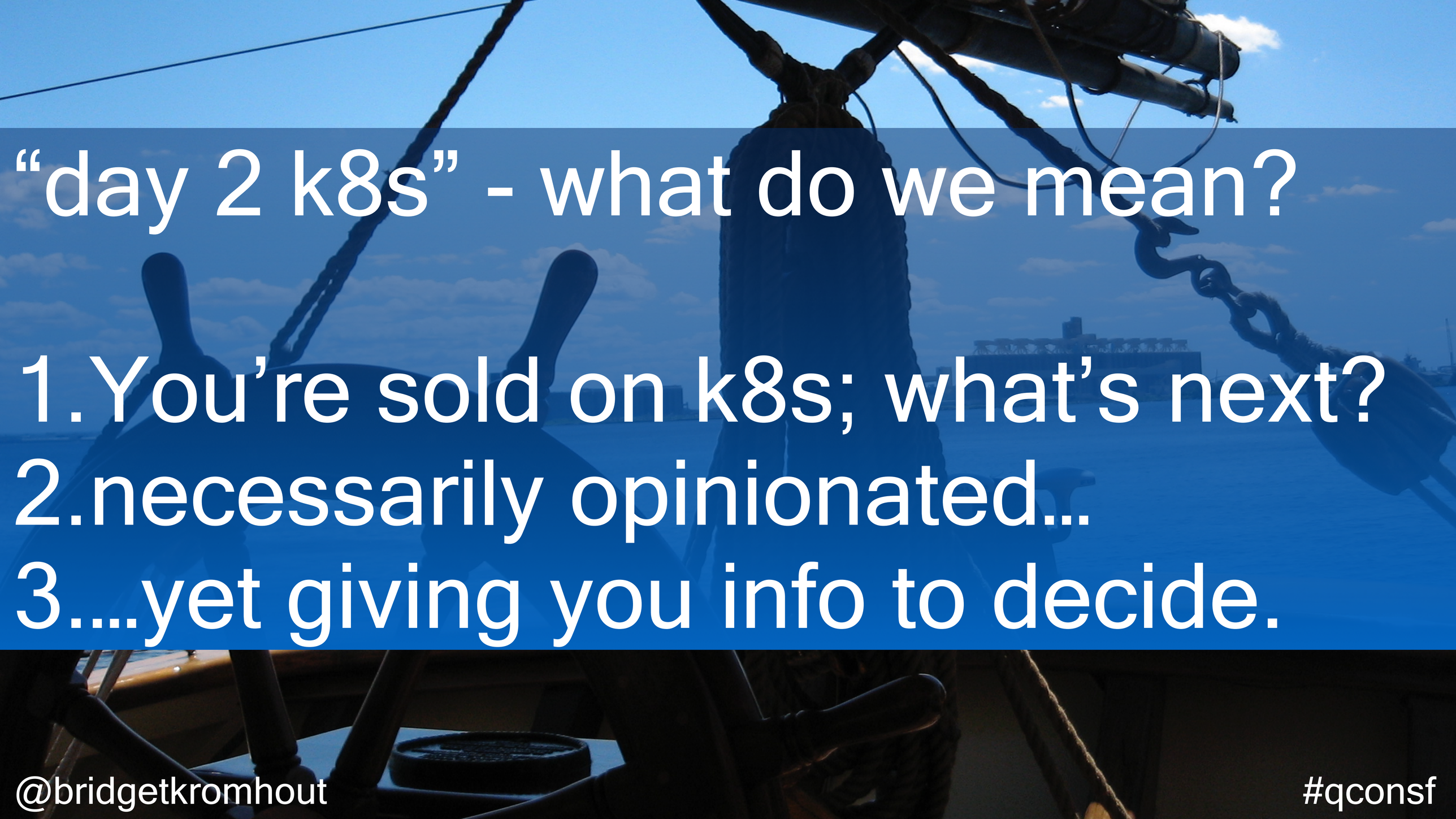
Kubernetes: empowering you to do more

Deploy your applications quickly and predictably

Scale your applications on the fly

Roll out new features seamlessly

Limit hardware usage to required resources



“day 2 k8s” - what do we mean?

1. You’re sold on k8s; what’s next?
2. necessarily opinionated…
3. …yet giving you info to decide.

operable k8s: next steps

-Getting started with Terraform & hosted k8s
-Managing configs with Helm & apps with Draft
-Event-driven scripting with Brigade & Kasti

Terraform

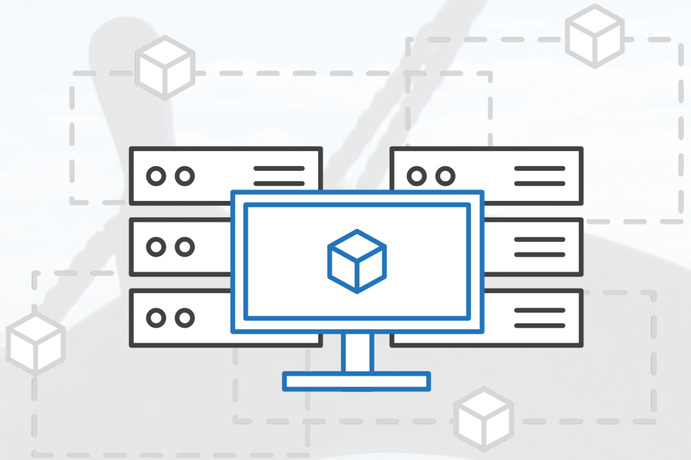
Deploy k8s clusters, pods, and services!

Find providers: https://registry.terraform.io/

Providers include Azure & Azure Stack, as well as other clouds.

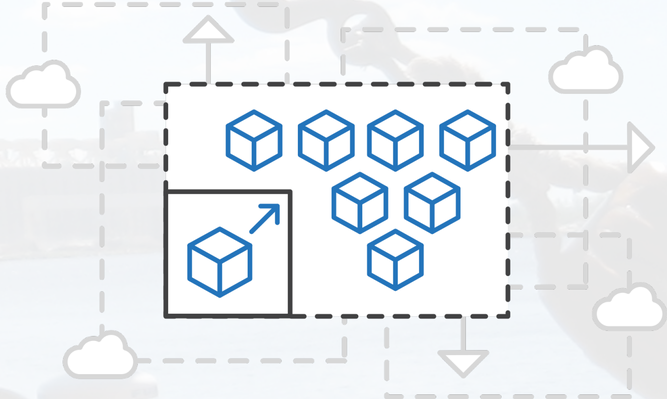
Azure Kubernetes Service (AKS)

Simplify the deployment, management, and operations of Kubernetes



Focus on your containers not the infrastructure

Work how you want with open-source APIs



Scale and run applications with confidence

(similar options exist for your cloud of choice)

Azure Kubernetes Service (AKS)

Get started easily

```
$ az aks create -g myResourceGroup -n myCluster --generate-ssh-keys
\ Running ..

$ az aks install-cli
Downloading client to /usr/local/bin/kubectl ..

$ az aks get-credentials -g myResourceGroup -n myCluster
Merged "myCluster" as current context ..

$ kubectl get nodes
NAME                          STATUS    AGE       VERSION
aks-mycluster-36851231-0      Ready     4m        v1.8.1
aks-mycluster-36851231-1      Ready     4m        v1.8.1
aks-mycluster-36851231-2      Ready     4m        v1.8.1
```

Azure Kubernetes Service (AKS)

Manage an AKS cluster

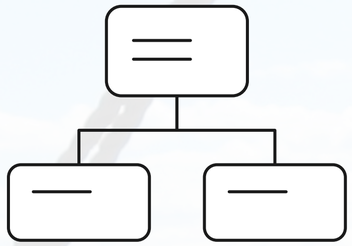
```
$ az aks list –o table
Name                 Location    ResourceGroup     KubernetesRelease  ProvisioningState
-------------------  ----------  --------------  -------------------  -------------------
myCluster            westus2     myResourceGroup                1.7.7  Succeeded

$ az aks upgrade -g myResourceGroup -n myCluster ––kubernetes-version 1.8.1
\ Running ..

$ kubectl get nodes
NAME                          STATUS     AGE        VERSION
aks-mycluster-36851231-0      Ready      12m        v1.8.1
aks-mycluster-36851231-1      Ready      8m         v1.8.1
aks-mycluster-36851231-2      Ready      3m         v1.8.1

$ az aks scale -g myResourceGroup -n myCluster --agent-count 10
\ Running ..
```

The package manager for Kubernetes

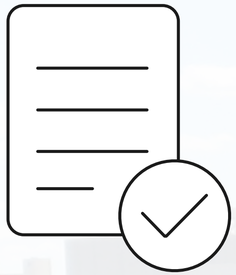
Helm is the best way to find, share, and use software built for Kubernetes.

Helm

Find, share, and use software built for k8s

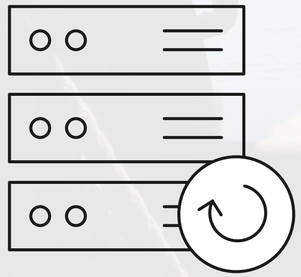


Manage complexity



Easy updates

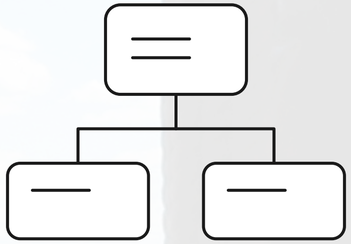
Simple sharing



Rollbacks

Helm

The best way to find, share, and use software built for Kubernetes



Manage complexity

Charts can describe complex apps; provide repeatable app installs, and serve as a single point of authority

Helm

The best way to find, share, and use software built for Kubernetes

Easy updates

Take the pain out of updates with in-place upgrades and custom hooks

Helm

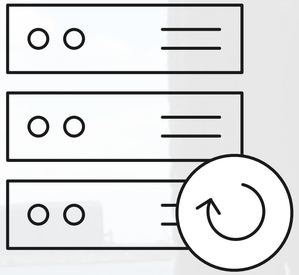
The best way to find, share, and use software built for Kubernetes

Simple sharing

Charts are easy to version, share, and host on public or private servers

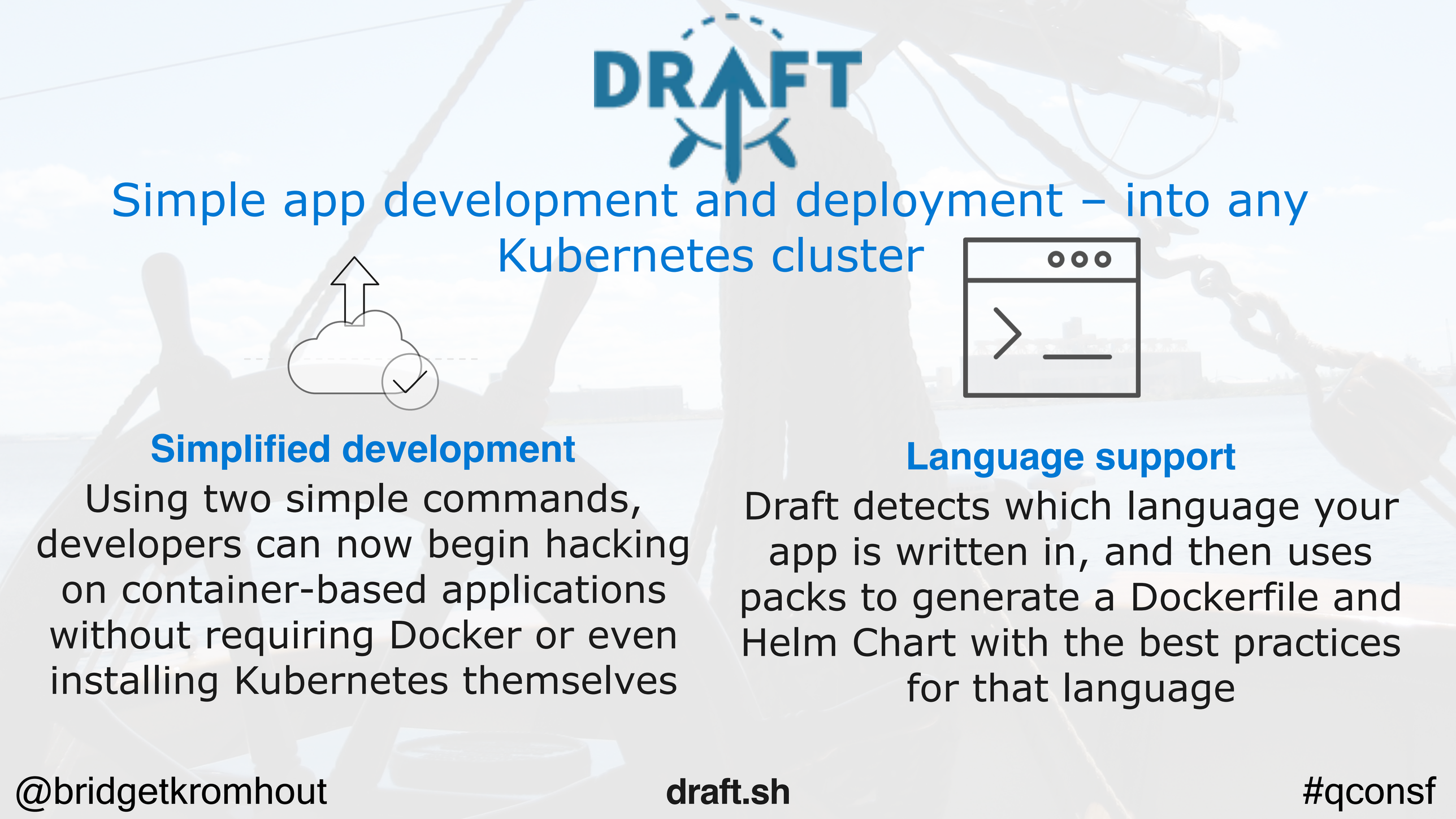
Helm

The best way to find, share, and use software built for Kubernetes



Rollbacks

Use `helm rollback` to roll back to an older version of a release with ease



Simple app development and deployment – into any Kubernetes cluster

Simplified development

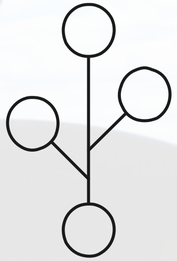
Using two simple commands, developers can now begin hacking on container-based applications without requiring Docker or even installing Kubernetes themselves

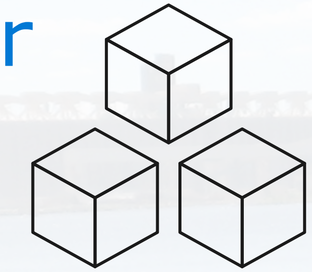
Language support

Draft detects which language your app is written in, and then uses packs to generate a Dockerfile and Helm Chart with the best practices for that language

BRIGADE

Run scriptable, automated tasks in the cloud — as part of your Kubernetes cluster





Simple, powerful pipes

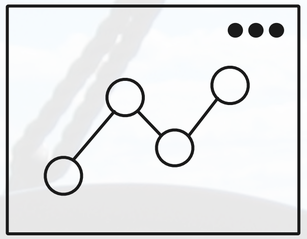
Each project gets a `brigade.js` config file, which is where you can write dynamic, interwoven pipelines and tasks for your Kubernetes cluster

Runs inside your cluster

By running Brigade as a service inside your Kubernetes cluster, you can harness the power of millions of available Docker images

Kashti

A simple UI to display build results and logs



Simple visualizations

A web dashboard for Brigade, helping to easily visualize and inspect your Brigade builds

Driving deep insights

Make Brigade DevOps workflows— projects, scripts, and jobs—and their events visible instantly

the future

“What’s next?”

Jed Bartlet, The West Wing

the future

“What’s next?”

Jed Bartlet, The West Wing

November 6th: votesaveamerica.com

“Day Two Is Forever”

Forever

Forever

Forever

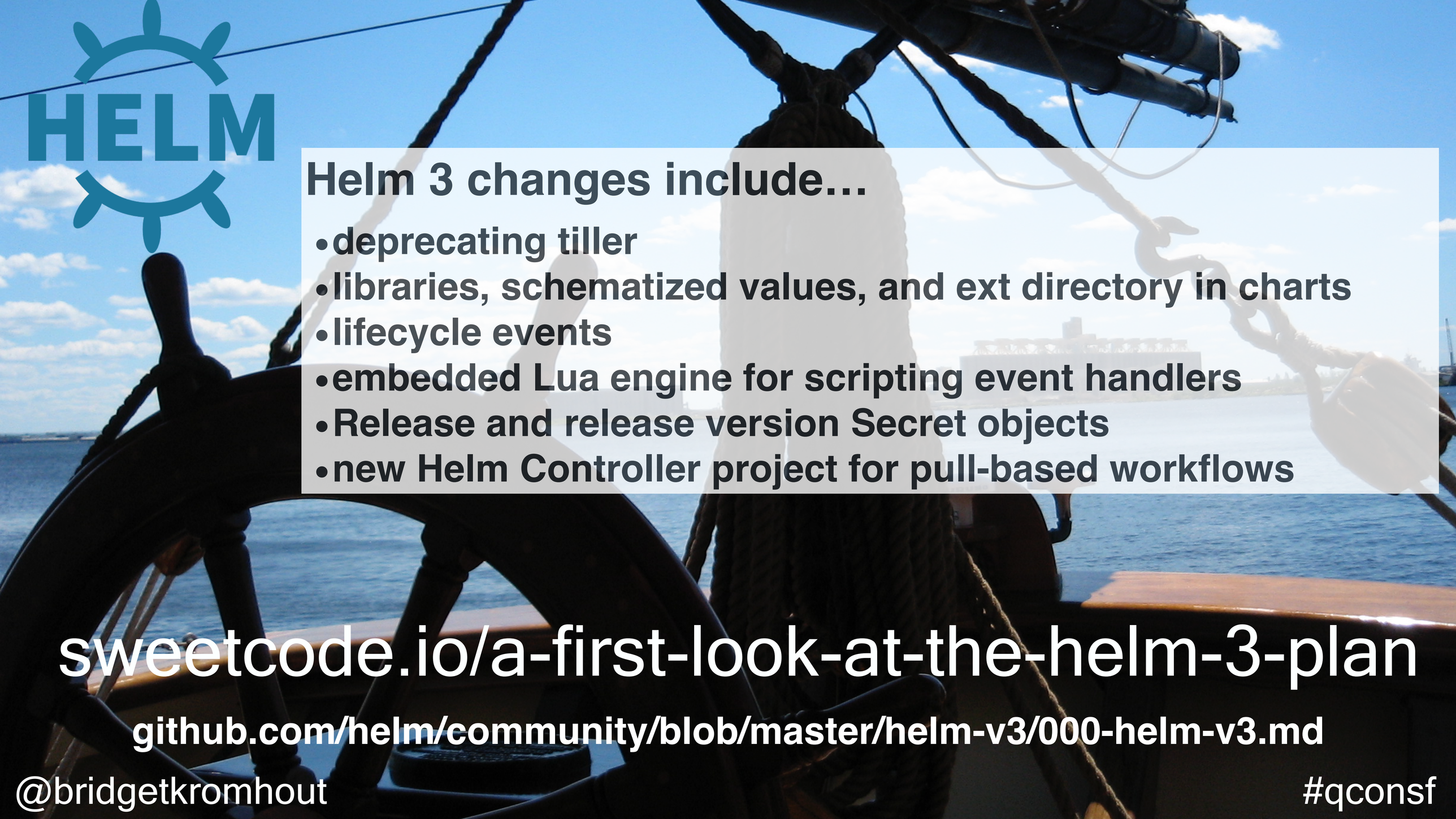
Forever

Forever

flickr.com/photos/sirtrentalot/3195464062/ (CC BY 2.0)

winter is coming
(k8s getting real)
@bridgetkromhout
#qconsf

check out container.training...
...but consider managed k8s!
(aka choose-your-own-complexity)

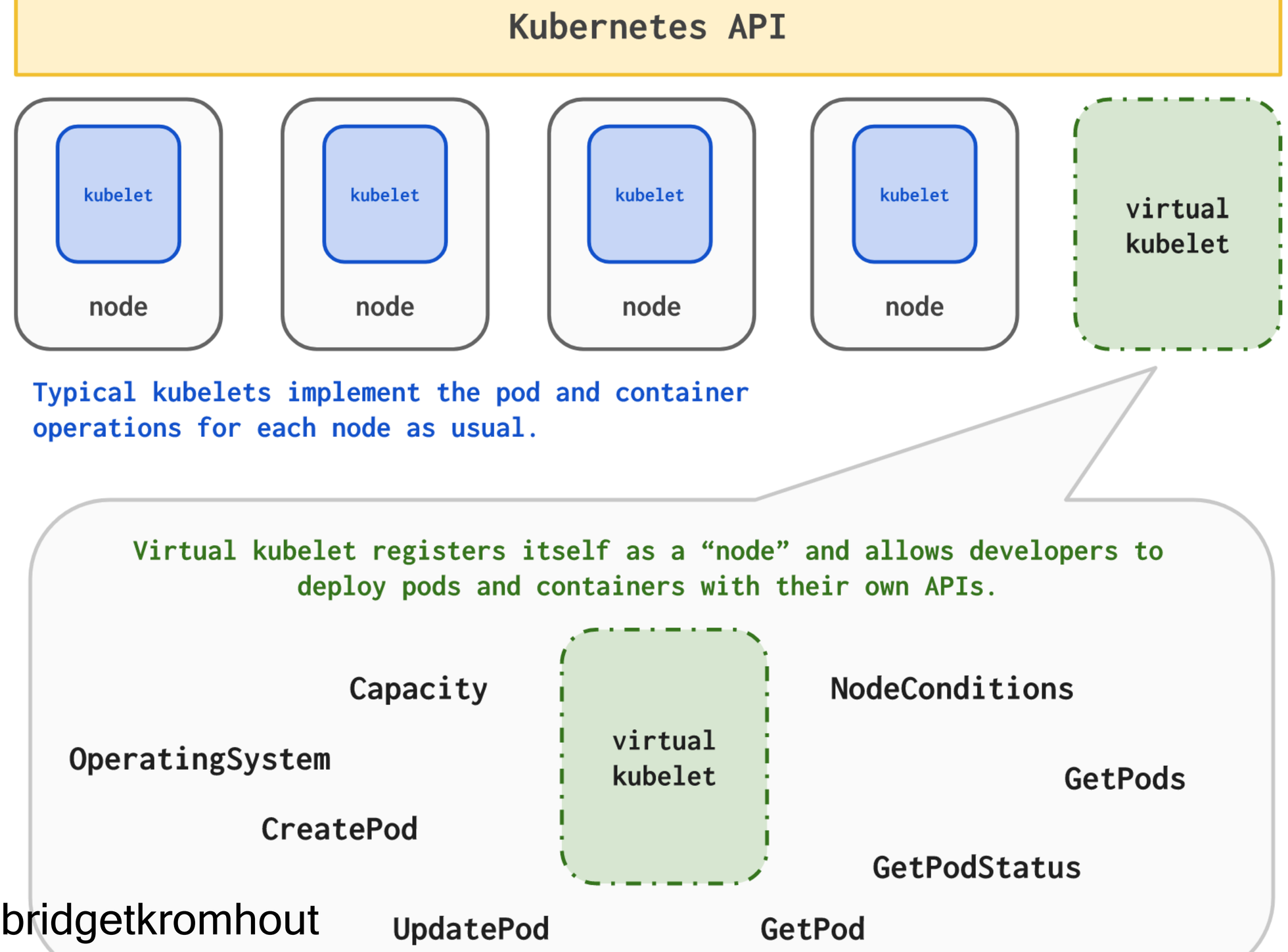


Helm 3 changes include…

- deprecating tiller
- libraries, schematized values, and ext directory in charts
- lifecycle events
- embedded Lua engine for scripting event handlers
- Release and release version Secret objects
- new Helm Controller project for pull-based workflows

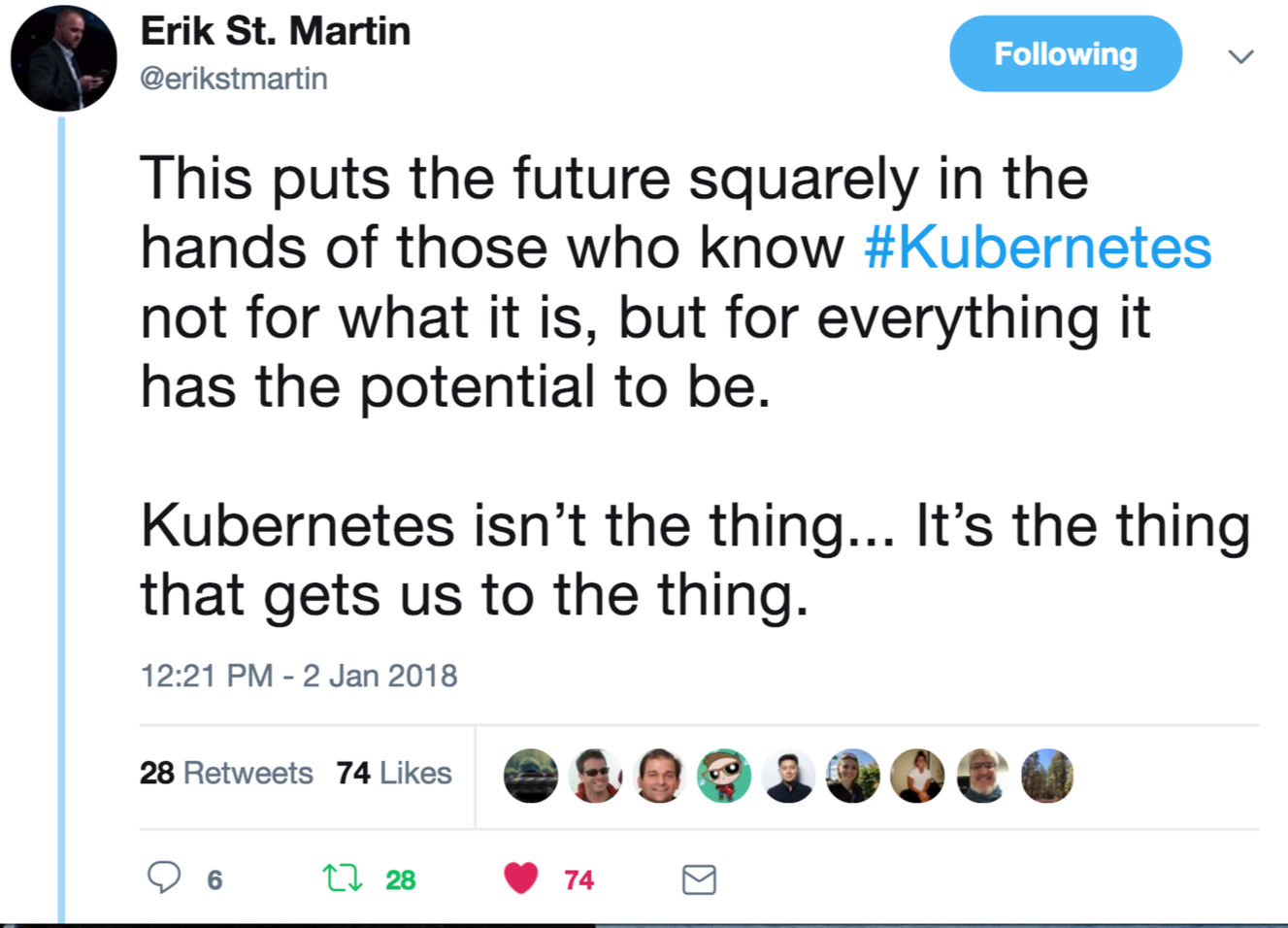
sweetcode.io/a-first-look-at-the-helm-3-plan

github.com/helm/community/blob/master/helm-v3/000-helm-v3.md



Virtual Kubelet

recognize change exists...



…and change doesn't end..

Jeffrey Snover
@jsnover

Following

The sea refuses no river.
Azure is over 50% Linux VMs
zdnet.com/google-amp/art …

6:07 AM - 28 Sep 2018 from Florida, USA

110 Retweets **265** Likes

7 110 265

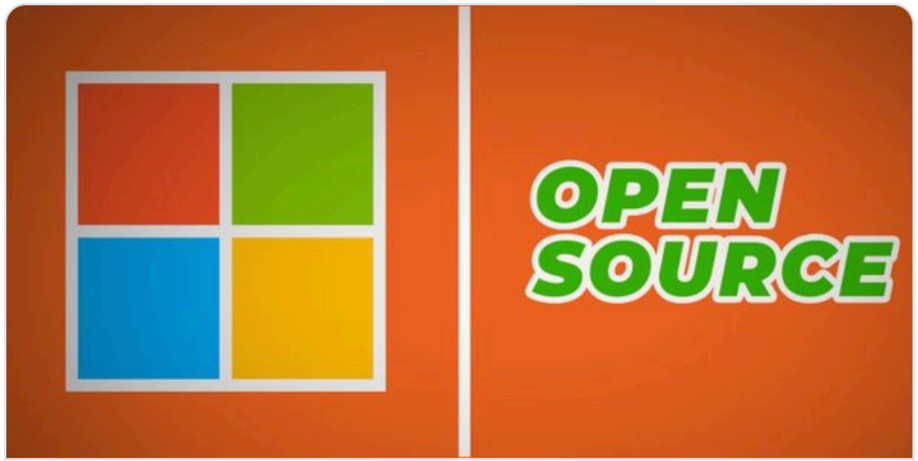
@bridgetkromhout

#qconsf

Nat Friedman
@natfriedman

Following

Microsoft is pledging our massive patent portfolio – over 60,000 patents – to Linux and open source by joining OIN this morning. If you're looking for signs that we are serious about being the world's largest open source company, look no further.



Microsoft open-sources its entire patent portfolio | ZDNet
Microsoft has joined the Open Invention Network, an open-source patent consortium. By so doing, it is offering its entire patent portfolio -- royalty f...
zdnet.com

9:49 AM - 10 Oct 2018

4,783 Retweets **9,241** Likes

151 4.8K 9.2K

#qconsf

Bridget Kromhout

@bridgetkromhout

Microsoft issued me a Mac when they hired me to help people use Linux on Azure. ✨

If this sounds like the beginning of a nerdy joke, it's because we need to question long-held opinions, let go of deeply-cherished stereotypes, and welcome this new era of open collaboration.

10:54 AM - 26 Nov 2017 from Minneapolis, MN

357 Retweets **1,459** Likes

47 357 1.5K

To learn more…

Terraform on Azure
docs.microsoft.com/azure/terraform

Azure Free Trial
azure.com/free

helm.sh, draft.sh, brigade.sh, kashti.sh

Microsoft Ignite: The Tour
microsoft.com/ignite-the-tour

Microsoft Learn
docs.microsoft.com/learn

Thanks!

Terraform on Azure
docs.microsoft.com/azure/terraform

Azure Free Trial
azure.com/free

helm.sh, draft.sh, brigade.sh, kashti.sh

Microsoft Ignite: The Tour
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Microsoft Learn
docs.microsoft.com/learn