



kubernetes operability tooling

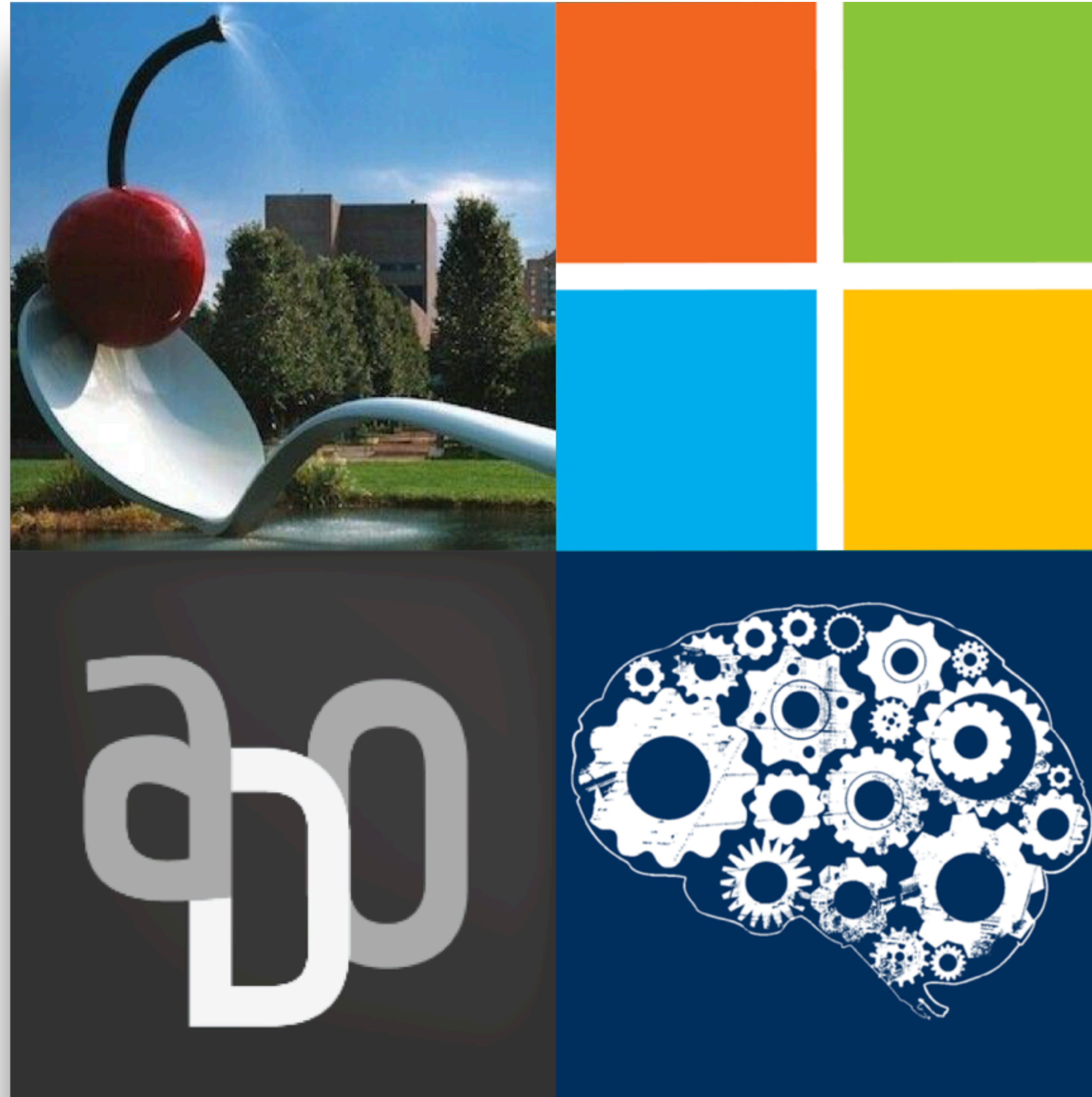
@bridgetkromhout

#GOTOchgo

Bridget Kromhout

lives:
Minneapolis,
Minnesota

podcasts:
Arrested
DevOps



works:
Microsoft

organizes:
devopsdays

Outline

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

Spoilers

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



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

Talking Heads — Once in a Lifetime

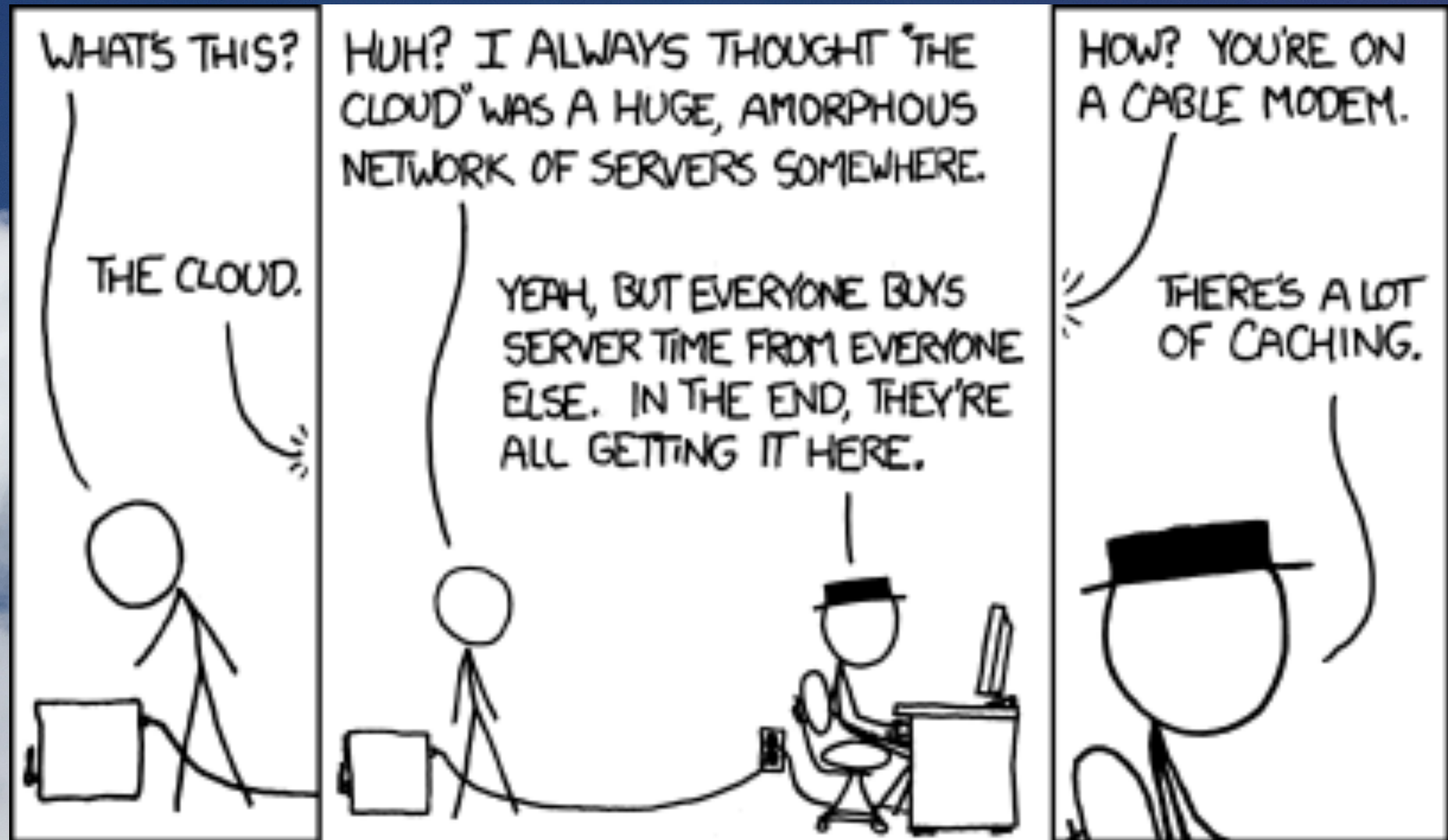
cloud



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#GOTOchgo

cloud



<https://xkcd.com/908/>

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



CONSISTENT DEVELOPMENT

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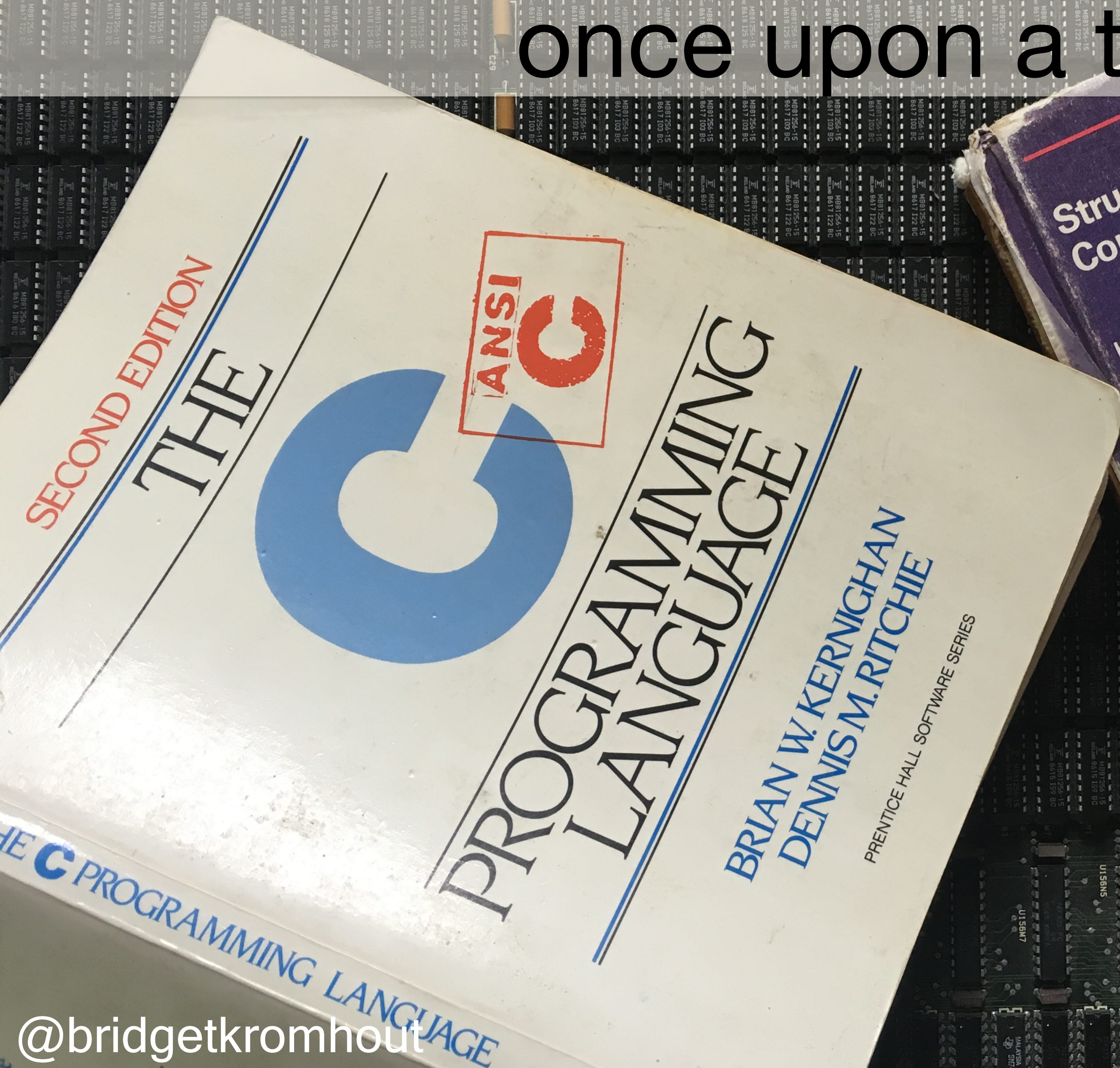
REPEATABLE DEPLOYMENT

#GOTOchgo

containers don't solve all problems



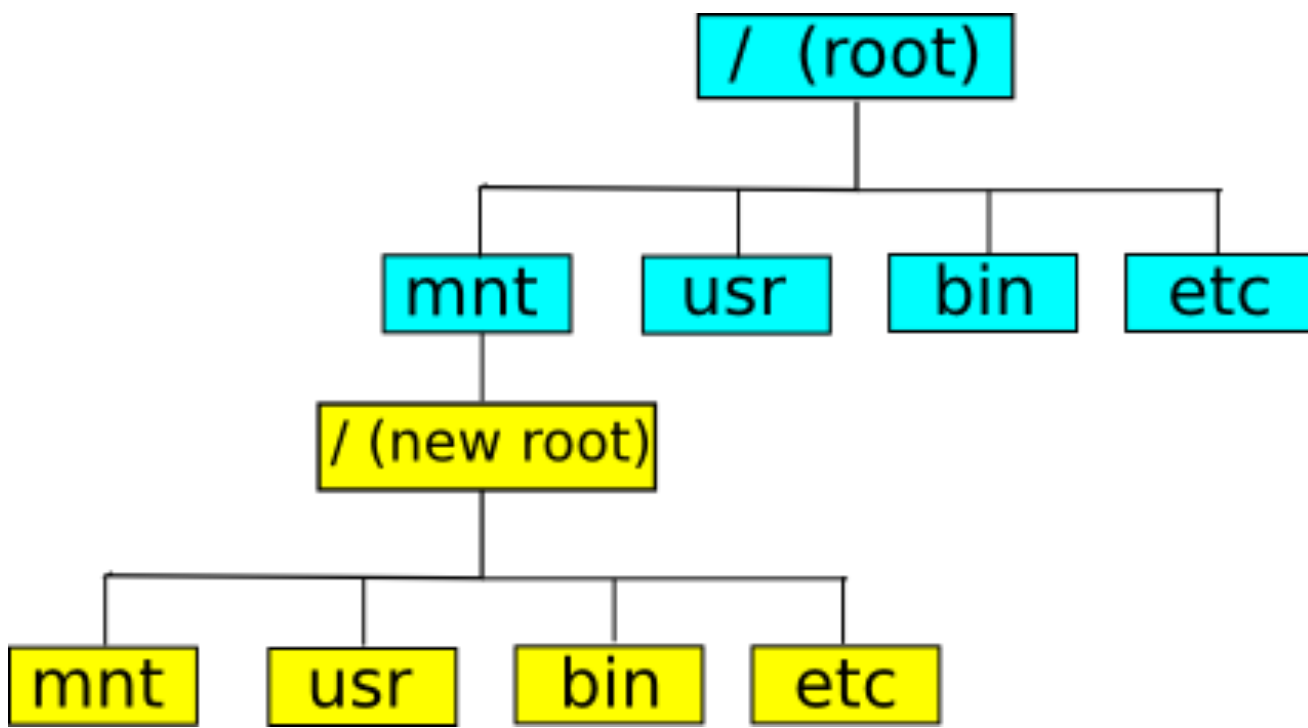
once upon a time....



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containers: early days



chroot

1979 (Version 7)
1982 (BSD)



FreeBSD jails

2000



Solaris Zones

2004



LXC

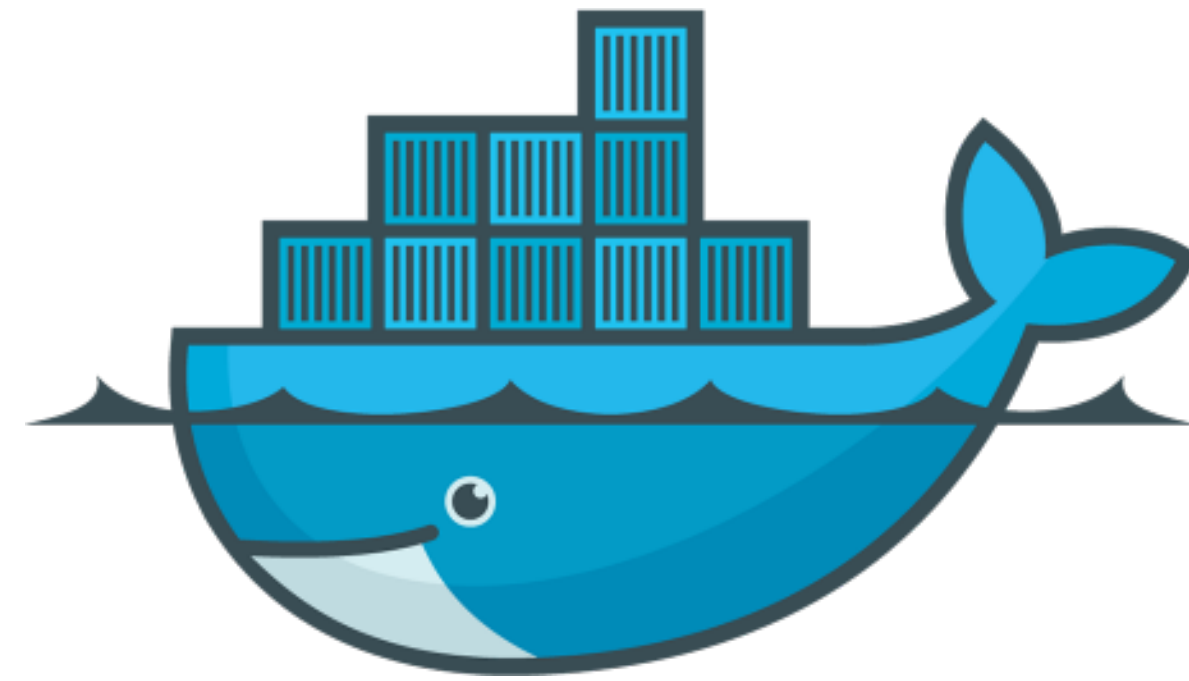
2008

containers: becoming mainstream



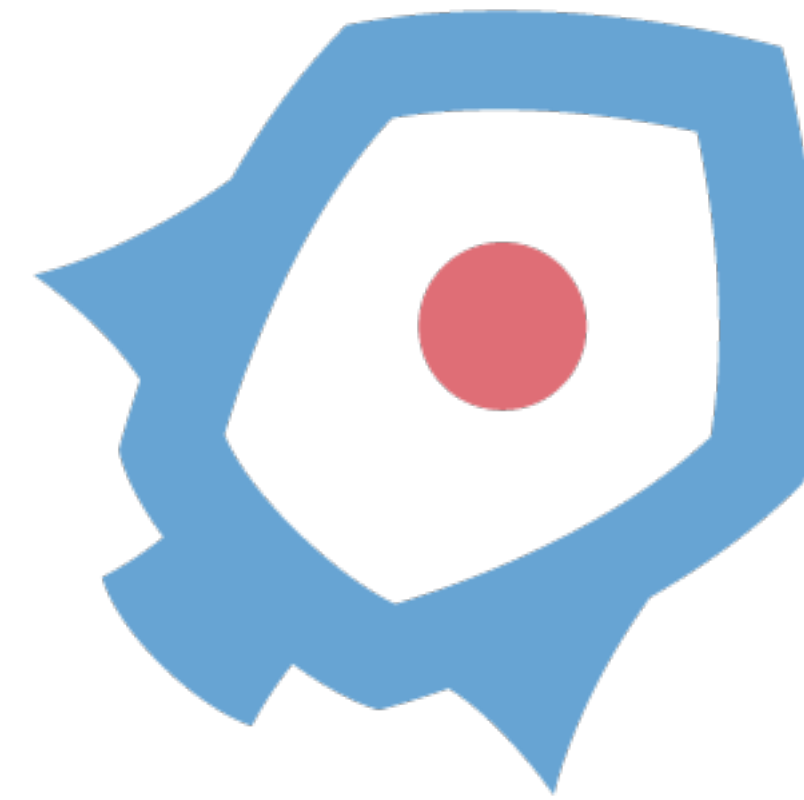
Cloud Foundry

2011



Docker

2013



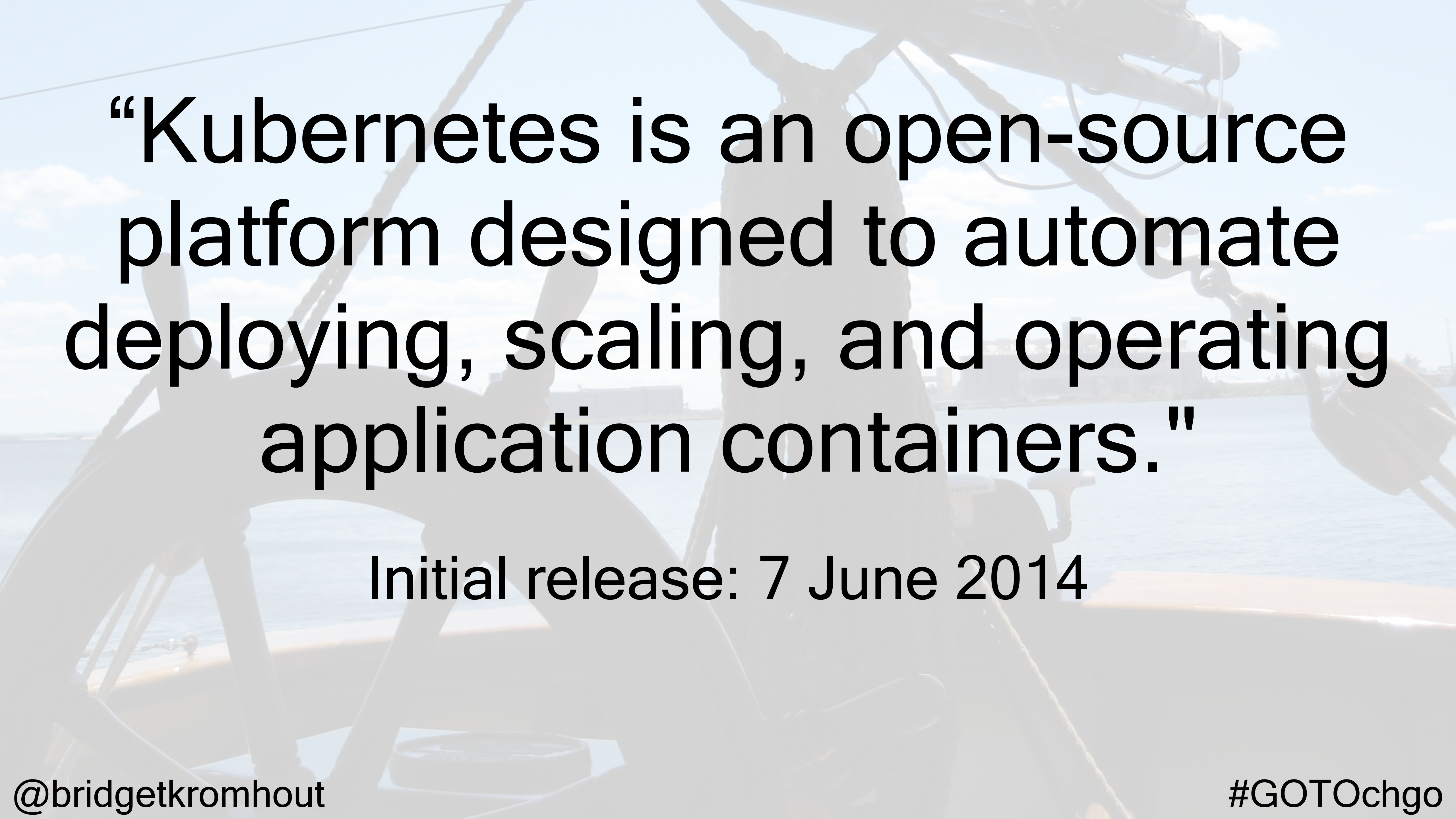
Rocket (later rkt)

2014



OCI

2015



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

Initial release: 7 June 2014

k8s 101



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

R.E.M. — Stand

k8s 101



unified API surface
JSON-based API
often controlled with kubectl CLI

k8s 101



**Pod: a collection of containers co-located on a single machine
(they run your application)**

k8s 101



Service: a load balancer which can route traffic to a collection of pods

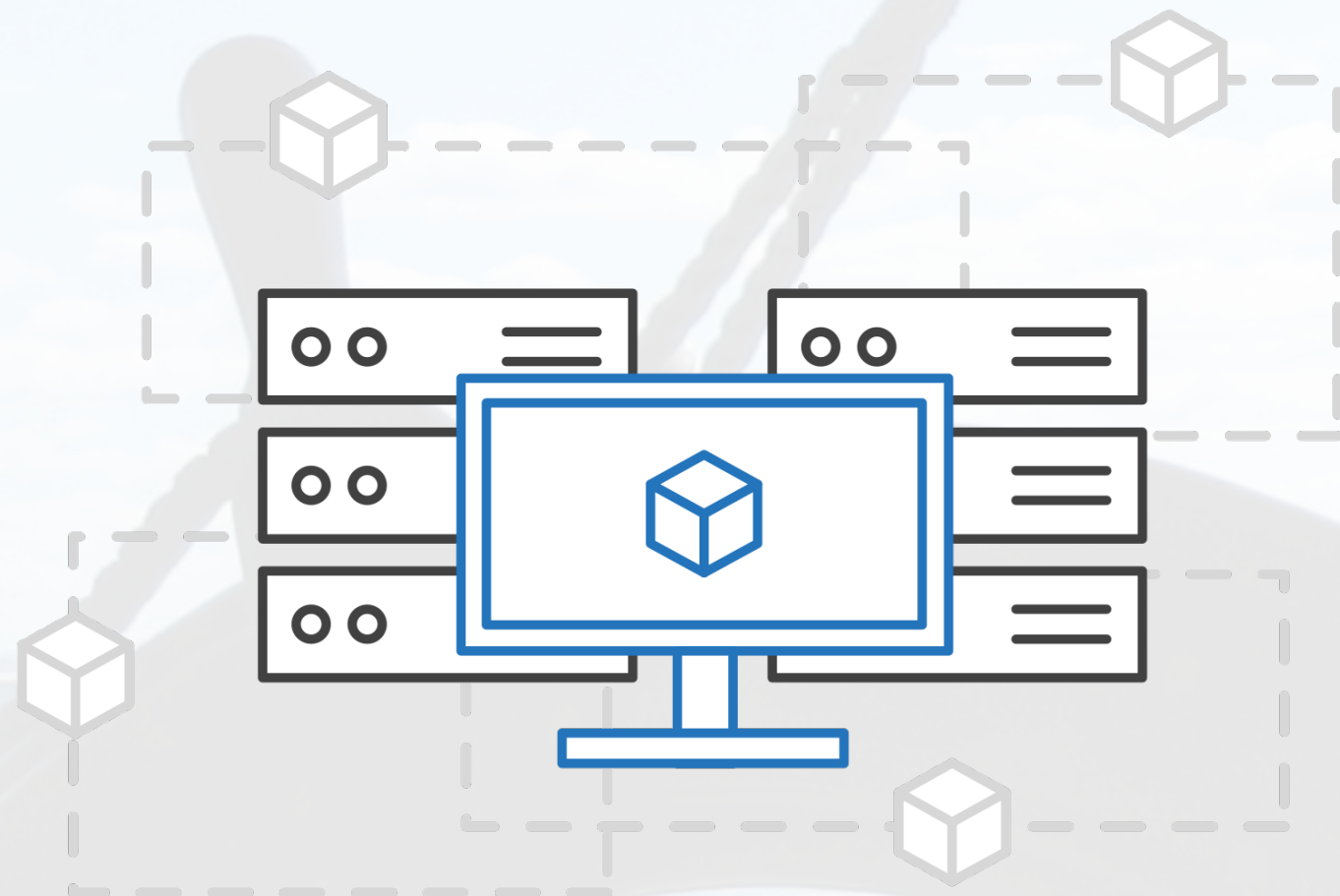
k8s 101



Deployment: uses a replica set to replicate a container multiple times for availability or scale

Azure Kubernetes Service (AKS)

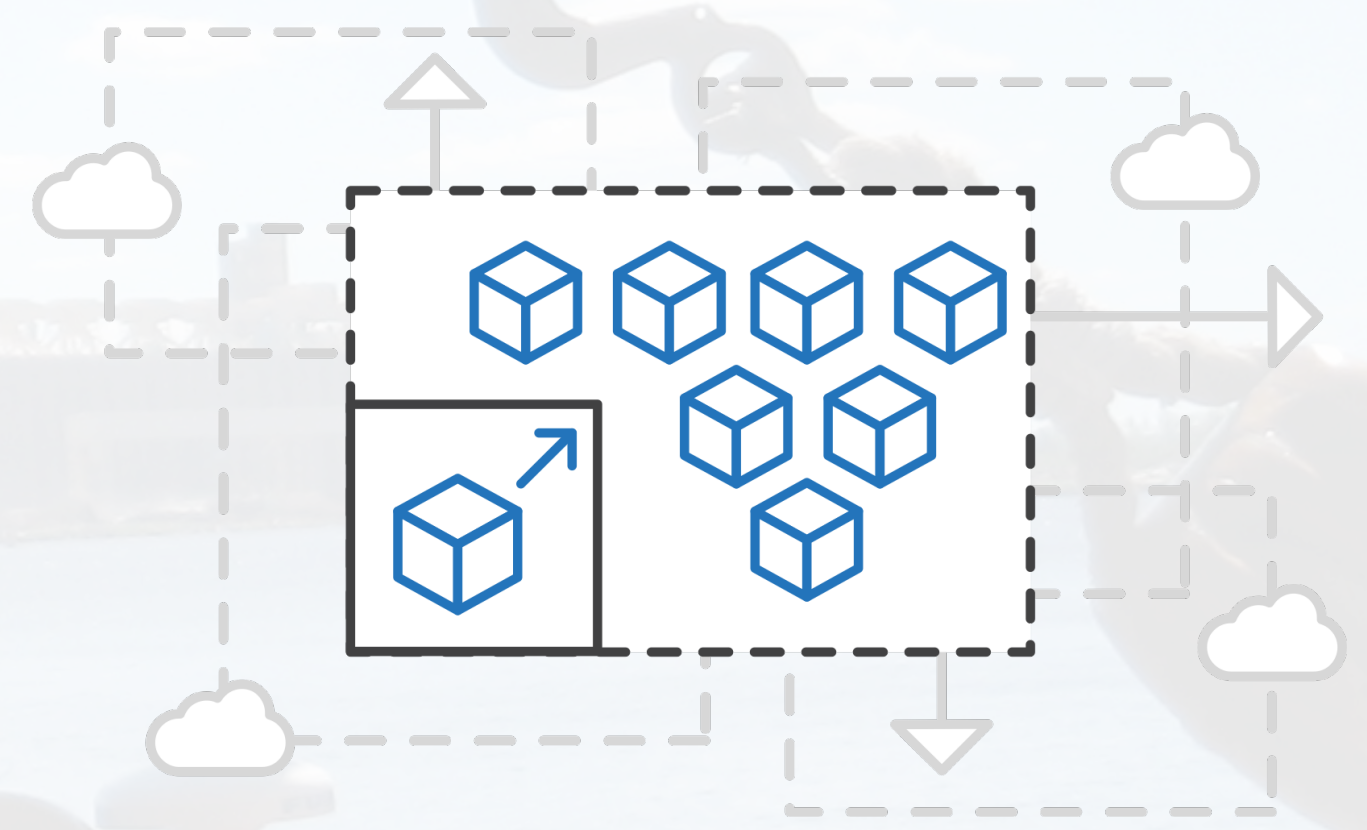
Simplify the deployment, management,
and operations of Kubernetes



Focus on your
containers not the
infrastructure

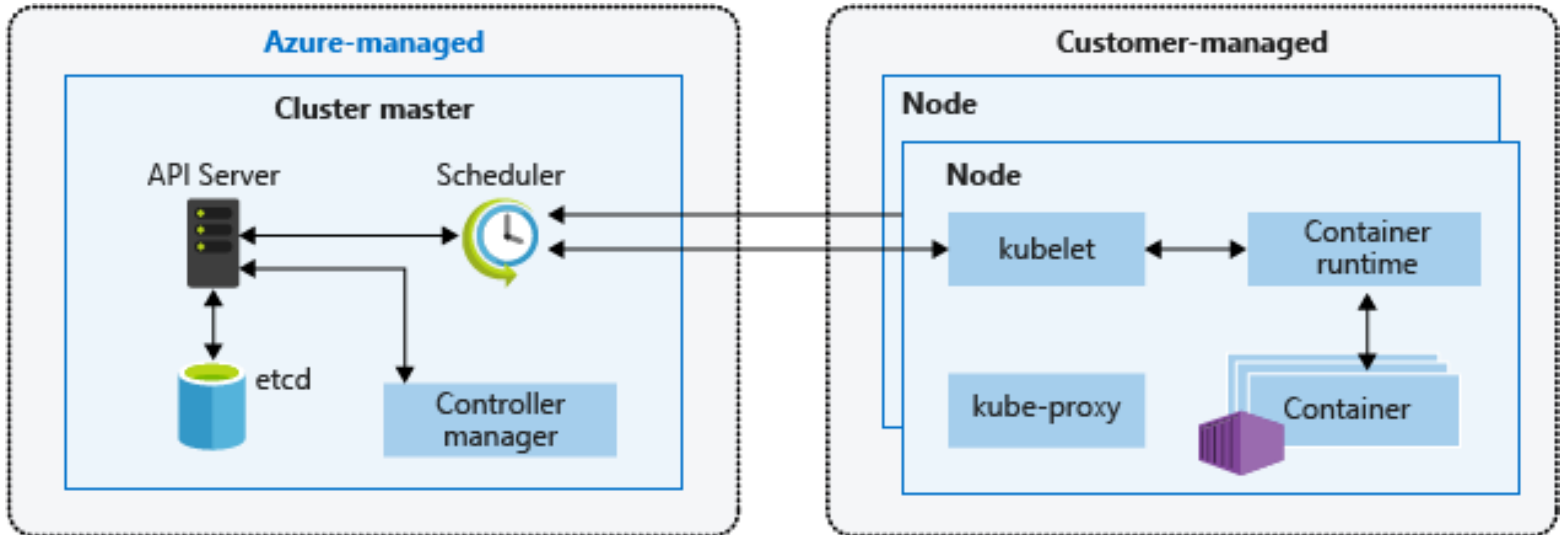


Work how you
want with open-
source APIs



Scale and run
applications with
confidence

Azure Kubernetes Service (AKS)



aka.ms/k8slearning

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-nodepool1-29486530-0	Ready	4m	v1.11.9
aks-nodepool1-29486530-1	Ready	4m	v1.11.9
aks-nodepool1-29486530-2	Ready	4m	v1.11.9

Manage an AKS cluster

```
$ az aks list -o table
```

Name	Location	ResourceGroup	KubernetesRelease	ProvisioningState
myCluster	eastus	myResourceGroup	1.11.9	Succeeded

```
$ az aks get-versions --location eastus --output table
```

KubernetesVersion	Upgrades
1.12.7	None available
1.12.6	1.12.7
1.11.9	1.12.6, 1.12.7
[...]	

```
$ az aks upgrade -g myResourceGroup -n myCluster --kubernetes-version 1.12.7
```

```
\ Running ..
```

```
$ kubectl get nodes
```

NAME	STATUS	AGE	VERSION
aks-nodepool1-29486530-0	Ready	12m	v1.12.7
aks-nodepool1-29486530-1	Ready	8m	v1.12.7
aks-nodepool1-29486530-2	Ready	3m	v1.12.7

```
$ az aks scale -g myResourceGroup -n myCluster --node-count 10
```

```
\ Running ..
```


tools in the k8s ecosystem



“Cannot run out time. There is infinite time. You are finite. Zathras is finite. This is wrong tool!”

Babylon 5 — “War Without End, Part 2”

kubernetes operability tooling

- Getting started with Terraform
- Managing configs with Helm & apps with Draft
- Event-driven scripting with Brigade & Kashti
- Packaging distributed apps: CNAB, Duffle, Porter



HashiCorp

Terraform

Deploy k8s clusters, pods, and services!

Find modules: <https://registry.terraform.io/>

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



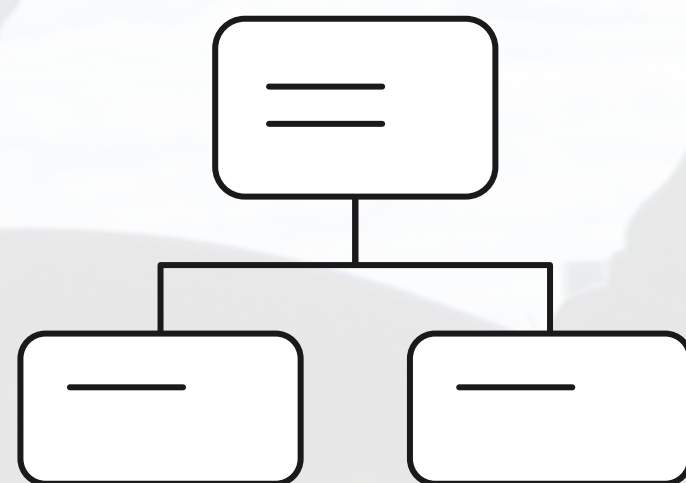
The package manager for Kubernetes

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





Find, share, and use software built for k8s



Manage complexity



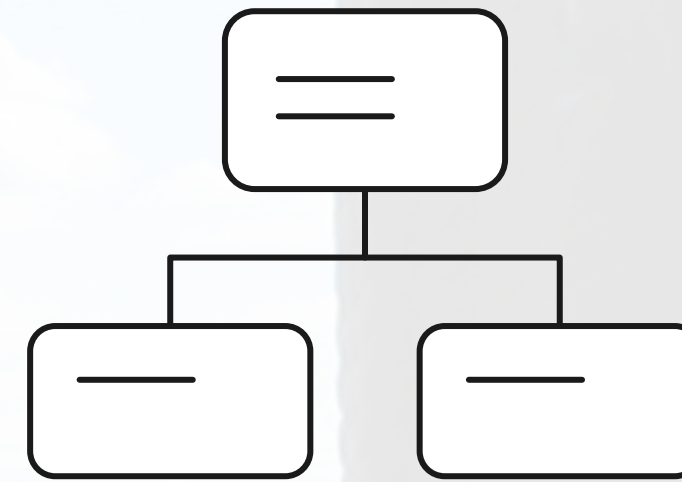
Simple sharing



Easy updates

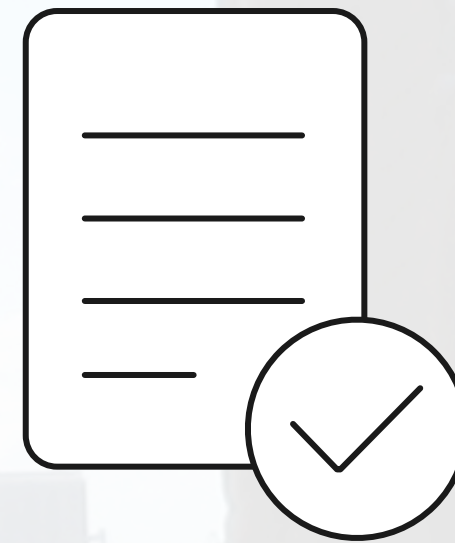


Rollbacks



Manage complexity

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



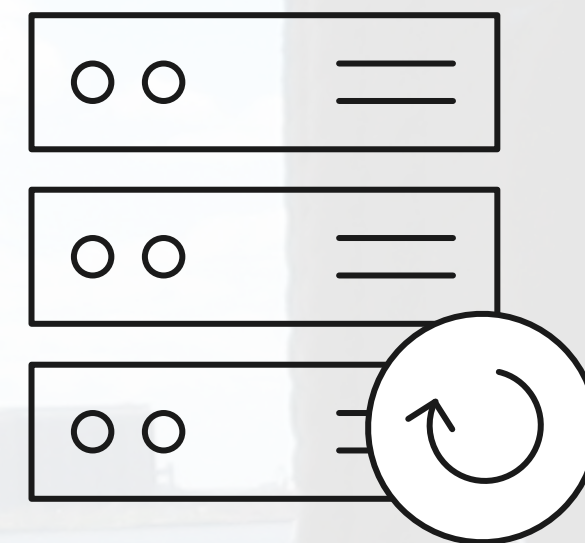
Easy updates

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



Simple sharing

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

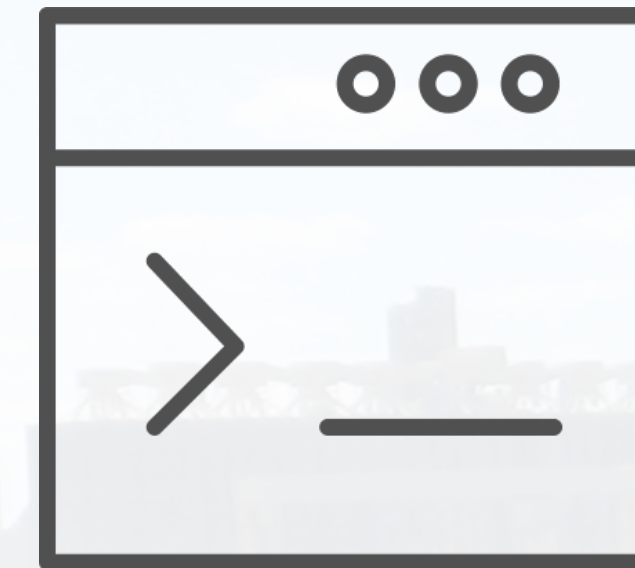
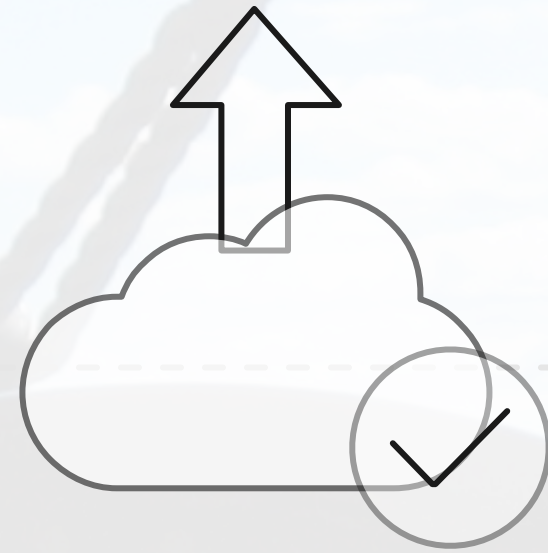


Rollbacks

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 working on container-based applications without requiring Docker or even installing Kubernetes themselves

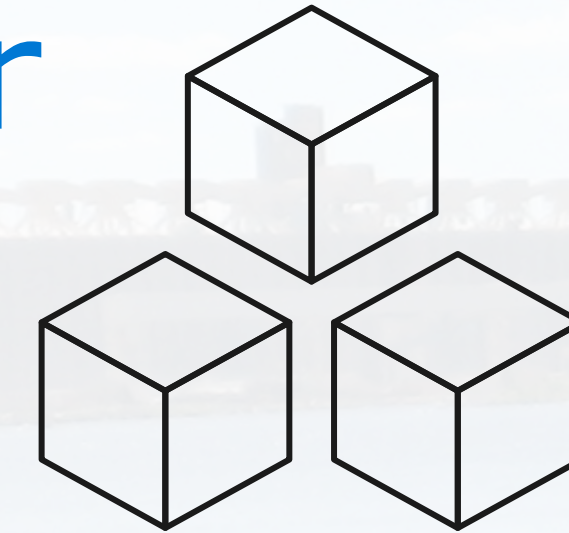
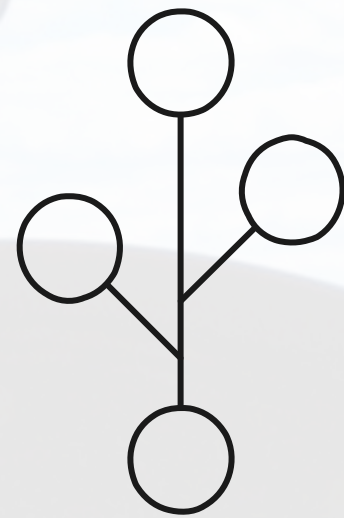
Language support

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

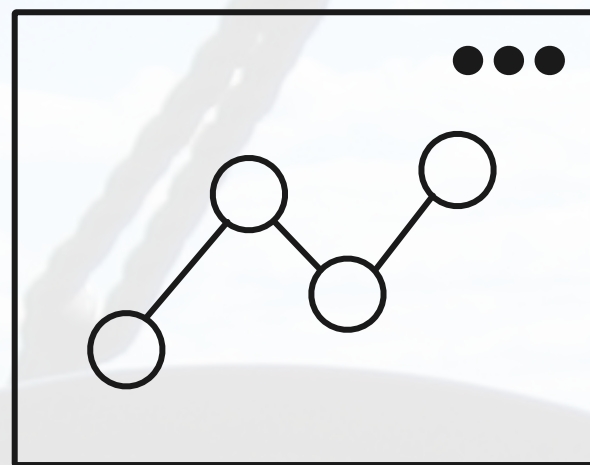
Each project gets a `brigade.js` config file, which is where you can write dynamic, interwoven pipelines and tasks for your Kubernetes cluster

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

Cloud Native Application Bundle

Spec for packaging distributed apps



CNAB: package distributed apps

CNABs facilitate the bundling,
installing and managing of
container-native apps — and
their coupled services

Duffle

Install and manage distributed app bundles



**Duffle: install & manage
distributed app bundles**

Simple CLI to interact with
CNAB, for use with your
clouds and services of choice

porter

A friendlier cloud installer



Install your app and its baggage

Bundle up not just the app,
but everything it needs to run
in the cloud

Build bundles smarter, not harder

Use mixins for common tools
and clouds, and depend on
existing bundles.

Surprise! It does package management too

Package and version your
bundle, then distribute it for
others to use.



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**

more at helm.sh/blog

Kubernetes API

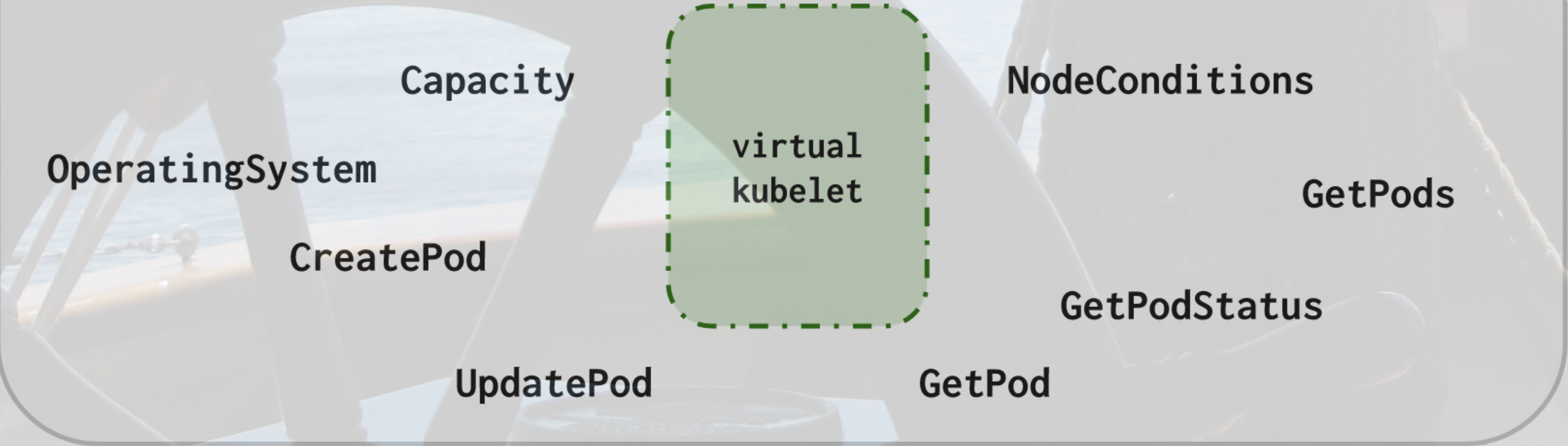


Typical kubelets implement the pod and container operations for each node as usual.

Virtual Kubelet



Virtual kubelet registers itself as a “node” and allows developers to deploy pods and containers with their own APIs.





brendandburns @brendandburns · Dec 4

Get ready for nodeless [@kubernetesio](#) !

Microsoft donates Virtual Kubelet to [@cloudnativefdn](#)

Virtual nodes now in preview in
[@Azure](#) kubernetes service

[#MSFTConnect](#) aka.ms/aks/connect2018



3



136



290





brendandburns @brendandburns · Dec 4

Get ready for nodeless @kubernetesio !



brendandburns @brendandburns · Dec 4

Get ready for nodeless @kubernetesio !

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#MSFTConnect aka.ms/aks/connect2018



3



136



290



Open Policy Agent

openpolicyagent.org

**Policy-based control
specified declaratively &
enforced automatically**



**Integrate as a sidecar, host-
level daemon, or library.**

**Update without recompiling
or redeploying**

**Improve consistency,
security, compliance**



the future



“What’s next?”

Jed Bartlet, The West Wing



winter is coming
(k8s getting real)

@bridgetkromhout

#GOTOchgo



(okay, winter is here)

still computers

silos are for grain

not actually devops



devopsdays Minneapolis
Aug 6-7, 2019

devopsdays Chicago
CFP: closes May 3
event: Aug 27-28, 2019

devopsdays.org



recognize
change
exists...



Erik St. Martin
@erikstmartin

Following

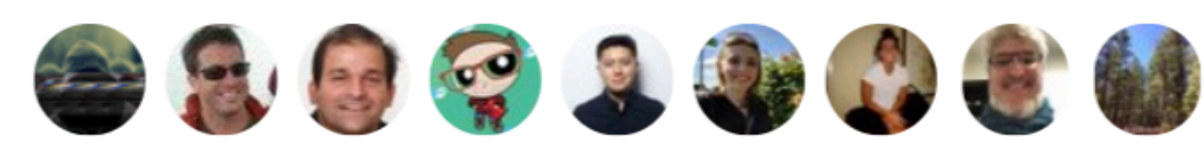


This puts the future squarely in the hands of those who know [#Kubernetes](#) not for what it is, but for everything it has the potential to be.

Kubernetes isn't the thing... It's the thing that gets us to the thing.

12:21 PM - 2 Jan 2018

28 Retweets 74 Likes



6 28 74

@bridgetkromhout

#GOTOchgo



...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

#GOTOchgo

...change is
the only
constant.

@bridgetkromhout



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





brendandburns @brendandburns · Dec 7
Phippy's visit to Seattle kicks off with the iconic Seattle Space Needle
@bridgetkromhout



brendandburns @brendandburns · 19h
Phippy wonders if this one could run PHP or containers...

#GOTOchgo

To learn more...

Cloud Native Tooling
deislabs.io

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

AKS docs
docs.microsoft.com/azure/aks

Microsoft Learn
docs.microsoft.com/learn

Thanks!

Cloud Native Tooling
deislabs.io

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docs.microsoft.com/learn