BUILDING APPLICATIONS TO INCREASE KUBERNETES ADOPTION, AND MAKE LIFE EASIER ONCE YOU'VE ADOPTED IT.

KATE KUCHIN

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github **@k8k**

gram **@katekuchin**

# WHOAMI

UX ENGINEER @ HEPTIO

'THE PUDGE'

HELEN

orkut

heptio heptio heptio heptio heptio
heptio heptio heptio heptio heptio

MY TEAM

SQUAD SNOW

MOYER

FABIO

AMY

TAMIKO

ROSS

PATRICK

BUILDING APPLICATIONS TO INCREASE KUBERNETES ADOPTION, AND MAKE LIFE EASIER ONCE YOU'VE ADOPTED IT.

THIS TITLE IS TOO LONG, SORRY.

# UIs FOR K8S

# AGENDA

- ~~WHO AM I && WHAT DO I DO~~

- KUBERNETES FOR NEWBERNETES

- WHAT GOOD ARE UIS ANYWAY?

- CNCF CONFORMANCE && SONOBUOY SCANNER

- WRAP IT UP

KUBERNETES FOR NEWBERNETES
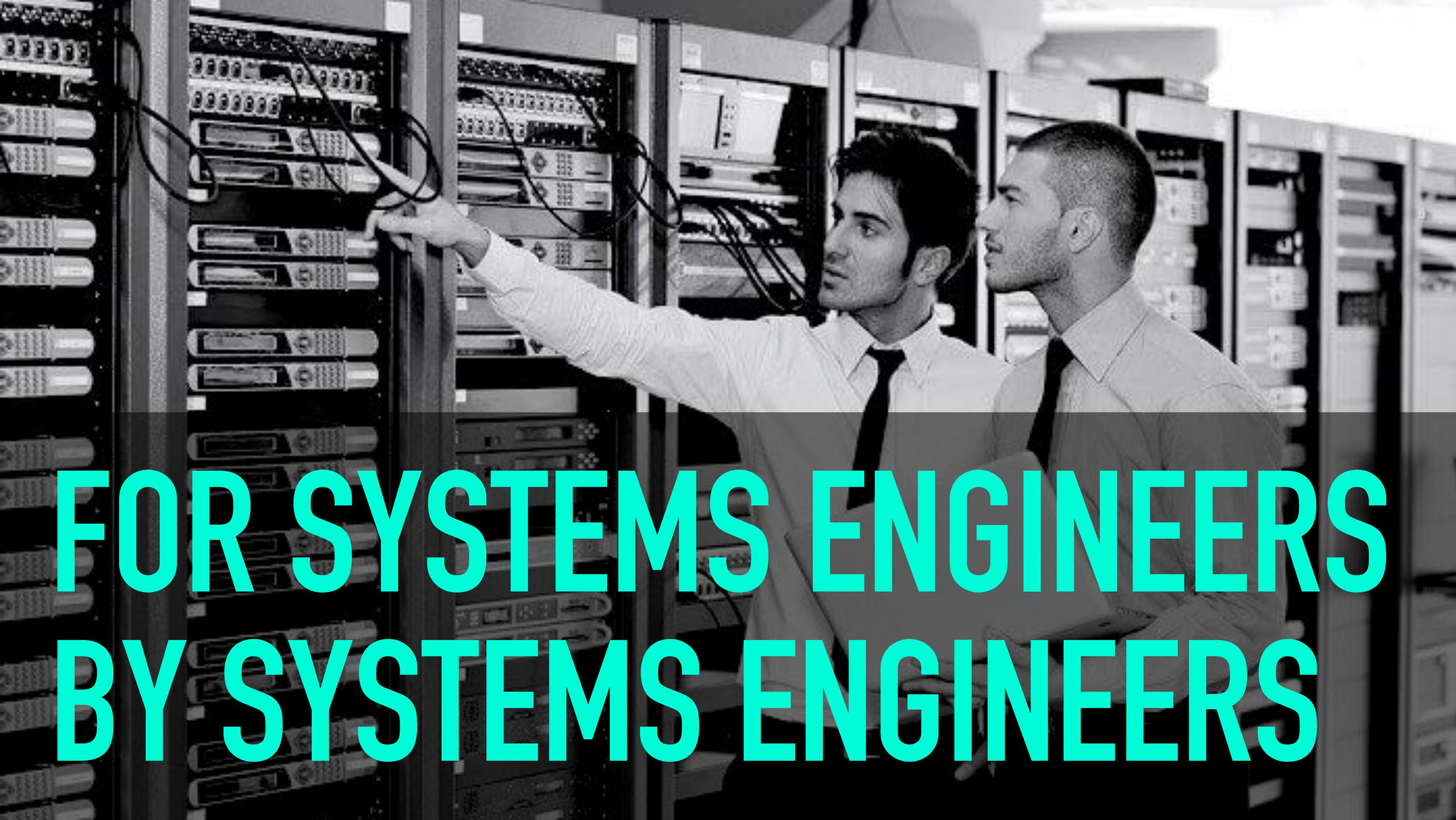
FOR SYSTEMS ENGINEERS BY SYSTEMS ENGINEERS

# KUBERNETES IS F**G INTIMIDATING

→ let the [...] go. [...] like a game of tetris, you want to use memory CPU and other resources as efficient as possible.

↳ Raison d'être is efficiency but has great side effect of workflow improvem[ent]

making the # of pod replicas right by
↳ Replica set and its pods are connected by labels.

ⓧ Every object in k8s has a label.

↳ the pod knows nothing about the replica set

↳ How to UPGRADE
• You can't just update the template bc the replica set won't know to update the pods since it only looks for the correctly labelled pods

CLUSTER ADMINISTRATOR
= human who sets up the cluster

CLUSTER USER
= [...]

Kubernetes [...] & How it works

PODS: The fundam[ental]



Kubernetes is declarative, Docker is imperative

highly consistent →
uses "raft" etcd is a
separate OSS project "Master"



sidecar
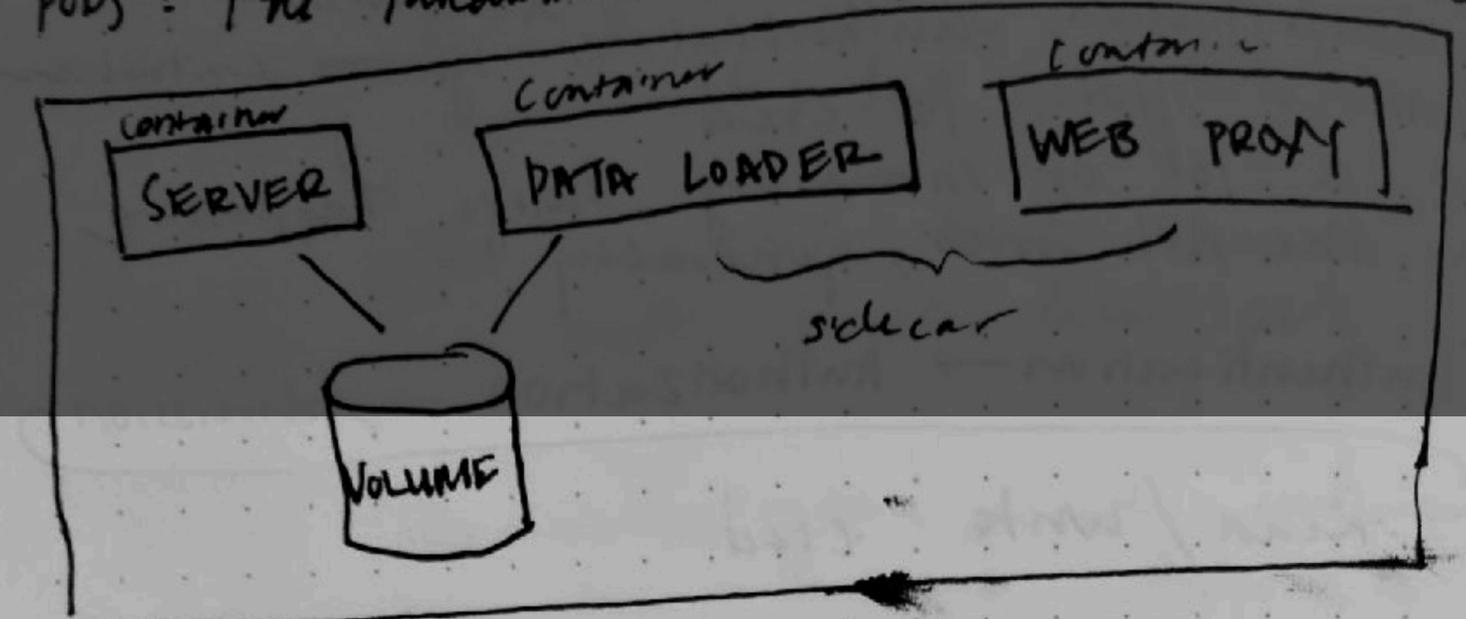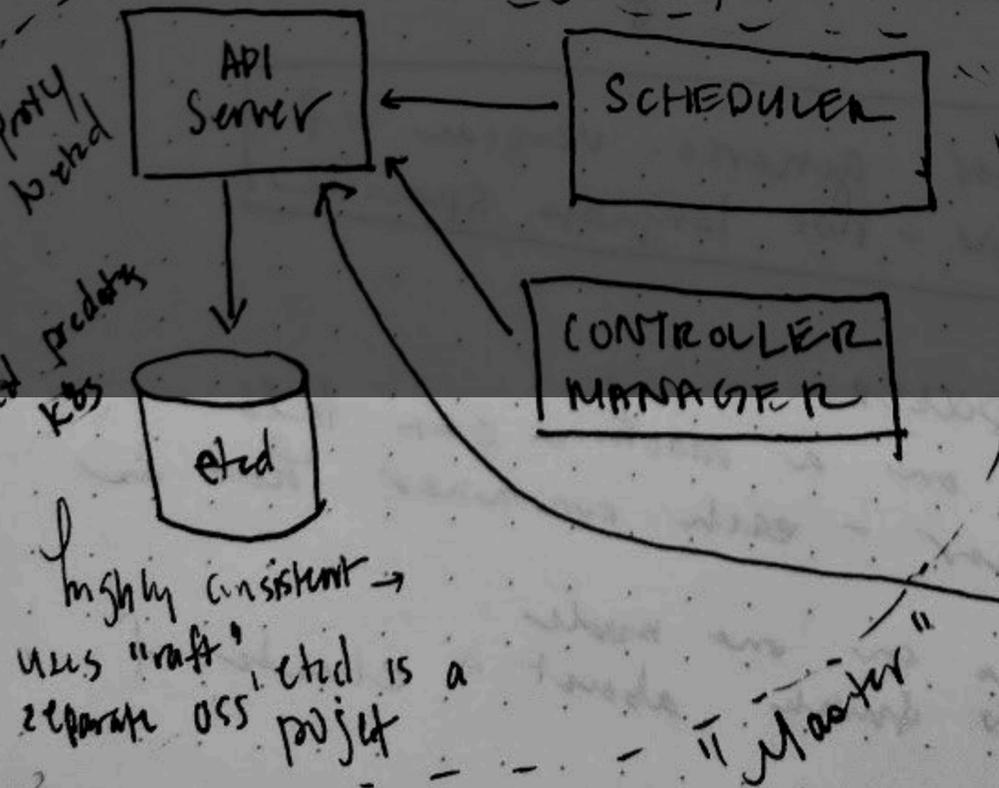
Containers can all be on the same pod, generally new users use one container p[er]

# READ THE DOCS

READ THE DOCS

# K8S USER JOURNEYS
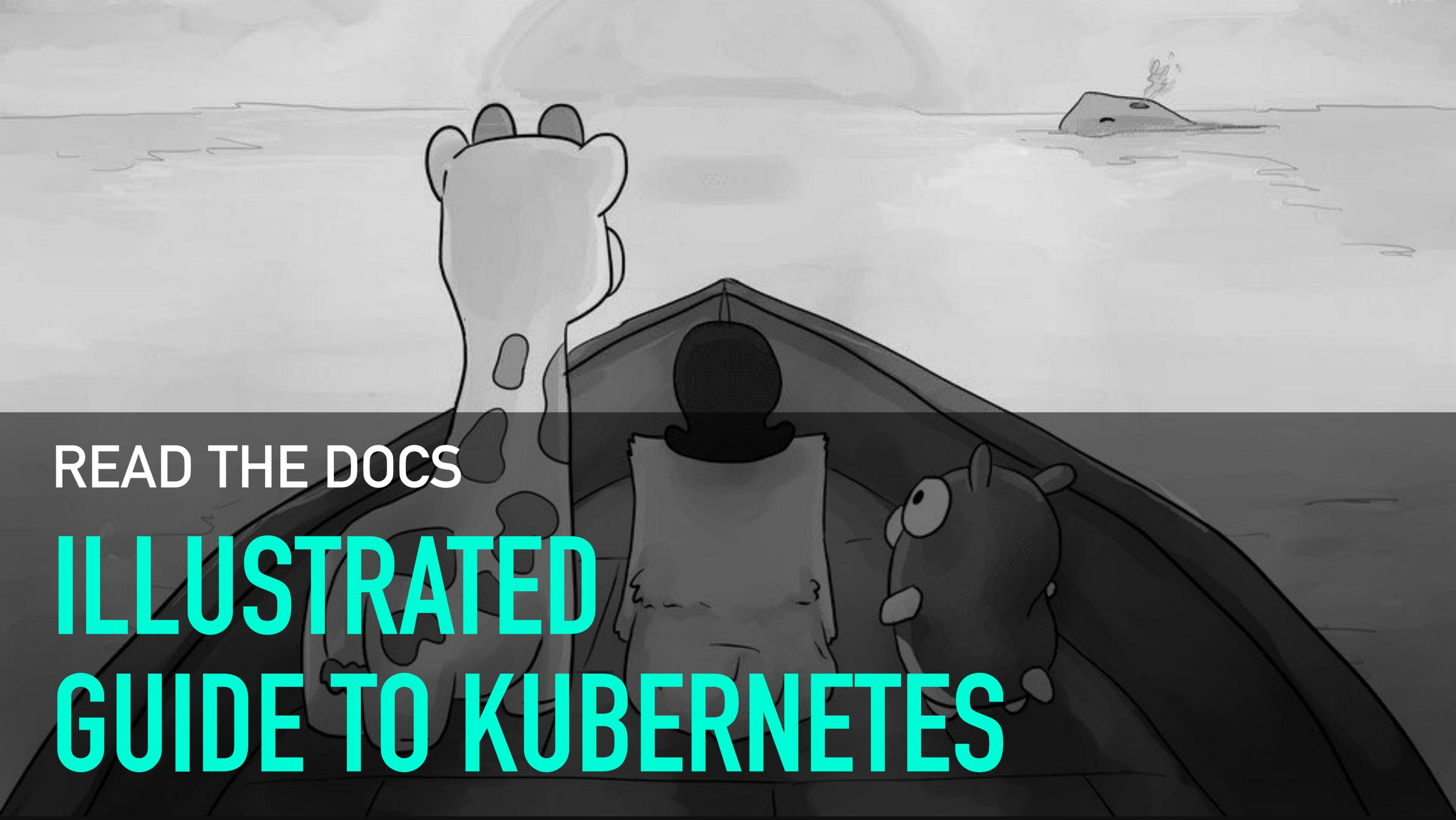
READ THE DOCS

ILLUSTRATED GUIDE TO KUBERNETES
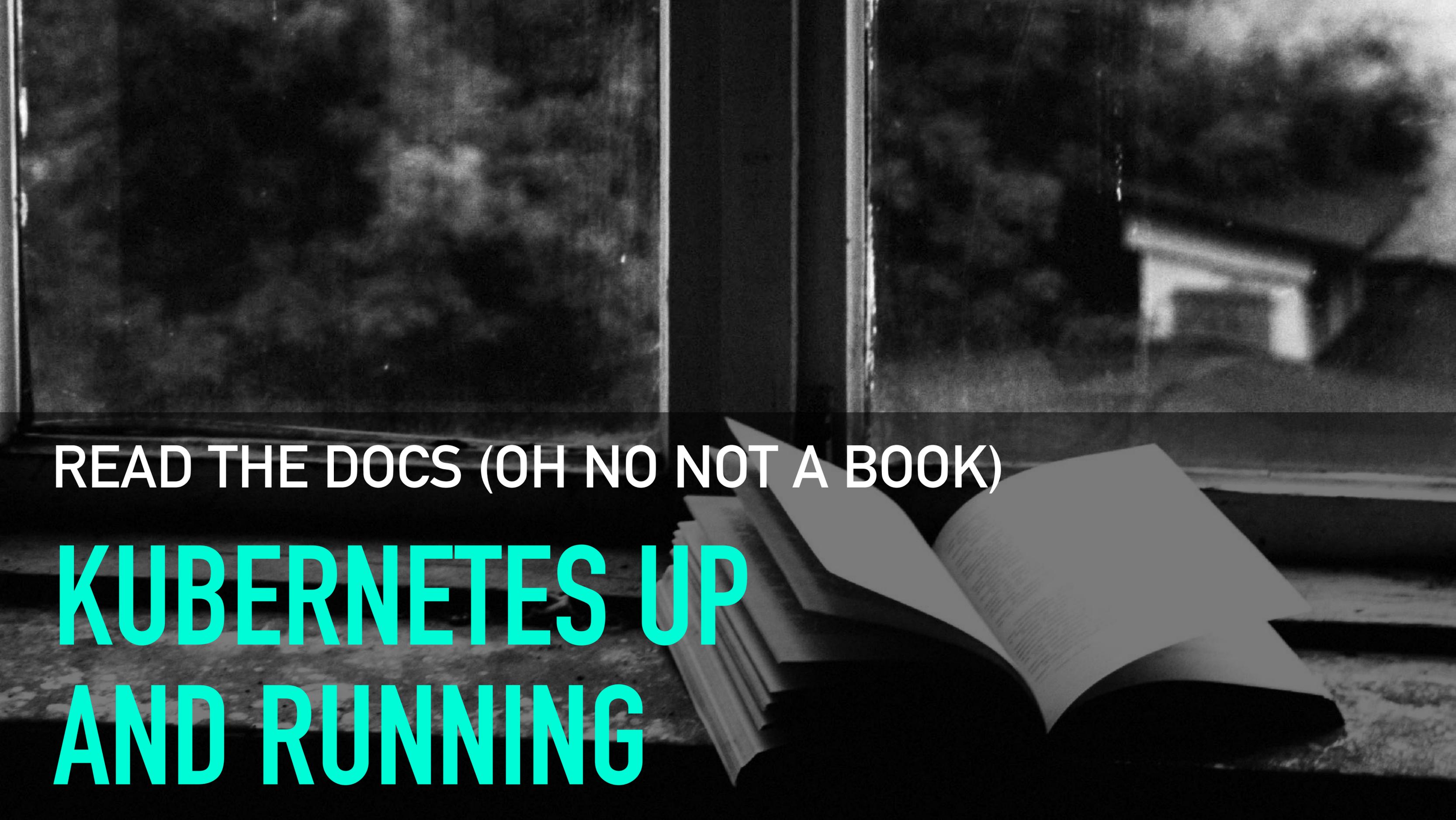
READ THE DOCS (OH NO NOT A BOOK)

# KUBERNETES UP AND RUNNING

READING RAINBOW

(TGIK)

# TRAININGS

**TRAININGS - SELF-PACED**

# LINUX FOUNDATION KUBERNETES FUNDAMENTALS

**TRAININGS - INSTRUCTOR-LED**

**HEPTIO HANDS-ON WORKSHOP**

TRAININGS - HEOTIO HANDS-ON WORKSHOP

kubeconeu2018

SET UP A CLUSTER

SET UP A CLUSTER

MINIKUBE

SET UP A CLUSTER

WEB ENVIRONMENT

SET UP A CLUSTER

# CLOUD PROVIDER

WHY ?

ASK
QUESTIONS

# HELPING OUT KUBELETS

- **DON'T ASSUME CORE CS KNOWLEDGE**

- **K8S' PATTERNS** VS. **DISTRIBUTED SYSTEMS**

- **BASICS OVER EVERYTHING**

EXPLOSIVE GROWTH MEANS A HUGE PORTION OF THE COMMUNITY IS NEW, SO EDUCATION, ONBOARDING, AND A CULTURE WELCOMING OF NEWCOMERS IS ESSENTIAL TO DOING THE WORK.

PATRICK MCKENZIE

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UIs: WHAT ARE THEY GOOD FOR?

UIs: WHAT ARE THEY GOOD FOR?

EDUCATION TOOL

UIs: WHAT ARE THEY GOOD FOR?

LOWERING THE BARRIER TO ENTRY

UIs: WHAT ARE THEY GOOD FOR?

PROVIDING SENSIBLE
DEFAULTS
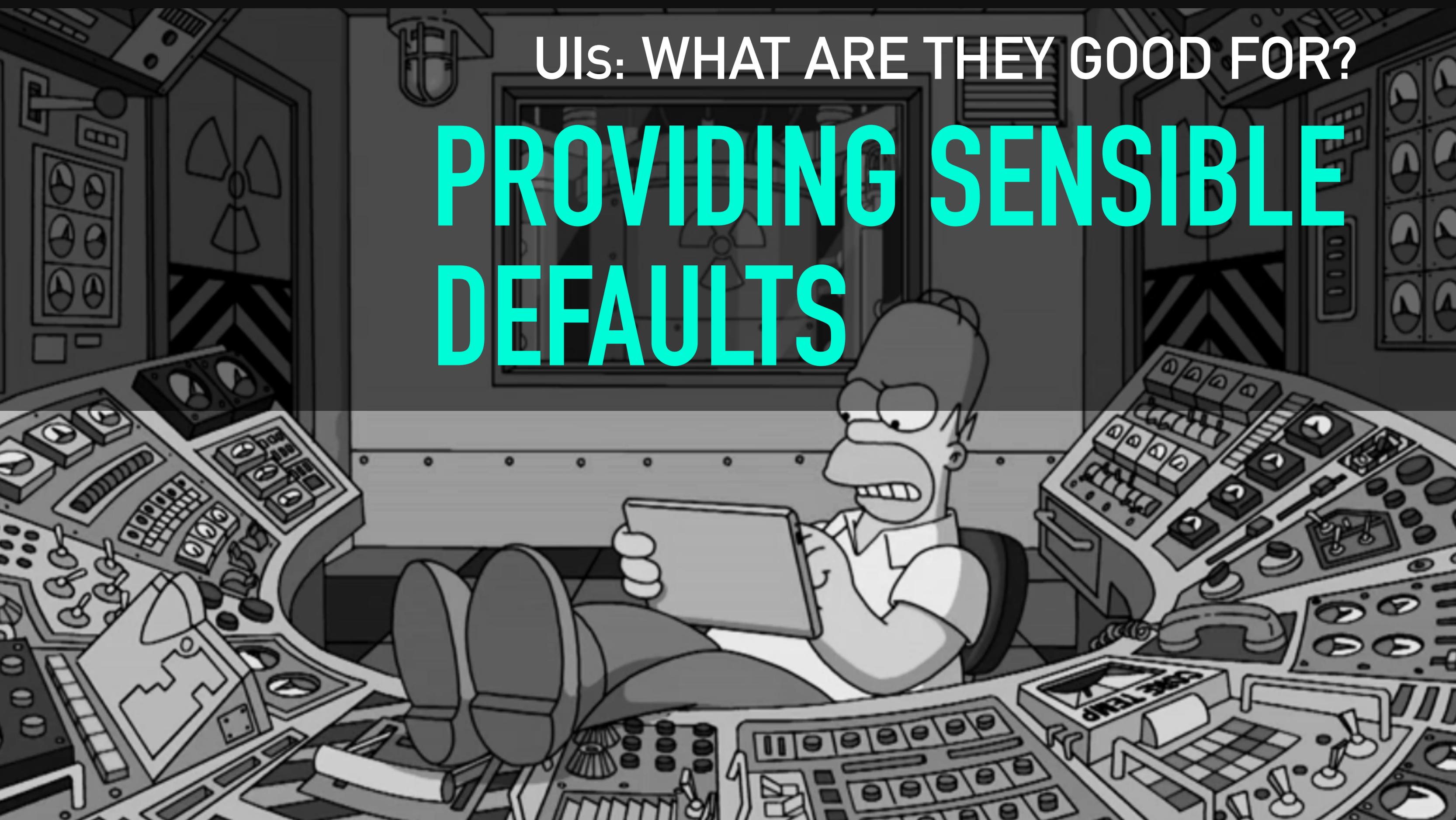
UIs: WHAT ARE THEY GOOD FOR?

COMPLEMENTING CLIs AND CONFIGS

UIs: WHAT ARE THEY GOOD FOR?

DATA VISUALIZATION
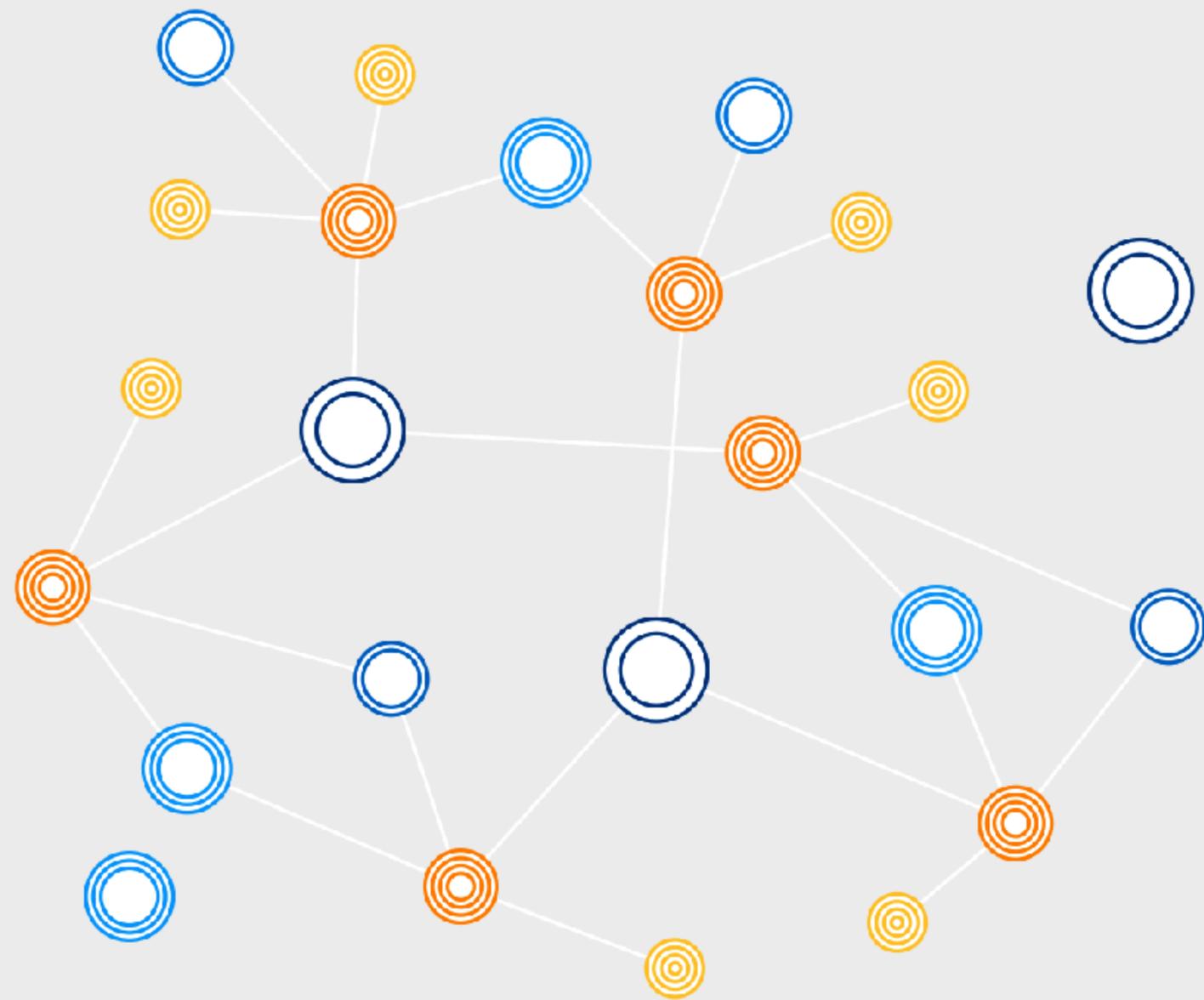
Pods    Services    Nodes    Replication Controllers    Containers    ReplicaSets
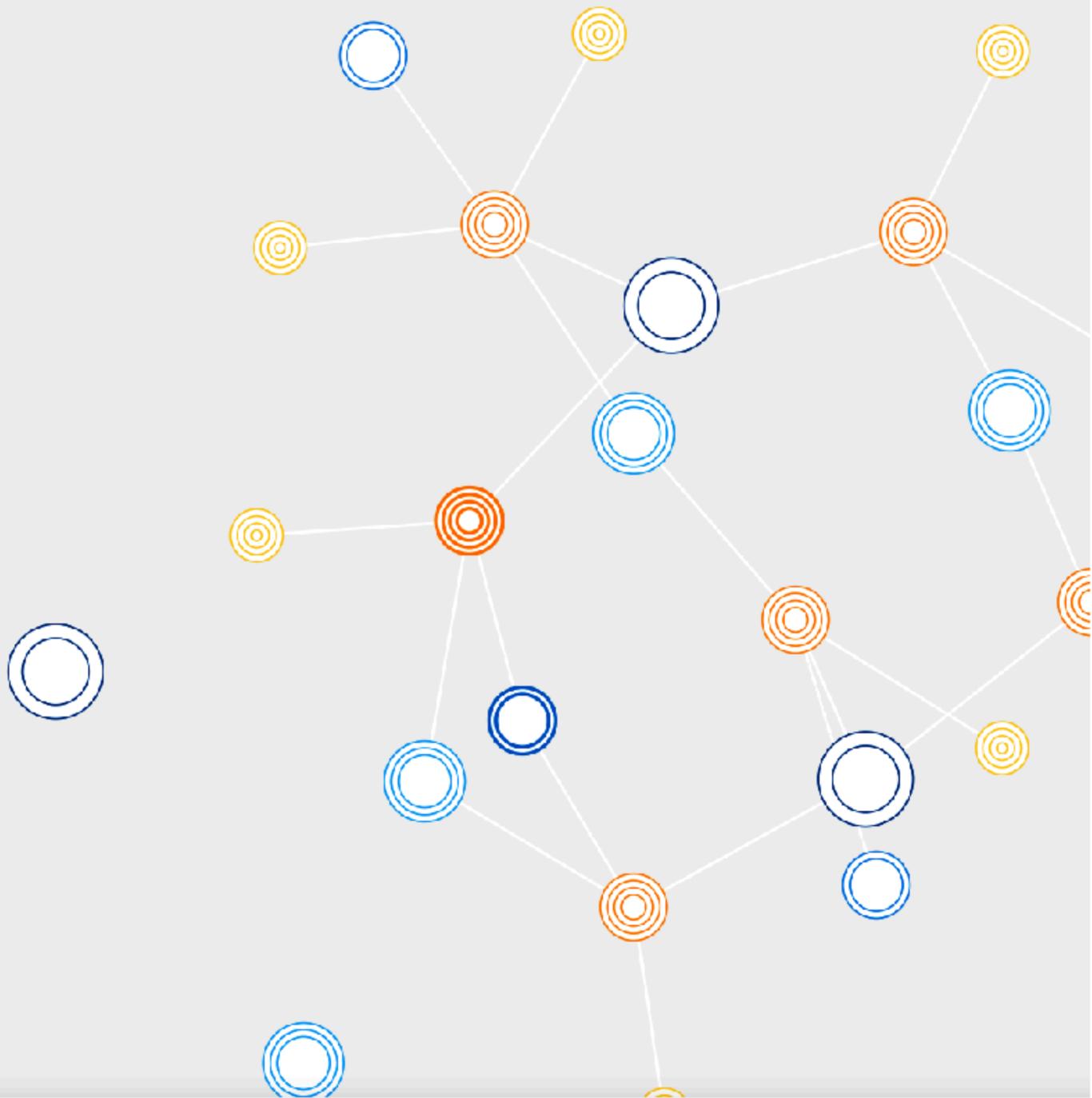
# Pod

## viz-2517118100-8lzr0

| labels | |
|---|---|
| | pod-template-hash    2517118100 |
| | run    viz |

| created | Jul 1, 2017 12:06:28 AM |
|---|---|
| namespace | viz |
| selfLink | /api/v1/namespaces/default/pods/viz-2517118100-8lzr0 |
| dnsPolicy | ClusterFirst |
| nodeName | ip-10-0-9-70.us-west-2.compute.internal |
| restartPolicy | Always |
| serviceAccount | default |

WANT MORE INFORMATION ABOUT THIS POD?

```
$ kubectl get pod viz-2517118100-8lzr0 -o yaml -n viz
```

Services    Nodes    Replication Controllers    Containers    ReplicaSets

UIs: WHAT ARE THEY GOOD FOR?

PARSING DIFFICULT TO DIGEST DATA

[Serial]" classname="Kubernetes e2e suite" time="0">
  </testcase>
  <testcase name="[sig-storage] EmptyDir volumes should support (root,0777,tmpfs) [Conformance]" classname="Kubernetes e2e suite" time="0">
  </testcase>
  <testcase name="[k8s.io] InitContainer should invoke init containers on a RestartNever pod" classname="Kubernetes e2e suite" time="0">
  </testcase>
  <testcase name="[sig-storage] Secrets should be consumable from pods in volume with mappings and Item Mode set [Conformance]" classname="Kubernetes e2e suite" time="0">
  </testcase>
  <testcase name="[sig-network] NetworkPolicy NetworkPolicy between server and client should enforce policy based on Ports [Feature:NetworkPolicy]" classname="Kubernetes e2e suite" time="28.49512116">
    <failure type="Failure">/go/src/github.com/heptio/sonobuoy-plugins/vendor/k8s.io/kubernetes/test/e2e/network/network_policy.go:1748&#xA;Mar 28 18:50:49.620: Pod client_a should not be able to connect to service svc-server, but was able to connect.
Pod logs:&#xA;Connecting to svc-server.e2e-tests-network-policy-5drd4:80
0% |                                              |     0  --:--:-- ETA&#xA;&#xA;100% |**********************************|     3   0:00:00 ETA&#xA;&#xA;Current NetworkPolicies:&#xA;[{allow-ingress-on-port-81  e2e-tests-network-policy-5drd4 /apis/networking.k8s.io/v1/namespaces/e2e-tests-network-policy-5drd4/networkpolicies/allow-ingress-on-port-81 5e9b313b-32b8-11e8-9fe0-0e0e5e698266 7282 1 2018-03-28 18:50:45 +0000 UTC <nil> <nil> map[] map[] [] nil [] }] [{{0xc4202632e0 81}] []}] [] []}}&#xA;&#xA; Pods:&#xA;&#x9;[Pod server &amp; Status:Phase Running,Conditions:[{Initialized True 0001-01-01 00:00:00 +0000 UTC 2018-03-28 18:50:27 +0000 UTC } {Ready True 0001-01-01 00:00:00 +0000 UTC 2018-03-28 18:50:36 +0000 UTC

# Getting Started

Install the Go tools
Test your installation
Uninstalling Go
Getting help

## Download the Go distribution

**Download Go**

Click here to visit the
downloads page

Official binary distributions are available for the FreeBSD (release 10-STABLE and above), Linux, Mac OS X (10.8 and above), and Windows operating systems and the 32-bit (386) and 64-bit (amd64) x86 processor architectures.

```
$ export PATH=$GOROOT/bin:$GOPATH/bin:$PATH
```

```
$ go get -u -v github.com/heptio/sonobuoy
```

```
$ sonobuoy run

# wait ~60 minutes for tests to run

$ sonobuoy retrieve
```

```
$ mkdir ./results; tar xzf *.tar.gz -C ./results
```

diagnostics ▸

diagnostics.tar.gz

hosts ▸

meta ▸

plugins ▸

podlogs ▸

resources ▸

serverversion.json

e2e ▸

results ▸

e2e.log

junit_01.xml

nethealth.txt

```xml
            [Serial]"·classname="Kubernetes·e2e·suite"·time="0">
········|··|··<skipped></skipped>
·····|··</testcase>
····|··<testcase·name="[sig-storage]·EmptyDir·volumes·should·support·(root,0777,tmpfs)·[Conformance]"·
    classname="Kubernetes·e2e·suite"·time="0">
····|··|··<skipped></skipped>
·····|··</testcase>
····|··<testcase·name="[k8s.io]·InitContainer·should·invoke·init·containers·on·a·RestartNever·pod"·classname="Kubernetes·
    e2e·suite"·time="0">
····|··|··<skipped></skipped>
·····|··</testcase>
····|··<testcase·name="[sig-storage]·Secrets·should·be·consumable·from·pods·in·volume·with·mappings·and·Item·Mode·set··
    [Conformance]"·classname="Kubernetes·e2e·suite"·time="0">
····|··|··<skipped></skipped>
·····|··</testcase>
····|··<testcase·name="[sig-network]·NetworkPolicy·NetworkPolicy·between·server·and·client·should·enforce·policy·based·
    on·Ports·[Feature:NetworkPolicy]"·classname="Kubernetes·e2e·suite"·time="28.49512116">
········|··|··<failure·
        type="Failure">/go/src/github.com/heptio/sonobuoy-plugins/vendor/k8s.io/kubernetes/test/e2e/network/network_po
        licy.go:174&#xA;Mar·28·18:50:49.620:·Pod·client-a·should·not·be·able·to·connect·to·service·svc-server,·but·
        was·able·to·connect.&#xA;Pod·logs:&#xA;Connecting·to·svc-server.e2e-tests-network-policy-5drd4:80·
        (10.103.255.111:80)&#xA;-······················100%·|********************************|······3···0:00:00·ETA&#xA;&
        #xA;foo&#xA;&#xA;&#xA;·Current·NetworkPolicies:&#xA;&#x9;[{{·}·{allow-ingress-on-port-81··
        e2e-tests-network-policy-5drd4·
        /apis/networking.k8s.io/v1/namespaces/e2e-tests-network-policy-5drd4/networkpolicies/allow-ingress-on-port-81·
        ec5ed385-32b8-11e8-8bfe-06e0f5e6a698·26927282·1·2018-03-28·18:50:45·+0000·UTC·&lt;nil&gt;·&lt;nil&gt;·map[]·
        map[]·[]·nil·[]·}·{{map[pod-name:server]·[]}·[{[{0xc4202632e0·81}]·[]}]·[]·[]}}]&#xA;&#xA;·Pods:&#xA;&#x9;·
        [Pod:·server,·Status:·&amp;PodStatus{Phase:Running,Conditions:[{Initialized·True·0001-01-01·00:00:00·+0000·
        UTC·2018-03-28·18:50:27·+0000·UTC··}·{Ready·True·0001-01-01·00:00:00·+0000·UTC·2018-03-28·18:50:36·+0000·UTC··
```

# Heptio
# Sonobuoy
# Scanner

## Run Heptio Sonobuoy

Paste the following command in your terminal:

```
kubectl apply -f https://scanner.heptio.com/984dcb91936073fb72f03776c844dc7e/yaml/    COPY
```

Wait for the list of conformance tests to appear. The scan results are associated with the unique URL of this page. To keep the list, you'll need to bookmark the URL.

This process can take up to 60 minutes.

☑ RBAC already enabled on cluster

You can run the same YAML yourself if you prefer to scan your cluster manually. Here it is:                COPY

```
    ---
    apiVersion: v1
    kind: Namespace
    metadata:
      name: heptio-sonobuoy
    ---
```

## CONFORMANCE RESULTS

× 

Tests Run: **137**

Total Failures: **10**

Download test report

---

× [sig-apps] Daemon set [Serial] should run and stop complex daemon [Conformance] +

× [sig-apps] StatefulSet [k8s.io] Basic StatefulSet functionality [StatefulSetBasic] Should recreate evicted statefulset [Conformance] +

× [sig-apps] StatefulSet [k8s.io] Basic StatefulSet functionality [StatefulSetBasic] Burst scaling should run to completion even with unhealthy pods [Conformance] +

× [sig-apps] Daemon set [Serial] should retry creating failed daemon pods [Conformance] +

| ✕ | [sig-apps] StatefulSet [k8s.io] Basic StatefulSet functionality [StatefulSetBasic] Should recreate evicted statefulset [Conformance] | + |

| ✕ | [sig-apps] StatefulSet [k8s.io] Basic StatefulSet functionality [StatefulSetBasic] Burst scaling should run to completion even with unhealthy pods [Conformance] | + |

## Failure Information

```
/workspace/anago-v1.10.0-
rc.1.9+fc32d2f3698e36/src/k8s.io/kubernetes/_output/dockerized/go/src/k8s.io/kubernetes/test/e2e/framework/framewo
rk.go:674
Expected error:
    <*errors.StatusError | 0xc421723200>: {
        ErrStatus: {
            TypeMeta: {Kind: "", APIVersion: ""},
            ListMeta: {SelfLink: "", ResourceVersion: "", Continue: ""},
            Status: "Failure",
            Message: "the server could not find the requested resource",
            Reason: "NotFound",
            Details: {Name: "", Group: "", Kind: "", UID: "", Causes: nil, RetryAfterSeconds: 0},
            Code: 404,
        },
    }
    the server could not find the requested resource
not to have occurred
/workspace/anago-v1.10.0-
rc.1.9+fc32d2f3698e36/src/k8s.io/kubernetes/_output/dockerized/go/src/k8s.io/kubernetes/test/e2e/apps/statefulset.
```
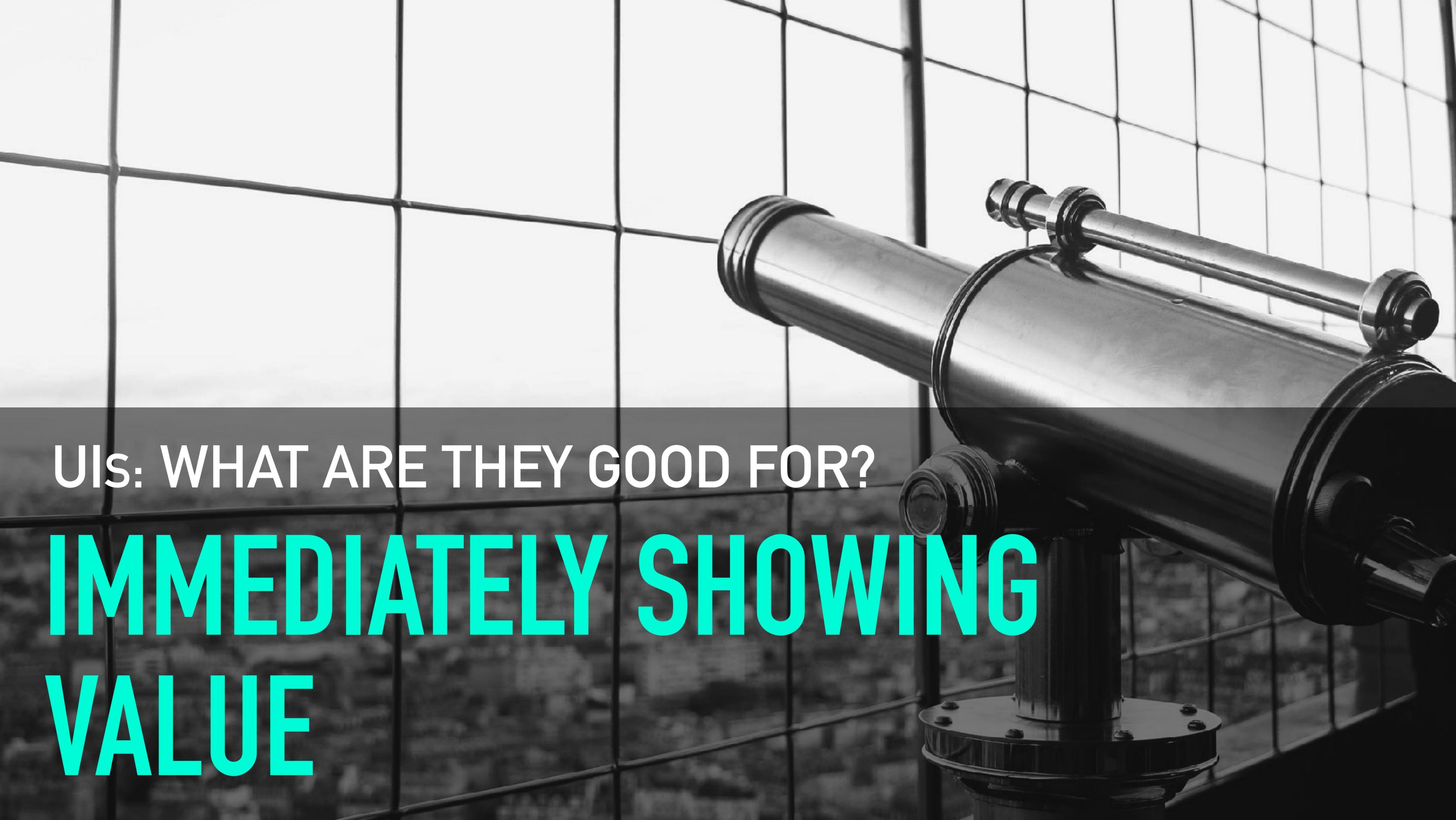
UIs: WHAT ARE THEY GOOD FOR?

IMMEDIATELY SHOWING VALUE

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- WRAP IT UP

WRAP IT UP
THANK YOU

# LINKS

| | |
|---|---|
| TGIK | https://www.youtube.com/playlist?list=PLvmPtYZtoXOENHJiAQc6HmV2jmuexKfrJ |
| Intro to Containers | https://medium.freecodecamp.org/a-beginner-friendly-introduction-to-containers-vms-and-docker-79a9e3e119b |
| Illustrated Guide to K8s | https://deis.com/blog/2016/kubernetes-illustrated-guide/ |
| K8s User Journeys | https://kubernetes.io/docs/user-journeys/users/application-developer/foundational/ |
| Linux Foundation Training | https://training.linuxfoundation.org/linux-courses/system-administration-training/kubernetes-fundamentals |
| Heptio Hands-on Workshop | j.hept.io/KubeConEU500 (promo: kubeconeu2018) |
| Minikube | https://kubernetes.io/docs/tasks/tools/install-minikube/ |
| Heptio AWS Quickstart | https://aws.amazon.com/quickstart/architecture/heptio-kubernetes/ |
| Sonobuoy Scanner | http://scanner.heptio.com/ |