

/'----`---`(_) _ () | | /') _ _ | | -` \ /'--` \
| () () || | () | | | | \` \ | (_) | | | (_)) (_ /
(_) (_) (_) (_) (_) (_) (_) ^ _ / ' (_ , _ / ' ` _ _ _)

🔥 Burning laps since 2016 🔥

a #sig-cluster-lifecycle project

17:30 up 3.5 years, 60,000 users, load: 0.00, 0.00, 0.00

% minikube status

Progress: Steady

Community: Excited about 2020!

Principles



Simple local Kubernetes, for day-to-day development & learning.

- Inclusive and community-driven
- User-friendly
- Support all Kubernetes features
- Cross-platform
- Reliable
- High Performance
- Developer Focused

Help Wanted!



- Ist principle is inclusive and community-driven
- We know minikube could be better. That's why we're here.
- There is plenty of low hanging fruit: documentation, anyone?
- We could use your help!
- We are happy to hold your hand and turn you into a Kubernetes contributor

The Origin Story



“ The most powerful magic is in the knowledge of the origin word. To know the birth and breeding of a thing or person, to reveal it, to recite it, and name it is to have power over it. ”

Eino Friberg, The Kalevala: Epic of the Finnish People

Chesterton's Fence



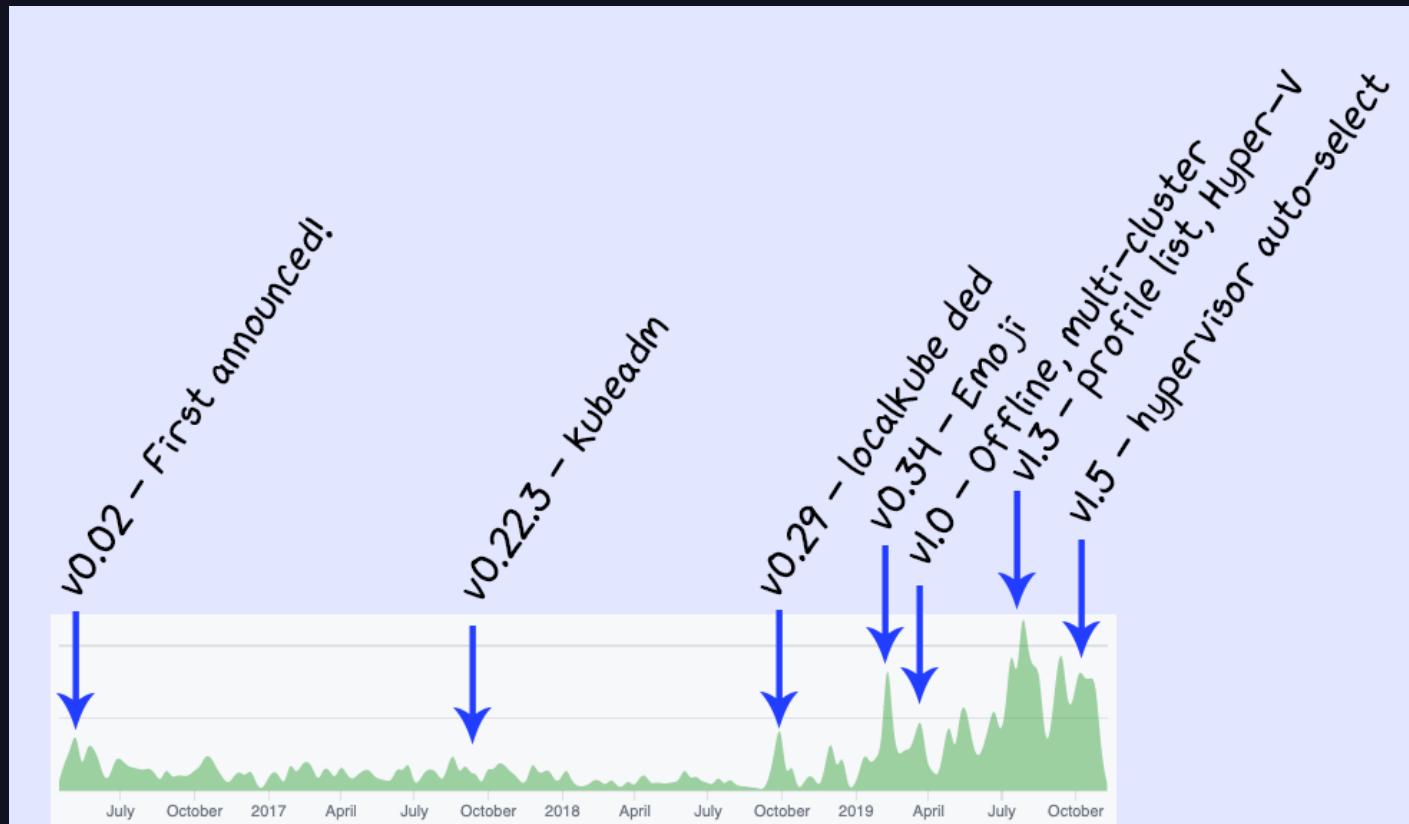
“

The more modern type of reformer goes gaily up to it and says, "I don't see the use of this; let us clear it away". To which the more intelligent type of reformer will do well to answer: "If you don't see the use of it, I certainly won't let you clear it away. Go away and think. Then, when you can come back and tell me that you do see the use of it, I may allow you to destroy

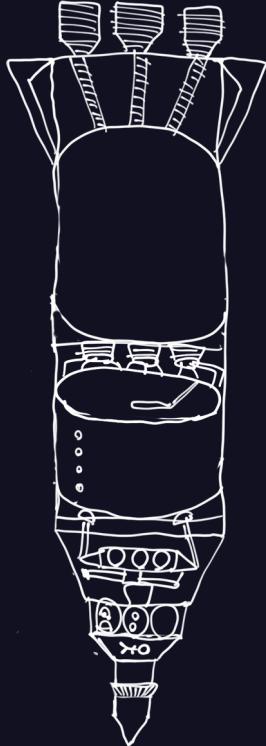
”

G. K. Chesterton, The Thing

A Brief History of Time



Architecture



- T-85: start -> libmachine -> hyperkit VM
- T-62: cluster -> ssh, sync time, CRI
- T-60: cache -> load images into CRI
- T-41: bootstrapper -> install kubeadm
- T-40: kubeadm -> pull
- T-28: kubeadm -> init
- T-8: bootstrapper -> wait for apiserver
- T-0: kubeconfig -> set context

Support Matrix



	Continuously Tested	Supported	YMMV	Planned
k8s	1.17	1.16	1.15	1.14
runtime	Docker	CRI-O	containerd	gvisor
bootstrapper	kubeadm	<i>kic</i>		
Drivers	VirtualBox	KVM2	HyperKit	HyperV
	Parallels	VMware	<i>Docker</i>	<i>Podman</i>
OS	Linux	MacOS	Windows	FreeBSD
Architecture	amd64	arm64	s390x	

minikube vs prod



- The master allows jobs to be scheduled
- Node won't resolve Kubernetes DNS records (pods can though!)
- More likely to OOM due to 2GB default memory size (`--memory`)
- Defaults to Docker runtime, allows direct image pushes

minikube vs others



“ minikube is what we recommend when you’re willing to pay some overhead for a more high-fidelity cluster ”

— *Tilt's guide to cluster selection*

minikube pros



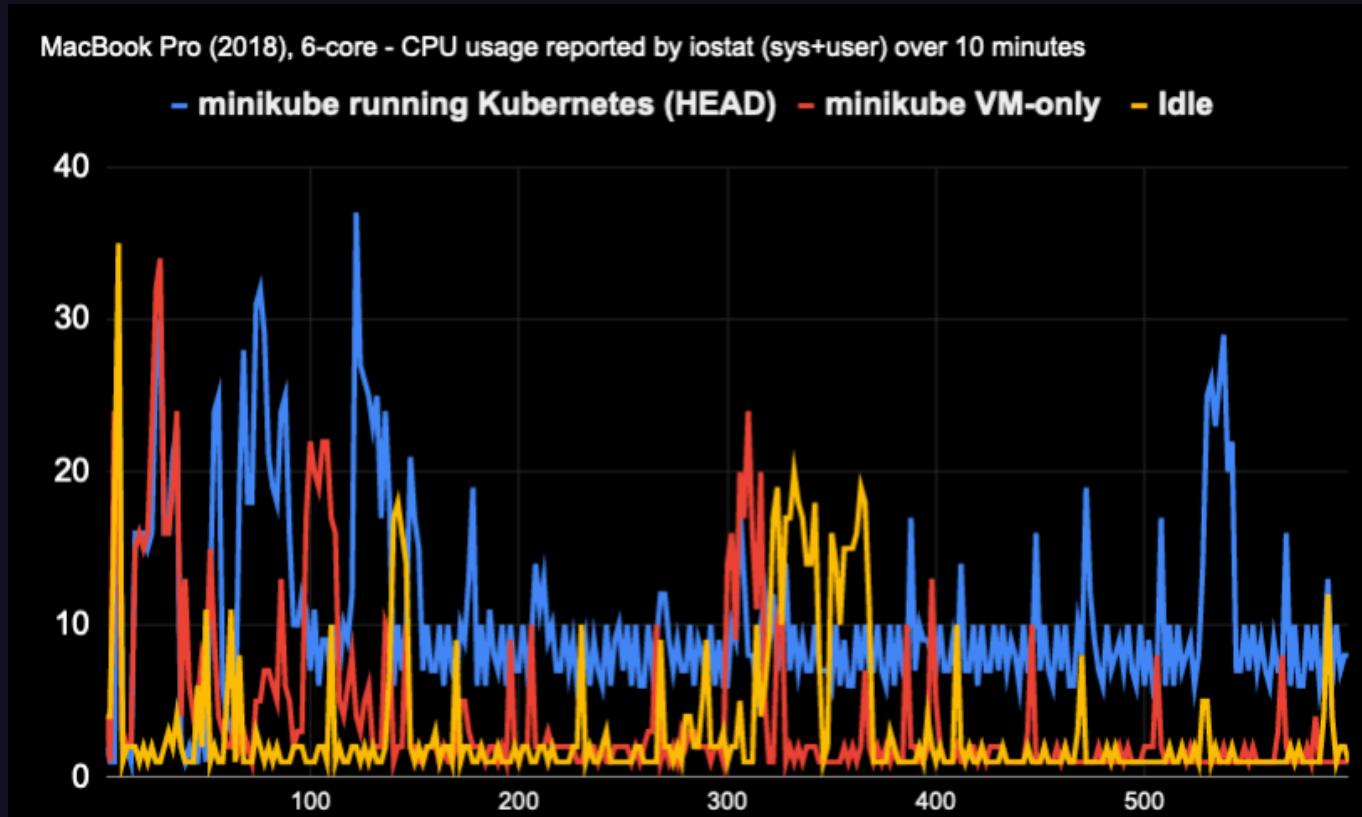
- The most full-featured local Kubernetes
- Easily run different k8s versions, container runtimes, controllers
- Build images in-cluster with `minikube docker-env`
- Developer-focused: LoadBalancer, addons, dashboard.
- Always supports the latest k8s + 5 older releases
- Ability to use tech that requires kernel module support
- Open-Source

minikube cons



- Higher overhead – you'll want to stop it when not in use
- Running within a VM makes Kubernetes performance slower
- Hypervisors can be difficult to configure
- Incompatible with VPN's that block LAN IP's

VM overhead is much less than you may think.



Since KubeCon Seattle



- Automatic driver selection & download
- 6 languages: de, es, en-US, fr, ja, pl, zh-CN
- Stable multi-cluster support (`profiles`)
- Image mirrors (China)
- kubectl version incompatibility detection
- More command line options: `delete --all`, `--addon`, `-f json`
- Improved proxy support
- Detects networking issues
- Reduced start latency (HEAD)
- Same-day release cadence with Kubernetes

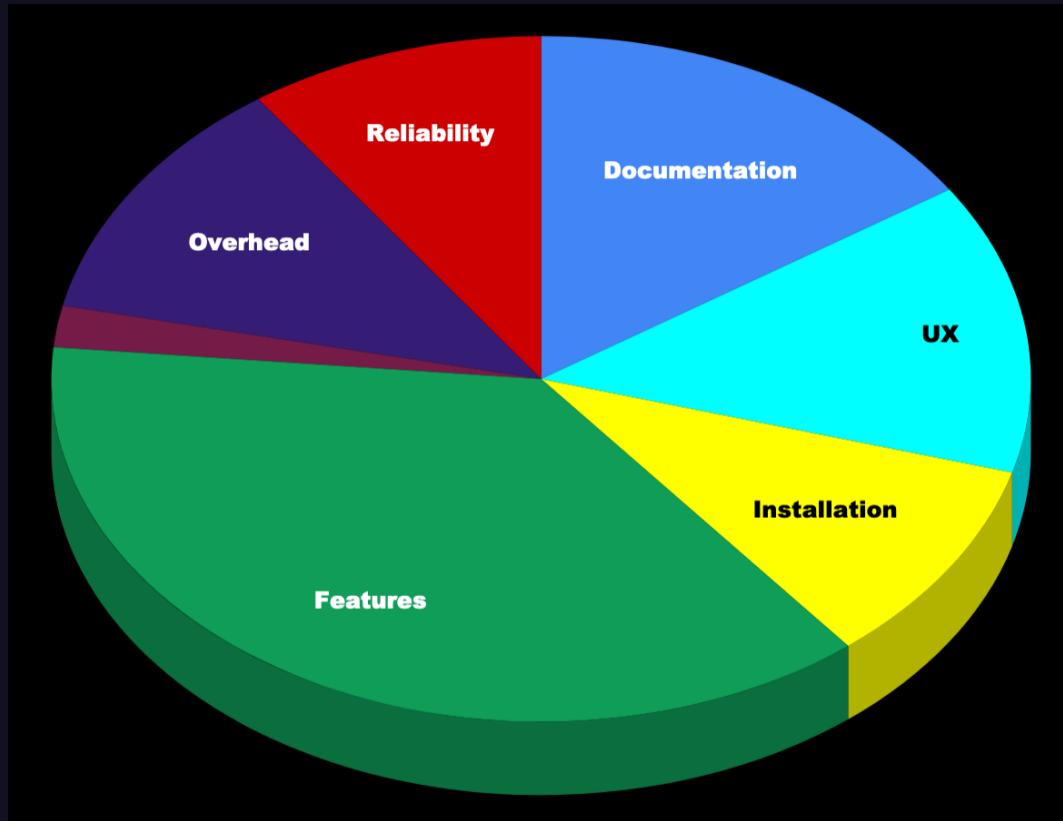
minikube today



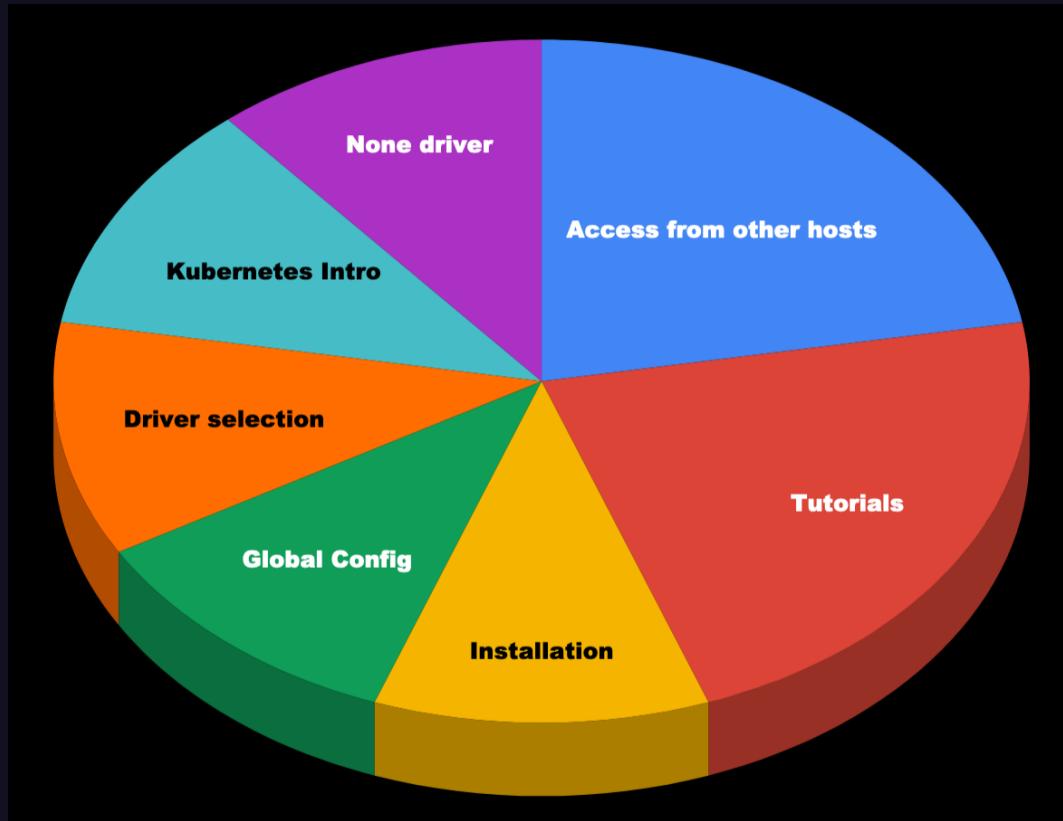
```
bash ~ .  
Darwin tstromberg-macbookpro.roam.corp.google.com 18.7.0 x86_64  
18:39 up 2 days, 12:25, 2 users, load averages: 3.79 3.16 2.74  
↳  
~/s/demoit ➜ ... minikube-deep ➜ Sat Nov 16 18:39:0  
~/s/demoit ➜ ... minikube-deep ➜ [red] Sat Nov 16 18:39:00 2019
```

```
code ~ src  
cmd/start.go x pkg/hyperkit.go pkg/docker.go pkg/kubeadm.go ...  
1 /*  
2 Copyright 2016 The Kubernetes Authors All rights reserved.  
3  
4 Licensed under the Apache License, Version 2.0 (the "License")  
5 you may not use this file except in compliance with the License.  
6 You may obtain a copy of the License at  
7  
8 http://www.apache.org/licenses/LICENSE-2.0  
9  
10 Unless required by applicable law or agreed to in writing, software  
11 distributed under the License is distributed on an "AS IS" BASIS  
12 WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or  
13 implied. See the License for the specific language governing permissions  
14 and limitations under the License.  
15 */  
16  
17 package cmd  
18  
19 import (  
20     "encoding/json"  
21     "fmt"  
22     "math"  
23     "net"  
24     "net/url"
```

Surveys are critical for user empathy

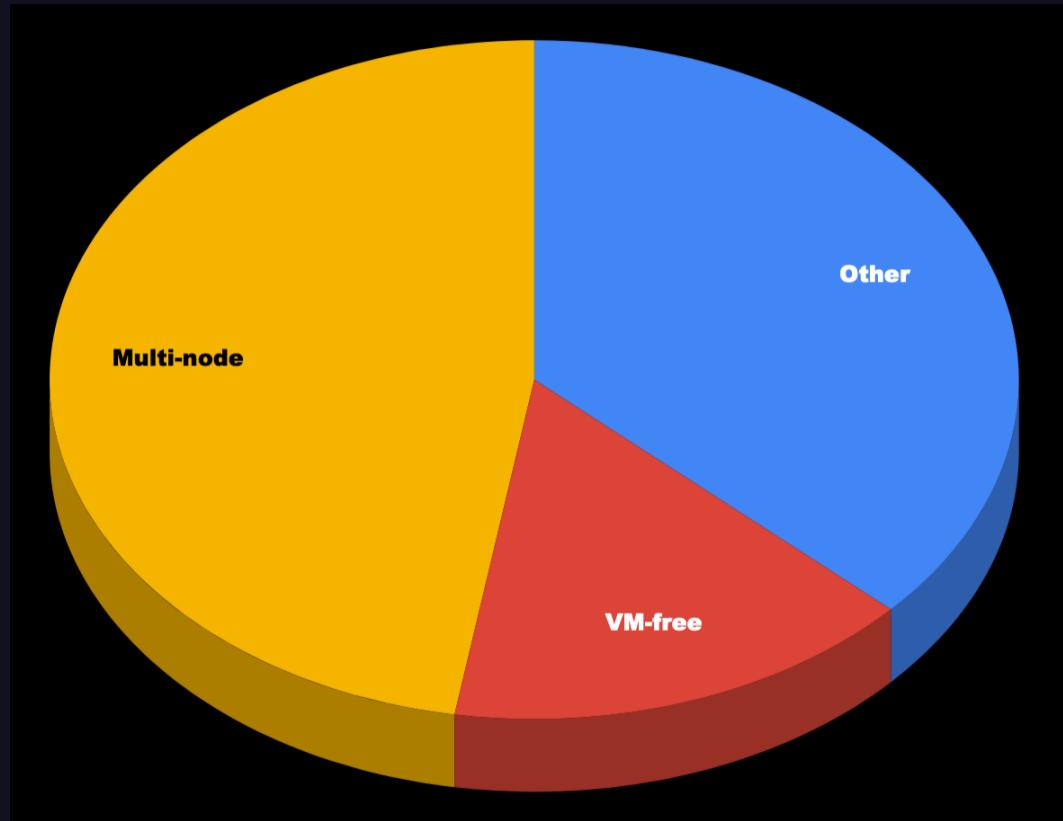


Documentation



Features

100
±



YOU FAIL?



- #1: None driver compatibility (6x)
- #2: Great Firewall of China (3x)
- #3: Nested virtualization(2x)
- #4: None driver - incomplete cleanup (2x)
- #5: VirtualBox/Hyper-V conflict (2x)
- #6: Services confusion (2x)
- #7: KVM/libvirt networking (2x)
- #8: VPN or firewall issue (2x)
- #9: Obsolete Kubernetes flags (2x)

Debugging common issues



- Hypervisor failure: `--alsologtostderr`
- kubelet failed: `kubelet` section of `minikube logs`
- not scheduling: `kubectl describe node`
- apiserver crashed: `minikube logs`, look for OOM in `dmesg`
- apiserver did not appear: `minikube logs`, see `kubelet & apiserver`
- connectivity failure: `VPN`, `firewall reboot?`

There is also `minikube logs` --problems, but it isn't great (yet!)

Confusing configuration persistence



- start flags are not persistent across restarts
- For persistence, use `minikube config`
- In v1.6, will become `--kubernetes-version` sticky across restarts
- Addons enable/disable is still global and persistent

Multi-node: Prototype



```
bash ~ .  
Darwin tstromberg-macbookpro.roam.corp.google.com 18.7.0 x86_64  
18:39 up 2 days, 12:25, 2 users, load averages: 3.79 3.16 2.74  
~/s/demoit ➜ ... ➜ minikube-deep ➜ Sat Nov 16 18:39:00 2019
```

```
code ~ src  
cmd/start.go x pkg/hyperkit.go pkg/docker.go pkg/kubeadm.go ...  
1 /*  
2 Copyright 2016 The Kubernetes Authors All rights reserved.  
3  
4 Licensed under the Apache License, Version 2.0 (the "License")  
5 you may not use this file except in compliance with the License.  
6 You may obtain a copy of the License at  
7  
8     http://www.apache.org/licenses/LICENSE-2.0  
9  
10 Unless required by applicable law or agreed to in writing, software  
11 distributed under the License is distributed on an "AS IS" BASIS  
12 WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or  
13 implied. See the License for the specific language governing permissions  
14 and limitations under the License.  
15 */  
16  
17 package cmd  
18  
19 import (  
20     "encoding/json"  
21     "fmt"  
22     "math"  
23     "net"  
24     "net/url"
```

Docker deployment: Prototype



```
bash ~ .  
Darwin tstromberg-macbookpro.roam.corp.google.com 18.7.0 x86_64  
18:39 up 2 days, 12:25, 2 users, load averages: 3.79 3.16 2.74  
~/s/demoit ➜ ... ➜ minikube-deep ➜ ss ^&1 |less;█
```

```
code ~ src  
cmd/start.go x pkg/hyperkit.go pkg/docker.go pkg/kubeadm.go ...  
1 /*  
2 Copyright 2016 The Kubernetes Authors All rights reserved.  
3  
4 Licensed under the Apache License, Version 2.0 (the "License")  
5 you may not use this file except in compliance with the License.  
6 You may obtain a copy of the License at  
7  
8     http://www.apache.org/licenses/LICENSE-2.0  
9  
10 Unless required by applicable law or agreed to in writing, software  
11 distributed under the License is distributed on an "AS IS" BASIS  
12 WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or  
13 implied. See the License for the specific language governing permissions  
14 and limitations under the License.  
15 */  
16  
17 package cmd  
18  
19 import (  
20     "encoding/json"  
21     "fmt"  
22     "math"  
23     "net"  
24     "net/url"
```

UI Prototype



- Persistent process allows us to signal alerts
- Resource starvation
- Deployment failures
- Switch between Kubernetes contexts
- Stop/start (and eventually suspend)
- hyperkit time sync

2020 roadmap



- Multi-node
- VM-free by default
- Hypervisor installation
- Improved CNI integration
- Revamp of addons
- >25% CPU overhead
- Startup latency under 45s
- Kernel-assisted mounts
- Suspend and Resume
- Optional toolbar UI
- post-libmachine exploration
- Newbie-friendly documentation
- Separation of create vs start

HELP WANTED!



We are a friendly and patient group of maintainers who want to help people learn Kubernetes. Many Kubernetes org members got their start by contributing to minikube.

- #minikube on Slack
- mailing list
- bi-weekly office-hours
- <https://minikube.sigs.k8s.io/>