

State of the UI: Leveraging Kubernetes Dashboard and Shaping its Future

Spencer Sugarman

UX Researcher, *Google*

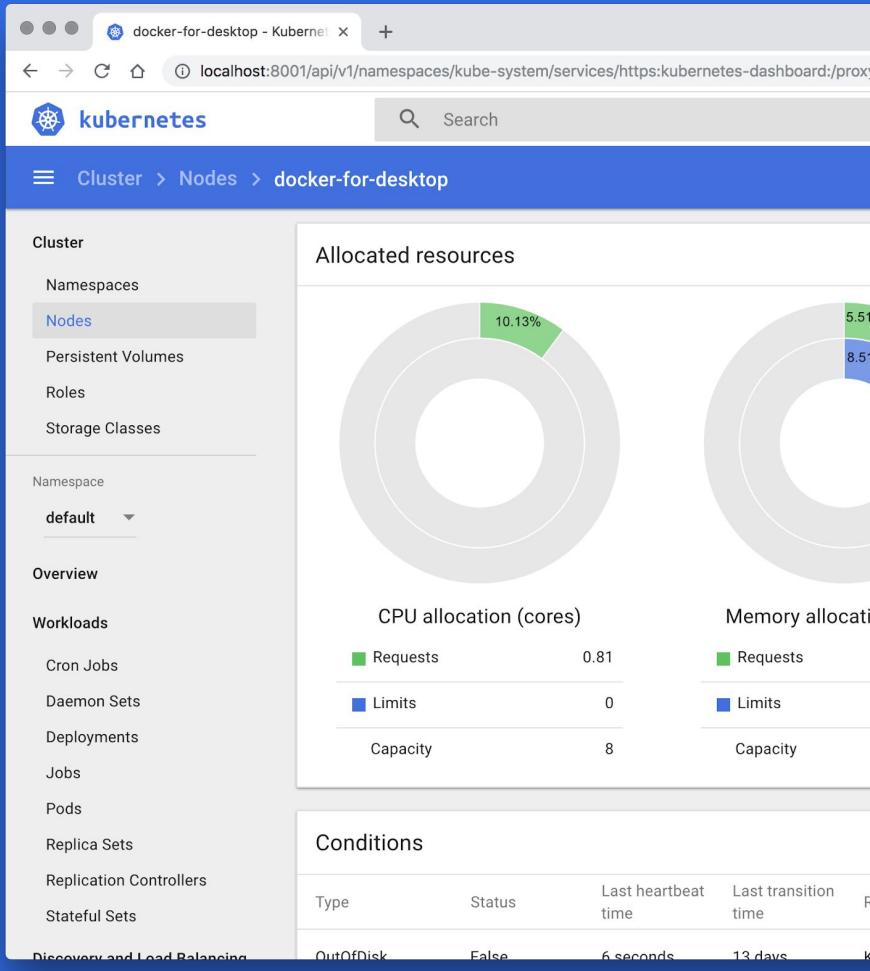
Dan Romlein

UX Designer, *Google*

Talk Goals

1. What Dashboard is and why you should be using it
2. Research findings and the future of Dashboard
3. Where to learn more and how to get involved

About Kubernetes Dashboard



☰ Overview

Cluster
Namespaces
Nodes
Persistent Volumes
Roles
Storage Classes

Namespace
default

Overview

Workloads
Cron Jobs
Daemon Sets
Deployments
Jobs
Pods
Replica Sets
Replication Controllers
Stateful Sets

Discovery and Load Balancing

Ingresses

Services

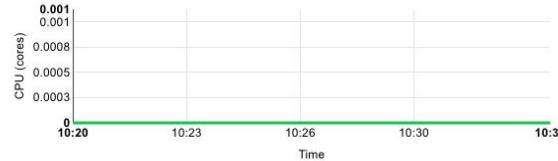
Config and Storage

Config Maps

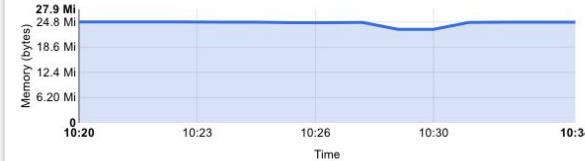
Persistent Volume Claims

Secrets

CPU usage



Memory usage ⓘ



Workloads

Workloads Statuses



Deployments



Pods



Replica Sets

Deployments

Name	Labels	Pods	Age	Images
my-app	app: my-app	1 / 1	5 months	nginx
kubernetes-dashboard	k8s-app: kubernetes-dashboard	1 / 1	6 months	kubernetesdashboarddev/kubernetes
oss-ui	app: oss-ui	1 / 1	6 months	kubernetesdashboarddev/kubernetes

Pods

Name	Node	Status	Restarts	Age	CPU (cores)	Memory (bytes)

Dashboard 1.0 launched in 2016

The screenshot shows the Kubernetes Dashboard 1.0 interface running in a web browser on a Mac OS X system. The title bar indicates the URL is `minion4.local`. The dashboard has a blue header with the Kubernetes logo and a red '+' button in the top right corner.

The main content area displays five application pods:

- droneio**:
 - app: droneio
 - 1 pod running
 - Logs ▾
 - Image: armhfbuild/drone:latest
 - Age: a day
 - Internal endpoint: droneio:80 TCP
 - External endpoint: none
- gogs**:
 - app: gogs
 - 1 pod running
 - Logs ▾
 - Image: larmog/rpi-gogs:0.8.23.0126-2
 - Age: 11 days
 - Internal endpoint: gogs:80 TCP
 - External endpoint: none
 - gogs-ssh:2222 TCP
- mysql**:
 - version: v5.5
 - 1 pod running
 - Logs ▾
 - Image: hypriot/rpi-mysql:5.5
 - Age: 11 days
 - Internal endpoint: mysql:3306 TCP
 - External endpoint: none
- kube-dns-v8**:
 - k8s-app: kube-dns
 - kubernetes.io/cluster-service: true
 - 1 pod running
 - Logs ▾
 - Image: kubernetes-on-arm/etcdd
 - Age: a month
 - Internal endpoint: kube-dns.kube-system:53 UDP
 - External endpoint: none
 - kube-dns.kube-system:53 TCP
- kubernetes-dashboard**:
 - k8s-app: kubernetes-dashboard
 - version: v0.1.0
 - 1 pod running
 - Logs ▾
 - Image: gor.io/google_code.go...board-arm:v0.1.0
 - Age: 7 minutes
 - Internal endpoint: kubernetes-dashboard.kube-system:80 TCP
 - External endpoint: none
- service-loadbalancer**:
 - app: service-loadbalancer
 - version: v1
 - 1 pod running
 - Logs ▾
 - Image: kubernetes-on-arm/loadbalancer
 - Age: 11 days
 - Internal endpoint: none
 - External endpoint: none

github.com/kubernetes/dashboard

The screenshot shows the GitHub repository page for `kubernetes/dashboard`. The repository has 2,008 commits, 45 branches, 28 releases, 142 contributors, and is licensed under Apache-2.0. The commit history lists recent changes, including updates to documentation, fixes for typographical errors, and improvements to build and vendor management. The latest commit is from 2 days ago.

File / Commit Message	Author	Date
<code>github</code> Update docs and add maciaszczykm@ to sig-ui-leads (#3269)	mooncak and k8s-ci-robot	21 days ago
<code>build</code> Issue 2330 (#3141)		6 days ago
<code>docs</code> Remove duplication in files (#3283)		9 days ago
<code>hooks</code> Replace gofmt code formating tool with goimports (#2172)		a year ago
<code>i18n</code> Update Korean translation for pod (#3155)		2 months ago
<code>src</code> Fix typos (#3290)		2 days ago
<code>vendor</code> chore: update go dependencies (#3157)		2 months ago
<code>.babelrc</code> fix: namespace param should be checked in onEnter hook (#2975)		6 months ago
<code>.clang-format</code> Enforce clang-format formatting on all JS files		3 years ago
<code>.dockerrc</code> Introduce global settings (#2532)		11 months ago
<code>.editorconfig</code> Add .editorconfig file (#2728)		10 months ago
<code>.eslintrc</code> Update .eslintrc (#2821)		8 months ago
<code>.gitignore</code> Fix high cpu usage (#2428)		a year ago
<code>.sass-lint.yml</code> Left nav progress version 2 (#1141)		2 years ago
<code>.travis.yml</code> Fix master build (#2574)		11 months ago
<code>Gopkg.lock</code> chore: update go dependencies (#3157)		2 months ago
<code>Gopkg.toml</code> chore: update go dependencies (#3157)		2 months ago

SIG-UI Team



Piotr Bryk, Google



Peng Xiao, Alauda



Sebastian Florek (co-lead), Loodse



Jeffrey Sica, University of Michigan



Jim Angel, General Motors



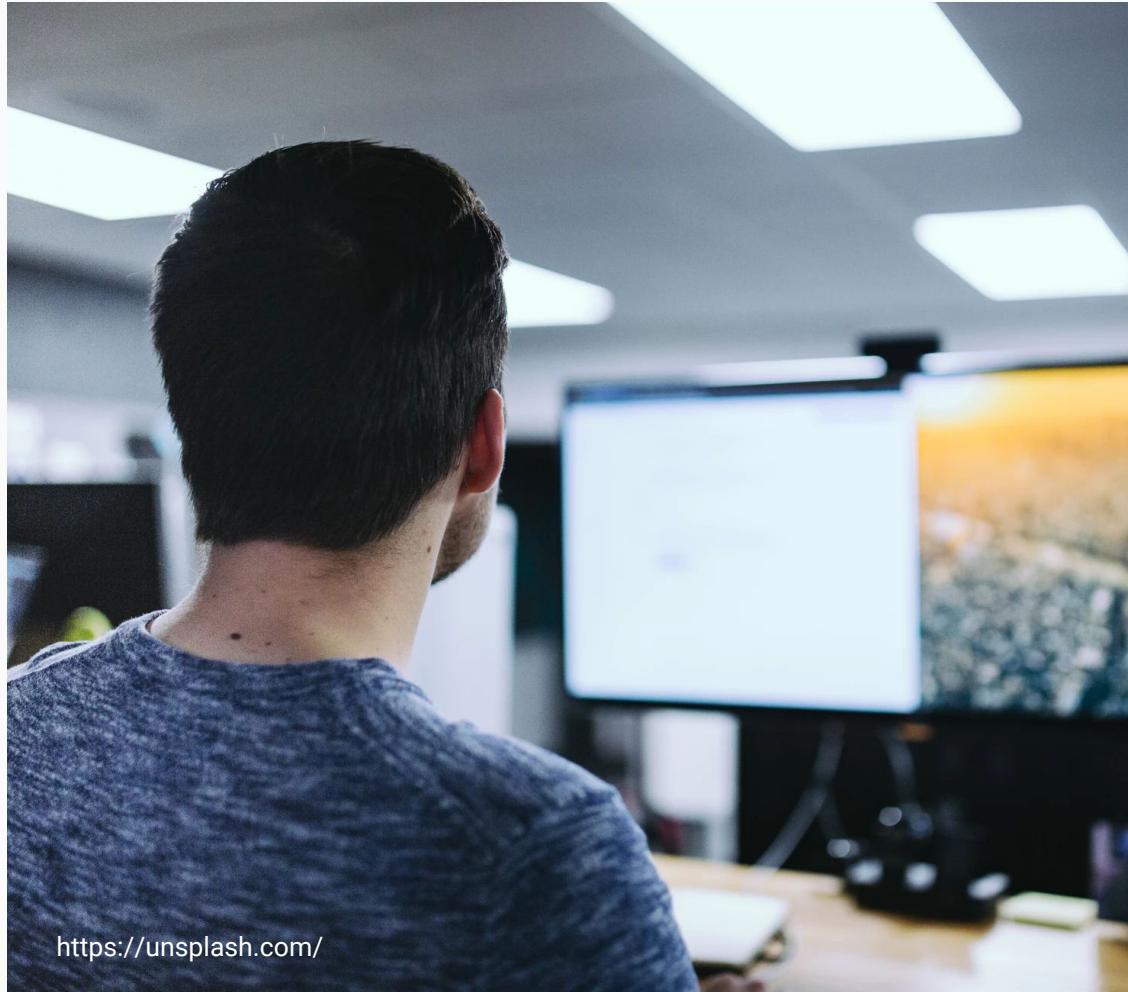
Marcin Maciaszczyk, Loodse

Why a UI?

60%

of survey takers
use a UI to
monitor or
manage their
resources in
Kubernetes

<https://github.com/kubernetes/dashboard/issues/3256#issuecomment-437199403>



<https://unsplash.com/>

UIs help you understand what's going on with your cluster, fast.

Pods						
	Name	Node	Status	Restarts	Age	⋮
✓	test-app-7b694cf576-npsqj	docker-for-desktop	Running	0	4 days	⋮ ⋮
✓	test-app-7b694cf576-7qdrj	docker-for-desktop	Running	0	4 days	⋮ ⋮
!	test-app-7b694cf576-hhg9f	docker-for-desktop	Waiting: ErrImagePull	0	4 days	⋮ ⋮
Search Line limits were exceeded, some search paths have been omitted, the applied search line is: default.svc.cluster.local svc.cluster.local cluster.local corp.google.com prod.google.com prodz.google.com						
✓	dromlein-app-5f5d97d86b-hrnht	docker-for-desktop	Running	0	4 days	⋮ ⋮
✓	dromlein-app-5f5d97d86b-nsvcq	docker-for-desktop	Running	0	4 days	⋮ ⋮
✓	dromlein-app-5f5d97d86b-qb2h9	docker-for-desktop	Running	0	4 days	⋮ ⋮
✓	dromlein-app-5f5d97d86b-8t2sr	docker-for-desktop	Running	0	4 days	⋮ ⋮



```
$ kubectl get nodes
NAME                               STATUS
gke-n3c8-7d9f8163-node-d015      Ready
gke-n3c8-7d9f8163-node-hmbh      Ready
gke-n3c8-7d9f8163-node-kdc4      Ready
$ cat rc.yaml
apiVersion: v1
kind: ReplicationController
metadata:
  name: nginx
spec:
  replicas: 8
  selector:
    app: nginx
  template:
    metadata:
      labels:
        app: nginx
    spec:
      nodeSelector:
        node: "1"
      containers:
        - name: nginx
          image: nginx
$ kubectl get pod -o wide
NAME        READY   STATUS    RESTARTS   AGE     NODE
nginx-8ondm  1/1    Running   0          10m    gke-n3c8-7d9f8163-node-d015
nginx-gyjd9  1/1    Running   0          10m    gke-n3c8-7d9f8163-node-d015
nginx-nc4ys  1/1    Running   0          10m    gke-n3c8-7d9f8163-node-d015
nginx-nwqlk  1/1    Running   0          10m    gke-n3c8-7d9f8163-node-d015
nginx-tvnmj  1/1    Running   0          10m    gke-n3c8-7d9f8163-node-d015
nginx-vjfiw  1/1    Running   0          10m    gke-n3c8-7d9f8163-node-d015
nginx-x3h2i  1/1    Running   0          10m    gke-n3c8-7d9f8163-node-d015
nginx-y59wf  1/1    Running   0          10m    gke-n3c8-7d9f8163-node-d015
$
```

Dashboard Strengths:

- Providing an overview
- Monitoring & troubleshooting
- Sharing with non-technical stakeholders
- Infrequent tasks
- Onboarding new K8s users / learning

Kubectl Strengths:

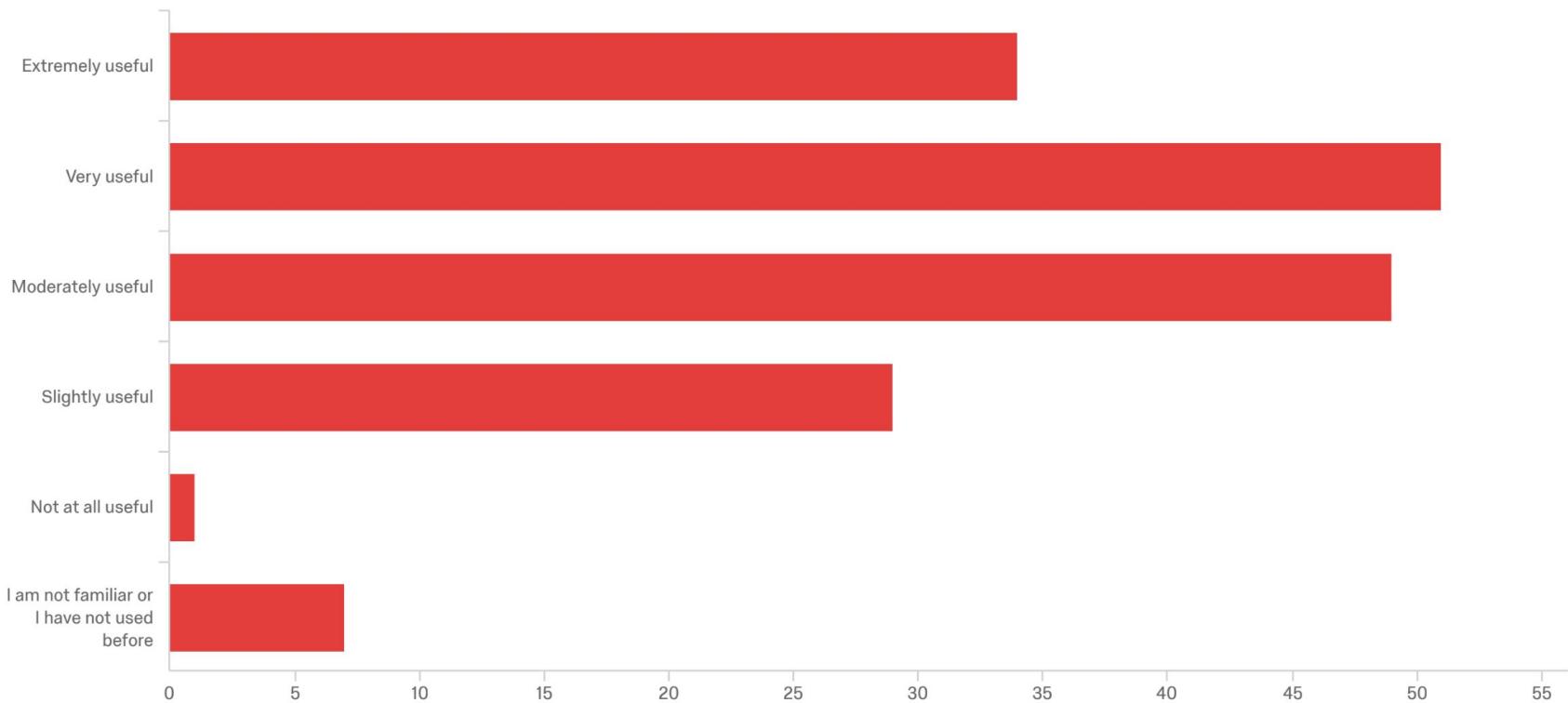
- In-Terminal workflows
- Frequently-repeated tasks
- Scripting & automation
- Sharing workflows / reproducibility
- Customization

Onboarding new K8s users



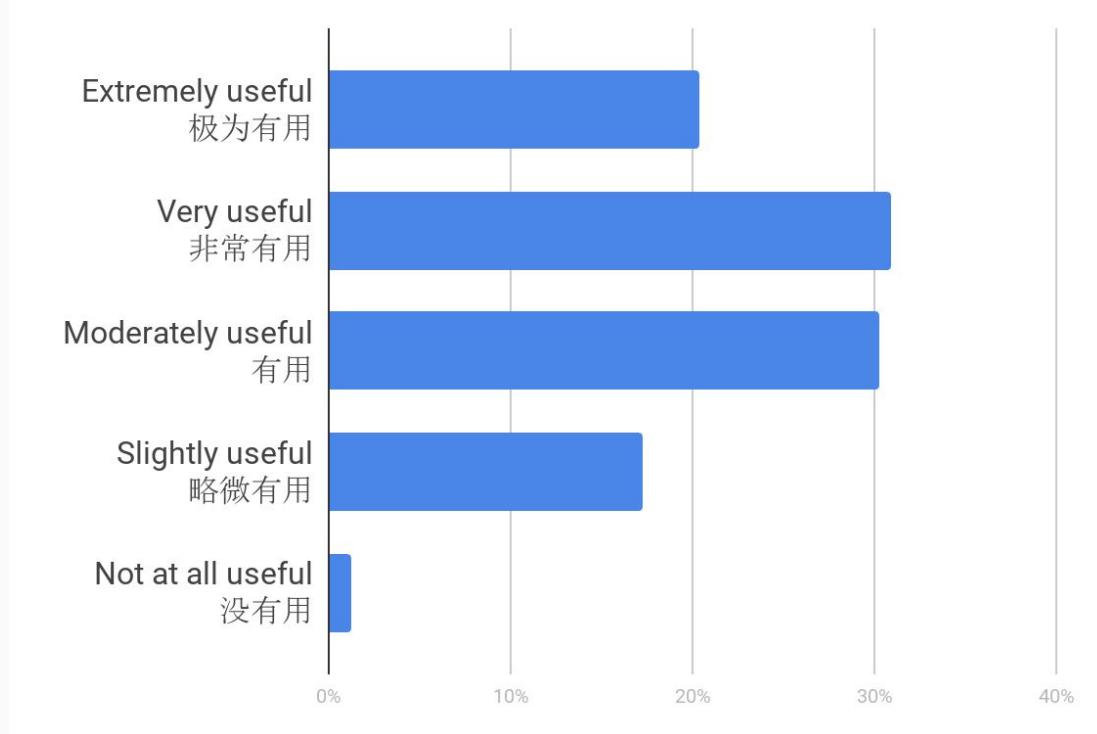
<https://unsplash.com/>

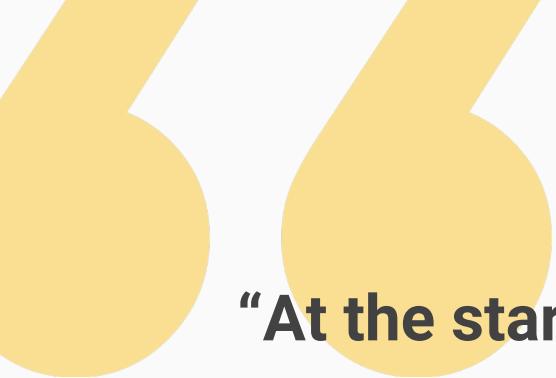
Q12 - How useful is the Kubernetes Dashboard for learning Kubernetes?



**Over 50% of survey
takers said that
Dashboard is **very**
**useful or extremely
useful for learning
Kubernetes****

How useful is the Kubernetes Dashboard for learning Kubernetes?
您认为Kubernetes Dashboard对学习Kubernetes有多大用处？





“At the start it was great to be able to visually see the resources and understand how they are grouped. This helped someone like me with a hands-on but visual learning style.”

→ Survey response

→ *Developer, running Kubernetes in AWS, Azure, and on-prem*

Dashboard as a K8s learning tool

Kubernetes

Search

+ CREATE | 🔍

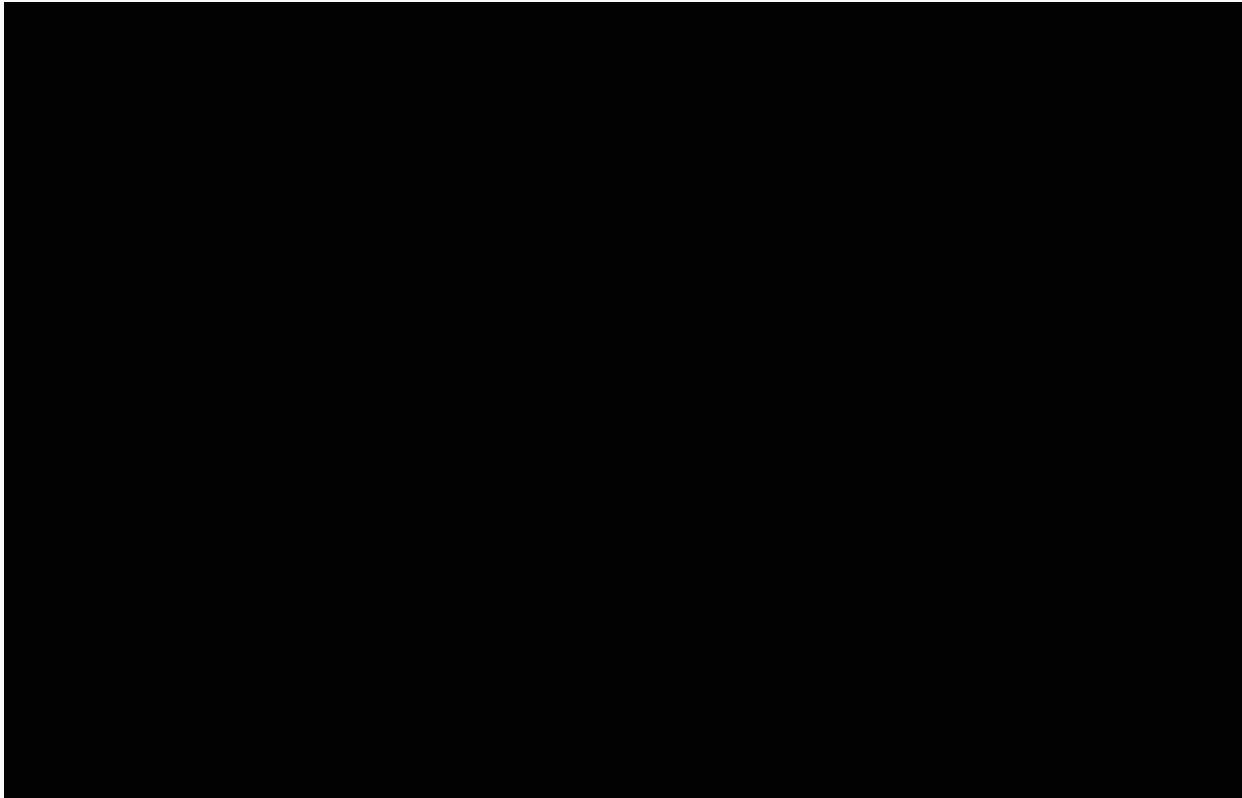
☰ Workloads > Replica Sets > test-app-7b694cf576

☰ LOGS ⚡ SCALE 🖊 EDIT 🗑 DELETE

Cluster	Details	Status
Namespaces	Name: test-app-7b694cf576	Pods:
Nodes	Namespace: default	
Persistent Volumes	Labels: k8s-app: test-app pod-template-hash: 3625079132	
Roles	Annotations: deployment.kubernetes.io/desired-replicas: 3 deployment.kubernetes.io/max-replicas: 4 deployment.kubernetes.io/revision: 1	
Storage Classes	Creation Time: 2018-10-25T19:54 UTC	
Namespace	Selector: k8s-app: test app pod-template-hash: 3625079132	
default	Images: nginx	

Overview	Workloads																													
Workloads																														
Cron Jobs																														
Daemon Sets																														
Deployments																														
Jobs																														
Pods																														
Replica Sets																														
Replication Controllers																														
Stateful Sets																														
Discovery and Load Balancing																														
Ingresses																														
Services																														
Overview	Pods																													
Workloads	<table border="1"><thead><tr><th>Name</th><th>Node</th><th>Status</th><th>Restarts</th><th>Age</th><th>⋮</th></tr></thead><tbody><tr><td>test-app-7b694cf576-7qdrj</td><td>docker-for-desktop</td><td>Running</td><td>0</td><td>2 minutes</td><td>⋮</td></tr><tr><td>test-app-7b694cf576-hhg9f</td><td>docker-for-desktop</td><td>Running</td><td>0</td><td>2 minutes</td><td>⋮</td></tr><tr><td>test-app-7b694cf576-npsqj</td><td>docker-for-desktop</td><td>Running</td><td>0</td><td>2 minutes</td><td>⋮</td></tr></tbody></table>						Name	Node	Status	Restarts	Age	⋮	test-app-7b694cf576-7qdrj	docker-for-desktop	Running	0	2 minutes	⋮	test-app-7b694cf576-hhg9f	docker-for-desktop	Running	0	2 minutes	⋮	test-app-7b694cf576-npsqj	docker-for-desktop	Running	0	2 minutes	⋮
Name	Node	Status	Restarts	Age	⋮																									
test-app-7b694cf576-7qdrj	docker-for-desktop	Running	0	2 minutes	⋮																									
test-app-7b694cf576-hhg9f	docker-for-desktop	Running	0	2 minutes	⋮																									
test-app-7b694cf576-npsqj	docker-for-desktop	Running	0	2 minutes	⋮																									
Replica Sets	<table border="1"><thead><tr><th>Name</th><th>Labels</th><th>Cluster IP</th><th>Internal endpoints</th><th>External endpoints</th><th>Age</th></tr></thead><tbody><tr><td>test-app</td><td>k8s-app: test-app</td><td>10.99.83.3</td><td>test-app:80 TCP test-app:31386 TCP</td><td>-</td><td>2 minutes</td></tr></tbody></table>						Name	Labels	Cluster IP	Internal endpoints	External endpoints	Age	test-app	k8s-app: test-app	10.99.83.3	test-app:80 TCP test-app:31386 TCP	-	2 minutes												
Name	Labels	Cluster IP	Internal endpoints	External endpoints	Age																									
test-app	k8s-app: test-app	10.99.83.3	test-app:80 TCP test-app:31386 TCP	-	2 minutes																									
Replication Controllers																														
Stateful Sets																														
Discovery and Load Balancing																														
Ingresses																														
Services																														

Create, read, update, delete resources.



Recent and upcoming features



Features since 2016 KubeCon update

- Exec into pod github.com/kubernetes/dashboard/releases
- Global search
- Login mechanism
- Settings page
- Support for Cron Jobs
- Redesigned resource creation
- ...and much much more.

In-progress work

- Migrating from ng1 to ng2 (#3152)
- Migrating metrics from Heapster to Kubernetes Metrics API (#2986)
- Apps list page (#2980)

The screenshot shows the Kubernetes Dashboard's "Overview" page. On the left, a sidebar lists various cluster components: Cluster, Cluster Roles, Namespaces, Nodes, Persistent Volumes, Storage Classes, Namespace (set to default), Overview, Workloads, Cron Jobs, Daemon Sets, Deployments, Jobs, Pods, Replica Sets, Replication Controllers, Stateful Sets, Discovery and Load Balancing, Ingresses, Services, Config and Storage, and Config Maps. The "Workloads" section is currently selected.

The main area is titled "Workloads" and contains two tabs: "Deployments" and "Pods".

Deployments:

Name	Labels	Pods	Age	Images
wordressed	k8s-app: wordressed	10 / 10	2 hours	wordpress
name	k8s-app: name	1 / 1	2 hours	wordpress

Pods:

Name	Labels	Node	Status	Restarts	Age	⋮
wordressed-7b5bb749fc-fdgx7	k8s-app: wordressed pod-template-hash: 3616630597	docker-for-desktop	Running	0	2 hours	⋮
wordressed-7b5bb749fc-qjbxm	k8s-app: wordressed pod-template-hash: 3616630597	docker-for-desktop	Running	0	2 hours	⋮
wordressed-7b5bb749fc-wdj2j	k8s-app: wordressed pod-template-hash: 3616630597	docker-for-desktop	Running	0	2 hours	⋮
redis-master	name: redis redis-sentinel: true	docker-for-desktop	Running	0	2 hours	⋮
wordressed-7b5bb749fc-5cb56	k8s-app: wordressed pod-template-hash: 3616630597	docker-for-desktop	Running	0	2 hours	⋮

Search Entire Site

for:

Find

Categories

- Men
- Women
- Children
- Hot Deals

Cost

Min

Max

Size

- Small
- Medium
- Large
- Large-X

All items



Trucker hat \$30

[Add to Cart](#) Compare Item

Track jacket \$100

[Add to Cart](#) Compare Item

Water bottle \$25

[Add to Cart](#) Compare Item

Moleskine \$30

[Add to Cart](#) Compare Item

Tote bag \$15

[Add to Cart](#) Compare Item

Coffee mug \$20

[Add to Cart](#) Compare Item

Compare items by selecting the appropriate checkbox. When you are finished, click here.

[Compare Selected Items](#)Skip to Page [1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#)[Next Page >](#)

Items 1-9 of 67 Total

Ordering Help

- [Track Your Orders](#)
- [Questions About Your Order](#)

Shipping & Returns Help

- [Shipping Costs & Times](#)
- [Our Return Policy](#)

Store Help

- [Find a Store](#)

Still Have Questions?

- [Online Customer Service](#)
- [Product Recall Info](#)

Categories

Men

Women

Children

Hot Deals

Price Filter

\$1 \$1000

Sizes

Small

Medium

Large

X Large



Trucker hat

\$30



Track jacket

\$100



Water bottle

\$25



Moleskine

\$30



Tote bag

\$15



Coffee mug

\$20

Demo

Future of Dashboard

A photograph showing a person from the side, wearing a grey long-sleeved shirt, sitting at a wooden table and writing in a notebook with a pen. Another person, wearing a black t-shirt, is visible across the table, looking towards the writer. The scene suggests a focused, collaborative environment.

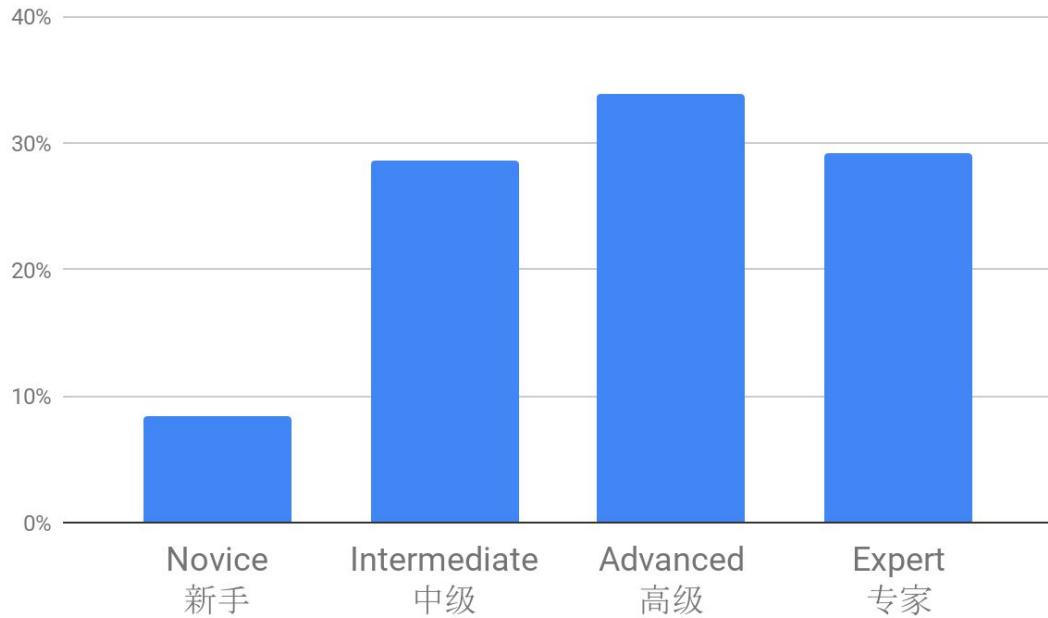
**How do
people use
Dashboard
today, and
want to use it
tomorrow?**

About the survey

163

Responses

How would you rate your knowledge of Kubernetes?
您如何评价您对于Kubernetes的了解程度？



Top requested changes

1. **Third-party plugins or integrations**

集成第三方插件

2. **Feature parity with kubectl**

功能与kubectl保持一致

3. **Multi-cluster management**

多集群管理

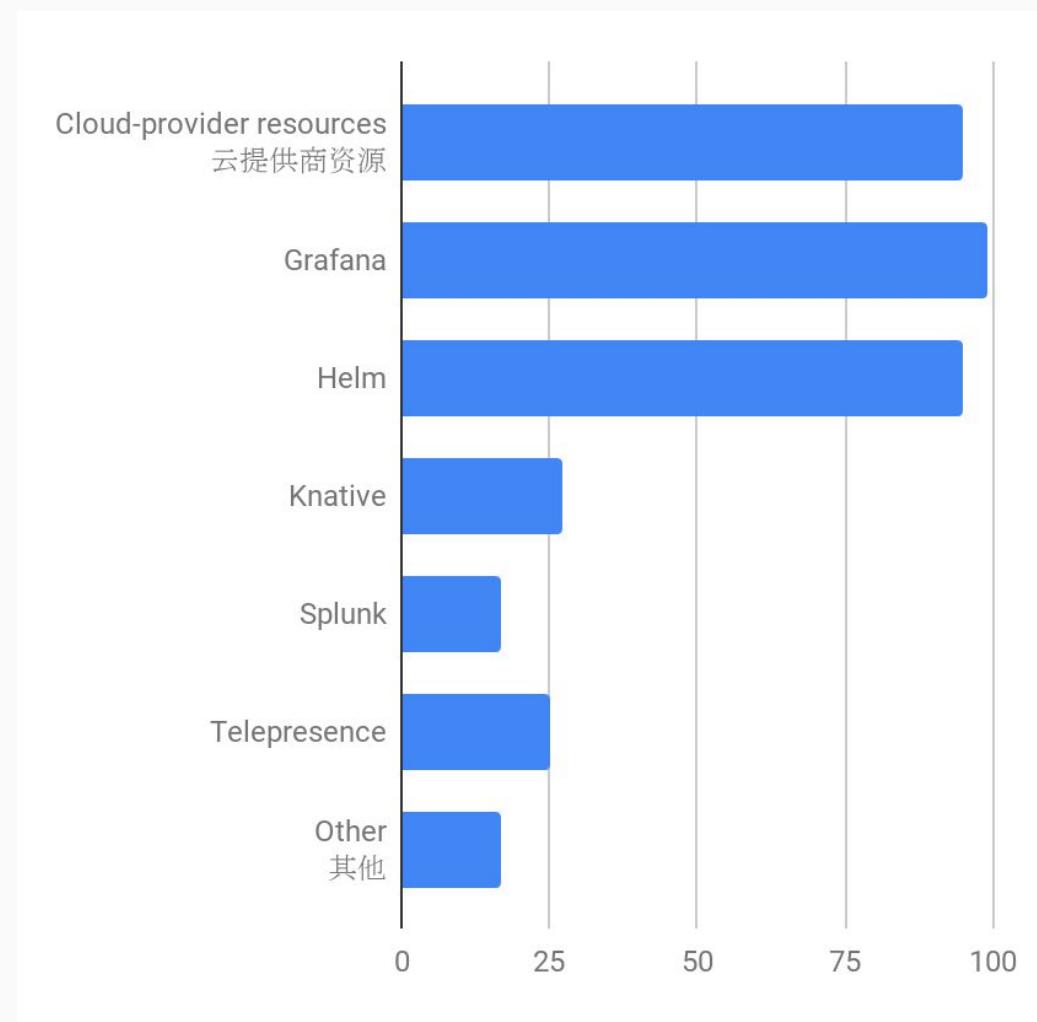
4. **Improved security**

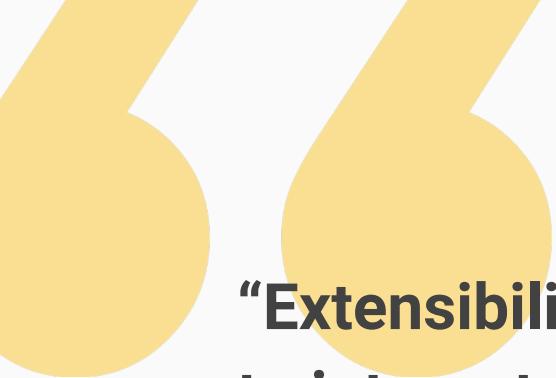
提高安全性

1. Third-party plugins or integrations
集成第三方插件

Which **third-party plugins or integrations** would you like to see supported in the Kubernetes Dashboard?

<https://github.com/kubernetes/dashboard/issues/3256#issuecomment-437199403>



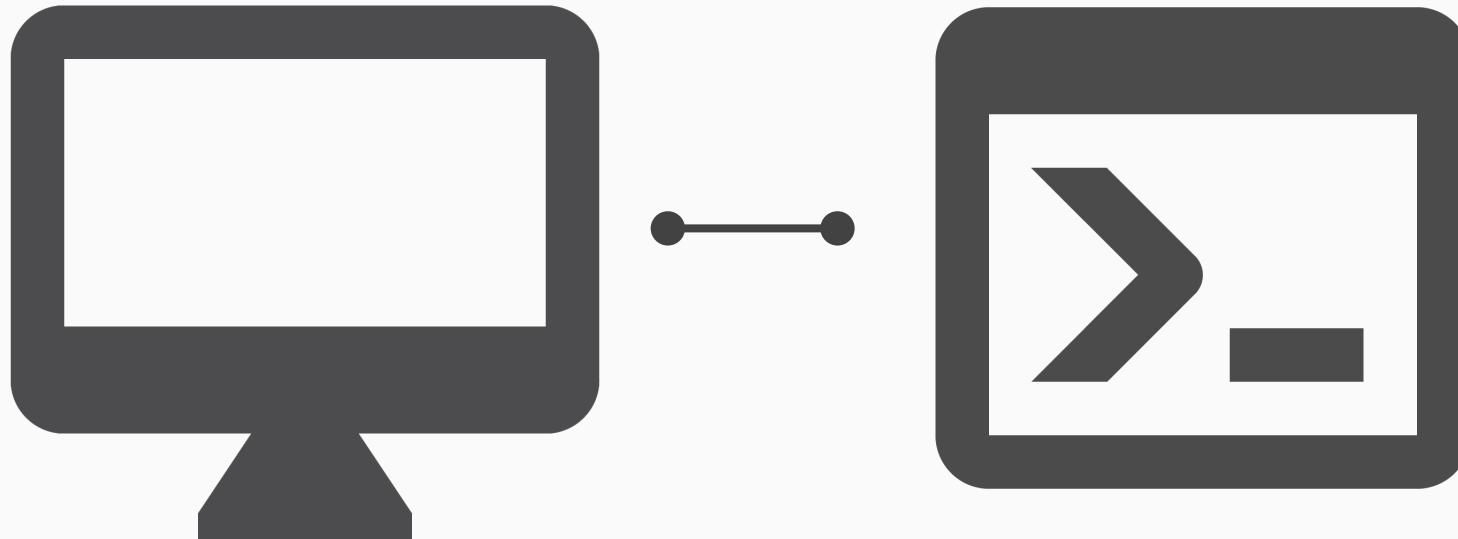


**“Extensibility, modularity, API for libraries
to integrate with Dashboard ... it should
follow philosophy of K8s, and should be
[the foundation] on which we can build our
custom command center.”**

→ Survey response

→ *Cluster Operator, running Kubernetes on-prem and in the cloud*

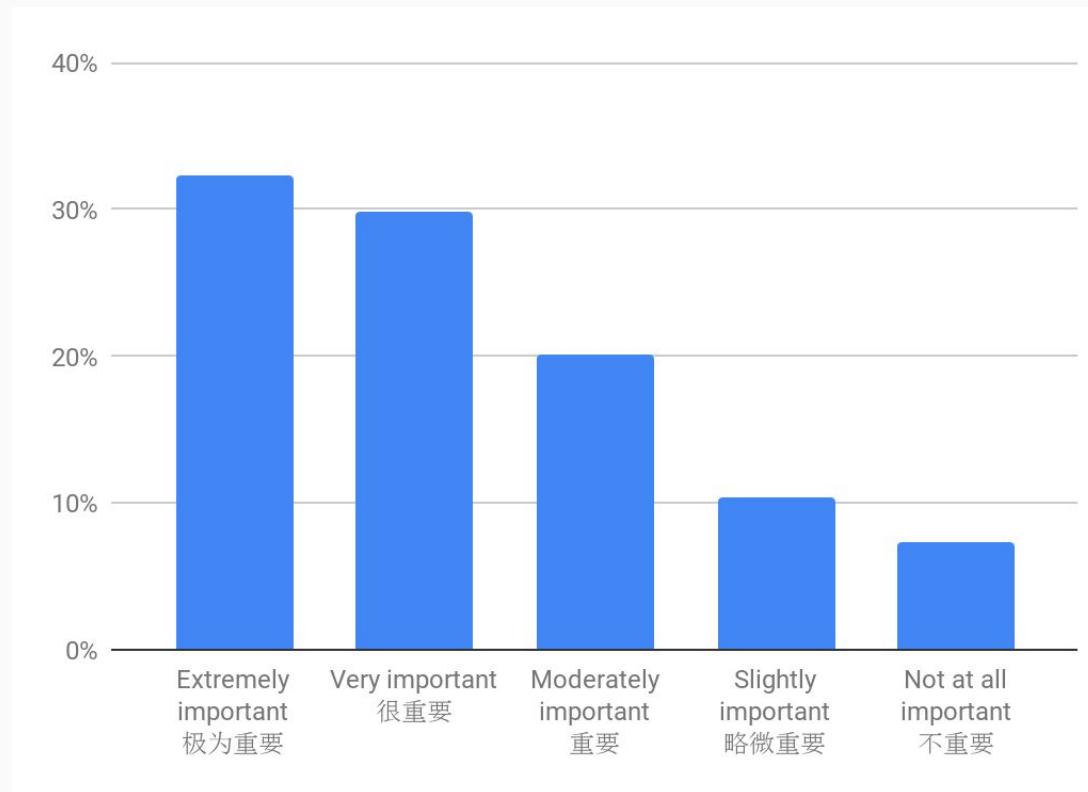
2. Feature parity with kubectl



3. Multi-cluster management 多集群管理

Most survey takers said that it is **very or extremely important** to see resources from multiple clusters in one place

How important is it to see resources from multiple clusters in one place?
在一个地方集中查看来自多个集群的资源对您来说有多重要？



4. Improved security

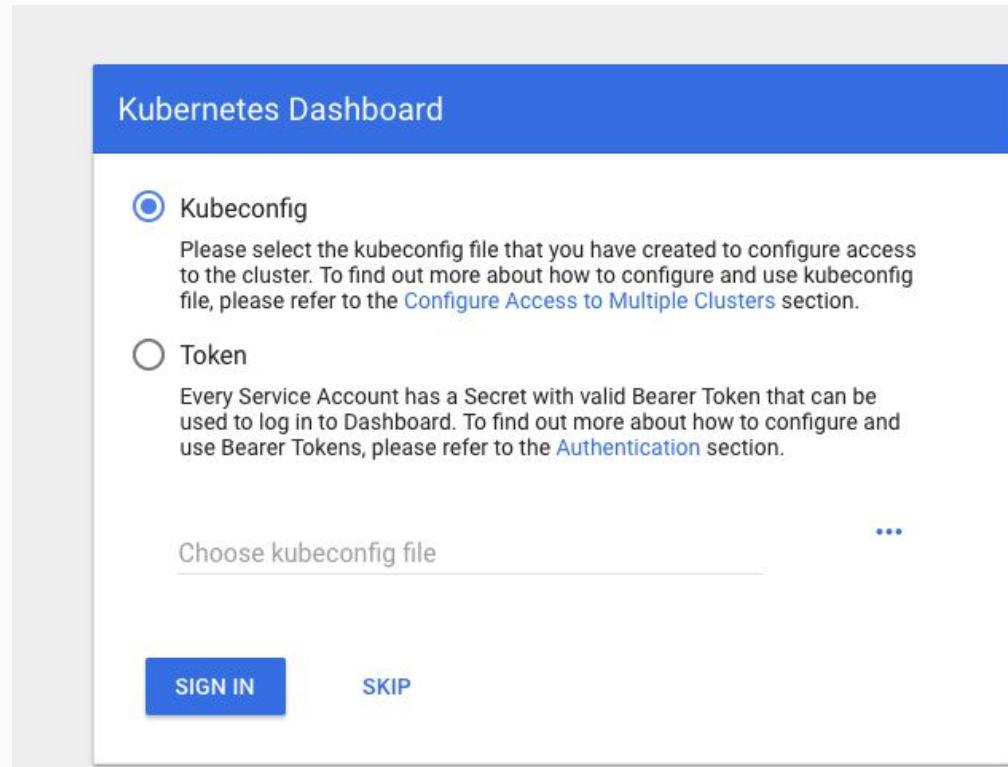
“During the week of June 1st, 2018, [researchers] discovered **more than 21,000** publicly facing container orchestration platforms. ... **Kubernetes represented more than 78% of all open IP's.**”

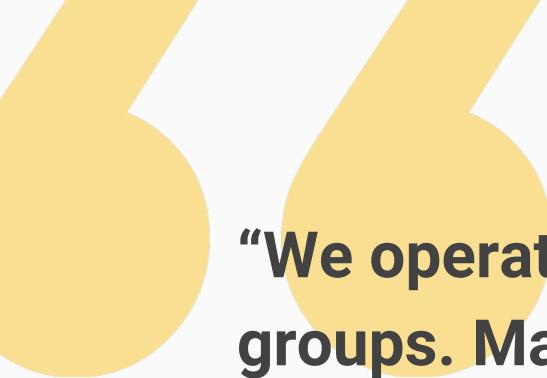
→ Lacework: Container Security Research

4. Improved security

**Securely running
Dashboard is
possible!**

bit.ly/securing-dashboard





“We operate a cluster with multiple end-user groups. Many of them would find the Dashboard extremely useful, but if we could ... have them [log in] with the same creds used to log into the cluster to only see their resources, that would be a huge win.”

→ Survey response

→ *Cluster Operator, running Kubernetes in GCP and on-prem*

Additional feature requests

- Custom Resource Definitions support
- Service topology view
- Mobile device support
- Cost estimates
- CI/CD pipelines
- ...and more!

① Feature Request: remember user's selected Namespace	kind/feature
#3312	opened 13 days ago by 2rs2ts
① UX Security enhancements	kind/design kind/feature priority/critical-urgent
#3179	opened on Jul 26 by danielromlein
① Design dark theme color palette	kind/design kind/feature
#3176	opened on Jul 26 by danielromlein
① Allow the user to search for labels	kind/feature lifecycle/frozen
#3160	opened on Jul 20 by BeWut
① Proposal: OAuth2 support	kind/feature lifecycle/frozen
#3148	opened on Jul 16 by SerialVelocity
① Angular Migration: State Managment	kind/feature lifecycle/frozen
#3133	opened on Jul 7 by austbst
① Support metrics API	good first issue kind/feature priority/critical-urgent
#2986	opened on Apr 26 by ijl
① Support rolling back Deployments to previous revisions	kind/feature lifecycle/frozen priority/P2
#2889	opened on Mar 12 by timoreimann
① Signin with the kubeconfig created with gcloud container clusters get-credentials doesn't work	good first issue help wanted kind/feature lifecycle/frozen priority/P2
#2849	opened on Feb 20 by BoasE
① Button for suspend/resume cronjob on detail page	help wanted kind/feature lifecycle/frozen priority/P3
#2836	opened on Feb 9 by dzoeteman
① dashboard ui not display networkpolicy	kind/feature lifecycle/frozen priority/P2
#2812	opened on Feb 4 by zhangjianweibj
① Describe and document installing dashboard on arm64 clusters	kind/feature lifecycle/frozen priority/P2

Get involved

Try out Dashboard



github.com/kubernetes/dashboard



github.com/kubernetes/minikube



Connect with us



#sig-ui



@danielromlein



[github.com/kubernetes/
community/tree/master/
sig-ui](https://github.com/kubernetes/community/tree/master/sig-ui)

The screenshot shows a GitHub repository page for the Kubernetes UI Special Interest Group (SIG). The repository is named "kubernetes/community" and is located at <https://github.com/kubernetes/community/tree/master/sig-ui>. The repository has 487 stars, 2,655 forks, and 1,532 issues. The "Code" tab is selected, showing a list of files and their recent activity. The "README.md" file is open, displaying the group's purpose and details about meetings and leadership.

kubernetes / community

Branch: master → **community / sig-ui /**

W whs-dot-hk Regenerate Latest commit 7270d21 on Jun 23

..

Owners Add sig labels and use aliases in OWNERS files a year ago

README.md Regenerate 4 months ago

README.md

UI Special Interest Group

Covers all things UI related. Efforts are centered around Kubernetes Dashboard: a general purpose, web-based UI for Kubernetes clusters. It allows users to manage applications running in the cluster and troubleshoot them, as well as manage the cluster itself.

Meetings

- Regular SIG Meeting: **Thursdays at 18:00 CET (Central European Time)** (weekly). [Convert to your timezone.](#)
 - [Meeting notes and Agenda.](#)

Leadership

Chairs

The Chairs of the SIG run operations and processes governing the SIG.

- Dan Romlein (@danielromlein), Google

Thank you!