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The Building Blocks of DX

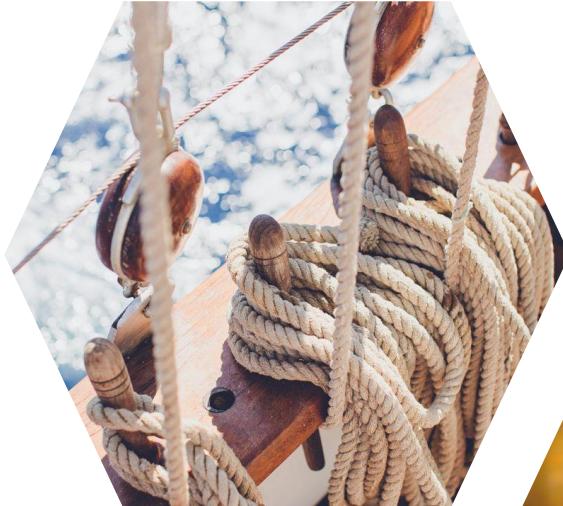
K8s Evolution from CLI to GitOps



@k_gamanji



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DX Enhancement

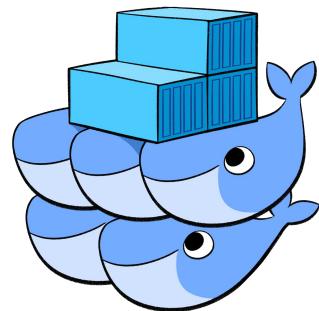


Cluster CLI



ApplicationOps

Container Orchestrators

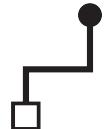






58%

—
Production
Systems



2K

—
Contributors



23K

—
KubeCon
Attendees





gRPC





CLOUD NATIVE Landscape



gRPC



User base diversification



Application developers

Application operators

Infrastructure operators

Cluster CLI



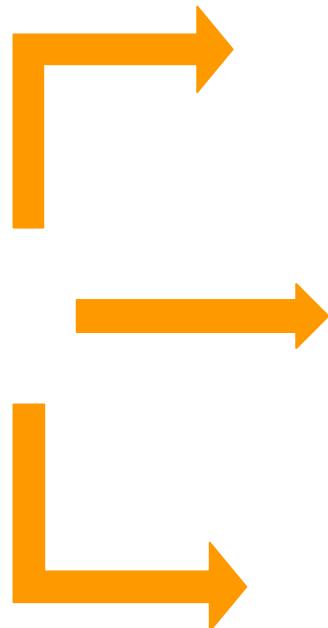
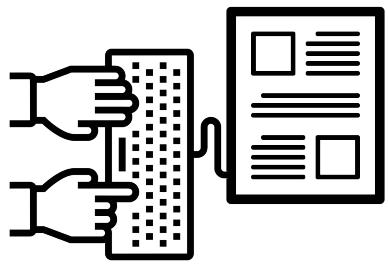
kubectl

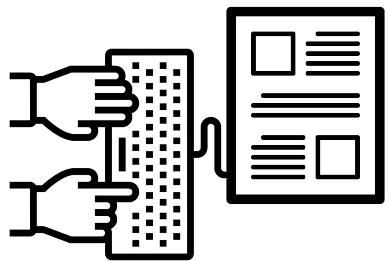
“

Command line tool for
interaction and management of
Kubernetes objects.

”

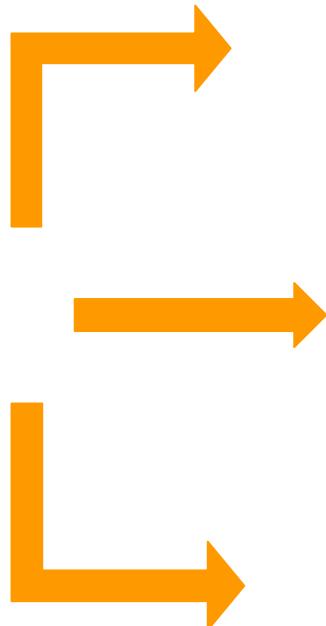






KUBECONFIG

- `~/.kube/config`
- `--kubeconfig`
- `export KUBECONFIG`



kubectl

SIG-CLI:

- 40+ operations
- 70+ flags
- Declarative and imperative management techniques



kubectl

Imperative

- + live objects
- no source config

Declarative

- + files stored locally
- high learning curve

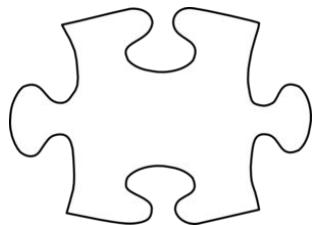
DX Enhancement



DX Enhancement

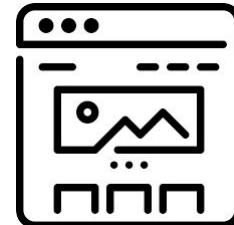
1. Simplicity
2. Optimization
3. Transparency
4. Durability

DX Enhancement



Extensions

Kubectl plugins



Wrappers

Web and terminal UIs

Extensions

Kubectl plugins



Kubectl Plugins

- Extend kubectl features
- Support for any language
- Custom DX



Kubectl Plugins

```
$ cat /usr/local/bin/kubectl-greetings  
  
#!/bin/bash  
echo "Hello Cloud Native!"
```

Kubectl Plugins

Path	File Name
\$ cat /usr/local/bin/kubectl-greetings	
	#!/bin/bash
	echo "Hello Cloud Native!"

Kubectl Plugins

```
$ kubectl plugin list
```

```
The following compatible plugins are
available:
```

```
/usr/local/bin/kubectl-greetings
```

```
/Users/bonsai/.krew/bin/kubectl-krew
```

```
/Users/bonsai/.krew/bin/kubectl-tree
```

Kubectl Plugins

```
$ kubectl greetings
```

```
Hello Cloud Native!
```

Centralized plugin index

Centralized plugin index



Krew



Krew

- Service discovery for plugins
- 90+ custom add-ons
- Plugin version manager





Krew

Plugin download stats

Calculated from total download count of release assets on GitHub.

Plugin



PluginName	Repo	Asset downloads ▾
1. cert-manager	jetstack/cert-manager	685,836
2. ingress-nginx	kubernetes/ingress-nginx	510,304
3. krew	kubernetes-sigs/krew	163,282
4. tail	boz/kail	89,726
5. score	zegl/kube-score	43,962

<https://stats.krew.dev/>

November 2020

Krew Plugins

```
apiVersion: {{v1alpha2}}
```

```
kind: Plugin
```

```
metadata:
```

```
  name: greetings
```

```
spec:
```

```
  version: "v1.0.0"
```

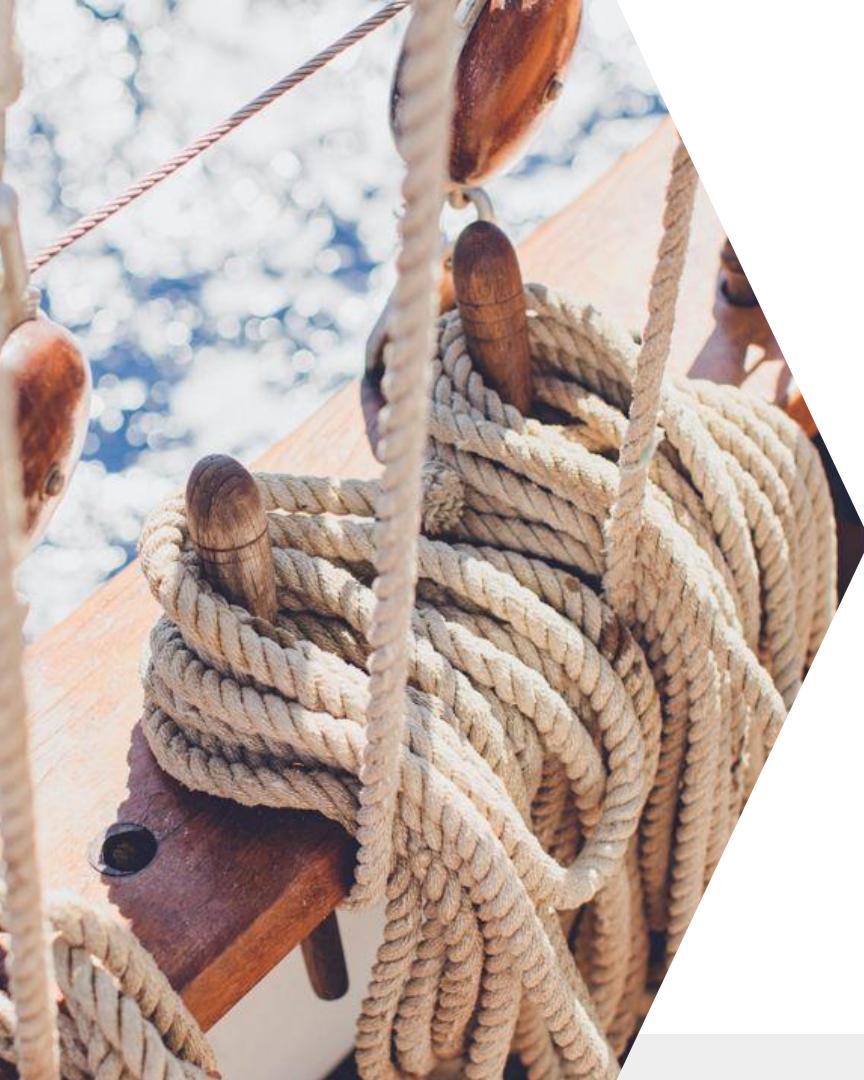
```
  homepage: {{URL}}/kubectl-greetings
```

```
platforms:
```

```
  uri: {{URL}}/v2.1.0.zip
```

```
  sha256: 868d0e41d4bf2fa3ece872e18
```

```
  bin: greetings.sh
```



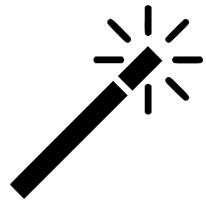
DEMO

<https://asciinema.org/a/DdndsbhZ8w6AaDtnHwf0Pr2jr>

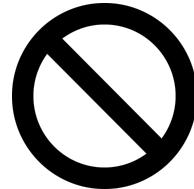
kubectl plugins



Tailored CLI



Plugins + aliases



No overwrite



one-cli

One Amex

```
$ one infra openshift login -e E1
```

Wrappers

Web and terminal UIs



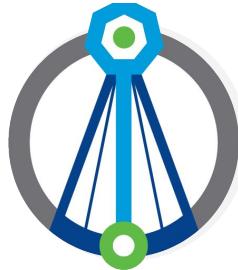
Operational view of the cluster state

Kubectl Wrappers

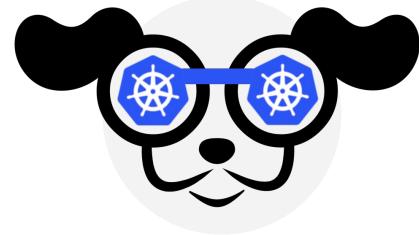
- Point of presence
- Developer-first
- Coverage of basic operations



Kubernetes UIs



OCTANT



k9s



Lens

The screenshot shows the OpenShift web console interface. The top navigation bar includes links for Home, Help, Logout, and a user icon. The left sidebar contains a navigation tree with sections like Applications, Namespaces, Discovery and Load Balancers, Catalog and Services, Custom Resources, RBAC, and Metrics. The main content area is titled "Namespace Overview" and displays a table of namespaces. The table columns are: Name, Status, Labels, and Actions. The namespaces listed are: openshift-ingress, openshift-ingress-dns, openshift-ingress-pod, and openshift-ingress-service. Below the table, there are sections for "Custom Resources", "Roles", and "Role Bindings".

Name	Status	Labels	Actions
openshift-ingress	Normal		
openshift-ingress-dns	Normal		
openshift-ingress-pod	Normal		
openshift-ingress-service	Normal		

Custom Resources

Name	Type	Version	Actions
clusterrolebinding	ClusterRoleBinding	v1	
clusterrole	ClusterRole	v1	
nodegroup	NodeGroup	v1	
nodegroupstatus	NodeGroupStatus	v1	

Roles

Name	Type	Version	Actions
clusterrolebinding	ClusterRoleBinding	v1	
clusterrole	ClusterRole	v1	

Role Bindings

Name	RoleRef	Subjects	Actions
clusterrolebinding	clusterrole	clusterrolebinding	
clusterrolebinding	clusterrole	nodegroup	

Application Ops



Configuration managers



Configuration managers

Helm

- template-driven
- imperative
- upstream charts

Kustomize

- template-free
- declarative
- deep merges



```
name: azimuth
replicaCount: 3
image:
  repository: image.registry/azimuth
  tag: 1.4.0
service:
  enabled: true
  internalPort: 8080
  externalPort: 80
```



```
resources:
  - deployment.yaml
  - service.yaml

images:
  - name: azimuth
    newName: image.registry/azimuth
    newTag: 1.4.0

patchesJson6902:
  - target:
      group: apps
      version: v1
      kind: Deployment
      name: azimuth
      path: patch.yaml
      - op: replace
        path: /spec/replicas
        value: 3
```

ApplicationOps



ClickOps



GitOps



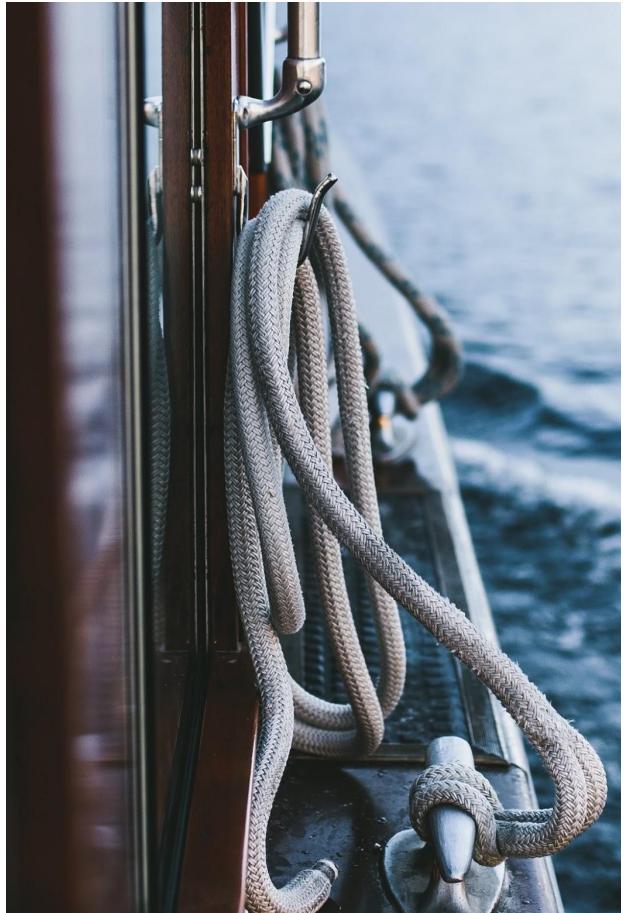
SheetOps

ClickOps



ClickOps

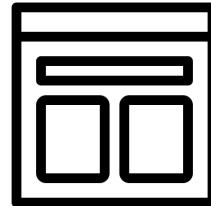
“ Application deployment is represented by a collection of “clicks” through a myriad of menu settings.



ClickOps



Powerful DX



Abstraction level



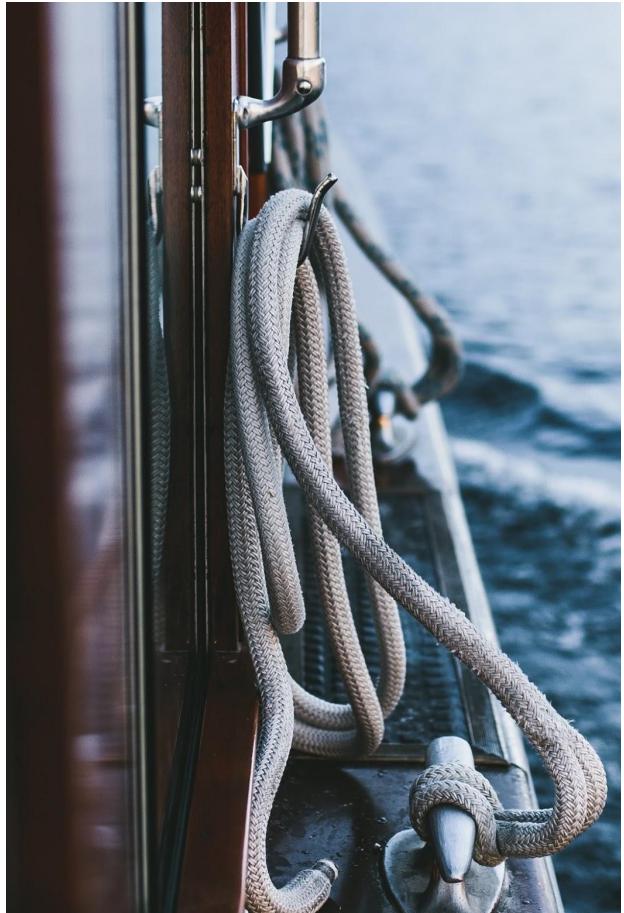
Roll-backs

GitOps



GitOps

“ Git repositories as the source of truth for defining the desired application state.



GitOps

- PR based rollout
- Automatic reconciliation
- Versioned cluster state

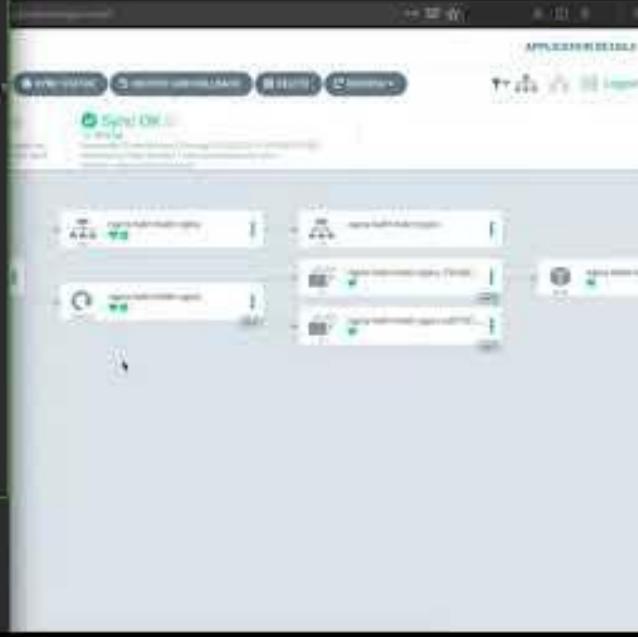
GitOps



flux



argo



SheetOps



SheetOps

“

Control the Kubernetes state
using Google Spreadsheets.

”



SheetOps

“

Control the Kubernetes state
using Google Spreadsheets.

”



Mission: replace YAML with spreadsheets

The screenshot shows a terminal window and a Google Sheets document side-by-side.

Terminal Window:

```
every 1.00s: kubectl get po -n default --export-csv > ./output.csv
```

Google Sheets Document:

SheetOps

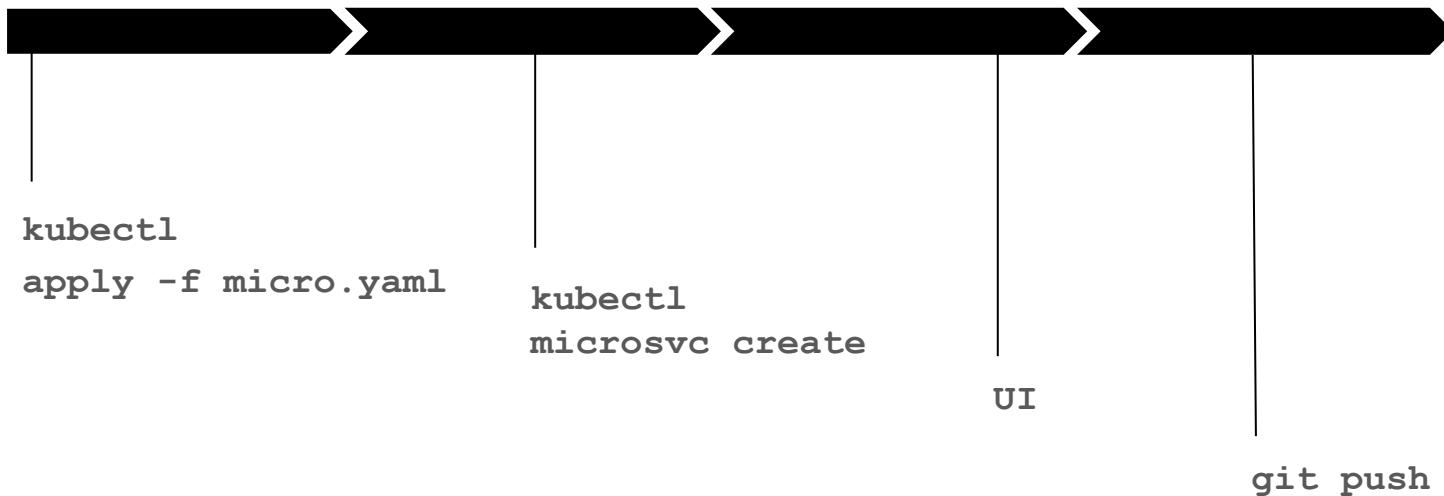
Deployment	Desired	Actual
kube-ops-view	1	1
kube-ops-view-n	5	1
spark0	2	2

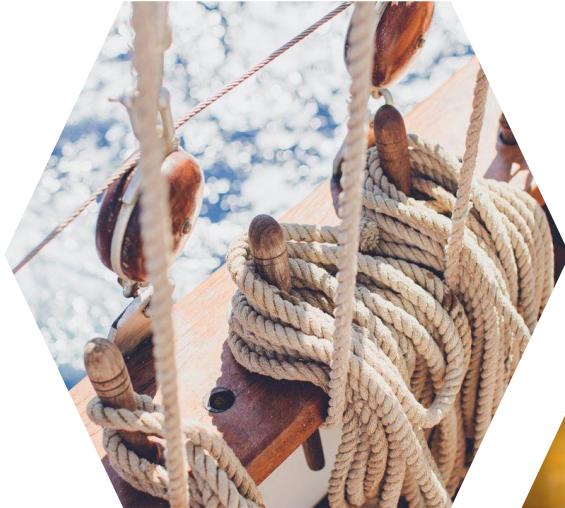
Kubernetes Deployment Status:

Name	Status	Reason	Restart
spark0-0	Running		0
spark0-1	Pending		0
spark0-2	Pending		0
spark0-3	ContainerCreating		1
spark0-4	Running		0
spark0-5	Running		0
spark0-6	Running		0
spark0-7	Running		0

So far ...

K8s Evolution from CLI to GitOps





DX Enhancement



Cluster CLI



ApplicationOps

Cluster DX

“

Declarative configuration schema that advocates for extensibility and optimization of the user journey.

”





Reach out!

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