

Kubernetes API

Adfinis**sy**Group

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Kubernetes API

An introduction to the Kubernetes API

Interaction with the Kubernetes API

`kubectl`

The default CLI tool for Kubernetes

Kubernetes Dashboard

Web GUI for interaction with Kubernetes

Kubernetes API Convention

Objects

Objects describe a desired state

Scheduler tries to ensure the desired state

Objects are defined in [YAML](#)

Kubernetes Object Example

```
apiVersion: v1
kind: Pod
metadata:
  name: myapp
  labels:
    app: myapp
spec:
  containers:
    - name: myapp
      image: registry.example.com/myapp:2.7
```

Kubernetes API Convention

- Objects needs to define at least
- apiVersion
- kind
- metadata
- spec

Object Kind

`apiVersion`

Which API version should be used for this object

`kind`

What kind of object is this (e.g. Pod, Deployment)

Together `apiVersion` and `kind` define which API scheme will be used for the `spec` field.

Object Specification

spec

Object properties

Object Specification

- Defines the object properties
- Different schemas per kind

Object Metadata

name

Name of the object, unique within a namespace

namespace

Namespace the object should be placed in

labels

Unstructured labels for selection and filtering

annotations

Unstructured label for cluster internal usage

Object Metadata

- Metadata places the object within Kubernetes
- Definition of additional information via labels
- usable for search and filtering
- Definition of additional properties via annotations
- only usable within Kubernetes (Ingress annotations)
- Name must be a [RFC 1123](#) compliant subdomain

Kubernetes Namespaces

- Namespaces provide a logical separation of objects
- Most objects in Kubernetes are namespaced
- Namespace names must be valid DNS labels
- [RFC 1123](#)
- `[a-z0-9]([a-z0-9]([a-z0-9]([a-z0-9])?)?)?)?`

Kubernetes Namespaces

- Namespaces can be used for customer/app separation
- This should be reflected in the naming scheme

```
$(customer)-$(app)-$(stage)
```

Kubernetes Namespaces

Only few objects with cluster-scope are not namespaced

- Namespaces
- ClusterRoles
- ClusterRoleBindings
- StorageClasses
- Nodes
- PersistentVolumes

::: notes - Namespaces are not namespaced for a reason - PersistentVolumes are not namespaced, but PersistentVolumeClaims are, because PersistentVolumes might need to be provisioned by admins. :::

Kubernetes CLI

`kubectl` is the command line interface for Kubernetes

```
kubectl -command-
```


kubectl get

Get a specific object or list of objects

```
$ kubectl get pods
NAME                READY STATUS RESTARTS AGE
wp-mariadb-0        1/1   Running 0       99s
wp-wordpress-569dccff6c-kczdv 1/1   Running 0       99s
```

```
$ kubectl get pod/wp-mariadb-0
NAME                READY STATUS RESTARTS AGE
wp-mariadb-0        1/1   Running 0       99s
```

kubectl get

Filter objects by label using `label` or `label`

```
$ kubectl get all -l release=wp -o name
NAME                READY STATUS RESTARTS AGE
pod/wp-mariadb-0    1/1   Running 0      28m
wp-wordpress-569dccff6c-kczdv 1/1   Running 0      99s
```

```
NAME                TYPE          CLUSTER-IP    EXTERNAL-IP  PORT(S)    AGE
service/wp-mariadb  ClusterIP    10.99.100.225 <none>       3306/TCP   28m
service/wp-wordpress ClusterIP    10.110.59.25  <none>       80/TCP     28m
```

```
NAME                DESIRED CURRENT UP-TO-DATE AVAILABLE AGE
deployment.apps/wp-wordpress 1        1        1        1        28m
```

```
NAME                DESIRED CURRENT AGE
statefulset.apps/wp-mariadb 1        1        28m
```

kubectl get

Multiple output formats available via `-o` or `--output`

- json
- yaml
- wide
- name

kubectl describe

Show detailed state of the object, including events

```
$ kubectl describe pod wp-mariadb-0
Name:          wp-mariadb-0
Namespace:    default
[...]
Events:
  Type     Reason          Age   From              Message
  ----     -
Normal    Scheduled       8m21s default-scheduler Successfully assigned wp-mariadb-0 to minikube
Normal    SuccessfulMountVolume 8m20s kubelet, minikube MountVolume.Setup succeeded for volume "pvc-1ec6c99a-ecd2-11e8-a1c7-005eab6edd6d"
Normal    SuccessfulMountVolume 8m20s kubelet, minikube MountVolume.Setup succeeded for volume "config"
Normal    SuccessfulMountVolume 8m20s kubelet, minikube MountVolume.Setup succeeded for volume "default-token-jffgp"
Normal    Pulled          8m20s kubelet, minikube Container image "docker.io/bitnami/mariadb:10.1.34" already present on machine
Normal    Created         8m20s kubelet, minikube Created container
Normal    Started         8m19s kubelet, minikube Started container
```

kubectl delete

Delete a Kubernetes object

```
$ kubectl delete pod wp-mariadb-0  
pod "wp-mariadb-0" deleted
```

For pods controlled by a controller the deletion of a pod is equivalent to a restart.

kubectl logs

Show logs output from a container

```
$ kubectl logs -f wp-wordpress-569dccff6c-kczdv
172.17.0.1 - - [21/Nov/2018:10:02:04 +0000] "GET /wp-login.php HTTP/1.1" 200 1075
172.17.0.1 - - [21/Nov/2018:10:02:14 +0000] "GET /wp-login.php HTTP/1.1" 200 1075
172.17.0.1 - - [21/Nov/2018:10:02:24 +0000] "GET /wp-login.php HTTP/1.1" 200 1075
172.17.0.1 - - [21/Nov/2018:10:02:34 +0000] "GET /wp-login.php HTTP/1.1" 200 1075
172.17.0.1 - - [21/Nov/2018:10:02:44 +0000] "GET /wp-login.php HTTP/1.1" 200 1075
```

kubectl exec

Run a command in a container

```
$ kubectl exec wp-mariadb-0 cat /etc/mysql/my.cnf
[mysqld]
port = 3306
socket = /run/mysqld/mysqld.sock
```

kubectl exec

Run an interactive shell in a container

```
$ kubectl exec -it wp-mariadb-0 bash  
user@wp-mariadb-0:/$
```


kubectl run

Run an interactive shell in a temporary pod

```
$ kubectl run debugger --generator=run-pod/v1 --image=alpine --rm=true -it -- sh
If you don't see a command prompt, try pressing enter.
/#
```

The pod will be deleted as soon as you exit the shell

Kubernetes API Reference

Overview of references for multiple API versions

<https://kubernetes.io/docs/reference/>

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