

CLIENT-GO

in **THE GOOD,
THE BAD**





Hi, I'm Lili

Lili Cotic

Software Developer @ Kinvolk
lili@kinvolk.io

@LiliCotic

on Twitter

@LiliC

On Github



Blog: kinvolk.io/blog
Github: github.com/kinvolk
Twitter: [kinvolkio](https://twitter.com/kinvolkio)
Email: hello@kinvolk.io

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rkt, rktlet, gobpf, systemd,
kube-spawn, Weave
Scope, Habitat, kernel,
etc.

A close-up, high-contrast photograph of a man's face. He has dark hair, a mustache, and a small black lip ring in his lower lip. The text "THE GOOD" is overlaid in large, white, bold, sans-serif capital letters across the center of his face, partially covering his eyes and nose. The background is a blurred, light-colored outdoor setting.

THE GOOD

client-go

- ★ github.com/kubernetes/client-go
- ★ Library in Go to interact with the Kubernetes API
- ★ 563 ☆s
- ★ Responsibility of [sig-api-machinery](#)



Use cases

- ★ Operators - application specific controllers
 - github.com/kinvolk/habitat-operator
 - github.com/coreos/prometheus-operator
 - github.com/zalando-incubator/postgres-operator
- ★ github.com/coreos/flannel
- ★ Kubernetes*



Setup a client

```
import (  
    "k8s.io/client-go/kubernetes"  
    "k8s.io/client-go/tools/clientcmd"  
)  
...  
  
config, err := clientcmd.BuildConfigFromFlags(masterURL, kubeconfig)  
  
...  
  
clientset, err := kubernetes.NewForConfig(config)
```



Outside the cluster

- ★ Uses provided path to local kubeconfig file
- ★ MasterURL can also be customized



Inside the cluster

- ★ Uses the Service Account
- ★ Token mounted inside the Pod at the `/var/run/secrets/kubernetes.io/serviceaccount` path
- ★ Configures TLS according to the cluster default



How to use the *clientset*?

```
d, err := clientset.AppsV1beta1().Deployments("default").List(v1.ListOptions{}
```



Behind the scenes...

```
func (c *deployments) List(opts v1.ListOptions) (result *v1beta1.DeploymentList, err
error) {
    result = &v1beta1.DeploymentList{}
    err = c.client.Get().
        Namespace(c.ns).
        Resource("deployments").
        VersionedParams(&opts, scheme.ParameterCodec).
        Do().
        Into(result)
    return
}
```

*Taken from client-go codebase.



Auto generated from K8s

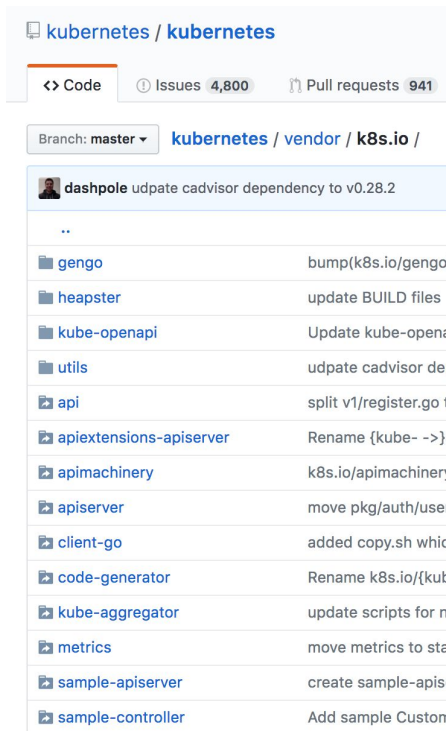


Staging area

- ★ Staging area under the kubernetes/kubernetes/staging/
- ★ Published by bot
- ★ Repositories:
 - k8s.io/apiextensions-apiserver
 - k8s.io/api
 - k8s.io/apimachinery
 - k8s.io/apiserver
 - **k8s.io/client-go**
 - k8s.io/kube-aggregator
 - k8s.io/code-generator
 - k8s.io/metrics
 - k8s.io/sample-apiserver
 - k8s.io/sample-controller



Kubernetes* uses client-go



kubernetes / **kubernetes**

<> Code 4,800 Issues 941 Pull requests

Branch: master **kubernetes / vendor / k8s.io /**

dashpole update cadvisor dependency to v0.28.2

..	
gengo	bump(k8s.io/gengo
heapster	update BUILD files
kube-openapi	Update kube-opena
utils	update cadvisor de
api	split v1/register.go t
apiextensions-apiserver	Rename {kube- ->}:
apimachinery	k8s.io/apimachinery
apiserver	move pkg/auth/user
client-go	added copy.sh whic
code-generator	Rename k8s.io/{kub
kube-aggregator	update scripts for n
metrics	move metrics to sta
sample-apiserver	create sample-apis
sample-controller	Add sample Custom

★ Symlinks in the vendor/k8s.io directory to the staging area



apimachinery

- ★ [apimachinery](#) - library containing schemes, encoding/decoding packages for Kubernetes objects
- ★ consumers are *k8s.io/kubernetes*, *k8s.io/client-go* and *k8s.io/apiserver*



A close-up, high-contrast portrait of a man's face, focusing on his eyes, nose, and a prominent mustache. The man has dark hair and is looking directly at the camera with a serious expression. The lighting is dramatic, highlighting the texture of his skin and the details of his facial features. The background is dark and out of focus. The text "THE BAD" is superimposed in the center of the image in a bold, white, sans-serif font.

THE BAD

General

- ★ Does too much
- ★ Things it does are sometimes disconnected



client-go packages



Minimal *client-go* pkg's

```
["discovery","kubernetes","kubernetes/scheme","kubernetes/typed/admissionregistration/v1alpha1","kubernetes/typed/apps/v1beta1","kubernetes/typed/authentication/v1","kubernetes/typed/authentication/v1beta1","kubernetes/typed/authorization/v1","kubernetes/typed/authorization/v1beta1","kubernetes/typed/autoscaling/v1","kubernetes/typed/autoscaling/v2alpha1","kubernetes/typed/batch/v1","kubernetes/typed/batch/v2alpha1","kubernetes/typed/certificates/v1beta1","kubernetes/typed/core/v1","kubernetes/typed/extensions/v1beta1","kubernetes/typed/networking/v1","kubernetes/typed/policy/v1beta1","kubernetes/typed/rbac/v1alpha1","kubernetes/typed/rbac/v1beta1","kubernetes/typed/settings/v1alpha1","kubernetes/typed/storage/v1","kubernetes/typed/storage/v1beta1","pkg/api","pkg/api/v1","pkg/api/v1/ref","pkg/apis/admissionregistration","pkg/apis/admissionregistration/v1alpha1","pkg/apis/apps","pkg/apis/apps/v1beta1","pkg/apis/authentication","pkg/apis/authentication/v1","pkg/apis/authentication/v1beta1","pkg/apis/authorization","pkg/apis/authorization/v1","pkg/apis/authorization/v1beta1","pkg/apis/autoscaling","pkg/apis/autoscaling/v1","pkg/apis/autoscaling/v2alpha1","pkg/apis/batch","pkg/apis/batch/v1","pkg/apis/batch/v2alpha1","pkg/apis/certificates","pkg/apis/certificates/v1beta1","pkg/apis/extensions","pkg/apis/extensions/v1beta1","pkg/apis/networking","pkg/apis/networking/v1","pkg/apis/policy","pkg/apis/policy/v1beta1","pkg/apis/rbac","pkg/apis/rbac/v1alpha1","pkg/apis/rbac/v1beta1","pkg/apis/settings","pkg/apis/settings/v1alpha1","pkg/apis/storage","pkg/apis/storage/v1","pkg/apis/storage/v1beta1","pkg/util","pkg/util/parsers","pkg/version","rest","rest/watch","tools/auth","tools/cache","tools/clientcmd","tools/clientcmd/api","tools/clientcmd/api/latest","tools/clientcmd/api/v1","tools/metrics","transport","util/cert","util/flowcontrol","util/homedir","util/integer","util/workqueue"]
```



client-go packages

★ */kubernetes*

- Clients to communicate with the Kubernetes cluster

★ */util/workqueue*

- Queue implementation

★ */tools/cache*

- Writing controllers



API versions



API versions

- ★ *How do I find what I need and should use (`foo/` vs `foo/v1` vs `foo/v1beta`)?*



API versions

★ **Development level**

- Not committed and not available in releases
- Audience: Other developers closely collaborating on a feature or proof-of-concept



API versions

★ **Alpha level** - `v1alpha1`

- In release, but disabled by default
- Audience: Developers and expert users interested in giving early feedback on features



API versions

★ **Beta level** - `v1beta1`

- Enabled by default
- Audience: Users interested in providing feedback on features



API versions

- ★ **Stable level - `v1`**
 - Enabled by default
 - Audience: all users



API changes in the upcoming release 1.9

Deprecated			Replaced By		
Group	Version	Kind	Group	Version	Kind
apps	v1beta2	Deployment	apps	v1	Deployment
apps	v1beta2	DaemonSet	apps	v1	DaemonSet
apps	v1beta2	ReplicaSet	apps	v1	ReplicaSet
apps	v1beta2	StatefulSet	apps	v1	StatefulSet

Source: kubernetes.io/docs/reference/workloads-18-19/



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apps	v1beta2	StatefulSet	apps	v1	StatefulSet

Source: kubernetes.io/docs/reference/workloads-18-19/



A close-up, high-contrast photograph of a man's face, likely from a movie. The man has a serious, intense expression, looking directly at the camera. He has dark hair, a mustache, and a goatee. The lighting is dramatic, with deep shadows on the sides of his face. The background is blurred, showing some greenery and a building. The text "THE UGLY" is overlaid in the center of the image in a bold, white, sans-serif font.

THE UGLY

Kubernetes releases

- ★ Kubernetes new releases every 3 months
- ★ Auto-updates of Kubernetes versions on providers: CoreOS
Tectonic, GKE,...
- ★ New versions of client-go are released later



Updating client-go

- ★ Project works for certain versions of the cluster
 - Handle different API versions
 - RBAC is *beta* in 1.7 but in 1.8 is *stable*





client-go and Kubernetes compatibility matrix

	Kubernetes 1.4	Kubernetes 1.5	Kubernetes 1.6	Kubernetes 1.7	Kubernetes 1.8
client-go 1.4	✓	-	-	-	-
client-go 1.5	+	-	-	-	-
client-go 2.0	+-	✓	+-	+-	+-
client-go 3.0	+-	+-	✓	-	+-
client-go 4.0	+-	+-	+-	✓	+-
client-go 5.0	+-	+-	+-	+-	✓
client-go HEAD	+-	+-	+-	+-	+



List all deployments

```
d, err := clientset.AppsV1beta1().Deployments("default").List(v1.ListOptions{})
```



Coupling of different projects

```
import "k8s.io/apimachinery/pkg/apis/meta/v1"
```

```
.....
```

```
d, err := clientset.AppsV1beta1().Deployments("default").List(v1.ListOptions{})
```



Coupling of different projects

```
import (  
  
    apierrors "k8s.io/apimachinery/pkg/api/errors"  
    metav1 "k8s.io/apimachinery/pkg/apis/meta/v1"  
    "k8s.io/apimachinery/pkg/fields"  
    "k8s.io/apimachinery/pkg/labels"  
    "k8s.io/apimachinery/pkg/runtime"  
    "k8s.io/client-go/kubernetes"  
    apiv1 "k8s.io/client-go/pkg/api/v1"  
    appsv1beta1 "k8s.io/client-go/pkg/apis/apps/v1beta1"  
    "k8s.io/client-go/rest"  
    "k8s.io/client-go/tools/cache"  
    "k8s.io/client-go/util/workqueue"  
)
```



A close-up photograph of a person's hand holding a handgun. The hand is positioned on the left side of the frame, with the thumb and index finger gripping the slide. The handgun is a semi-automatic pistol, likely a Glock, with a dark finish. The background is blurred, showing an outdoor setting with trees and a fence. The word "Demo" is written in a white, cursive script font across the center of the image, partially overlapping the hand and the handgun.

Demo

Staged rollout of deployments

Source code can be found [here](#).





It's for you.

Other clients

- ★ <3 github.com/ericchiang/k8s
- ★ Rust clients
 - github.com/camallo/k8s-client-rs
 - github.com/anowell/kubeclient-rs
- ★ Python github.com/kubernetes-incubator/client-python
- ★ Java github.com/kubernetes-client/java
- ★ C# github.com/kubernetes-client/csharp



Future of client-go



K8s 1.9 - client-go 6.0

- ★ Nightly releases of client-go
- ★ Release notes for developers
- ★ Release tags introduced
- ★ No major breaking changes planned



Future of the project

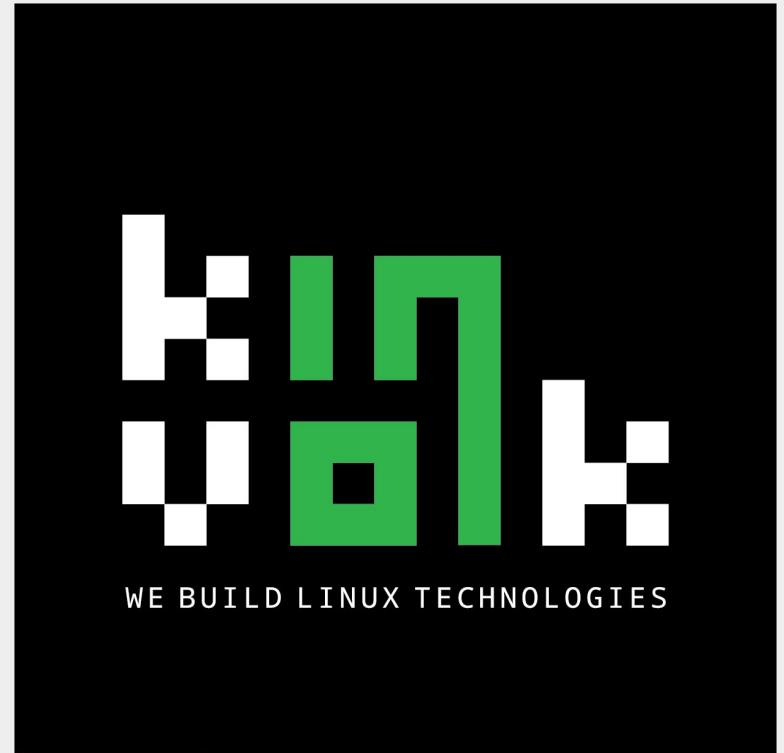
- ★ *#client-go-docs* on the k8s slack channel
 - Place to discuss improvements of documentation
 - Contribute to documentation
 - Community effort
- ★ Discussions for improvement ongoing at this Kubecon



Thank you!



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