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# Think Design About Pretty kubectl Plugins

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# We spend a lot of time in the Terminal



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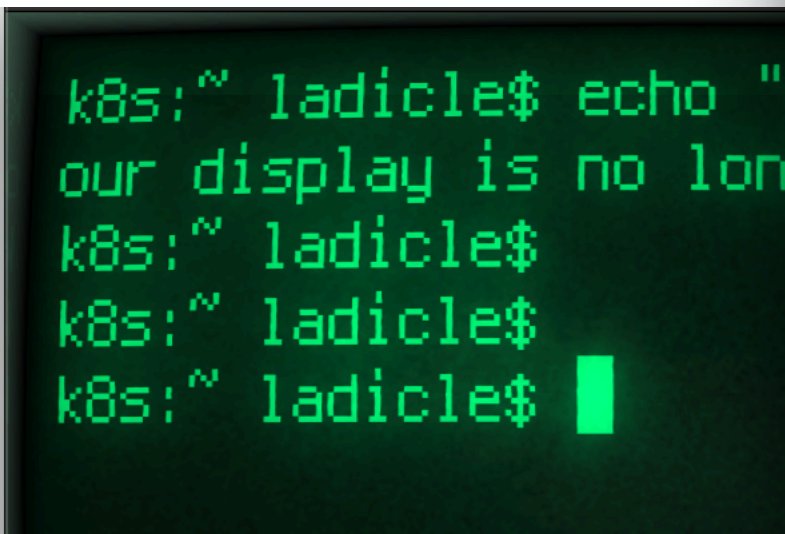
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# Our display is no longer a CRT!

- Many of today's terminal emulators support **ANSI colors** and **Unicode** (e.g. emoji)
- However, many command-line tools still use only ASCII codes.





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# Benefit of Pretty Commands

# Pretty CLI increases our understanding.



Decorated characters and symbols have more information content per character than the monochromatic alphabet.

**Which is easier to understand?**

## Only Alphabet

Cloudy, Sunny, Cloudy, Rain, Sunny, Snowy, Sunny



## Use Emoji





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# kubectl plugin

*kubectl is a powerful tool, but to extend it by the plugin can make operations more efficient.*

# What is kubectl plugin?

kubectl plugin is a **standalone executable** that includes 'kubectl-' as a prefix in its name.

```
$ kubectl sample1
Do something

# Somewhere Directory specified in ` $PATH `
$ ls /path/to/plugins | grep kubectl
kubectl-sample1
kubectl-sample2
...
```

Prefix



# Useful libraries for Plugin Development



- **k8s.io/cli-runtime** allows plugins to embedded commonly used features. (e.g. `-namespace` flag)
- **k8s.io/client-go** supports like cluster authentication and k8s resource manipulation.

```
import (  
    // Initialize all known client auth plugins.  
    _ "k8s.io/client-go/plugin/pkg/client/auth"  
  
    "k8s.io/cli-runtime/pkg/genericclioptions"  
)  
  
func NewRolesumCmd() *cobra.Command {  
    cmd := &cobra.Command{...}  
    cfgFlags := genericclioptions.NewConfigFlags(true)  
    cfgFlags.AddFlags(cmd.PersistentFlags())  
    ...  
}
```



Summarize RBAC roles for the specified subject  
(ServiceAccount, User and Group).

<https://github.com/Ladicle/kubectl-rolesum>

```
>>> kubectl rolesum test-user
ServiceAccount: default/test-user
Secrets:
• */test-user-token-prbpv

Policies:
• Name: default/test-role
  Resource  Name  Exclude  Verbs  G L W C U P D DC
  pods      [*]   [-]      [edit, exec]  ✓ × × × × × × ×

Name      PRIV  RO-RootFS  Volumes  Caps  SELinux  RunAsUser  FSgroup  SUPgroup
test-psp  False False      [*]      [*]   RunAsAny  MustRunAsNonRoot  RunAsAny  RunAsAny

• Name: */edit
  Resource  Name  Exclude  Verbs  G L W C U P D DC
bindings  [*]   [-]      [-]    ✓ ✓ ✓ × × × × ×
configmaps  [*]   [-]      [-]    ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
controllerrevisions.apps  [*]   [-]      [-]    ✓ ✓ ✓ × × × × ×
cronjobs.batch  [*]   [-]      [-]    ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
cronjobs.batch/status  [*]   [-]      [-]    ✓ ✓ ✓ × × × × ×
daemonsets.apps  [*]   [-]      [-]    ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
daemonsets.apps/status  [*]   [-]      [-]    ✓ ✓ ✓ × × × × ×
```

# Evolution of Plugin Design



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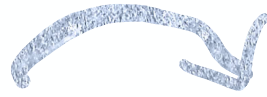
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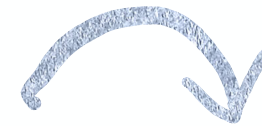


- **Step1:** Simply output all roles that the specified subject has.
- **Step2:** Coloring and Symbolization
- **Step3:** Separate by meaning with list bullets

Step 1



Step 2



Step 3

```
kubectl bindrole test-user
ServiceAccount default/test-user

default/test-role
Resource [Verbs] [ResourceName] [NonResourceURL]
pods [get,edit,exec] [] []
securitypolicies.policy [use] [test-ppsp] []

ClusterRole: edit
Resource [Verbs] [ResourceName] [NonResourceURL]
pods/attach [get,list,watch] [] []
pods/exec [get,list,watch] [] []
pods/portforward [get,list,watch] [] []
pods/proxy [get,list,watch] [] []
secrets [get,list,watch] [] []
services/proxy [get,list,watch] [] []
serviceaccounts [impersonate] [] []
pods [create,delete,deletecollection,patch,update] [] []
pods/attach [create,delete,deletecollection,patch,update] [] []
pods/exec [create,delete,deletecollection,patch,update] [] []
pods/portforward [create,delete,deletecollection,patch,update] [] []
pods/proxy [create,delete,deletecollection,patch,update] [] []
configmaps [create,delete,deletecollection,patch,update] [] []
endpoints [create,delete,deletecollection,patch,update] [] []
persistentvolumeclaims [create,delete,deletecollection,patch,update] [] []
```

```
ServiceAccount default/test-user

Role: default/test-role
Resource G L W C U P D DC ResourceName NonResourceURL
pods ✓ x x x x x x x [] []
podsecuritypolicies.policy x x x x x x x x [test-ppsp] []

ClusterRole: edit
Resource G L W C U P D DC ResName NonResURL
pods/attach ✓ ✓ ✓ x x x x x [] []
pods/exec ✓ ✓ ✓ x x x x x [] []
pods/portforward ✓ ✓ ✓ x x x x x [] []
pods/proxy ✓ ✓ ✓ x x x x x [] []
secrets ✓ ✓ ✓ x x x x x [] []
services/proxy x x x x x x x x [] []
serviceaccounts x x x x x x x x [] []
pods x x x ✓ ✓ ✓ ✓ ✓ [] []
pods/attach x x x ✓ ✓ ✓ ✓ ✓ [] []
```

```
>>> kubectl bindrole test-user
ServiceAccount: default/test-user
Secrets:
• */test-user-token-6fthz

Policies:
• Name: default/test-role
Resource Name Exclude Verbs G L W C U P D DC
pods [*] [-] [edit, exec] ✓ x x x x x x x

• Name: */edit
Resource Name Exclude Verbs G L W C U P D DC
bindings [*] [-] [-] ✓ ✓ ✓ x x x x x
configmaps [*] [-] [-] ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
controllerrevisions.apps [*] [-] [-] ✓ ✓ ✓ x x x x x
cronjobs.batch [*] [-] [-] ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
daemonsets.extensions [*] [-] [-] ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
daemonsets.extensions [*] [-] [-] ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
deployments.apps [*] [-] [-] ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
deployments.apps/rollback [*] [-] [-] x x x ✓ ✓ ✓ ✓ ✓
```

# Evolution of Plugin Design

- **Step1: Simply output all roles that the specified subject has.**
- Step2: Basic verbs coloring and symbolization in a table format.
- Step3: Make output human friendly by merging, sorting and deduplication.

```

>>> ./kubectl-bindrole test-user
ServiceAccount default/test-user

Role: default/test-role
  Resource      [Verbs] [ResourceName] [NonResourceURL]
  pods          [get,edit,exec] [] []
  podsecuritypolicies.policy [use] [test-psp] []

ClusterRole: edit
  Resource      [Verbs] [ResourceName] [NonResourceURL]
  pods/attach   [get,list,watch] [] []
  pods/exec     [get,list,watch] [] []
  pods/portforward [get,list,watch] [] []
  pods/proxy    [get,list,watch] [] []
  secrets       [get,list,watch] [] []
  services/proxy [get,list,watch] [] []
  serviceaccounts [impersonate] [] []
  pods          [create,delete,deletecollection,patch,update] [] []
  pods/attach   [create,delete,deletecollection,patch,update] [] []
  pods/exec     [create,delete,deletecollection,patch,update] [] []
  pods/portforward [create,delete,deletecollection,patch,update] [] []
  pods/proxy    [create,delete,deletecollection,patch,update] [] []
  configmaps    [create,delete,deletecollection,patch,update] [] []
  endpoints     [create,delete,deletecollection,patch,update] [] []
  persistentvolumeclaims [create,delete,deletecollection,patch,update] [] []

```

What the Role  
Can't Do?

# Evolution of Plugin Design

- Step1: Simply output all roles that the specified subject has.
- **Step2: Basic verbs coloring and symbolization in a table format.**
- Step3: Make output human friendly by merging, sorting and deduplication.

```
ServiceAccount default/test-user

Role: default/test-role
  Resource      G L W C U P D DC  ResourceName  NonResourceURL
  pods          ✓ × × × × × × ×  []             []
  podsecuritypolicies.policy  × × × × × × × ×  [test-psp]    []

ClusterRole: edit
  Resource      G L W C U P D DC  ResName  NonResURL
  pods/attach   ✓ ✓ ✓ × × × × ×  []       []
  pods/exec     ✓ ✓ ✓ × × × × ×  []       []
  pods/portforward ✓ ✓ ✓ × × × × ×  []       []
  pods/proxy    ✓ ✓ ✓ × × × × ×  []       []
  secrets       ✓ ✓ ✓ × × × × ×  []       []
  services/proxy ✓ ✓ ✓ × × × × ×  []       []
  serviceaccounts × × × × × × × ×  []       []
  pods          × × × ✓ ✓ ✓ ✓ ✓  []       []
  pods/attach   × × × ✓ ✓ ✓ ✓ ✓  []       []
  pods/exec     × × × ✓ ✓ ✓ ✓ ✓  []       []
```

Defined Twice

# Evolution of Plugin Design



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- Step1: Simply output all roles that the specified subject has.
- Step2: Basic verbs coloring and symbolization in a table format.
- **Step3: Make output human friendly by merging, sorting and deduplication.**

```
>>> kubectl bindrole test-user
ServiceAccount: default/test-user
Secrets:
• */test-user-token-6fthz

Policies:
• Name: default/test-role
  Resource  Name  Exclude  Verbs      G L W C U P D DC
  pods      [*]   [-]      [edit, exec] ✓ × × × × × × ×

  Name      PRIV  RO-RootFS  Volumes  Caps  SELinux  RunAsUser  FSgroup  SUPgroup
  test-psp  False False      [*]      [*]   RunAsAny MustRunAsNonRoot RunAsAny  RunAsAny

• Name: */edit
  Resource      Name  Exclude  Verbs      G L W C U P D DC
  bindings      [*]   [-]      [-]        ✓ ✓ ✓ × × × × ×
  configmaps    [*]   [-]      [-]        ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
  controllerrevisions.apps [*]   [-]      [-]        ✓ ✓ ✓ × × × × ×
  cronjobs.batch [*]   [-]      [-]        ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
  daemonsets.apps [*]   [-]      [-]        ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
  daemonsets.extensions [*]   [-]      [-]        ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
  deployments.apps [*]   [-]      [-]        ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
  deployments.apps/rollback [*]   [-]      [-]        × × × ✓ ✓ ✓ ✓ ✓
  deployments.apps/rollback [*]   [-]      [-]        ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
```

# Pretty Plugin Design Tips



- **Allows to disable coloring** for tools that do not support ANSI colors.
- It is safe to use **14 colors**, excluding white and black, to support different color schemes.



```
import (  
    "github.com/spf13/cobra"  
    "k8s.io/kubectl/pkg/util/term"  
)  
  
func NewRolesumCommand() *cobra.Command {  
    cmd := &cobra.Command{...}  
    cmd.Flags().BoolVarP(&color, "color", "R", false,  
  
    tty := term.TTY{Out: out}.IsTerminalOut()  
    printSomething(color|tty)  
  
    ...  
}
```



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# Thanks!

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