Configure Access to Multiple Clusters

This page shows how to configure access to multiple clusters by using configuration files. After your clusters, users, and contexts are defined in one or more configuration files, you can quickly switch between clusters by using the `kubectl config use-context` command.

> **Note:** A file that is used to configure access to a cluster is sometimes called a *kubeconfig file*. This is a generic way of referring to configuration files. It does not mean that there is a file named `kubeconfig`.

Before you begin

You need to have a Kubernetes cluster, and the kubectl command-line tool must be configured to communicate with your cluster. If you do not already have a cluster, you can create one by using Minikube, or you can use one of these Kubernetes playgrounds:

- Katacoda
- Play with Kubernetes

To check that kubectl is installed, run `kubectl version --client` . The kubectl version should be within one minor version of your cluster's API server.

Define clusters, users, and contexts

Suppose you have two clusters, one for development work and one for scratch work. In the `development` cluster, your frontend developers work in a namespace called `frontend` , and your storage developers work in a namespace called `storage` . In your `scratch` cluster, developers work in the default namespace, or they create auxiliary namespaces as they see fit. Access to the development cluster requires authentication by certificate. Access to the scratch cluster requires authentication by username and password.

Create a directory named `config-exercise` . In your `config-exercise` directory, create a file named `config-demo` with this content:

```
apiVersion: v1
kind: Config
preferences: {}

clusters:
```

```
- cluster:
  name: development
- cluster:
  name: scratch

users:
- name: developer
- name: experimenter

contexts:
- context:
  name: dev-frontend
- context:
  name: dev-storage
- context:
  name: exp-scratch
```

A configuration file describes clusters, users, and contexts. Your `config-demo` file has the framework to describe two clusters, two users, and three contexts.

Go to your `config-exercise` directory. Enter these commands to add cluster details to your configuration file:

```
emo set-cluster development --server=https://1.2.3.4 --certificate-authority=fake-ca-file
emo set-cluster scratch --server=https://5.6.7.8 --insecure-skip-tls-verify
```

Add user details to your configuration file:

```
t-credentials developer --client-certificate=fake-cert-file --client-key=fake-key-seefile
t-credentials experimenter --username=exp --password=some-password
```

Note:

- To delete a user you can run `kubectl --kubeconfig=config-demo config unset users.<name>`
- To remove a cluster, you can run `kubectl --kubeconfig=config-demo config unset clusters.<name>`
- To remove a context, you can run `kubectl --kubeconfig=config-demo config unset contexts.<name>`

Add context details to your configuration file:

```
demo set-context dev-frontend --cluster=development --namespace=frontend --user=developer
demo set-context dev-storage --cluster=development --namespace=storage --user=developer
demo set-context exp-scratch --cluster=scratch --namespace=default --user=experimenter
```

Open your `config-demo` file to see the added details. As an alternative to opening the `config-demo` file, you can use the `config view` command.

```
kubectl config --kubeconfig=config-demo view
```

The output shows the two clusters, two users, and three contexts:

```
apiVersion: v1
clusters:
- cluster:
    certificate-authority: fake-ca-file
    server: https://1.2.3.4
  name: development
- cluster:
    insecure-skip-tls-verify: true
    server: https://5.6.7.8
  name: scratch
contexts:
- context:
    cluster: development
    namespace: frontend
    user: developer
  name: dev-frontend
- context:
    cluster: development
    namespace: storage
    user: developer
  name: dev-storage
- context:
    cluster: scratch
    namespace: default
    user: experimenter
  name: exp-scratch
current-context: ""
kind: Config
preferences: {}
users:
- name: developer
  user:
    client-certificate: fake-cert-file
    client-key: fake-key-file
- name: experimenter
  user:
    password: some-password
    username: exp
```

The `fake-ca-file`, `fake-cert-file` and `fake-key-file` above are the placeholders for the pathnames of the certificate files. You need change these to the actual pathnames of certificate files in your environment.

Sometimes you may want to use Base64-encoded data embedded here instead of separate certificate files; in that case you need add the suffix `-data` to the keys, for example, `certificate-authority-data`, `client-certificate-data`, `client-key-data`.

Each context is a triple (cluster, user, namespace). For example, the `dev-frontend` context says, "Use the credentials of the `developer` user to access the `frontend` namespace of the `development` cluster".

Set the current context:

```
kubectl config --kubeconfig=config-demo use-context dev-frontend
```

Now whenever you enter a `kubectl` command, the action will apply to the cluster, and namespace listed in the `dev-frontend` context. And the command will use the credentials of the user listed in the `dev-frontend` context.

To see only the configuration information associated with the current context, use the `--minify` flag.

```
kubectl config --kubeconfig=config-demo view --minify
```

The output shows configuration information associated with the `dev-frontend` context:

```
apiVersion: v1
clusters:
- cluster:
    certificate-authority: fake-ca-file
    server: https://1.2.3.4
  name: development
contexts:
- context:
    cluster: development
    namespace: frontend
    user: developer
  name: dev-frontend
current-context: dev-frontend
kind: Config
preferences: {}
users:
- name: developer
  user:
    client-certificate: fake-cert-file
    client-key: fake-key-file
```

Now suppose you want to work for a while in the scratch cluster.

Change the current context to `exp-scratch`:

```
kubectl config --kubeconfig=config-demo use-context exp-scratch
```

Now any `kubectl` command you give will apply to the default namespace of the `scratch` cluster. And the command will use the credentials of the user listed in the `exp-scratch` context.

View configuration associated with the new current context, `exp-scratch`.

```
kubectl config --kubeconfig=config-demo view --minify
```

Finally, suppose you want to work for a while in the `storage` namespace of the `development` cluster.

Change the current context to `dev-storage`:

```
kubectl config --kubeconfig=config-demo use-context dev-storage
```

View configuration associated with the new current context, `dev-storage`.

```
kubectl config --kubeconfig=config-demo view --minify
```

Create a second configuration file

In your `config-exercise` directory, create a file named `config-demo-2` with this content:

```
apiVersion: v1
kind: Config
preferences: {}
```

```
contexts:
- context:
    cluster: development
    namespace: ramp
    user: developer
  name: dev-ramp-up
```

The preceding configuration file defines a new context named `dev-ramp-up`.

Set the KUBECONFIG environment variable

See whether you have an environment variable named `KUBECONFIG`. If so, save the current value of your `KUBECONFIG` environment variable, so you can restore it later. For example:

Linux

```
export KUBECONFIG_SAVED=$KUBECONFIG
```

Windows PowerShell

```
$Env:KUBECONFIG_SAVED=$ENV:KUBECONFIG
```

The `KUBECONFIG` environment variable is a list of paths to configuration files. The list is colon-delimited for Linux and Mac, and semicolon-delimited for Windows. If you have a `KUBECONFIG` environment variable, familiarize yourself with the configuration files in the list.

Temporarily append two paths to your `KUBECONFIG` environment variable. For example:

Linux

```
export KUBECONFIG=$KUBECONFIG:config-demo:config-demo-2
```

Windows PowerShell

```
$Env:KUBECONFIG=("config-demo;config-demo-2")
```

In your `config-exercise` directory, enter this command:

```
kubectl config view
```

The output shows merged information from all the files listed in your `KUBECONFIG` environment variable. In particular, notice that the merged information has the `dev-ramp-up` context from the `config-demo-2` file and the three contexts from the `config-demo` file:

```
contexts:
- context:
    cluster: development
    namespace: frontend
```

```
    user: developer
  name: dev-frontend
- context:
    cluster: development
    namespace: ramp
    user: developer
  name: dev-ramp-up
- context:
    cluster: development
    namespace: storage
    user: developer
  name: dev-storage
- context:
    cluster: scratch
    namespace: default
    user: experimenter
  name: exp-scratch
```

For more information about how kubeconfig files are merged, see Organizing Cluster Access Using kubeconfig Files

Explore the $HOME/.kube directory

If you already have a cluster, and you can use `kubectl` to interact with the cluster, then you probably have a file named `config` in the `$HOME/.kube` directory.

Go to `$HOME/.kube`, and see what files are there. Typically, there is a file named `config`. There might also be other configuration files in this directory. Briefly familiarize yourself with the contents of these files.

Append $HOME/.kube/config to your KUBECONFIG environment variable

If you have a `$HOME/.kube/config` file, and it's not already listed in your `KUBECONFIG` environment variable, append it to your `KUBECONFIG` environment variable now. For example:

Linux

```
export KUBECONFIG=$KUBECONFIG:$HOME/.kube/config
```

Windows Powershell

```
$Env:KUBECONFIG="$Env:KUBECONFIG;$HOME\.kube\config"
```

View configuration information merged from all the files that are now listed in your `KUBECONFIG` environment variable. In your config-exercise directory, enter:

```
kubectl config view
```

Clean up

Return your `KUBECONFIG` environment variable to its original value. For example:

Linux

```
export KUBECONFIG=$KUBECONFIG_SAVED
```

Windows PowerShell

```
$Env:KUBECONFIG=$ENV:KUBECONFIG_SAVED
```

What's next

- Organizing Cluster Access Using kubeconfig Files
- kubectl config

Feedback

Was this page helpful?

Yes No

Create an Issue Edit This Page

Page last modified on May 30, 2020 at 3:10 PM PST by add en pages (Page History)