Experiment 05: Working with k3d and Rancher

Create our cluster for this experiment. We'll be working with the Rancher configuration for k3d. Rancher Labs was purchased by Suse this year to continue to provide solutions for IoT and Edge usages for Kubernetes in cloud-native application development and modernization.

k3d cluster create k3d-rancher --api-port 6550 --servers 1 --agents 3 --port 443:443@loadbalancer --wait

[36mINFO[0m[0000] Created network 'k3d-k3d-rancher'
[36mINFO[0m[0000] Created volume 'k3d-k3d-rancher-images'
[36mINFO[0m[0001] Creating node 'k3d-k3d-rancher-server-0'
[36mINFO[0m[0001] Creating node 'k3d-k3d-rancher-agent-0'
[36mINFO[0m[0001] Creating node 'k3d-k3d-rancher-agent-1'
[36mINFO[0m[0005] Creating node 'k3d-k3d-rancher-agent-2'
[36mINFO[0m[0005] Creating LoadBalancer 'k3d-k3d-rancher-serverlb'
[36mINFO[0m[0013] Cluster 'k3d-rancher' created successfully!
[36mINFO[0m[0014] You can now use it like this:
kubectl cluster-info

This folder should have been created in our k3d getting started lab, but just to be sure

mkdir .kube

cd .kube

C:\k3d\.kube> **cd ..**

On Windows:

set KUBECONFIG_FILE=C:\k3d\.kube\k3d-rancher

k3d kubeconfig get k3d-rancher > %KUBECONFIG_FILE%

set KUBECONFIG=%KUBECONFIG_FILE%

On MacOS or Linux

~/k3d/.kube $ **export KUBECONFIG_FILE=~/.kube/k3d-rancher**

~/k3d/.kube $ **k3d kubeconfig get k3d-rancher > $KUBECONFIG_FILE**

~/k3d/.kube $ **export KUBECONFIG=$KUBECONFIG_FILE**

On Windows:

set | grep KUBE

KUBECONFIG_FILE=C:\k3d\.kube\k3d-rancher

On MacOS:

set | grep KUBE

KUBECONFIG_FILE=~/.kube/k3d-rancher

kubectl cluster-info

Kubernetes master is running at https://0.0.0.0:6550
CoreDNS is running at https://0.0.0.0:6550/api/v1/namespaces/kube-system/services/kube-dns:dns/proxy
Metrics-server is running at https://0.0.0.0:6550/api/v1/namespaces/kube-system/services/https:metrics-server:/proxy

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.

k3d cluster list

NAME SERVERS AGENTS LOADBALANCER
k3d-rancher 1/1 3/3 true

For Windows:

type %KUBECONFIG_FILE%

For MacOS:

echo $KUBECONFIG_FILE

---

apiVersion: v1
clusters:
- cluster:
    certificate-authority-data:
LS0tLS1CRUdJTiBDRVJUSUZJQ0FURS0tLS0tCk1JSUJWekNCL3FBREFnRUNBZ0VBTUFvR
0NDcUdTTTQ5QkFNQ01DTXhJVEFmQmdOVkJBTU1HR3N6Y3kxelpYSjIKWlhJdFkyRkFNVF
U1T1RZM01qUTRPVEFlRncweU1EQTVNRGt4TnpJNE1EbGFGdzB6TURBNU1EY3hOekk0TU
RsYQpNQ014SVRBZkJnTlZCQU1NR0dzemN5MXpaWEoyWlhJdFkyRkFNVFU1T1RZM01qUT

RPVEJaTUJNR0J5cUdTTTQ5CkFnRUdDQ3FHU000OUF3RUhBMElBQkdmRm53RUtycFVtbV
h3ckVFUFdaYSsxZWdYQWhPV2ZUZEorZU94UWo4U3kKUDgzSTJQbDYrTUQ4OUNMTlRTb
E1Ebk5pM3FvS1N0ZHdGZFRhOFRHQUxTS2pJekFoTUE0R0ExVWREd0VCL3dRRQpBd0lDc
ERBUEJnTlZIUk1CQWY4RUJUQURBUUgvTUFvR0NDcUdTTTQ5QkFNQ0EwZ0FNRVVDSUF
VOGpaQ0RORkhMCkpDVkdOd2I2UXhxS0xPekp1NUtYV2JNdGZ0VVB4Ymc4QWlFQXNkQXF
JRm90R2JPcVk4OUxudU45eStrTU44M1AKU1pPWWRGMElyNUV2dXgwPQotLS0tLUVORCB
DRVJUSUZJQ0FURS0tLS0tCg==
    server: https://0.0.0.0:6550
  name: k3d-k3d-rancher
contexts:
- context:
    cluster: k3d-k3d-rancher
    user: admin@k3d-k3d-rancher
  name: k3d-k3d-rancher
current-context: k3d-k3d-rancher
kind: Config
preferences: {}
users:
- name: admin@k3d-k3d-rancher
  user:
    password: dd79f910ebe64a30855bcd38b7425b98
    username: admin

set KUBECONFIG=%KUBECONFIG_FILE%

kubectl get nodes

```
NAME                     STATUS   ROLES    AGE     VERSION
k3d-k3d-rancher-agent-1   Ready    <none>   7m36s   v1.18.6+k3s1
k3d-k3d-rancher-agent-0   Ready    <none>   7m35s   v1.18.6+k3s1
k3d-k3d-rancher-agent-2   Ready    <none>   7m35s   v1.18.6+k3s1
k3d-k3d-rancher-server-0   Ready    master   7m34s   v1.18.6+k3s1
```

kubectl get pods

No resources found in default namespace.

kubectl config view -o jsonpath='{.users[*].name}'

'admin@k3d-k3d-rancher'

kubectl config get-contexts

```
CURRENT   NAME              CLUSTER           AUTHINFO                NAMESPACE
*         k3d-k3d-rancher   k3d-k3d-rancher   admin@k3d-k3d-rancher
```

kubectl config current-context

k3d-k3d-rancher

kubectl create namespace cattle-system

namespace/cattle-system created

kubectl apply --validate=false -f https://github.com/jetstack/cert-manager/releases/download/v0.15.0/cert-manager.crds.yaml

customresourcedefinition.apiextensions.k8s.io/certificaterequests.cert-manager.io created
customresourcedefinition.apiextensions.k8s.io/certificates.cert-manager.io created
customresourcedefinition.apiextensions.k8s.io/challenges.acme.cert-manager.io created
customresourcedefinition.apiextensions.k8s.io/clusterissuers.cert-manager.io created
customresourcedefinition.apiextensions.k8s.io/issuers.cert-manager.io created
customresourcedefinition.apiextensions.k8s.io/orders.acme.cert-manager.io created

kubectl create namespace cert-manager

namespace/cert-manager created

k3d node list

NAME	ROLE	CLUSTER	STATUS
k3d-k3d-rancher-agent-0	agent	k3d-rancher	running
k3d-k3d-rancher-agent-1	agent	k3d-rancher	running
k3d-k3d-rancher-agent-2	agent	k3d-rancher	running
k3d-k3d-rancher-server-0	server	k3d-rancher	running
k3d-k3d-rancher-serverlb	loadbalancer	k3d-rancher	running

kubectl get nodes

NAME	STATUS	ROLES	AGE	VERSION
k3d-k3d-rancher-agent-1	Ready	<none>	27m	v1.18.6+k3s1
k3d-k3d-rancher-agent-0	Ready	<none>	27m	v1.18.6+k3s1
k3d-k3d-rancher-agent-2	Ready	<none>	27m	v1.18.6+k3s1
k3d-k3d-rancher-server-0	Ready	master	27m	v1.18.6+k3s1

kubectl get namespaces

NAME	STATUS	AGE
p-2v6dj	Active	22h

```
p-2244b             Active   22h
local               Active   22h
kube-node-lease     Active   22h
default             Active   22h
cattle-global-data  Active   22h
cattle-global-nt    Active   22h
kube-public         Active   22h
cert-manager        Active   22h
kube-system         Active   22h
user-l7m6j          Active   21h
cattle-system       Active   22h
```

Helm Installation

Install Helm if not already present

https://github.com/helm/helm/releases

For Windows that would be

https://get.helm.sh/helm-v3.6.0-windows-amd64.zip

Unzip to the C:\helm folder or wherever you want the binary to live

For MacOS:

$ **brew install helm**

For Windows:

Open powershell

PS> **choco install helm**

Open a Windows Command Prompt (CMD)

C:\ > **mkdir helm**

C:\> **cd \helm**

C:\helm> **dir windows-amd64\.**

```
 Volume in drive C is OS
 Volume Serial Number is 5081-CA53

 Directory of C:\helm\windows-amd64

09/09/2020  12:37 PM    <DIR>          .
09/09/2020  12:37 PM    <DIR>          ..
09/09/2020  12:37 PM        39,836,672 helm.exe
09/09/2020  12:37 PM            11,373 LICENSE
09/09/2020  12:37 PM             3,308 README.md
               3 File(s)     39,851,353 bytes
```

2 Dir(s) 173,093,220,352 bytes free

C:\helm> **move windows-amd64\helm.exe .**

1 file(s) moved.

C:\helm> **helm version**

version.BuildInfo{Version:"v3.3.1",
GitCommit:"249e5215cde0c3fa72e27eb7a30e8d55c9696144", GitTreeState:"clean",
GoVersion:"go1.14.7"}

C:\helm> **helm repo add rancher-latest https://releases.rancher.com/server-charts/latest**

"rancher-latest" has been added to your repositories

C:\helm> **helm repo add jetstack https://charts.jetstack.io**

"jetstack" has been added to your repositories

C:\helm> **helm repo update**

Hang tight while we grab the latest from your chart repositories...
...Successfully got an update from the "rancher-latest" chart repository
...Successfully got an update from the "jetstack" chart repository
Update Complete. ⎈Happy Helming!⎈

c:\helm\helm install cert-manager jetstack/cert-manager --namespace cert-manager --version v0.15.0 --wait

Or from the c:\helm folder

Install Cert-Manager with a Helm 3 chart

C:\helm> **helm install cert-manager jetstack/cert-manager --namespace cert-manager --version v0.15.0 --wait**

NAME: cert-manager
LAST DEPLOYED: Wed Sep 9 12:44:33 2020
NAMESPACE: cert-manager
STATUS: deployed
REVISION: 1
TEST SUITE: None
NOTES:
cert-manager has been deployed successfully!

In order to begin issuing certificates, you will need to set up a ClusterIssuer

or Issuer resource (for example, by creating a 'letsencrypt-staging' issuer).

More information on the different types of issuers and how to configure them

can be found in our documentation:

https://cert-manager.io/docs/configuration/

For information on how to configure cert-manager to automatically provision

Certificates for Ingress resources, take a look at the `ingress-shim`

documentation:

https://cert-manager.io/docs/usage/ingress/

Rollout the cert-manager deployment

kubectl -n cert-manager rollout status deploy/cert-manager

deployment "cert-manager" successfully rolled out

Prime the container images we need to reduce the likelihood of timeout

docker pull rancher/rancher:v2.4.8
v2.4.8: Pulling from rancher/rancher
Digest: sha256:5a16a6a0611e49d55ff9d9fbf278b5ca2602575de8f52286b18158ee1a8a5963
Status: Image is up to date for rancher/rancher:v2.4.8
docker.io/rancher/rancher:v2.4.8

docker pull rancher/k3s:v1.18.6-k3s1
v1.18.6-k3s1: Pulling from rancher/k3s
Digest: sha256:a835d76608a2503af8b681bb5888499d7c3456902f6853c8c1031f4a884715ca
Status: Image is up to date for rancher/k3s:v1.18.6-k3s1
docker.io/rancher/k3s:v1.18.6-k3s1

docker pull rancher/server:latest
latest: Pulling from rancher/server
Digest: sha256:95b55603122c28baea4e8d94663aa34ad770bbc624a9ed6ef986fb3ea5224d91
Status: Image is up to date for rancher/server:latest
docker.io/rancher/server:latest

docker pull rancher/k3d-proxy:v3.0.1
v3.0.1: Pulling from rancher/k3d-proxy

Digest: sha256:2ff467bb4a25f904954f7f65e4c7c73134b53bd422f4229f106c7c202ee347e2
Status: Image is up to date for rancher/k3d-proxy:v3.0.1
docker.io/rancher/k3d-proxy:v3.0.1

Install Rancher with a Helm 3 chart

helm install rancher rancher-latest/rancher --namespace cattle-system --set hostname=rancher.k3d.localhost --wait --timeout 900s

NAME: rancher
LAST DEPLOYED: Fri Sep 11 08:34:47 2020
NAMESPACE: cattle-system
STATUS: deployed
REVISION: 1
TEST SUITE: None
NOTES:
Rancher Server has been installed.

NOTE: Rancher may take several minutes to fully initialize. Please standby while Certificates are being issued and Ingress comes up.

Check out our docs at https://rancher.com/docs/rancher/v2.x/en/

Browse to https://rancher.k3d.localhost

Happy Containering!

Rollout the rancher deployment

kubectl -n cattle-system rollout status deploy/rancher

deployment "rancher" successfully rolled out

Load the URL https://rancher.k3d.localhost

This requires that entry to be added to localhost 127.0.0.1 in our /etc/hosts file

On MacOS:

Edit the hosts file and add the following line

vim /etc/hosts

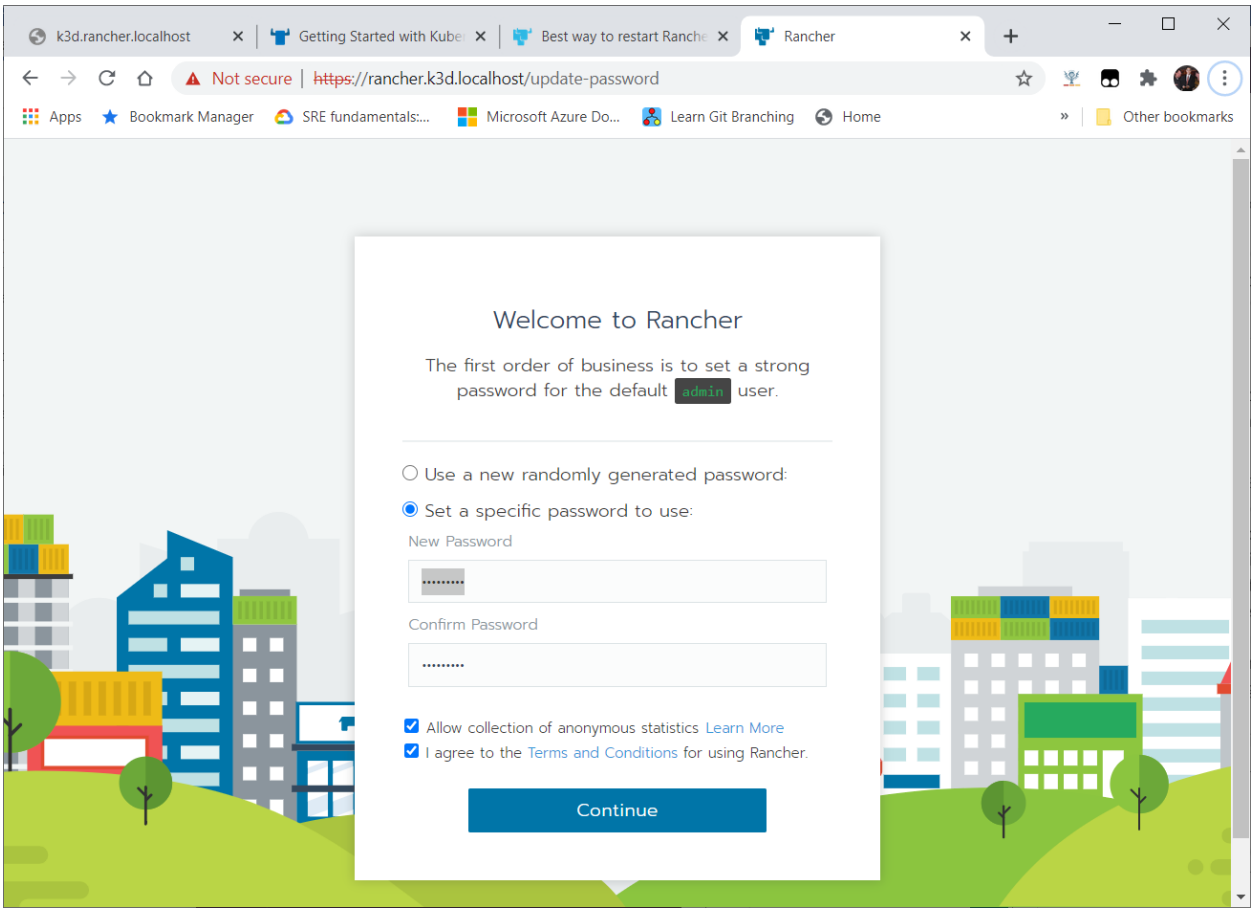
127.0.0.1 kubernetes.docker.internal rancher.k3d.localhost k3d.my.org sample.k3d.localhost

On Windows:

Edit the hosts file and add the following line

notepad c:\windows\system32\drivers\etc\hosts

127.0.0.1 kubernetes.docker.internal rancher.k3d.localhost k3d.my.org sample.k3d.localhost


k3d.rancher.localhost
Getting Started with Kube
Best way to restart Ranche
Rancher
Not secure | https://rancher.k3d.localhost/update-password
Apps
Bookmark Manager
SRE fundamentals:...
Microsoft Azure Do...
Learn Git Branching
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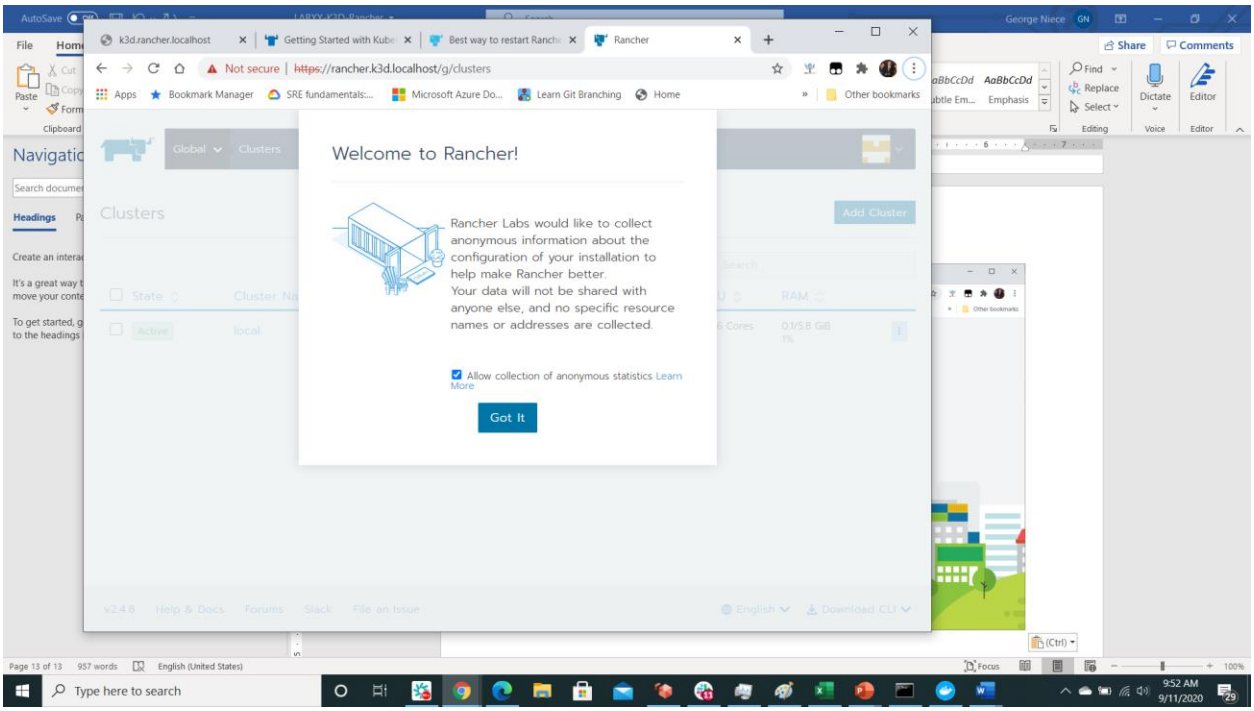
Other bookmarks
Welcome to Rancher
The first order of business is to set a strong password for the default admin user.
Use a new randomly generated password:
Set a specific password to use:
New Password
Confirm Password
Allow collection of anonymous statistics Learn More
I agree to the Terms and Conditions for using Rancher.
Continue


k3d.rancher.localhost
Getting Started with Kube
Best way to restart Ranche
Rancher
Not secure | https://rancher.k3d.localhost/g/clusters
Apps
Bookmark Manager
SRE fundamentals:...
Microsoft Azure Do...
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Home
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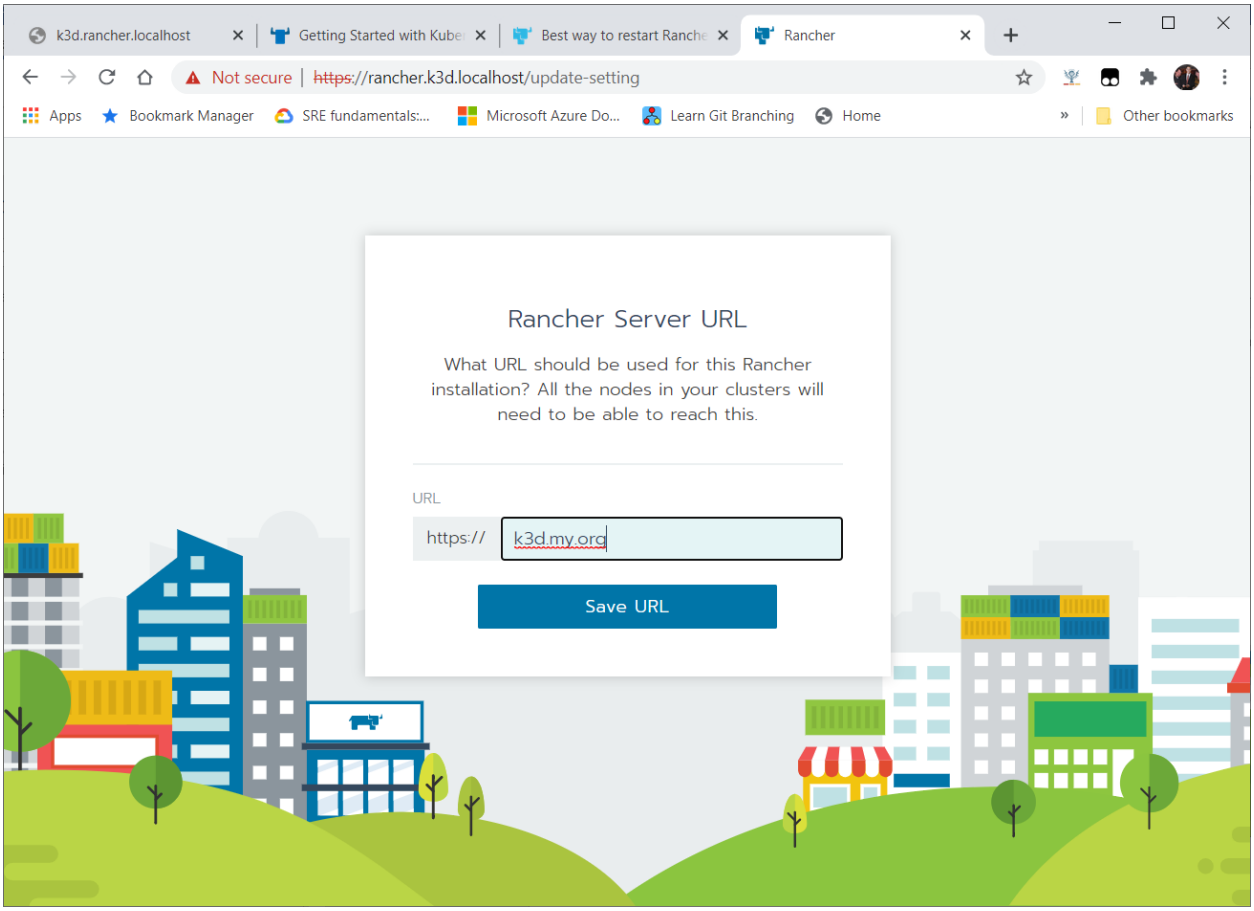
Welcome to Rancher!
Rancher Labs would like to collect anonymous information about the configuration of your installation to help make Rancher better.
Your data will not be shared with anyone else, and no specific resource names or addresses are collected.
Allow collection of anonymous statistics Learn More
Got It
Clusters
Add Cluster
Type here to search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Rancher
Not secure | https://rancher.k3d.localhost/update-setting
Apps
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Learn Git Branching
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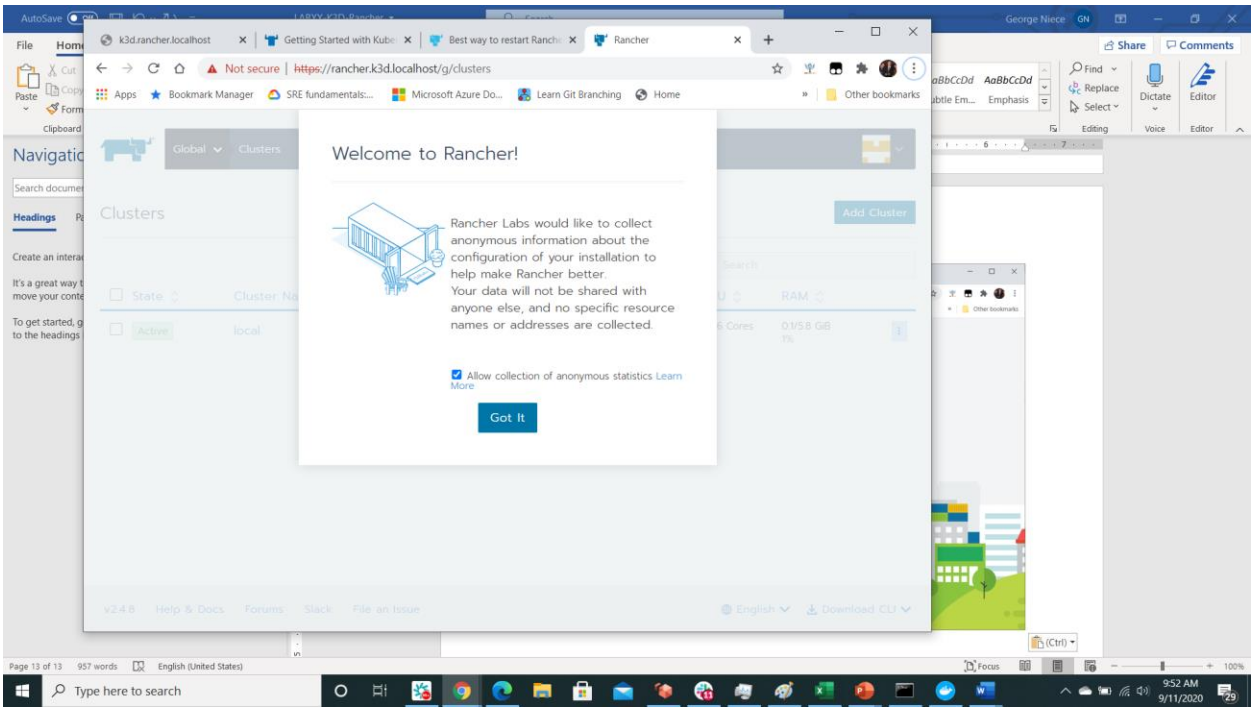
Other bookmarks
Rancher Server URL
What URL should be used for this Rancher installation? All the nodes in your clusters will need to be able to reach this.
URL
https://
k3d.my.org
Save URL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Add Cluster
v2.4.8
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File an Issue
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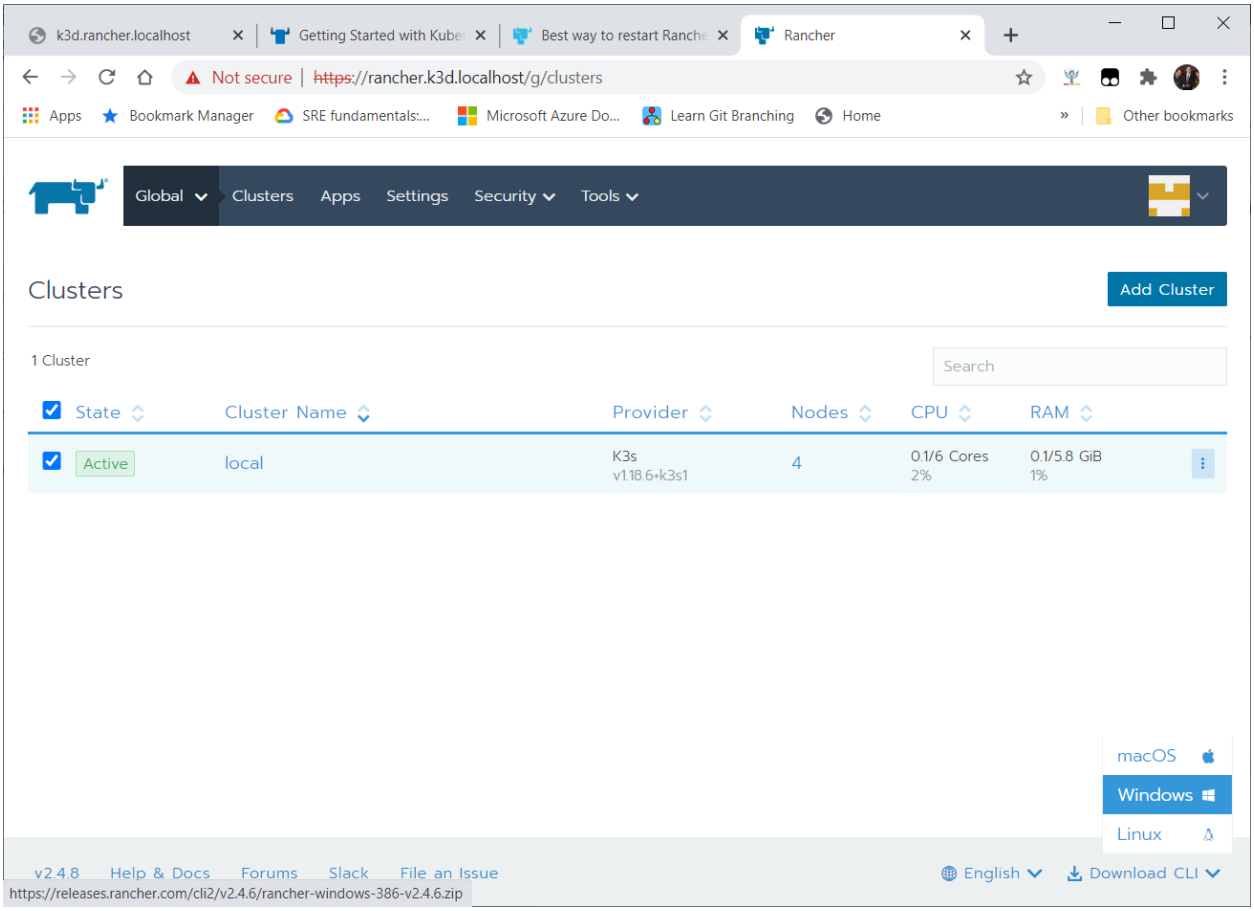
Type here to search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1 Cluster
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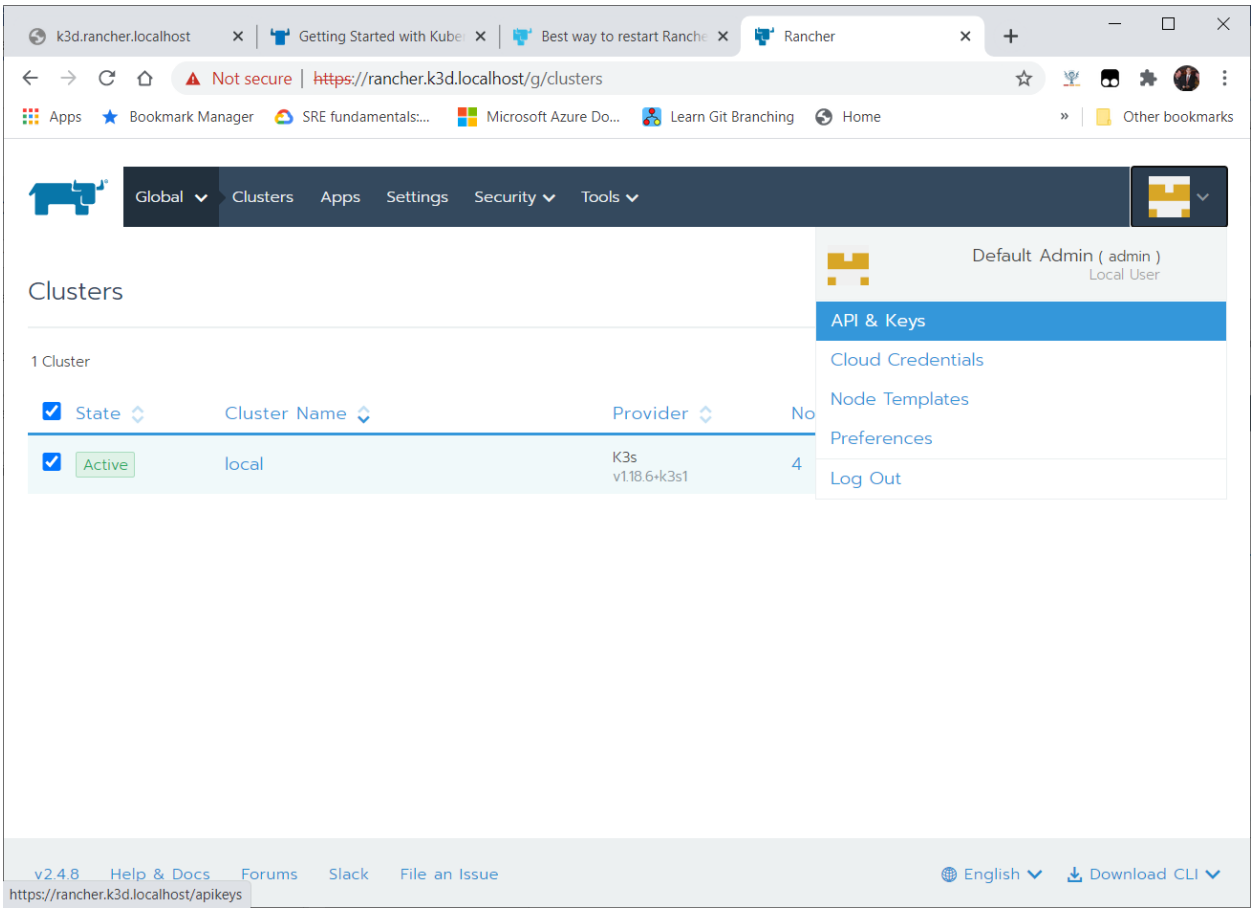
Provider
Nodes
CPU
RAM
Active
local
K3s
v1.18.6+k3s1
4
0.1/6 Cores
2%
0.1/5.8 GiB
1%
macOS
Windows
Linux
v2.4.8
Help & Docs
Forums
Slack
File an Issue
English
Download CLI
https://releases.rancher.com/cli2/v2.4.6/rancher-windows-386-v2.4.6.zip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1 Cluster
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v1.18.6+k3s1
4
v2.4.8
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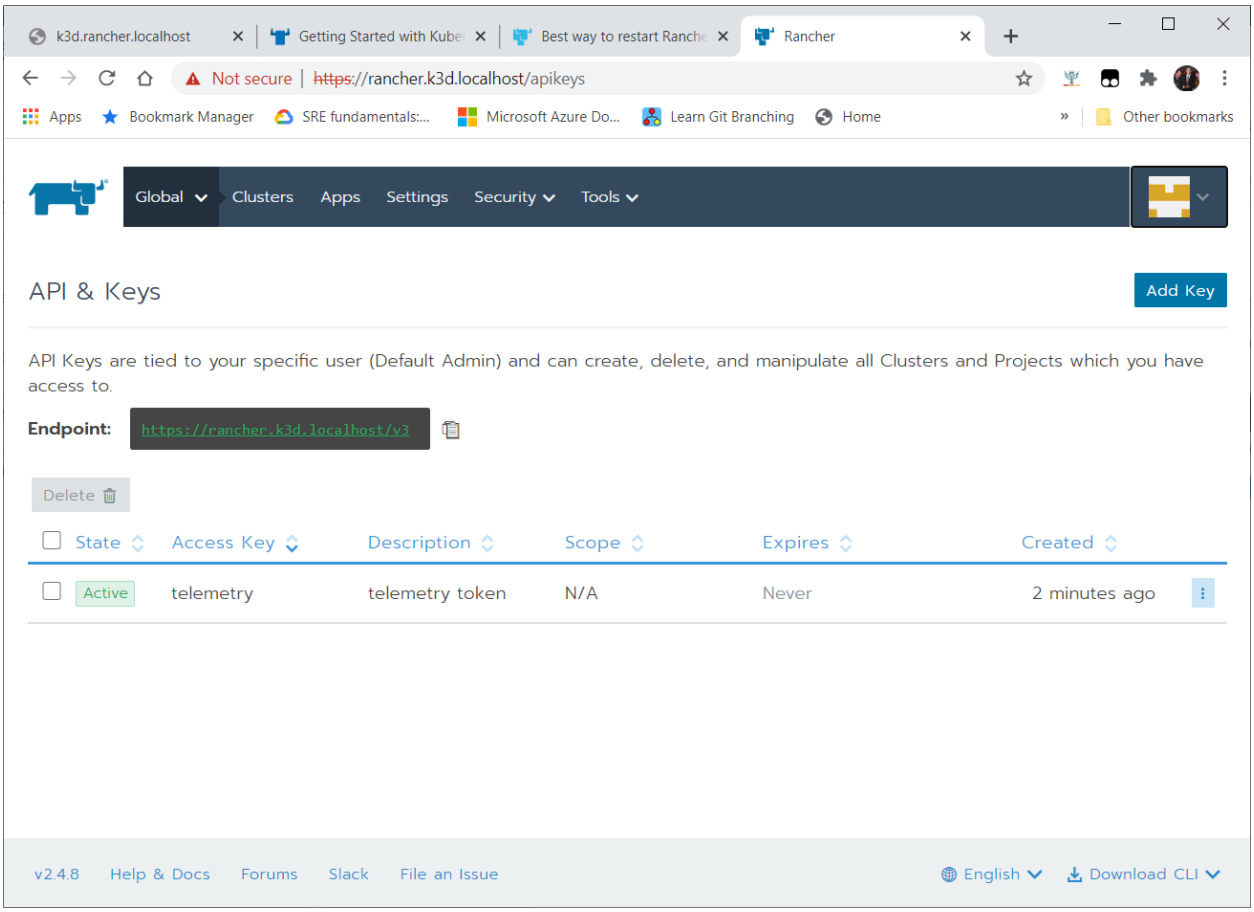
Download CLI
https://rancher.k3d.localhost/apikeys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API & Keys
Add Key
API Keys are tied to your specific user (Default Admin) and can create, delete, and manipulate all Clusters and Projects which you have access to.
Endpoint:
https://rancher.k3d.localhost/v3
Delete
State
Access Key
Description
Scope
Expires
Created
Active
telemetry
telemetry token
N/A
Never
2 minutes ago
v2.4.8
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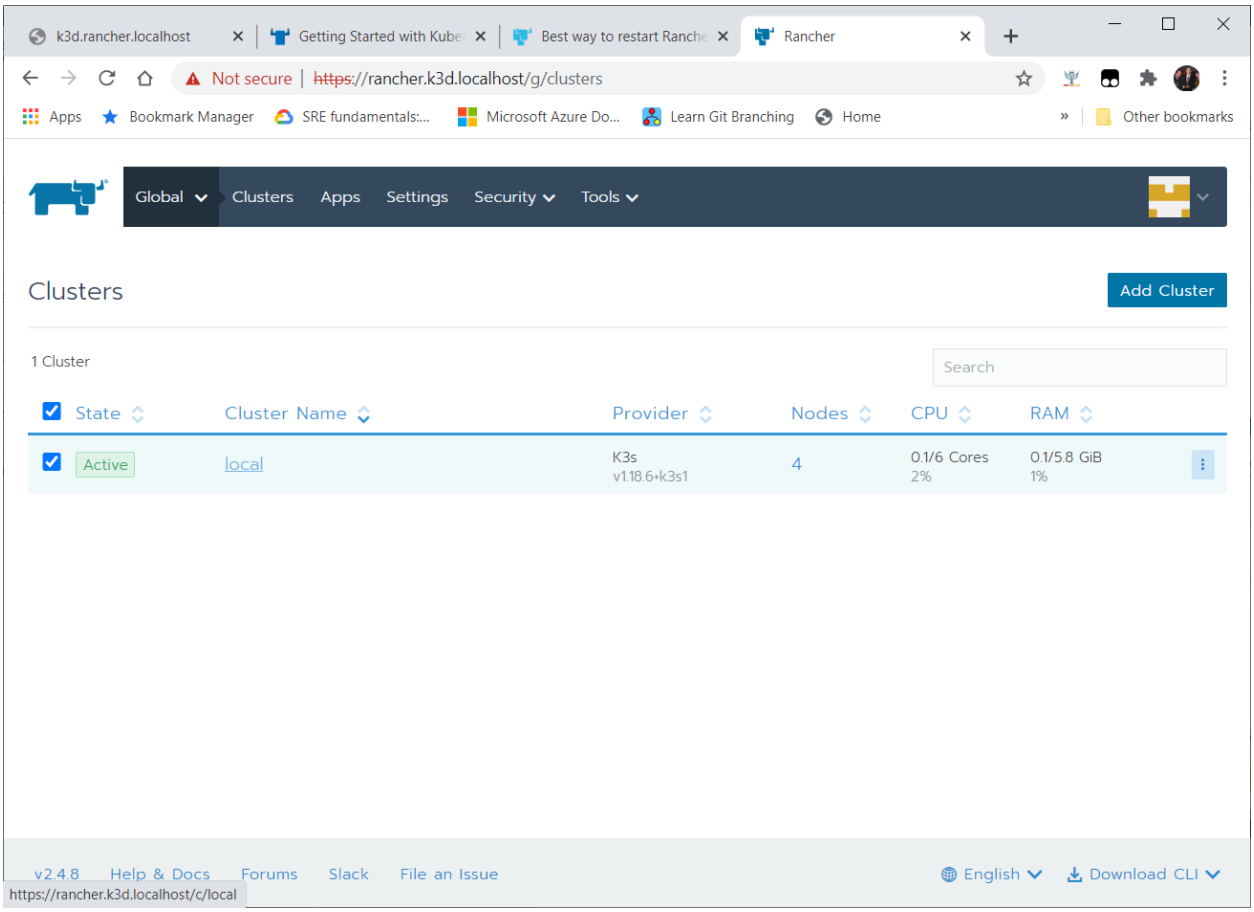
Download CLI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CPU
RAM
Active
local
K3s
v1.18.6+k3s1
4
0.1/6 Cores
2%
0.1/5.8 GiB
1%
v2.4.8
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File an Issue
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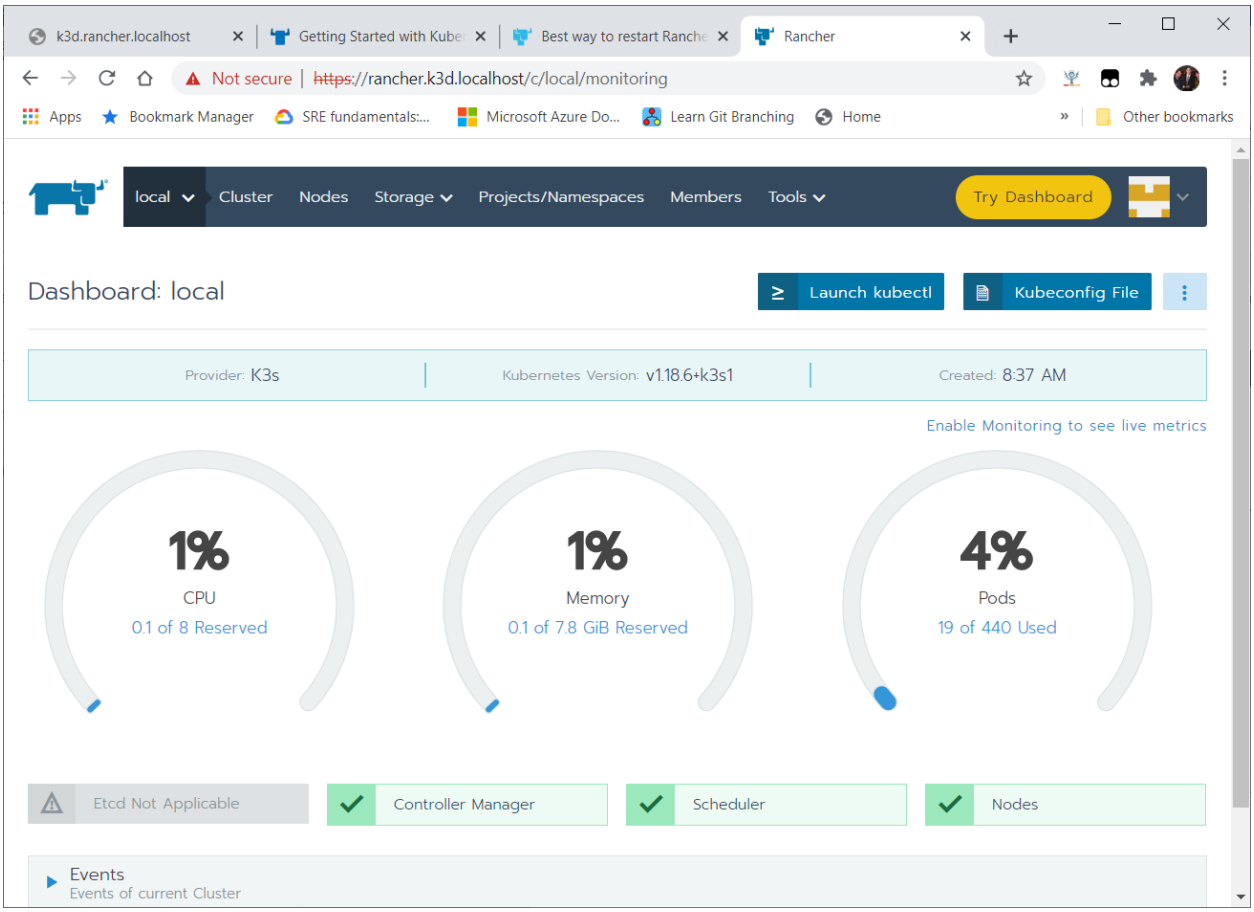
https://rancher.k3d.localhost/c/local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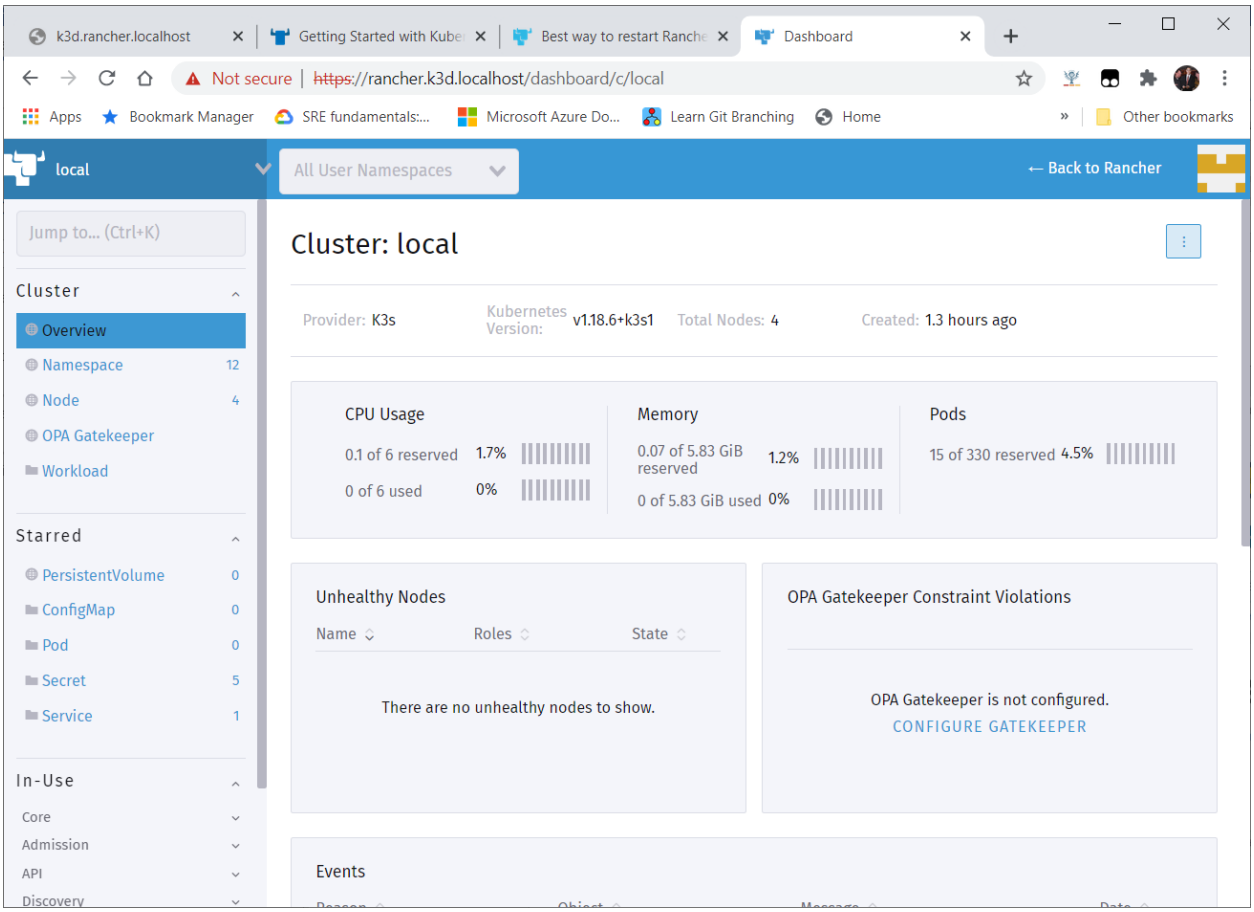
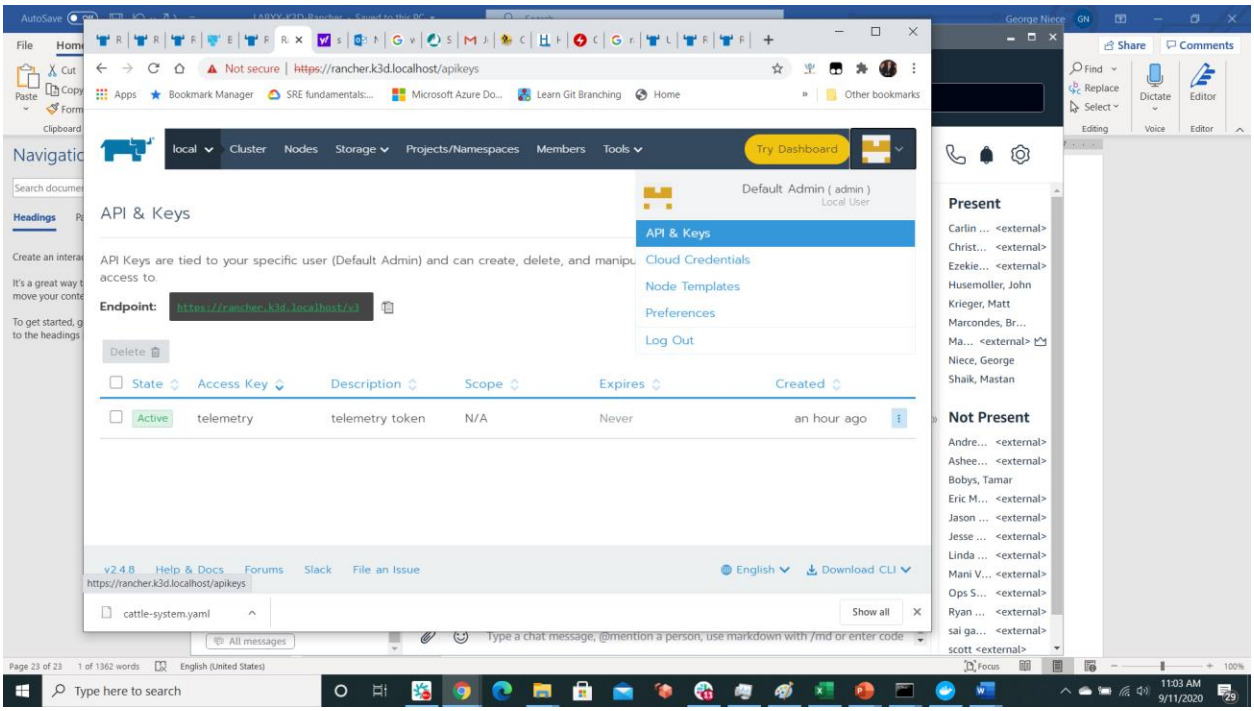
Nodes
Storage
Projects/Namespaces
Members
Tools
Try Dashboard
Dashboard: local
Launch kubectl
Kubeconfig File
Provider: K3s
Kubernetes Version: v1.18.6+k3s1
Created: 8:37 AM
Enable Monitoring to see live metrics
1%
CPU
0.1 of 8 Reserved
1%
Memory
0.1 of 7.8 GiB Reserved
4%
Pods
19 of 440 Used
Etcd Not Applicable
Controller Manager
Scheduler
Nodes
Events
Events of current Cluster

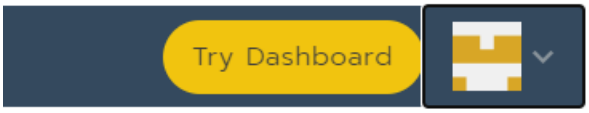


https://rancher.com/docs/rancher/v2.x/en/quick-start-guide/workload/

https://rancher.com/docs/rancher/v2.x/en/quick-start-guide/workload/quickstart-deploy-workload-ingress/

https://rancher.com/docs/rancher/v2.x/en/quick-start-guide/workload/quickstart-deploy-workload-nodeport/





Clusters and Projects which you have

Add API Key

Description

ExperimentKey

Automatically Expire

- Never
- A day from now
- A month from now
- A year from now
- Custom - 0 minutes

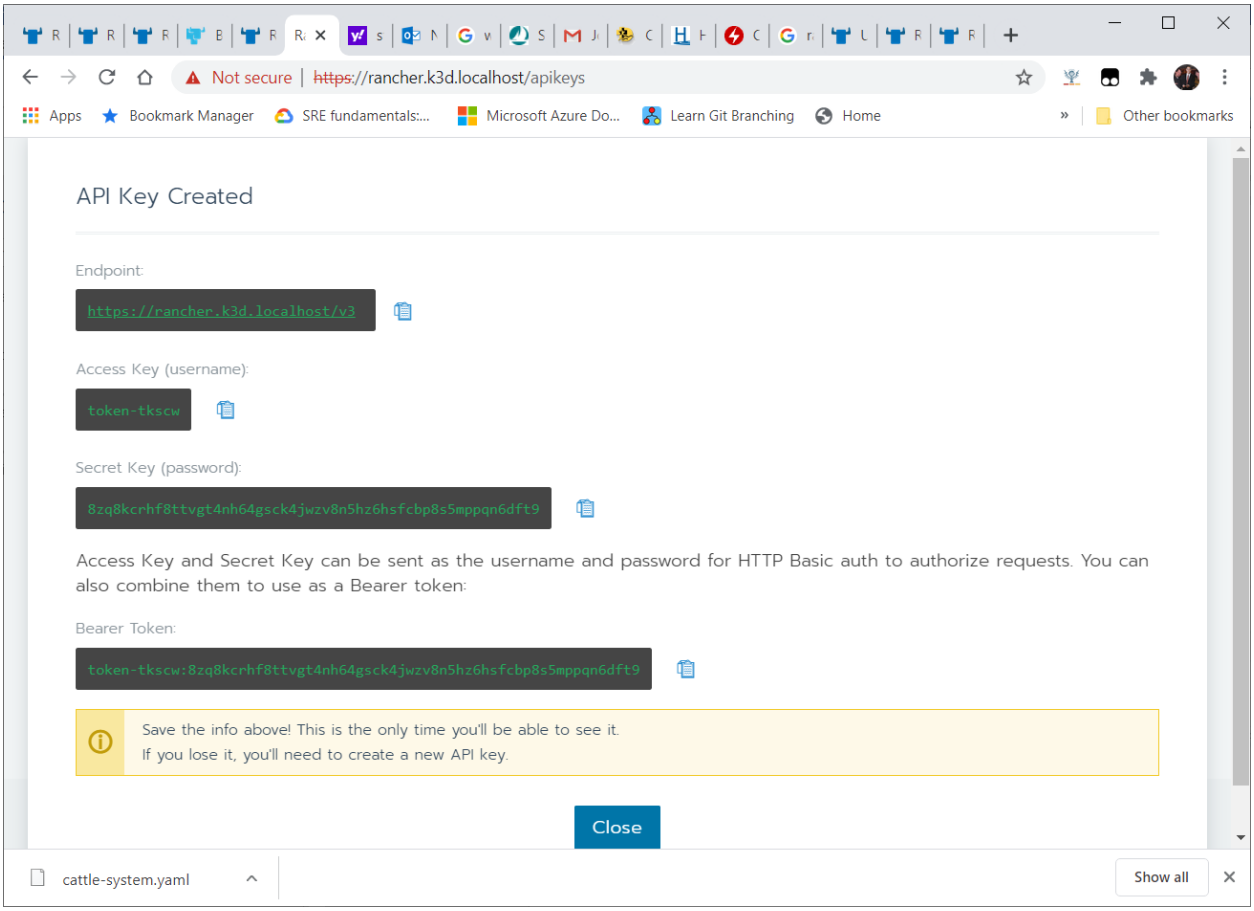
Scope

no scope

Cluster-scoped tokens can be used to interact directly with the Kubernetes API of clusters configured with an Authorized Cluster Endpoint

Create Cancel

Information for API Key is displayed for Endpoint, Access Key, Secret Key and Bearer Token



API Key Created

Endpoint:https://rancher.k3d.localhost/v3

Access Key (username):token-tkscw

Secret Key (password):8zq8kcrhf8ttvgt4nh64gsck4jwzv8n5hz6hsfcbp8s5mppqn6dft9

Access Key and Secret Key can be sent as the username and password for HTTP Basic auth to authorize requests. You can also combine them to use as a Bearer token:

Bearer Token:token-tkscw:8zq8kcrhf8ttvgt4nh64gsck4jwzv8n5hz6hsfcbp8s5mppqn6dft9

Save the info above! This is the only time you'll be able to see it.
If you lose it, you'll need to create a new API key.

Working with the Rancher CLI

Download the Rancher CLI and drop that in the c:\k3d\rancher-v2.4.6 folder, we download from the Rancher UI, but you can also find more here:

https://rancher.com/docs/rancher/v2.x/en/cli/

Execute the CLI to login to Rancher

rancher login --help

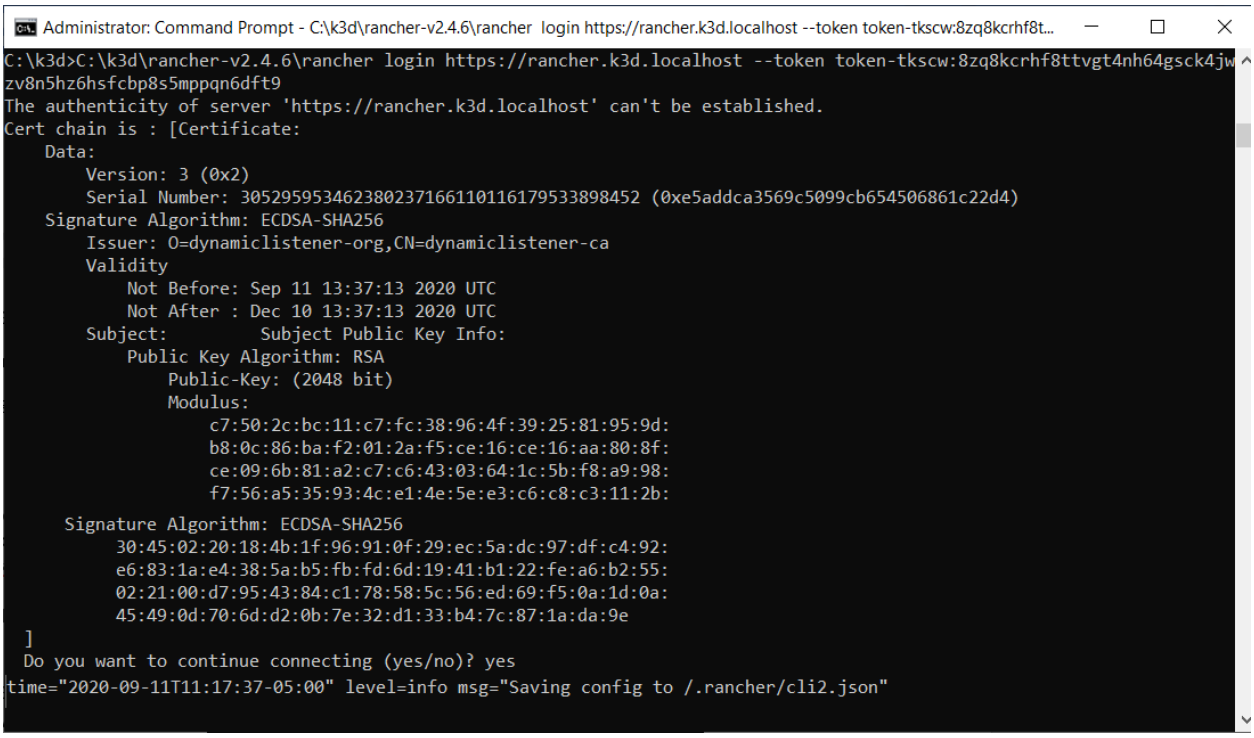
Login to a Rancher server

Usage:

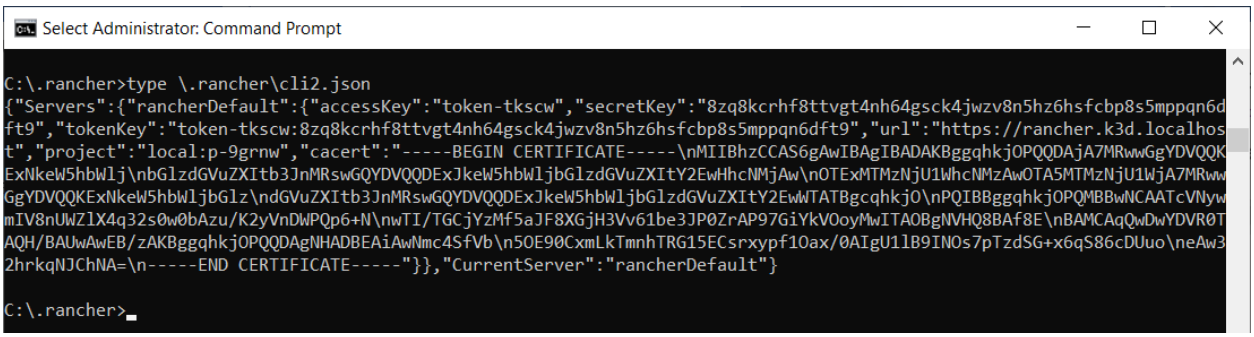
rancher login [OPTIONS] [SERVERURL]

Options:
--context value Set the context during login
--token value, -t value Token from the Rancher UI
--cacert value Location of the CACerts to use
--name value Name of the Server
--skip-verify Skip verification of the CACerts presented by the Server

rancher login https://rancher.k3d.localhost --token token-tkscw:8zq8kcrhf8ttvgt4nh64gsck4jwzv8n5hz6hsfcbp8s5mppqn6dft9



type \.rancher\cli2.json



Delete our Rancher cluster

k3d cluster delete k3d-rancher

[36mINFO[0m[0000] Deleting cluster 'k3d-rancher'
[36mINFO[0m[0000] Deleted k3d-k3d-rancher-serverlb
[36mINFO[0m[0001] Deleted k3d-k3d-rancher-agent-2
[36mINFO[0m[0002] Deleted k3d-k3d-rancher-agent-1
[36mINFO[0m[0005] Deleted k3d-k3d-rancher-agent-0
[36mINFO[0m[0007] Deleted k3d-k3d-rancher-server-0
[36mINFO[0m[0007] Deleting cluster network 'a585d66c5fd0942e0ef48b87c60967a568f87407dbe51644bc975b14a345c6e4'

[36mINFO[0m[0007] Deleting image volume 'k3d-k3d-rancher-images'
[36mINFO[0m[0007] Removing cluster details from default kubeconfig...
[36mINFO[0m[0007] Removing standalone kubeconfig file (if there is one)...
[36mINFO[0m[0007] Successfully deleted cluster k3d-rancher!

References

K3s https://github.com/rancher/k3s/releases/tag/v1.16.15+k3s1

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https://medium.com/@yannalbou/k3d-k3s-k8s-perfect-match-for-dev-and-testing-896c8953acc0

https://medium.com/polarsquad/check-your-helm-deployments-ffe26014804

https://rancher.com/docs/rancher/v2.x/en/installation/k8s-install/helm-rancher/#7-verify-that-the-rancher-server-is-successfully-deployed

https://cert-manager.io/docs/installation/kubernetes/

ImagePullBackoff
https://managedkube.com/kubernetes/k8sbot/troubleshooting/imagepullbackoff/2019/02/23/imagepullbackoff.html