

Exercise 13.3: Adding tools for monitoring and metrics

With the deprecation of **Heapster** the new, integrated **Metrics Server** has been further developed and deployed. The **Prometheus** project of **CNCF.io** has matured from incubation to graduation, is commonly used for collecting metrics, and should be considered as well.

Configure Metrics



Very Important

The `metrics-server` is written to interact with Docker. If you chose to use `crio` the logs will show errors and inability to collect metrics.

1. Begin by cloning the software. The `git` command should be installed already. Install it if not found.

```
student@cp:~$ git clone \
  https://github.com/kubernetes-incubator/metrics-server.git
```

<output_omitted>

2. As the software may have changed it is a good idea to read the **README.md** file for updated information.

```
student@cp:~$ cd metrics-server/ ; less README.md
```

<output_omitted>

3. Create the necessary objects. Be aware as new versions are released there may be some changes to the process and the created objects. Use the `components.yaml` to create the objects. The backslash is not necessary if you type it all on one line.

```
student@cp:~$ kubectl create -f \
  https://github.com/kubernetes-sigs/metrics-server/releases/download/v0.3.7/components.yaml
```

```
clusterrole.rbac.authorization.k8s.io/system:aggregated-metrics-reader created
clusterrolebinding.rbac.authorization.k8s.io/metrics-server:system:auth-delegator created
rolebinding.rbac.authorization.k8s.io/metrics-server-auth-reader created
apiservice.apiregistration.k8s.io/v1beta1.metrics.k8s.io created
serviceaccount/metrics-server created
deployment.apps/metrics-server created
service/metrics-server created
clusterrole.rbac.authorization.k8s.io/system:metrics-server created
clusterrolebinding.rbac.authorization.k8s.io/system:metrics-server created
```

4. View the current objects, which are created in the `kube-system` namespace. All should show a `Running` status.

```
student@cp:~$ kubectl -n kube-system get pods
```

```
<output_omitted>
kube-proxy-ld2hb                1/1      Running    0          2d21h
kube-scheduler-u16-1-13-1-2f8c  1/1      Running    0          2d21h
metrics-server-fc6d4999b-b9rjj  1/1      Running    0          42s
```

5. Edit the metrics-server deployment to allow insecure TLS. The default certificate is x509 self-signed and not trusted by default. In production you may want to configure and replace the certificate. You may encounter other issues as this software is fast-changing. The need for the kubelet-preferred-address-types line has been reported on some platforms.

```
student@cp:~$ kubectl -n kube-system edit deployment metrics-server
```

YAML

```
1  ....
2  spec:
3    containers:
4      - args:
5        - --cert-dir=/tmp
6        - --secure-port=4443
7        - --kubelet-insecure-tls                                #<-- Add this line
8        - --kubelet-preferred-address-types=InternalIP,ExternalIP,Hostname #<--May be needed
9      image: k8s.gcr.io/metrics-server/metrics-server:v0.3.7
10  ....
```

6. Test that the metrics server pod is running and does not show errors. At first you should see a few lines showing the container is listening. As the software changes these messages may be slightly different.

```
student@cp:~$ kubectl -n kube-system logs metrics-server<TAB>
```

```
I0207 14:08:13.383209      1 serving.go:312] Generated self-signed cert
(/tmp/apiserver.crt, /tmp/apiserver.key)
I0207 14:08:14.078360      1 secure_serving.go:116] Serving securely on
[::]:4443
```

7. Test that the metrics working by viewing pod and node metrics. Your output may have different pods. It can take an minute or so for the metrics to populate and not return an error.

```
student@cp:~$ sleep 120 ; kubectl top pod --all-namespaces
```

NAMESPACE	NAME	CPU(cores)	MEMORY(bytes)
kube-system	calico-kube-controllers-7b9dcdcc5-qg6zd	2m	6Mi
kube-system	calico-node-dr279	23m	22Mi
kube-system	calico-node-xtvfd	21m	22Mi
kube-system	coredns-5644d7b6d9-k7kts	2m	6Mi
kube-system	coredns-5644d7b6d9-rnr2v	3m	6Mi

<output_omitted>

```
student@cp:~$ kubectl top nodes
```

NAME	CPU(cores)	CPU%	MEMORY(bytes)	MEMORY%
cp 228m	11%	2357Mi	31%	
worker 76m	3%	1385Mi	18%	

8. Using keys we generated in an earlier lab we can also interrogate the API server. Your server IP address will be different.

```
student@cp:~$ curl --cert ./client.pem \
--key ./client-key.pem --cacert ./ca.pem \
https://k8scp:6443/apis/metrics.k8s.io/v1beta1/nodes
```

```
{
  "kind": "NodeMetricsList",
  "apiVersion": "metrics.k8s.io/v1beta1",
  "metadata": {
    "selfLink": "/apis/metrics.k8s.io/v1beta1/nodes"
  },
}
```

```

"items": [
  {
    "metadata": {
      "name": "u16-1-13-1-2f8c",
      "selfLink": "/apis/metrics.k8s.io/v1beta1/nodes/u16-1-13-1-2f8c",
      "creationTimestamp": "2019-01-10T20:27:00Z"
    },
    "timestamp": "2019-01-10T20:26:18Z",
    "window": "30s",
    "usage": {
      "cpu": "215675721n",
      "memory": "2414744Ki"
    }
  },
  <output_omitted>

```

Configure the Dashboard

While the dashboard looks nice it has not been a common tool in use. Those that could best develop the tool tend to only use the CLI, so it may lack full wanted functionality.

The first commands do not have the details. Refer to earlier content as necessary.

1. Search <https://artifacthub.io/> for the helm organization and the kubernetes-dashboard chart.
2. Fetch the chart and edit the `values.yaml` file.

YAML

```

1 ....
2 service:
3   type: NodePort           #<-- Change to NodePort
4   externalPort: 443
5   ....

```

3. Install the chart and give it a name of dashboard
4. The helm chart version does not allow any resource access by default. We will give the dashboard full admin rights, which may be more than one would in production. The dashboard is running in the `default` namespace. First find the name of the service account, which is based off the name you used for the chart.

There is more on service account in the Security chapter.

```
student@cp:~$ kubectl get serviceaccounts
```

NAME	SECRETS	AGE
dashboard-kubernetes-dashboard	1	6m
default	1	2d21h
myingress-ingress-nginx	1	42h

```

student@cp:~$ kubectl create clusterrolebinding dashaccess \
  --clusterrole=cluster-admin \
  --serviceaccount=default:kubernetes-dashboard

```

```
clusterrolebinding.rbac.authorization.k8s.io/dashaccess created
```

5. On your local system open a browser and navigate to an HTTPS URL made of the Public IP and the high-numbered port. You will get a message about an insecure connection. Select the **Advanced** button, then **Add Exception...**, then **Confirm Security Exception**. Some browsers won't even give you to option. If nothing shows up try a different browser. The page should then show the Kubernetes Dashboard. You may be able to find the public IP address using `curl`.

```
student@cp:~$ curl ifconfig.io
```

```
35.231.8.178
```

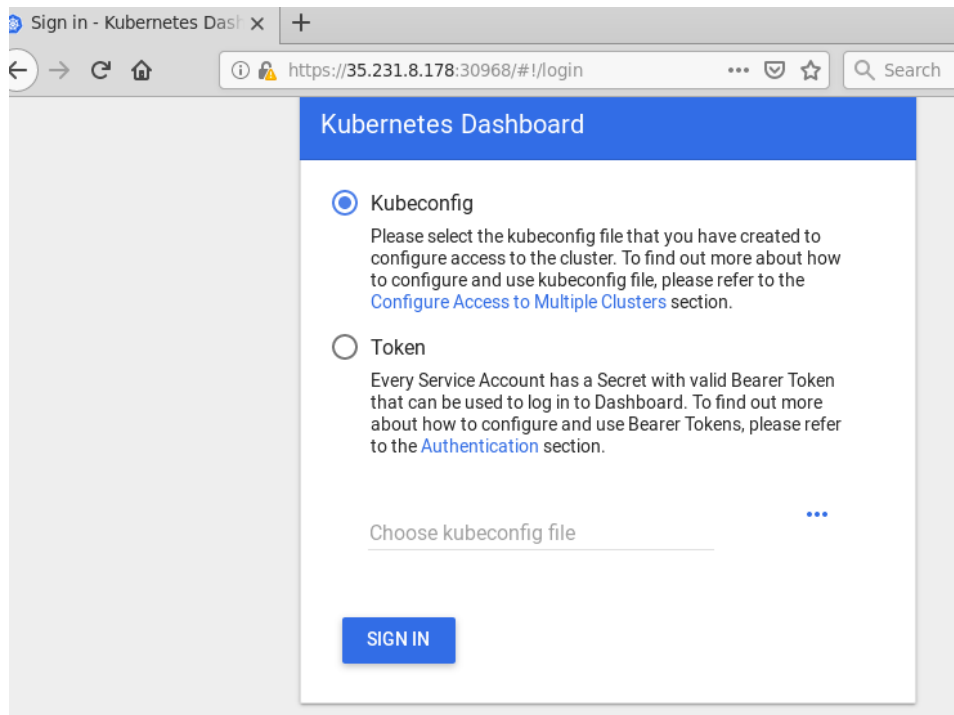


Figure 13.1: External Access via Browser

- We will use the Token method to access the dashboard. With RBAC we need to use the proper token, the `kubernetes-dashboard-token` in this case. Find the token, copy it then paste into the login page. The **Tab** key can be helpful to complete the secret name instead of finding the hash.

```
student@cp:~$ kubectl create token kubernetes-dashboard
```

```
eyJlxezoLAilithbGciOiJSUzI1NiIsImtpZCI6IiJ9.eyJpc3MiOiJrdWJ1cm5ldGVzL3N1cnZpY2VhY2NvdW50Iiwia3ViZXJuZXRlcy5pby9zZXJ2aWNlYWVjb3VudC9uYWw1c3BhY2UiOiJrdWJ1LXN5c3R1bSIsImt1YmVybmV0ZXMuaW8vc2VydmljZWFjY291bnQvc2VjcmV0Lm5hbWUiOiJrdWJ1cm5ldGVzLWRhc2hib2FyZCI0b2t1bi1wbW04NCIsImt1YmVybmV0ZXMuaW8vc2VydmljZWFjY291bnQvc2VydmljZS1hY2NvdW50Lm5hbWUiOiJrdWJ1cm5ldGVzLWRhc2hib2FyZCI0b2t1bi1wbW04NCIsImt1YmVybmV0ZXMuaW8vc2VydmljZWFjY291bnQvc2VydmljZS1hY2NvdW50LnVpZCI6IjE5MDY4ZDIzLWZlMTctMTF0S1hZmMyLTQyMDEwYThlMDAwMyIsInN1YiI6InN5c3R1bTprZXJ2aWNlYWVjb3VudC9uYWw1c3R1bTprZXJ2aWNlcm5ldGVzLWRhc2hib2FyZCJ9.aYTUMWr290pjt5i32rb8qXpq4onn3hLhvz6yLSYexgRd6NYSygVUyqnkRsFE1trg9i1ftNXKJdzkY5kQzN3AcpUTvyj_BvJgzNh3JM9p7QMjI8LHTz4TrRZrvwJVWitrEn4VnTQuFVcADFD_rKB9FyI_gvT_QiW5fQm24ygtIgfy0d44263oakG8sL64q7UfQNW2wt5S0orMUtybOmX4CXNUYM8G44ejEtv9GW50sVjEmLIGaoEMX7fctwUN_XCyPdzcG2W0xRHahBjmbCuLz2SSWL52q4nXQmhTq_L8VDDpt6LjEqXW6LtDJZGjVCs2MnBLerQz-ZAgsVaubbQ
```

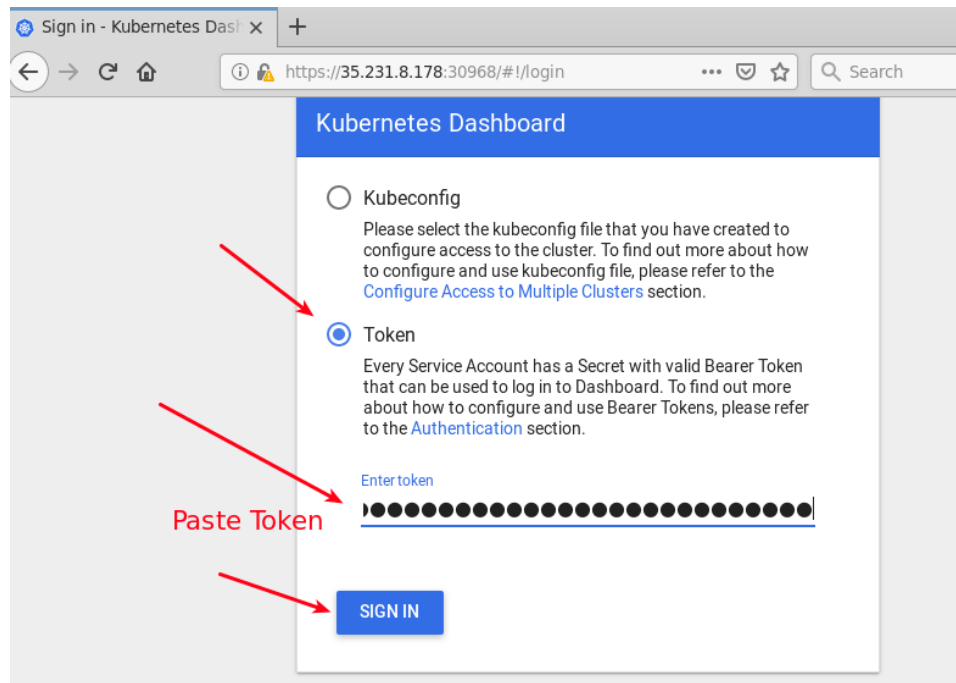


Figure 13.2: External Access via Browser

7. Navigate around the various sections and use the menu to the left as time allows. As the pod view is of the default namespace, you may want to switch over to the `kube-system` namespace or create a new deployment to view the resources via the GUI. Scale the deployment up and down and watch the responsiveness of the GUI.

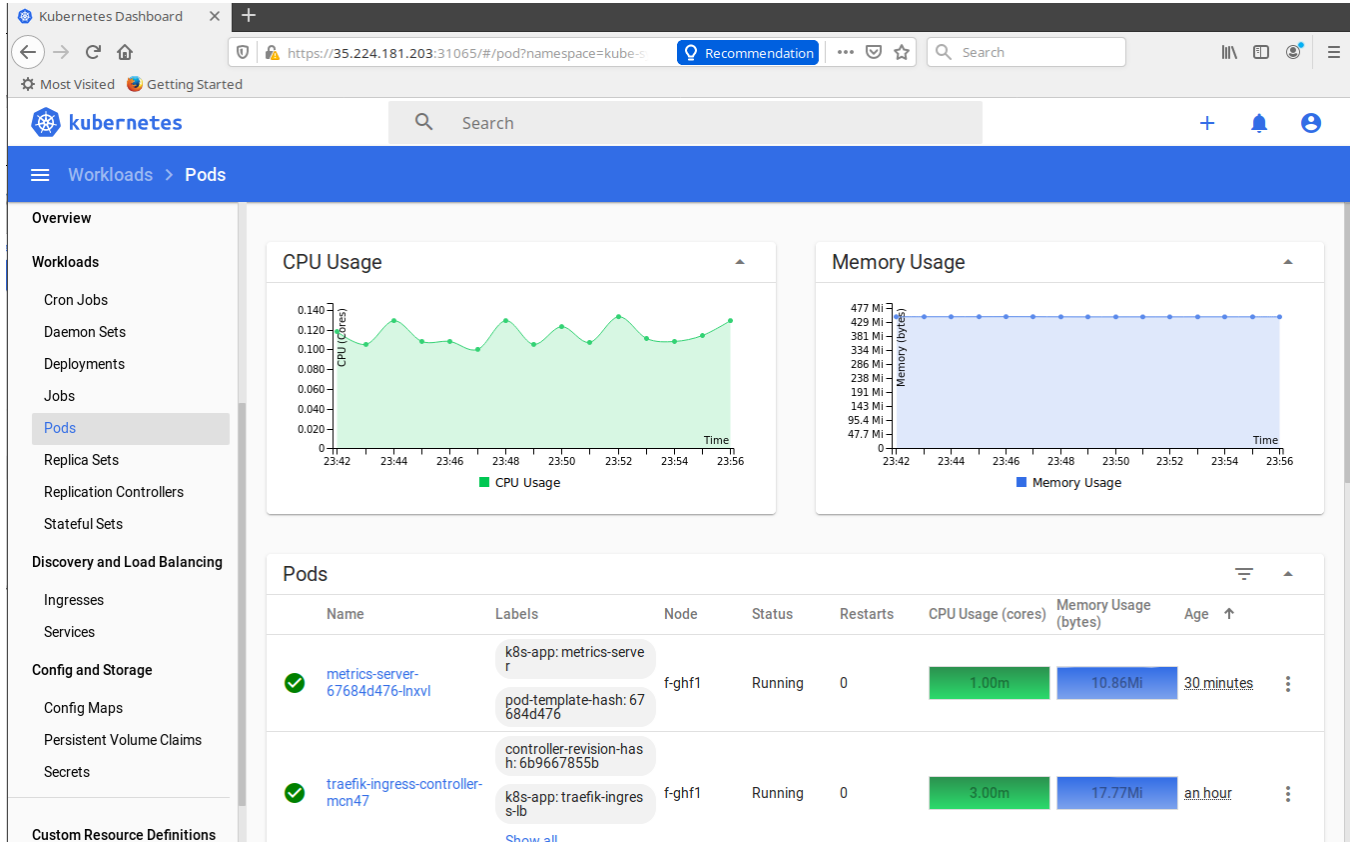


Figure 13.3: External Access via Browser