Class Assignment / Homework VI

Install your first Kubernetes cluster

1. **Install kubectl**
2. **Install K3D**
3. **Spin up your first Kubernetes cluster**
4. **Play a bit with kubectl**
5. **Destroy your first Kubernetes cluster**

Install kubectl

bojan@bojan-VirtualBox:~$ sudo snap install kubectl --classic
kubectl 1.29.4 from Canonical✓ installed

bojan@bojan-VirtualBox:~$ kubectl version
Client Version: v1.29.4
Kustomize Version: v5.0.4-0.20230601165947-6ce0bf390ce3
The connection to the server localhost:8080 was refused - did you specify the right host or port?

bojan@bojan-VirtualBox:~$ kubectl
kubectl controls the Kubernetes cluster manager.

Find more information at: https://kubernetes.io/docs/reference/kubectl/

Basic Commands (Beginner):
create Create a resource from a file or from stdin
expose Take a replication controller, service, deployment or pod and expose it as a new Kubernetes service
run Run a particular image on the cluster
set Set specific features on objects
…

Install K3D

bojan@bojan-VirtualBox:~$ wget -q -O - [https://raw.githubusercontent.com/k3d-io/k3d/main/install.sh](https://raw.githubusercontent.com/k3d-io/k3d/main/) | bash
main: line 75: type: curl: not found
main: line 106: type: curl: not found
main: line 123: type: curl: not found
Preparing to install k3d into /usr/local/bin
k3d installed into /usr/local/bin/k3d
Run 'k3d --help' to see what you can do with it.

bojan@bojan-VirtualBox:~$ k3d
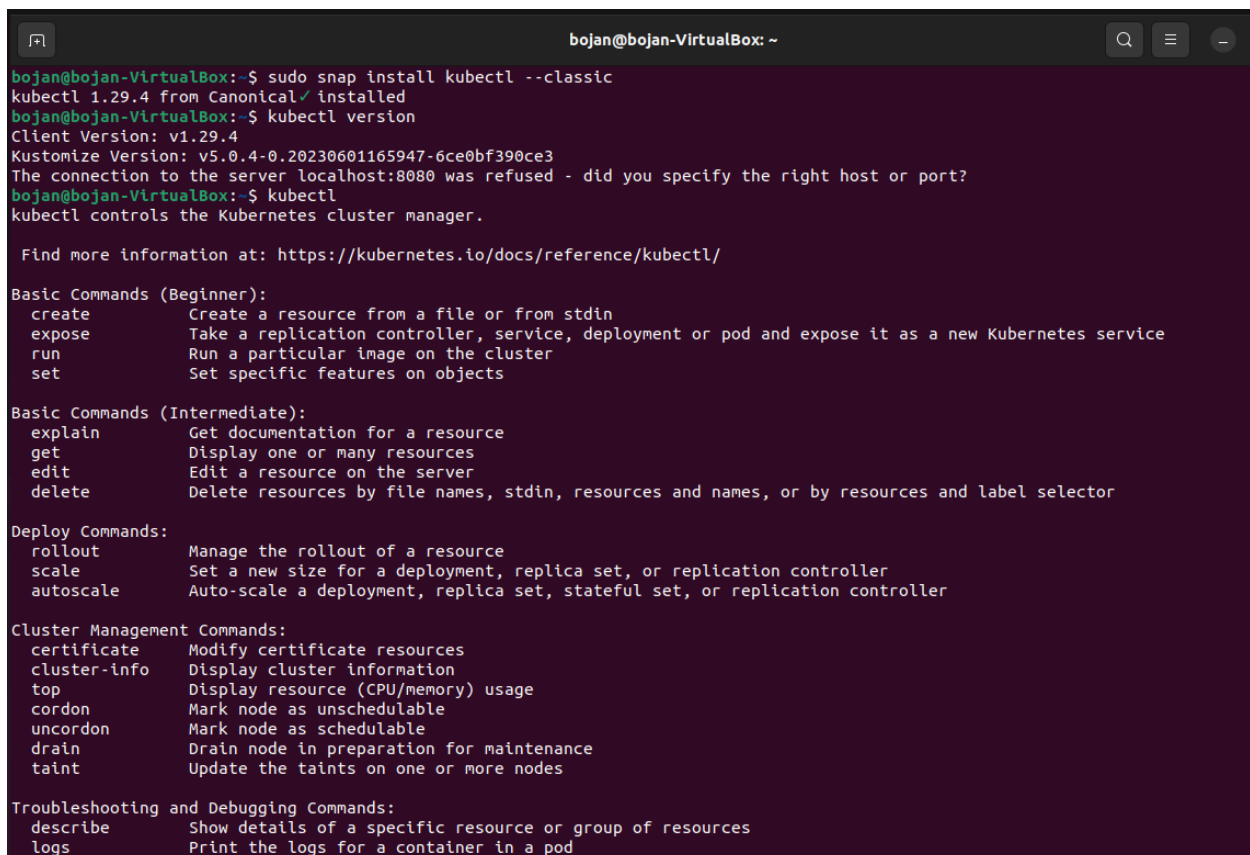Usage:
k3d [flags]
k3d [command]

Available Commands:
cluster Manage cluster(s)
completion Generate completion scripts for [bash, zsh, fish, powershell | psh]
config Work with config file(s)
…

```
bojan@bojan-VirtualBox:~$ sudo snap install kubectl --classic
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bojan@bojan-VirtualBox:~$ kubectl version
Client Version: v1.29.4
Kustomize Version: v5.0.4-0.20230601165947-6ce0bf390ce3
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bojan@bojan-VirtualBox:~$ kubectl
kubectl controls the Kubernetes cluster manager.

 Find more information at: https://kubernetes.io/docs/reference/kubectl/

Basic Commands (Beginner):
  create         Create a resource from a file or from stdin
  expose         Take a replication controller, service, deployment or pod and expose it as a new Kubernetes service
  run            Run a particular image on the cluster
  set            Set specific features on objects

Basic Commands (Intermediate):
  explain        Get documentation for a resource
  get            Display one or many resources
  edit           Edit a resource on the server
  delete         Delete resources by file names, stdin, resources and names, or by resources and label selector

Deploy Commands:
  rollout        Manage the rollout of a resource
  scale          Set a new size for a deployment, replica set, or replication controller
  autoscale      Auto-scale a deployment, replica set, stateful set, or replication controller

Cluster Management Commands:
  certificate    Modify certificate resources
  cluster-info   Display cluster information
  top            Display resource (CPU/memory) usage
  cordon         Mark node as unschedulable
  uncordon       Mark node as schedulable
  drain          Drain node in preparation for maintenance
  taint          Update the taints on one or more nodes

Troubleshooting and Debugging Commands:
  describe       Show details of a specific resource or group of resources
  logs           Print the logs for a container in a pod
```

```
bojan@bojan-VirtualBox:~$ wget -q -O - https://raw.githubusercontent.com/k3d-io/k3d/main/install.sh | bash
main: line 75: type: curl: not found
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Preparing to install k3d into /usr/local/bin
k3d installed into /usr/local/bin/k3d
Run 'k3d --help' to see what you can do with it.
bojan@bojan-VirtualBox:~$ k3d
Usage:
  k3d [flags]
  k3d [command]

Available Commands:
  cluster      Manage cluster(s)
  completion   Generate completion scripts for [bash, zsh, fish, powershell | psh]
  config       Work with config file(s)
  help         Help about any command
  image        Handle container images.
  kubeconfig   Manage kubeconfig(s)
  node         Manage node(s)
  registry     Manage registry/registries
  version      Show k3d and default k3s version

Flags:
  -h, --help          help for k3d
      --timestamps    Enable Log timestamps
      --trace         Enable super verbose output (trace logging)
      --verbose       Enable verbose output (debug logging)
      --version       Show k3d and default k3s version

Use "k3d [command] --help" for more information about a command.
```

Spin up your first Kubernetes cluster

bojan@bojan-VirtualBox:~$ sudo k3d cluster create cluster211151
INFO[0000] Prep: Network
INFO[0000] Created network 'k3d-cluster211151'
INFO[0000] Created image volume k3d-cluster211151-images
INFO[0000] Starting new tools node...
INFO[0001] Creating node 'k3d-cluster211151-server-0'
INFO[0002] Pulling image 'ghcr.io/k3d-io/k3d-tools:5.6.3'
INFO[0004] Pulling image 'docker.io/rancher/k3s:v1.28.8-k3s1'
INFO[0005] Starting node 'k3d-cluster211151-tools'
INFO[0027] Creating LoadBalancer 'k3d-cluster211151-serverlb'
INFO[0029] Pulling image 'ghcr.io/k3d-io/k3d-proxy:5.6.3'
INFO[0042] Using the k3d-tools node to gather environment information
INFO[0043] HostIP: using network gateway 172.20.0.1 address
INFO[0043] Starting cluster 'cluster211151'
INFO[0043] Starting servers...
INFO[0043] Starting node 'k3d-cluster211151-server-0'
INFO[0052] All agents already running.
INFO[0052] Starting helpers...
INFO[0052] Starting node 'k3d-cluster211151-serverlb'
INFO[0060] Injecting records for hostAliases (incl. host.k3d.internal) and for 2 network members into CoreDNS configmap...
INFO[0062] Cluster 'cluster211151' created successfully!

```
bojan@bojan-VirtualBox:~$ sudo k3d cluster create cluster211151
INFO[0000] Prep: Network
INFO[0000] Created network 'k3d-cluster211151'
INFO[0000] Created image volume k3d-cluster211151-images
INFO[0000] Starting new tools node...
INFO[0001] Creating node 'k3d-cluster211151-server-0'
INFO[0002] Pulling image 'ghcr.io/k3d-io/k3d-tools:5.6.3'
INFO[0004] Pulling image 'docker.io/rancher/k3s:v1.28.8-k3s1'
INFO[0005] Starting node 'k3d-cluster211151-tools'
INFO[0027] Creating LoadBalancer 'k3d-cluster211151-serverlb'
INFO[0029] Pulling image 'ghcr.io/k3d-io/k3d-proxy:5.6.3'
INFO[0042] Using the k3d-tools node to gather environment information
INFO[0043] HostIP: using network gateway 172.20.0.1 address
INFO[0043] Starting cluster 'cluster211151'
INFO[0043] Starting servers...
INFO[0043] Starting node 'k3d-cluster211151-server-0'
INFO[0052] All agents already running.
INFO[0052] Starting helpers...
INFO[0052] Starting node 'k3d-cluster211151-serverlb'
INFO[0060] Injecting records for hostAliases (incl. host.k3d.internal) and for 2 network members into CoreDNS configmap...
INFO[0062] Cluster 'cluster211151' created successfully!
INFO[0062] You can now use it like this:
kubectl cluster-info
bojan@bojan-VirtualBox:~$
```

Play a bit with kubectl

bojan@bojan-VirtualBox:~$ sudo kubectl cluster-info

Kubernetes control plane is running at https://0.0.0.0:43943
CoreDNS is running at https://0.0.0.0:43943/api/v1/namespaces/kube-system/services/kube-dns:dns/proxy
Metrics-server is running at https://0.0.0.0:43943/api/v1/namespaces/kube-system/services/https:metrics-server:https/proxy

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


```
bojan@bojan-VirtualBox:~$
bojan@bojan-VirtualBox:~$ sudo kubectl cluster-info
Kubernetes control plane is running at https://0.0.0.0:43943
CoreDNS is running at https://0.0.0.0:43943/api/v1/namespaces/kube-system/services/kube-dns:dns/proxy
Metrics-server is running at https://0.0.0.0:43943/api/v1/namespaces/kube-system/services/https:metrics-server:https/proxy

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.
bojan@bojan-VirtualBox:~$
```

bojan@bojan-VirtualBox:~$ sudo k3d cluster --help
Manage cluster(s)

Usage:
k3d cluster [flags]
k3d cluster [command]
...

bojan@bojan-VirtualBox:~$ sudo k3d cluster list
NAME SERVERS AGENTS LOADBALANCER
cluster211151 1/1 0/0 true

bojan@bojan-VirtualBox:~$ sudo kubectl get nodes
NAME STATUS ROLES AGE VERSION
k3d-cluster211151-server-0 Ready control-plane,master 8m28s v1.28.8+k3s1

bojan@bojan-VirtualBox:~$ sudo kubectl get pods --all-namespaces
NAMESPACE NAME READY STATUS RESTARTS AGE
kube-system local-path-provisioner-6c86858495-sv2sb 1/1 Running 0 8m34s
kube-system coredns-6799fbcd5-2pj2v 1/1 Running 0 8m34s
kube-system metrics-server-54fd9b65b-ftwbh 1/1 Running 0 8m34s
kube-system helm-install-traefik-crd-hrb4v 0/1 Completed 0 8m35s
kube-system helm-install-traefik-mg5n7 0/1 Completed 1 8m35s
kube-system svclb-traefik-a97788c5-7fzlq 2/2 Running 0 7m2s
kube-system traefik-f4564c4f4-rxc8d 1/1 Running 0 7m2s

Destroy your first Kubernetes cluster

bojan@bojan-VirtualBox:~$ sudo k3d cluster delete cluster211151
INFO[0000] Deleting cluster 'cluster211151'
INFO[0002] Deleting cluster network 'k3d-cluster211151'
INFO[0002] Deleting 1 attached volumes...
INFO[0002] Removing cluster details from default kubeconfig...
INFO[0002] Removing standalone kubeconfig file (if there is one)...
INFO[0002] Successfully deleted cluster cluster211151!

bojan@bojan-VirtualBox:~$ sudo kubectl cluster-info
E0419 12:12:43.136739 10864 memcache.go:265] couldn't get current server API group list: Get "http://localhost:8080/api?timeout=32s": dial tcp 127.0.0.1:8080: connect: connection refused
E0419 12:12:43.137757 10864 memcache.go:265] couldn't get current server API group list: Get "http://localhost:8080/api?timeout=32s": dial tcp 127.0.0.1:8080: connect: connection refused
E0419 12:12:43.139895 10864 memcache.go:265] couldn't get current server API group list: Get "http://localhost:8080/api?timeout=32s": dial tcp 127.0.0.1:8080: connect: connection refused

Second Kubernetes cluster with 3 master nodes and 5 worker nodes

bojan@bojan-VirtualBox:~$ sudo k3d cluster create -s 3 -a 5 cluster211151
INFO[0000] Prep: Network
INFO[0000] Created network 'k3d-cluster211151'
INFO[0000] Created image volume k3d-cluster211151-images
INFO[0000] Starting new tools node...
INFO[0000] Creating initializing server node
INFO[0000] Creating node 'k3d-cluster211151-server-0'
INFO[0000] Starting node 'k3d-cluster211151-tools'
INFO[0002] Creating node 'k3d-cluster211151-server-1'
INFO[0003] Creating node 'k3d-cluster211151-server-2'
INFO[0003] Creating node 'k3d-cluster211151-agent-0'
INFO[0003] Creating node 'k3d-cluster211151-agent-1'
INFO[0003] Creating node 'k3d-cluster211151-agent-2'
INFO[0003] Creating node 'k3d-cluster211151-agent-3'
INFO[0003] Creating node 'k3d-cluster211151-agent-4'
INFO[0004] Creating LoadBalancer 'k3d-cluster211151-serverlb'
INFO[0004] Using the k3d-tools node to gather environment information
INFO[0004] HostIP: using network gateway 172.21.0.1 address
INFO[0004] Starting cluster 'cluster211151'
INFO[0004] Starting the initializing server...
INFO[0005] Starting node 'k3d-cluster211151-server-0'
INFO[0011] Starting servers...
INFO[0011] Starting node 'k3d-cluster211151-server-1'
INFO[0034] Starting node 'k3d-cluster211151-server-2'
INFO[0108] Starting agents...
INFO[0110] Starting node 'k3d-cluster211151-agent-2'
INFO[0114] Starting node 'k3d-cluster211151-agent-3'
INFO[0116] Starting node 'k3d-cluster211151-agent-4'
INFO[0116] Starting node 'k3d-cluster211151-agent-1'
INFO[0117] Starting node 'k3d-cluster211151-agent-0'
INFO[0206] Starting helpers...
INFO[0207] Starting node 'k3d-cluster211151-serverlb'
INFO[0224] Injecting records for hostAliases (incl. host.k3d.internal) and for 9 network members into CoreDNS configmap...
INFO[0231] Cluster 'cluster211151' created successfully!
INFO[0232] You can now use it like this:
kubectl cluster-info

bojan@bojan-VirtualBox:~$ sudo kubectl cluster-info
Kubernetes control plane is running at https://0.0.0.0:44507
CoreDNS is running at https://0.0.0.0:44507/api/v1/namespaces/kube-system/services/kube-dns:dns/proxy
Metrics-server is running at https://0.0.0.0:44507/api/v1/namespaces/kube-system/services/https:metrics-server:https/proxy

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

bojan@bojan-VirtualBox:~$ sudo kubectl get nodes
NAME STATUS ROLES AGE VERSION
k3d-cluster211151-agent-0 Ready <none> 96s v1.28.8+k3s1
k3d-cluster211151-agent-1 Ready <none> 96s v1.28.8+k3s1
k3d-cluster211151-agent-2 Ready <none> 99s v1.28.8+k3s1
k3d-cluster211151-agent-3 Ready <none> 93s v1.28.8+k3s1
k3d-cluster211151-agent-4 Ready <none> 86s v1.28.8+k3s1
k3d-cluster211151-server-0 Ready control-plane,etcd,master 4m31s v1.28.8+k3s1
k3d-cluster211151-server-1 Ready control-plane,etcd,master 4m17s v1.28.8+k3s1
k3d-cluster211151-server-2 Ready control-plane,etcd,master 2m53s v1.28.8+k3s1

bojan@bojan-VirtualBox:~$ sudo kubectl get pods --all-namespaces
NAMESPACE NAME READY STATUS RESTARTS AGE
kube-system coredns-6799fbcd5-f24lt 1/1 Running 0 4m54s
kube-system helm-install-traefik-2zd62 0/1 ContainerCreating 0 4m55s
kube-system helm-install-traefik-crd-7pgjh 0/1 ContainerCreating 0 4m55s
kube-system local-path-provisioner-6c86858495-smvhz 1/1 Running 0 4m54s
kube-system metrics-server-54fd9b65b-qq648 1/1 Running 0 4m54s

bojan@bojan-VirtualBox:~$ sudo k3d cluster delete cluster211151
INFO[0001] Deleting cluster 'cluster211151'
INFO[0036] Deleting cluster network 'k3d-cluster211151'
INFO[0037] Deleting 1 attached volumes...
INFO[0037] Removing cluster details from default kubeconfig...
INFO[0037] Removing standalone kubeconfig file (if there is one)...
INFO[0037] Successfully deleted cluster cluster211151!

```
bojan@bojan-VirtualBox:~$ sudo k3d cluster create -s 3 -a 5 cluster211151
INFO[0000] Prep: Network
INFO[0000] Created network 'k3d-cluster211151'
INFO[0000] Created image volume k3d-cluster211151-images
INFO[0000] Starting new tools node...
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INFO[0000] Creating node 'k3d-cluster211151-server-0'
INFO[0000] Starting node 'k3d-cluster211151-tools'
INFO[0002] Creating node 'k3d-cluster211151-server-1'
INFO[0003] Creating node 'k3d-cluster211151-server-2'
INFO[0003] Creating node 'k3d-cluster211151-agent-0'
INFO[0003] Creating node 'k3d-cluster211151-agent-1'
INFO[0003] Creating node 'k3d-cluster211151-agent-2'
INFO[0003] Creating node 'k3d-cluster211151-agent-3'
INFO[0003] Creating node 'k3d-cluster211151-agent-4'
INFO[0004] Creating LoadBalancer 'k3d-cluster211151-serverlb'
INFO[0004] Using the k3d-tools node to gather environment information
INFO[0004] HostIP: using network gateway 172.21.0.1 address
INFO[0004] Starting cluster 'cluster211151'
INFO[0004] Starting the initializing server...
INFO[0005] Starting node 'k3d-cluster211151-server-0'
INFO[0011] Starting servers...
INFO[0011] Starting node 'k3d-cluster211151-server-1'
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INFO[0108] Starting agents...
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INFO[0116] Starting node 'k3d-cluster211151-agent-1'
INFO[0117] Starting node 'k3d-cluster211151-agent-0'
INFO[0206] Starting helpers...
INFO[0207] Starting node 'k3d-cluster211151-serverlb'
INFO[0224] Injecting records for hostAliases (incl. host.k3d.internal) and for 9 network members into CoreDNS configmap...
INFO[0231] Cluster 'cluster211151' created successfully!
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kubectl cluster-info
```



```
bojan@bojan-VirtualBox:~$ sudo kubectl cluster-info
Kubernetes control plane is running at https://0.0.0.0:44507
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Metrics-server is running at https://0.0.0.0:44507/api/v1/namespaces/kube-system/services/https:metrics-server:https/proxy

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.
bojan@bojan-VirtualBox:~$
bojan@bojan-VirtualBox:~$ sudo kubectl get nodes
NAME                         STATUS   ROLES                       AGE     VERSION
k3d-cluster211151-agent-0    Ready    <none>                      96s     v1.28.8+k3s1
k3d-cluster211151-agent-1    Ready    <none>                      96s     v1.28.8+k3s1
k3d-cluster211151-agent-2    Ready    <none>                      99s     v1.28.8+k3s1
k3d-cluster211151-agent-3    Ready    <none>                      93s     v1.28.8+k3s1
k3d-cluster211151-agent-4    Ready    <none>                      86s     v1.28.8+k3s1
k3d-cluster211151-server-0   Ready    control-plane,etcd,master   4m31s   v1.28.8+k3s1
k3d-cluster211151-server-1   Ready    control-plane,etcd,master   4m17s   v1.28.8+k3s1
k3d-cluster211151-server-2   Ready    control-plane,etcd,master   2m53s   v1.28.8+k3s1
bojan@bojan-VirtualBox:~$
bojan@bojan-VirtualBox:~$ sudo kubectl get pods --all-namespaces
NAMESPACE     NAME                                      READY   STATUS             RESTARTS   AGE
kube-system   coredns-6799fbcd5-f24lt                   1/1     Running            0          4m54s
kube-system   helm-install-traefik-2zd62                0/1     ContainerCreating  0          4m55s
kube-system   helm-install-traefik-crd-7pgjh            0/1     ContainerCreating  0          4m55s
kube-system   local-path-provisioner-6c86858495-smvhz   1/1     Running            0          4m54s
kube-system   metrics-server-54fd9b65b-qq648            1/1     Running            0          4m54s
bojan@bojan-VirtualBox:~$
bojan@bojan-VirtualBox:~$ sudo k3d cluster delete cluster211151
INFO[0001] Deleting cluster 'cluster211151'
INFO[0036] Deleting cluster network 'k3d-cluster211151'
INFO[0037] Deleting 1 attached volumes...
INFO[0037] Removing cluster details from default kubeconfig...
INFO[0037] Removing standalone kubeconfig file (if there is one)...
INFO[0037] Successfully deleted cluster cluster211151!
```

Изработил:

Бојан Ристов (211151)