

Lab02 – Upgrading Cluster version with Kubeadm

In this exercise, you will learn how to upgrade the cluster version from 1.28 to 1.29 using kubeadm. The cluster will contain of a single control plane node named `kube-control-plane`, and two workers node named `kube-node1` and `kube-node2`.

Upgrading the Control Plane Node

(<https://kubernetes.io/docs/tasks/administer-cluster/kubeadm/kubeadm-upgrade/>)

1. Shell into the control plane node with `vagrant ssh kube-control-plane`, and find the latest patch release for Kubernetes 1.29

```
brahim@Training:~/k8s-lab$ vagrant ssh kube-control-plane
Last login: Tue Feb 27 20:03:07 2024 from 10.0.2.2
vagrant@kube-control-plane:~$
vagrant@kube-control-plane:~$ kubectl get node
NAME                STATUS    ROLES    AGE   VERSION
kube-control-plane  Ready    control-plane   82m   v1.28.7
kube-node1          Ready    <none>        69m   v1.28.2
kube-node2          Ready    <none>        57m   v1.28.2
vagrant@kube-control-plane:~$
vagrant@kube-control-plane:~$ sudo apt update && sudo apt-cache madison kubeadm
Hit:1 https://prod-cdn.packages.k8s.io/repositories/iscv:/kubernetes:/core:/stable:/v1.29/deb InRelease
Hit:2 https://download.docker.com/linux/ubuntu jammy InRelease
Hit:3 https://mirrors.edge.kernel.org/ubuntu jammy InRelease
Hit:4 https://mirrors.edge.kernel.org/ubuntu jammy-updates InRelease
Hit:5 https://mirrors.edge.kernel.org/ubuntu jammy-backports InRelease
Hit:6 https://mirrors.edge.kernel.org/ubuntu jammy-security InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
6 packages can be upgraded. Run 'apt list --upgradable' to see them.
W: https://download.docker.com/linux/ubuntu/dists/jammy/InRelease: Key is stored in legacy trusted.gpg keyring (/etc/apt/trusted.gpg), see the
DEPRECATION section in apt-key(8) for details.
kubeadm | 1.29.2-1.1 | https://pkgs.k8s.io/core:/stable:/v1.29/deb Packages
kubeadm | 1.29.1-1.1 | https://pkgs.k8s.io/core:/stable:/v1.29/deb Packages
kubeadm | 1.29.0-1.1 | https://pkgs.k8s.io/core:/stable:/v1.29/deb Packages
```

...

2. Upgrade kubeadm to `1.29.2-1.1` via `apt`. Verify that the correct version has been set.

```
vagrant@kube-control-plane:~$ sudo apt-mark unhold kubeadm && sudo apt update && sudo apt install -y kubeadm='1.29.2-1.1' && sudo apt-mark hold kubeadm
kubeadm was already not on hold.
Hit:1 https://download.docker.com/linux/ubuntu jammy InRelease
Hit:3 https://mirrors.edge.kernel.org/ubuntu jammy InRelease
Hit:4 https://mirrors.edge.kernel.org/ubuntu jammy-updates InRelease
Hit:5 https://mirrors.edge.kernel.org/ubuntu jammy-backports InRelease
Hit:6 https://mirrors.edge.kernel.org/ubuntu jammy-security InRelease
Hit:2 https://prod-cdn.packages.k8s.io/repositories/iscv:/kubernetes:/core:/stable:/v1.29/deb InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
6 packages can be upgraded. Run 'apt list --upgradable' to see them.
```

3. Verify that the download works and has the expected version.

```
vagrant@kubernetes-control-plane:~$ kubectl version
kubectl version: &version.Info{Major:"1", Minor:"29", GitVersion:"v1.29.2", GitCommit:"4b8e819355d791d96b7e9d9efe4cbafae2311c88", GitTreeState:"clean", BuildDate:"2024-02-14T10:39:04Z", GoVersion:"go1.21.7", Compiler:"gc", Platform:"linux/amd64"}
vagrant@kubernetes-control-plane:~$
```

4. Verify the upgrade plan.

```
vagrant@kubernetes-control-plane:~$ sudo kubectl upgrade plan
[upgrade/config] Making sure the configuration is correct:
[upgrade/config] Reading configuration from the cluster...
[upgrade/config] FYI: You can look at this config file with 'kubectl -n kube-system get cm kubernetes-config -o yaml'
[preflight] Running pre-flight checks.
[upgrade] Running cluster health checks
[upgrade] Fetching available versions to upgrade to
[upgrade/versions] Cluster version: v1.28.7
[upgrade/versions] kubectl version: v1.29.2
```

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Components that must be upgraded manually after you have upgraded the control plane with 'kubectl upgrade apply':

COMPONENT	CURRENT	TARGET
kubelet	2 x v1.28.2	v1.29.2
	1 x v1.28.7	v1.29.2

Upgrade to the latest version in the v1.28 series:

COMPONENT	CURRENT	TARGET
kube-apiserver	v1.28.7	v1.29.2
kube-controller-manager	v1.28.7	v1.29.2
kube-scheduler	v1.28.7	v1.29.2
kube-proxy	v1.28.7	v1.29.2
CoreDNS	v1.10.1	v1.11.1
etcd	3.5.9-0	3.5.10-0

You can now apply the upgrade by executing the following command:

```
kubectl upgrade apply v1.29.2
```

The table below shows the current state of component configs as understood by this version of kubectl. Configs that have a "yes" mark in the "MANUAL UPGRADE REQUIRED" column require manual config upgrade or resetting to kubectl defaults before a successful upgrade can be performed. The version to manually upgrade to is denoted in the "PREFERRED VERSION" column.

API GROUP	CURRENT VERSION	PREFERRED VERSION	MANUAL UPGRADE REQUIRED
kubeproxy.config.k8s.io	v1alpha1	v1alpha1	no
kubelet.config.k8s.io	v1beta1	v1beta1	no

```
vagrant@kubernetes-control-plane:~$
```

5. Choose a version to upgrade to, and run the appropriate command.

```
vagrant@kubernetes-control-plane:~$ sudo kubectl upgrade apply v1.29.2
[upgrade/config] Making sure the configuration is correct:
[upgrade/config] Reading configuration from the cluster...
[upgrade/config] FYI: You can look at this config file with 'kubectl -n kube-system get cm kubernetes-config -o yaml'
[preflight] Running pre-flight checks.
[upgrade] Running cluster health checks
[upgrade/version] You have chosen to change the cluster version to "v1.29.2"
[upgrade/versions] Cluster version: v1.28.7
[upgrade/versions] kubectl version: v1.29.2
[upgrade] Are you sure you want to proceed? [y/N]: y
[upgrade/prepull] Pulling images required for setting up a Kubernetes cluster
[upgrade/prepull] This might take a minute or two, depending on the speed of your internet connection
[upgrade/prepull] You can also perform this action in beforehand using 'kubectl config images pull'
```

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```
[bootstrap-token] Configured RBAC rules to allow the csrapprover controller automatically approve CSRs from a Node Bootstrap Token
[bootstrap-token] Configured RBAC rules to allow certificate rotation for all node client certificates in the cluster
[addons] Applied essential addon: CoreDNS
[addons] Applied essential addon: kube-proxy

[upgrade/successful] SUCCESS! Your cluster was upgraded to "v1.29.2". Enjoy!

[upgrade/kubelet] Now that your control plane is upgraded, please proceed with upgrading your kubelets if you haven't already done so.
vagrant@kubernetes-control-plane:~$
```

6. Drain the control plane node.

```
vagrant@kubernetes-control-plane:~$ kubectl drain kubernetes-control-plane --ignore-daemonsets
node/kubernetes-control-plane cordoned
Warning: ignoring DaemonSet-managed Pods: kube-system/kube-proxy-75wmr, kube-system/weave-net-pxp9z
node/kubernetes-control-plane drained
vagrant@kubernetes-control-plane:~$
vagrant@kubernetes-control-plane:~$ kubectl get node
```

NAME	STATUS	ROLES	AGE	VERSION
kubernetes-control-plane	Ready,SchedulingDisabled	control-plane	112m	v1.28.7
kubernetes-node1	Ready	<none>	98m	v1.28.2
kubernetes-node2	Ready	<none>	86m	v1.28.2

```
vagrant@kubernetes-control-plane:~$
```

7. Upgrade the kubelet and kubectl.

```
vagrant@kubernetes-control-plane:~$ sudo apt-mark unhold kubectl kubelet && sudo apt update && sudo apt install -y kubectl='1.29.2-1.1' kubelet='1.29.2-1.1' && sudo apt-mark hold kubectl kubelet
kubectl was already not on hold.
kubelet was already not on hold.
Hit:1 https://download.docker.com/linux/ubuntu jammy InRelease
Hit:3 https://mirrors.edge.kernel.org/ubuntu jammy InRelease
```

...

8. Restart the kubelet

```
vagrant@kubernetes-control-plane:~$ sudo systemctl daemon-reload
vagrant@kubernetes-control-plane:~$ sudo systemctl restart kubelet
vagrant@kubernetes-control-plane:~$
vagrant@kubernetes-control-plane:~$
```

9. Uncordon the node

```
vagrant@kubernetes-control-plane:~$ kubectl get node
```

NAME	STATUS	ROLES	AGE	VERSION
kubernetes-control-plane	Ready,SchedulingDisabled	control-plane	119m	v1.29.2
kubernetes-node1	Ready	<none>	106m	v1.28.2
kubernetes-node2	Ready	<none>	94m	v1.28.2

```
vagrant@kubernetes-control-plane:~$
vagrant@kubernetes-control-plane:~$ kubectl uncordon kubernetes-control-plane
node/kubernetes-control-plane uncordoned
vagrant@kubernetes-control-plane:~$
vagrant@kubernetes-control-plane:~$ kubectl get node
```

NAME	STATUS	ROLES	AGE	VERSION
kubernetes-control-plane	Ready	control-plane	120m	v1.29.2
kubernetes-node1	Ready	<none>	106m	v1.28.2
kubernetes-node2	Ready	<none>	94m	v1.28.2

```
vagrant@kubernetes-control-plane:~$
```

Upgrading the Worker Node

(<https://kubernetes.io/docs/tasks/administer-cluster/kubeadm/upgrading-linux-nodes/>)

10. Shell into the worker node with `vagrant ssh kube-node1` and Upgrade kubeadm to `1.28.2-00` via `apt`. Verify that the correct version has been set.

```
brahim@Training:~/k8s-lab$ vagrant ssh kube-node1
Last login: Tue Feb 27 20:44:17 2024 from 10.0.2.2
vagrant@kube-node1:~$ sudo apt-mark unhold kubeadm && sudo apt update && sudo apt install -y kubeadm='1.29.2-1.1' && sudo apt-mark hold kubeadm
kubeadm was already not on hold.
Hit:1 https://download.docker.com/linux/ubuntu jammy InRelease
Hit:2 https://prod-cdn.packages.k8s.io/repositories/lsv:/kubernetes:/core:/stable:/v1.29/deb InRelease
0% [Working]
```

...

11. Call "kubeadm upgrade node"

```
vagrant@kube-node1:~$ sudo kubeadm upgrade node
[upgrade] Reading configuration from the cluster...
[upgrade] FYI: You can look at this config file with 'kubectl -n kube-system get cm kubeadm-config -o yaml'
[preflight] Running pre-flight checks
[preflight] Skipping prepull. Not a control plane node.
[upgrade] Skipping phase. Not a control plane node.
[upgrade] Backing up kubelet config file to /etc/kubernetes/tmp/kubeadm-kubelet-config2088691062/config.yaml
[kubelet-start] Writing kubelet configuration to file "/var/lib/kubelet/config.yaml"
[upgrade] The configuration for this node was successfully updated!
[upgrade] Now you should go ahead and upgrade the kubelet package using your package manager.
vagrant@kube-node1:~$
```

12. Drain the node.

```
brahim@Training:~/k8s-lab$ vagrant ssh kube-control-plane
Last login: Tue Feb 27 20:46:05 2024 from 10.0.2.2
vagrant@kube-control-plane:~$ kubectl drain kube-node1 --ignore-daemonsets
node/kube-node1 cordoned
Warning: ignoring DaemonSet-managed Pods: kube-system/kube-proxy-64d5z, kube-system/weave-net-hr6wb
evicting pod kube-system/coredns-76f75df574-49qxr

pod/coredns-76f75df574-49qxr evicted
node/kube-node1 drained
vagrant@kube-control-plane:~$
vagrant@kube-control-plane:~$ kubectl get node
NAME                STATUS              ROLES    AGE   VERSION
kube-control-plane  Ready              control-plane   124m   v1.29.2
kube-node1          Ready,SchedulingDisabled <none>    111m   v1.28.2
kube-node2          Ready              <none>       99m   v1.28.2
vagrant@kube-control-plane:~$
logout
brahim@Training:~/k8s-lab$
```

13. Upgrade the kubelet and kubectl

```

brahim@Training:~/k8s-lab$ vagrant ssh kube-node1
Last login: Tue Feb 27 20:44:30 2024 from 10.0.2.2
vagrant@kube-node1:~$ sudo apt-mark unhold kubectl kubelet && sudo apt update && sudo apt install -y kubectl='1.29.2-1.1' kubelet='1.29.2-1.1'
&& sudo apt-mark hold kubectl kubelet
kubectl was already not on hold.
kubelet was already not on hold.
Hit:1 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/stable:/v1.29/deb InRelease
Hit:2 https://mirrors.edge.kernel.org/ubuntu jammy InRelease
Hit:3 https://download.docker.com/linux/ubuntu jammy InRelease
Hit:4 https://mirrors.edge.kernel.org/ubuntu jammy-updates InRelease
Hit:5 https://mirrors.edge.kernel.org/ubuntu jammy-backports InRelease
Hit:6 https://mirrors.edge.kernel.org/ubuntu jammy-security InRelease

```

...

14. Restart the kubelet and then uncordon the node

```

vagrant@kube-node1:~$ sudo systemctl daemon-reload
vagrant@kube-node1:~$ sudo systemctl restart kubelet.service
vagrant@kube-node1:~$
logout
brahim@Training:~/k8s-lab$ vagrant ssh kube-control-plane
Last login: Tue Feb 27 20:47:48 2024 from 10.0.2.2
vagrant@kube-control-plane:~$ kubectl uncordon kube-node1
node/kube-node1 uncordoned
vagrant@kube-control-plane:~$
vagrant@kube-control-plane:~$ kubectl get node

```

NAME	STATUS	ROLES	AGE	VERSION
kube-control-plane	Ready	control-plane	130m	v1.29.2
kube-node1	Ready	<none>	117m	v1.29.2
kube-node2	Ready	<none>	105m	v1.28.2

```

vagrant@kube-control-plane:~$

```

15. Apply the same commands on kube-node2 to upgrade it from 1.28 to 1.29 version