Lab17 – Troubleshooting an issue with Worker Node

In this exercise, you will learn how to troubleshooting the underlying issue of worker node. The cluster will contain of a single control plane node named `kube-control-plane`, and two workers nodes named `kube-node1` and `kube-node2`.

1. Apply the `problem-setup.sh` script to kube-node1 worker node.

```
brahim@Training:~/lab17-troubleshooting-worker-node$ scp problem-setup.sh vagrant@192.168.56.11:~/
vagrant@192.168.56.11's password:
problem-setup.sh                                                                              100%  316   396.4KB/s   00:00
brahim@Training:~/lab17-troubleshooting-worker-node$ ssh vagrant@192.168.56.11
vagrant@192.168.56.11's password:
Last login: Fri Mar  8 21:07:52 2024 from 10.0.2.2
vagrant@kube-node1:~$ ./problem-setup.sh
vagrant@kube-node1:~$
vagrant@kube-node1:~$ exit
logout
Connection to 192.168.56.11 closed.
brahim@Training:~/lab17-troubleshooting-worker-node$
```

2. Have a look at the status of the nodes. The worker node has an issue indicated by "NotReady".

```
brahim@Training:~/lab17-troubleshooting-worker-node$ kubectl get node -owide
NAME                STATUS     ROLES           AGE   VERSION   INTERNAL-IP     EXTERNAL-IP   OS-IMAGE             KERNEL-VERSION      CONTAIN
ER-RUNTIME
kube-control-plane   Ready      control-plane   10d   v1.29.2   192.168.56.10   <none>        Ubuntu 22.04.4 LTS   5.15.0-97-generic   contain
erd://1.6.28
kube-node1           NotReady   <none>          10d   v1.29.2   192.168.56.11   <none>        Ubuntu 22.04.2 LTS   5.15.0-69-generic   contain
erd://1.6.28
kube-node2           Ready      <none>          10d   v1.29.2   192.168.56.12   <none>        Ubuntu 22.04.2 LTS   5.15.0-69-generic   contain
erd://1.6.28
brahim@Training:~/lab17-troubleshooting-worker-node$
brahim@Training:~/lab17-troubleshooting-worker-node$
```

The events of the worker node to not expose any apparent issues.

```
brahim@Training:~/lab17-troubleshooting-worker-node$ kubectl describe node kube-node1
Name:               kube-node1
Roles:              <none>
Labels:             beta.kubernetes.io/arch=amd64
                    beta.kubernetes.io/os=linux
                    color=green
                    kubernetes.io/arch=amd64
                    kubernetes.io/hostname=kube-node1
                    kubernetes.io/os=linux
Annotations:        kubeadm.alpha.kubernetes.io/cri-socket: unix:///var/run/containerd/containerd.sock
                    node.alpha.kubernetes.io/ttl: 0
                    volumes.kubernetes.io/controller-managed-attach-detach: true
CreationTimestamp:  Tue, 27 Feb 2024 19:55:29 +0100
Taints:             node.kubernetes.io/unreachable:NoExecute
                    node.kubernetes.io/unreachable:NoSchedule
Unschedulable:      false
Lease:
  HolderIdentity:  kube-node1
  AcquireTime:     <unset>
```

3. Shell into the node having an issue and identify the root cause.

```
brahim@Training:~/lab17-troubleshooting-worker-node$ ssh vagrant@192.168.56.11
vagrant@192.168.56.11's password:
Last login: Fri Mar  8 21:16:15 2024 from 192.168.56.1
vagrant@kube-node1:~$
vagrant@kube-node1:~$  sudo journalctl -u kubelet.service | tail
Mar 08 21:17:33 kube-node1 systemd[1]: kubelet.service: Failed with result 'exit-code'.
Mar 08 21:17:43 kube-node1 systemd[1]: kubelet.service: Scheduled restart job, restart counter is at 31.
Mar 08 21:17:43 kube-node1 systemd[1]: Stopped kubelet: The Kubernetes Node Agent.
Mar 08 21:17:43 kube-node1 systemd[1]: Started kubelet: The Kubernetes Node Agent.
Mar 08 21:17:43 kube-node1 kubelet[7144]: Flag --container-runtime-endpoint has been deprecated, This parameter should be set via the config f
ile specified by the Kubelet's --config flag. See https://kubernetes.io/docs/tasks/administer-cluster/kubelet-config-file/ for more informatio
n.
Mar 08 21:17:43 kube-node1 kubelet[7144]: Flag --pod-infra-container-image has been deprecated, will be removed in a future release. Image gar
bage collector will get sandbox image information from CRI.
Mar 08 21:17:43 kube-node1 kubelet[7144]: I0308 21:17:43.586356    7144 server.go:204] "--pod-infra-container-image will not be pruned by the
image garbage collector in kubelet and should also be set in the remote runtime"
Mar 08 21:17:43 kube-node1 kubelet[7144]: E0308 21:17:43.598748    7144 run.go:74] "command failed" err="failed to construct kubelet dependenc
ies: unable to load client CA file /etc/kubernetes/pki/non-existent-ca.crt: open /etc/kubernetes/pki/non-existent-ca.crt: no such file or dire
ctory"
Mar 08 21:17:43 kube-node1 systemd[1]: kubelet.service: Main process exited, code=exited, status=1/FAILURE
Mar 08 21:17:43 kube-node1 systemd[1]: kubelet.service: Failed with result 'exit-code'.
vagrant@kube-node1:~$
vagrant@kube-node1:~$
```

The `journalctl` can provide useful information about the service. It looks like the client CA file is misconfigured.

The configuration file can be discovered by rendering the status of the service. The drop-in value points to `/etc/systemd/system/kubelet.service.d/10-kubeadm.conf`.

```
vagrant@kube-node1:~$ systemctl status kubelet.service
● kubelet.service - kubelet: The Kubernetes Node Agent
     Loaded: loaded (/lib/systemd/system/kubelet.service; enabled; vendor preset: enabled)
    Drop-In: /usr/lib/systemd/system/kubelet.service.d
             └─10-kubeadm.conf
     Active: activating (auto-restart) (Result: exit-code) since Fri 2024-03-08 21:20:27 UTC; 3s ago
       Docs: https://kubernetes.io/docs/
    Process: 7313 ExecStart=/usr/bin/kubelet $KUBELET_KUBECONFIG_ARGS $KUBELET_CONFIG_ARGS $KUBELET_KUBEADM_ARGS $KUBELET_EXTRA_ARGS (code=ex>
   Main PID: 7313 (code=exited, status=1/FAILURE)
        CPU: 56ms
```

The value of the environment variable `KUBELET_CONFIG_ARGS` is `--config=/var/lib/kubelet/config.yaml`. Upon inspection of the file, the value of `authentication.x509.clientCAFile` is `/etc/kubernetes/pki/non-existent-ca.crt`. This file does not exist. Let's fix the file by changing to `clientCAFile: /etc/kubernetes/pki/ca.crt`.

```
vagrant@kube-node1:~$ sudo cat /var/lib/kubelet/config.yaml
apiVersion: kubelet.config.k8s.io/v1beta1
authentication:
  anonymous:
    enabled: false
  webhook:
    cacheTTL: 0s
    enabled: true
  x509:
    clientCAFile: /etc/kubernetes/pki/non-existent-ca.crt
authorization:
  mode: Webhook

vagrant@kube-node1:~$ ls /etc/kubernetes/pki/non-existent-ca.crt
ls: cannot access '/etc/kubernetes/pki/non-existent-ca.crt': No such file or directory
vagrant@kube-node1:~$
vagrant@kube-node1:~$ ls /etc/kubernetes/pki/
ca.crt
vagrant@kube-node1:~$
vagrant@kube-node1:~$
```

4. Fix the root cause and restart the node. should render `Successfully connected to database!`, a failure response should render `Failed to connect to database: <error message>`.

```
apiVersion: kubelet.config.k8s.io/v1beta1
authentication:
  anonymous:
    enabled: false
  webhook:
    cacheTTL: 0s
    enabled: true
  x509:
#    clientCAFile: /etc/kubernetes/pki/non-existent-ca.crt
    clientCAFile: /etc/kubernetes/pki/ca.crt
authorization:
  mode: Webhook

vagrant@kube-node1:~$ sudo vim /var/lib/kubelet/config.yaml
vagrant@kube-node1:~$
vagrant@kube-node1:~$ sudo systemctl daemon-reload
vagrant@kube-node1:~$ sudo systemctl restart kubelet
vagrant@kube-node1:~$
vagrant@kube-node1:~$
```

5. The status of the previously failing node should say "Ready".

```
vagrant@kube-node1:~$
logout
Connection to 192.168.56.11 closed.
brahim@Training:~/lab17-troubleshooting-worker-node$ kubectl get node -owide
NAME                STATUS   ROLES           AGE   VERSION   INTERNAL-IP     EXTERNAL-IP   OS-IMAGE             KERNEL-VERSION      CONTAINER
-RUNTIME
kube-control-plane   Ready    control-plane   10d   v1.29.2   192.168.56.10   <none>        Ubuntu 22.04.4 LTS   5.15.0-97-generic   container
d://1.6.28
kube-node1           Ready    <none>          10d   v1.29.2   192.168.56.11   <none>        Ubuntu 22.04.2 LTS   5.15.0-69-generic   container
d://1.6.28
kube-node2           Ready    <none>          10d   v1.29.2   192.168.56.12   <none>        Ubuntu 22.04.2 LTS   5.15.0-69-generic   container
d://1.6.28
brahim@Training:~/lab17-troubleshooting-worker-node$
```