Kubernetes Lab

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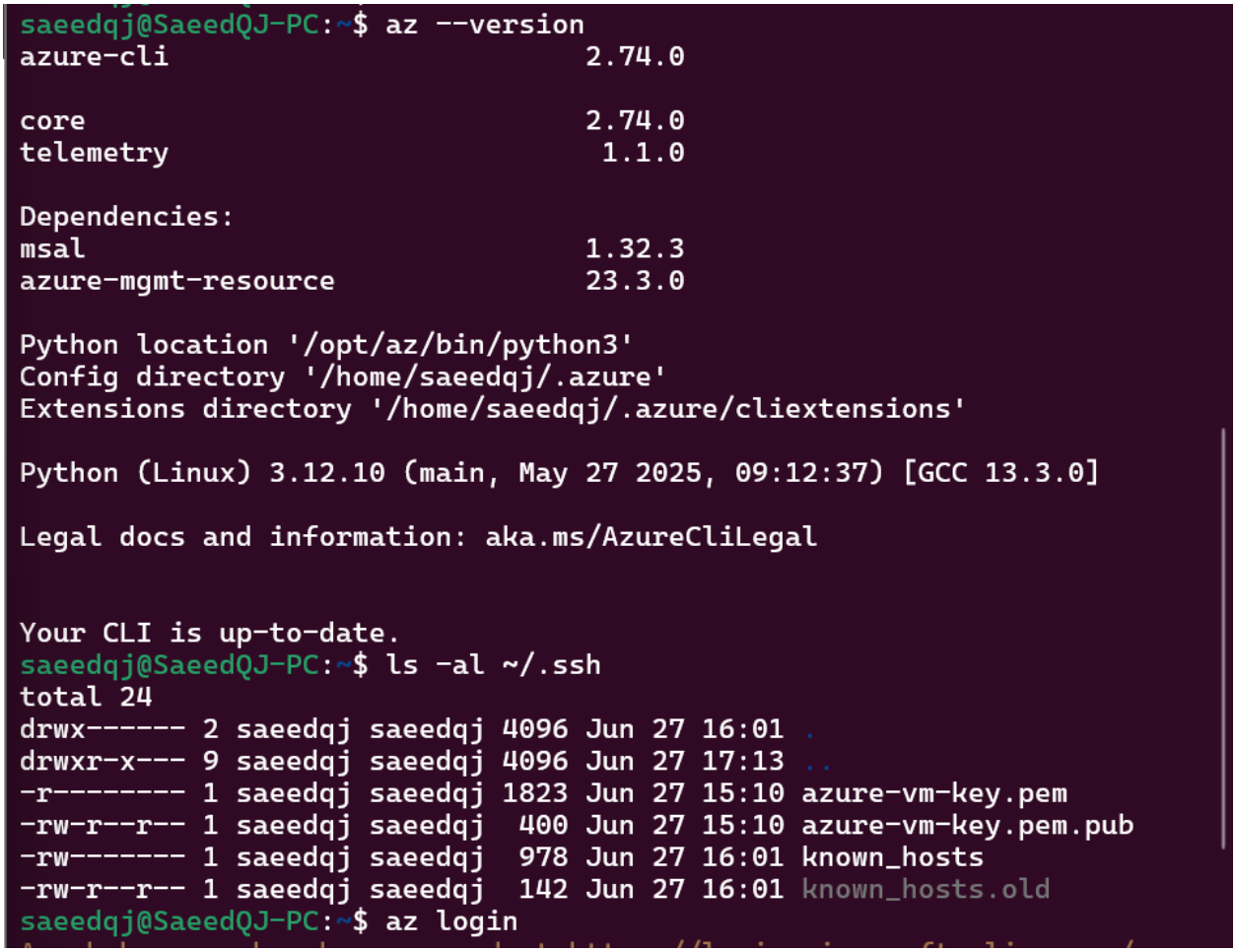
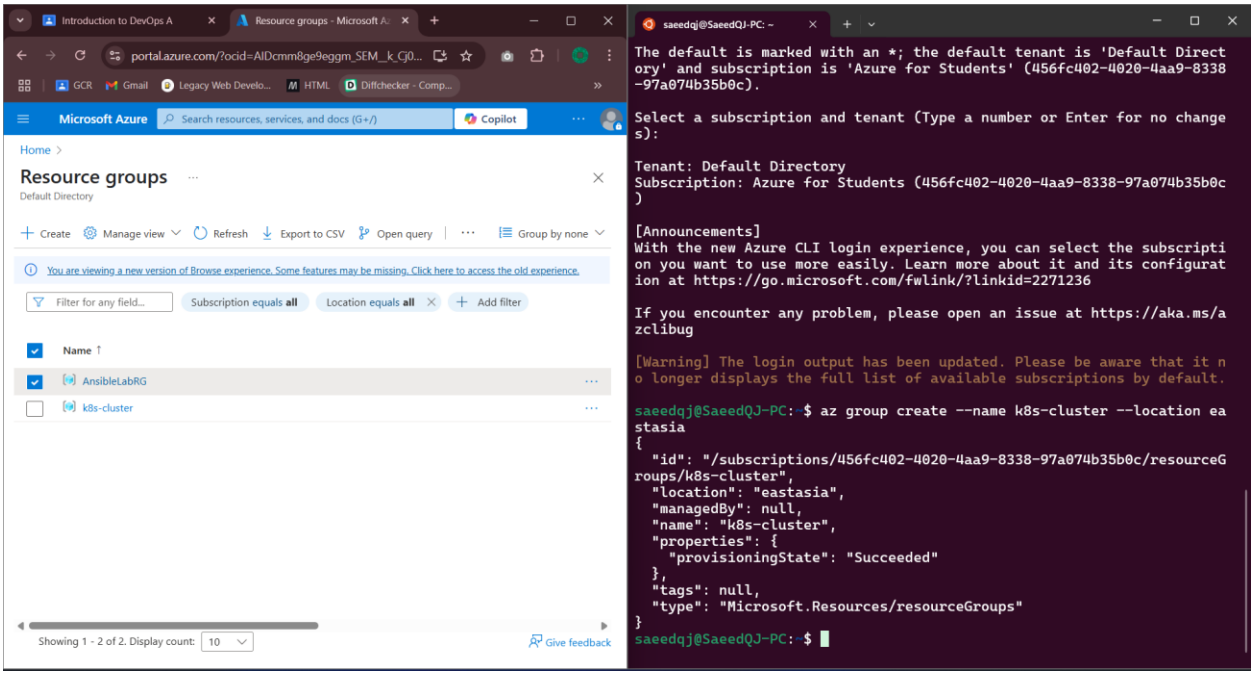
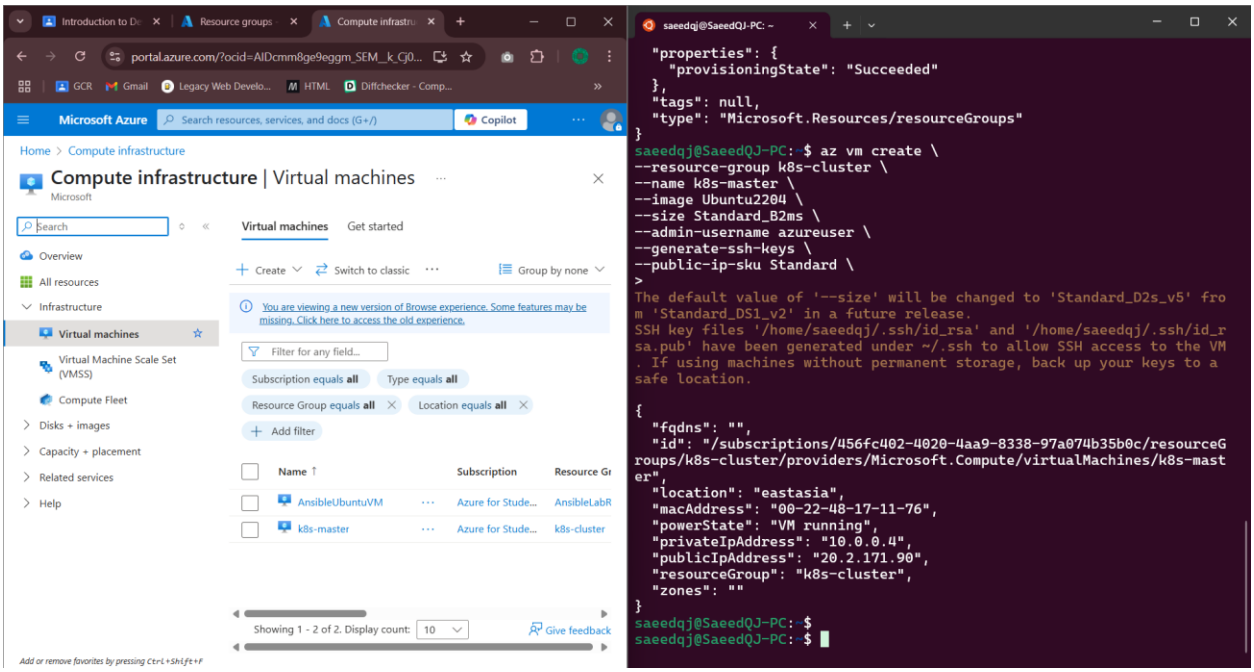
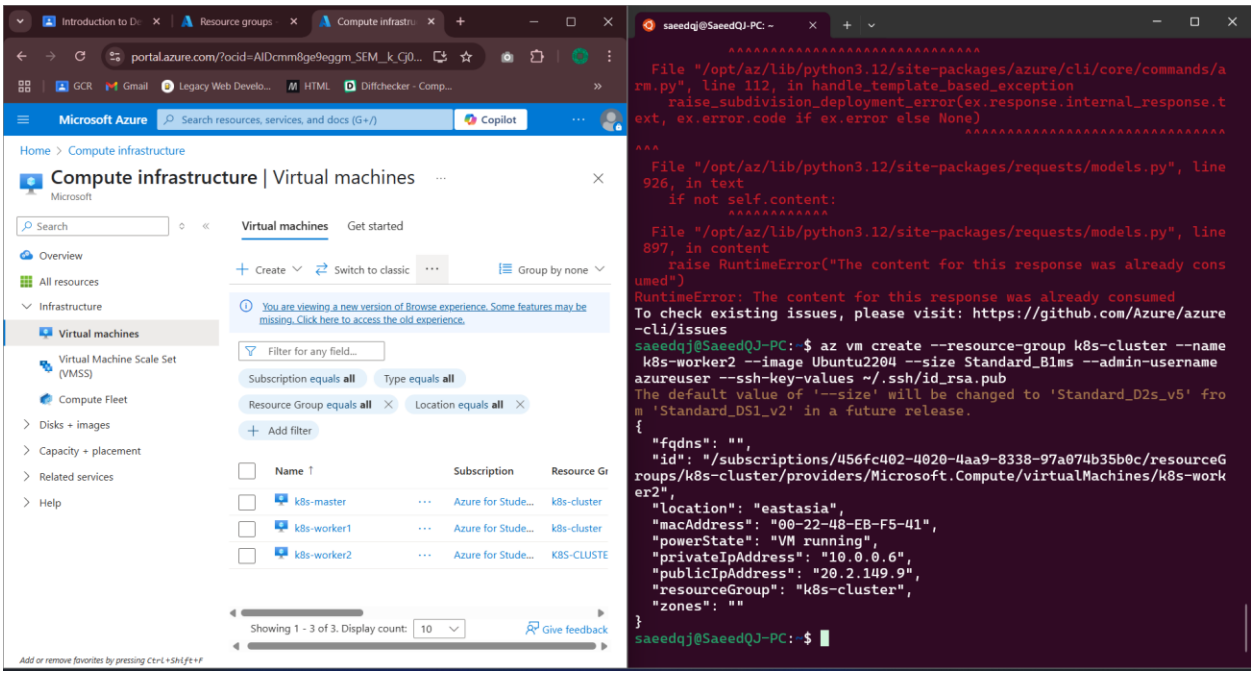






Needed to delete AnsibleUbuntuVM that was created earlier so that I could match the quota that was assigned for free version. 3 Public IP address could be assigned and I was trying to create a 4th as the requirements requested.




```
saeedqj@SaeedQJ-PC:~$ az network nsg rule create \
  --resource-group k8s-cluster \
  --nsg-name k8s-masterNSG \
  --name kubernetes-api \
  --protocol tcp \
  --priority 1010 \
  --destination-port-range 6443 \
  --access Allow \
  --direction Inbound \
  --source-address-prefix '*'
{
  "access": "Allow",
  "destinationAddressPrefix": "*",
  "destinationAddressPrefixes": [],
  "destinationPortRange": "6443",
  "destinationPortRanges": [],
  "direction": "Inbound",
  "etag": "W/\"b1bbc1e1-5bfc-4450-a568-b76227eb5bcd\"",
  "id": "/subscriptions/456fc402-4020-4aa9-8338-97a074b35b0c/resourceGroups/k8s-cluster/providers/Microsoft.Network/networkSecurityGroups/k8s-masterNSG/securityRules/kubernetes-api",
  "name": "kubernetes-api",
  "priority": 1010,
  "protocol": "Tcp",
  "provisioningState": "Succeeded",
  "resourceGroup": "k8s-cluster",
  "sourceAddressPrefix": "*",
  "sourceAddressPrefixes": [],
  "sourcePortRange": "*",
  "sourcePortRanges": [],
  "type": "Microsoft.Network/networkSecurityGroups/securityRules"
}
saeedqj@SaeedQJ-PC:~$
```

Setup of all three machines done.

```
Last login: Sat Jun 28 10:34:05 2025 from 175.107.224.122
azureuser@k8s-master:~$ MASTER_PRIVATE_IP=$(ip -4 addr show eth0 | gre
p -oP '(?<=inet\s)\d+(\.\d+){3}')
echo "Master node private IP is: $MASTER_PRIVATE_IP"
Master node private IP is: 10.0.0.4
azureuser@k8s-master:~$
```

```
azureuser@k8s-master:~$ sudo kubeadm init --pod-network-cidr=10.244.0.
0/16 --apiserver-advertise-address=$MASTER_PRIVATE_IP
I0628 11:04:58.730513    3862 version.go:256] remote version is much n
ewer: v1.33.2; falling back to: stable-1.28
[init] Using Kubernetes version: v1.28.15
[preflight] Running pre-flight checks
[preflight] Pulling images required for setting up a Kubernetes cluste
r
[preflight] This might take a minute or two, depending on the speed of
 your internet connection
[preflight] You can also perform this action in beforehand using 'kube
adm config images pull'
W0628 11:05:19.563042    3862 checks.go:835] detected that the sandbox
```

```
azureuser@k8s-master:~$ mkdir -p $HOME/.kube
azureuser@k8s-master:~$ sudo cp -i /etc/kubernetes/admin.conf $HOME/.k
ube/config
azureuser@k8s-master:~$ sudo chown $(id -u):$(id -g) $HOME/.kube/confi
g
azureuser@k8s-master:~$
```

```
azureuser@k8s-master:~$ kubectl apply -f https://docs.projectcalico.or
g/v3.24/manifests/calico.yaml
poddisruptionbudget.policy/calico-kube-controllers created
serviceaccount/calico-kube-controllers created
serviceaccount/calico-node created
configmap/calico-config created
customresourcedefinition.apiextensions.k8s.io/bgpconfigurations.crd.pr
```

```
deployment.apps/calico-kube-controllers created
azureuser@k8s-master:~$ kubectl get nodes
NAME         STATUS   ROLES           AGE     VERSION
k8s-master   Ready    control-plane   2m59s   v1.28.1
azureuser@k8s-master:~$ kubectl get pods --all-namespaces
NAMESPACE     NAME                                 READY   STATUS              RESTARTS   AGE
kube-system   calico-kube-controllers-7d8788dbf-7xtlq   0/1     ContainerCreating   0          42s
kube-system   calico-node-mbj7t                    1/1     Running             0          42s
kube-system   coredns-5dd5756b68-m8597             1/1     Running             0          2m46s
kube-system   coredns-5dd5756b68-vs78p             1/1     Running             0          2m46s
kube-system   etcd-k8s-master                      1/1     Running             0          3m6s
kube-system   kube-apiserver-k8s-master            1/1     Running             0          3m5s
kube-system   kube-controller-manager-k8s-master   1/1     Running             0          3m5s
kube-system   kube-proxy-5dw2j                     1/1     Running             0          2m51s
kube-system   kube-scheduler-k8s-master            1/1     Running             0          3m5s
azureuser@k8s-master:~$
```

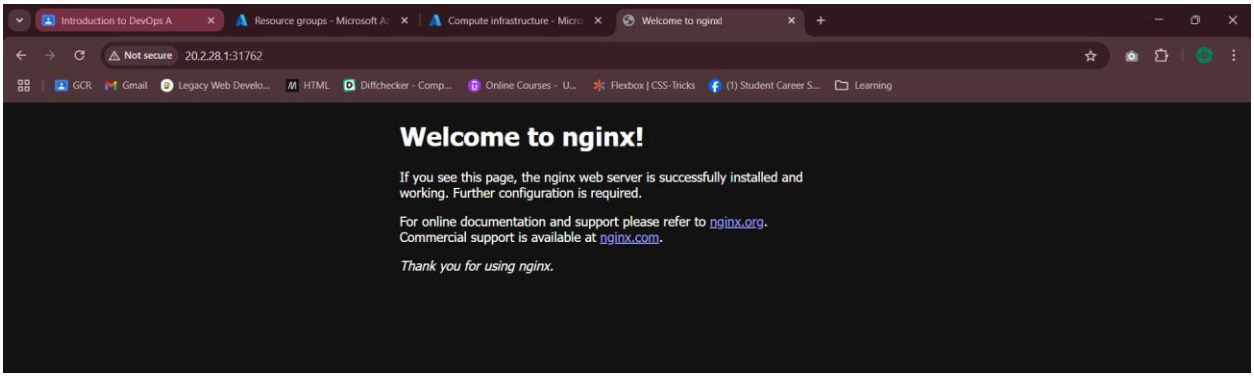
```
azureuser@k8s-worker2:~$ sudo kubeadm join 10.0.0.4:6443 --token 5c0rj2.2b3628iilrkln8a8 \
        --discovery-token-ca-cert-hash sha256:4461ed9b5adab377635e35e30da543f670fc006cd87522c144a5012511ac60b4
[preflight] Running pre-flight checks
[preflight] Reading configuration from the cluster...
[preflight] FYI: You can look at this config file with 'kubectl -n kube-system get cm kubeadm-config -o yaml'
[kubelet-start] Writing kubelet configuration to file "/var/lib/kubelet/config.yaml"
[kubelet-start] Writing kubelet environment file with flags to file "/var/lib/kubelet/kubeadm-flags.env"
[kubelet-start] Starting the kubelet
[kubelet-start] Waiting for the kubelet to perform the TLS Bootstrap...

This node has joined the cluster:
* Certificate signing request was sent to apiserver and a response was received.
* The Kubelet was informed of the new secure connection details.

Run 'kubectl get nodes' on the control-plane to see this node join the cluster.
```

Same we did for worker node 1 and join it to the master node.

```
azureuser@k8s-master:~$ kubectl get nodes
NAME          STATUS   ROLES           AGE     VERSION
k8s-master    Ready    control-plane   10m     v1.28.1
k8s-worker1   Ready    <none>          3m20s   v1.28.1
k8s-worker2   Ready    <none>          101s    v1.28.1
azureuser@k8s-master:~$
```

```
Last login: Sat Jun 28 11:00:36 2025 from 175.107.224.122
azureuser@k8s-master:~$ kubectl get nodes
NAME          STATUS   ROLES           AGE     VERSION
k8s-master    Ready    control-plane   10m     v1.28.1
k8s-worker1   Ready    <none>          3m20s   v1.28.1
k8s-worker2   Ready    <none>          101s    v1.28.1
azureuser@k8s-master:~$ nano nginx-deployment.yaml
azureuser@k8s-master:~$ kubectl apply -f nginx-deployment.yaml
deployment.apps/nginx-deployment created
azureuser@k8s-master:~$ kubectl get deployments
NAME               READY   UP-TO-DATE   AVAILABLE   AGE
nginx-deployment   2/2     2            2           33s
azureuser@k8s-master:~$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
nginx-deployment-7c79c4bf97-2gd5r   1/1     Running   0          39s
nginx-deployment-7c79c4bf97-fvm9z   1/1     Running   0          39s
azureuser@k8s-master:~$ kubectl expose deployment nginx-deployment --type=NodePort --port=80
service/nginx-deployment exposed
azureuser@k8s-master:~$ kubectl get svc
NAME               TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)        AGE
kubernetes         ClusterIP   10.96.0.1        <none>        443/TCP        14m
nginx-deployment   NodePort    10.108.173.207   <none>        80:31762/TCP   14s
```

```
saeedqj@SaeedQJ-PC: ~
azureuser@k8s-master:~$ exit
logout
Connection to 20.2.171.90 closed.
saeedqj@SaeedQJ-PC:~$ az vm list-ip-addresses -g k8s-cluster --name k8s-worker1
[
  {
    "virtualMachine": {
      "name": "k8s-worker1",
      "network": {
        "privateIpAddresses": [
          "10.0.0.5"
        ],
        "publicIpAddresses": [
          {
            "id": "/subscriptions/456fc402-4020-4aa9-8338-97a074b35b0c/resourceGroups/k8s-cluster/providers/Microsoft.Network/publicIPAddresses/
k8s-worker1PublicIP",
            "ipAddress": "20.2.28.1",
            "ipAllocationMethod": "Static",
            "name": "k8s-worker1PublicIP",
            "resourceGroup": "k8s-cluster",
            "zone": null
          }
        ]
      },
      "resourceGroup": "k8s-cluster"
    }
  }
]
saeedqj@SaeedQJ-PC:~$
```




```
azureuser@k8s-master: ~

Last login: Sat Jun 28 11:15:53 2025 from 175.107.224.122
azureuser@k8s-master:~$ kubectl scale deployment nginx-deployment --replicas=4
deployment.apps/nginx-deployment scaled
azureuser@k8s-master:~$ kubectl get pods
NAME                               READY   STATUS    RESTARTS   AGE
nginx-deployment-7c79c4bf97-2gd5r   1/1     Running   0          13m
nginx-deployment-7c79c4bf97-42585   1/1     Running   0          15s
nginx-deployment-7c79c4bf97-9kgzm   1/1     Running   0          15s
nginx-deployment-7c79c4bf97-fvm9z   1/1     Running   0          13m
azureuser@k8s-master:~$ kubectl logs nginx-deployment-7c79c4bf97-2gd5r
/docker-entrypoint.sh: /docker-entrypoint.d/ is not empty, will attempt to perform configuration
/docker-entrypoint.sh: Looking for shell scripts in /docker-entrypoint.d/
/docker-entrypoint.sh: Launching /docker-entrypoint.d/10-listen-on-ipv6-by-default.sh
10-listen-on-ipv6-by-default.sh: info: Getting the checksum of /etc/nginx/conf.d/default.conf
10-listen-on-ipv6-by-default.sh: info: Enabled listen on IPv6 in /etc/nginx/conf.d/default.conf
/docker-entrypoint.sh: Sourcing /docker-entrypoint.d/15-local-resolvers.envsh
/docker-entrypoint.sh: Launching /docker-entrypoint.d/20-envsubst-on-templates.sh
/docker-entrypoint.sh: Launching /docker-entrypoint.d/30-tune-worker-processes.sh
/docker-entrypoint.sh: Configuration complete; ready for start up
2025/06/28 11:18:43 [notice] 1#1: using the "epoll" event method
2025/06/28 11:18:43 [notice] 1#1: nginx/1.29.0
2025/06/28 11:18:43 [notice] 1#1: built by gcc 12.2.0 (Debian 12.2.0-14+deb12u1)
2025/06/28 11:18:43 [notice] 1#1: OS: Linux 6.8.0-1030-azure
2025/06/28 11:18:43 [notice] 1#1: getrlimit(RLIMIT_NOFILE): 1048576:1048576
2025/06/28 11:18:43 [notice] 1#1: start worker processes
2025/06/28 11:18:43 [notice] 1#1: start worker process 29
10.0.0.5 - - [28/Jun/2025:11:29:44 +0000] "GET / HTTP/1.1" 200 615 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, lik
e Gecko) Chrome/137.0.0.0 Safari/537.36" "-"
2025/06/28 11:29:44 [error] 29#29: *1 open() "/usr/share/nginx/html/favicon.ico" failed (2: No such file or directory), client: 10.0.0.5, server
: localhost, request: "GET /favicon.ico HTTP/1.1", host: "20.2.28.1:31762", referrer: "http://20.2.28.1:31762/"
10.0.0.5 - - [28/Jun/2025:11:29:44 +0000] "GET /favicon.ico HTTP/1.1" 404 555 "http://20.2.28.1:31762/" "Mozilla/5.0 (Windows NT 10.0; Win64; x6
4) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/137.0.0.0 Safari/537.36" "-"
azureuser@k8s-master:~$
```

```
azureuser@k8s-master:~$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
nginx-deployment-7c79c4bf97-2gd5r   1/1     Running   0          15m
nginx-deployment-7c79c4bf97-42585   1/1     Running   0          2m41s
nginx-deployment-7c79c4bf97-9kgzm   1/1     Running   0          2m41s
nginx-deployment-7c79c4bf97-fvm9z   1/1     Running   0          15m
azureuser@k8s-master:~$ kubectl delete pod nginx-deployment-7c79c4bf97-9kgzm
pod "nginx-deployment-7c79c4bf97-9kgzm" deleted
azureuser@k8s-master:~$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
nginx-deployment-7c79c4bf97-2gd5r   1/1     Running   0          16m
nginx-deployment-7c79c4bf97-42585   1/1     Running   0          3m17s
nginx-deployment-7c79c4bf97-fvm9z   1/1     Running   0          16m
nginx-deployment-7c79c4bf97-w6n7m   1/1     Running   0          16s
azureuser@k8s-master:~$ kubectl describe pod nginx-deployment-7c79c4bf97-w6n7m
```

```
                          node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
  Type    Reason     Age   From               Message
  ----    ------     ----  ----               -------
  Normal  Scheduled  61s   default-scheduler  Successfully assigned default/nginx-deployment-7c79c4bf97-w6n7m to k8s-worker1
  Normal  Pulling    60s   kubelet            Pulling image "nginx:latest"
  Normal  Pulled     58s   kubelet            Successfully pulled image "nginx:latest" in 1.797s (1.797s including waiting)
  Normal  Created    58s   kubelet            Created container nginx
  Normal  Started    58s   kubelet            Started container nginx
azureuser@k8s-master:~$
```

azureuser@k8s-master: ~

```
azureuser@k8s-master:~$ kubectl delete deployment nginx-deployment
deployment.apps "nginx-deployment" deleted
azureuser@k8s-master:~$ kubectl delete service nginx-deployment
service "nginx-deployment" deleted
azureuser@k8s-master:~$ sudo kubeadm reset -f
[reset] Reading configuration from the cluster...
[reset] FYI: You can look at this config file with 'kubectl -n kube-system get cm kubeadm-config -o yaml'
[preflight] Running pre-flight checks
[reset] Deleted contents of the etcd data directory: /var/lib/etcd
[reset] Stopping the kubelet service
[reset] Unmounting mounted directories in "/var/lib/kubelet"
[reset] Deleting contents of directories: [/etc/kubernetes/manifests /var/lib/kubelet /etc/kubernetes/pki]
[reset] Deleting files: [/etc/kubernetes/admin.conf /etc/kubernetes/kubelet.conf /etc/kubernetes/bootstrap-kub
elet.conf /etc/kubernetes/controller-manager.conf /etc/kubernetes/scheduler.conf]

The reset process does not clean CNI configuration. To do so, you must remove /etc/cni/net.d

The reset process does not reset or clean up iptables rules or IPVS tables.
If you wish to reset iptables, you must do so manually by using the "iptables" command.

If your cluster was setup to utilize IPVS, run ipvsadm --clear (or similar)
to reset your system's IPVS tables.

The reset process does not clean your kubeconfig files and you must remove them manually.
Please, check the contents of the $HOME/.kube/config file.
```