Version - **2025.01**

Last update : 2025/01/17 15:29

DOE307 - Troubleshooting K8s

Contents

LAB #1 - The API Server

1.1 - Connection Refused

When it is not possible to connect to the K8s API server, you will see an error such as this:

```
trainee@kubemaster:~$ kubectl get pods
The connection to the server localhost:8080 was refused - did you specify the right host or port?
```

As a general rule, this error is caused by one of three situations:

The kubelet service

Check that the kubelet service is enabled and running on the controller:

```
trainee@kubemaster:~$ su -
Mot de passe : fenestros

root@kubemaster:~# systemctl status kubelet
● kubelet.service - kubelet: The Kubernetes Node Agent
   Loaded: loaded (/lib/systemd/system/kubelet.service; enabled; vendor preset: enable
  Drop-In: /etc/systemd/system/kubelet.service.d
           └─10-kubeadm.conf
   Active: active (running) since Fri 2022-09-16 09:29:34 CEST; 1 weeks 4 days ago
     Docs: https://kubernetes.io/docs/home/
 Main PID: 550 (kubelet)
    Tasks: 17 (limit: 4915)
   Memory: 129.6M
      CPU: 4h 16min 54.676s
   CGroup: /system.slice/kubelet.service
           └─550 /usr/bin/kubelet --bootstrap-kubeconfig=/etc/kubernetes/bootstrap-kub

Warning: Journal has been rotated since unit was started. Log output is incomplete or
lines 1-14/14 (END)
[q]
```

The KUBECONFIG variable

If you are using the root account to interact with K8s, check that the **KUBECONFIG** variable is set correctly:

```
root@kubemaster:~# echo $KUBECONFIG
/etc/kubernetes/admin.conf
```

The $HOME/.kube/config file

If you are using a normal user account to interact with K8s, check the contents of the **$HOME/.kube/config** file and that it has the correct permissions:

```
root@kubemaster:~# exit
déconnexion
trainee@kubemaster:~$

trainee@kubemaster:~$ cat $HOME/.kube/config
apiVersion: v1
clusters:
- cluster:
    certificate-authority-data:
LS0tLS1CRUdJTiBDRVJUSUZJQ0FURS0tLS0tCk1JSUMvakNDQWVhZ0F3SUJBZ0lCQURBTkJna3Foa2lHOXcwQkFRc0ZBREFWTVJNd0VRWURWUVFER
XdwcmRXSmwKY201bGRHVnpNQjRYRFRJeU1Ea3dOREEzTXpVek5sb1hEVE15TURrd01UQTNNelV6Tmxvd0ZURVRNQkVHQTFVRQpBeE1LYTNWaVpYSn
VaWFJsY3pDQ0FTSXdEUVlKS29aSWh2Y05BUUVCQlFBRGdnRVBBRENDQVFvQ2dnRUJBS2RICm9PbXpsd2xEdXdDSWhPdEk5aEVVYXpMWjNhNExDVVR
yZDlIdlBSWDBYZGZGS2w3S29OS3RXYVhjK1pBbFNBazAKaXVZYzE1NXlIQ3ViYUEyU1FmYzZFMElIZ25ISlFqSy9WSTI1Szc1Zjg5NHk5dGlvczVo
c1dDemdodUhUTkEwTgpyZmhzb0lPMHBHU0dEdStrR1lpN25lQVZwZUwyL2JjYy8xdzVyaEh4bGFackNsaFNsaVJQcWFqclFyVWNSWm5lCk9XS09TW
jNObi9neTRGUktlRXpzOTllNU14OXp2Y0JxWC9zSTRqYjJoRWQ0NnBuTG1OMlM4NEFjQzR6R01iRHEKSHY0aDMra1lkbmE5YUJwN3hSWGNHNWRlZV
l1Yzhramt1dEhGUlNMYUlLSzBYa2lCbEtBOHR0YU1tSkYrczRMdgplblhDTEpYd1RCWWtGd3RMemc4Q0F3RUFBYU5aTUZjd0RnWURWUjBQQVFIL0J
BUURBZ0trTUE4R0ExVWRFd0VCCi93UUZNQU1CQWY4d0hRWURWUjBPQkJZRUZOdCtnOEJtVWNoekY4My9ZSEcveWIxaVdmc0lNQlVHQTFVZEVRUU8K
TUF5Q0NtdDFZbVZ5Ym1WMFpYTXdEUVlKS29aSWh2Y05BUUVMQlFBRGdnRUJBRWZOMHoyVnl6dUxiek5YOC9pcAp0VFFGV2Q4TDJvMUV6L0FKZzR2a
kpMTG9VcmVKTHhtckpMcW1Yc3JUU2hCYXYzODJxcHRjeDhqNktRRjMwZzIyCnJxSUxuNzN5NFdBYVJKNFgwM2dtUGlheWlmZzdYOHFNaEpjbmtqRl
N3Vy92VUt1YWkvcDdpWkFQMUVCL1FtUFgKNXphUEZIT1d3QWIvQzU2ZmxrMmpJcVE3bmRvL2VpOFRsdTI5MG1JYUdGSFRPU0hCYk1ReEE3RjVUV3Z
```

```
XQ0l5aQpPdTA5REFZdnU3dGFSZlA1SkhVdFlQL0Vady9KMUxlaWxrL3ZMbStTSXV0L0puR2hvTDJUdWVQUnd3TCtXRWswClNrS3RKQkVFQ2hVYkdz
ZVN2RndEdS96NlgvQXFtSXRyQXJnVy9mTlV1TW9GRHo0MXFLYll4ekZuZ2hkSTN5WGsKQ25NPQotLS0tLUVORCBDRVJUSUZJQ0FURS0tLS0tCg==
    server: https://192.168.56.2:6443
  name: kubernetes
contexts:
- context:
    cluster: kubernetes
    user: kubernetes-admin
  name: kubernetes-admin@kubernetes
current-context: kubernetes-admin@kubernetes
kind: Config
preferences: {}
users:
- name: kubernetes-admin
  user:
    client-certificate-data:
LS0tLS1CRUdJTiBDRVJUSUZJQ0FURS0tLS0tCk1JSURJVENDQWdtZ0F3SUJBZ0lJZDVaTG10Yng1ODh3RFFZSktvWklodmNOQVFFTEJRQXdGVEVUT
UJFR0ExVUUKQXhNS2EzVmlaWEp1WlhSbGN6QWVGdzB5TWpBNU1EUXdOek0xTXpaYUZ3MHlNekE1TURReE1ESTRNakJhTURReApGekFWQmdOVkJBb1
REbk41YzNSbGJUcHRZWE4wWlhKek1Sa3dGd1lEVlFRREV4QnJkV0psY201bGRHVnpMV0ZrCmJXbHVNSUlCSWpBTkJna3Foa2lHOXcwQkFRUZBQU9
DQVE4QU1JSUJDZ0tDQVFFQTZLLy8zREhnczZ1c2VBaDIKWitVdFZxekRSRERIMUt5RjB2VlhtUml6alcyVHR3dEhjS3NKV3dUcVprS3BMb2hMSndN
VUEyeVlrS04xWXpLRwpjVWc4N2VvcGJBcWRTS3dFclBOdHZ5WlBPK2VrQ3AxQVo1dXA5T3cxM1FVQkZHZVpkR2haVkZHV1paaWNsMkQzCnRjY3dqc
mhDS3pUcmVhMTFOWkZIWGZqTmxnaXNlYk4rbGZEcDM4K3l3cVBDQXNrWkdlYUFZcFlvSXlqRlQwSS8KNDA2dXlpeUI1OHdxaE1zQjU3S1NWWko3K0
1ncGR0SjVCcmZOeE5lNng3cmQ3TXNwb0VWeXlBUlBMdk50WTdWago0VGVMSm9aNDYwci81cG5EWjlXbFgrMnN2VXRFRjVJcmdoMnZhU3pLNHBWaEJ
RS2M3S2dSdXVtZjBFYnphWXhWCmQ5eUVDUUlEQVFBQm8xWXdWREFPQmdOVkhROEJBZjhFQkFNQ0JhQXdFd1lEVlIwbEJBd3dDZ1lJS3dZQkJRVUgK
QXdJd0RBWURWUjBUQVFIL0JBSXdBREFmQmdOVkhTTUVHREFXZ0JUYmZvUEFabEhJY3hmTi8yQnh2OG05WWxuNwpDREFOQmdrcWhraUc5dzBCQVFzR
kFBT0NBUUVBaFNNTGkrQStsQmkyQUI1K1IxTTRLNmRYRjc0RjNvUlNKT3pWCjlkQmppejV2czdtSkFNeURrLzBYQzlaVmhER2N1QnZiQ1RzWVBuOH
hlZXV6Uml6OGI2Ny8zNW4rVUp0SlZoRFgKdmdaejJkQmFSQ3ZtVStoV1RueW5CUU9lRDlEQ2RuQXA2ZlJCNE9oN1pEOXNXZGxoOEMrbTBMaXE1UzV
5Uy92SQpVeWVQZ096aWlZMlF5ajdwTjhqczd5OG9Ia2lGOTM2Nlh3V0VoK1lWeGgxcG9iMGhIa1ZBUEZVS25Ed0xKS2N1CmY4MlBSU0dSWVZoaVlW
ZFM2ZTg1TFhxRkkwMVdqd2txVVo4NHhPVVYyekVCSGlIZ0lKN09VbjArbEYrQW8wVkoKZ1l2L2kzYW9IcUsxc21kejVjWWNxQTlPaW1xalZ5RWV6c
zhjS0xYbFRnZ2VQM2krOVE9PQotLS0tLUVORCBDRVJUSUZJQ0FURS0tLS0tCg==
    client-key-data:
LS0tLS1CRUdJTiBSU0EgUFJJVkFURSBLRVktLS0tLQpNSUlFb3dJQkFBS0NBUUVBNksvLzNESGdzNnVzZUFoMlorVXRWcXpEUkRESDFLeUYwdlZYb
VJpempXMlR0d3RICmNLc0pXd1RxWmtLcExvaExKd01VQTJ5WWtLTjFZektHY1VnODdlb3BiQXFkU0t3RXJQTnR2eVpQTytla0NwMUEKWjV1cDlPdz
EzUVVCRkdlWmRHaFpWRkdXWlppY2wyRDN0Y2N3anJoQ0t6VHJlYTExTlpGSFhmak5sZ2lzZWJOKwpsZkRwMzgreXdxUENBc2taR2VhQVlwWW9JeWp
```

```
GVDBJLzQwNnV5aXlCNTh3cWhNc0I1N0tTVlpKNytNZ3BkdEo1CkJyZk54TmU2eDdyZDdNc3BvRVZ5eUFSUEx2TnRZN1ZqNFRlTEpvWjQ2MHIvNXBu
RFo5V2xYKzJzdlV0RUY1SXIKZ2gydmFTeks0cFZoQlFLYzdLZ1J1dW1mMEViemFZeFZkOXlFQ1FJREFRQUJBb0lCQUNHTVpwNXZ6bzc1SEllOQo2S
ng0TFg1R3NHeWZmK0JJODQ2RDh4cE90bXlZdE9oNlJ0V1d3MldOSXVLVmorRDJvNmMvU1Y1cEJPSXR2eG9MClNka0JhazkvS0hPOFlBci9TamxKYT
dSWXFLbmhid1Jjd2RGdVh5WEIvTTRlRDViS2pSUjhpd3llS3NvQkkrcXIKZjJ1RkNabzZOTWdYL0M5eDgrbENSZ0RsZzNhekNRQm1wVW9CM2Zmbjd
paDRIc3MzMkR6K29FcEx2TnkyS2o0RgpUTFVGQ0pTcTFKTXVQN2tVaXI1WUpzUTFySFcrUlNiNEZVNlJpTzkzSjJNdStWVmcxR0dxMEI4c3o5eStO
SDNXClhJY3B1MGNtOXN2MzBUZG1OcGRWRnZqOXR6ZzJlbW1wZTNFcmdQak1LQjFUWDdtT3BrVXVsZjNKQ1VRYk1JS1UKVDdaajg3VUNnWUVBNlg3V
np5ZmprU3hFVU0xbEFQbG1DNjJkUFJPajQxQjA5M2dYaHUyQ3hIQlRKUzdrYVhsSgpTOHFFcjlrV1FvRFVoM1N5RldhSkhNZy9lOWJRdHhBRWl5al
FvbE4vSEZ2aEdrWGNNVm1pMXE3ZFdUVjM3aEVCCmExekNPcFVtZWR4OWszanpKUkx3b1VaNUtySTR0WkJyOXNwQXltTEZPb09oMm16NEtYSXo4ZWN
DZ1lFQS94MDYKclJ2NzJGNXI3UmlLSG45cHUyUHJEYkdlSFVGZ01tZHI0MW9NQnlHem5ZY3E2M2FmM3RacWFEVGs1SnBDTFlDeQpvUEk1UlYvQWdv
QmNmeDhLVzRpdW0rVTZhOTN2R1FCWkxJY2o3c1k1SnBFSysvYnZTUGNDTzJlU214c3JhZ01PCm5odjV0ZUxYSlpTelZwcERzZ2hmQXJ3NDUxQmZFc
lVWOEVwZi9JOENnWUJQbnh5eHcxeHFpTG5UQS9kSldjSmUKZ1JsNVZsVXdrcU1RTURkMW4xQlVSQ2xXS0tOakJDVG1YMnpYdWlOSkVqMW00M2hHcS
t4ZGtEdDFzMDhBM2NsdQoyc0FxV21haCtRTE52cnpUWjBtTUE1MGZhb2cyK2oyTnF0Zmd1ak9nb250LzZtS2ZaZElBYk5Pc3A1R0crSFNZCmQyZVl
uQTI5WWwyeTZpM0ZsRmY2U1FLQmdRRFdFdDd6K0hHREJPaW4wbG5FY2NKMW5zalZldUJsU0VEQ3l3bzcKZzRwb1NaMkJhTFZaVlBlZWRHcGgrMUMv
aTdwUW1KaE1lallZd3RxMko2UjJmOE9mUDdqVjFLc0xiUGFBRWt6QwpFcnpTVnNBS1h0Zkt5MUhMOW9xRzhzaVJJMkZ3MmhQZ0ZUV2JyVGhBcnVFM
m9NaUJrb2kzc041SExLZzYrSDNxClgxN2dmUUtCZ0ZYUUw5TzBqOWNYM3FzVU00K0pyL3JwUXJ1L2t4b1YydFpQZzljVEplN3p2dVYrazE2ZFhaTi
sKS202L0tQNWN5UnIzYnFrUXZBYjZHK2xlcUh0QTVvTk9SalI5bDI0SjNnNnl5YlBrakR2eU8rRVgrUlNDV203QwpiZ2NxeE16Q1BJYmtWSEpsYXd
qczJKaWp5YTh0OUV6N09YcWFXYU8yakptK2pVVzdsaStmCi0tLS0tRU5EIFJTQSBQUklWQVRFIEtFWS0tLS0tCg==
```

```
trainee@kubemaster:~$ ls -l $HOME/.kube/config
-rw------- 1 trainee sudo 5636 sept. 28 12:56 /home/trainee/.kube/config

trainee@kubemaster:~$ su -
Mot de passe :
root@kubemaster:~#
```

1.2 - System Pod logs

If, at this stage, you haven't found any apparent errors, you should look at the log of the pod **kube-system_kube-apiserver-xxxxxxxxxxxx** :

```
root@kubemaster:~# ls -l /var/log/pods
total 28
drwxr-xr-x 6 root root 4096 sept. 4 09:44 kube-system_calico-node-dc7hd_3fe340ed-6df4-4252-9e4e-8c244453176a
drwxr-xr-x 3 root root 4096 sept. 4 13:00 kube-system_coredns-565d847f94-tqd8z_d96f42ed-
```

```
ebd4-4eb9-8c89-2d80b81ef9cf
drwxr-xr-x 3 root root 4096 sept. 4 12:36 kube-system_etcd-
kubemaster.ittraining.loc_ddbb10499877103d862e5ce637b18ab1
drwxr-xr-x 3 root root 4096 sept. 4 12:36 kube-system_kube-apiserver-
kubemaster.ittraining.loc_ec70600cac9ca8c8ea9545f1a42f82e5
drwxr-xr-x 3 root root 4096 sept. 4 12:36 kube-system_kube-controller-manager-
kubemaster.ittraining.loc_0e3dcf54223b4398765d21e9e6aaebc6
drwxr-xr-x 3 root root 4096 sept. 4 12:31 kube-system_kube-proxy-x7fpc_80673937-ff21-4dba-a821-fb3b0b1541a4
drwxr-xr-x 3 root root 4096 sept. 4 12:36 kube-system_kube-scheduler-
kubemaster.ittraining.loc_c3485d2a42b90757729a745cd8ee5f7d

root@kubemaster:~# ls -l /var/log/pods/kube-system_kube-apiserver-
kubemaster.ittraining.loc_ec70600cac9ca8c8ea9545f1a42f82e5
total 4
drwxr-xr-x 2 root root 4096 Sep 16 09:31 kube-apiserver

root@kubemaster:~# ls -l /var/log/pods/kube-system_kube-apiserver-
kubemaster.ittraining.loc_ec70600cac9ca8c8ea9545f1a42f82e5/kube-apiserver
total 2420
-rw-r----- 1 root root 1009731 Sep 16 08:19 0.log
-rw-r----- 1 root root 1460156 Sep. 28 12:22 1.log

root@kubemaster:~# tail /var/log/pods/kube-system_kube-apiserver-
kubemaster.ittraining.loc_ec70600cac9ca8c8ea9545f1a42f82e5/kube-apiserver/1.log
2022-09-28T11:22:18.406048353+02:00 stderr F Trace[1595276047]: [564.497826ms] [564.497826ms] END
2022-09-28T11:22:18.406064364+02:00 stderr F I0928 09:22:18.405784 1 trace.go:205] Trace[1267846829]: “Get”
url:/apis/coordination.k8s.io/v1/namespaces/kube-system/leases/kube-scheduler,user-agent:kube-scheduler/v1.25.0
(linux/amd64) kubernetes/a866cbe/leader-election,audit-id:1b71bbbb-49ad-4f40-b859-f40b06416452,client:192.
168.56.2,accept:application/vnd.kubernetes.protobuf, */*,protocol:HTTP/2.0 (28-Sep-2022 09:22:17.899) (total
time: 505ms):
2022-09-28T11:22:18.406072365+02:00 stderr F Trace[1267846829]: --- “About to write a response” 505ms
(09:22:18.405)
2022-09-28T11:22:18.406079291+02:00 stderr F Trace[1267846829]: [505.988424ms] [505.988424ms] END
2022-09-28T12:17:17.854768983+02:00 stderr F I0928 10:17:17.854660 1 alloc.go:327] “allocated clusterIPs“
```

```
service=”default/service-netshoot” clusterIPs=map[IPv4:10.107.115.28]
2022-09-28T12:22:18.832566527+02:00 stderr F I0928 10:22:18.831876 1 trace.go:205] Trace[338168453]:
“List(recursive=true) etcd3” audit-id:8acb508c-5121-4d18-8f8a-
ed87d01f33b8,key:/pods/default,resourceVersion:,resourceVersionMatch:,limit:500,continue: (28-Sep-2022
10:22:18.063) (total time: 768ms):
2022-09-28T12:22:18.83263296+02:00 stderr F Trace[338168453]: [768.168206ms] [768.168206ms] END
2022-09-28T12:22:18.832893075+02:00 stderr F I0928 10:22:18.832842 1 trace.go:205] Trace[238339745]: “List”
url:/api/v1/namespaces/default/pods,user-agent:kubectl/v1.25.0 (linux/amd64) kubernetes/a866cbe,audit-
id:8acb508c-5121-4d18-8f8a-ed87d01f33b8,client:192.168.56.
2,accept:application/json;as=Table;v=v1;g=meta.k8s.io,application/json;as=Table;v=v1beta1;g=meta.k8s.io,applicati
on/json,protocol:HTTP/2.0 (28-Sep-2022 10:22:18.063) (total time: 769ms):
2022-09-28T12:22:18.832902737+02:00 stderr F Trace[238339745]: --- “Listing from storage done” 768ms
(10:22:18.831)
2022-09-28T12:22:18.832908995+02:00 stderr F Trace[238339745]: [769.149103ms] [769.149103ms] END
```

Note that when the API server becomes functional again, it is possible to consult the log using the **kubectl logs** command:

```
root@kubemaster:~# kubectl get pods -n kube-system
NAME                                                READY   STATUS    RESTARTS        AGE
calico-kube-controllers-6799f5f4b4-2tgpq            1/1     Running   0               42m
calico-node-5htrc                                   1/1     Running   1 (12d ago)     24d
calico-node-dc7hd                                   1/1     Running   1 (12d ago)     24d
calico-node-qk5kt                                   1/1     Running   1 (12d ago)     24d
coredns-565d847f94-kkpbp                            1/1     Running   0               42m
coredns-565d847f94-tqd8z                            1/1     Running   1 (12d ago)     23d
etcd-kubemaster.ittraining.loc                      1/1     Running   1 (12d ago)     23d
kube-apiserver-kubemaster.ittraining.loc            1/1     Running   1 (12d ago)     23d
kube-controller-manager-kubemaster.ittraining.loc   1/1     Running   12 (5d3h ago)   23d
kube-proxy-ggmt6                                    1/1     Running   1 (12d ago)     23d
kube-proxy-x5j2r                                    1/1     Running   1 (12d ago)     23d
kube-proxy-x7fpc                                    1/1     Running   1 (12d ago)     23d
kube-scheduler-kubemaster.ittraining.loc            1/1     Running   14 (29h ago)    23d
metrics-server-5dbb5ff5bd-vh5fz                     1/1     Running   1 (12d ago)     23d
```

```
root@kubemaster:~# kubectl logs kube-apiserver-kubemaster.ittraining.loc -n kube-system | tail
Trace[1595276047]: [564.497826ms] [564.497826ms] END
I0928 09:22:18.405784 1 trace.go:205] Trace[1267846829]: “Get” url:/apis/coordination.k8s.io/v1/namespaces/kube-system/leases/kube-scheduler,user-agent:kube-scheduler/v1.25.0 (linux/amd64) kubernetes/a866cbe/leader-election,audit-id:1b71bbbb-49ad-4f40-b859-f40b06416452,client:192.
168.56.2,accept:application/vnd.kubernetes.protobuf, */*,protocol:HTTP/2.0 (28-Sep-2022 09:22:17.899) (total time: 505ms):
Trace[1267846829]: --- “About to write a response” 505ms (09:22:18.405)
Trace[1267846829]: [505.988424ms] [505.988424ms] END
I0928 10:17:17.854660 1 alloc.go:327] “allocated clusterIPs“ service=”default/service-netshoot” clusterIPs=map[IPv4:10.107.115.28]
I0928 10:22:18.831876 1 trace.go:205] Trace[338168453]: “List(recursive=true) etcd3” audit-id:8acb508c-5121-4d18-8f8a-ed87d01f33b8,key:/pods/default,resourceVersion:,resourceVersionMatch:,limit:500,continue: (28-Sep-2022 10:22:18.063) (total time: 768ms):
Trace[338168453]: [768.168206ms] [768.168206ms] END
I0928 10:22:18.832842 1 trace.go:205] Trace[238339745]: “List” url:/api/v1/namespaces/default/pods,user-agent:kubectl/v1.25.0 (linux/amd64) kubernetes/a866cbe,audit-id:8acb508c-5121-4d18-8f8a-ed87d01f33b8,client:192.168.56.
2,accept:application/json;as=Table;v=v1;g=meta.k8s.io,application/json;as=Table;v=v1beta1;g=meta.k8s.io,application/json,protocol:HTTP/2.0 (28-Sep-2022 10:22:18.063) (total time: 769ms):
Trace[238339745]: --- “Listing from storage done” 768ms (10:22:18.831)
Trace[238339745]: [769.149103ms] [769.149103ms] END
```

LAB #2 - The Nodes

2.1 - NotReady Status

When a node in the cluster demonstrates a problem, look at the **Conditions** section in the output of the **kubectl describe node** command for the node concerned:

```
root@kubemaster:~# kubectl describe node kubenode1.ittraining.loc
...
Conditions:
  Type                 Status  LastHeartbeatTime                 LastTransitionTime                Reason
Message
  ----                 ------  -----------------                 ------------------                ------
-------
  NetworkUnavailable   False   Fri, 16 Sep 2022 09:35:05 +0200   Fri, 16 Sep 2022 09:35:05 +0200   CalicoIsUp
Calico is running on this node
  MemoryPressure       False   Wed, 28 Sep 2022 09:17:21 +0200   Sun, 04 Sep 2022 13:13:02 +0200
KubeletHasSufficientMemory   kubelet has sufficient memory available
  DiskPressure         False   Wed, 28 Sep 2022 09:17:21 +0200   Sun, 04 Sep 2022 13:13:02 +0200
KubeletHasNoDiskPressure     kubelet has no disk pressure
  PIDPressure          False   Wed, 28 Sep 2022 09:17:21 +0200   Sun, 04 Sep 2022 13:13:02 +0200
KubeletHasSufficientPID      kubelet has sufficient PID available
  Ready                True    Wed, 28 Sep 2022 09:17:21 +0200   Thu, 15 Sep 2022 17:57:04 +0200   KubeletReady
kubelet is posting ready status
...
```

As a general rule, the **NotReady** status is created by the failure of the **kubelet** service on the node, as demonstrated in the following example:

```
root@kubemaster:~# ssh -l trainee 192.168.56.3
trainee@192.168.56.3's password: trainee
Linux kubenode1.ittraining.loc 4.9.0-19-amd64 #1 SMP Debian 4.9.320-2 (2022-06-30) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Fri Sep 16 18:07:39 2022 from 192.168.56.2
trainee@kubenode1:~$ su -
Mot de passe : fenestros
```

```
root@kubenode1:~# systemctl stop kubelet

root@kubenode1:~# systemctl disable kubelet
Removed /etc/systemd/system/multi-user.target.wants/kubelet.service.

root@kubenode1:~# exit
déconnexion
trainee@kubenode1:~$ exit
déconnexion
Connection to 192.168.56.3 closed.

root@kubemaster:~# kubectl get nodes
NAME                        STATUS     ROLES           AGE   VERSION
kubemaster.ittraining.loc   Ready      control-plane   24d   v1.25.0
kubenode1.ittraining.loc    NotReady   <none>          24d   v1.25.0
kubenode2.ittraining.loc    Ready      <none>          24d   v1.25.0
```

By activating and starting the service, the node regains its **Ready** status:

```
root@kubemaster:~# ssh -l trainee 192.168.56.3
trainee@192.168.56.3's password: trainee
Linux kubenode1.ittraining.loc 4.9.0-19-amd64 #1 SMP Debian 4.9.320-2 (2022-06-30) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Wed Sep 28 09:20:14 2022 from 192.168.56.2
trainee@kubenode1:~$ su -
Mot de passe : fenestros

root@kubenode1:~# systemctl enable kubelet
```

```
Created symlink /etc/systemd/system/multi-user.target.wants/kubelet.service →
/lib/systemd/system/kubelet.service.

root@kubenode1:~# systemctl start kubelet

root@kubenode1:~# systemctl status kubelet
● kubelet.service - kubelet: The Kubernetes Node Agent
   Loaded: loaded (/lib/systemd/system/kubelet.service; enabled; vendor preset: enable
  Drop-In: /etc/systemd/system/kubelet.service.d
           └─10-kubeadm.conf
   Active: active (running) since Wed 2022-09-28 09:54:49 CEST; 7s ago
     Docs: https://kubernetes.io/docs/home/
 Main PID: 5996 (kubelet)
    Tasks: 18 (limit: 4915)
   Memory: 32.1M
      CPU: 555ms
   CGroup: /system.slice/kubelet.service
           └─5996 /usr/bin/kubelet --bootstrap-kubeconfig=/etc/kubernetes/bootstrap-ku

sept. 28 09:54:51 kubenode1.ittraining.loc kubelet[5996]: I0928 09:54:51.572692    599
sept. 28 09:54:52 kubenode1.ittraining.loc kubelet[5996]: I0928 09:54:52.181515    599
sept. 28 09:54:52 kubenode1.ittraining.loc kubelet[5996]: I0928 09:54:52.239266    599
sept. 28 09:54:52 kubenode1.ittraining.loc kubelet[5996]: I0928 09:54:52.289189    599
sept. 28 09:54:52 kubenode1.ittraining.loc kubelet[5996]: E0928 09:54:52.289617    599
sept. 28 09:54:52 kubenode1.ittraining.loc kubelet[5996]: I0928 09:54:52.289652    599
sept. 28 09:54:54 kubenode1.ittraining.loc kubelet[5996]: I0928 09:54:54.139010    599
sept. 28 09:54:56 kubenode1.ittraining.loc kubelet[5996]: I0928 09:54:56.138812    599
sept. 28 09:54:56 kubenode1.ittraining.loc kubelet[5996]: I0928 09:54:56.241520    599
sept. 28 09:54:57 kubenode1.ittraining.loc kubelet[5996]: I0928 09:54:57.243967    599
root@kubenode1:~#

root@kubenode1:~# exit
déconnexion
trainee@kubenode1:~$ exit
```

```
déconnexion
Connection to 192.168.56.3 closed.

root@kubemaster:~# kubectl get nodes
NAME                        STATUS   ROLES           AGE   VERSION
kubemaster.ittraining.loc   Ready    control-plane   24d   v1.25.0
kubenode1.ittraining.loc    Ready    <none>          24d   v1.25.0
kubenode2.ittraining.loc    Ready    <none>          24d   v1.25.0
```

LAB #3 - Pods

When a pod in the cluster shows a problem, look at the **Events** section in the output of the **kubectl describe pod** command for the pod concerned.

3.1 - The ImagePullBackOff Error

Start by creating the file **deployment-postgresql.yaml**:

To do: Copy the content from **here** **and paste it into your file.**

```
root@kubemaster:~# vi deployment-postgresql.yaml
root@kubemaster:~# cat deployment-postgresql.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: postgresql
  labels:
    app: postgresql
spec:
```

```
  replicas: 1
  selector:
    matchLabels:
      app: postgresql
  template:
    metadata:
      labels:
        app: postgresql
    spec:
      containers:
      - image: bitnami/postgresql:10.12.10
        imagePullPolicy: IfNotPresent
        name: postgresql
```

Then deploy the application:

```
root@kubemaster:~# kubectl apply -f deployment-postgresql.yaml
deployment.apps/postgresql created
```

If you look at the created pod, you'll see that there's a **ImagePullBackOff** error:

```
root@kubemaster:~# kubectl get pods
NAME                          READY   STATUS             RESTARTS   AGE
postgresql-6778f6569c-x84xd   0/1     ImagePullBackOff   0          25s
sharedvolume                  2/2     Running            0          8d
volumepod                     0/1     Completed          0          8d
```

See the **Events** section of the **describe** command output to see what has happens:

```
root@kubemaster:~# kubectl describe pod postgresql-6778f6569c-x84xd | tail
                            node.kubernetes.io/unreachable:NoExecute op=Exists for 300s
Events:
  Type     Reason     Age                From               Message
  ----     ------     ----               ----               -------
```

```
  Normal   Scheduled  74s                default-scheduler  Successfully assigned default/postgresql-6778f6569c-
x84xd to kubenode1.ittraining.loc
  Normal   Pulling    28s (x3 over 74s)  kubelet            Pulling image "bitnami/postgresql:10.12.10"
  Warning  Failed     27s (x3 over 72s)  kubelet            Failed to pull image "bitnami/postgresql:10.12.10":
rpc error: code = NotFound desc = failed to pull and unpack image "docker.io/bitnami/postgresql:10.12.10": failed
to resolve reference "docker.io/bitnami/postgresql:10.12.10": docker.io/bitnami/postgresql:10.12.10: not found
  Warning  Failed     27s (x3 over 72s)  kubelet            Error: ErrImagePull
  Normal   BackOff    12s (x3 over 72s)  kubelet            Back-off pulling image "bitnami/postgresql:10.12.10"
  Warning  Failed     12s (x3 over 72s)  kubelet            Error: ImagePullBackOff
```

As you can see, there are three warnings

```
  Warning  Failed     27s (x3 over 72s)  kubelet            Failed to pull image "bitnami/postgresql:10.12.10":
rpc error: code = NotFound desc = failed to pull and unpack image "docker.io/bitnami/postgresql:10.12.10": failed
to resolve reference "docker.io/bitnami/postgresql:10.12.10": docker.io/bitnami/postgresql:10.12.10: not found

  Warning  Failed     27s (x3 over 72s)  kubelet            Error: ErrImagePull

  Warning  Failed     12s (x3 over 72s)  kubelet            Error: ImagePullBackOff
```

The first of the three warnings clearly tells us that there's a problem with the image tag specified in the **deployment-postgresql.yaml** file: **docker.io/bitnami/postgresql:10.12.10: not found**.

Change the tag in this file to **10.13.0** :

```
root@kubemaster:~# vi deployment-postgresql.yaml
root@kubemaster:~# cat deployment-postgresql.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: postgresql
  labels:
    app: postgresql
spec:
```

```
  replicas: 1
  selector:
    matchLabels:
      app: postgresql
  template:
    metadata:
      labels:
        app: postgresql
    spec:
      containers:
      - image: bitnami/postgresql:10.13.0
        imagePullPolicy: IfNotPresent
        name: postgresql
```

Now apply the modification:

```
root@kubemaster:~# kubectl apply -f deployment-postgresql.yaml
deployment.apps/postgresql configured
```

3.2 - The CrashLoopBackOff Error

If you look at the second Pod created, you'll see that there is a **CrashLoopBackOff** error:

```
root@kubemaster:~# kubectl get pods
NAME                          READY   STATUS             RESTARTS     AGE
postgresql-6668d5d6b5-swr9g   0/1     CrashLoopBackOff   1 (3s ago)   46s
postgresql-6778f6569c-x84xd   0/1     ImagePullBackOff   0            5m55s
sharedvolume                  2/2     Running            0            8d
volumepod                     0/1     Completed          0            8d
```

See the **Events** section of the **describe** command output to see what has happened with the second pod:

```
root@kubemaster:~# kubectl describe pod postgresql-6668d5d6b5-swr9g | tail
Events:
  Type     Reason     Age                  From               Message
  ----     ------     ----                 ----               -------
  Normal   Scheduled  4m3s                 default-scheduler  Successfully assigned
default/postgresql-6668d5d6b5-swr9g to kubenode1.ittraining.loc
  Normal   Pulling    4m2s                 kubelet            Pulling image "bitnami/postgresql:10.13.0"
  Normal   Pulled     3m22s                kubelet            Successfully pulled image
"bitnami/postgresql:10.13.0" in 40.581665048s
  Normal   Created    90s (x5 over 3m21s)  kubelet            Created container postgresql
  Normal   Started    90s (x5 over 3m21s)  kubelet            Started container postgresql
  Normal   Pulled     90s (x4 over 3m20s)  kubelet            Container image "bitnami/postgresql:10.13.0"
already present on machine
  Warning  BackOff    68s (x9 over 3m19s)  kubelet            Back-off restarting failed container
```

This time, the **Events** section gives no indication of the problem!

To get more information about the problem, you can use the **logs** command:

```
root@kubemaster:~# kubectl logs postgresql-6668d5d6b5-swr9g | tail
postgresql 08:43:48.60
postgresql 08:43:48.60 Welcome to the Bitnami postgresql container
postgresql 08:43:48.60 Subscribe to project updates by watching
https://github.com/bitnami/bitnami-docker-postgresql
postgresql 08:43:48.60 Submit issues and feature requests at
https://github.com/bitnami/bitnami-docker-postgresql/issues
postgresql 08:43:48.60
postgresql 08:43:48.62 INFO  ==> ** Starting PostgreSQL setup **
postgresql 08:43:48.63 INFO  ==> Validating settings in POSTGRESQL_* env vars..
postgresql 08:43:48.63 ERROR ==> The POSTGRESQL_PASSWORD environment variable is empty or not set. Set the
environment variable ALLOW_EMPTY_PASSWORD=yes to allow the container to be started with blank passwords. This is
recommended only for development.
postgresql 08:43:48.63 ERROR ==> The POSTGRESQL_PASSWORD environment variable is empty or not set. Set the
environment variable ALLOW_EMPTY_PASSWORD=yes to allow the container to be started with blank passwords. This is
```

```
recommended only for development.
```

The output of the **logs** command clearly indicates that the problem is linked to the contents of the **POSTGRESQL_PASSWORD** variable, which is empty. It also tells us that we could set the value of the **ALLOW_EMPTY_PASSWORD** variable to **yes** to get around this problem:

```
...
postgresql 08:43:48.63 ERROR ==> The POSTGRESQL_PASSWORD environment variable is empty or not set. Set the
environment variable ALLOW_EMPTY_PASSWORD=yes to allow the container to be started with blank passwords. This is
recommended only for development.
```

Update the **deployment-postgresql.yaml** file as follows:

```
root@kubemaster:~# vi deployment-postgresql.yaml
root@kubemaster:~# cat deployment-postgresql.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: postgresql
  labels:
    app: postgresql
spec:
  replicas: 1
  selector:
    matchLabels:
      app: postgresql
  template:
    metadata:
      labels:
        app: postgresql
    spec:
      containers:
      - image: bitnami/postgresql:10.13.0
        imagePullPolicy: IfNotPresent
        name: postgresql
```

```
        env:
        - name: POSTGRESQL_PASSWORD
          value: "VerySecurePassword:-)"
```

Apply the modification:

```
root@kubemaster:~# kubectl apply -f deployment-postgresql.yaml
deployment.apps/postgresql configured
```

Note the state of the Pod and the deployment :

```
root@kubemaster:~# kubectl get pods
NAME                          READY   STATUS      RESTARTS   AGE
postgresql-6f885d8957-tnlbb   1/1     Running     0          29s
sharedvolume                  2/2     Running     0          8d
volumepod                     0/1     Completed   0          8d

root@kubemaster:~# kubectl get deployments
NAME         READY   UP-TO-DATE   AVAILABLE   AGE
postgresql   1/1     1            1           14m
```

Now use the **-f** option of the logs command to see continuous traces:

```
root@kubemaster:~# kubectl logs postgresql-6f885d8957-tnlbb -f
postgresql 08:48:35.14
postgresql 08:48:35.14 Welcome to the Bitnami postgresql container
postgresql 08:48:35.14 Subscribe to project updates by watching
https://github.com/bitnami/bitnami-docker-postgresql
postgresql 08:48:35.14 Submit issues and feature requests at
https://github.com/bitnami/bitnami-docker-postgresql/issues
postgresql 08:48:35.15
postgresql 08:48:35.16 INFO ==> ** Starting PostgreSQL setup **
postgresql 08:48:35.17 INFO ==> Validating settings in POSTGRESQL_* env vars...
postgresql 08:48:35.18 INFO ==> Loading custom pre-init scripts...
```

```
postgresql 08:48:35.18 INFO ==> Initializing PostgreSQL database...
postgresql 08:48:35.20 INFO ==> pg_hba.conf file not detected. Generating it...
postgresql 08:48:35.20 INFO ==> Generating local authentication configuration
postgresql 08:48:47.94 INFO ==> Starting PostgreSQL in background...
postgresql 08:48:48.36 INFO ==> Changing password of postgres
postgresql 08:48:48.39 INFO ==> Configuring replication parameters
postgresql 08:48:48.46 INFO ==> Configuring fsync
postgresql 08:48:48.47 INFO ==> Loading custom scripts...
postgresql 08:48:48.47 INFO ==> Enabling remote connections
postgresql 08:48:48.48 INFO ==> Stopping PostgreSQL...
postgresql 08:48:49.49 INFO ==> ** PostgreSQL setup finished! **

postgresql 08:48:49.50 INFO ==> ** Starting PostgreSQL **
2022-09-28 08:48:49.633 GMT [1] LOG: listening on IPv4 address “0.0.0.0”, port 5432
2022-09-28 08:48:49.633 GMT [1] LOG: listening on IPv6 address “::”, port 5432
2022-09-28 08:48:49.699 GMT [1] LOG: listening on Unix socket “/tmp/.s.PGSQL.5432”
2022-09-28 08:48:49.817 GMT [106] LOG: database system was shut down at 2022-09-28 08:48:48 GMT
2022-09-28 08:48:49.852 GMT [1] LOG: database system is ready to accept connections
^C
```

Important : Note the use of **^C** to stop the **kubectl logs postgresql-6f885d8957-tnlbb -f** command.

LAB #4 - Containers

4.1 - The exec Command

The **exec** command can be used to execute a command inside a container in a pod. Let's say you want to check the contents of the PostgreSQL configuration file, **postgresql.conf** :

```
root@kubemaster:~# kubectl exec postgresql-6f885d8957-tnlbb -- cat /opt/bitnami/postgresql/conf/postgresql.conf |
more
# -----------------------------
# PostgreSQL configuration file
# -----------------------------
#
# This file consists of lines of the form:
#
# name = value
#
# (The “=” is optional.) Whitespace may be used. Comments are introduced with
# “#” anywhere on a line. The complete list of parameter names and allowed
# values can be found in the PostgreSQL documentation.
#
# The commented-out settings shown in this file represent the default values.
# Re-commenting a setting is NOT sufficient to revert it to the default value;
# you need to reload the server.
#
# This file is read on server startup and when the server receives a SIGHUP
# signal. If you edit the file on a running system, you have to SIGHUP the
# server for the changes to take effect, run “pg_ctl reload”, or execute
# SELECT pg_reload_conf()”. Some parameters, which are marked below,
# require a server shutdown and restart to take effect.
#
# Any parameter can also be given as a command-line option to the server, e.g.,
# “postgres -c log_connections=on”. Some parameters can be changed at run time
# with the “SET” SQL command.
#
# Memory units: kB = kilobytes Time units: ms = milliseconds
# MB = megabytes s = seconds
# GB = gigabytes min = minutes
# TB = terabytes h = hours
# d = days
```

```
#------------------------------------------------------------------------------
# FILE LOCATIONS
#------------------------------------------------------------------------------

# The default values of these variables are driven from the -D command-line
# option or PGDATA environment variable, represented here as ConfigDir.

#data_directory = 'ConfigDir' # use data in another directory
# (change requires restart)
#hba_file = 'ConfigDir/pg_hba.conf' # host-based authentication file
# (change requires restart)
#ident_file = 'ConfigDir/pg_ident.conf' # ident configuration file
# (change requires restart)

# If external_pid_file is not explicitly set, no extra PID file is written.
#external_pid_file = '' # write an extra PID file
# (change requires restart)



#------------------------------------------------------------------------------
# CONNECTIONS AND AUTHENTICATION
#------------------------------------------------------------------------------

--More--
```

Finally, it is of course possible to enter the container itself in order to search for possible problems:

```
root@kubemaster:~# kubectl exec postgresql-6f885d8957-tnlbb --stdin --tty -- /bin/bash
I have no name!@postgresql-6f885d8957-tnlbb:/$ exit
exit
root@kubemaster:~#
```

LAB #5 - Networking

5.1 - kube-proxy and DNS

Use the **kubectl get pods** command to obtain the names of the **kube-proxy** and **coredns** pods:

```
root@kubemaster:~# kubectl get pods -n kube-system
NAME                                                READY   STATUS    RESTARTS        AGE
calico-kube-controllers-6799f5f4b4-2tgpq            1/1     Running   0               160m
calico-node-5htrc                                   1/1     Running   1 (12d ago)     24d
calico-node-dc7hd                                   1/1     Running   1 (12d ago)     24d
calico-node-qk5kt                                   1/1     Running   1 (12d ago)     24d
coredns-565d847f94-kkpbp                            1/1     Running   0               160m
coredns-565d847f94-tqd8z                            1/1     Running   1 (12d ago)     23d
etcd-kubemaster.ittraining.loc                      1/1     Running   1 (12d ago)     23d
kube-apiserver-kubemaster.ittraining.loc            1/1     Running   1 (12d ago)     23d
kube-controller-manager-kubemaster.ittraining.loc   1/1     Running   12 (5d4h ago)   23d
kube-proxy-ggmt6                                    1/1     Running   1 (12d ago)     23d
kube-proxy-x5j2r                                    1/1     Running   1 (12d ago)     23d
kube-proxy-x7fpc                                    1/1     Running   1 (12d ago)     23d
kube-scheduler-kubemaster.ittraining.loc            1/1     Running   14 (31h ago)    23d
metrics-server-5dbb5ff5bd-vh5fz                     1/1     Running   1 (12d ago)     23d
```

Check each pod's logs for any errors:

```
root@kubemaster:~# kubectl logs -n kube-system kube-proxy-ggmt6 | tail
I0916 07:32:34.968850       1 shared_informer.go:255] Waiting for caches to sync for service config
I0916 07:32:34.968975       1 config.go:226] "Starting endpoint slice config controller"
I0916 07:32:34.968988       1 shared_informer.go:255] Waiting for caches to sync for endpoint slice config
I0916 07:32:34.968995       1 config.go:444] "Starting node config controller"
I0916 07:32:34.969002       1 shared_informer.go:255] Waiting for caches to sync for node config
I0916 07:32:35.069078       1 shared_informer.go:262] Caches are synced for service config
```

```
I0916 07:32:35.069147       1 shared_informer.go:262] Caches are synced for node config
I0916 07:32:35.069169       1 shared_informer.go:262] Caches are synced for endpoint slice config
I0916 07:33:06.103911       1 trace.go:205] Trace[210170851]: "iptables restore" (16-Sep-2022 07:33:03.886)
(total time: 2216ms):
Trace[210170851]: [2.216953699s] [2.216953699s] END
```

```
root@kubemaster:~# kubectl logs -n kube-system coredns-565d847f94-kkpbp | tail
[INFO] plugin/kubernetes: waiting for Kubernetes API before starting server
[INFO] plugin/kubernetes: waiting for Kubernetes API before starting server
.:53
[INFO] plugin/reload: Running configuration SHA512 =
591cf328cccc12bc490481273e738df59329c62c0b729d94e8b61db9961c2fa5f046dd37f1cf888b953814040d180f52594972691cd6ff41b
e96639138a43908
CoreDNS-1.9.3
linux/amd64, go1.18.2, 45b0a11
```

5.2 - The netshoot Container

If, at this stage, you haven't found any apparent errors, it's time to create a pod containing a container generated from the **nicolaka/netshoot** image. This image contains a large number of pre-installed troubleshooting tools:

Create the file **nginx-netshoot.yaml**:

To do: Copy the content from **here** **and paste it into your file.**

```
root@kubemaster:~# vi nginx-netshoot.yaml
root@kubemaster:~# cat nginx-netshoot.yaml
```

```
apiVersion: v1
kind: Pod
metadata:
  name: nginx-netshoot
  labels:
    app: nginx-netshoot
spec:
  containers:
  - name: nginx
    image: nginx:1.19.1
---
apiVersion: v1
kind: Service
metadata:
  name: service-netshoot
spec:
  type: ClusterIP
  selector:
    app: nginx-netshoot
  ports:
    - protocol: TCP
      port: 80
      targetPort: 80
```

Create the pod:

```
root@kubemaster:~# kubectl create -f nginx-netshoot.yaml
pod/nginx-netshoot created
service/service-netshoot created
```

Check that the service is running:

```
root@kubemaster:~# kubectl get services
NAME              TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)   AGE
```

```
kubernetes         ClusterIP   10.96.0.1       <none>        443/TCP   24d
service-netshoot   ClusterIP   10.107.115.28   <none>        80/TCP    5m18s
```

Now create the **netshoot.yaml** file:

To do: Copy the content from **here** **and paste it into your file.**

```
root@kubemaster:~# vi netshoot.yaml
root@kubemaster:~# cat netshoot.yaml
apiVersion: v1
kind: Pod
metadata:
  name: netshoot
spec:
  containers:
  - name: netshoot
    image: nicolaka/netshoot
    command: ['sh', '-c', 'while true; do sleep 5; done']
```

Create the pod:

```
root@kubemaster:~# kubectl create -f netshoot.yaml
pod/netshoot created
```

Check that the pod status is **READY** :

```
root@kubemaster:~# kubectl get pods
NAME                          READY   STATUS      RESTARTS   AGE
netshoot                      1/1     Running     0          6m7s
nginx-netshoot                1/1     Running     0          9m32s
postgresql-6f885d8957-tnlbb   1/1     Running     0          98m
```

```
sharedvolume                  2/2     Running     0          8d
troubleshooting               1/1     Running     0          125m
volumepod                     0/1     Completed   0          8d
```

Enter the **netshoot** container:

```
root@kubemaster:~# kubectl exec --stdin --tty netshoot -- /bin/bash
bash-5.1#
```

Test the **service-netshoot** service:

```
bash-5.1# curl service-netshoot
<!DOCTYPE html>
<html>
<head>
<title>Welcome to nginx!</title>
<style>
    body {
        width: 35em;
        margin: 0 auto;
        font-family: Tahoma, Verdana, Arial, sans-serif;
    }
</style>
</head>
<body>
<h1>Welcome to nginx!</h1>
<p>If you see this page, the nginx web server is successfully installed and
working. Further configuration is required.</p>

<p>For online documentation and support please refer to
<a href="http://nginx.org/">nginx.org</a>.<br/>
Commercial support is available at
<a href="http://nginx.com/">nginx.com</a>.</p>
```

```
<p><em>Thank you for using nginx.</em></p>
</body>
</html>
```

Lastly, use the **nslookup** command to obtain the IP address of the service:

```
bash-5.1# nslookup service-netshoot
Server:         10.96.0.10
Address:        10.96.0.10#53

Name:   service-netshoot.default.svc.cluster.local
Address: 10.107.115.28
```

> **Important** : For more information about the tools included in the **netshoot** container, see the **netshoot** page on **GitHub**.
