



# OKD on Bare Metal

Thomas Cameron

Red Hat Practice Lead, Sparksoft

Test Automation



DevSecOps Delivery



Data Science



Contact Center Operations



# Welcome!

Thank you for being here!

# What we're going to cover today

- Introduction
- Credit
- Network
- DHCP
- DNS Settings
- HAProxy
- NFS
- Installing the Cluster
- Post-installation Configuration

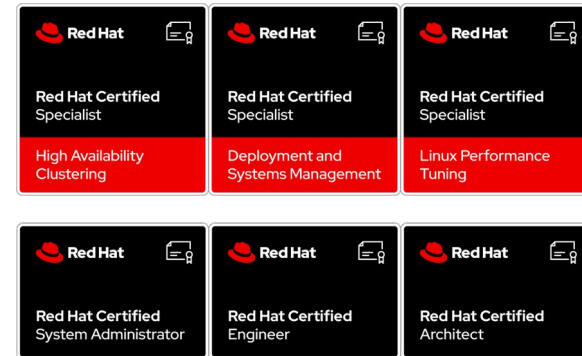
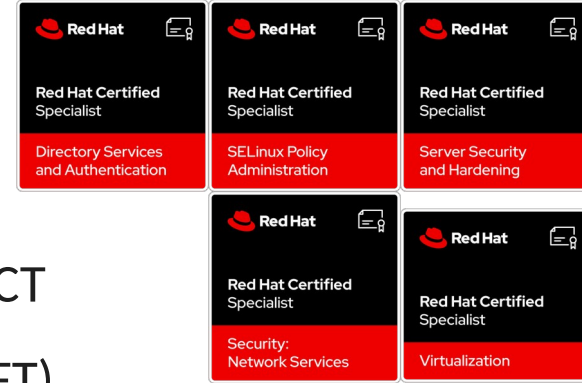
# Introduction

Who am I, and why should you care?



# Howdy! I'm Thomas

- I've been doing this since 1993
- Started as a Novell CNE
- Went to work for Microsoft, became an MCSE/MCT
- Started using Linux in 1995 (while working at MSFT)
- Worked for Red Hat for about 14 years – RHCA level 5
- Went to AWS for 4 years – Solution Arch Pro, Solution Arch Assoc, Security Specialty, SysOps Associate, AAI
- Been with SparkSoft since July 2023



Howdy! I'm  
Thomas

- I am NOT an OKD maven. I like OKD, and I am learning OKD, but I'm still muddling my way through this.
- You never, ever stop learning (thank goodness).

# Credit

Big ups to Ryan Hay!

# Howdy! I'm Thomas

- HUGE credit goes to Ryan Hay <https://github.com/ryanhay>
- I shamelessly used his video
  - <https://www.youtube.com/watch?v=d03xg2PKOPg>
- And his instructions
  - <https://github.com/ryanhay/ocp4-metal-install>
- to prepare this demo.
- I had to update a bunch of stuff for Fedora 39, but the “bones” are definitely from his work.



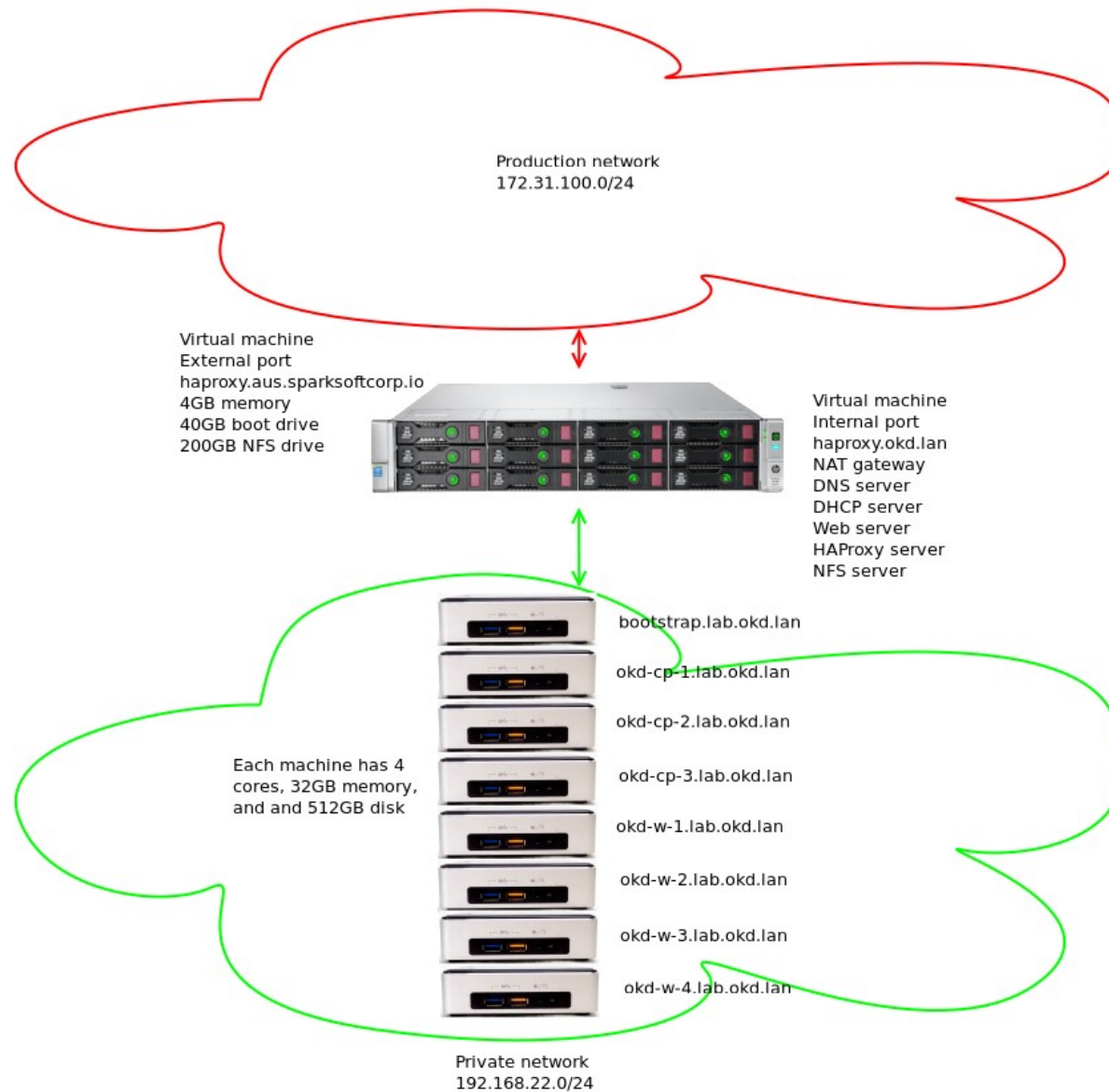
# Network

What environment is this installed in?

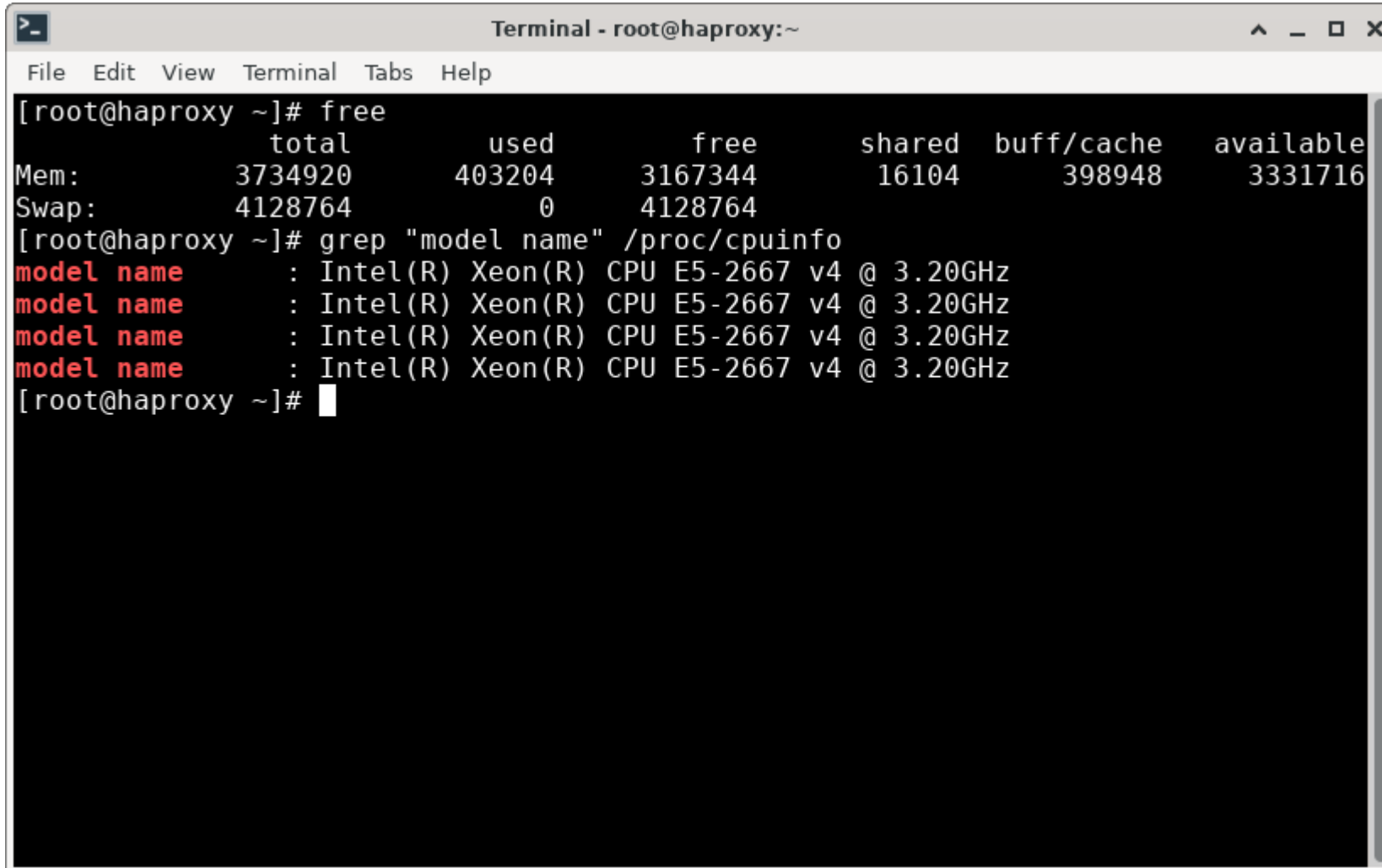
# Two networks, 8 physical machines, one VM

- The production network is 172.31.100.0/24
  - DNS
  - DHCP/PXE
- The private network for the OKD cluster is 192.168.22.0/24
  - Need private DNS
  - Need private DHCP
- The connection between the two networks is the HAProxy machine, a VM
  - One interface bridged to the production network
  - One interface bridged to the private network

# The Layout



# The Layout



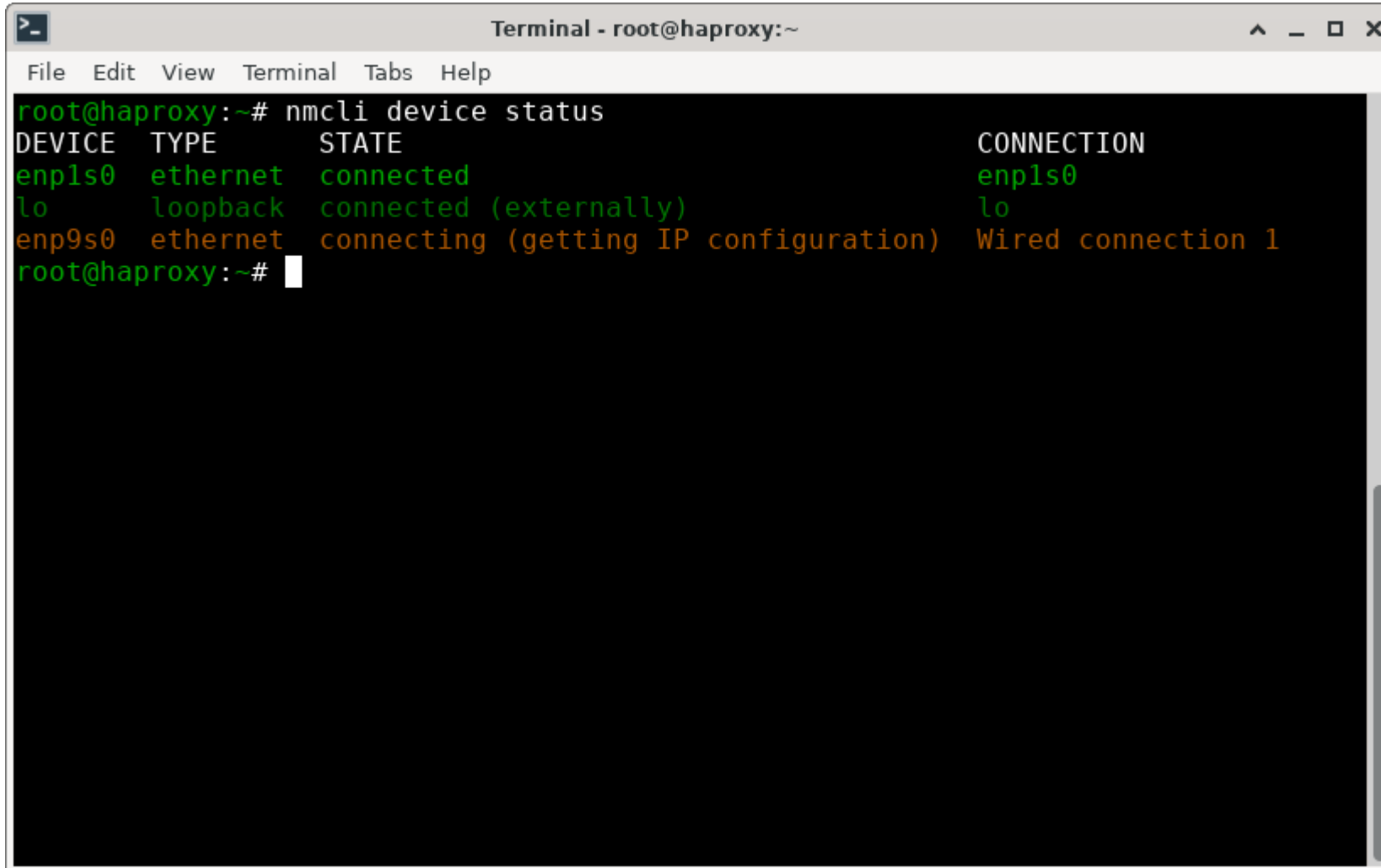
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
[root@haproxy ~]# free
              total        used         free       shared    buff/cache   available
Mem:          3734920        403204        3167344         16104         398948        3331716
Swap:          4128764            0         4128764
[root@haproxy ~]# grep "model name" /proc/cpuinfo
model name      : Intel(R) Xeon(R) CPU E5-2667 v4 @ 3.20GHz
model name      : Intel(R) Xeon(R) CPU E5-2667 v4 @ 3.20GHz
model name      : Intel(R) Xeon(R) CPU E5-2667 v4 @ 3.20GHz
model name      : Intel(R) Xeon(R) CPU E5-2667 v4 @ 3.20GHz
[root@haproxy ~]#
```



## Set up the second interface

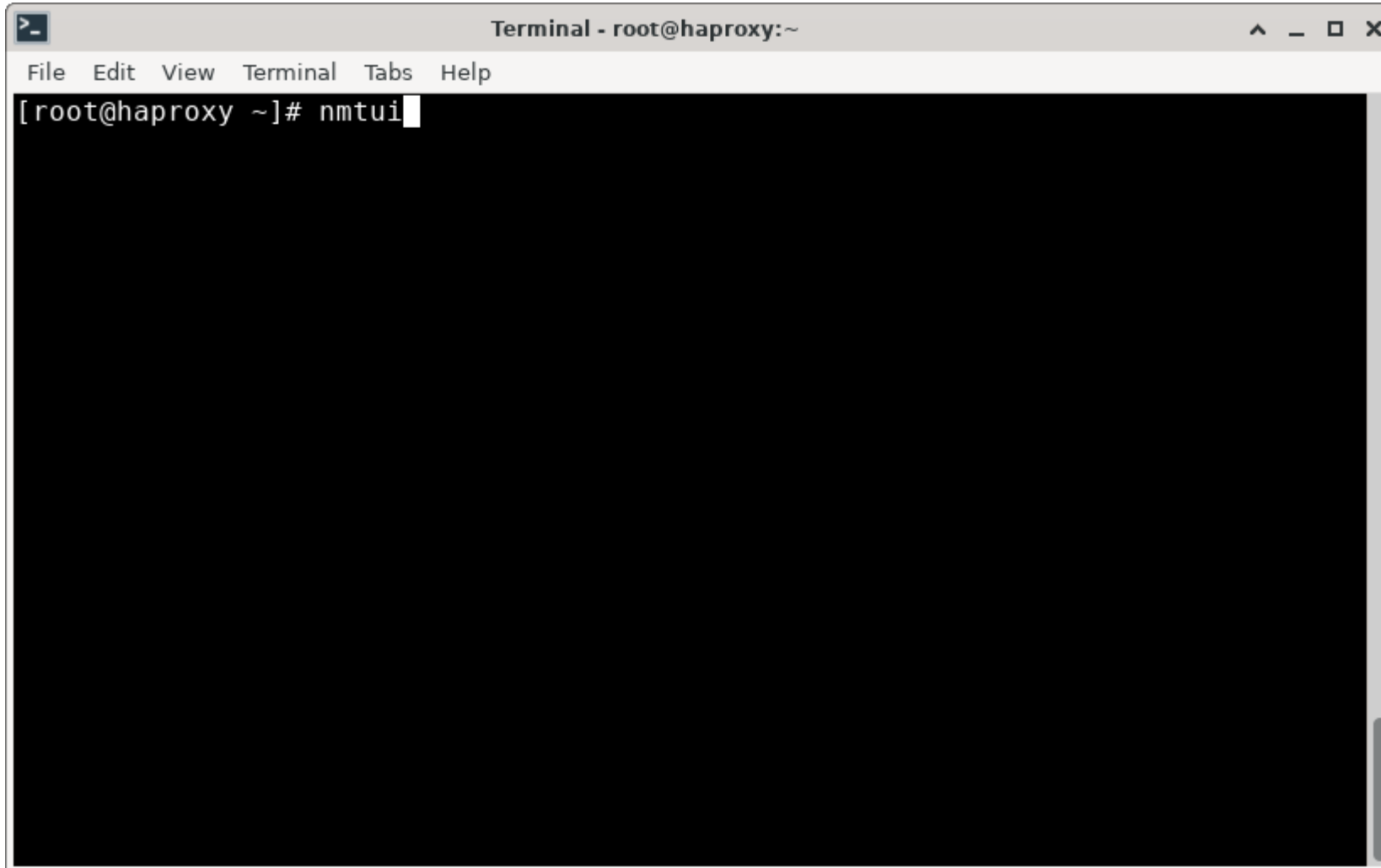
- I kickstarted the HAProxy machine from the production network, and it has a DHCP reservation so that the IP address is fixed
- The second interface was unconfigured

# Network



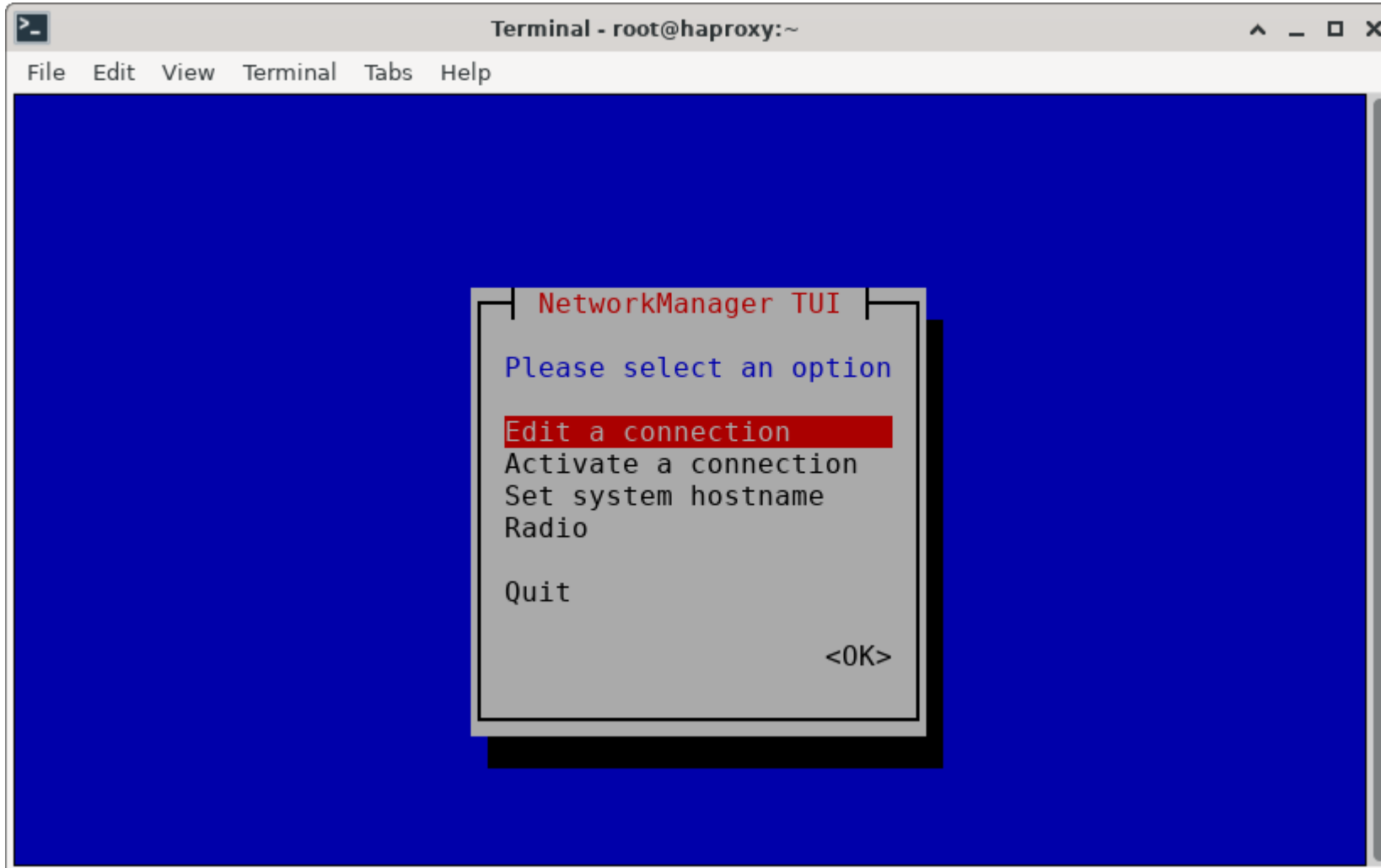
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# nmcli device status
DEVICE  TYPE      STATE                                CONNECTION
enp1s0  ethernet  connected                            enp1s0
lo      loopback  connected (externally)              lo
enp9s0  ethernet  connecting (getting IP configuration) Wired connection 1
root@haproxy:~#
```

# Network

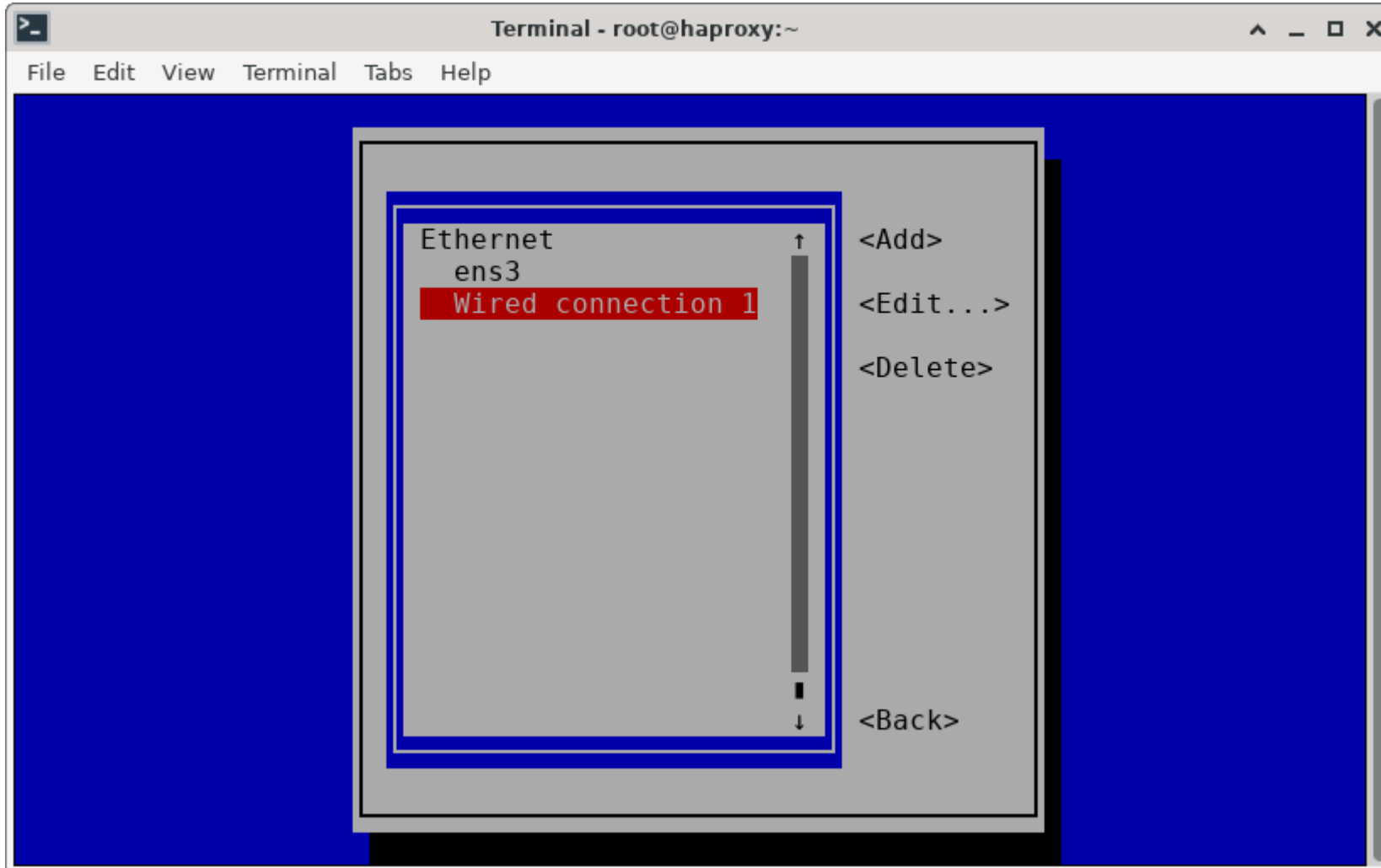


A terminal window titled "Terminal - root@haproxy:~" with a menu bar containing "File", "Edit", "View", "Terminal", "Tabs", and "Help". The terminal prompt is "[root@haproxy ~]# nmtui" with a white cursor at the end of the command. The rest of the terminal area is black.

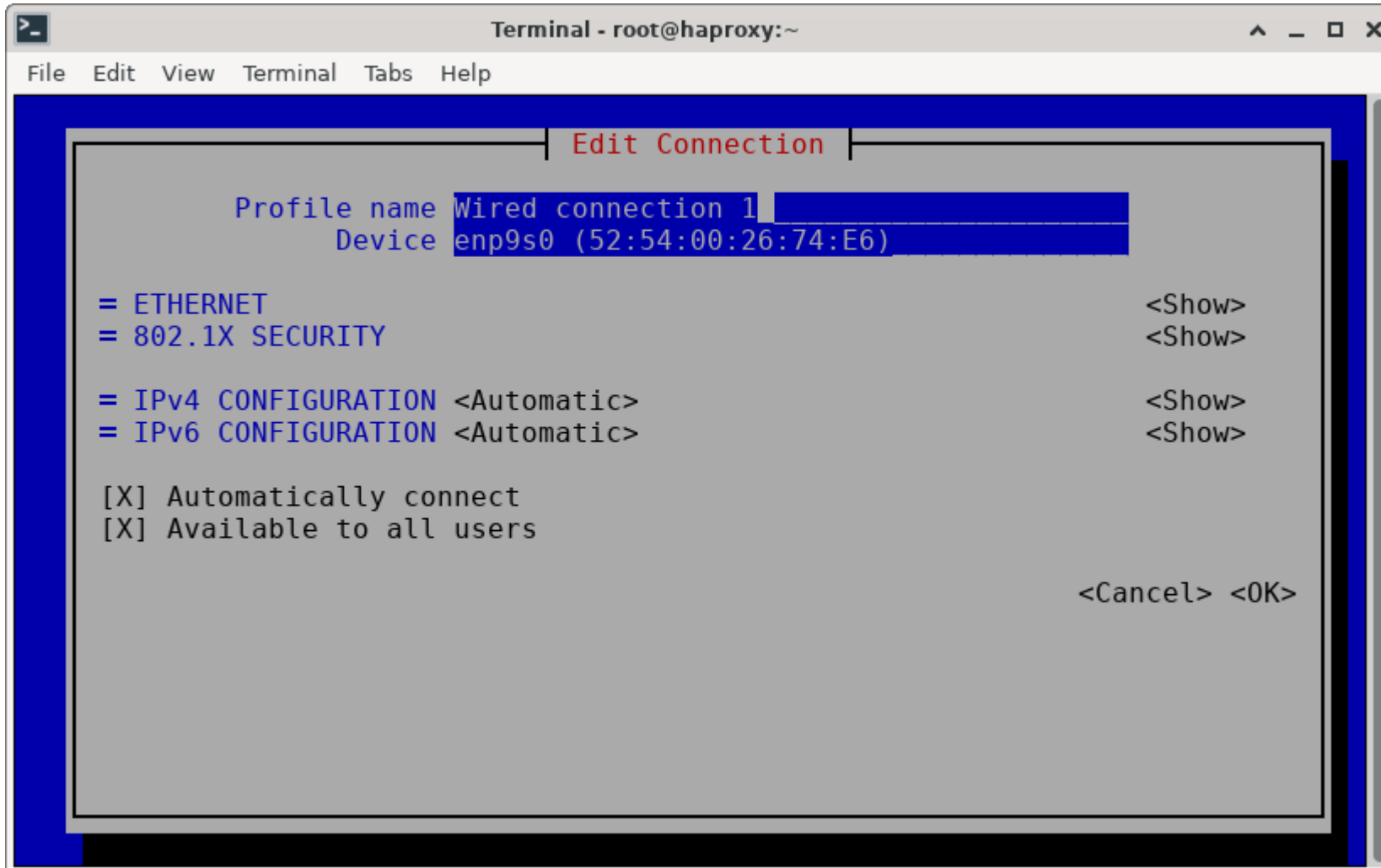
# Network



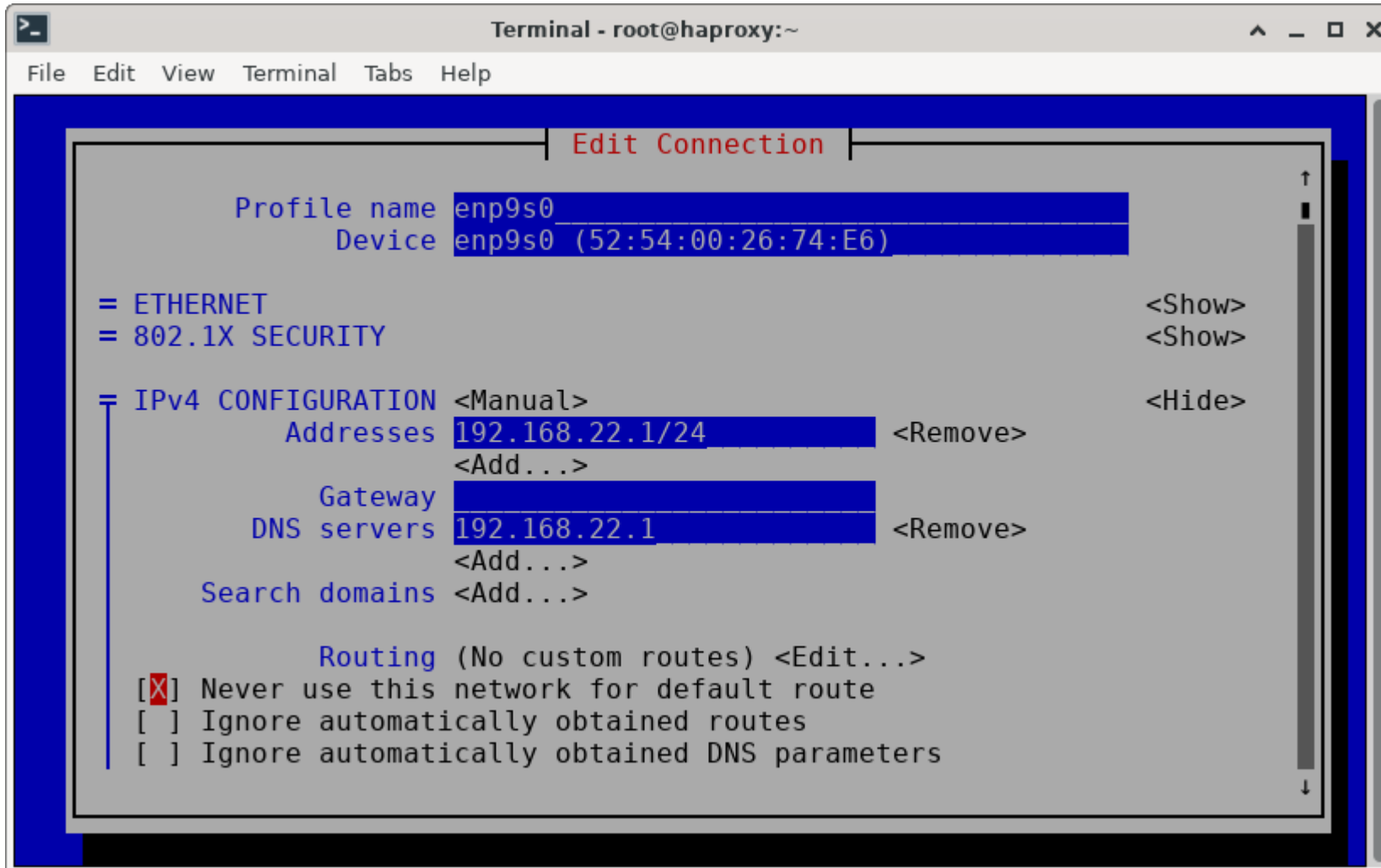
# Network



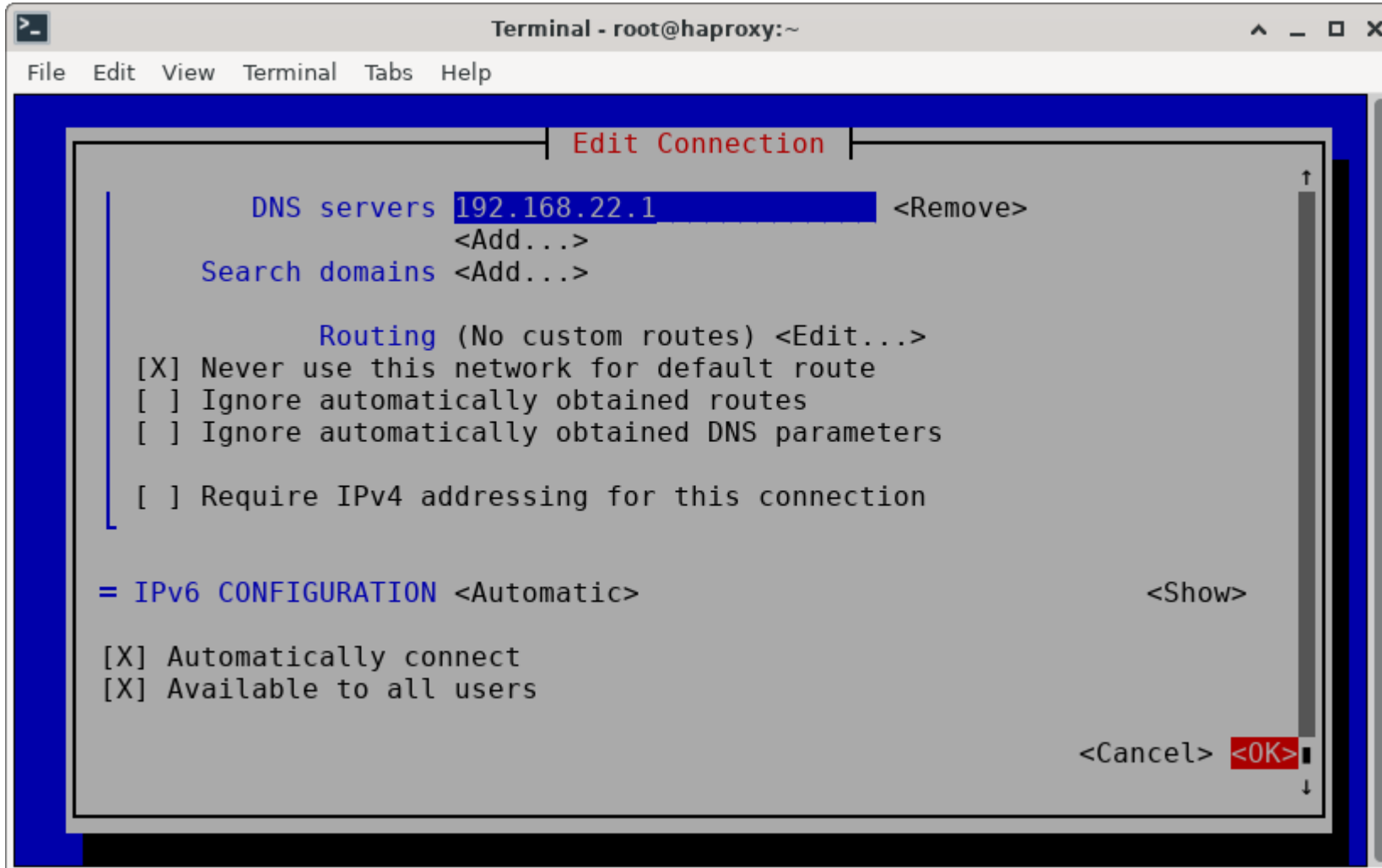
# Network



# Network

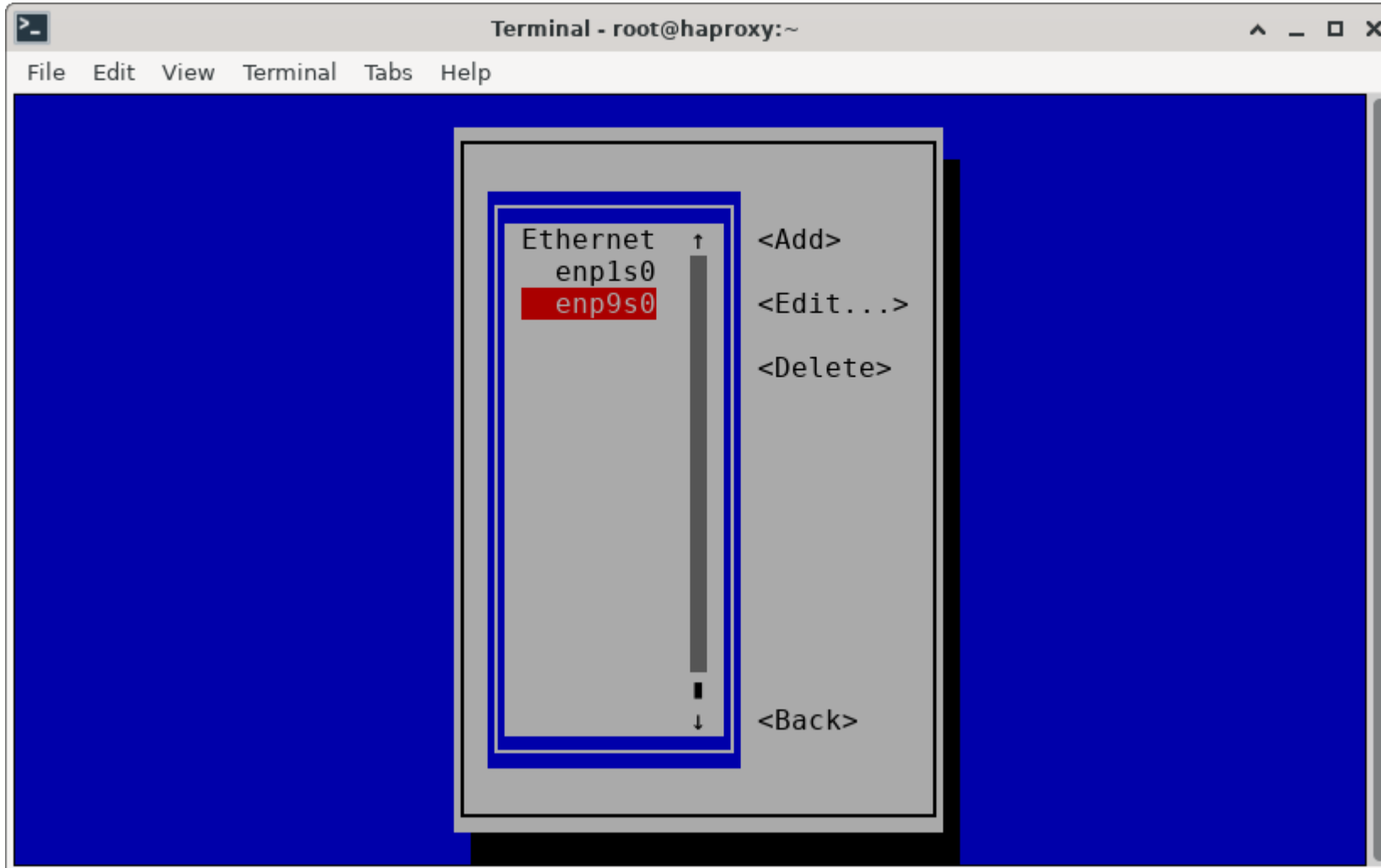


# Network

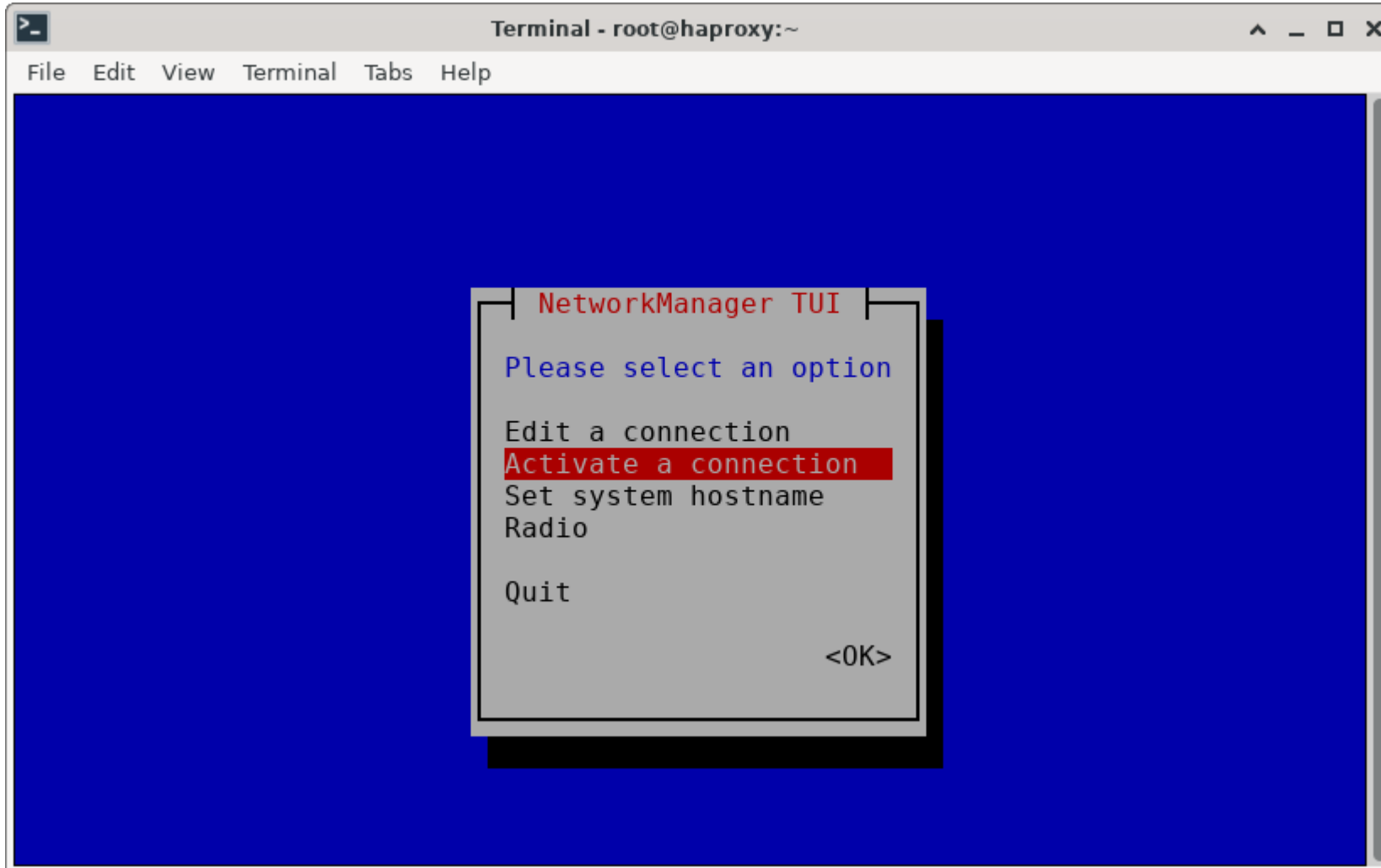




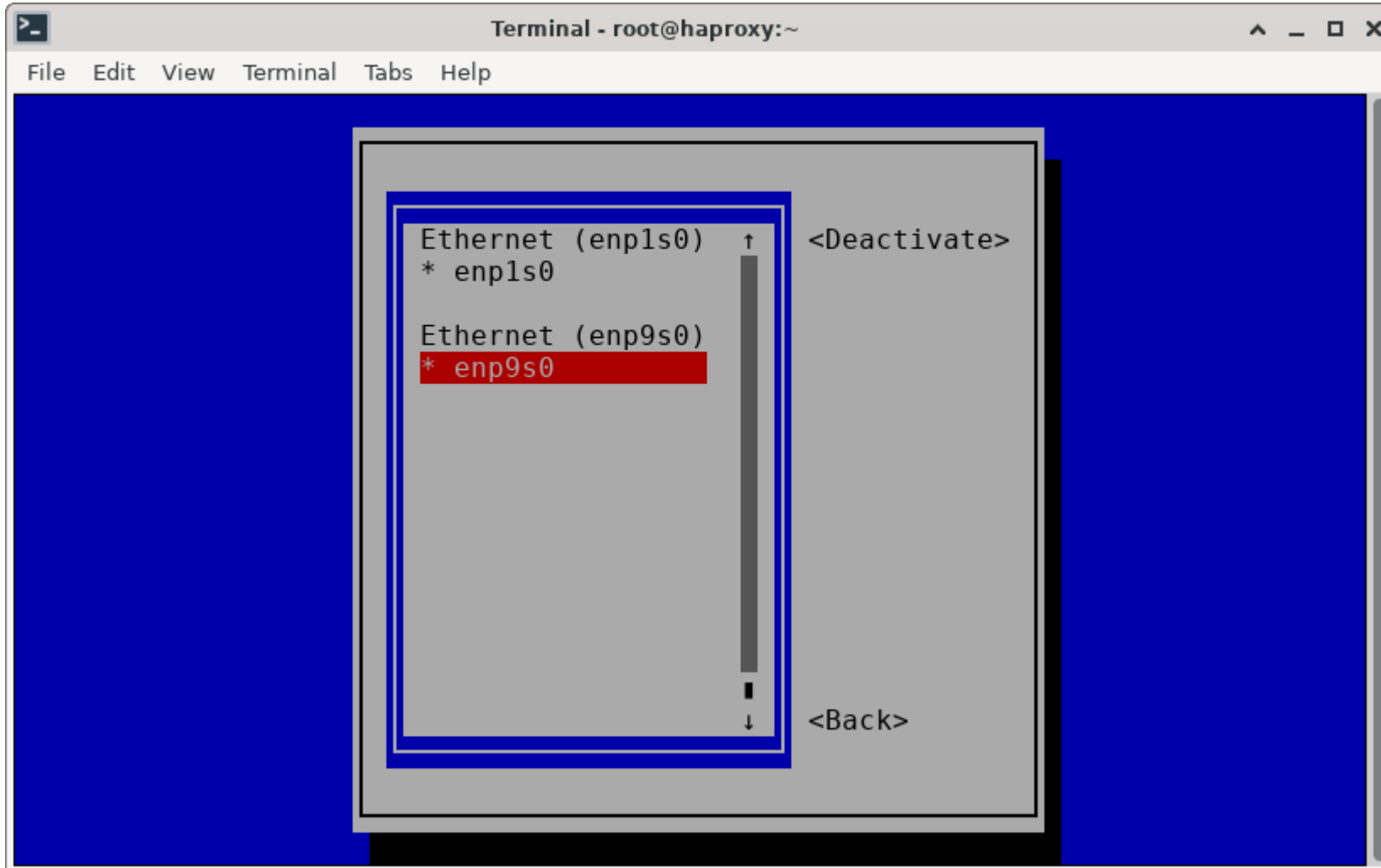
# Network



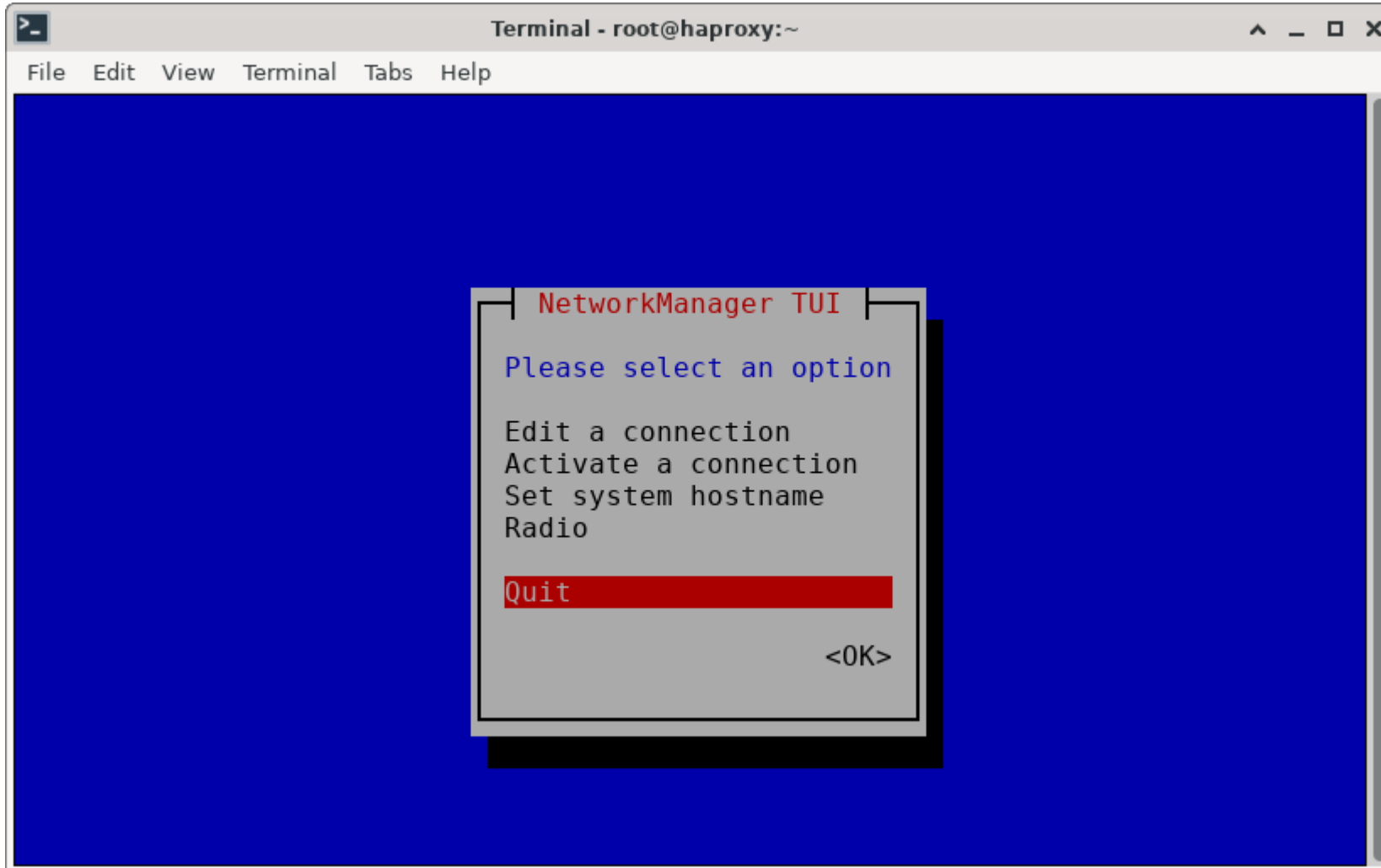
# Network



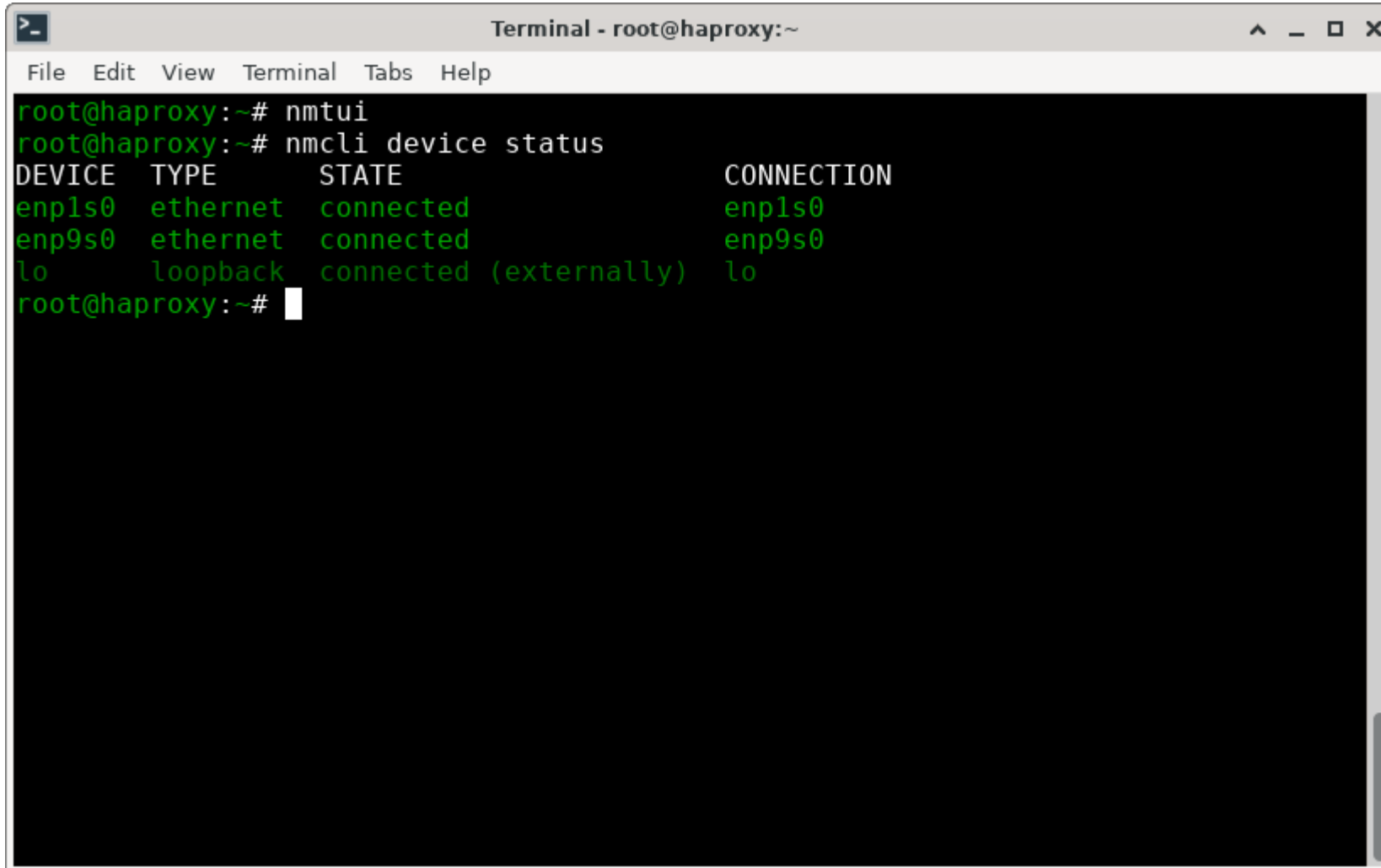
# Network



# Network

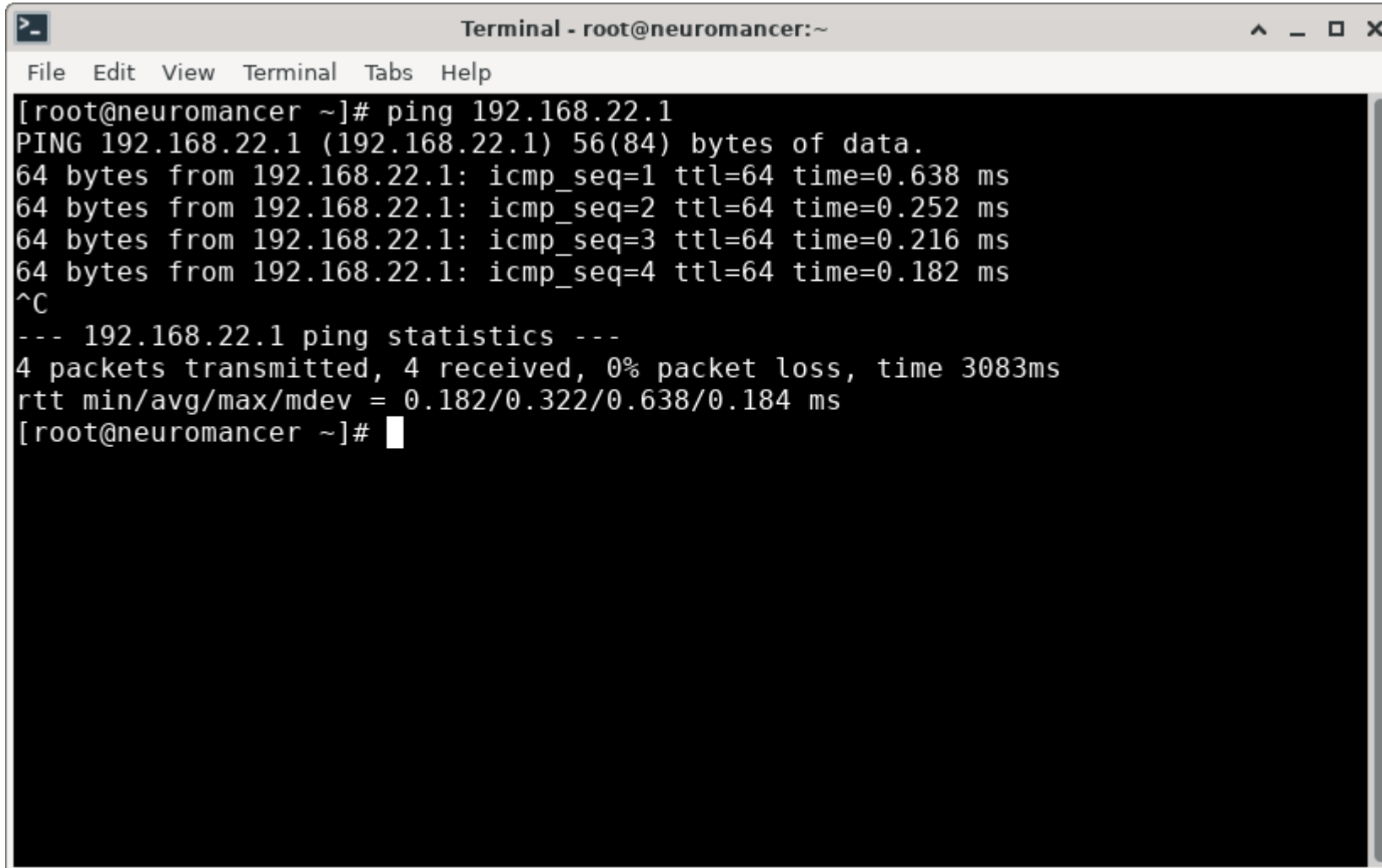


# Network



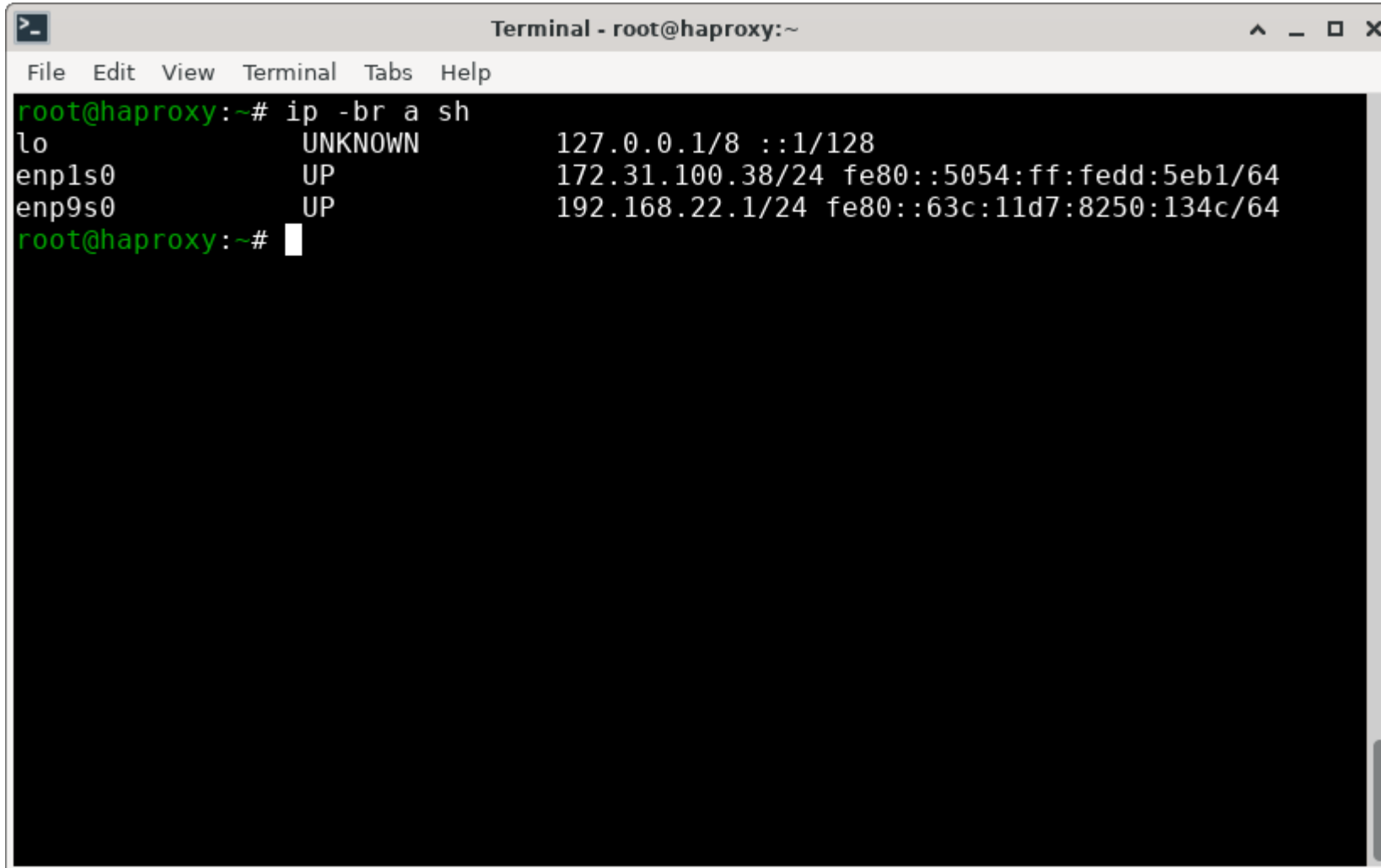
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# nmtui
root@haproxy:~# nmcli device status
DEVICE  TYPE      STATE      CONNECTION
enp1s0  ethernet  connected  enp1s0
enp9s0  ethernet  connected  enp9s0
lo      loopback  connected (externally)  lo
root@haproxy:~#
```

# Network



```
Terminal - root@neuromancer:~
File Edit View Terminal Tabs Help
[root@neuromancer ~]# ping 192.168.22.1
PING 192.168.22.1 (192.168.22.1) 56(84) bytes of data.
64 bytes from 192.168.22.1: icmp_seq=1 ttl=64 time=0.638 ms
64 bytes from 192.168.22.1: icmp_seq=2 ttl=64 time=0.252 ms
64 bytes from 192.168.22.1: icmp_seq=3 ttl=64 time=0.216 ms
64 bytes from 192.168.22.1: icmp_seq=4 ttl=64 time=0.182 ms
^C
--- 192.168.22.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3083ms
rtt min/avg/max/mdev = 0.182/0.322/0.638/0.184 ms
[root@neuromancer ~]#
```

# Network



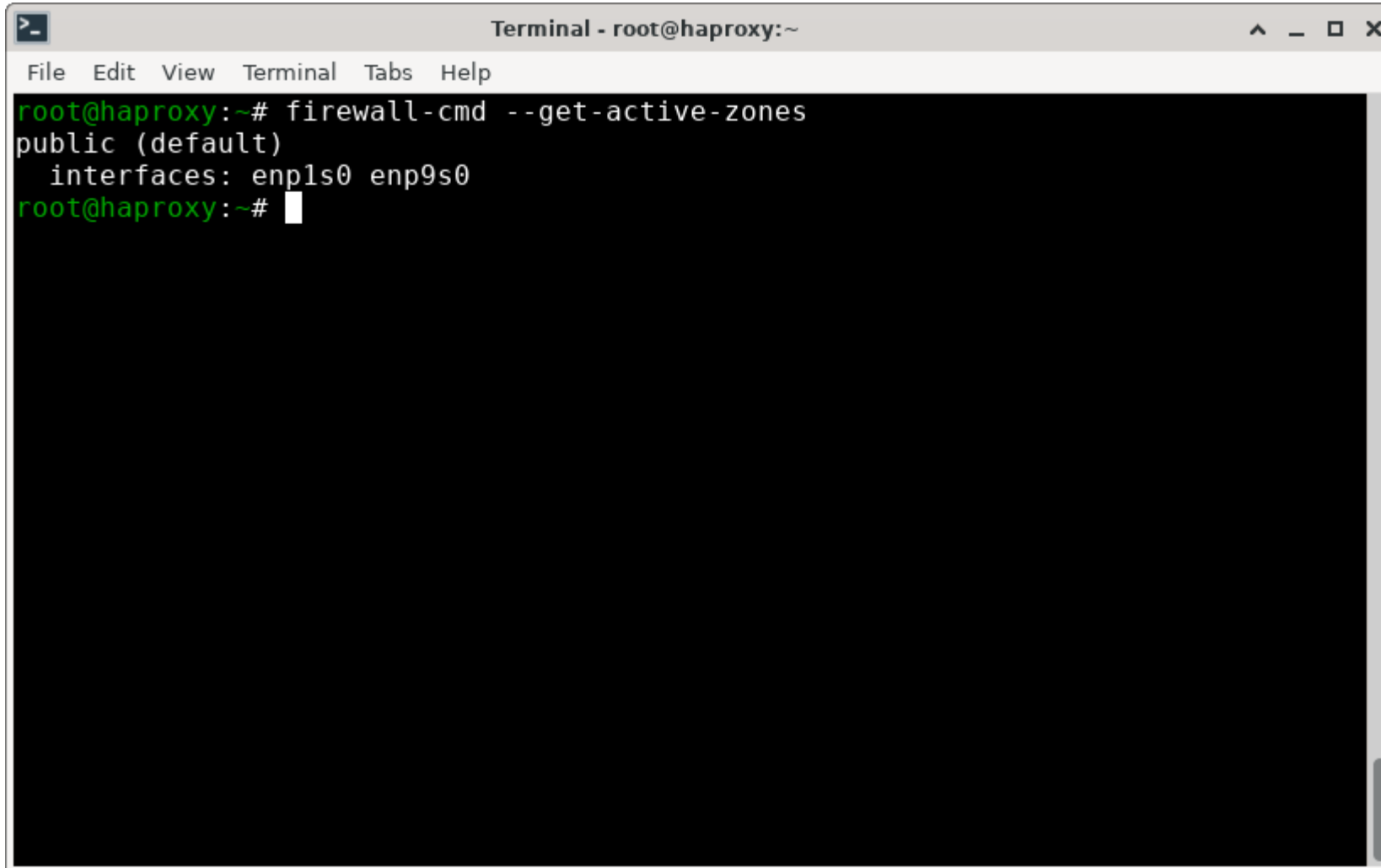
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# ip -br a sh
lo                UNKNOWN          127.0.0.1/8 ::1/128
enp1s0            UP               172.31.100.38/24 fe80::5054:ff:fedd:5eb1/64
enp9s0            UP               192.168.22.1/24 fe80::63c:11d7:8250:134c/64
root@haproxy:~#
```

# Firewall/NAT

- Now I need to tell firewalld that these two interfaces are on different networks (internal and external), so I can manage firewall rules and network address translation.

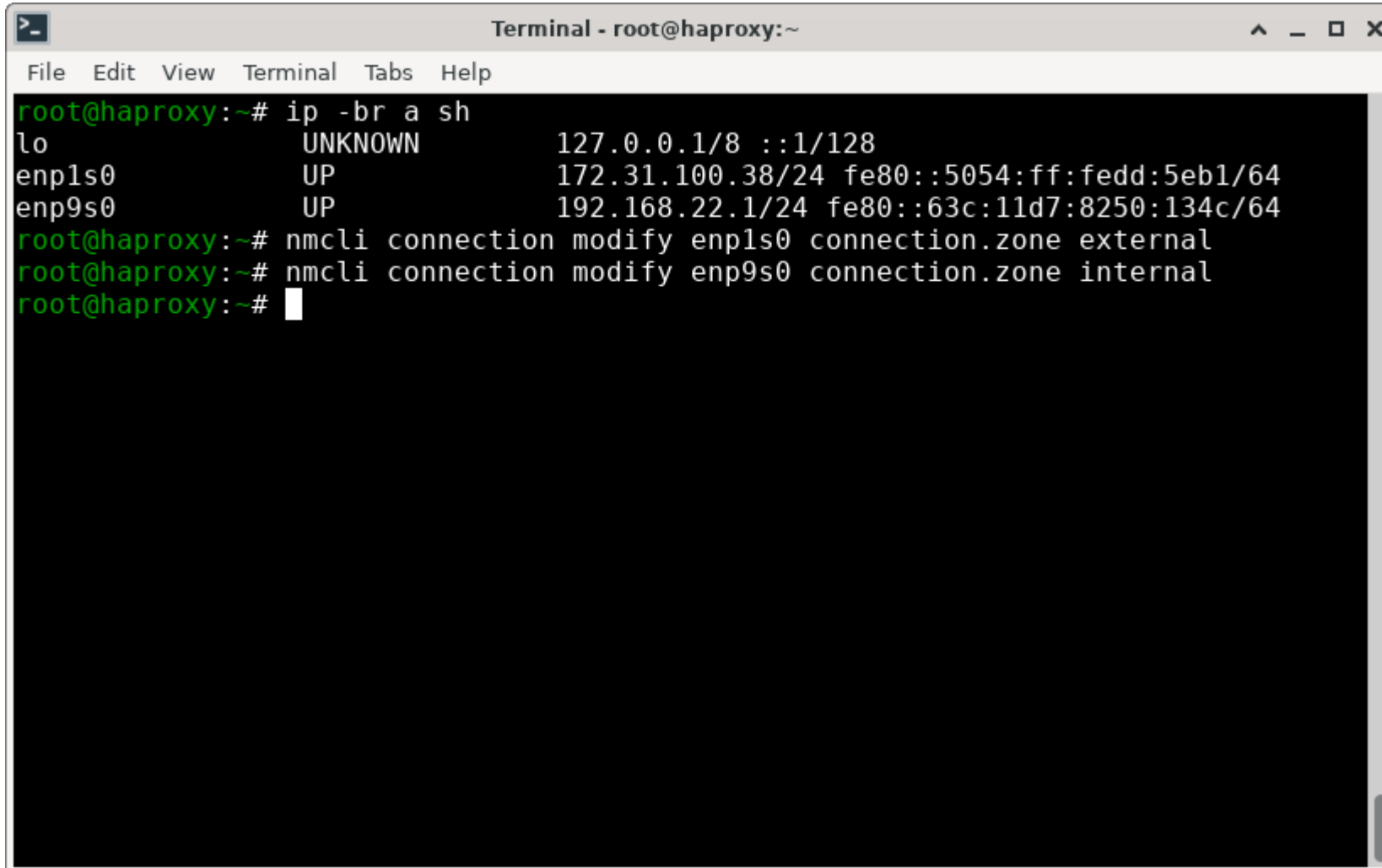


# Firewall/NAT



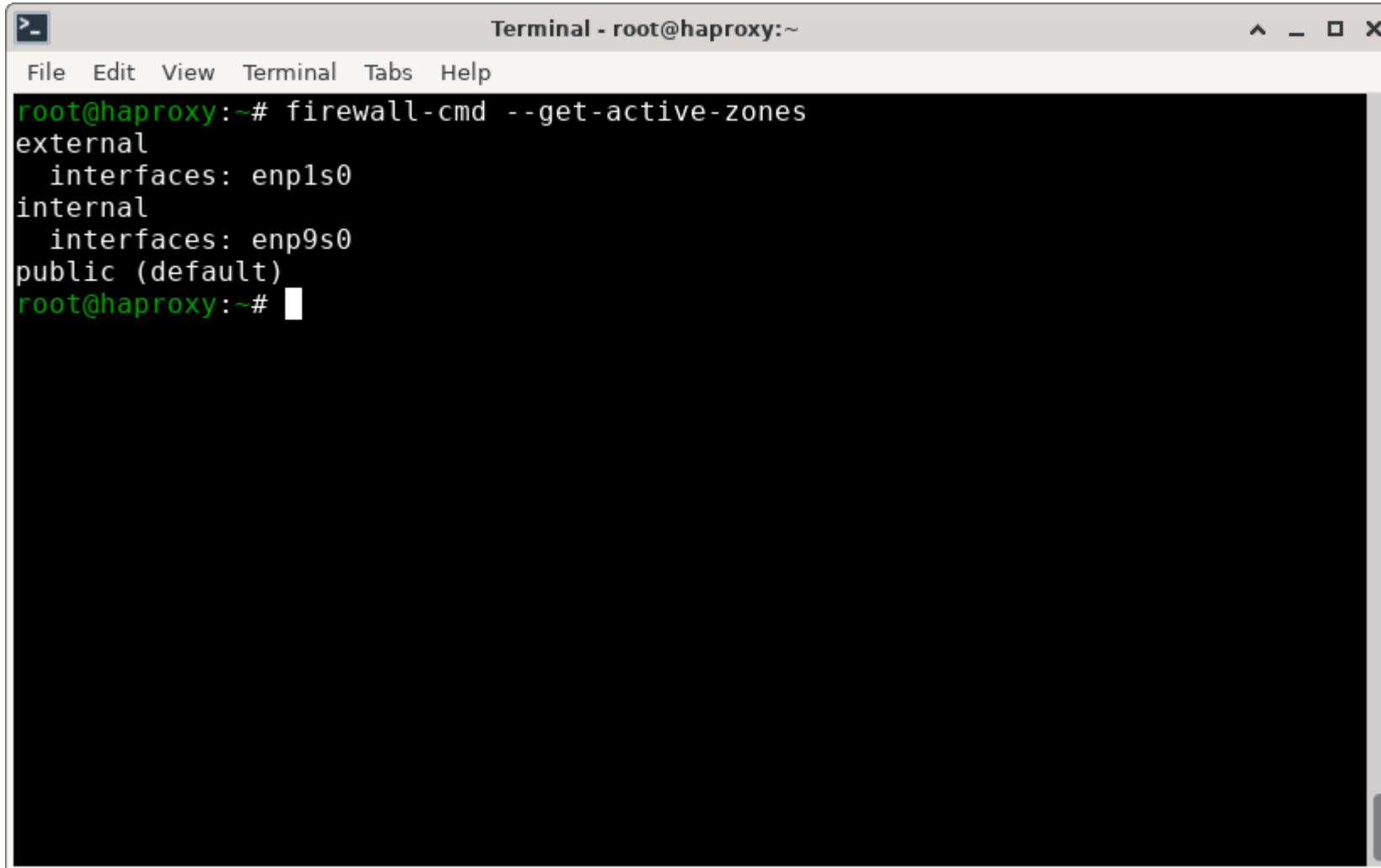
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# firewall-cmd --get-active-zones
public (default)
  interfaces: enp1s0 enp9s0
root@haproxy:~#
```

# Firewall/NAT



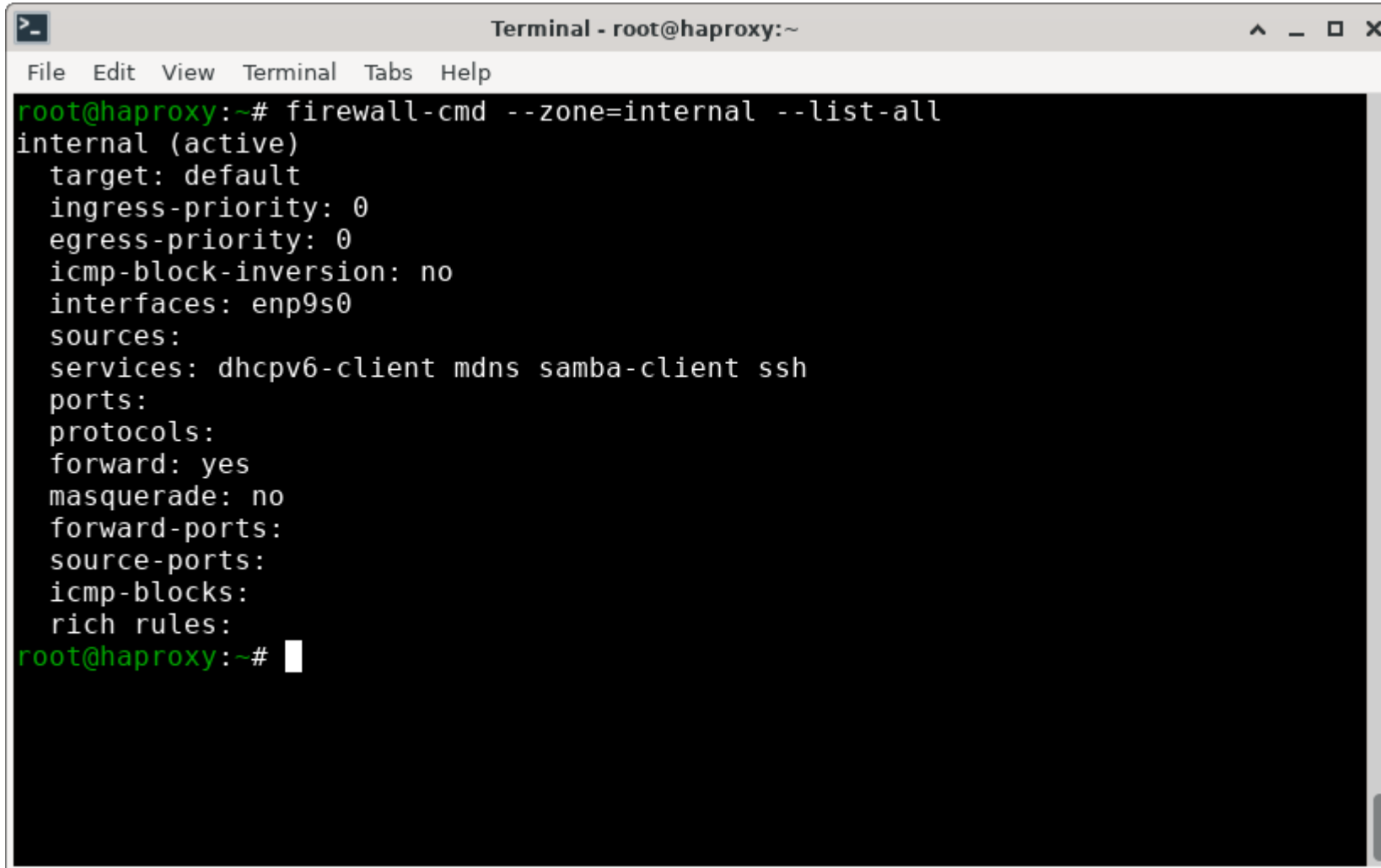
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# ip -br a sh
lo                UNKNOWN          127.0.0.1/8 ::1/128
enp1s0            UP               172.31.100.38/24 fe80::5054:ff:fedd:5eb1/64
enp9s0            UP               192.168.22.1/24 fe80::63c:11d7:8250:134c/64
root@haproxy:~# nmcli connection modify enp1s0 connection.zone external
root@haproxy:~# nmcli connection modify enp9s0 connection.zone internal
root@haproxy:~#
```

# Firewall/NAT

A terminal window titled "Terminal - root@haproxy:~" with a menu bar containing "File", "Edit", "View", "Terminal", "Tabs", and "Help". The terminal shows the command "firewall-cmd --get-active-zones" being executed, resulting in the following output:

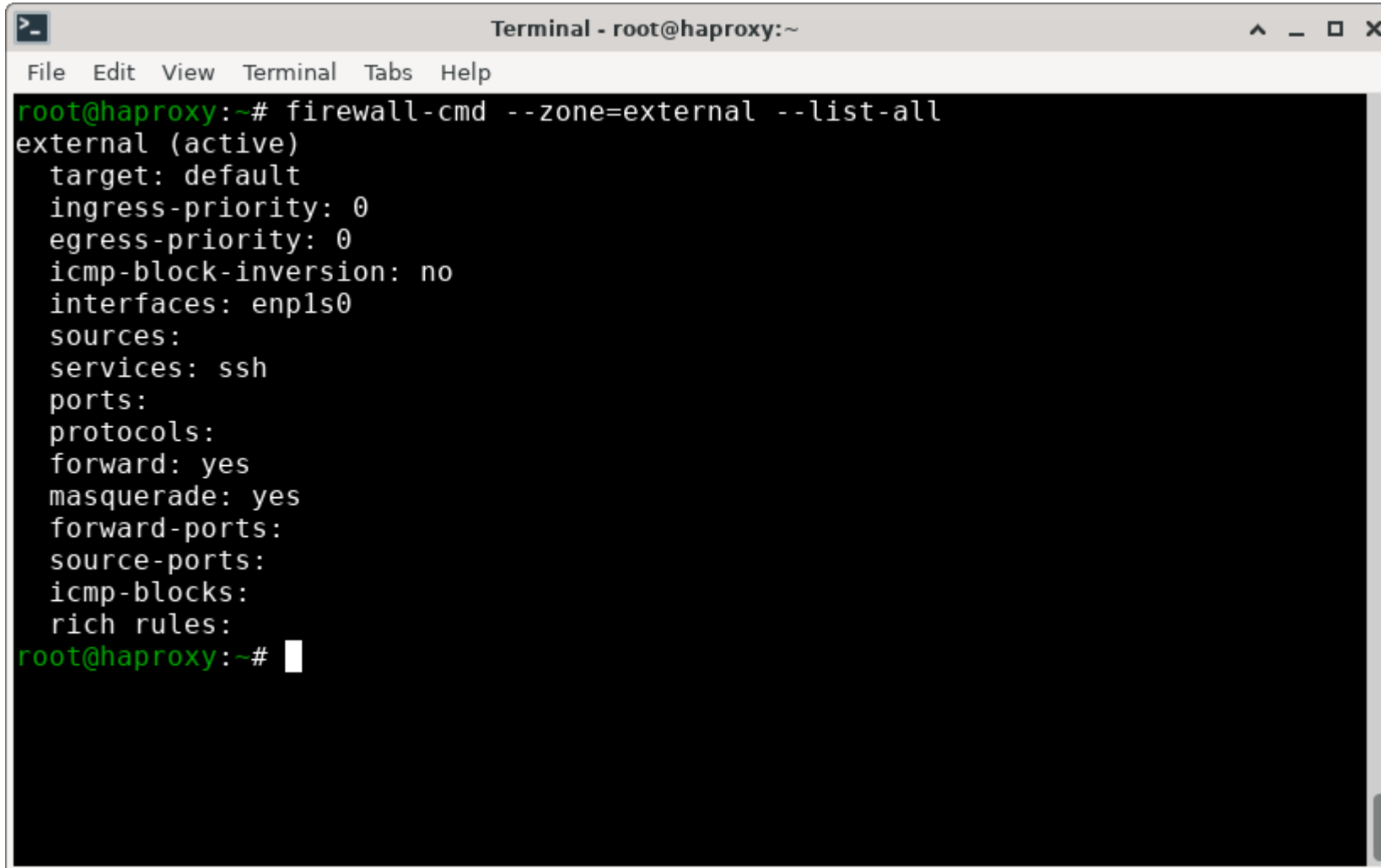
```
root@haproxy:~# firewall-cmd --get-active-zones
external
  interfaces: enp1s0
internal
  interfaces: enp9s0
public (default)
root@haproxy:~#
```

# Firewall/NAT



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# firewall-cmd --zone=internal --list-all
internal (active)
  target: default
  ingress-priority: 0
  egress-priority: 0
  icmp-block-inversion: no
  interfaces: enp9s0
  sources:
  services: dhcpv6-client mdns samba-client ssh
  ports:
  protocols:
  forward: yes
  masquerade: no
  forward-ports:
  source-ports:
  icmp-blocks:
  rich rules:
root@haproxy:~#
```

# Firewall/NAT

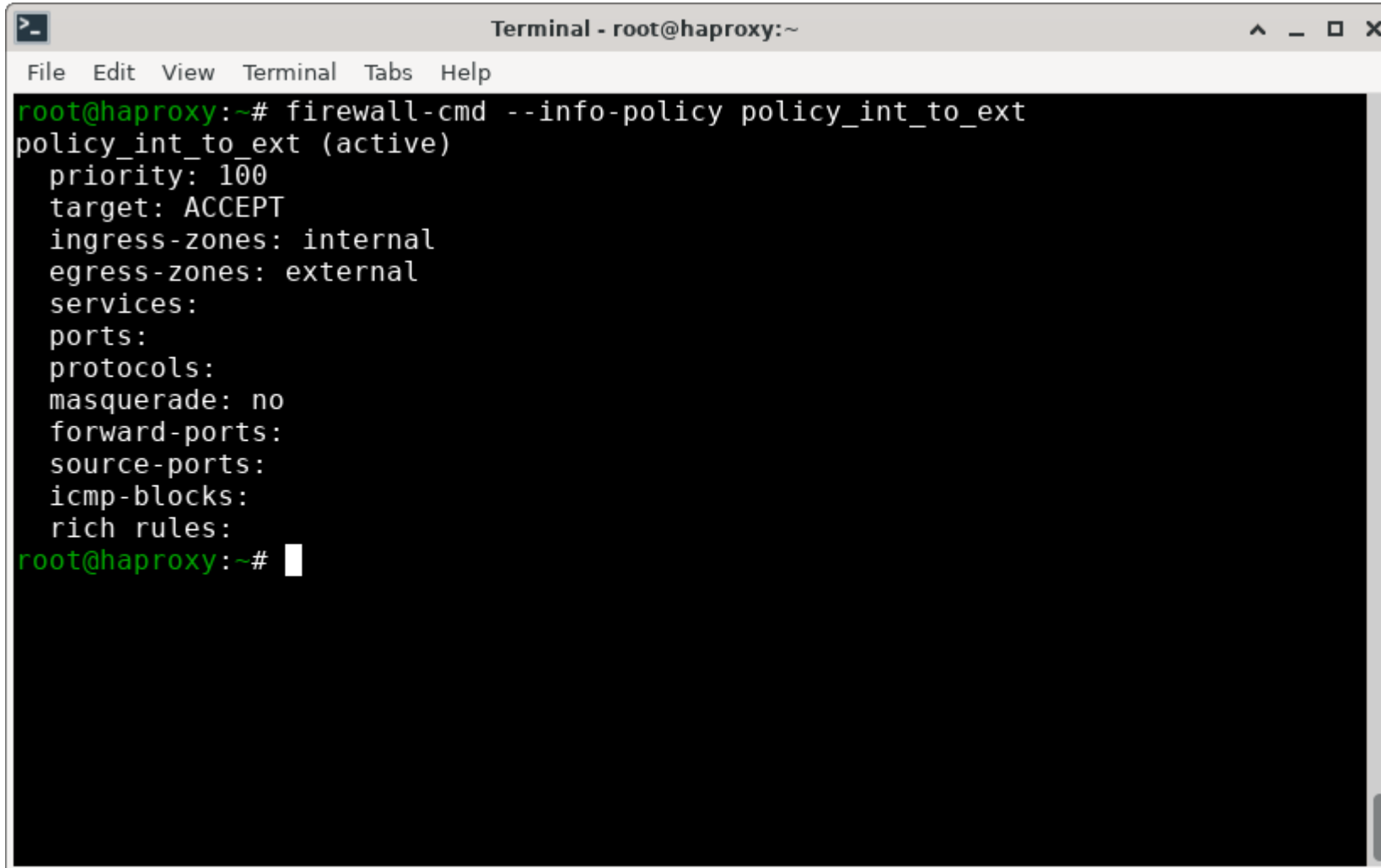


```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# firewall-cmd --zone=external --list-all
external (active)
  target: default
  ingress-priority: 0
  egress-priority: 0
  icmp-block-inversion: no
  interfaces: enpl1s0
  sources:
  services: ssh
  ports:
  protocols:
  forward: yes
  masquerade: yes
  forward-ports:
  source-ports:
  icmp-blocks:
  rich rules:
root@haproxy:~#
```

# Firewall/NAT

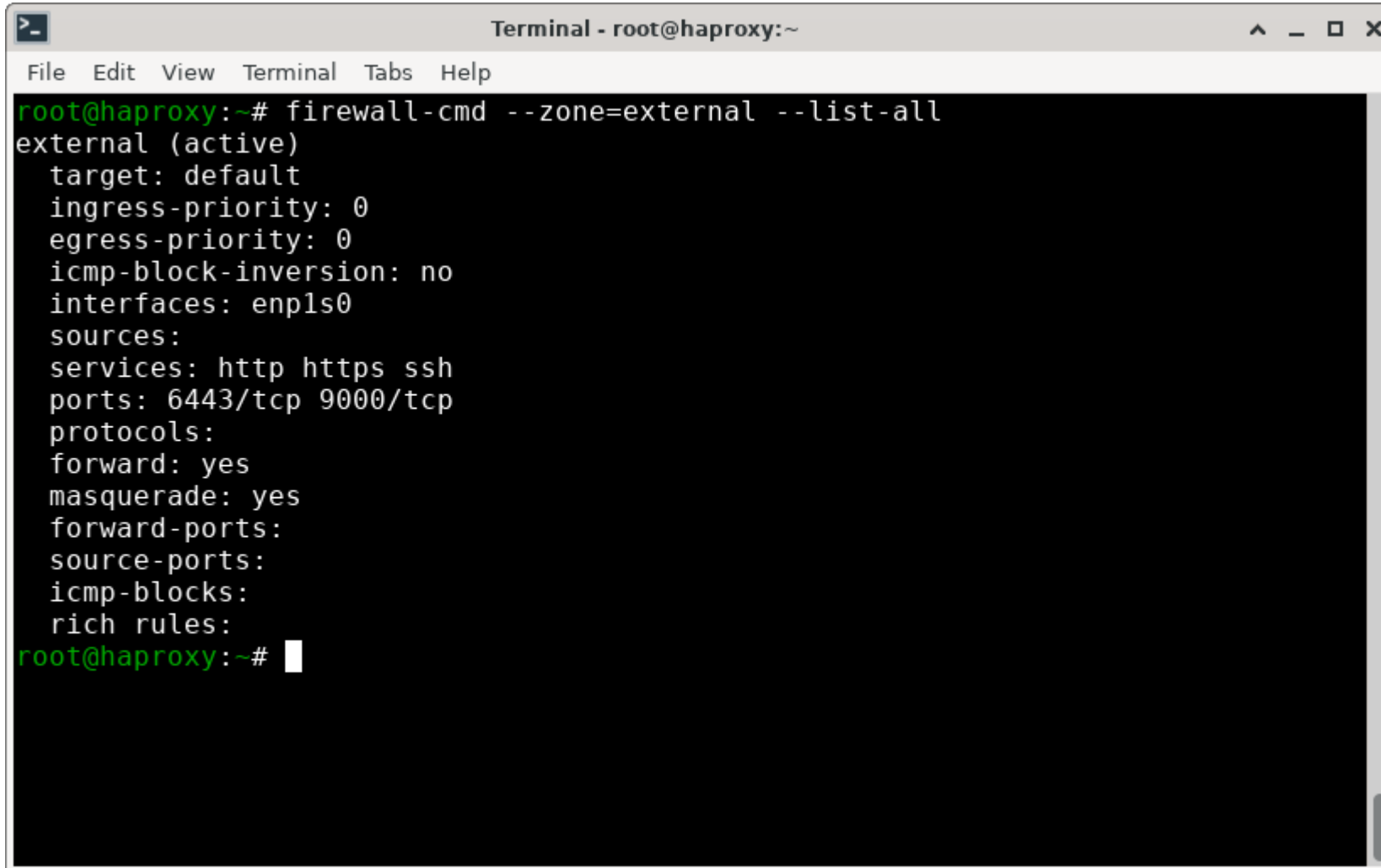
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# firewall-cmd --permanent --new-policy policy_int_to_ext
success
root@haproxy:~# firewall-cmd --permanent --policy policy_int_to_ext --add-ingres
s-zone internal
success
root@haproxy:~# firewall-cmd --permanent --policy policy_int_to_ext --add-egress
-zone external
success
root@haproxy:~# firewall-cmd --permanent --policy policy_int_to_ext --set-priori
ty 100
success
root@haproxy:~# firewall-cmd --permanent --policy policy_int_to_ext --set-target
ACCEPT
success
root@haproxy:~# firewall-cmd --permanent --zone=external --add-masquerade
Warning: ALREADY_ENABLED: masquerade
success
root@haproxy:~# firewall-cmd --reload
success
root@haproxy:~#
```

# Firewall/NAT



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# firewall-cmd --info-policy policy_int_to_ext
policy_int_to_ext (active)
  priority: 100
  target: ACCEPT
  ingress-zones: internal
  egress-zones: external
  services:
  ports:
  protocols:
  masquerade: no
  forward-ports:
  source-ports:
  icmp-blocks:
  rich rules:
root@haproxy:~#
```

# Firewall/NAT



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# firewall-cmd --zone=external --list-all
external (active)
  target: default
  ingress-priority: 0
  egress-priority: 0
  icmp-block-inversion: no
  interfaces: enpl1s0
  sources:
  services: http https ssh
  ports: 6443/tcp 9000/tcp
  protocols:
  forward: yes
  masquerade: yes
  forward-ports:
  source-ports:
  icmp-blocks:
  rich rules:
root@haproxy:~#
```



# Firewall/NAT

```
Terminal - root@okd-w-3:~
File Edit View Terminal Tabs Help
root@haproxy:~# ssh okd-w-3.lab.okd.lan
root@okd-w-3.lab.okd.lan's password:
Activate the web console with: systemctl enable --now cockpit.socket

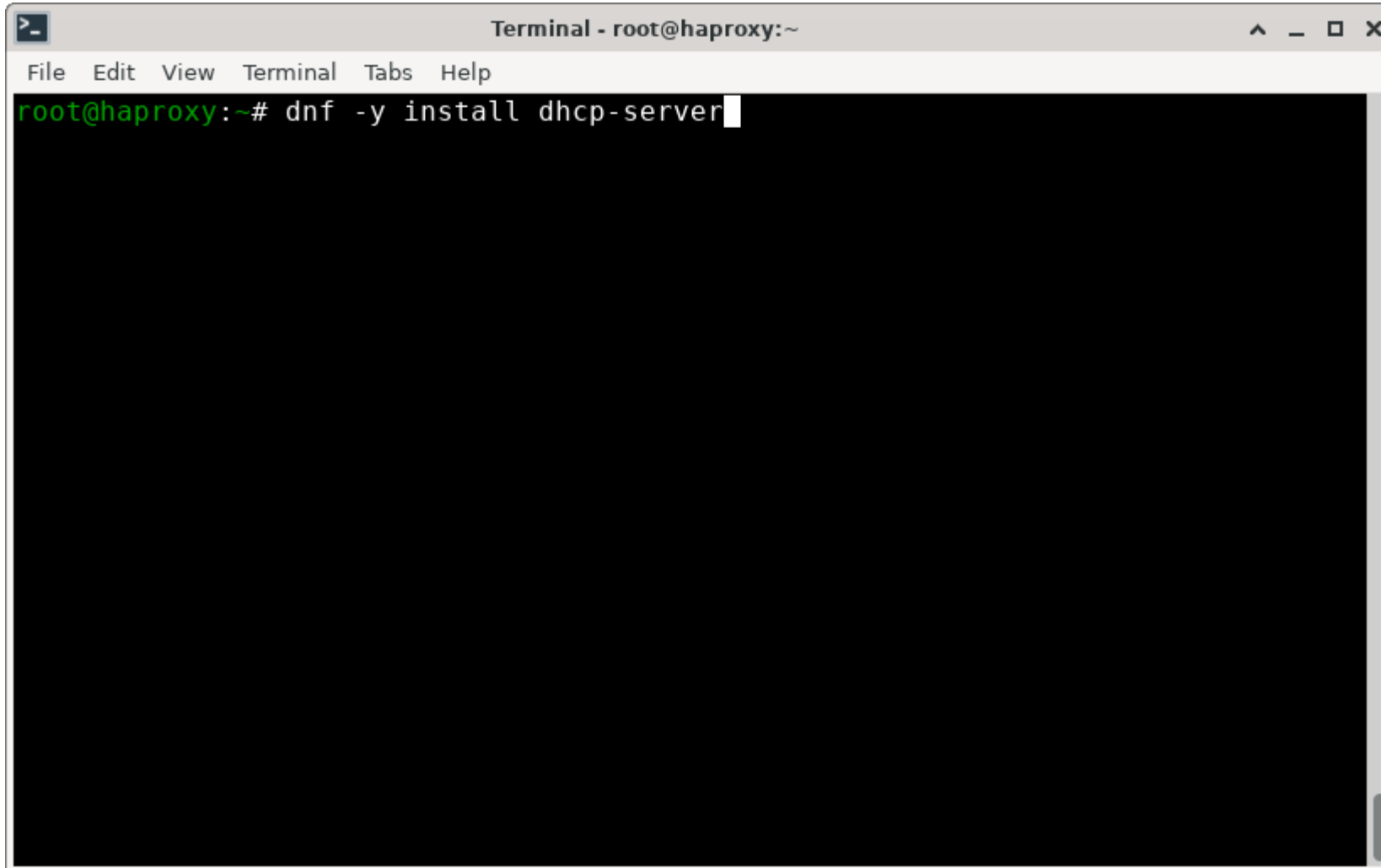
Register this system with Red Hat Insights: insights-client --register
Create an account or view all your systems at https://red.ht/insights-dashboard
Last login: Thu Apr 11 20:08:44 2024 from 192.168.22.1
[root@okd-w-3 ~]# ping -c 4 4.2.2.1
PING 4.2.2.1 (4.2.2.1) 56(84) bytes of data.
64 bytes from 4.2.2.1: icmp_seq=1 ttl=55 time=21.9 ms
64 bytes from 4.2.2.1: icmp_seq=2 ttl=55 time=19.5 ms
64 bytes from 4.2.2.1: icmp_seq=3 ttl=55 time=19.7 ms
64 bytes from 4.2.2.1: icmp_seq=4 ttl=55 time=19.8 ms

--- 4.2.2.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3006ms
rtt min/avg/max/mdev = 19.527/20.226/21.864/0.950 ms
[root@okd-w-3 ~]#
```

# DHCP

- I've already got DHCP running on the production network, but the private network doesn't have any access to it.
- Install and configure DHCP

# DHCP



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# dnf -y install dhcp-server
```

# DHCP

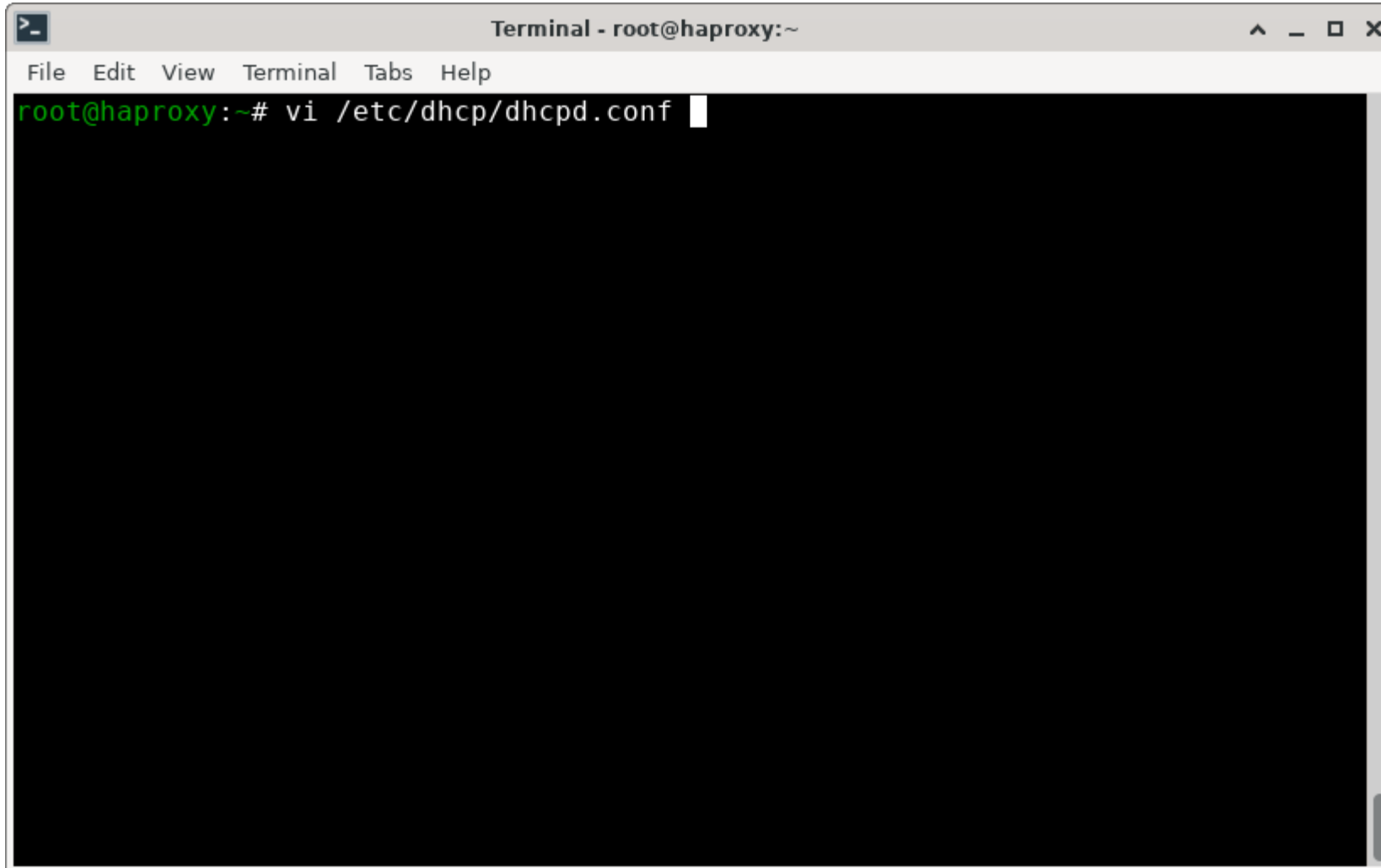
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
Install 1 Package

Total download size: 1.3 M
Installed size: 4.1 M
Downloading Packages:
dhcp-server-4.4.3-9.P1.fc39.x86_64.rpm          2.4 MB/s | 1.3 MB      00:00
-----
Total                                          1.6 MB/s | 1.3 MB      00:00
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing                :                               1/1
  Running scriptlet: dhcp-server-12:4.4.3-9.P1.fc39.x86_64 1/1
  Installing             : dhcp-server-12:4.4.3-9.P1.fc39.x86_64 1/1
  Running scriptlet: dhcp-server-12:4.4.3-9.P1.fc39.x86_64 1/1
  Verifying              : dhcp-server-12:4.4.3-9.P1.fc39.x86_64 1/1

Installed:
  dhcp-server-12:4.4.3-9.P1.fc39.x86_64

Complete!
root@haproxy:~#
```

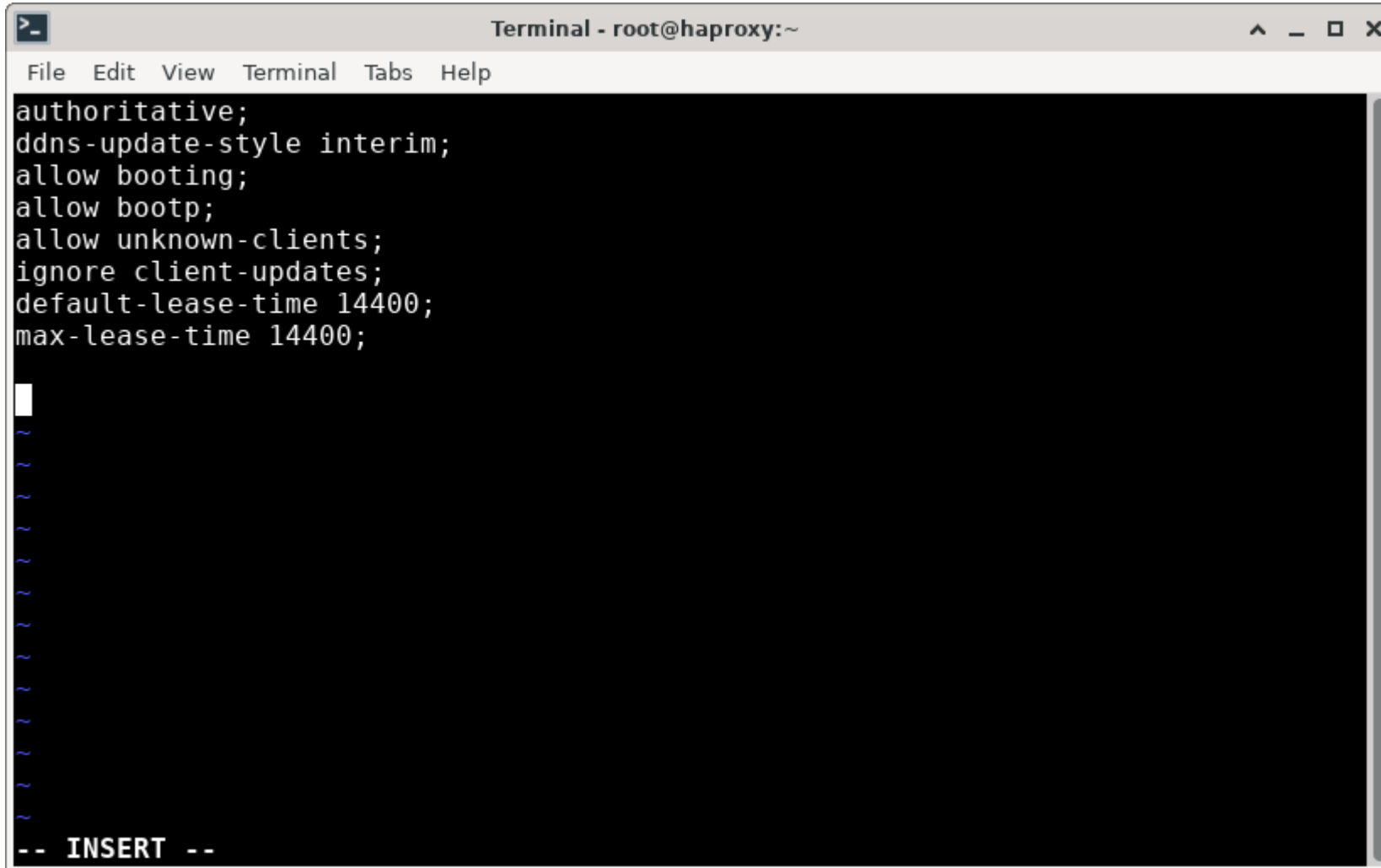
# DHCP



A terminal window titled "Terminal - root@haproxy:~" with a menu bar containing "File", "Edit", "View", "Terminal", "Tabs", and "Help". The terminal prompt is "root@haproxy:~#" and the command "vi /etc/dhcp/dhcpd.conf" has been entered, with a white cursor at the end of the line. The rest of the terminal area is black.

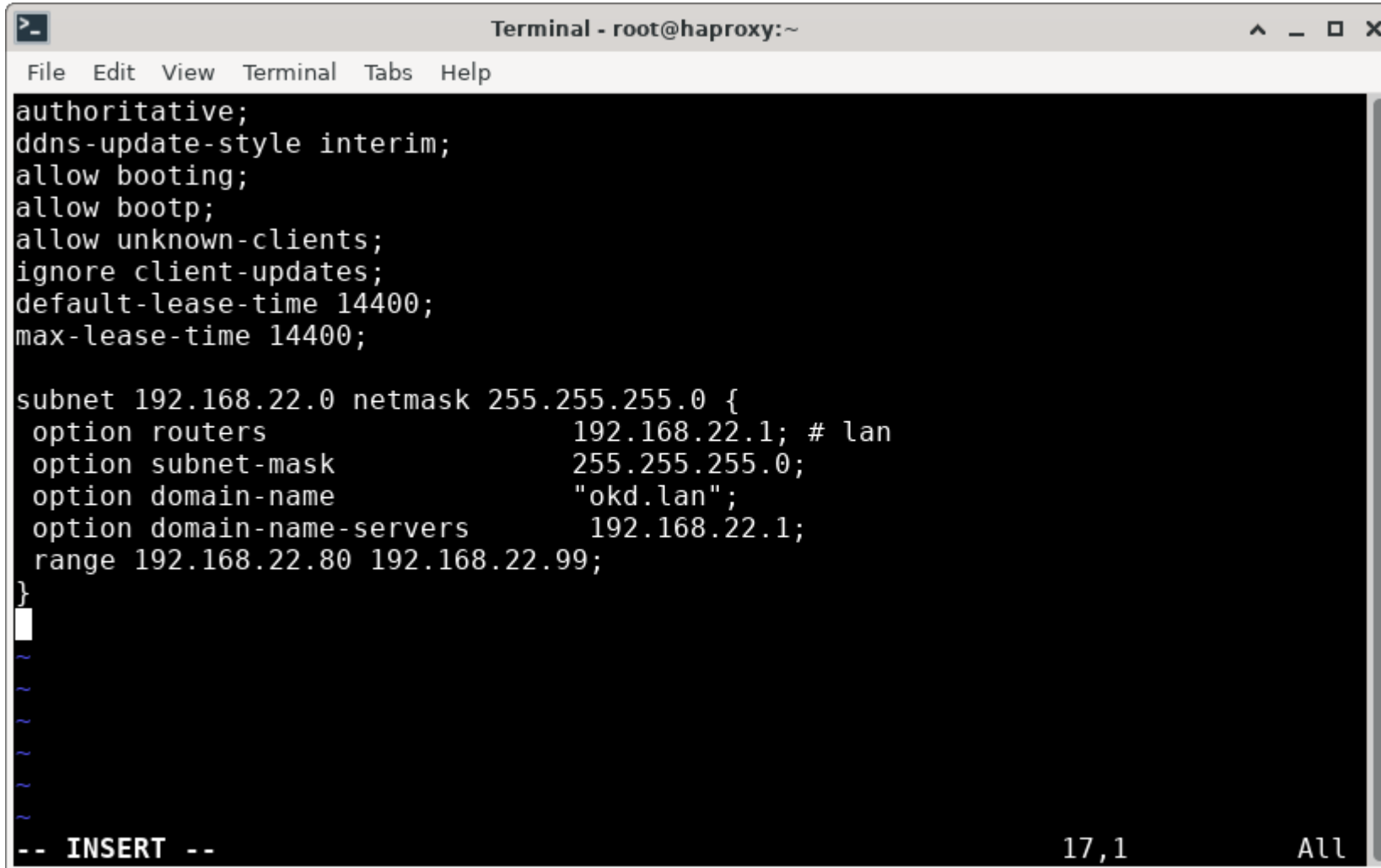


# DHCP



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
authoritative;
ddns-update-style interim;
allow booting;
allow bootp;
allow unknown-clients;
ignore client-updates;
default-lease-time 14400;
max-lease-time 14400;
~
~
~
~
~
~
~
~
~
~
-- INSERT --
```

# DHCP



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
authoritative;
ddns-update-style interim;
allow booting;
allow bootp;
allow unknown-clients;
ignore client-updates;
default-lease-time 14400;
max-lease-time 14400;

subnet 192.168.22.0 netmask 255.255.255.0 {
  option routers          192.168.22.1; # lan
  option subnet-mask      255.255.255.0;
  option domain-name      "okd.lan";
  option domain-name-servers 192.168.22.1;
  range 192.168.22.80 192.168.22.99;
}
~
~
~
~
~
-- INSERT --                               17,1      All
```



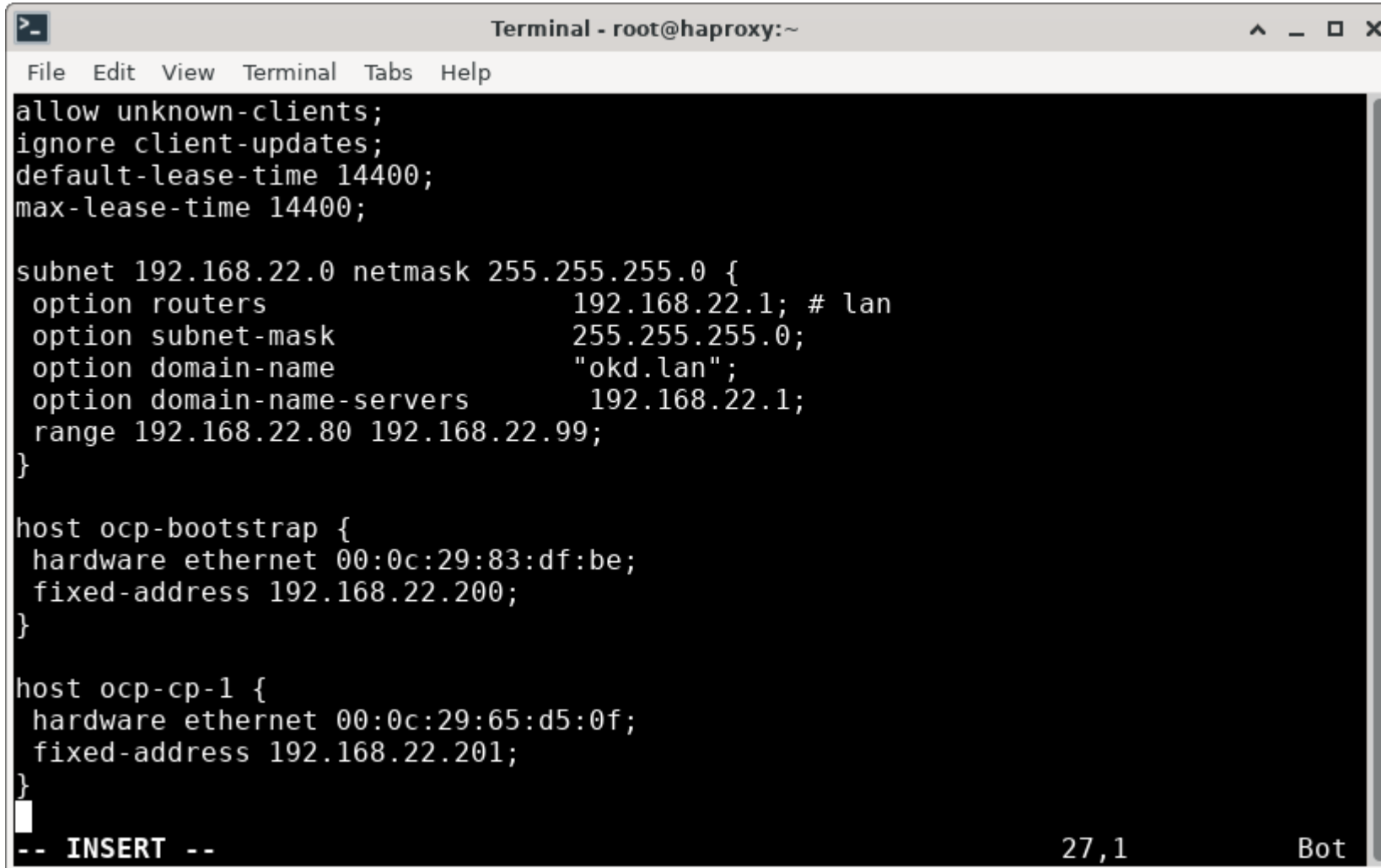
# DHCP

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
ddns-update-style interim;
allow booting;
allow bootp;
allow unknown-clients;
ignore client-updates;
default-lease-time 14400;
max-lease-time 14400;

subnet 192.168.22.0 netmask 255.255.255.0 {
  option routers          192.168.22.1; # lan
  option subnet-mask     255.255.255.0;
  option domain-name     "okd.lan";
  option domain-name-servers 192.168.22.1;
  range 192.168.22.80 192.168.22.99;
}

host ocp-bootstrap {
  hardware ethernet 00:0c:29:83:df:be;
  fixed-address 192.168.22.200;
}
~
~
-- INSERT --                               22,1                               Bot
```

# DHCP



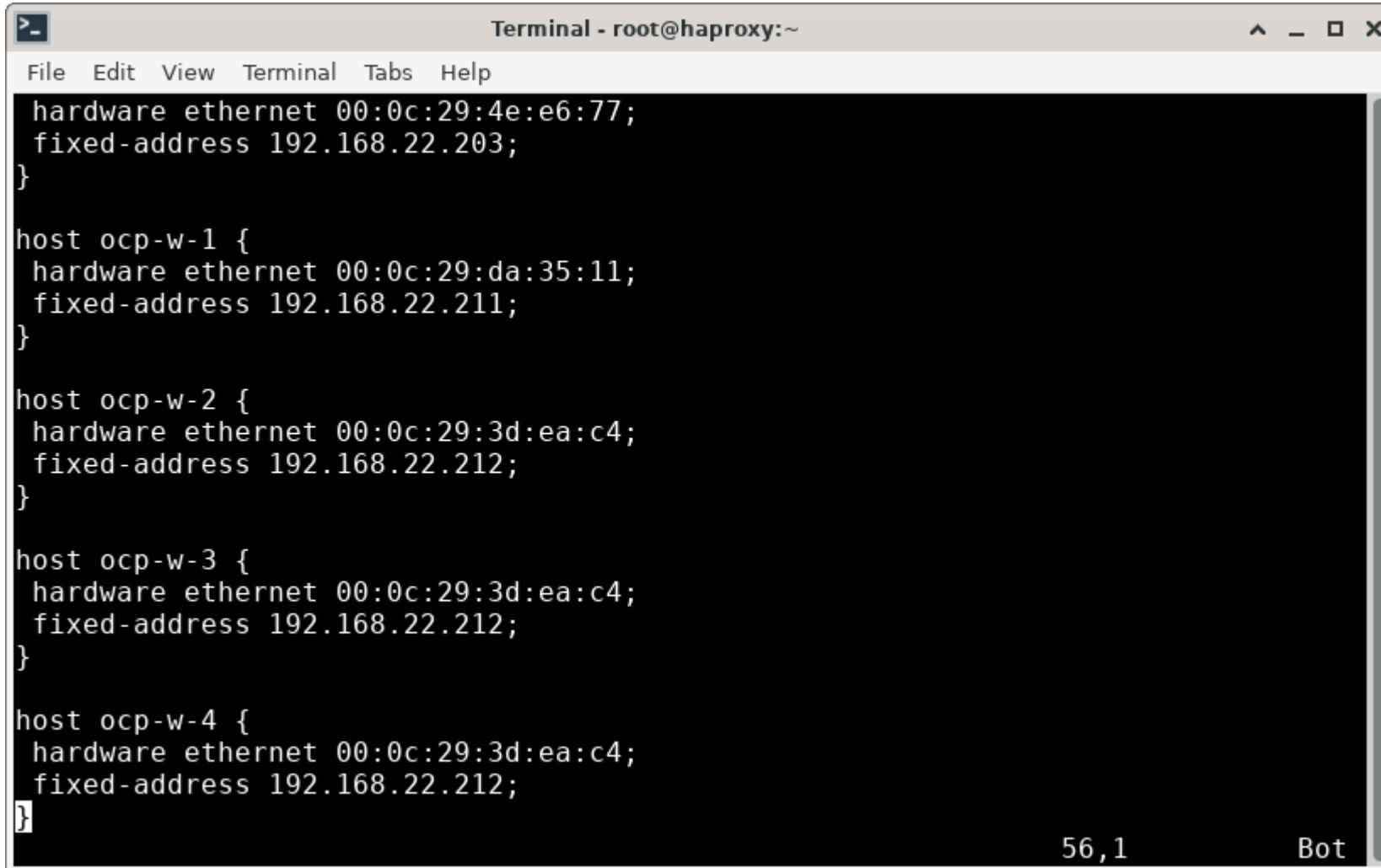
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
allow unknown-clients;
ignore client-updates;
default-lease-time 14400;
max-lease-time 14400;

subnet 192.168.22.0 netmask 255.255.255.0 {
  option routers          192.168.22.1; # lan
  option subnet-mask     255.255.255.0;
  option domain-name     "okd.lan";
  option domain-name-servers 192.168.22.1;
  range 192.168.22.80 192.168.22.99;
}

host ocp-bootstrap {
  hardware ethernet 00:0c:29:83:df:be;
  fixed-address 192.168.22.200;
}

host ocp-cp-1 {
  hardware ethernet 00:0c:29:65:d5:0f;
  fixed-address 192.168.22.201;
}
-- INSERT --                               27,1                               Bot
```

# DHCP



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
hardware ethernet 00:0c:29:4e:e6:77;
fixed-address 192.168.22.203;
}

host ocp-w-1 {
hardware ethernet 00:0c:29:da:35:11;
fixed-address 192.168.22.211;
}

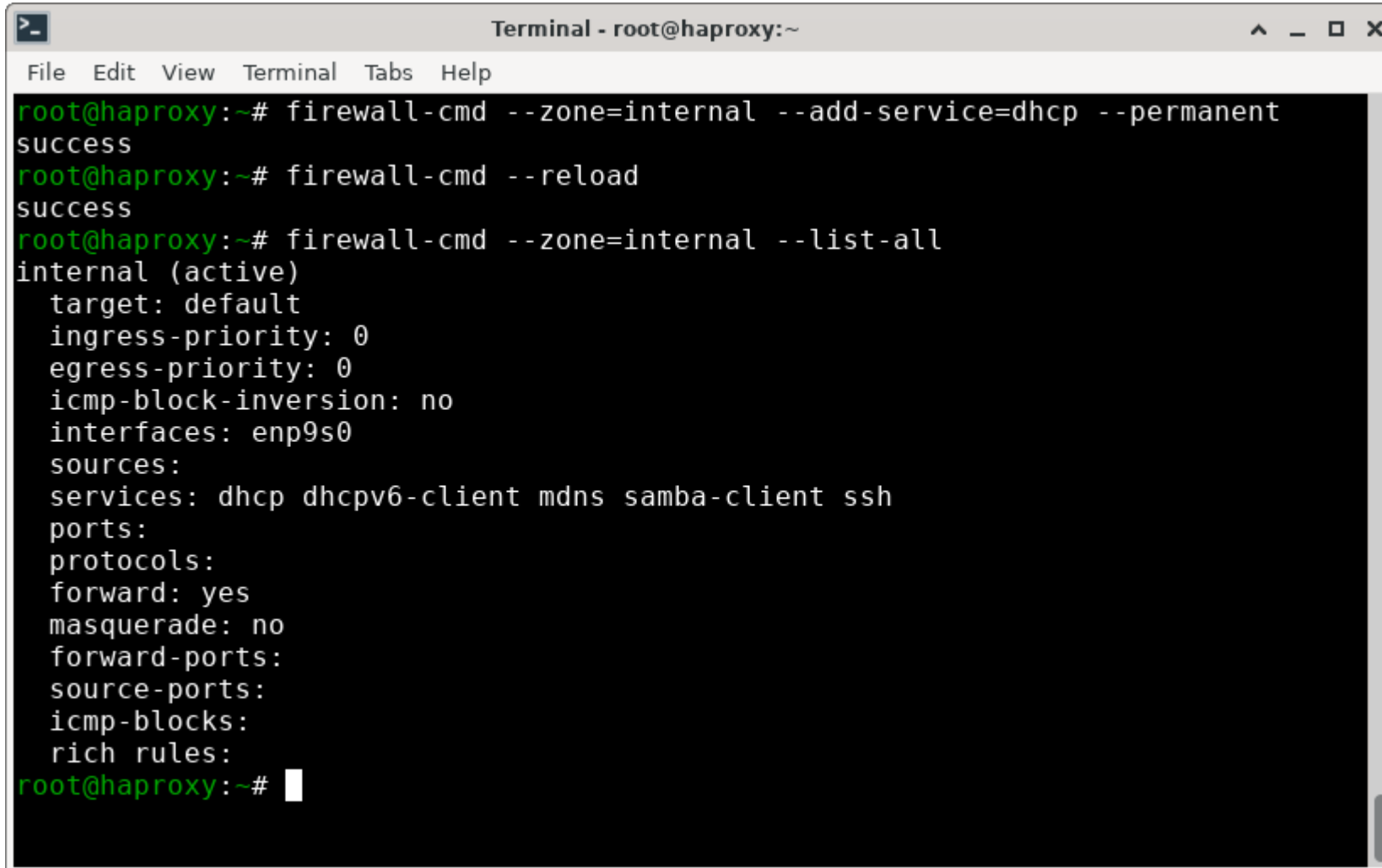
host ocp-w-2 {
hardware ethernet 00:0c:29:3d:ea:c4;
fixed-address 192.168.22.212;
}

host ocp-w-3 {
hardware ethernet 00:0c:29:3d:ea:c4;
fixed-address 192.168.22.212;
}

host ocp-w-4 {
hardware ethernet 00:0c:29:3d:ea:c4;
fixed-address 192.168.22.212;
}

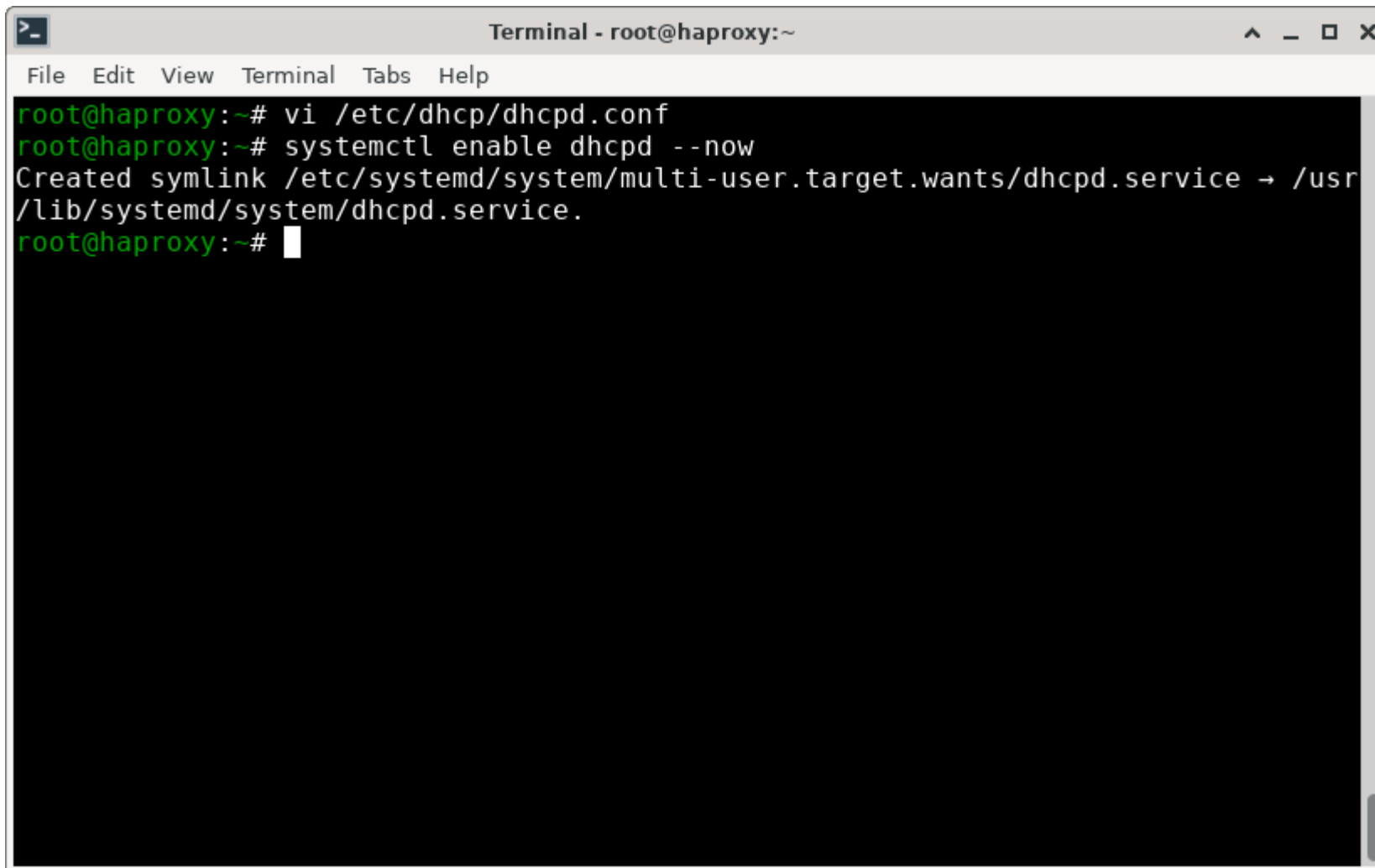
56,1 Bot
```

# DHCP

A terminal window titled "Terminal - root@haproxy:~" with a menu bar (File, Edit, View, Terminal, Tabs, Help). The terminal shows three commands and their outputs: 1. "firewall-cmd --zone=internal --add-service=dhcp --permanent" returns "success". 2. "firewall-cmd --reload" returns "success". 3. "firewall-cmd --zone=internal --list-all" returns a detailed list of firewall settings for the 'internal' zone, including target, priorities, interfaces, services, and protocols.

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# firewall-cmd --zone=internal --add-service=dhcp --permanent
success
root@haproxy:~# firewall-cmd --reload
success
root@haproxy:~# firewall-cmd --zone=internal --list-all
internal (active)
  target: default
  ingress-priority: 0
  egress-priority: 0
  icmp-block-inversion: no
  interfaces: enp9s0
  sources:
  services: dhcp dhcpv6-client mdns samba-client ssh
  ports:
  protocols:
  forward: yes
  masquerade: no
  forward-ports:
  source-ports:
  icmp-blocks:
  rich rules:
root@haproxy:~#
```

# DHCP

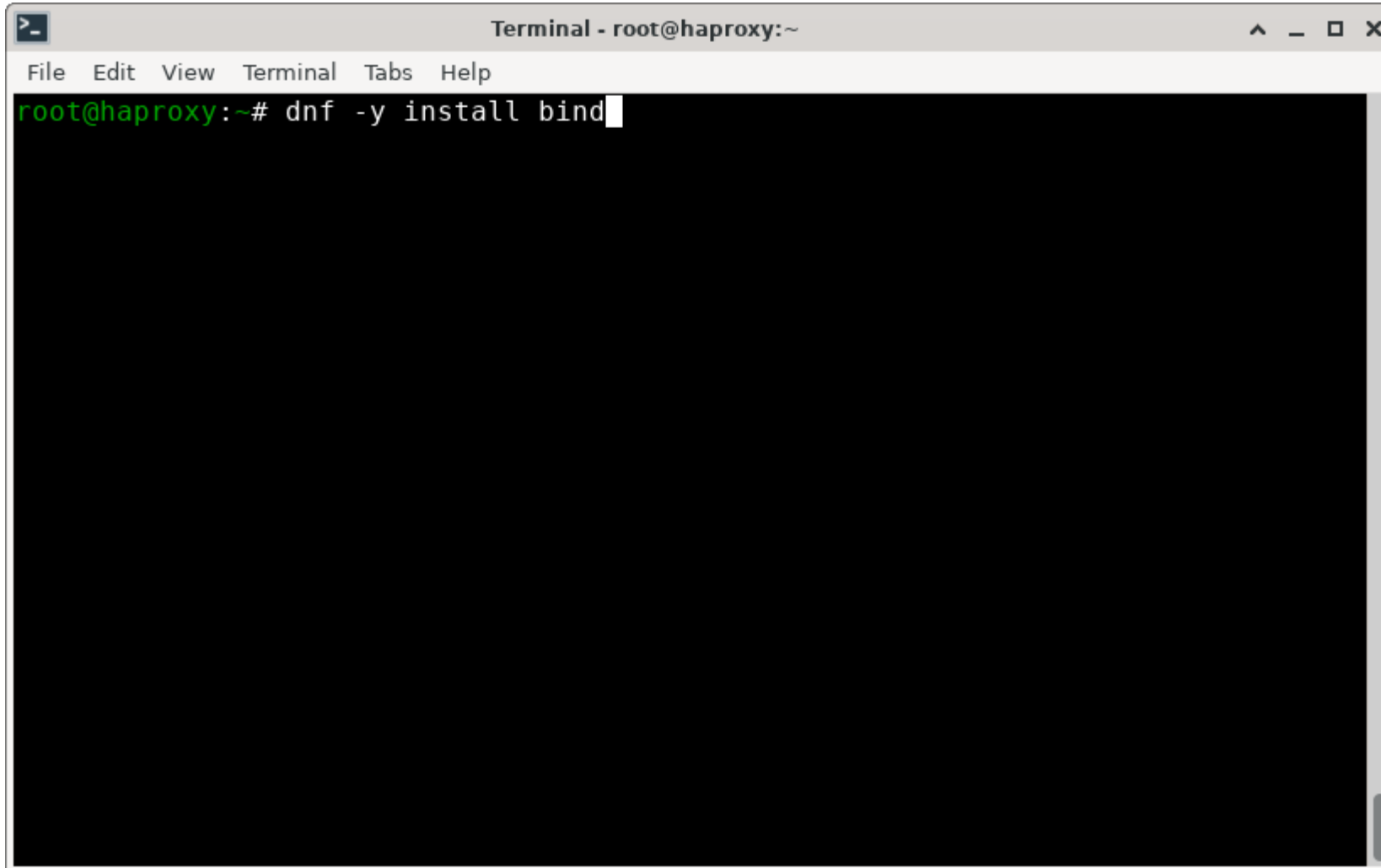


```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# vi /etc/dhcp/dhcpd.conf
root@haproxy:~# systemctl enable dhcpd --now
Created symlink /etc/systemd/system/multi-user.target.wants/dhcpd.service -> /usr
/lib/systemd/system/dhcpd.service.
root@haproxy:~#
```

# DNS

- The production network already has DNS, but the private network doesn't
- It would be easy to argue that this cluster is so small that we could get away with /etc/hosts files, but OKD uses a BUNCH of hostnames. A DNS wildcard is quick and easy.

# DNS



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# dnf -y install bind
```

# DNS

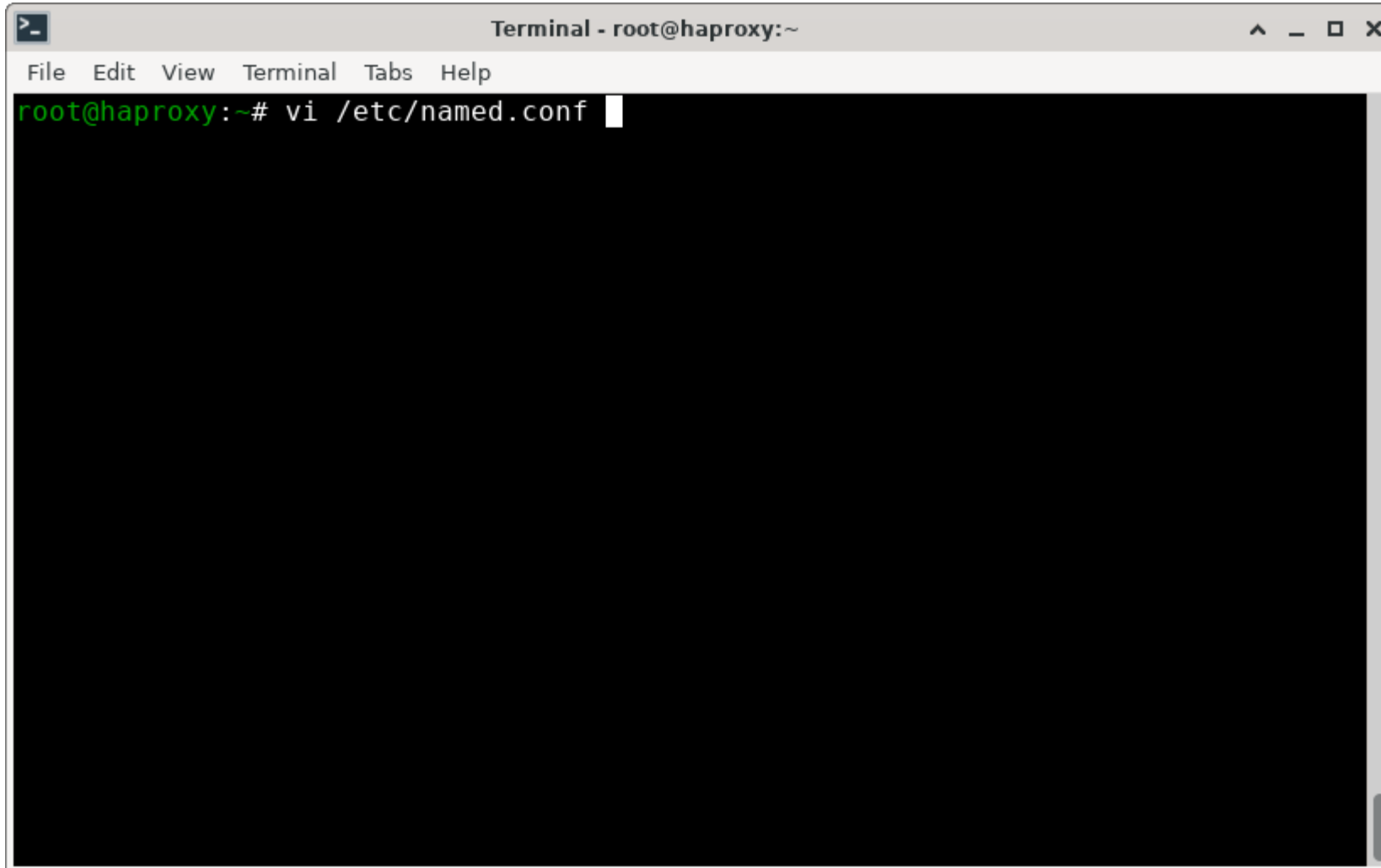
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
Installed size: 2.0 M
Downloading Packages:
(1/2): bind-dnssec-utils-9.18.24-1.fc39.x86_64. 330 kB/s | 148 kB 00:00
(2/2): bind-9.18.24-1.fc39.x86_64.rpm 1.0 MB/s | 529 kB 00:00
-----
Total 749 kB/s | 676 kB 00:00
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing      : 1/1
  Installing     : bind-dnssec-utils-32:9.18.24-1.fc39.x86_64 1/2
  Running scriptlet: bind-32:9.18.24-1.fc39.x86_64 2/2
  Installing     : bind-32:9.18.24-1.fc39.x86_64 2/2
  Running scriptlet: bind-32:9.18.24-1.fc39.x86_64 2/2
  Verifying      : bind-32:9.18.24-1.fc39.x86_64 1/2
  Verifying      : bind-dnssec-utils-32:9.18.24-1.fc39.x86_64 2/2

Installed:
  bind-32:9.18.24-1.fc39.x86_64  bind-dnssec-utils-32:9.18.24-1.fc39.x86_64

Complete!
root@haproxy:~#
```



# DNS



A terminal window titled "Terminal - root@haproxy:~" with standard window controls. The terminal shows a menu bar with "File", "Edit", "View", "Terminal", "Tabs", and "Help". The command prompt is "root@haproxy:~#". The command "vi /etc/named.conf" has been entered, and a white cursor is visible at the end of the line. The rest of the terminal area is black.

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# vi /etc/named.conf
```

# DNS

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
//
// named.conf
//
// Provided by Red Hat bind package to configure the ISC BIND named(8) DNS
// server as a caching only nameserver (as a localhost DNS resolver only).
//
// See /usr/share/doc/bind*/sample/ for example named configuration files.
//
options {
    listen-on port 53 { 127.0.0.1; };
    listen-on-v6 port 53 { ::1; };
    directory      "/var/named";
    dump-file       "/var/named/data/cache_dump.db";
    statistics-file "/var/named/data/named_stats.txt";
    memstatistics-file "/var/named/data/named_mem_stats.txt";
    secroots-file  "/var/named/data/named.secroots";
    recursing-file  "/var/named/data/named.recursing";
    allow-query     { localhost; };

    /*
     * - If you are building an AUTHORITATIVE DNS server, do NOT enable recurs
ion.
"/etc/named.conf" 59L, 1722B                                     1,1                               Top
```

# DNS

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
//
// Provided by Red Hat bind package to configure the ISC BIND named(8) DNS
// server as a caching only nameserver (as a localhost DNS resolver only).
//
// See /usr/share/doc/bind*/sample/ for example named configuration files.
//
options {
    listen-on port 53 { any; };
    listen-on-v6 port 53 { ::1; };
    directory      "/var/named";
    dump-file       "/var/named/data/cache_dump.db";
    statistics-file "/var/named/data/named_stats.txt";
    memstatistics-file "/var/named/data/named_mem_stats.txt";
    secroots-file  "/var/named/data/named.secroots";
    recursing-file  "/var/named/data/named.recursing";
    allow-query     { any; };

    /*
     - If you are building an AUTHORITATIVE DNS server, do NOT enable recursion.
     - If you are building a RECURSIVE (caching) DNS server, you need to enable
    */
}
-- INSERT --                               19,23-30          5%
```

# DNS

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
- If your recursive DNS server has a public IP address, you MUST enable
access
control to limit queries to your legitimate users. Failing to do so w
ill
cause your server to become part of large scale DNS amplification
attacks. Implementing BCP38 within your network would greatly
reduce such attack surface
*/
recursion yes;

dnssec-validation yes;

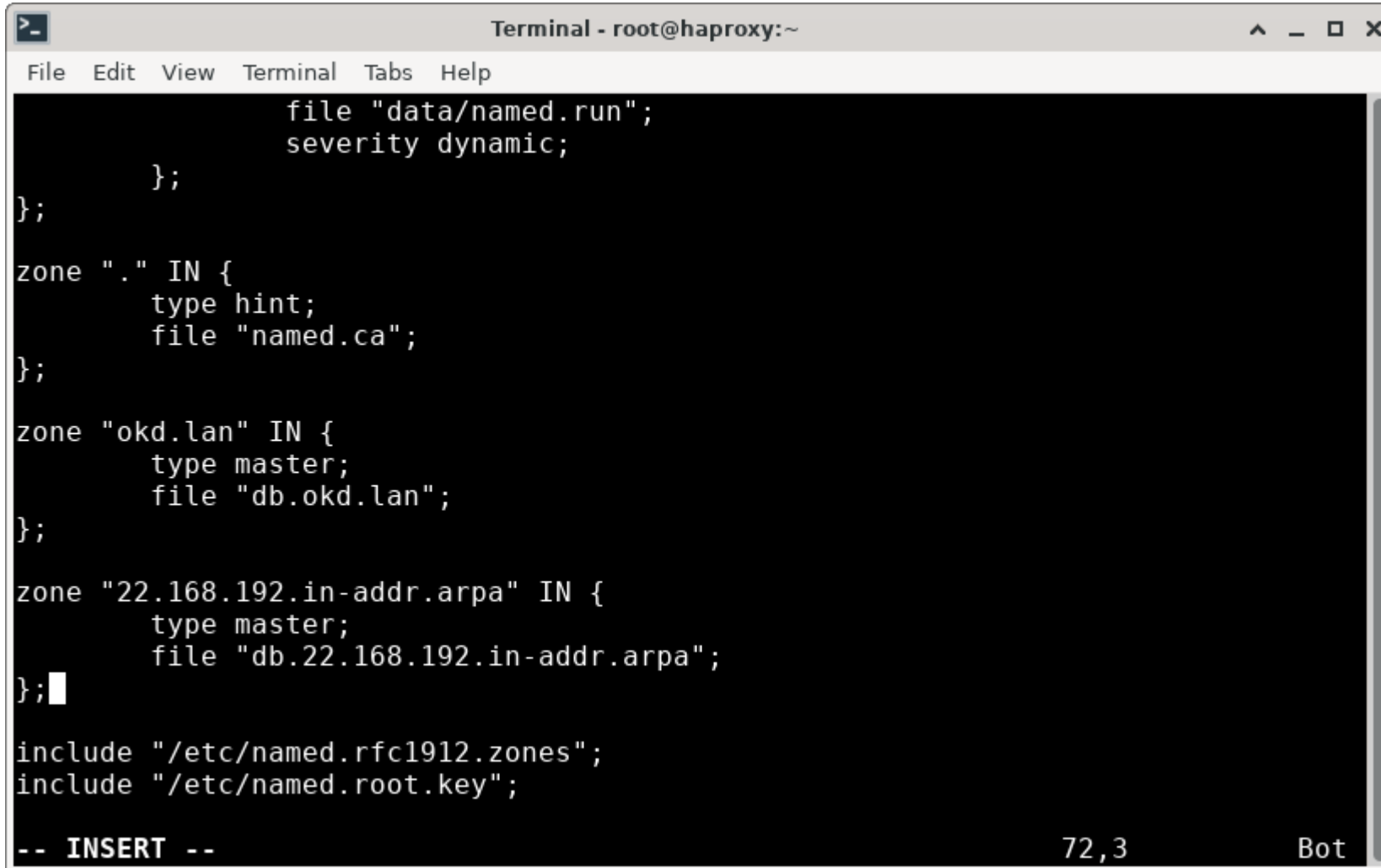
// Added by Thomas Cameron so that internal hosts can resolve
// external hosts on the external network

forwarders {
    172.31.100.15;
};

managed-keys-directory "/var/named/dynamic";
geoip-directory "/usr/share/GeoIP";

pid-file "/run/named/named.pid";
-- INSERT --
```

# DNS



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
    file "data/named.run";
    severity dynamic;
};
};
zone "." IN {
    type hint;
    file "named.ca";
};
zone "okd.lan" IN {
    type master;
    file "db.okd.lan";
};
zone "22.168.192.in-addr.arpa" IN {
    type master;
    file "db.22.168.192.in-addr.arpa";
};
include "/etc/named.rfc1912.zones";
include "/etc/named.root.key";
-- INSERT --                               72,3      Bot
```

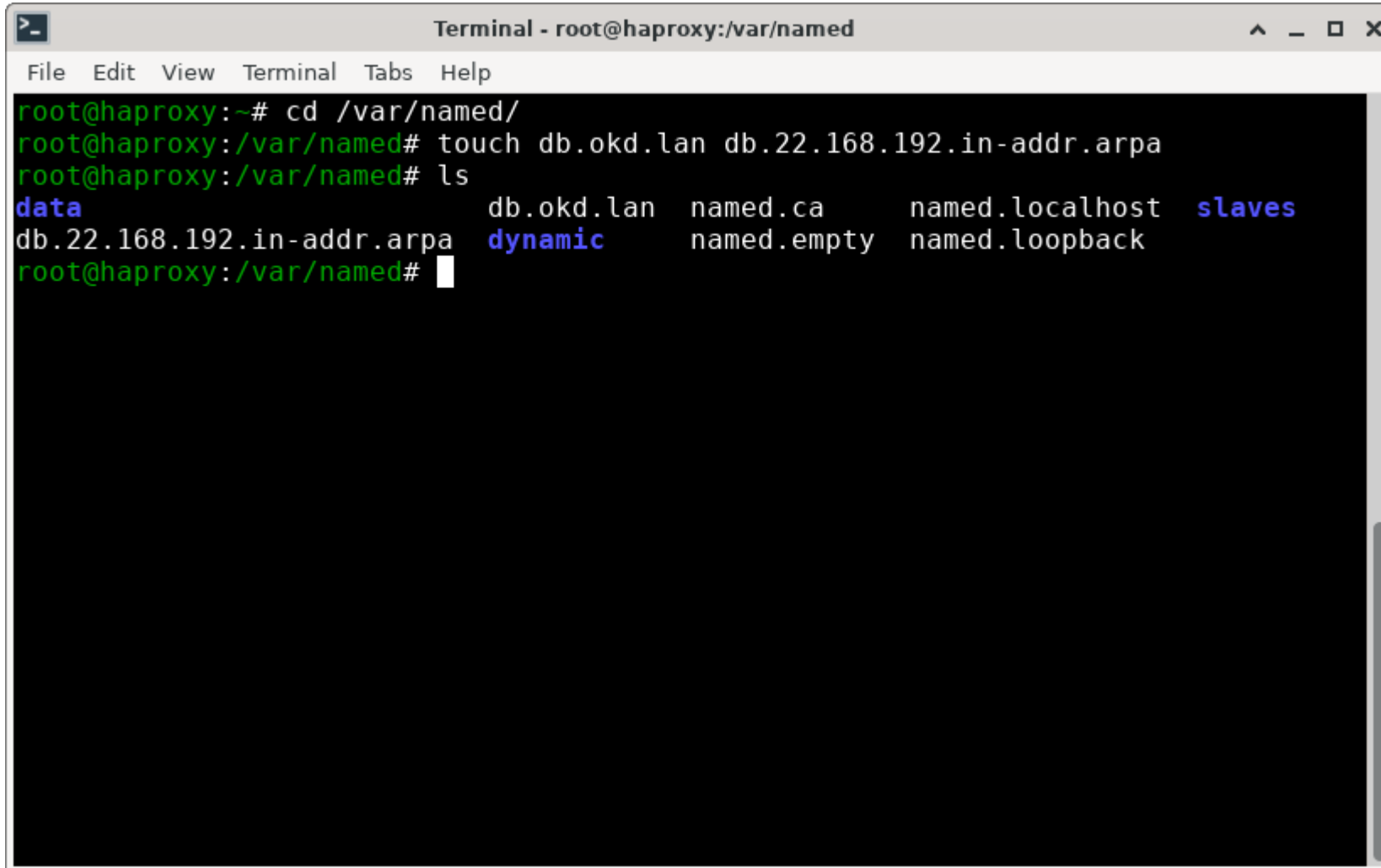
# DNS

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# diff /usr/share/doc/bind/named.conf.default /etc/named.conf
11c11
<     listen-on port 53 { 127.0.0.1; };
---
>     listen-on port 53 { any; };
19c19
<     allow-query     { localhost; };
---
>     allow-query     { any; };
34a35,41
> // Added by Thomas Cameron so that internal hosts can resolve
> // external hosts on the external network
>
>     forwarders {
>         172.31.100.15;
>     };
54a62,71
> };
>
> zone "okd.lan" IN {
>     type master;
>     file "db.okd.lan";
> };
```

# DNS

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
19c19
<     allow-query      { localhost; };
---
>     allow-query      { any; };
34a35,41
> // Added by Thomas Cameron so that internal hosts can resolve
> // external hosts on the external network
>
>     forwarders {
>         172.31.100.15;
>     };
54a62,71
> };
>
> zone "okd.lan" IN {
>     type master;
>     file "db.okd.lan";
> };
>
> zone "22.168.192.in-addr.arpa" IN {
>     type master;
>     file "db.22.168.192.in-addr.arpa";
root@haproxy:~#
```

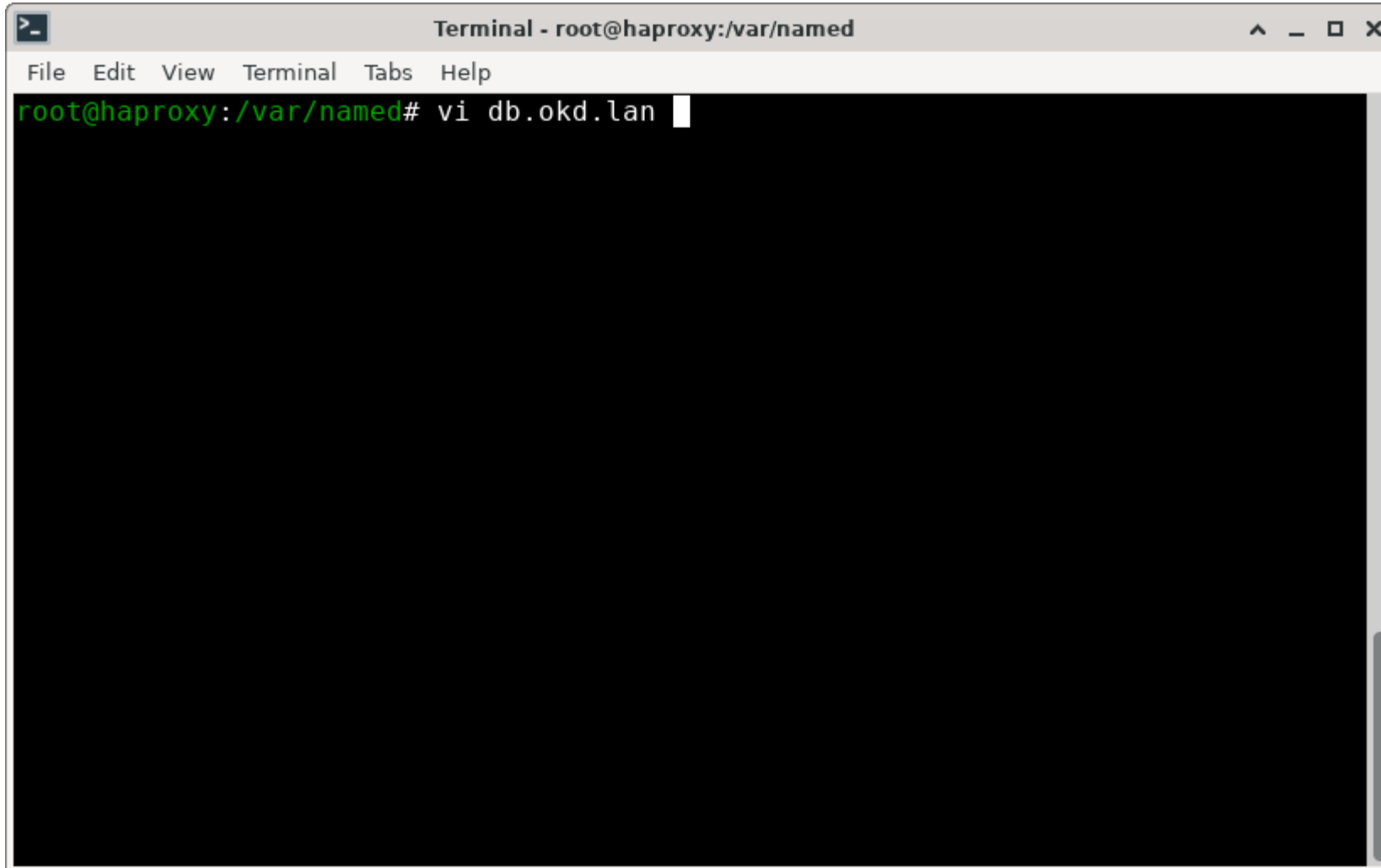
# DNS



```
Terminal - root@haproxy:/var/named
File Edit View Terminal Tabs Help
root@haproxy:~# cd /var/named/
root@haproxy:/var/named# touch db.okd.lan db.22.168.192.in-addr.arpa
root@haproxy:/var/named# ls
data                db.okd.lan         named.ca           named.localhost   slaves
db.22.168.192.in-addr.arpa  dynamic           named.empty       named.loopback
```



# DNS



A terminal window titled "Terminal - root@haproxy:/var/named" with a menu bar containing "File", "Edit", "View", "Terminal", "Tabs", and "Help". The terminal prompt is "root@haproxy:/var/named#" and the command "vi db.okd.lan" has been entered, with a white cursor at the end of the line. The rest of the terminal area is black.

# DNS

```
Terminal - root@haproxy:/var/named
File Edit View Terminal Tabs Help
$TTL      604800
@         IN      SOA    haproxy.okd.lan. contact.okd.lan (
          1      ; Serial
          604800 ; Refresh
          86400  ; Retry
          2419200; Expire
          604800 ; Minimum
)
          IN      NS     haproxy

haproxy.okd.lan.      IN      A      192.168.22.1
; Temp Bootstrap Node
okd-bootstrap.lab.okd.lan.  IN      A      192.168.22.200

; Control Plane Nodes
okd-cp-1.lab.okd.lan.    IN      A      192.168.22.201
okd-cp-2.lab.okd.lan.    IN      A      192.168.22.202
okd-cp-3.lab.okd.lan.    IN      A      192.168.22.203

; Worker Nodes
okd-w-1.lab.okd.lan.     IN      A      192.168.22.211
okd-w-2.lab.okd.lan.     IN      A      192.168.22.212
"db.okd.lan" 43L, 1686B written                                12,0-1      Top
```

# DNS

```
Terminal - root@haproxy:/var/named
File Edit View Terminal Tabs Help
; Worker Nodes
okd-w-1.lab.okd.lan.      IN      A       192.168.22.211
okd-w-2.lab.okd.lan.      IN      A       192.168.22.212
okd-w-3.lab.okd.lan.      IN      A       192.168.22.213
okd-w-4.lab.okd.lan.      IN      A       192.168.22.214

; OpenShift Internal - Load balancer
api.lab.okd.lan.         IN      A       192.168.22.1
api-int.lab.okd.lan.     IN      A       192.168.22.1
*.apps.lab.okd.lan.      IN      A       192.168.22.1

; ETCD Cluster
etcd-0.lab.okd.lan.      IN      A       192.168.22.201
etcd-1.lab.okd.lan.      IN      A       192.168.22.202
etcd-2.lab.okd.lan.      IN      A       192.168.22.203

; OpenShift Internal SRV records (cluster name = lab)
_etcd-server-ssl._tcp.lab.okd.lan.  86400  IN      SRV     0      10     2380
_etcd-0.lab
_etcd-server-ssl._tcp.lab.okd.lan.  86400  IN      SRV     0      10     2380
_etcd-1.lab
_etcd-server-ssl._tcp.lab.okd.lan.  86400  IN      SRV     0      10     2380
_etcd-2.lab

37,1 86%
```

# DNS

```
Terminal - root@haproxy:/var/named
File Edit View Terminal Tabs Help
okd-w-3.lab.okd.lan.      IN      A       192.168.22.213
okd-w-4.lab.okd.lan.      IN      A       192.168.22.214

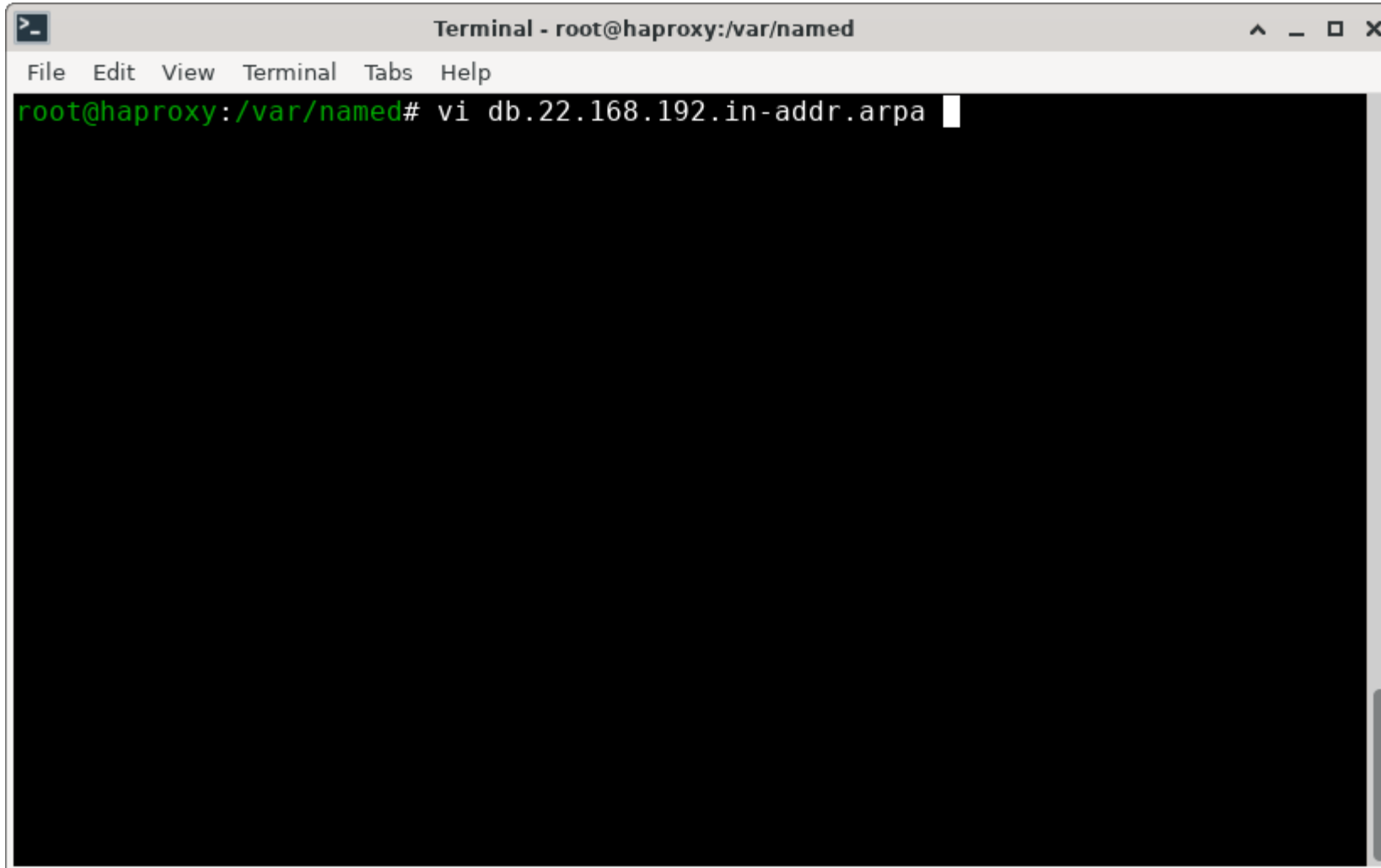
; OpenShift Internal - Load balancer
api.lab.okd.lan.         IN      A       192.168.22.1
api-int.lab.okd.lan.     IN      A       192.168.22.1
*.apps.lab.okd.lan.      IN      A       192.168.22.1

; ETCD Cluster
etcd-0.lab.okd.lan.      IN      A       192.168.22.201
etcd-1.lab.okd.lan.      IN      A       192.168.22.202
etcd-2.lab.okd.lan.      IN      A       192.168.22.203

; OpenShift Internal SRV records (cluster name = lab)
_etcd-server-ssl._tcp.lab.okd.lan.  86400   IN      SRV     0      10     2380
_etcd-0.lab
_etcd-server-ssl._tcp.lab.okd.lan.  86400   IN      SRV     0      10     2380
_etcd-1.lab
_etcd-server-ssl._tcp.lab.okd.lan.  86400   IN      SRV     0      10     2380
_etcd-2.lab

oauth-openshift.apps.lab.okd.lan.    IN      A       192.168.22.1
console-openshift-console.apps.lab.okd.lan.  IN      A       192.168.22.1
                                          43,1      Bot
```

# DNS



A terminal window titled "Terminal - root@haproxy:/var/named" with a menu bar containing "File", "Edit", "View", "Terminal", "Tabs", and "Help". The terminal prompt is "root@haproxy:/var/named#" and the command "vi db.22.168.192.in-addr.arpa" has been entered, with a white cursor at the end of the command.

# DNS

```
Terminal - root@haproxy:/var/named
File Edit View Terminal Tabs Help
$TTL      604800
@         IN      SOA      haproxy.okd.lan. contact.okd.lan (
; Serial
          1
          604800 ; Refresh
          86400  ; Retry
          2419200; Expire
          604800 ; Minimum
)

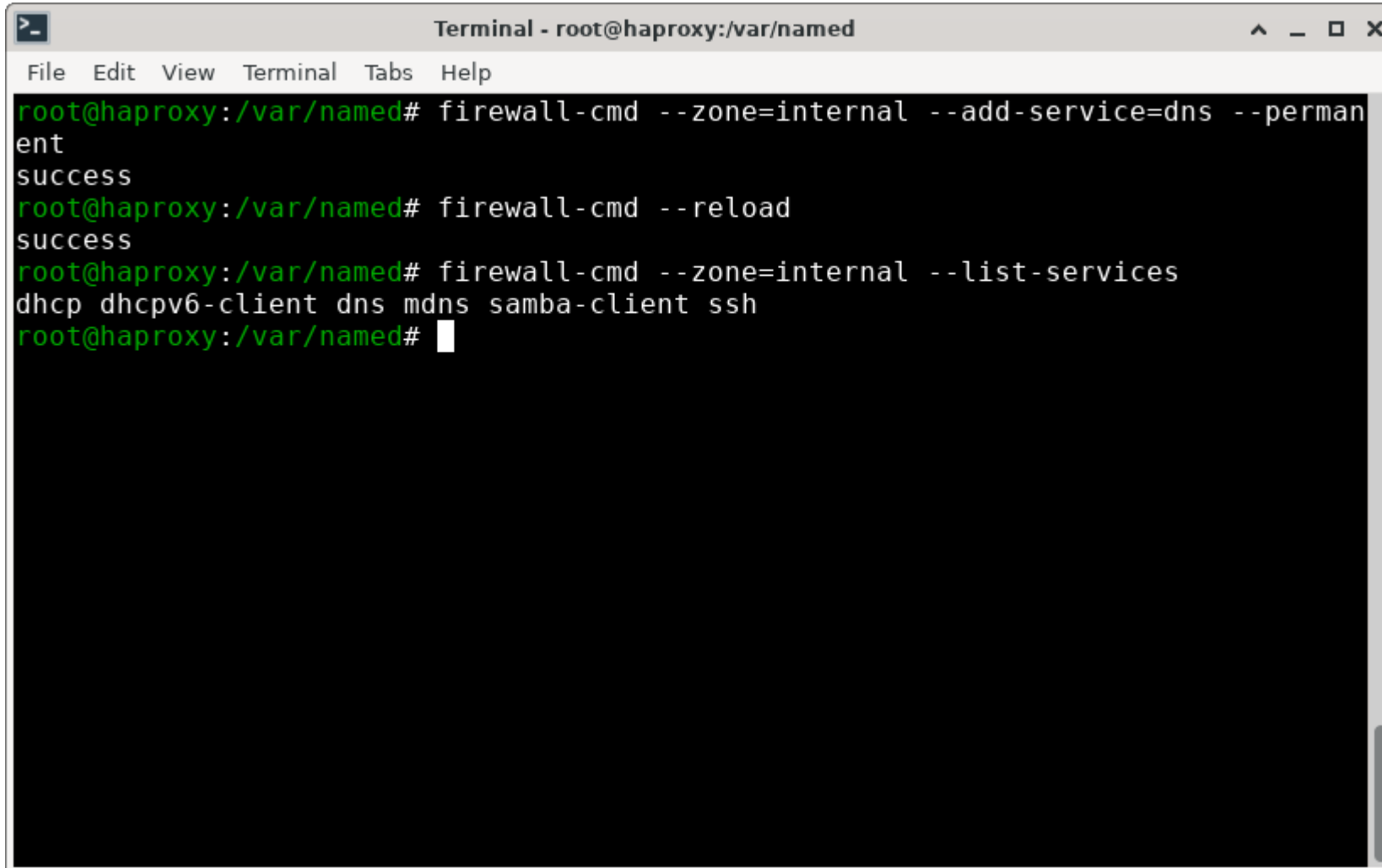
IN      NS      haproxy.okd.lan.

1       IN      PTR      haproxy.okd.lan.
1       IN      PTR      api.lab.okd.lan.
1       IN      PTR      api-int.lab.okd.lan.
;
200     IN      PTR      okd-bootstrap.lab.okd.lan.
;
201     IN      PTR      okd-cp-1.lab.okd.lan.
202     IN      PTR      okd-cp-2.lab.okd.lan.
203     IN      PTR      okd-cp-3.lab.okd.lan.
;
211     IN      PTR      okd-w-1.lab.okd.lan.
212     IN      PTR      okd-w-2.lab.okd.lan.
"db.22.168.192.in-addr.arpa" 25L, 737B written           1,1           Top
```

# DNS

```
Terminal - root@haproxy:/var/named
File Edit View Terminal Tabs Help
    1      ; Serial
 604800   ; Refresh
   86400  ; Retry
2419200  ; Expire
 604800   ; Minimum
)
IN       NS       haproxy.okd.lan.
1        IN       PTR       haproxy.okd.lan.
1        IN       PTR       api.lab.okd.lan.
1        IN       PTR       api-int.lab.okd.lan.
;
200      IN       PTR       okd-bootstrap.lab.okd.lan.
;
201      IN       PTR       okd-cp-1.lab.okd.lan.
202      IN       PTR       okd-cp-2.lab.okd.lan.
203      IN       PTR       okd-cp-3.lab.okd.lan.
;
211      IN       PTR       okd-w-1.lab.okd.lan.
212      IN       PTR       okd-w-2.lab.okd.lan.
213      IN       PTR       okd-w-3.lab.okd.lan.
214      IN       PTR       okd-w-4.lab.okd.lan.
25,1                                          Bot
```

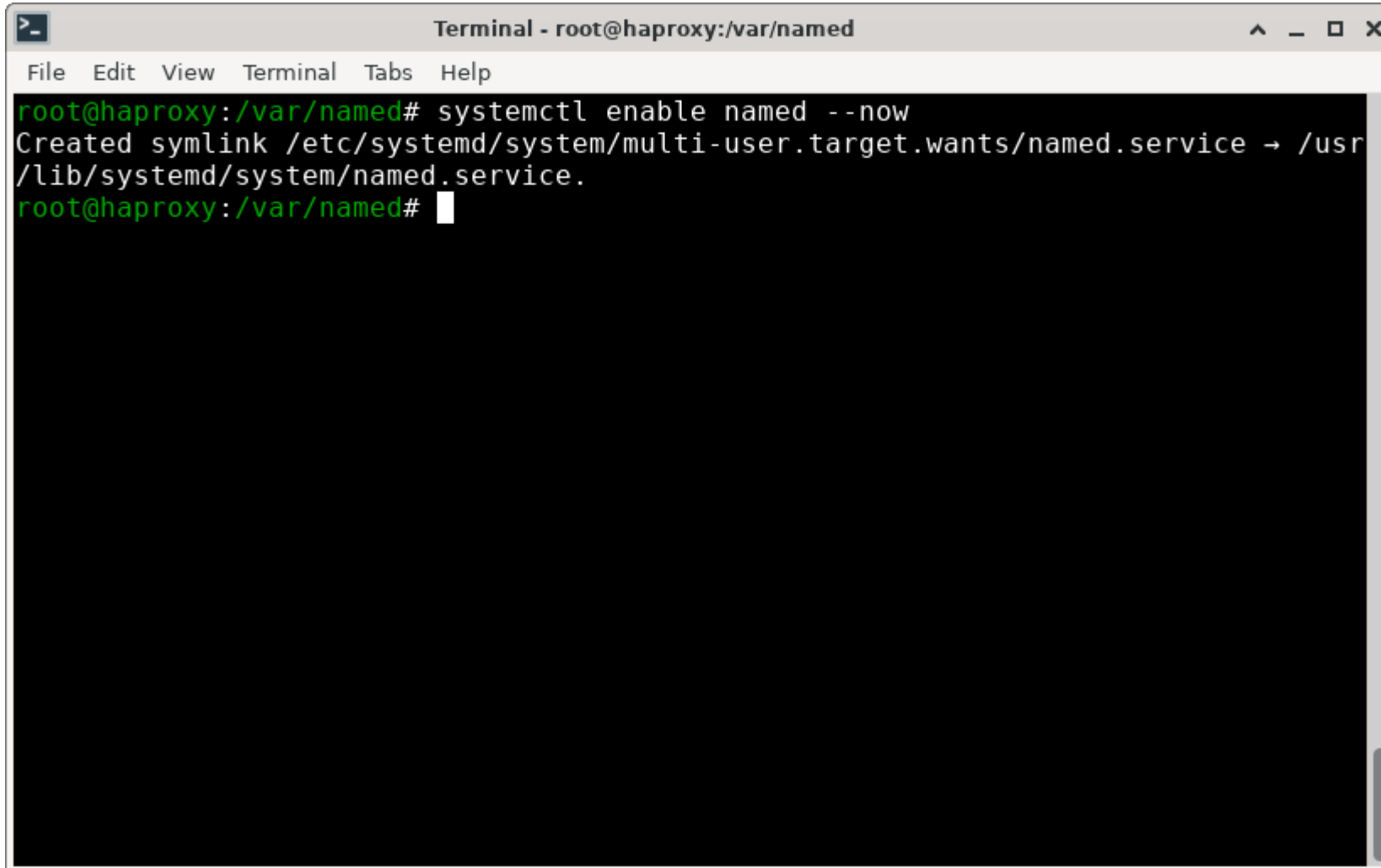
# DNS



```
Terminal - root@haproxy:/var/named
File Edit View Terminal Tabs Help
root@haproxy:/var/named# firewall-cmd --zone=internal --add-service=dns --perman
ent
success
root@haproxy:/var/named# firewall-cmd --reload
success
root@haproxy:/var/named# firewall-cmd --zone=internal --list-services
dhcp dhcpv6-client dns mdns samba-client ssh
root@haproxy:/var/named#
```

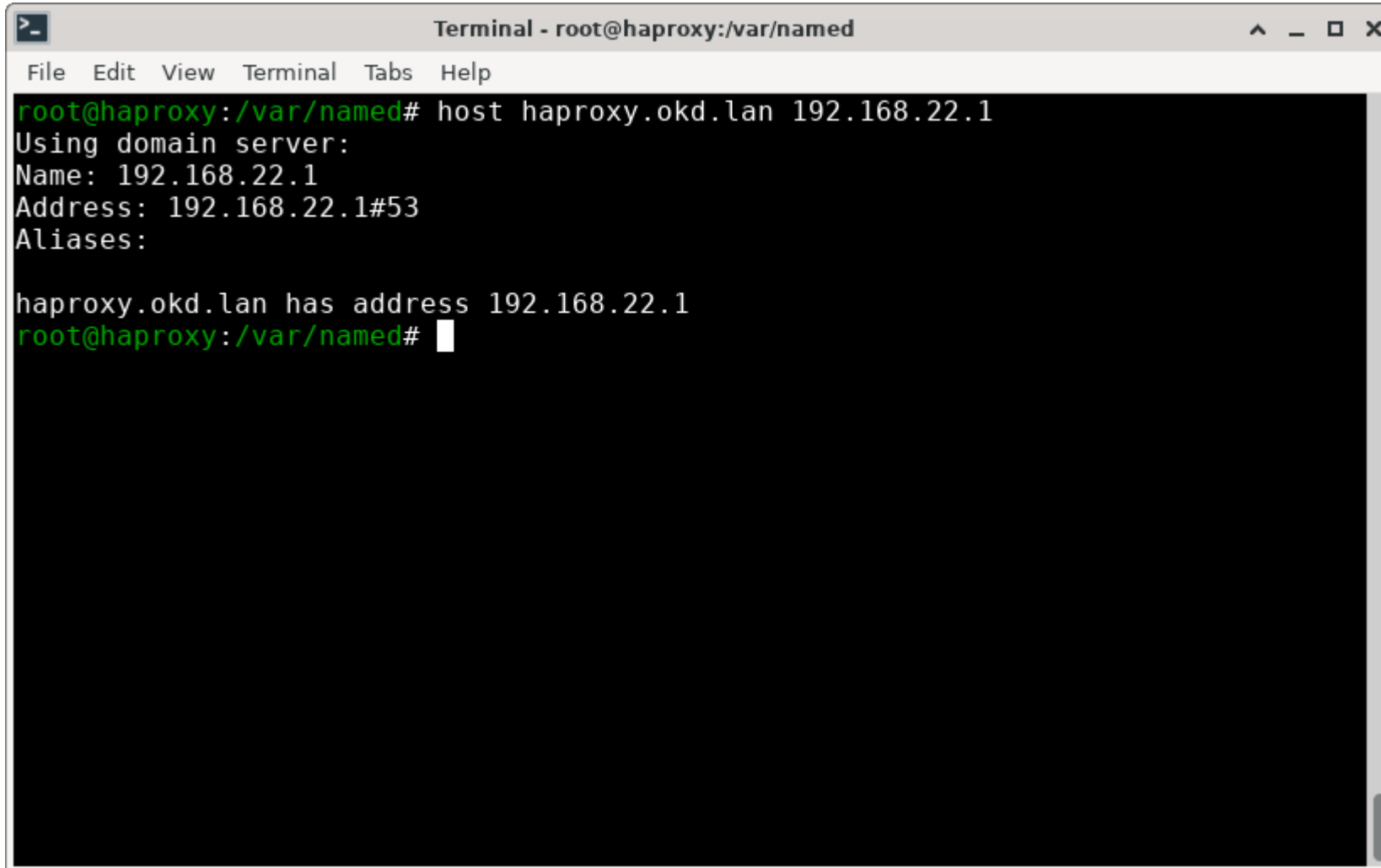


# DNS



```
Terminal - root@haproxy:/var/named
File Edit View Terminal Tabs Help
root@haproxy:/var/named# systemctl enable named --now
Created symlink /etc/systemd/system/multi-user.target.wants/named.service → /usr/lib/systemd/system/named.service.
root@haproxy:/var/named#
```

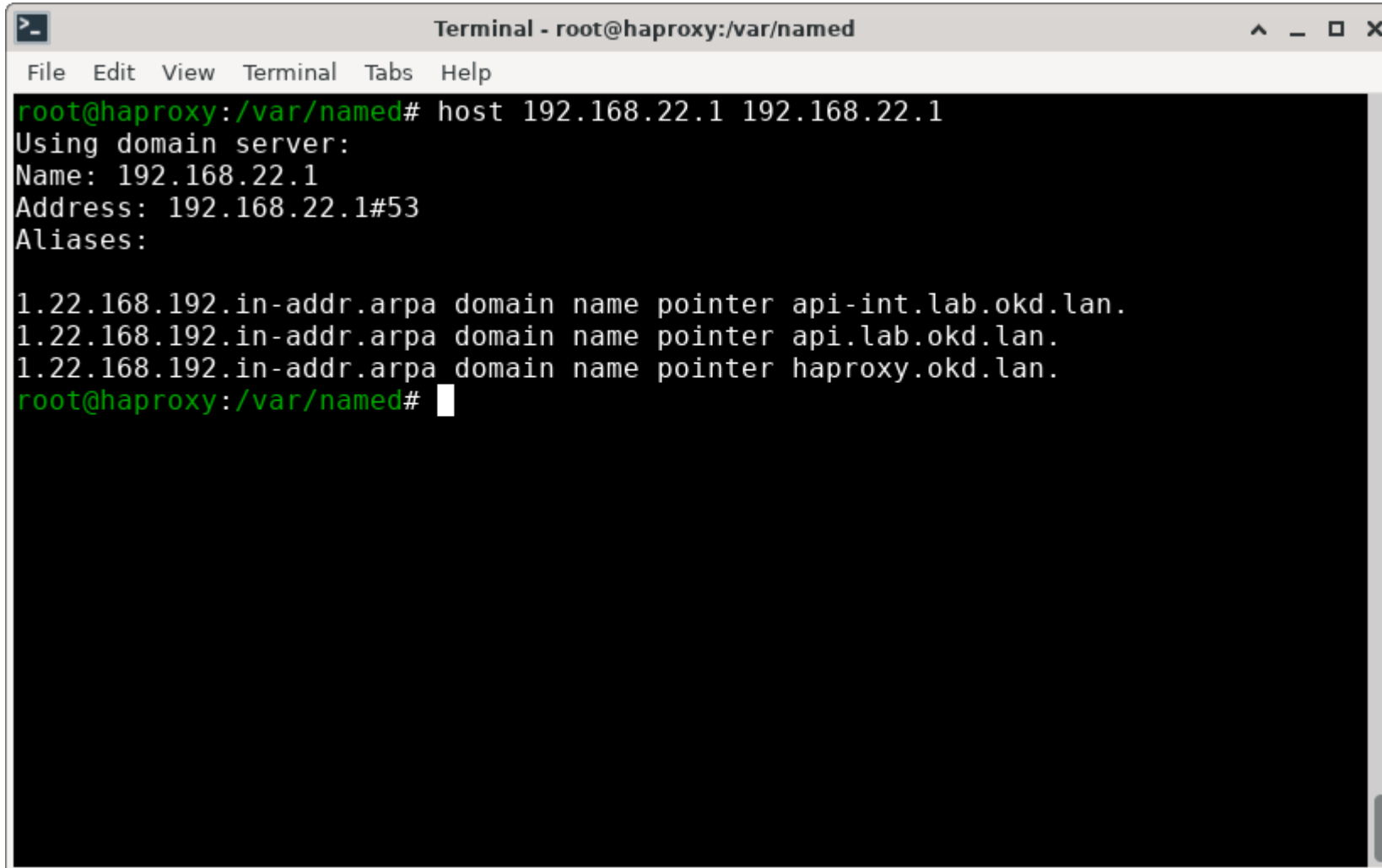
# DNS



```
Terminal - root@haproxy:/var/named
File Edit View Terminal Tabs Help
root@haproxy:/var/named# host haproxy.okd.lan 192.168.22.1
Using domain server:
Name: 192.168.22.1
Address: 192.168.22.1#53
Aliases:

haproxy.okd.lan has address 192.168.22.1
root@haproxy:/var/named#
```

# DNS



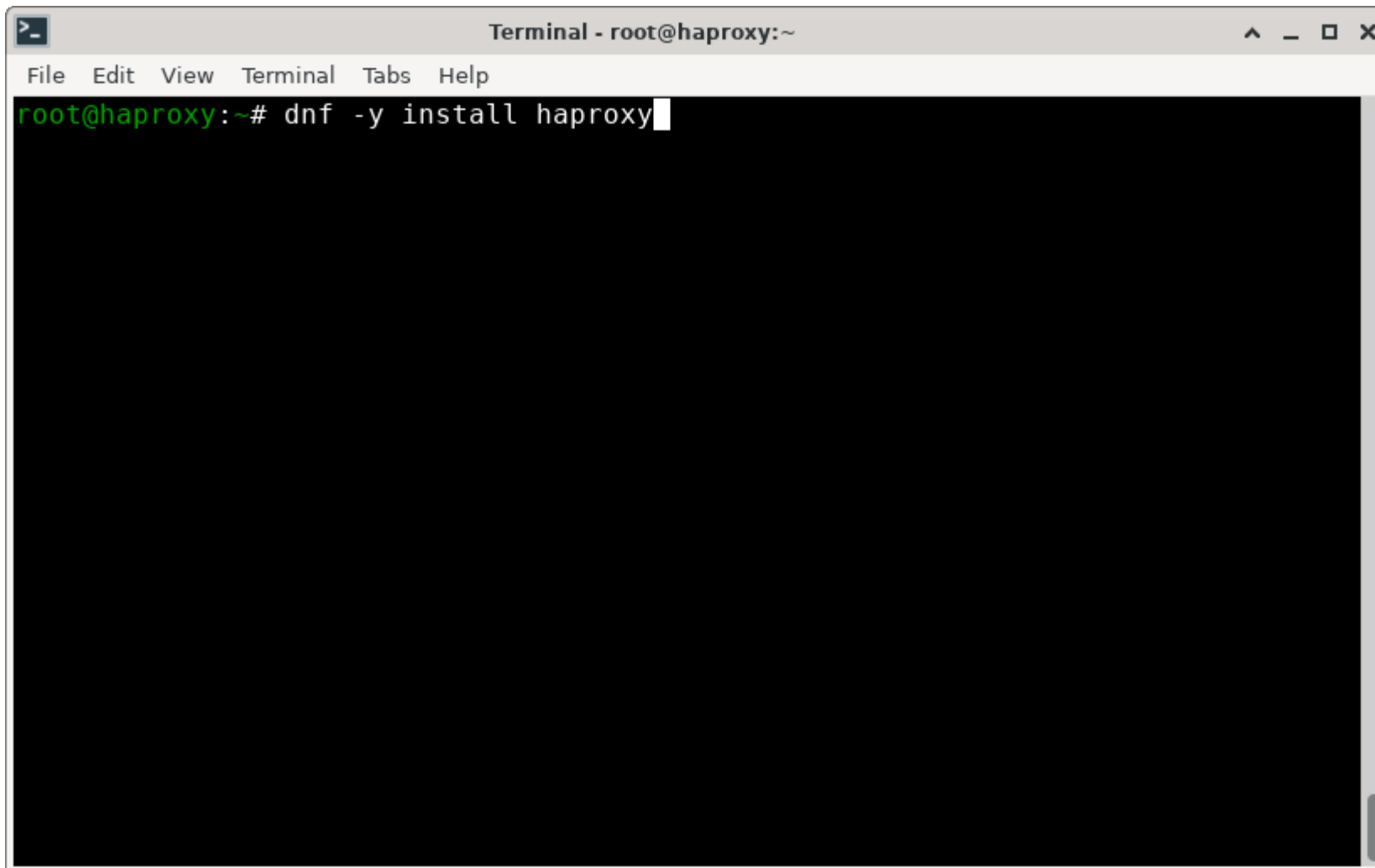
```
Terminal - root@haproxy:/var/named
File Edit View Terminal Tabs Help
root@haproxy:/var/named# host 192.168.22.1 192.168.22.1
Using domain server:
Name: 192.168.22.1
Address: 192.168.22.1#53
Aliases:

1.22.168.192.in-addr.arpa domain name pointer api-int.lab.okd.lan.
1.22.168.192.in-addr.arpa domain name pointer api.lab.okd.lan.
1.22.168.192.in-addr.arpa domain name pointer haproxy.okd.lan.
root@haproxy:/var/named#
```

# HAProxy

- We're going to use HAProxy to distribute traffic coming into the HAProxy machine from internal OR external networks to the nodes in the cluster.
- Because we're going to be accessing the cluster from the public network, we need to proxy traffic to the nodes on the private network.
- Because traffic can be distributed across various nodes from the private network, we're going to send all the internal traffic to the HAProxy machine's internal interface to distribute the load.

# HAProxy



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# dnf -y install haproxy
```

# HAProxy

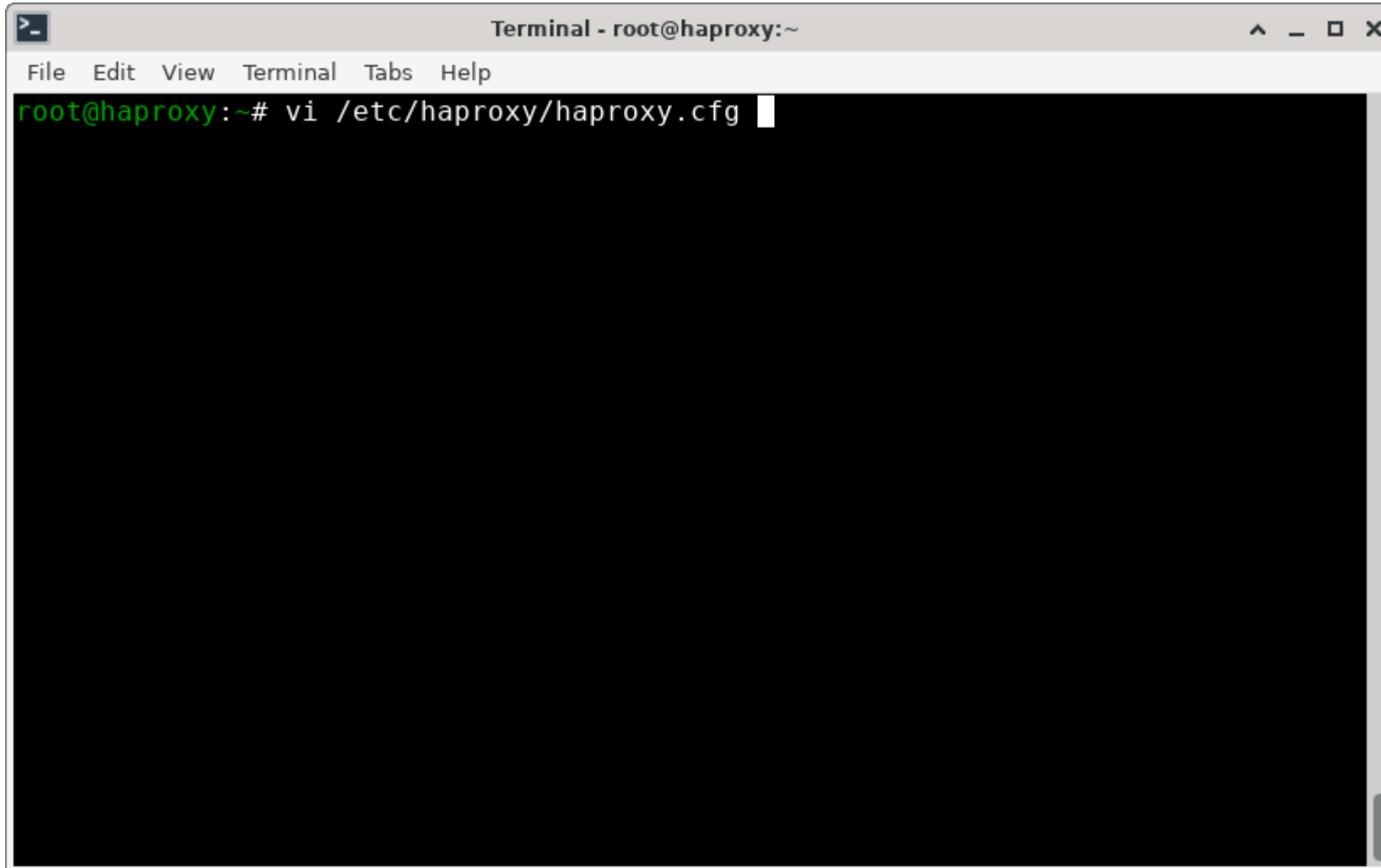
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
Install 1 Package

Total download size: 2.5 M
Installed size: 7.6 M
Downloading Packages:
haproxy-2.8.5-1.fc39.x86_64.rpm          3.6 MB/s | 2.5 MB    00:00
-----
Total                                  2.5 MB/s | 2.5 MB    00:00
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing                :                               1/1
  Running scriptlet: haproxy-2.8.5-1.fc39.x86_64          1/1
  Installing              : haproxy-2.8.5-1.fc39.x86_64          1/1
  Running scriptlet: haproxy-2.8.5-1.fc39.x86_64          1/1
  Verifying                : haproxy-2.8.5-1.fc39.x86_64          1/1

Installed:
 haproxy-2.8.5-1.fc39.x86_64

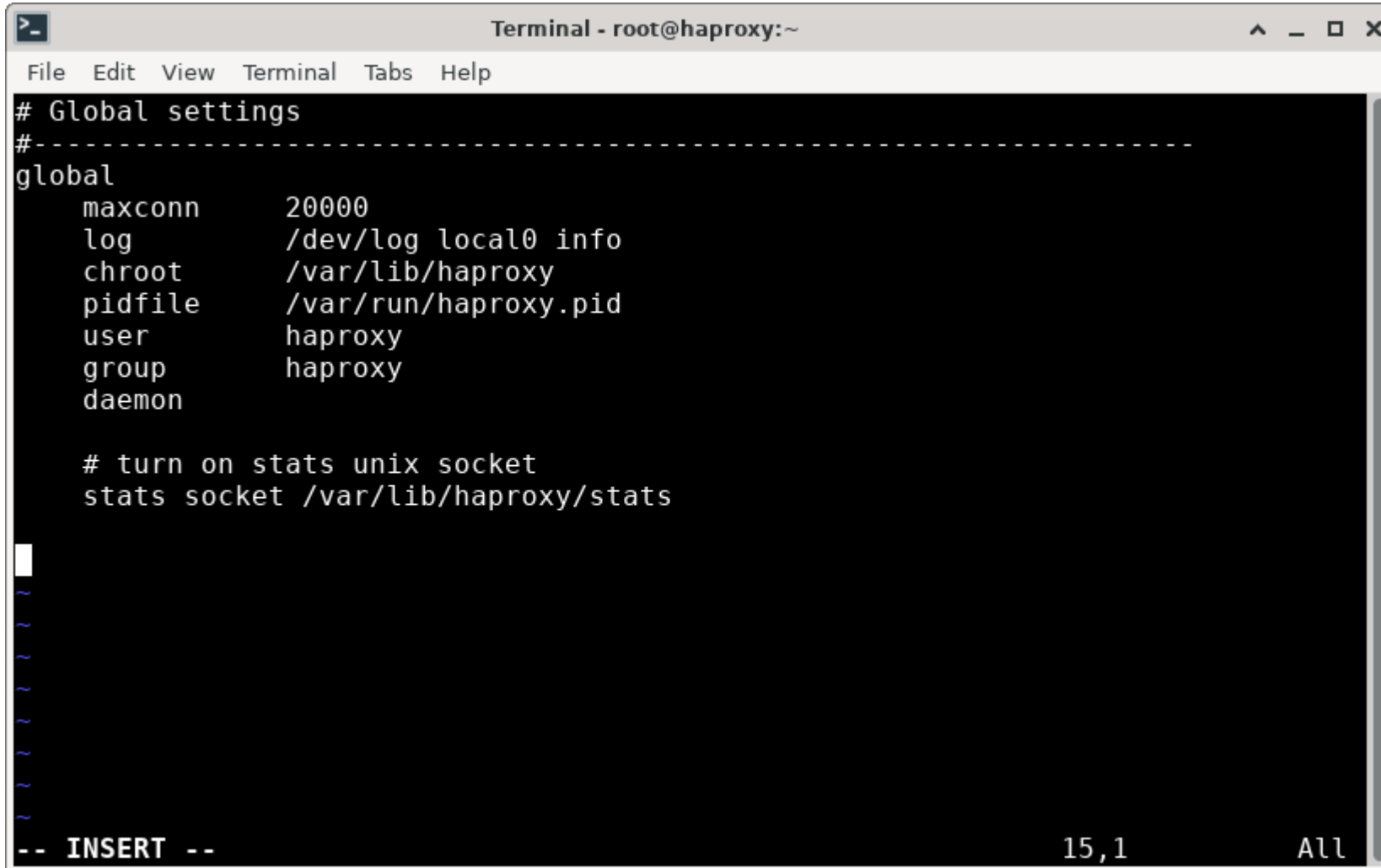
Complete!
root@haproxy:~#
```

# HAProxy



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# vi /etc/haproxy/haproxy.cfg
```

# HAProxy

A terminal window titled "Terminal - root@haproxy:~" with a menu bar containing "File", "Edit", "View", "Terminal", "Tabs", and "Help". The terminal content shows the HAProxy configuration file. It starts with "# Global settings" followed by a dashed line. The "global" section includes: "maxconn 20000", "log /dev/log local0 info", "chroot /var/lib/haproxy", "pidfile /var/run/haproxy.pid", "user haproxy", "group haproxy", and "daemon". Below this is a comment "# turn on stats unix socket" and the configuration "stats socket /var/lib/haproxy/stats". The terminal ends with "-- INSERT --" on the left, "15,1" in the bottom right, and "All" on the far right.

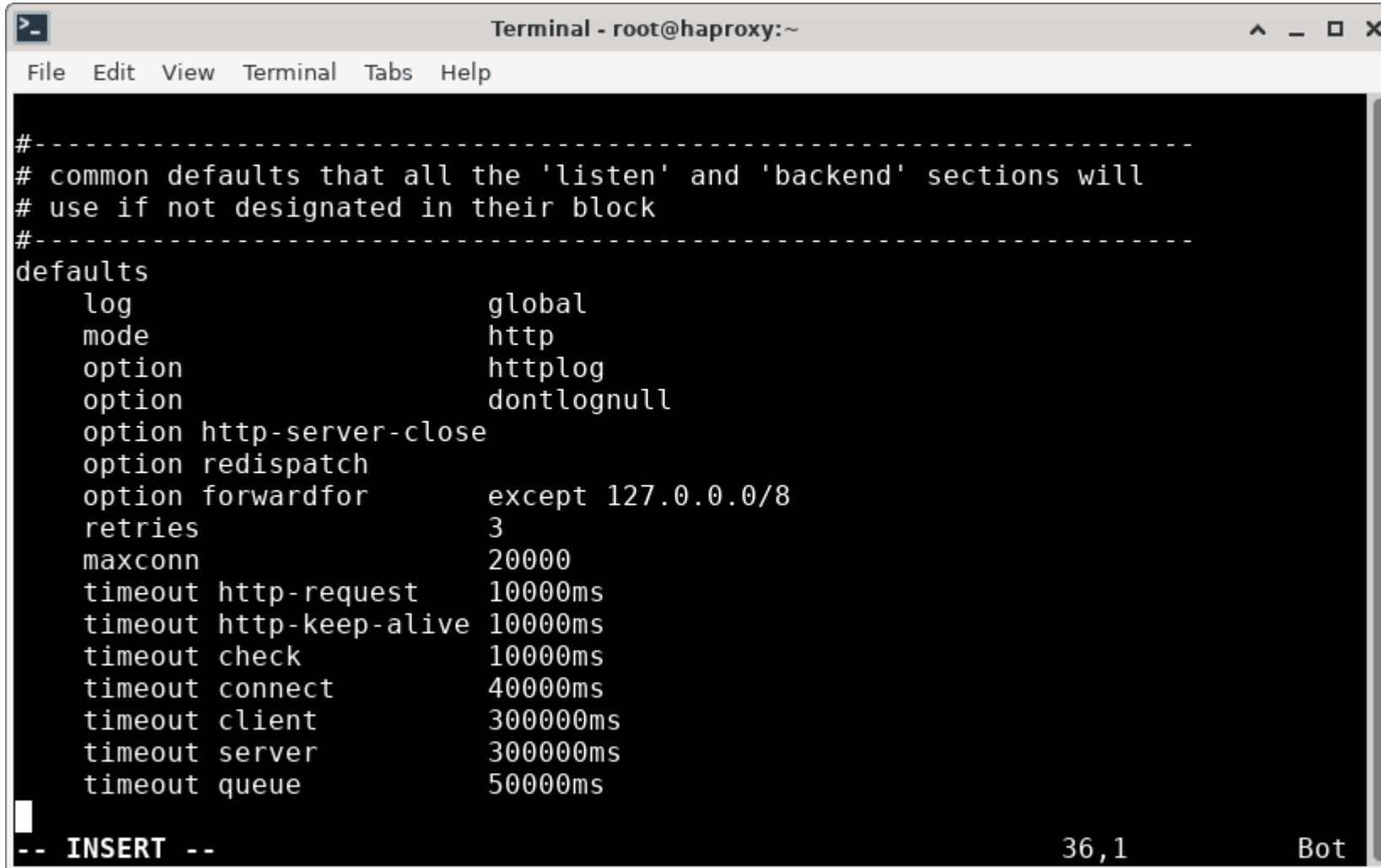
```
>_ Terminal - root@haproxy:~ ^ _ □ ×
File Edit View Terminal Tabs Help
# Global settings
#-----
global
  maxconn      20000
  log          /dev/log local0 info
  chroot       /var/lib/haproxy
  pidfile      /var/run/haproxy.pid
  user         haproxy
  group        haproxy
  daemon

# turn on stats unix socket
stats socket /var/lib/haproxy/stats

-- INSERT --                               15,1                               All
```



# HAProxy



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
#-----
# common defaults that all the 'listen' and 'backend' sections will
# use if not designated in their block
#-----
defaults
  log                global
  mode               http
  option             httplog
  option             dontlognull
  option http-server-close
  option redispatch
  option forwardfor  except 127.0.0.0/8
  retries            3
  maxconn           20000
  timeout http-request 10000ms
  timeout http-keep-alive 10000ms
  timeout check      10000ms
  timeout connect    40000ms
  timeout client      300000ms
  timeout server     300000ms
  timeout queue      50000ms
-- INSERT --                                     36,1                               Bot
```

# HAProxy

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
log global
mode http
option httplog
option dontlognull
option http-server-close
option redispatch
option forwardfor except 127.0.0.0/8
retries 3
maxconn 20000
timeout http-request 10000ms
timeout http-keep-alive 10000ms
timeout check 10000ms
timeout connect 40000ms
timeout client 300000ms
timeout server 300000ms
timeout queue 50000ms

# Enable HAProxy stats
listen stats
  bind :9000
  stats uri /stats
  stats refresh 10000ms

-- INSERT -- 42,1 Bot
```

# HAProxy

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
option forwardfor      except 127.0.0.0/8
retries                3
maxconn                20000
timeout http-request   10000ms
timeout http-keep-alive 10000ms
timeout check          10000ms
timeout connect        40000ms
timeout client          300000ms
timeout server         300000ms
timeout queue          50000ms

# Enable HAProxy stats
listen stats
  bind :9000
  stats uri /stats
  stats refresh 10000ms

# Kube API Server
frontend k8s_api_frontend
  bind :6443
  default_backend k8s_api_backend
  mode tcp

-- INSERT --
```

48,1

Bot

# HAProxy

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
timeout server      300000ms
timeout queue      50000ms

# Enable HAProxy stats
listen stats
  bind :9000
  stats uri /stats
  stats refresh 10000ms

# Kube API Server
frontend k8s_api_frontend
  bind :6443
  default_backend k8s_api_backend
  mode tcp

backend k8s_api_backend
  mode tcp
  balance source
  server      okd-bootstrap 192.168.22.200:6443 check
  server      okd-cp-1 192.168.22.201:6443 check
  server      okd-cp-2 192.168.22.202:6443 check
  server      okd-cp-3 192.168.22.203:6443 check

-- INSERT --                                     56,1                                     Bot
```

# HAProxy

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
stats refresh 10000ms

# Kube API Server
frontend k8s_api_frontend
  bind :6443
  default_backend k8s_api_backend
  mode tcp

backend k8s_api_backend
  mode tcp
  balance source
  server      okd-bootstrap 192.168.22.200:6443 check
  server      okd-cp-1      192.168.22.201:6443 check
  server      okd-cp-2      192.168.22.202:6443 check
  server      okd-cp-3      192.168.22.203:6443 check

# OKD Machine Config Server
frontend okd_machine_config_server_frontend
  mode tcp
  bind :22623
  default_backend okd_machine_config_server_backend

-- INSERT --                                     62,1                               Bot
```

# HAProxy

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
backend k8s_api_backend
  mode tcp
  balance source
  server      okd-bootstrap 192.168.22.200:6443 check
  server      okd-cp-1 192.168.22.201:6443 check
  server      okd-cp-2 192.168.22.202:6443 check
  server      okd-cp-3 192.168.22.203:6443 check

# OKD Machine Config Server
frontend okd_machine_config_server_frontend
  mode tcp
  bind :22623
  default_backend okd_machine_config_server_backend

backend okd_machine_config_server_backend
  mode tcp
  balance source
  server      okd-bootstrap 192.168.22.200:22623 check
  server      okd-cp-1 192.168.22.201:22623 check
  server      okd-cp-2 192.168.22.202:22623 check
  server      okd-cp-3 192.168.22.203:22623 check

-- INSERT --                               70,1                               Bot
```

# HAProxy

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help

# OKD Machine Config Server
frontend okd_machine_config_server_frontend
  mode tcp
  bind :22623
  default_backend okd_machine_config_server_backend

backend okd_machine_config_server_backend
  mode tcp
  balance source
  server      okd-bootstrap 192.168.22.200:22623 check
  server      okd-cp-1      192.168.22.201:22623 check
  server      okd-cp-2      192.168.22.202:22623 check
  server      okd-cp-3      192.168.22.203:22623 check

# OKD Ingress - layer 4 tcp mode for each. Ingress Controller will handle layer
7.
frontend okd_http_ingress_frontend
  bind :80
  default_backend okd_http_ingress_backend
  mode tcp

-- INSERT --                                     76,1                               Bot
```

# HAProxy

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
mode tcp
balance source
server      okd-bootstrap 192.168.22.200:22623 check
server      okd-cp-1 192.168.22.201:22623 check
server      okd-cp-2 192.168.22.202:22623 check
server      okd-cp-3 192.168.22.203:22623 check

# OKD Ingress - layer 4 tcp mode for each. Ingress Controller will handle layer
7.
frontend okd_http_ingress_frontend
  bind :80
  default_backend okd_http_ingress_backend
  mode tcp

backend okd_http_ingress_backend
  balance source
  mode tcp
  server      okd-w-1 192.168.22.211:80 check
  server      okd-w-2 192.168.22.212:80 check
  server      okd-w-3 192.168.22.213:80 check
  server      okd-w-4 192.168.22.214:80 check

-- INSERT --
84,1 Bot
```



# HAProxy

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
server      okd-cp-2 192.168.22.202:22623 check
server      okd-cp-3 192.168.22.203:22623 check

# OKD Ingress - layer 4 tcp mode for each. Ingress Controller will handle layer
7.
frontend okd_http_ingress_frontend
  bind :80
  default_backend okd_http_ingress_backend
  mode tcp

backend okd_http_ingress_backend
  balance source
  mode tcp
  server      okd-w-1 192.168.22.211:80 check
  server      okd-w-2 192.168.22.212:80 check
  server      okd-w-3 192.168.22.213:80 check
  server      okd-w-4 192.168.22.214:80 check

frontend okd_https_ingress_frontend
  bind *:443
  default_backend okd_https_ingress_backend
  mode tcp

-- INSERT --                                     89,1                               Bot
```

# HAProxy

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
mode tcp

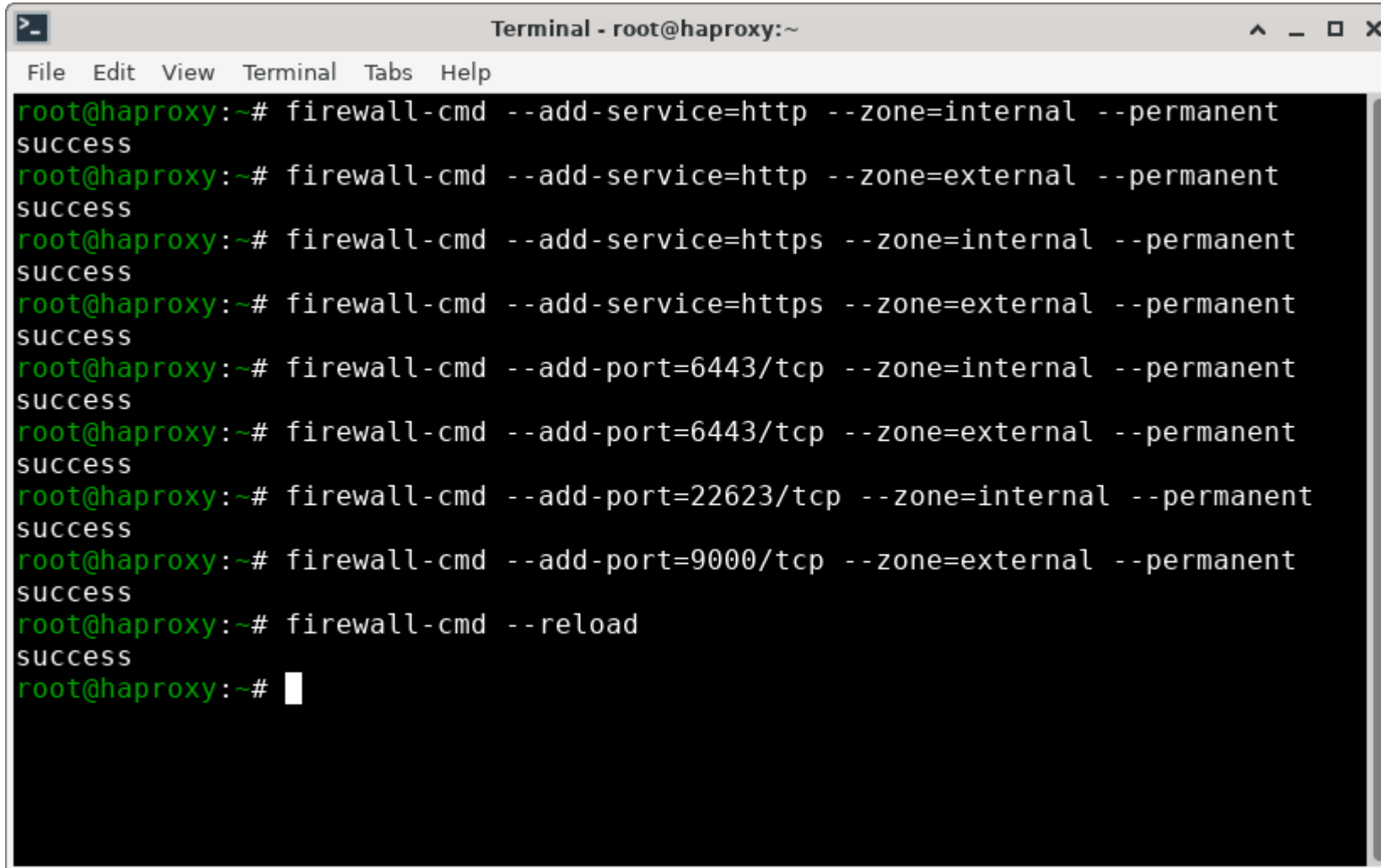
backend okd_http_ingress_backend
  balance source
  mode tcp
  server      okd-w-1 192.168.22.211:80 check
  server      okd-w-2 192.168.22.212:80 check
  server      okd-w-3 192.168.22.213:80 check
  server      okd-w-4 192.168.22.214:80 check

frontend okd_https_ingress_frontend
  bind *:443
  default_backend okd_https_ingress_backend
  mode tcp

backend okd_https_ingress_backend
  mode tcp
  balance source
  server      okd-w-1 192.168.22.211:443 check
  server      okd-w-2 192.168.22.212:443 check
  server      okd-w-3 192.168.22.213:443 check
  server      okd-w-4 192.168.22.214:443 check

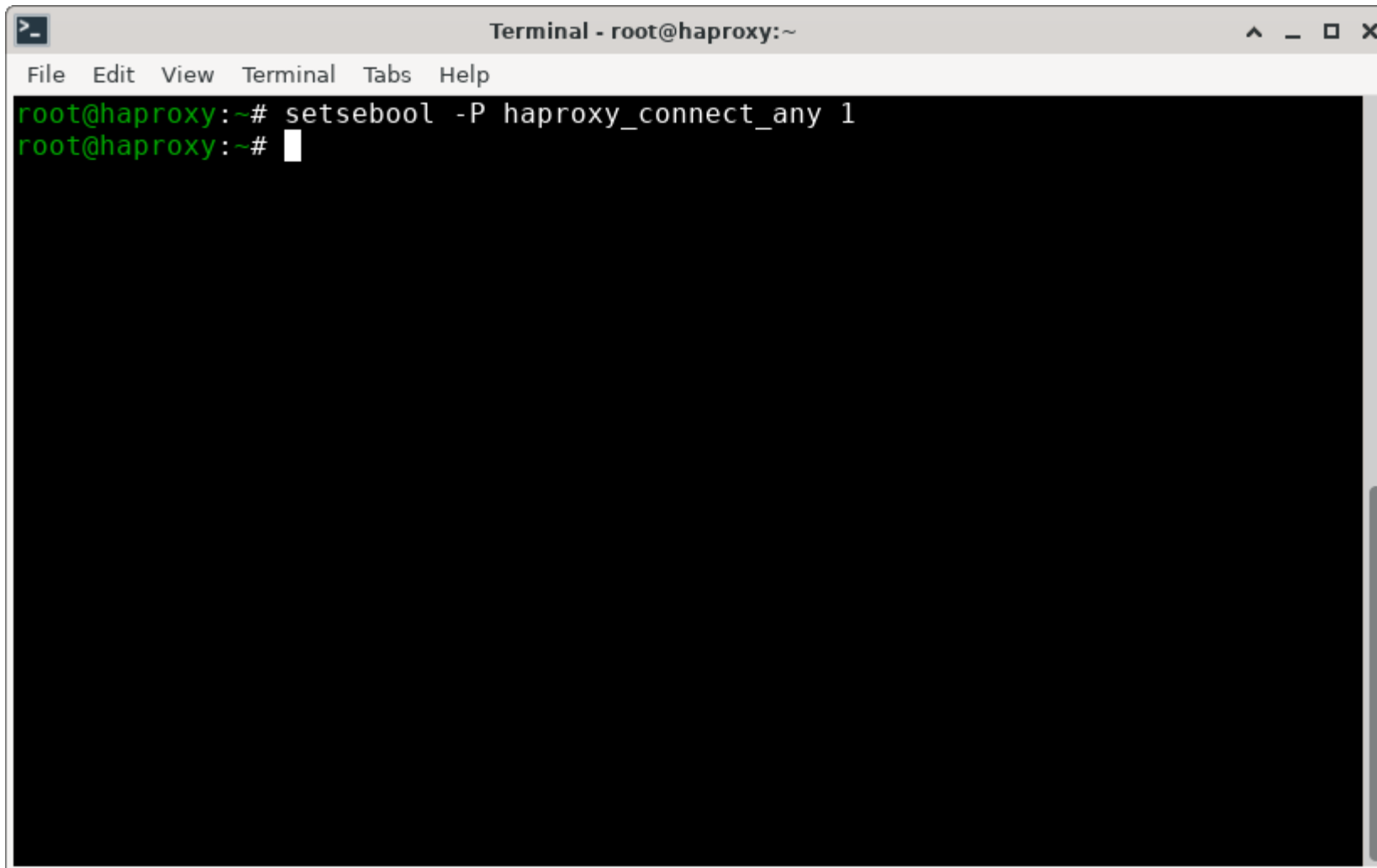
-- INSERT --                                     97,1                                     Bot
```

# HAProxy



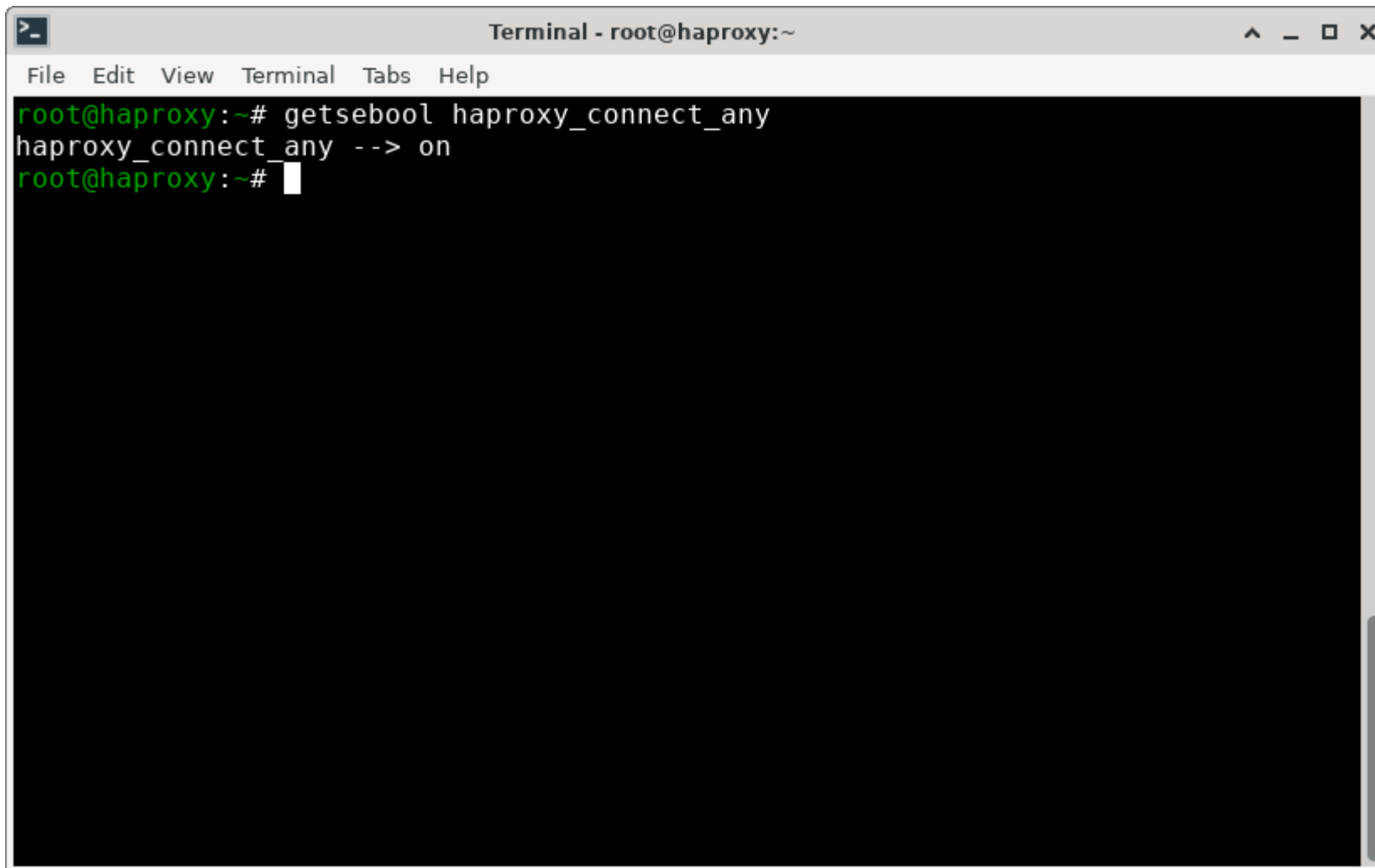
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# firewall-cmd --add-service=http --zone=internal --permanent
success
root@haproxy:~# firewall-cmd --add-service=http --zone=external --permanent
success
root@haproxy:~# firewall-cmd --add-service=https --zone=internal --permanent
success
root@haproxy:~# firewall-cmd --add-service=https --zone=external --permanent
success
root@haproxy:~# firewall-cmd --add-port=6443/tcp --zone=internal --permanent
success
root@haproxy:~# firewall-cmd --add-port=6443/tcp --zone=external --permanent
success
root@haproxy:~# firewall-cmd --add-port=22623/tcp --zone=internal --permanent
success
root@haproxy:~# firewall-cmd --add-port=9000/tcp --zone=external --permanent
success
root@haproxy:~# firewall-cmd --reload
success
root@haproxy:~#
```

# HAProxy



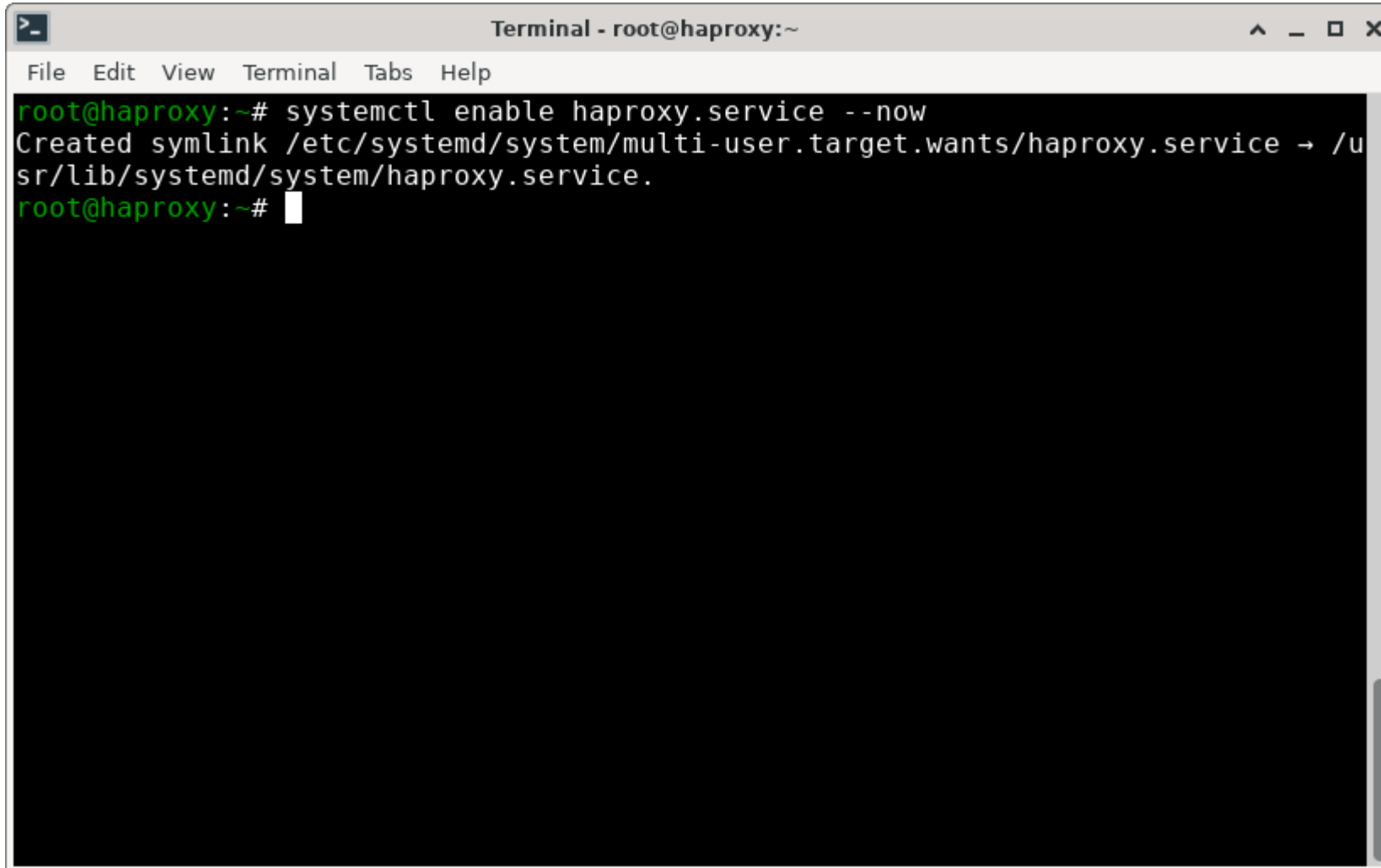
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# setsebool -P haproxy_connect_any 1
root@haproxy:~#
```

# HAProxy



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# getsebool haproxy_connect_any
haproxy_connect_any --> on
root@haproxy:~#
```

# HAProxy



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# systemctl enable haproxy.service --now
Created symlink /etc/systemd/system/multi-user.target.wants/haproxy.service → /usr/lib/systemd/system/haproxy.service.
root@haproxy:~#
```

# HAProxy version 2.8.5-aba8d0, released 2023/12/07

## Statistics Report for pid 2981

### > General process information

pid = 2981 (process #1, nproc = 1, nbthread = 4)  
 uptime = 0d 0h01m52s; warnings = 28  
 system limits: memmax = unlimited; ulimit-n = 40055  
 maxsock = 40055; maxconn = 20000; reached = 0; maxpipes = 0  
 current conns = 1; current pipes = 0/0; conn rate = 1/sec; bit rate = 0.000 kbps  
 Running tasks: 0/42; idle = 100 %

Legend for status colors:

- active UP
- active UP, going down
- active DOWN, going up
- active or backup DOWN
- active or backup DOWN for maintenance (MAINT)
- active or backup SOFT STOPPED for maintenance
- backup UP
- backup UP, going down
- backup DOWN, going up
- not checked

Note: "NOLB"/"DRAIN" = UP with load-balancing disabled.

Display option:

- Scope:
- [Hide 'DOWN' servers](#)
- [Disable refresh](#)
- [Refresh now](#)
- [CSV export](#)
- [JSON export \(schema\)](#)

External resources:

- [Primary site](#)
- [Updates \(v2.8\)](#)
- [Online manual](#)

stats	Queue			Session rate			Sessions				Bytes		Denied		Errors			Warnings		Server											
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend				1	1	-	1	2	20 000	1			0	0	0	0	0	0	0	0	0	0	OPEN								
Backend	0	0		0	0		0	0	2 000	0	0	0s	0	0	0	0	0	0	0	0	0	0	1m52s UP		0/0	0	0			0	

k8s api frontend	Queue			Session rate			Sessions				Bytes		Denied		Errors			Warnings		Server											
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend				0	0	-	0	0	20 000	0			0	0	0	0	0	0	0	0	0	0	OPEN								

k8s api backend	Queue			Session rate			Sessions				Bytes		Denied		Errors			Warnings		Server											
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
okd-bootstrap	0	0	-	0	0	-	0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	0	1m52s DOWN	L4CON in 0ms	1/1	Y	-	1	1	1m52s	-
okd-cp-1	0	0	-	0	0	-	0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	0	1m50s DOWN	* L4TOUT in 2001ms	1/1	Y	-	1	1	1m50s	-
okd-cp-2	0	0	-	0	0	-	0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	0	1m50s DOWN	* L4TOUT in 2002ms	1/1	Y	-	1	1	1m50s	-
okd-cp-3	0	0	-	0	0	-	0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	0	1m50s DOWN	L4TOUT in 2002ms	1/1	Y	-	1	1	1m50s	-
Backend	0	0		0	0		0	0	2 000	0	0	?	0	0	0	0	0	0	0	0	0	0	1m50s DOWN		0/0	0	0			1	1m50s

okd machine config server frontend	Queue			Session rate			Sessions				Bytes		Denied		Errors			Warnings		Server											
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend				0	0	-	0	0	20 000	0			0	0	0	0	0	0	0	0	0	0	OPEN								

okd machine config server backend	Queue			Session rate			Sessions				Bytes		Denied		Errors			Warnings		Server											
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
okd-bootstrap	0	0	-	0	0	-	0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	0	1m52s DOWN	L4CON in 0ms	1/1	Y	-	1	1	1m52s	-
okd-cp-1	0	0	-	0	0	-	0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	0	1m49s DOWN	L4TOUT in 2000ms	1/1	Y	-	1	1	1m49s	-
okd-cp-2	0	0	-	0	0	-	0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	0	1m49s DOWN	L4TOUT in 2001ms	1/1	Y	-	1	1	1m49s	-
okd-cp-3	0	0	-	0	0	-	0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	0	1m49s DOWN	L4TOUT in 2002ms	1/1	Y	-	1	1	1m49s	-
Backend	0	0		0	0		0	0	2 000	0	0	?	0	0	0	0	0	0	0	0	0	0	1m49s DOWN		0/0	0	0			1	1m49s

okd http ingress frontend	Queue			Session rate			Sessions				Bytes		Denied		Errors			Warnings		Server											
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend				0	0	-	0	0	20 000	0			0	0	0	0	0	0	0	0	0	0	OPEN								

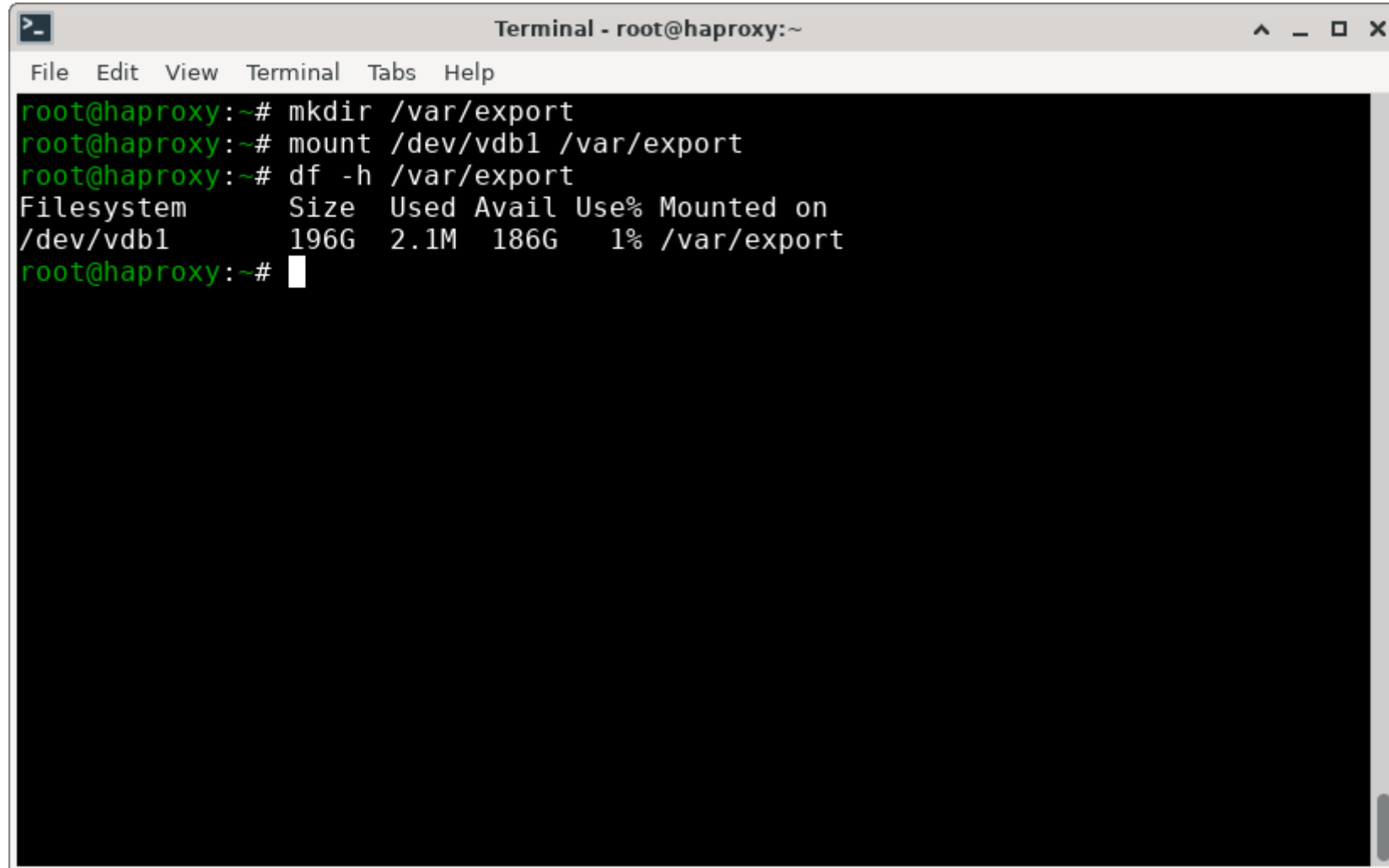
okd http ingress backend	Queue			Session rate			Sessions				Bytes		Denied		Errors			Warnings		Server											
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
okd-w-1	0	0	-	0	0	-	0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	0	1m49s DOWN	L4TOUT in 2001ms	1/1	Y	-	1	1	1m49s	-
okd-w-2	0	0	-	0	0	-	0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	0	1m49s DOWN	L4TOUT in 2001ms	1/1	Y	-	1	1	1m49s	-
okd-w-3	0	0	-	0	0	-	0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	0	1m49s DOWN	L4TOUT in 2001ms	1/1	Y	-	1	1	1m49s	-
okd-w-4	0	0	-	0	0	-	0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	0	1m49s DOWN	L4TOUT in 2003ms	1/1	Y	-	1	1	1m49s	-
Backend	0	0		0	0		0	0	2 000	0	0	?	0	0	0	0	0	0	0	0	0	0	1m49s DOWN		0/0	0	0			1	1m49s

# NFS

- We're going to set up an NFS server for registry storage.
- I added a second 200GB disk to the HAProxy machine, partitioned it, and formatted it with ext4.
- We'll export it using NFS.

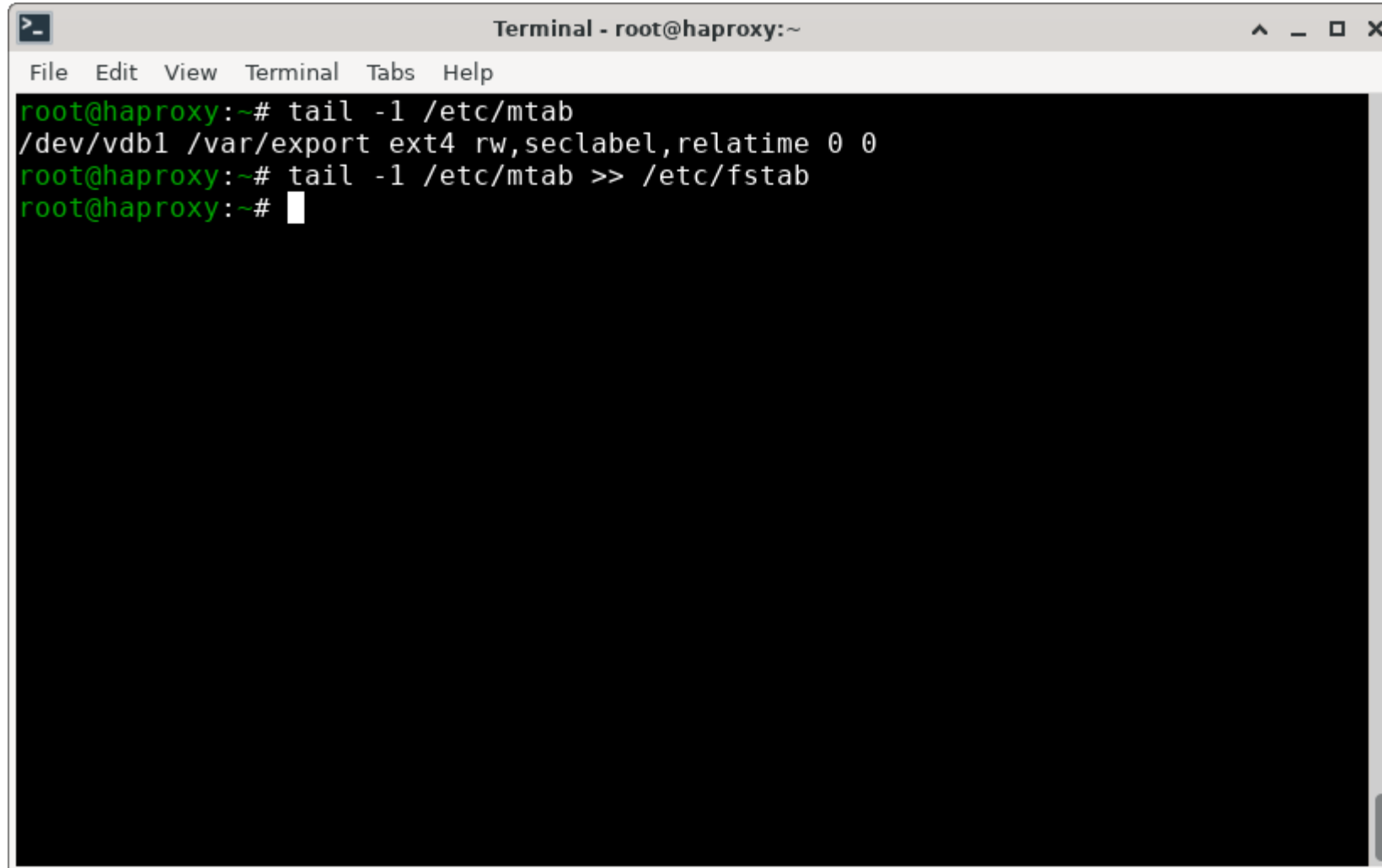


# NFS



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# mkdir /var/export
root@haproxy:~# mount /dev/vdb1 /var/export
root@haproxy:~# df -h /var/export
Filesystem      Size  Used Avail Use% Mounted on
/dev/vdb1       196G  2.1M  186G   1% /var/export
root@haproxy:~#
```

# NFS

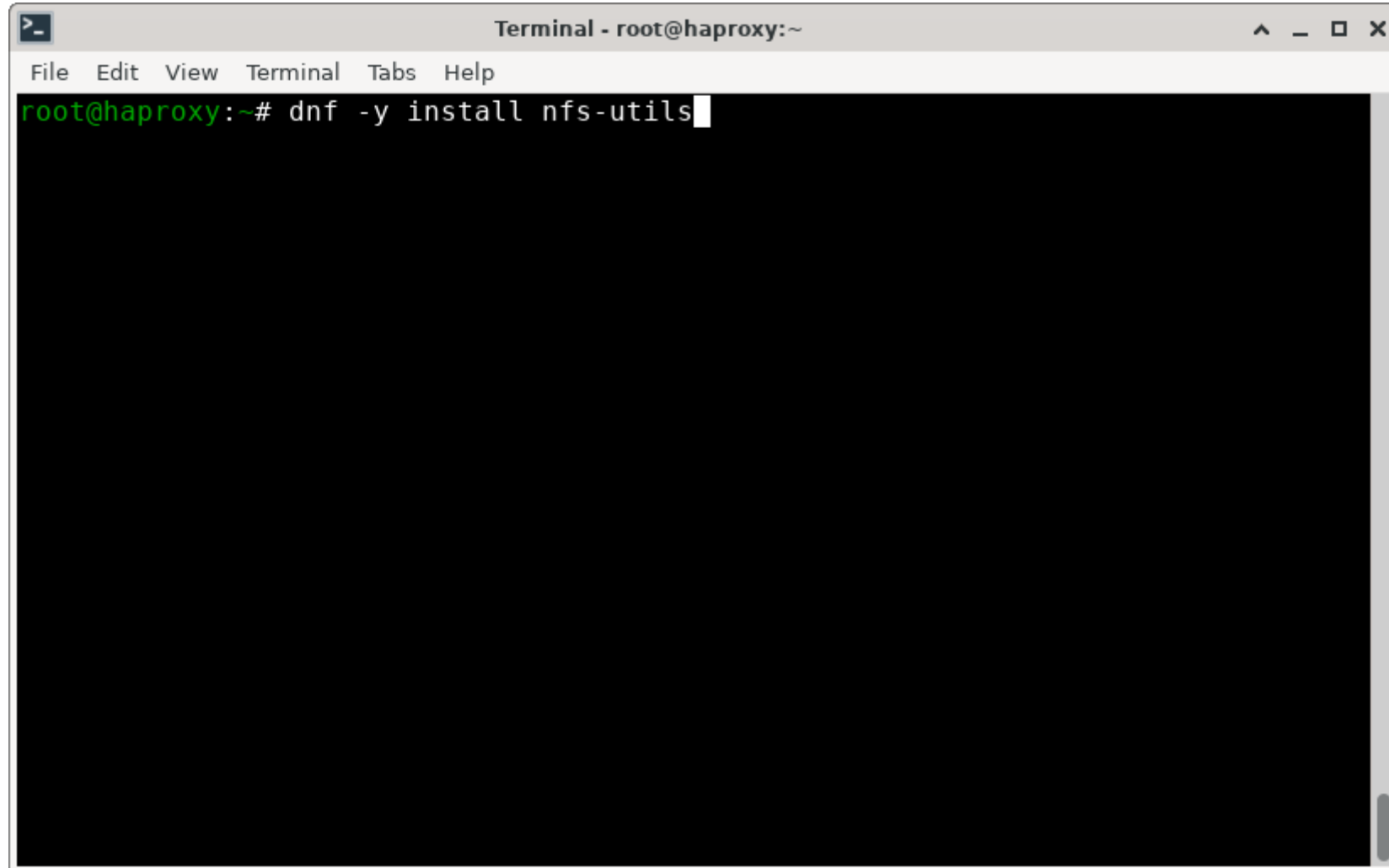


```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# tail -1 /etc/mtab
/dev/vdb1 /var/export ext4 rw,seclabel,relatime 0 0
root@haproxy:~# tail -1 /etc/mtab >> /etc/fstab
root@haproxy:~#
```

# NFS

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# cat /etc/fstab
#
# /etc/fstab
# Created by anaconda on Thu Apr 11 20:51:27 2024
#
# Accessible filesystems, by reference, are maintained under '/dev/disk/'.
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.
#
# After editing this file, run 'systemctl daemon-reload' to update systemd
# units generated from this file.
#
UUID=74050d47-aa78-42c5-8934-8fdb2f38ca37 / ext4 default
ts 1 1
UUID=c3b0a8b5-1f0c-4fba-8717-fb045328da47 /boot ext4 default
ts 1 2
/dev/vdb1 /var/export ext4 rw,seclabel,relatime 0 0
root@haproxy:~#
```

# NFS



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# dnf -y install nfs-utils
```

# NFS

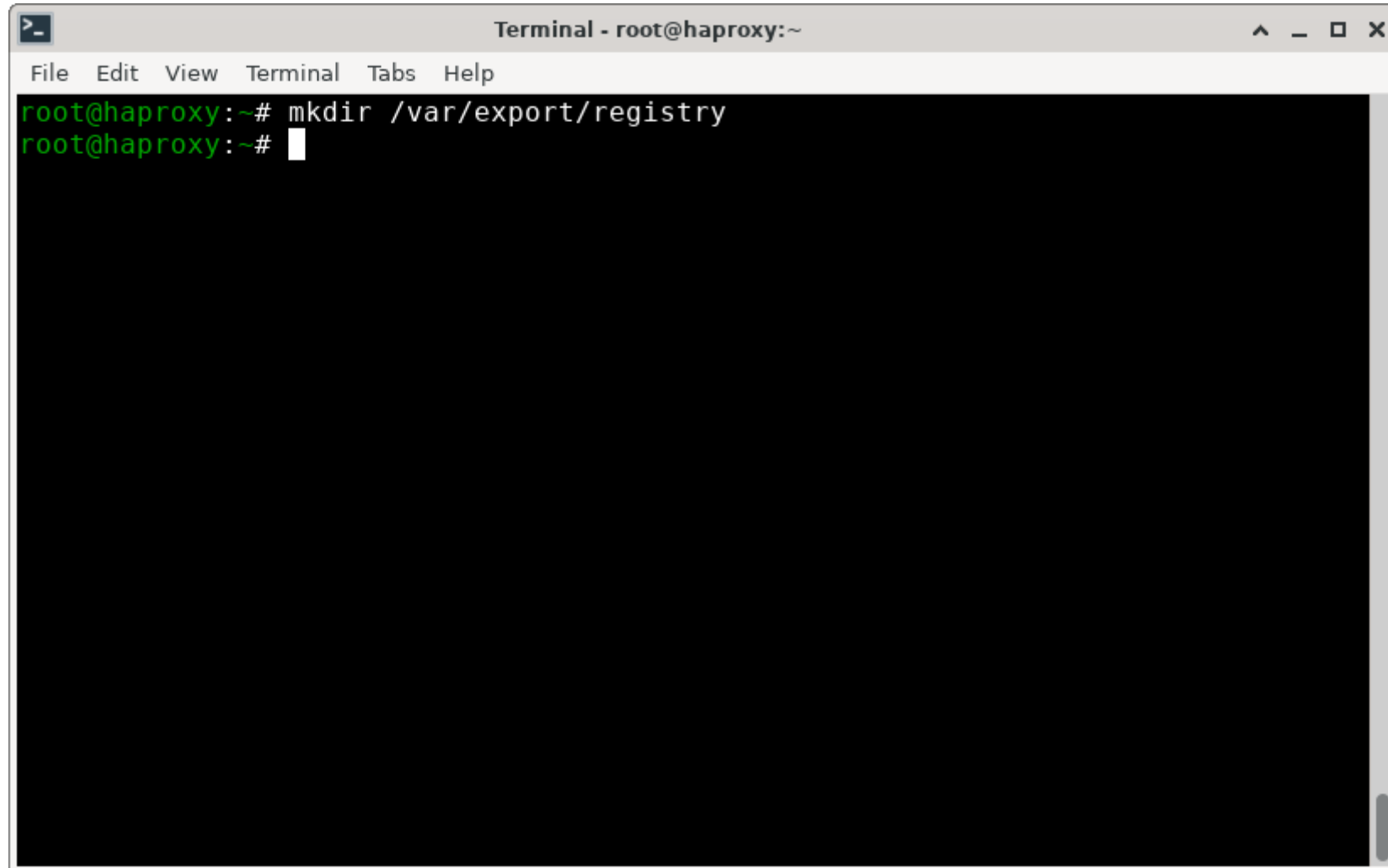
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
Running scriptlet: gssproxy-0.9.1-6.fc39.x86_64 4/5
Installing       : gssproxy-0.9.1-6.fc39.x86_64 4/5
Running scriptlet: gssproxy-0.9.1-6.fc39.x86_64 4/5
Running scriptlet: nfs-utils-1:2.6.4-0.rc5.fc39.x86_64 5/5
Installing       : nfs-utils-1:2.6.4-0.rc5.fc39.x86_64 5/5
Running scriptlet: nfs-utils-1:2.6.4-0.rc5.fc39.x86_64 5/5
Created symlink /etc/systemd/system/multi-user.target.wants/nfs-client.target →
/usr/lib/systemd/system/nfs-client.target.
Created symlink /etc/systemd/system/remote-fs.target.wants/nfs-client.target → /
usr/lib/systemd/system/nfs-client.target.

Verifying       : gssproxy-0.9.1-6.fc39.x86_64 1/5
Verifying       : libev-4.33-8.fc39.x86_64 2/5
Verifying       : libverto-libev-0.3.2-6.fc39.x86_64 3/5
Verifying       : nfs-utils-1:2.6.4-0.rc5.fc39.x86_64 4/5
Verifying       : rpcbind-1.2.6-4.rc3.fc39.x86_64 5/5

Installed:
gssproxy-0.9.1-6.fc39.x86_64      libev-4.33-8.fc39.x86_64
libverto-libev-0.3.2-6.fc39.x86_64  nfs-utils-1:2.6.4-0.rc5.fc39.x86_64
rpcbind-1.2.6-4.rc3.fc39.x86_64

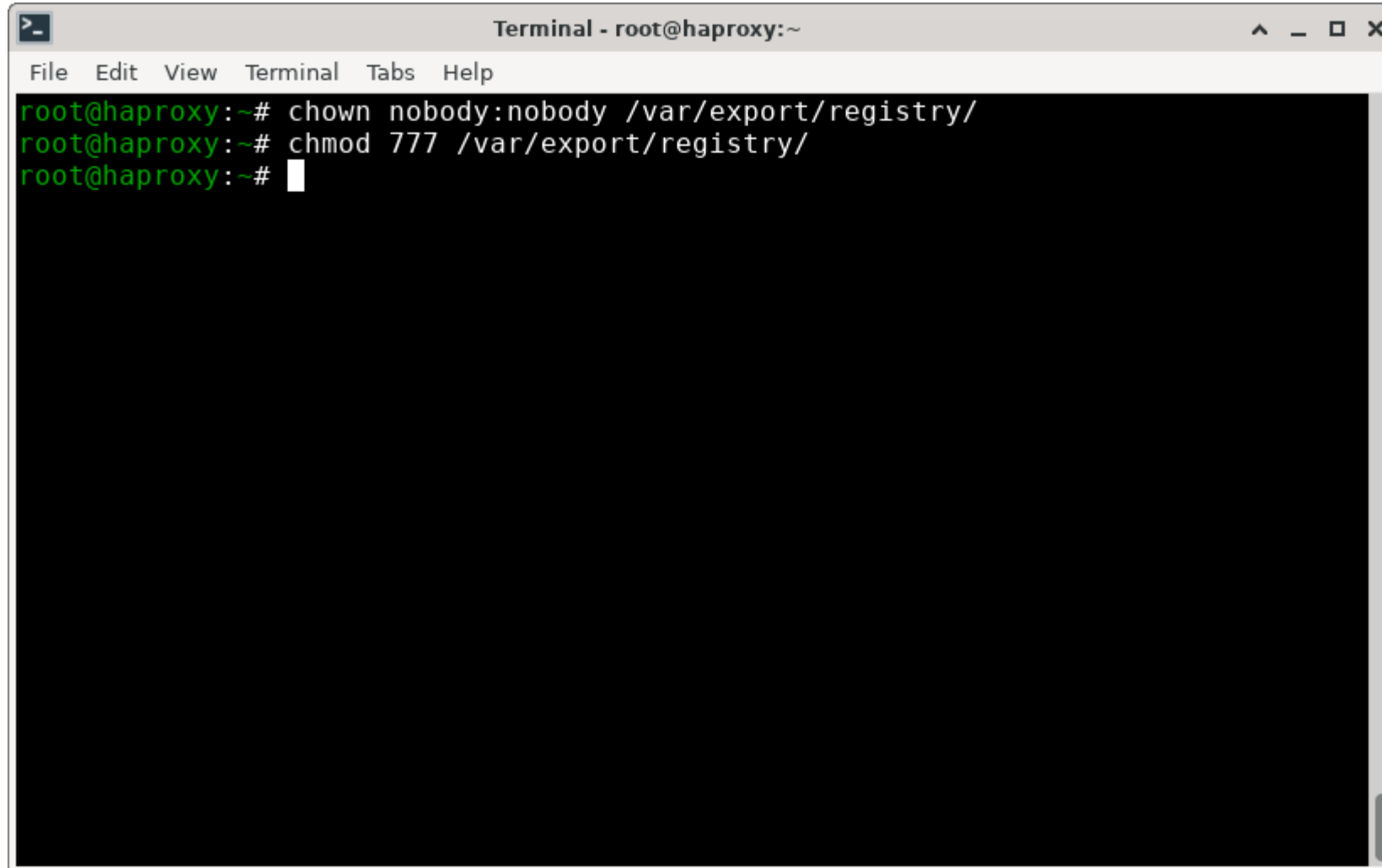
Complete!
root@haproxy:~#
```

# NFS



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# mkdir /var/export/registry
root@haproxy:~#
```

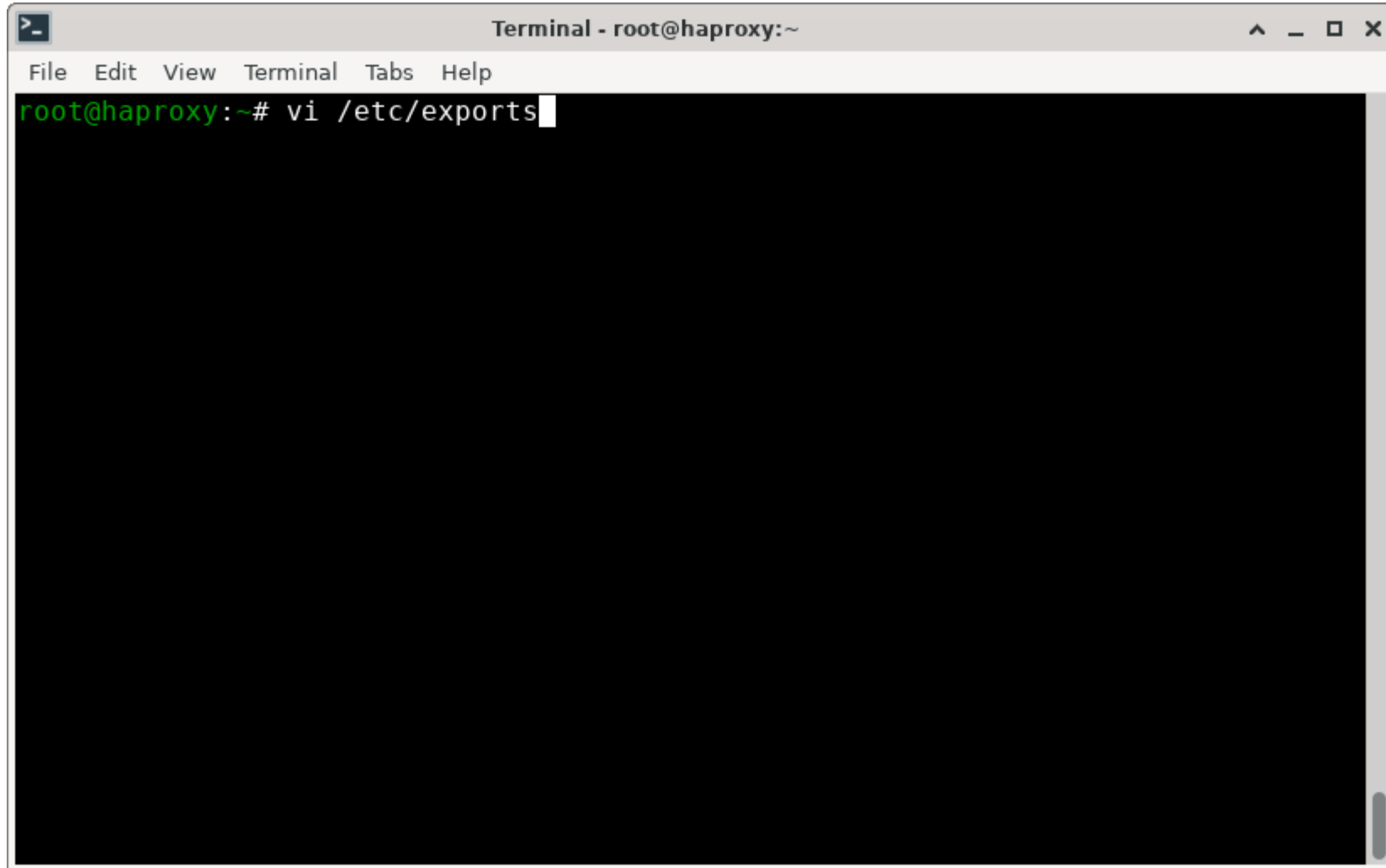
# NFS



A terminal window titled "Terminal - root@haproxy:~" with a menu bar containing "File", "Edit", "View", "Terminal", "Tabs", and "Help". The terminal content shows three lines of commands executed as root:

```
root@haproxy:~# chown nobody:nobody /var/export/registry/  
root@haproxy:~# chmod 777 /var/export/registry/  
root@haproxy:~#
```

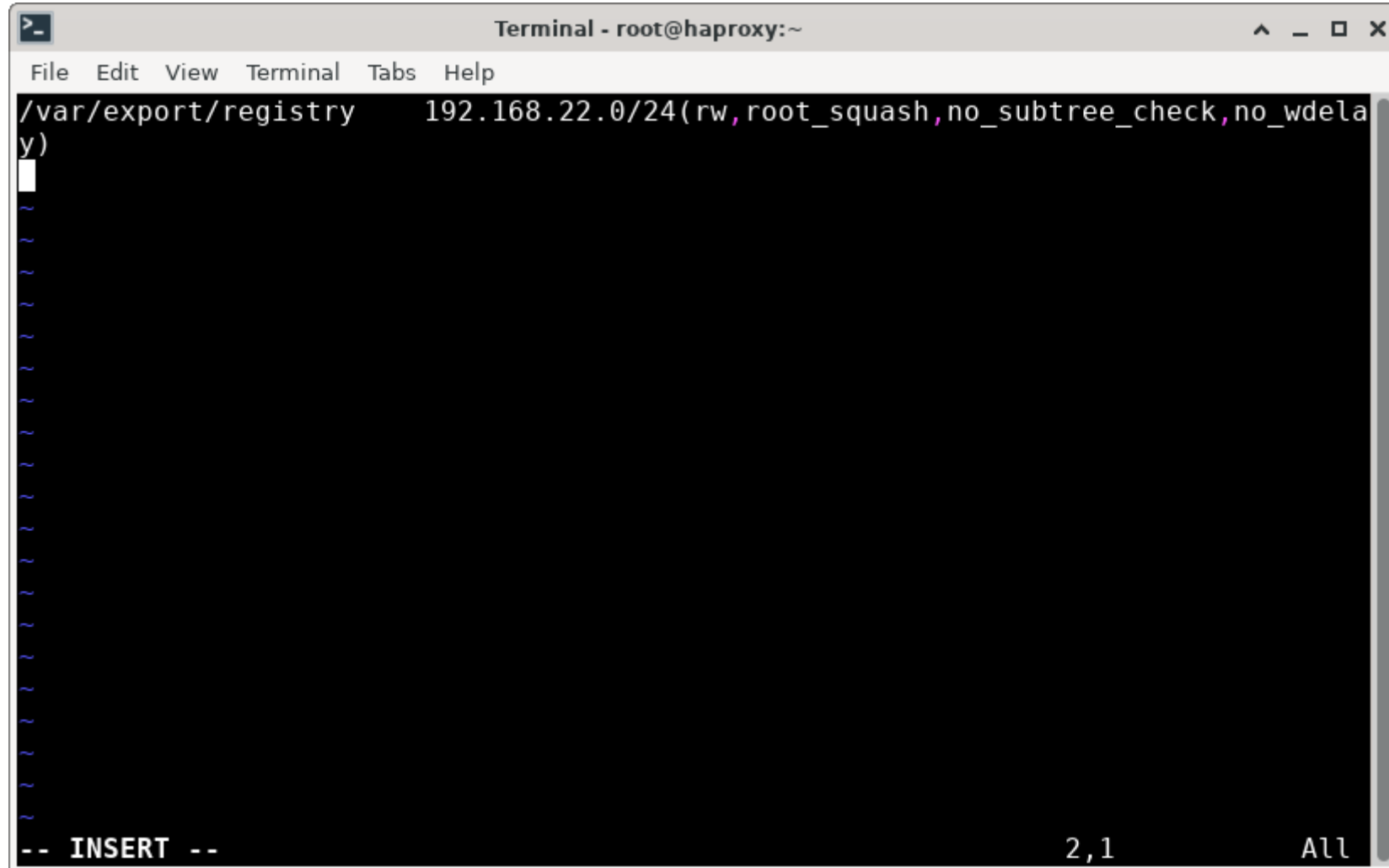
# NFS



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# vi /etc/exports
```

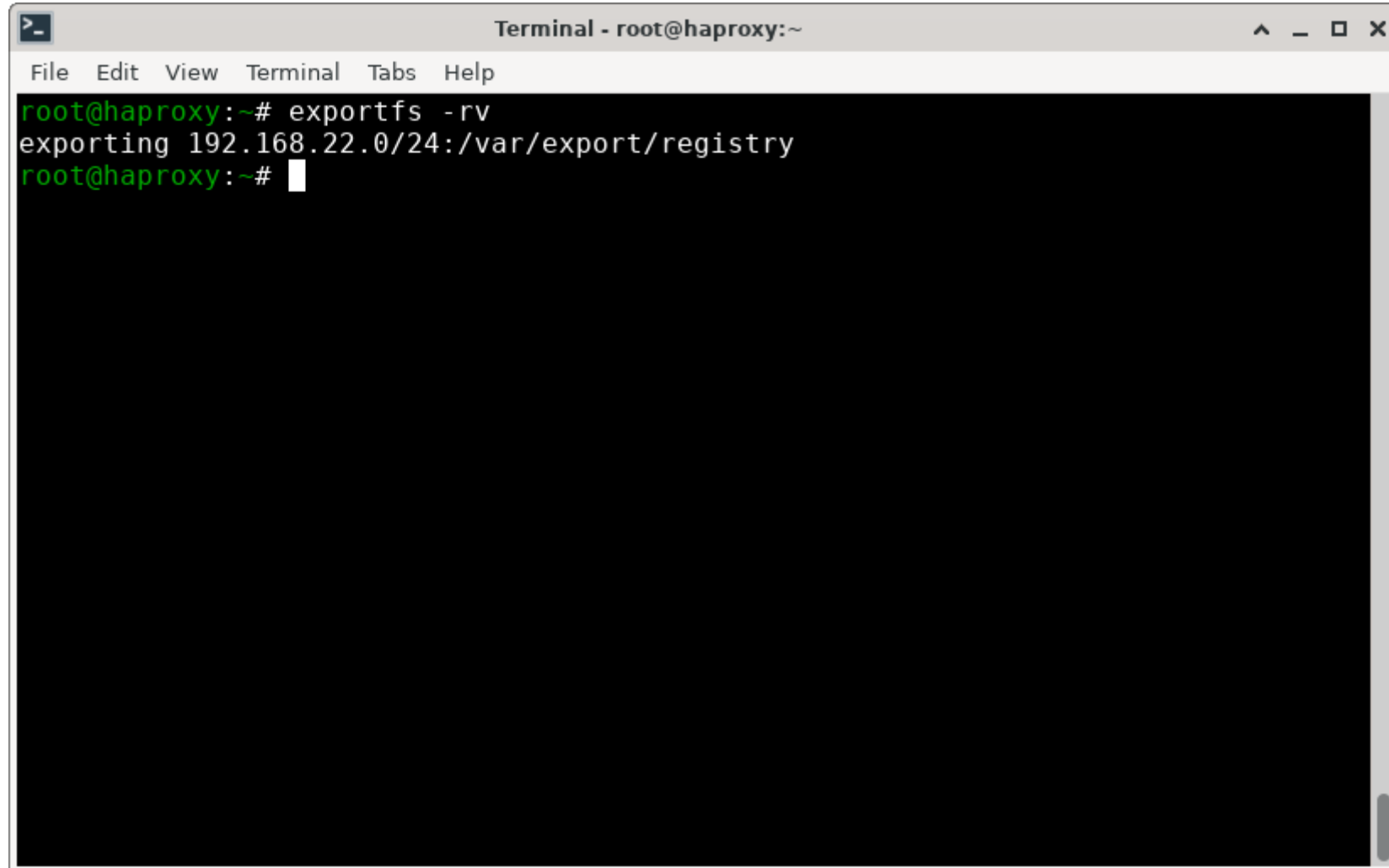


# NFS



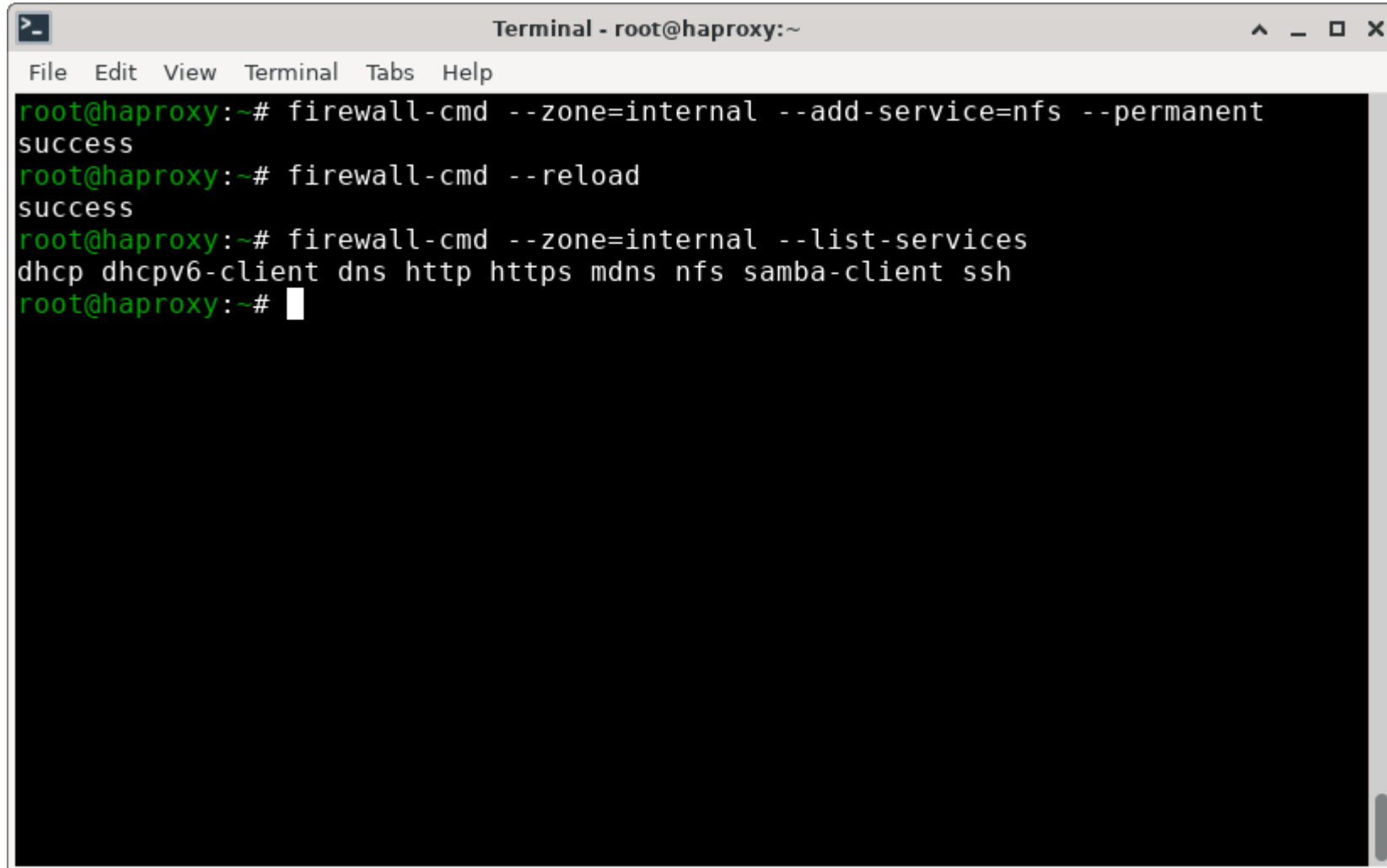
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
/var/export/registry 192.168.22.0/24(rw,root_squash,no_subtree_check,no_wdela
y)
-- INSERT --                               2,1                               All
```

# NFS



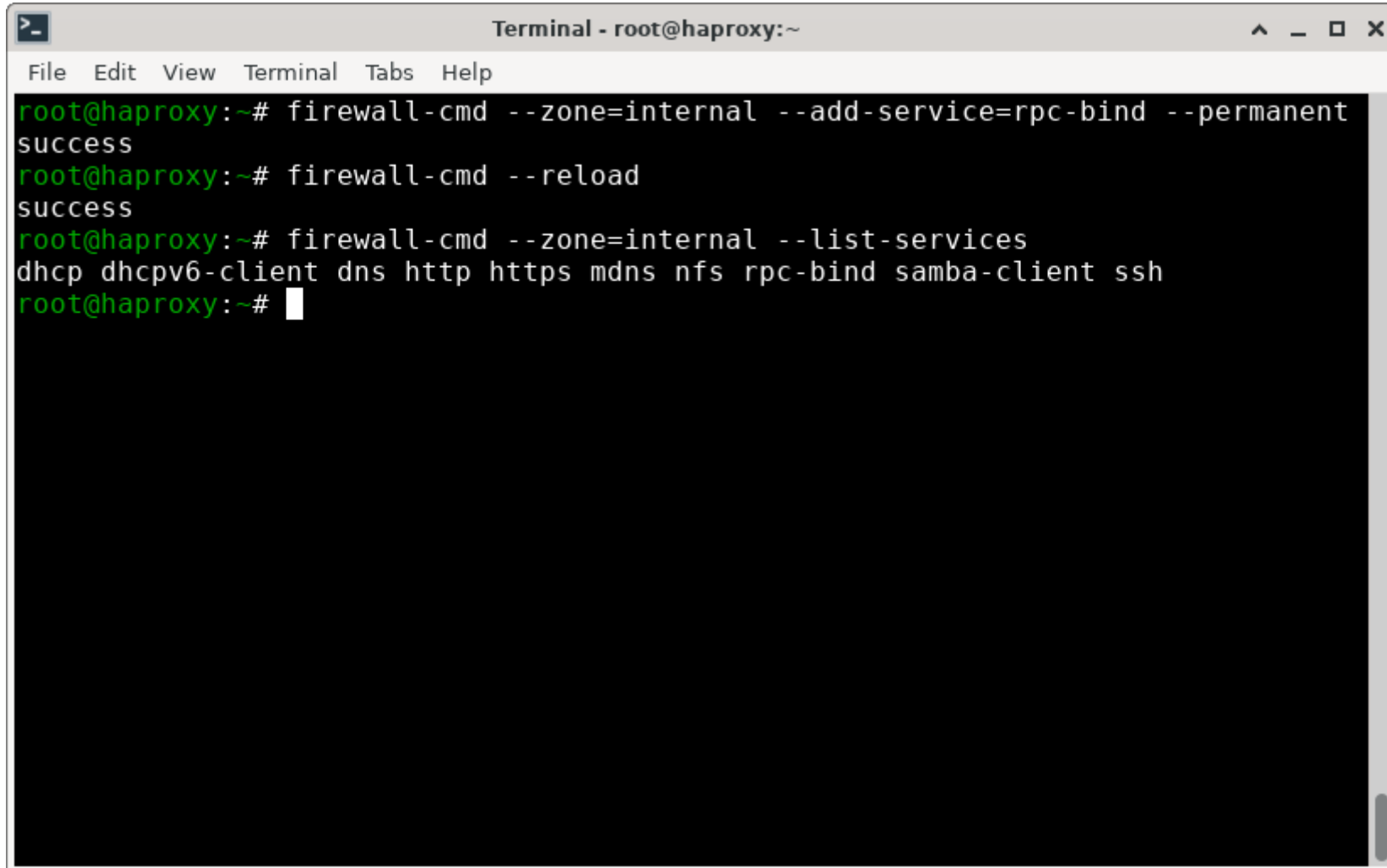
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# exportfs -rv
exporting 192.168.22.0/24:/var/export/registry
root@haproxy:~#
```

# NFS



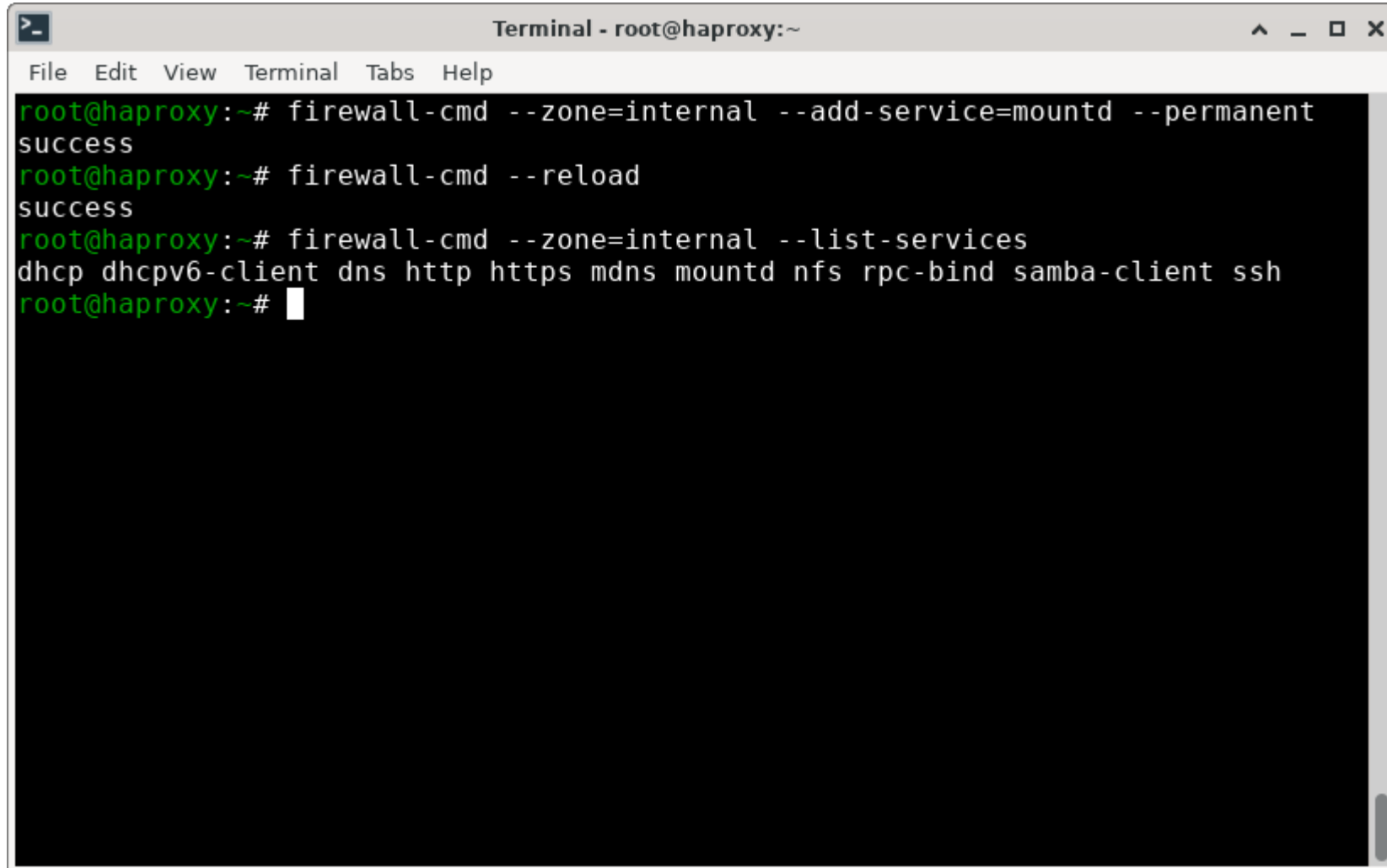
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# firewall-cmd --zone=internal --add-service=nfs --permanent
success
root@haproxy:~# firewall-cmd --reload
success
root@haproxy:~# firewall-cmd --zone=internal --list-services
dhcp dhcpv6-client dns http https mdns nfs samba-client ssh
root@haproxy:~#
```

# NFS



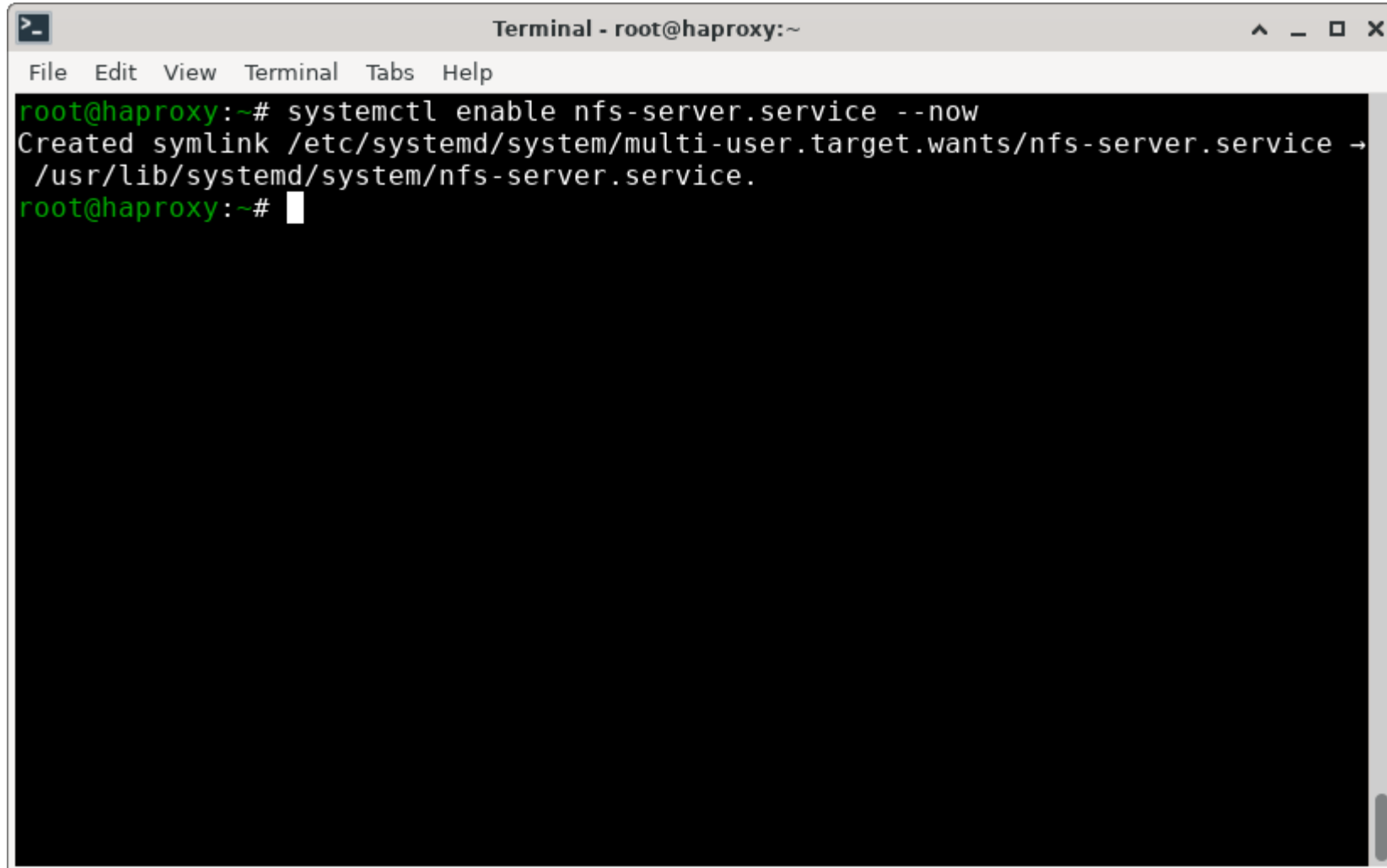
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# firewall-cmd --zone=internal --add-service=rpc-bind --permanent
success
root@haproxy:~# firewall-cmd --reload
success
root@haproxy:~# firewall-cmd --zone=internal --list-services
dhcp dhcpv6-client dns http https mdns nfs rpc-bind samba-client ssh
root@haproxy:~#
```

# NFS



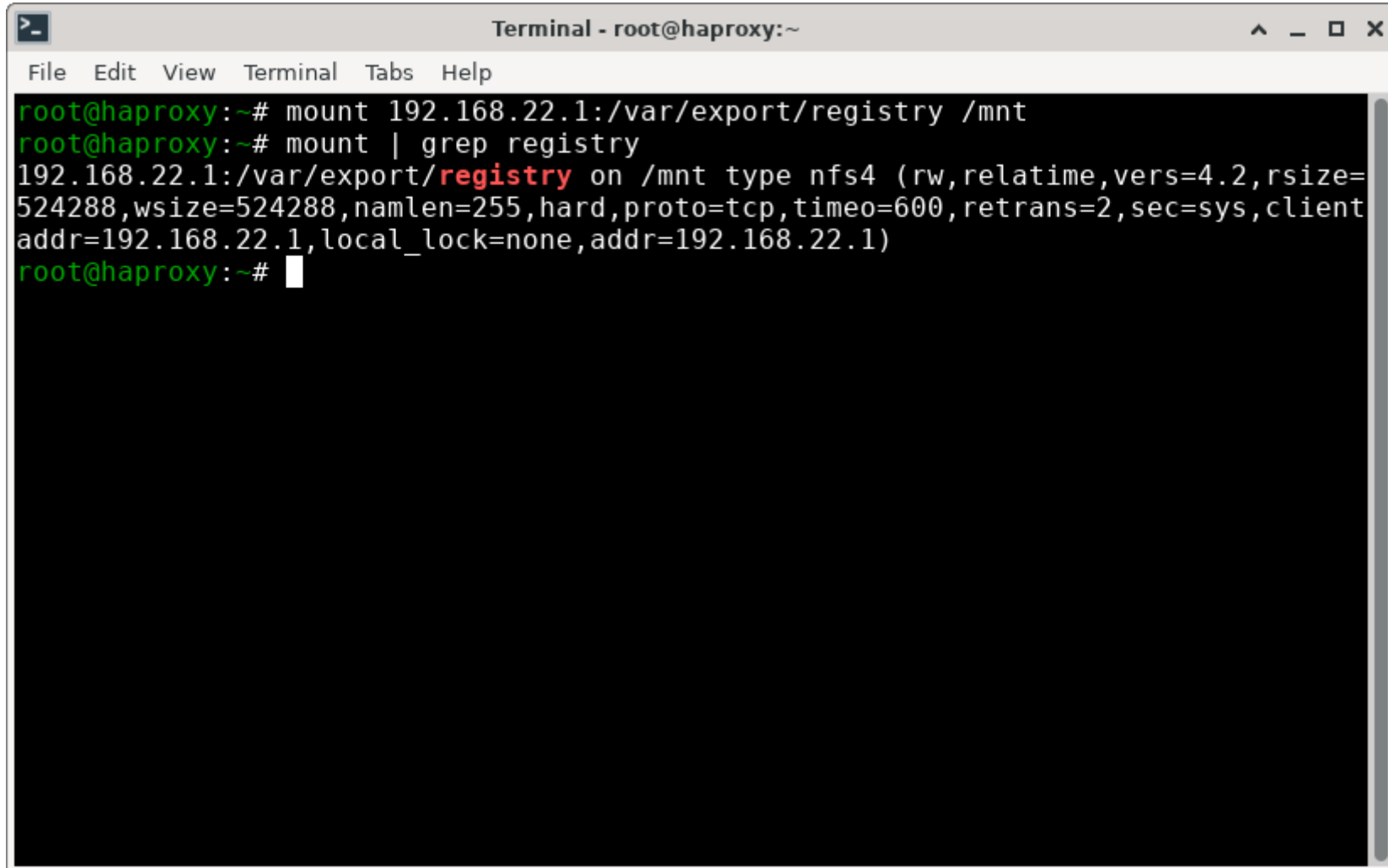
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# firewall-cmd --zone=internal --add-service=mountd --permanent
success
root@haproxy:~# firewall-cmd --reload
success
root@haproxy:~# firewall-cmd --zone=internal --list-services
dhcp dhcpv6-client dns http https mdns mountd nfs rpc-bind samba-client ssh
root@haproxy:~#
```

# NFS



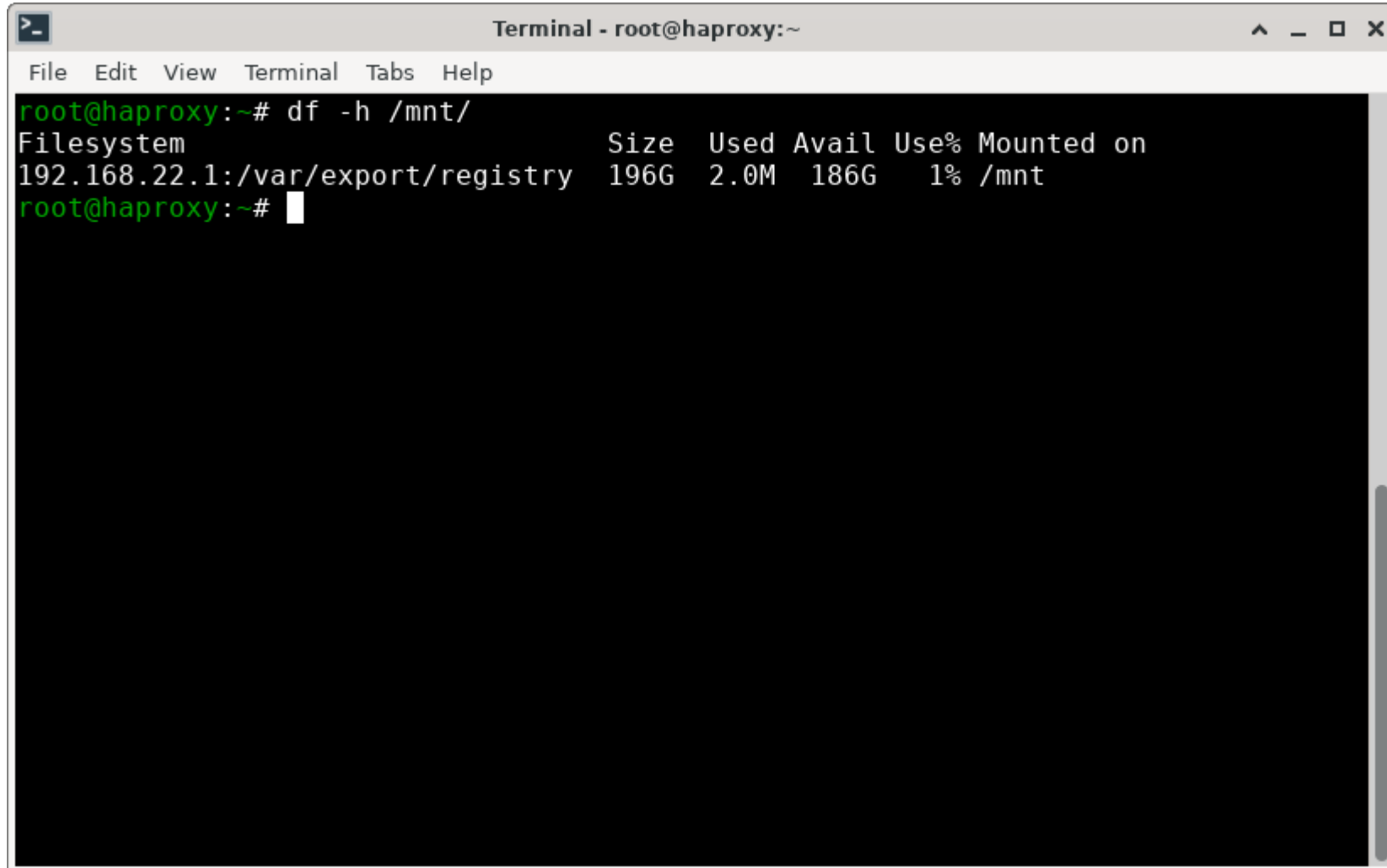
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# systemctl enable nfs-server.service --now
Created symlink /etc/systemd/system/multi-user.target.wants/nfs-server.service →
/usr/lib/systemd/system/nfs-server.service.
root@haproxy:~#
```

# NFS



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# mount 192.168.22.1:/var/export/registry /mnt
root@haproxy:~# mount | grep registry
192.168.22.1:/var/export/registry on /mnt type nfs4 (rw,relatime,vers=4.2,rsiz=
524288,wsiz=524288,namlen=255,hard,proto=tcp,timeo=600,retrans=2,sec=sys,client
addr=192.168.22.1,local_lock=none,addr=192.168.22.1)
root@haproxy:~#
```

# NFS

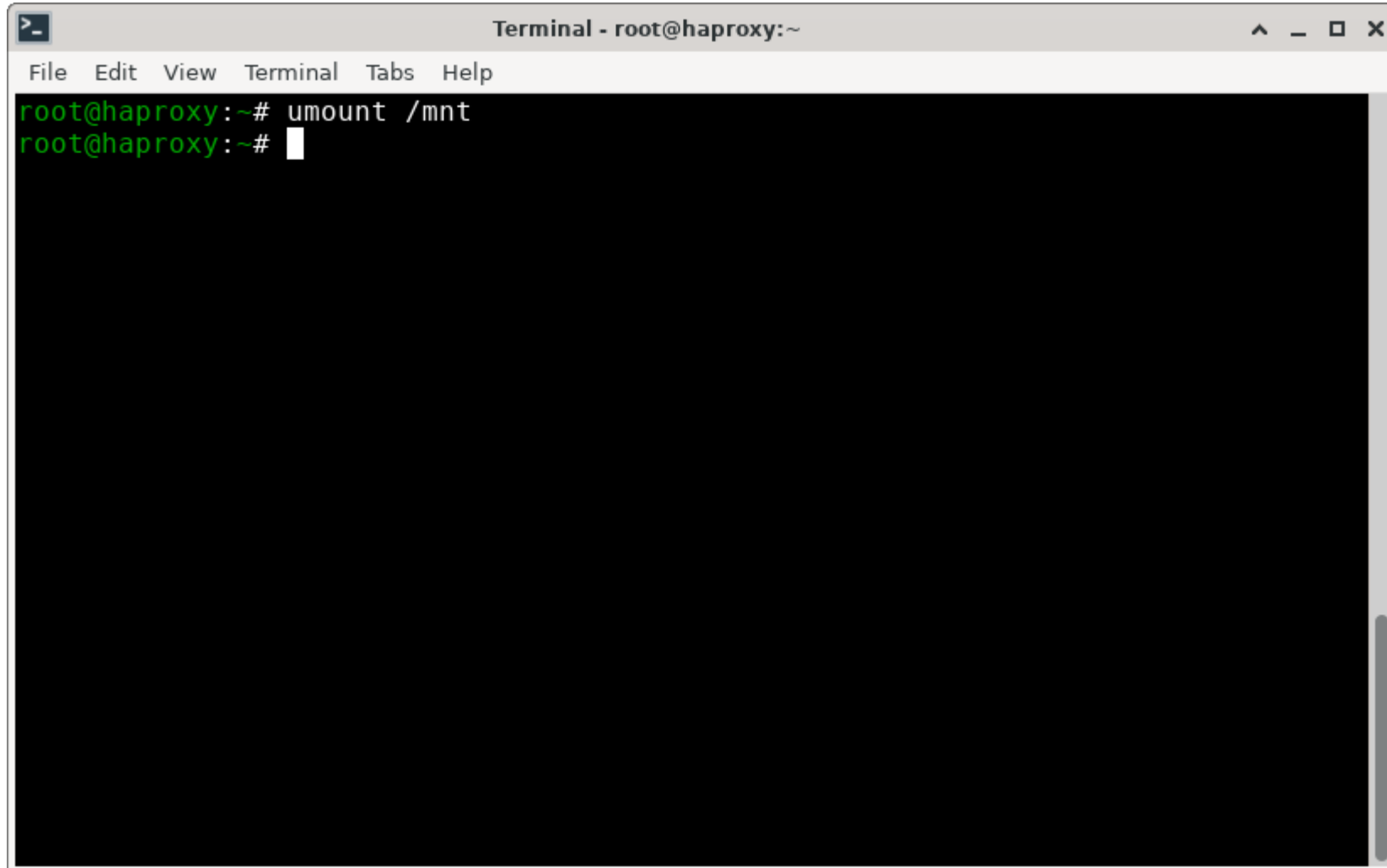


A terminal window titled "Terminal - root@haproxy:~" showing the output of the command `df -h /mnt/`. The output is a table with columns: Filesystem, Size, Used, Avail, Use%, and Mounted on. The data row shows: 192.168.22.1:/var/export/registry, 196G, 2.0M, 186G, 1%, /mnt. The prompt `root@haproxy:~#` is visible at the end of the line.

```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# df -h /mnt/
Filesystem                Size  Used Avail Use% Mounted on
192.168.22.1:/var/export/registry 196G  2.0M 186G   1% /mnt
root@haproxy:~#
```



# NFS



```
Terminal - root@haproxy:~  
File Edit View Terminal Tabs Help  
root@haproxy:~# umount /mnt  
root@haproxy:~#
```

# Download the client and installer

- Download the installation and client software
  - openshift-client-linux
  - openshift-install-linux
- I used my desktop machine to download the client and installer

Releases Tags Find a release

Mar 10

vrutkovs

4.15.0-0.okd-...  
e03dd17

Compare

# 4.15.0-0.okd-2024-03-10-010116 Latest

## Client tools for OpenShift

These archives contain the client tooling for [OpenShift](#).

To verify the contents of this directory, use the 'gpg' and 'shasum' tools to ensure the archives you have downloaded match those published from this location.

The openshift-install binary has been preconfigured to install the following release:

```
Name: 4.15.0-0.okd-2024-03-10-010116
Digest: sha256:46b462be1e4c15ce5ab5fba97e713e8824bbb9f614ac5abe1be41fda916920cc
Created: 2024-03-10T06:53:44Z
OS/Arch: linux/amd64
Manifests: 707
Metadata files: 1

Pull From: quay.io/openshift/okd@sha256:46b462be1e4c15ce5ab5fba97e713e8824bbb9f614ac5abe1be41fda916920cc

Release Metadata:
Version: 4.15.0-0.okd-2024-03-10-010116
Upgrades: <none>
Metadata:
```

```
cluster-machine-approver quay.io/openshift/okd-content@sha256:a4999452f126c8591aae  
cluster-monitoring-operator quay.io/openshift/okd-content@sha256:cbbd5af3d21d4df519ac  
cluster-network-operator quay.io/openshift/okd-content@sha256:e97313025e336f52e6ae  
c...
```

[Read more](#)

▼ **Assets** 15

<a href="#">ccocctl-linux-4.15.0-0.okd-2024-03-10-010116.tar.gz</a>	34.7 MB	Mar 10
<a href="#">openshift-client-linux-4.15.0-0.okd-2024-03-10-010116.tar.gz</a>	62.4 MB	Mar 10
<a href="#">openshift-client-linux-arm64-4.15.0-0.okd-2024-03-10-010116.tar.gz</a>	48.8 MB	Mar 10
<a href="#">openshift-client-mac-4.15.0-0.okd-2024-03-10-010116.tar.gz</a>	52.1 MB	Mar 10
<a href="#">openshift-client-mac-arm64-4.15.0-0.okd-2024-03-10-010116.tar.gz</a>	50.4 MB	Mar 10
<a href="#">openshift-client-windows-4.15.0-0.okd-2024-03-10-010116.zip</a>	51.2 MB	Mar 10
<a href="#">openshift-install-linux-4.15.0-0.okd-2024-03-10-010116.tar.gz</a>	419 MB	Mar 10
<a href="#">openshift-install-linux-arm64-4.15.0-0.okd-2024-03-10-010116.tar.gz</a>	372 MB	Mar 10
<a href="#">openshift-install-mac-4.15.0-0.okd-2024-03-10-010116.tar.gz</a>	442 MB	Mar 10
<a href="#">openshift-install-mac-arm64-4.15.0-0.okd-2024-03-10-010116.tar.gz</a>	426 MB	Mar 10
<a href="#">release.txt</a>	30.3 KB	Mar 10
<a href="#">sha256sum.txt</a>	1.33 KB	Mar 10
<a href="#">sha256sum.txt.asc</a>	488 Bytes	Mar 10
<a href="#">Source code (zip)</a>		Mar 7
<a href="#">Source code (tar.gz)</a>		Mar 7

4 people reacted

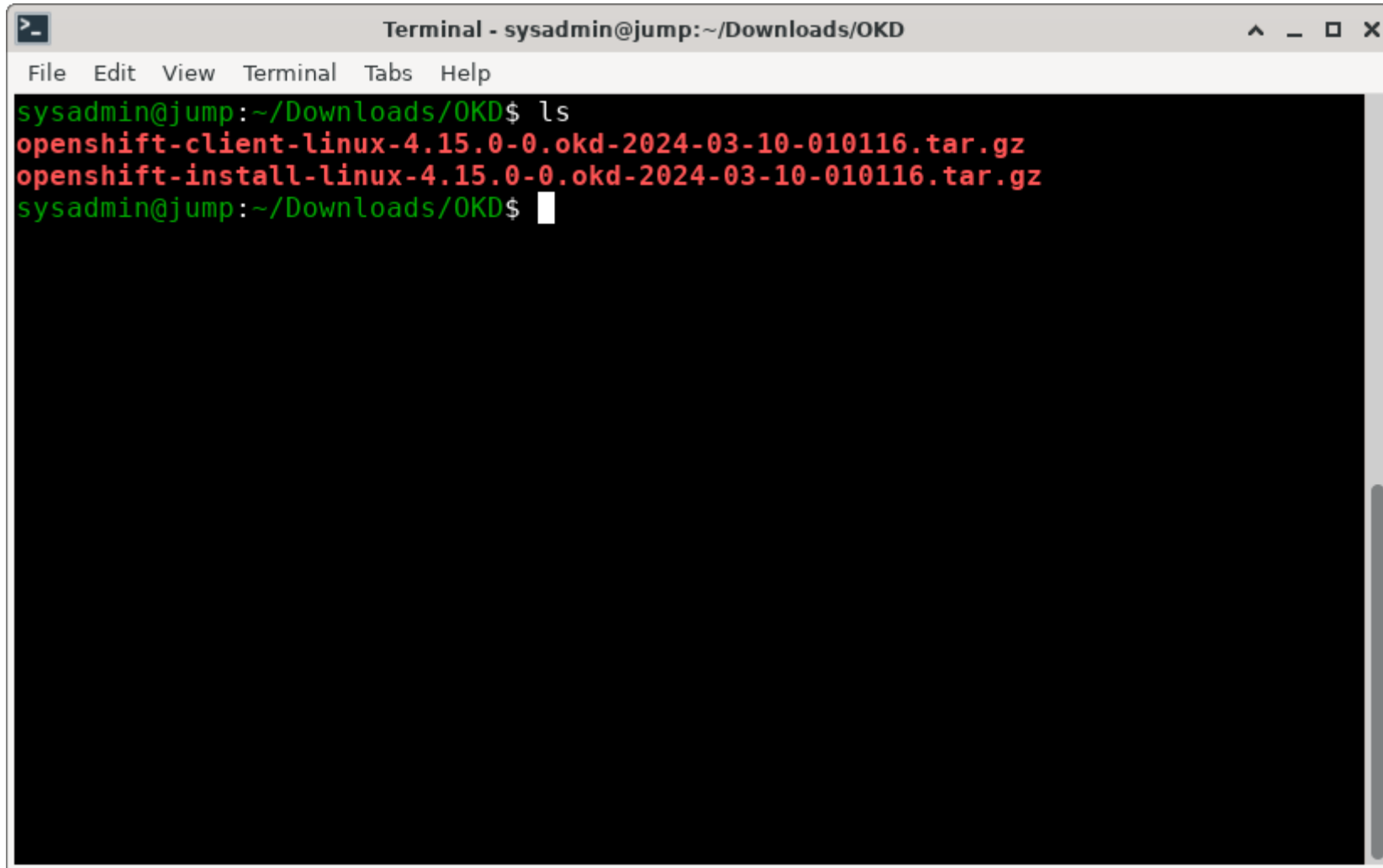
1 Join discussion

Feb 25

vrutkovs

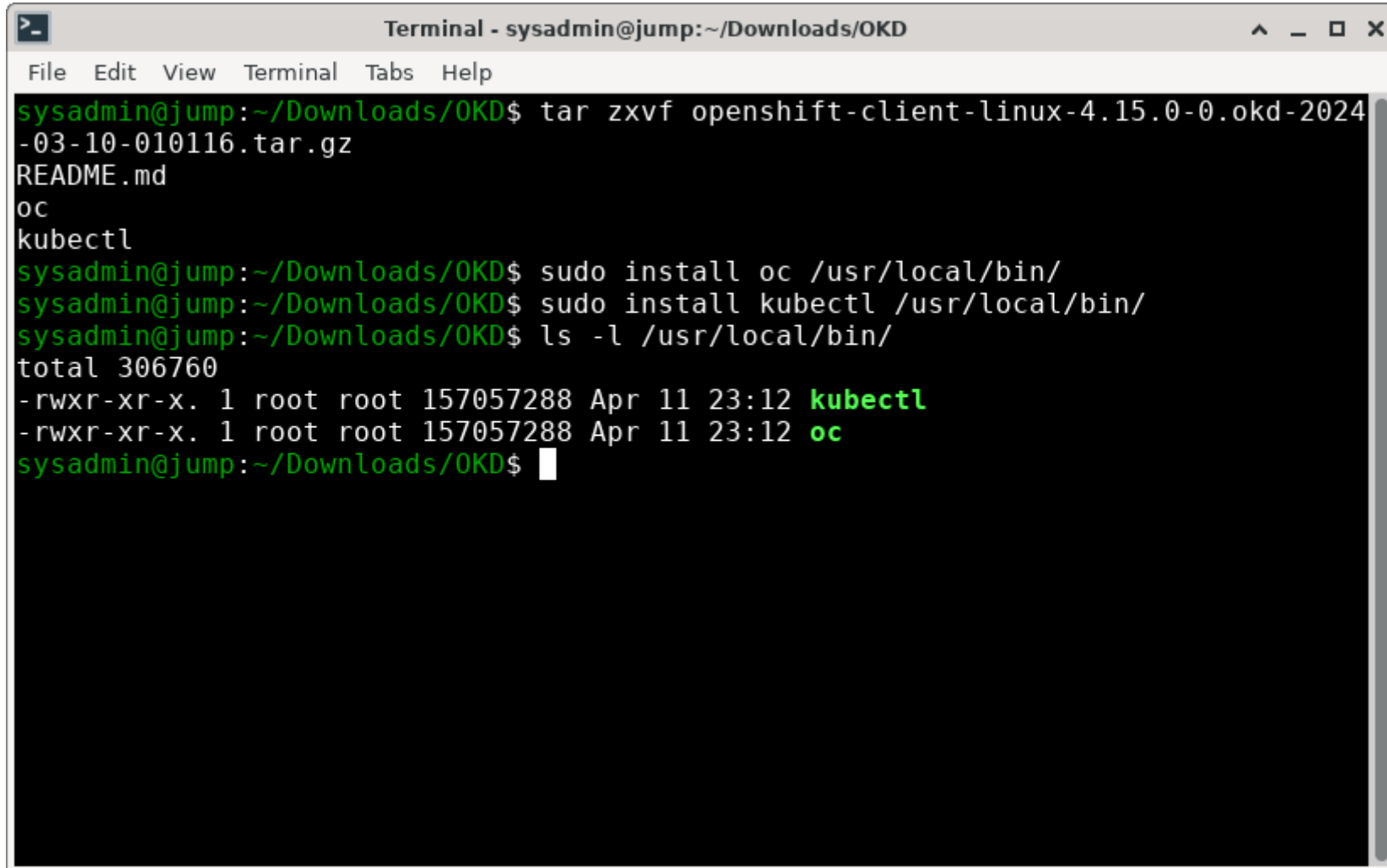
## 4.15.0-0.okd-2024-02-23-163410

# Client and Install



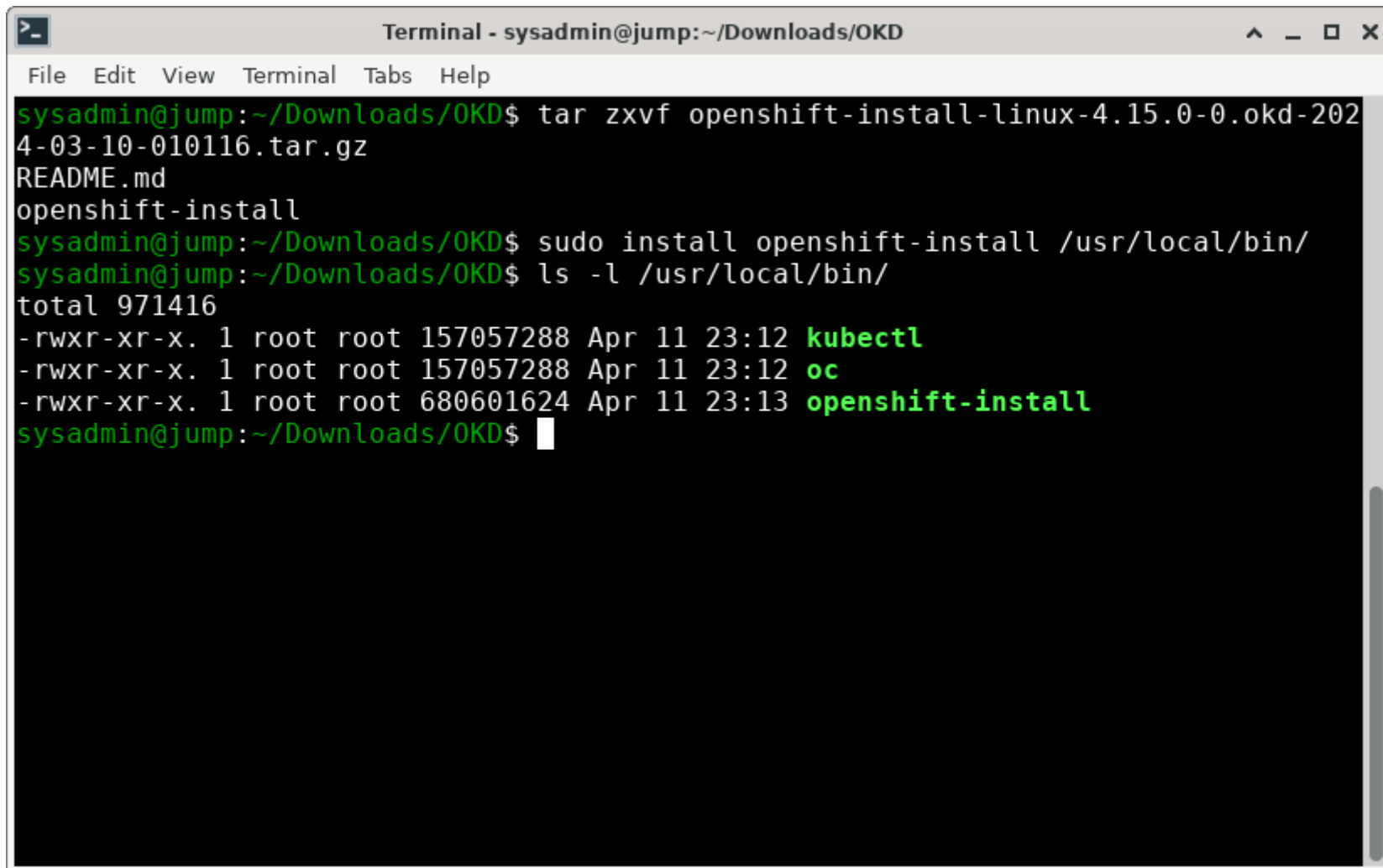
```
Terminal - sysadmin@jump:~/Downloads/OKD
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads/OKD$ ls
openshift-client-linux-4.15.0-0.okd-2024-03-10-010116.tar.gz
openshift-install-linux-4.15.0-0.okd-2024-03-10-010116.tar.gz
sysadmin@jump:~/Downloads/OKD$
```

# Client and Install



```
Terminal - sysadmin@jump:~/Downloads/OKD
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads/OKD$ tar zxvf openshift-client-linux-4.15.0-0.okd-2024-03-10-010116.tar.gz
README.md
oc
kubectl
sysadmin@jump:~/Downloads/OKD$ sudo install oc /usr/local/bin/
sysadmin@jump:~/Downloads/OKD$ sudo install kubectl /usr/local/bin/
sysadmin@jump:~/Downloads/OKD$ ls -l /usr/local/bin/
total 306760
-rwxr-xr-x. 1 root root 157057288 Apr 11 23:12 kubectl
-rwxr-xr-x. 1 root root 157057288 Apr 11 23:12 oc
sysadmin@jump:~/Downloads/OKD$
```

# Client and Install



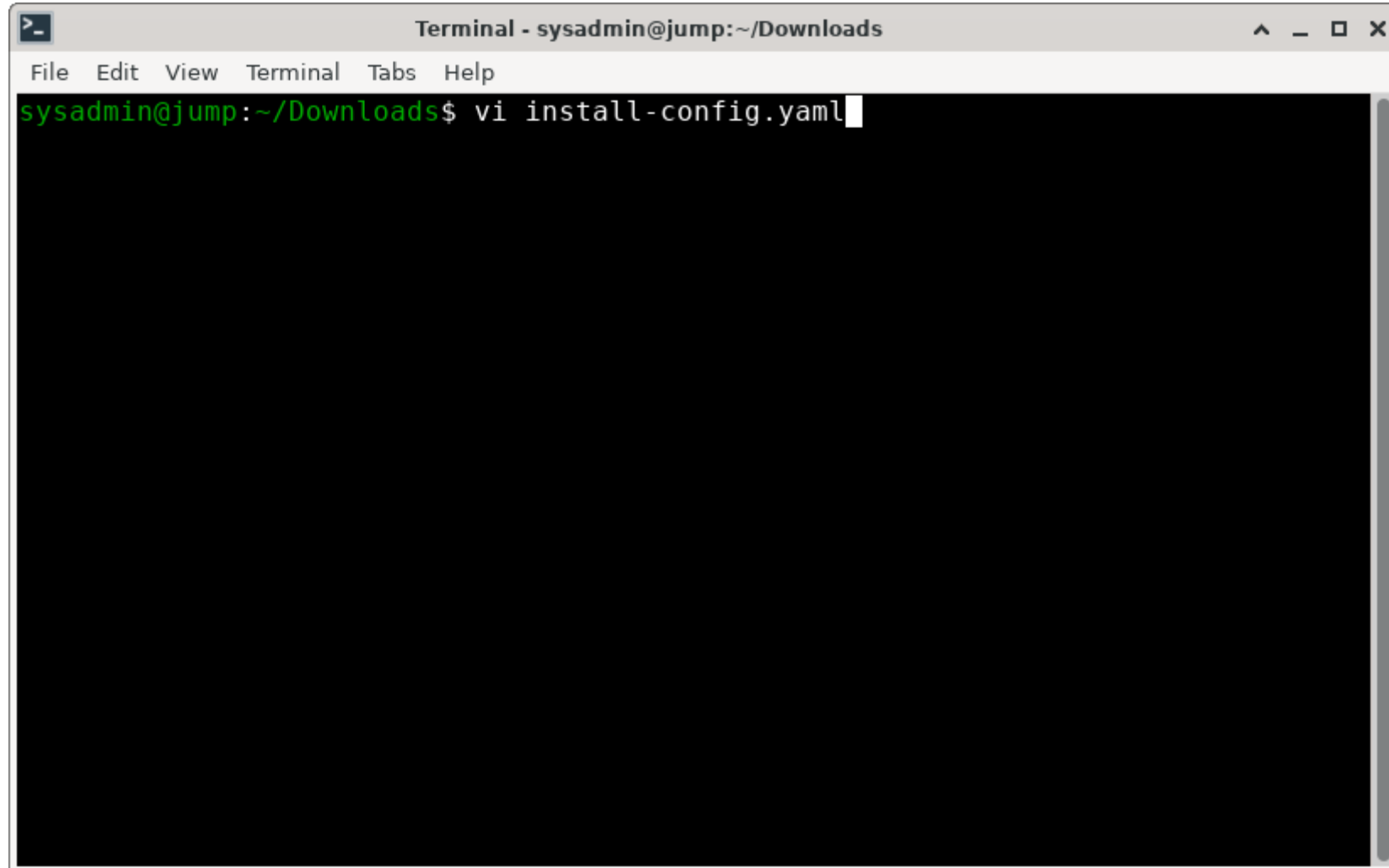
```
Terminal - sysadmin@jump:~/Downloads/OKD
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads/OKD$ tar zxvf openshift-install-linux-4.15.0-0.okd-2024-03-10-010116.tar.gz
README.md
openshift-install
sysadmin@jump:~/Downloads/OKD$ sudo install openshift-install /usr/local/bin/
sysadmin@jump:~/Downloads/OKD$ ls -l /usr/local/bin/
total 971416
-rwxr-xr-x. 1 root root 157057288 Apr 11 23:12 kubectl
-rwxr-xr-x. 1 root root 157057288 Apr 11 23:12 oc
-rwxr-xr-x. 1 root root 680601624 Apr 11 23:13 openshift-install
sysadmin@jump:~/Downloads/OKD$
```

# Create the install- config.yaml file

- You can download the template from the documentation site:  
<https://github.com/openshift/installer/blob/master/docs/user/customization.md>
- I used the one from Ryan's repository, and modified it a little bit for OKD vs. OpenShift



# install-config.yaml



A terminal window titled "Terminal - sysadmin@jump:~/Downloads" with a menu bar containing "File", "Edit", "View", "Terminal", "Tabs", and "Help". The terminal shows the command `sysadmin@jump:~/Downloads$ vi install-config.yaml` being entered at the prompt. The rest of the terminal area is black.

# install-config.yaml

```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
apiVersion: v1
baseDomain: okd.lan
compute:
  - hyperthreading: Enabled
    name: worker
    replicas: 0 # Must be set to 0 for User Provisioned Installation as worker nodes will be manually deployed.
controlPlane:
  hyperthreading: Enabled
  name: master
  replicas: 3
metadata:
  name: lab # Cluster name
networking:
  clusterNetwork:
    - cidr: 10.128.0.0/14
      hostPrefix: 23
  networkType: OVNKubernetes
  serviceNetwork:
    - 172.30.0.0/16
platform:
  none: {}
fips: false
1,1 Top
```

# Grab your pull secret

- You **can** create a pull secret at <https://console.redhat.com/openshift/install/pull-secret> but it will register your cluster to Red Hat!
- Instead, you can use the string `{"auths":{"fake":{"auth":"aWQ6cGFzcwo="}}}` into your `install-configure.yaml` to bypass registration.

[README](#) [Code of conduct](#) [Apache-2.0 license](#) [Security](#)

Extract the downloaded tarballs and copy the binaries into your PATH. Then run the following from an empty directory:

```
$ openshift-install create cluster
```

You'll be prompted to choose a platform to install to - AWS is currently the best place to start with OKD4 while we get Fedora CoreOS machine images set up in the other clouds.

You will need to have cloud credentials set in your shell properly before installation. You must have permission to configure the appropriate cloud resources from that account (such as VPCs, instances, and DNS records). You must have already configured a public DNS zone on your chosen cloud before the install starts.

You will also be prompted for a pull-secret that will be made available to all of of your machines - for OKD4 you should either paste the pull-secret you use for your registry, or paste `{"auths":{"fake":{"auth":"aWQ6cGFzcwo="}}}` to bypass the required value check (see [bug #182](#)).

Once the install completes successfully (usually 30m on AWS) the console URL and an admin username and password will be printed. If your DNS records were correct, you should be able to log in to your new OKD4 cluster!

To undo the installation and delete any cloud resources created by the installer, run

```
$ openshift-install destroy cluster
```

[Learn more about the installer](#)

The OpenShift client tools for your cluster can be downloaded from the web console.

## Features

- A fully automated distribution of Kubernetes on all major clouds and bare metal, OpenStack, and other virtualization providers
  - Easily build applications with integrated service discovery and persistent storage.
  - Quickly and easily scale applications to handle periods of increased demand.
    - Support for automatic high availability, load balancing, health checking, and failover.
  - Access to the Operator Hub for extending Kubernetes with new, automated lifecycle capabilities
- Developer centric tooling and console for building containerized applications on Kubernetes
  - Push source code to your Git repository and automatically deploy containerized applications

# Pull secret

```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
compute:
- hyperthreading: Enabled
  name: worker
  replicas: 0 # Must be set to 0 for User Provisioned Installation as worker nodes will be manually deployed.
ControlPlane:
  hyperthreading: Enabled
  name: master
  replicas: 3
metadata:
  name: lab # Cluster name
networking:
  clusterNetwork:
    - cidr: 10.128.0.0/14
      hostPrefix: 23
  networkType: OVNKubernetes
  serviceNetwork:
    - 172.30.0.0/16
platform:
  none: {}
fips: false
pullSecret: '{"auths":{"fake":{"auth":"aWQ6cGFzcwo="}}}'
@@@
7,1 66%
```

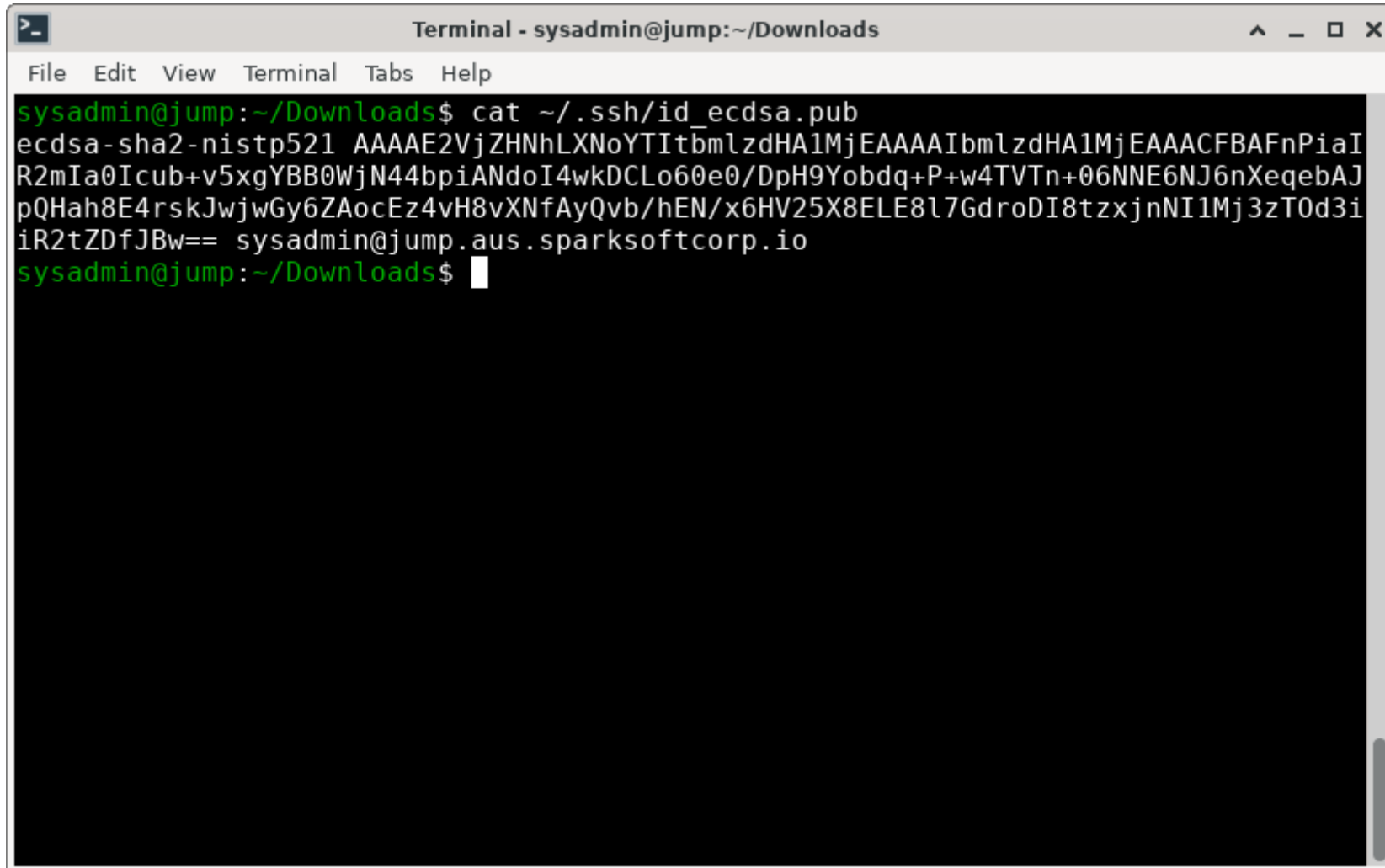
# Create an ssh key

- Use `ssh-keygen -t ecdsa -b 521`

# ssh-keygen

```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ ssh-keygen -t ecdsa -b 521
Generating public/private ecdsa key pair.
Enter file in which to save the key (/home/sysadmin/.ssh/id_ecdsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/sysadmin/.ssh/id_ecdsa
Your public key has been saved in /home/sysadmin/.ssh/id_ecdsa.pub
The key fingerprint is:
SHA256:FLbxL8SkgnKwjjeq6GX2luzNzeK8WdV4NdWgGfSKwh2Q sysadmin@jump.aus.sparksoftco
rp.io
The key's randomart image is:
+---[ECDSA 521]---+
| .      + E..+...|
| = . . @ oo *..|
| + + . + * .* 0 |
| . 0   0...0. . |
| .      ..So...  |
| ..   0.    ..   |
| ... 0. .      |
| .0  .=.+      |
|+.  o0.o.      |
+-----[SHA256]-----+
sysadmin@jump:~/Downloads$
```

# ssh-keygen



```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ cat ~/.ssh/id_ecdsa.pub
ecdsa-sha2-nistp521 AAAAE2VjZHNhLXNoYTItbmlzdHA1MjEAAAABImlzdHA1MjEAAACFBABnPiAI
R2mIa0Icub+v5xgYBB0WjN44bpiANdoI4wkDCLo60e0/DpH9Yobdq+P+w4TVTn+06NNE6NJ6nXegebAJ
pQHah8E4rskJwjwGy6ZAocEz4vH8vXNfAyQvb/hEN/x6HV25X8ELE8l7GdroDI8tzxjnNI1Mj3zT0d3i
iR2tZDfJBw== sysadmin@jump.aus.sparksoftcorp.io
sysadmin@jump:~/Downloads$
```



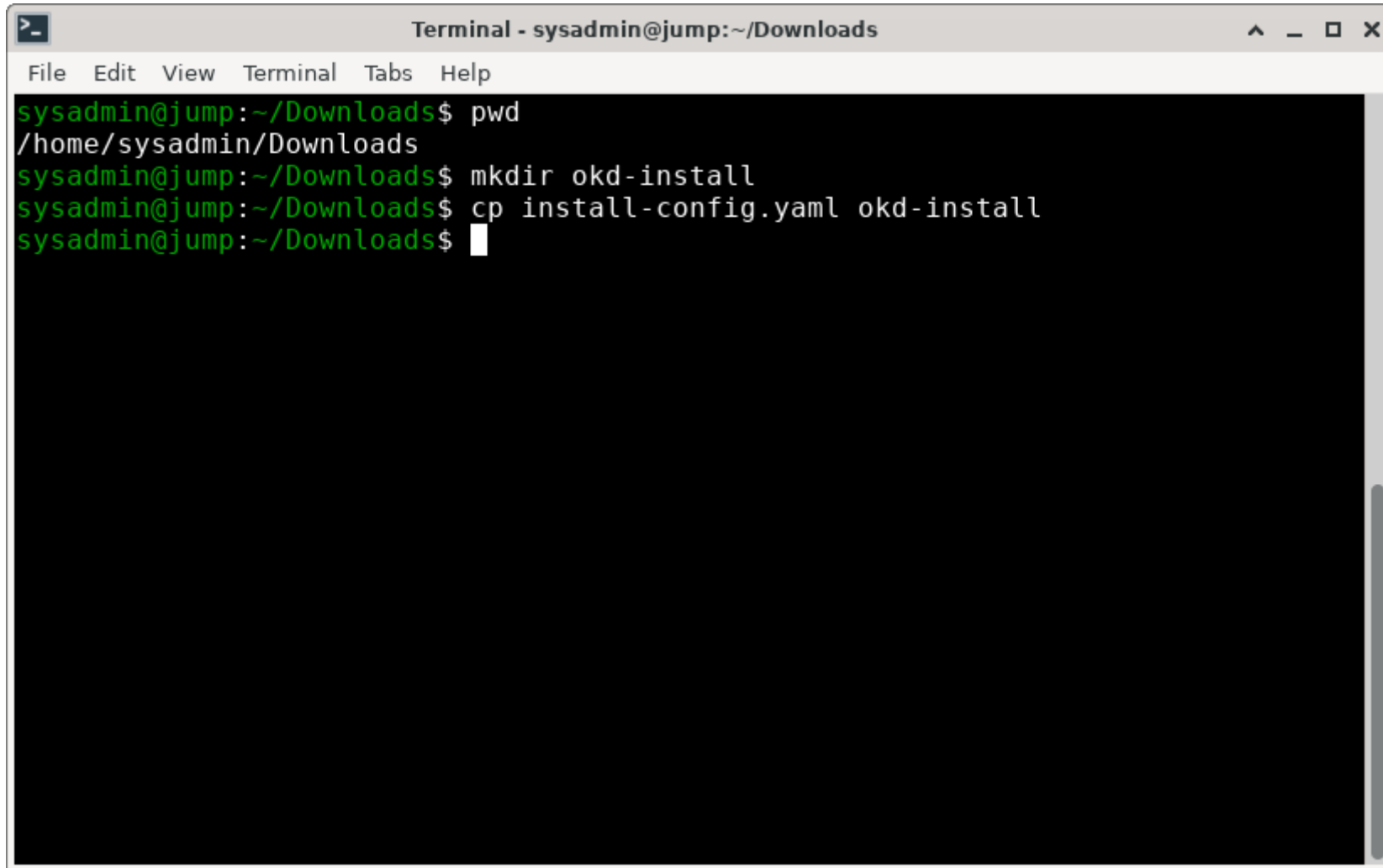
# ssh-keygen

```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
replicas: 0 # Must be set to 0 for User Provisioned Installation as worker nodes will be manually deployed.
controlPlane:
  hyperthreading: Enabled
  name: master
  replicas: 3
metadata:
  name: lab # Cluster name
networking:
  clusterNetwork:
    - cidr: 10.128.0.0/14
      hostPrefix: 23
  networkType: OVNKubernetes
  serviceNetwork:
    - 172.30.0.0/16
platform:
  none: {}
fips: false
pullSecret: '{"auths":{"fake":{"auth":"aWQ6cGFzcwo="}}}'
sshKey: 'ecdsa-sha2-nistp521 AAAAE2VjZHNhLXNoYTItbmlzdHA1MjEAAAABImlzdHA1MjEAAAC
FBAFnPiaIR2mIa0Icub+v5xgYBB0WjN44bpiANdoI4wkDCLo60e0/DpH9Yobdq+P+w4TVTn+06NNE6NJ
6nXegebAJpQHah8E4rskJwjwGy6ZAocEz4vH8vXNfAyQvb/hEN/x6HV25X8ELE8l7GdroDI8tzxnNI1
Mj3zT0d3iir2tZDfJBw== sysadmin@jump.aus.sparksoftcorp.io'
24,1 Bot
```

# Create installation files

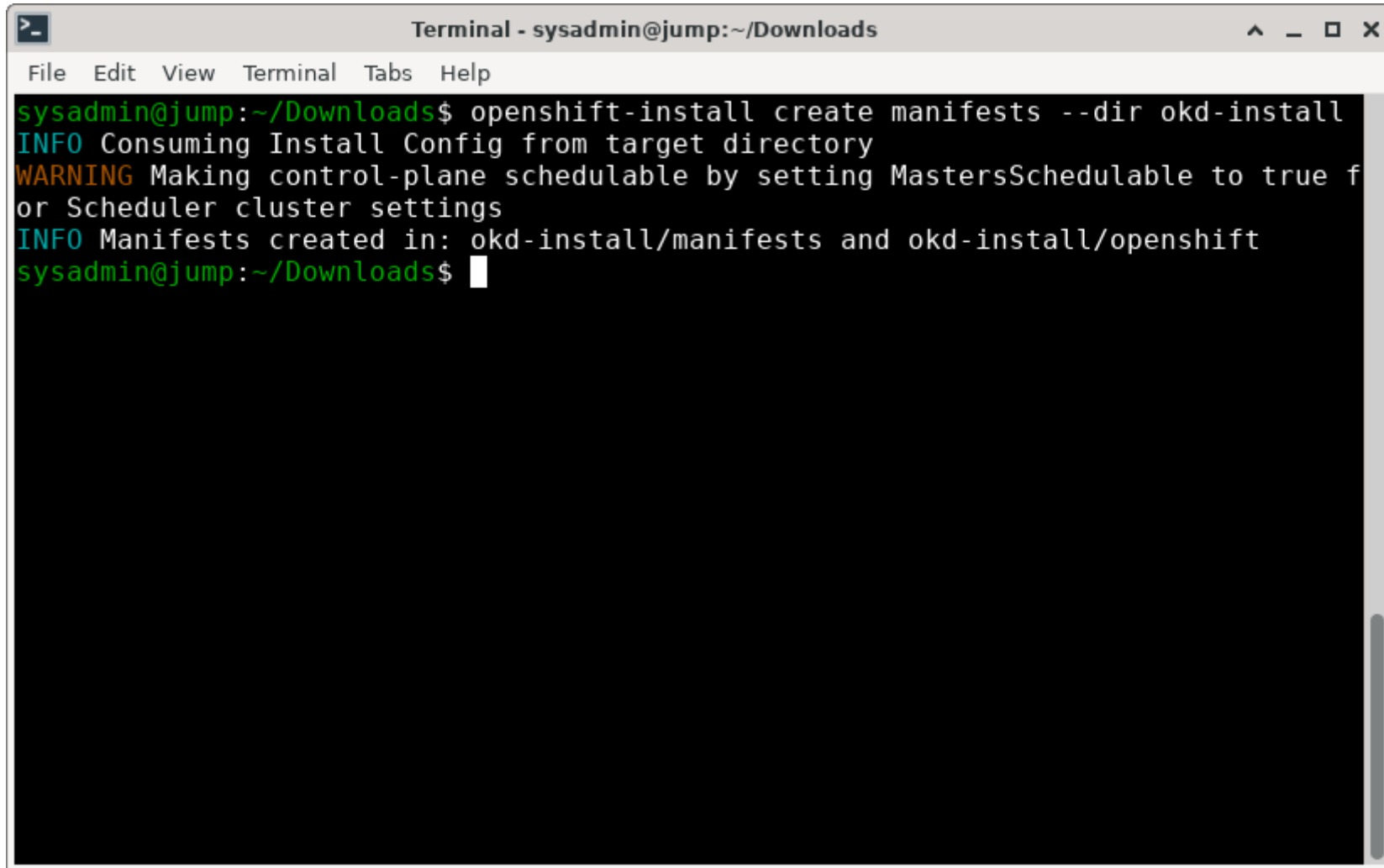
- Note that when you create the installation files, it will nuke your install-config.yaml file! So keep a copy of it if you want to re-deploy your cluster later.

# Create installation files



```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ pwd
/home/sysadmin/Downloads
sysadmin@jump:~/Downloads$ mkdir okd-install
sysadmin@jump:~/Downloads$ cp install-config.yaml okd-install
sysadmin@jump:~/Downloads$
```

# Create installation files

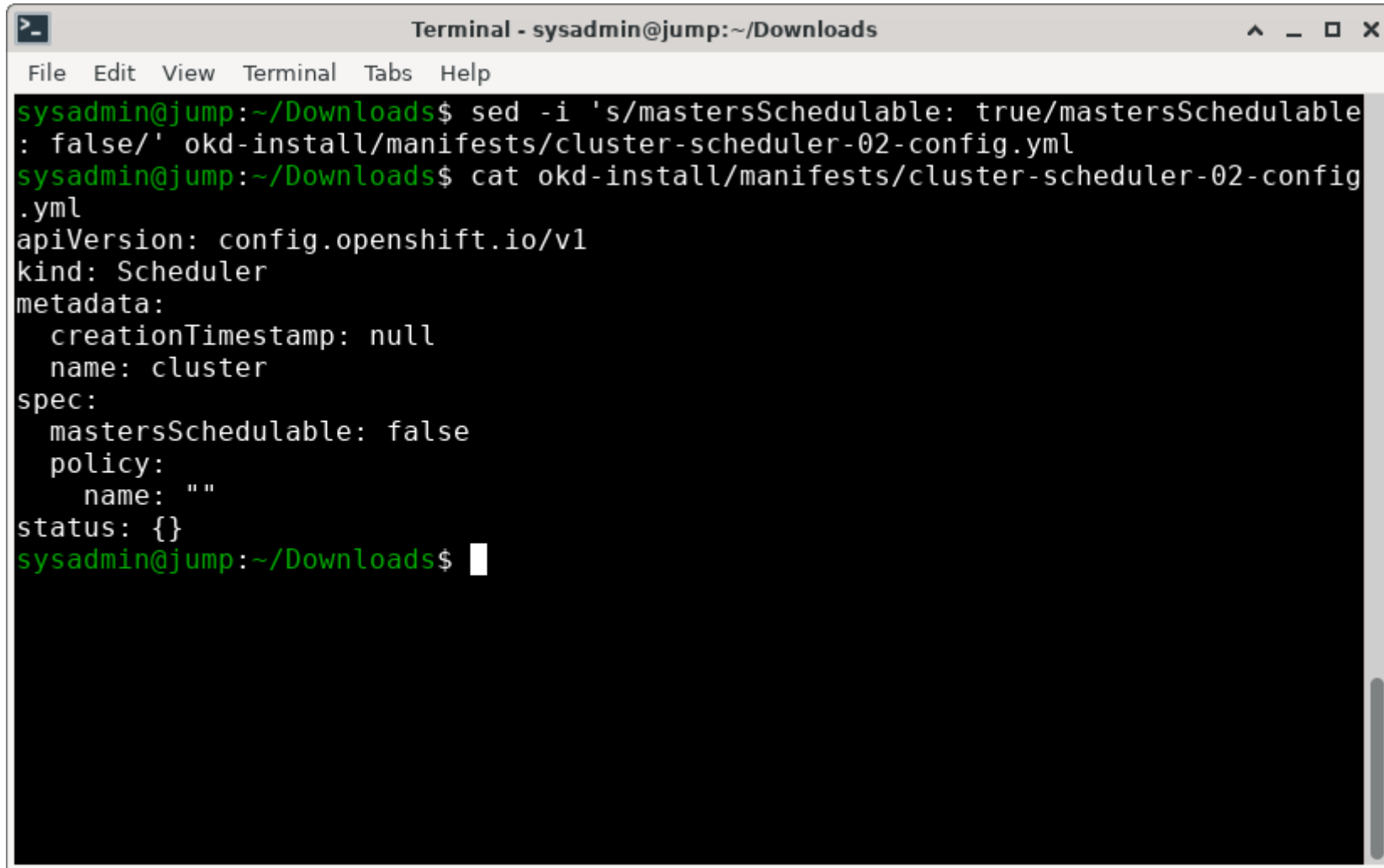


```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ openshift-install create manifests --dir okd-install
INFO Consuming Install Config from target directory
WARNING Making control-plane schedulable by setting MastersSchedulable to true f
or Scheduler cluster settings
INFO Manifests created in: okd-install/manifests and okd-install/openshift
sysadmin@jump:~/Downloads$
```

If you don't  
want your  
control plane  
nodes to be  
scheduleable

- Change the cluster-scheduler-02-config.yml so that mastersScheduleable is set to false

# Create installation files

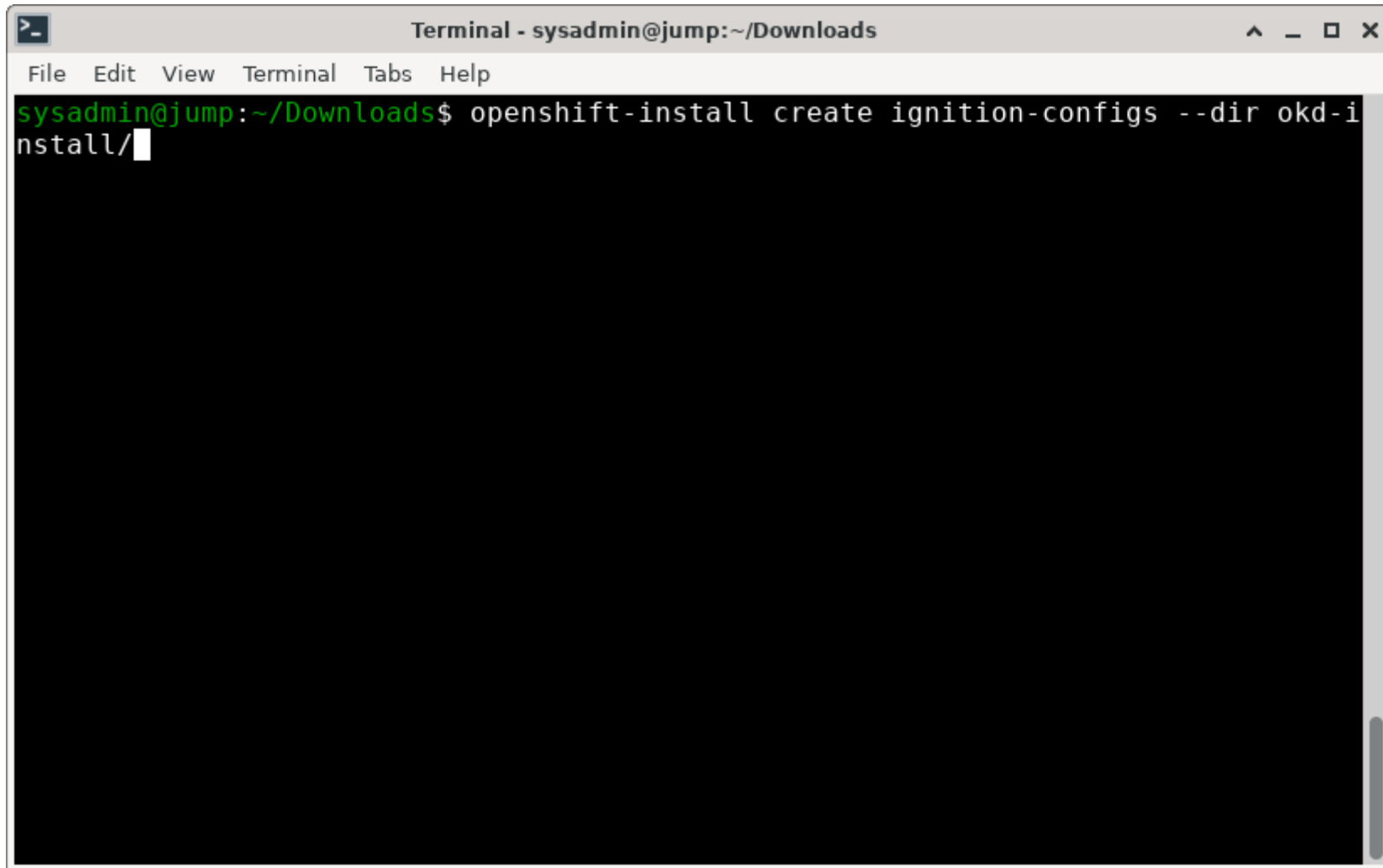


```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ sed -i 's/mastersSchedulable: true/mastersSchedulable: false/' okd-install/manifests/cluster-scheduler-02-config.yml
sysadmin@jump:~/Downloads$ cat okd-install/manifests/cluster-scheduler-02-config.yml
apiVersion: config.openshift.io/v1
kind: Scheduler
metadata:
  creationTimestamp: null
  name: cluster
spec:
  mastersSchedulable: false
  policy:
    name: ""
status: {}
sysadmin@jump:~/Downloads$
```

# Create the ignition files

- `openshift-install create ignition-configs --dir okd-install`

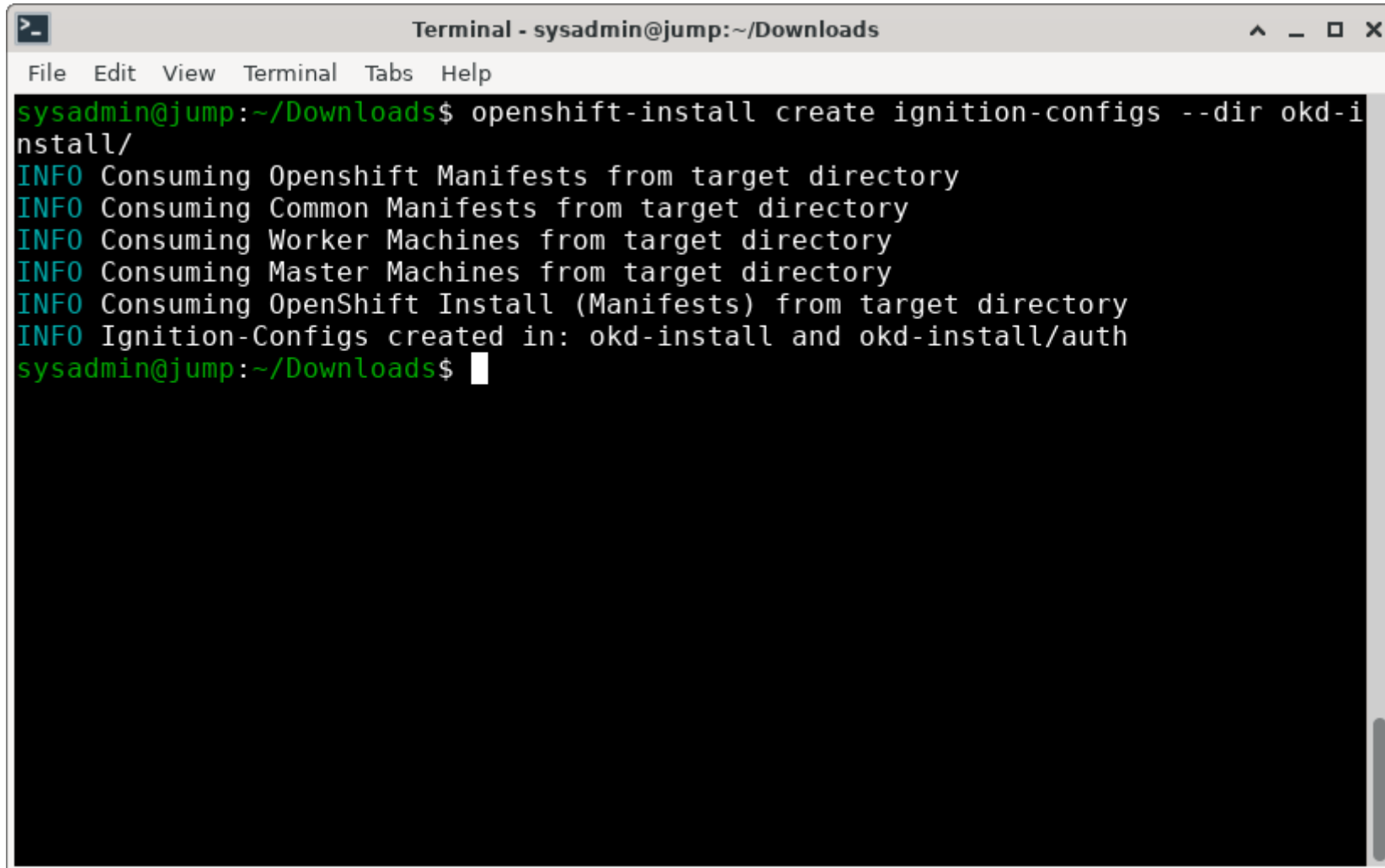
# Create installation files



```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ openshift-install create ignition-configs --dir okd-i
ninstall/
```

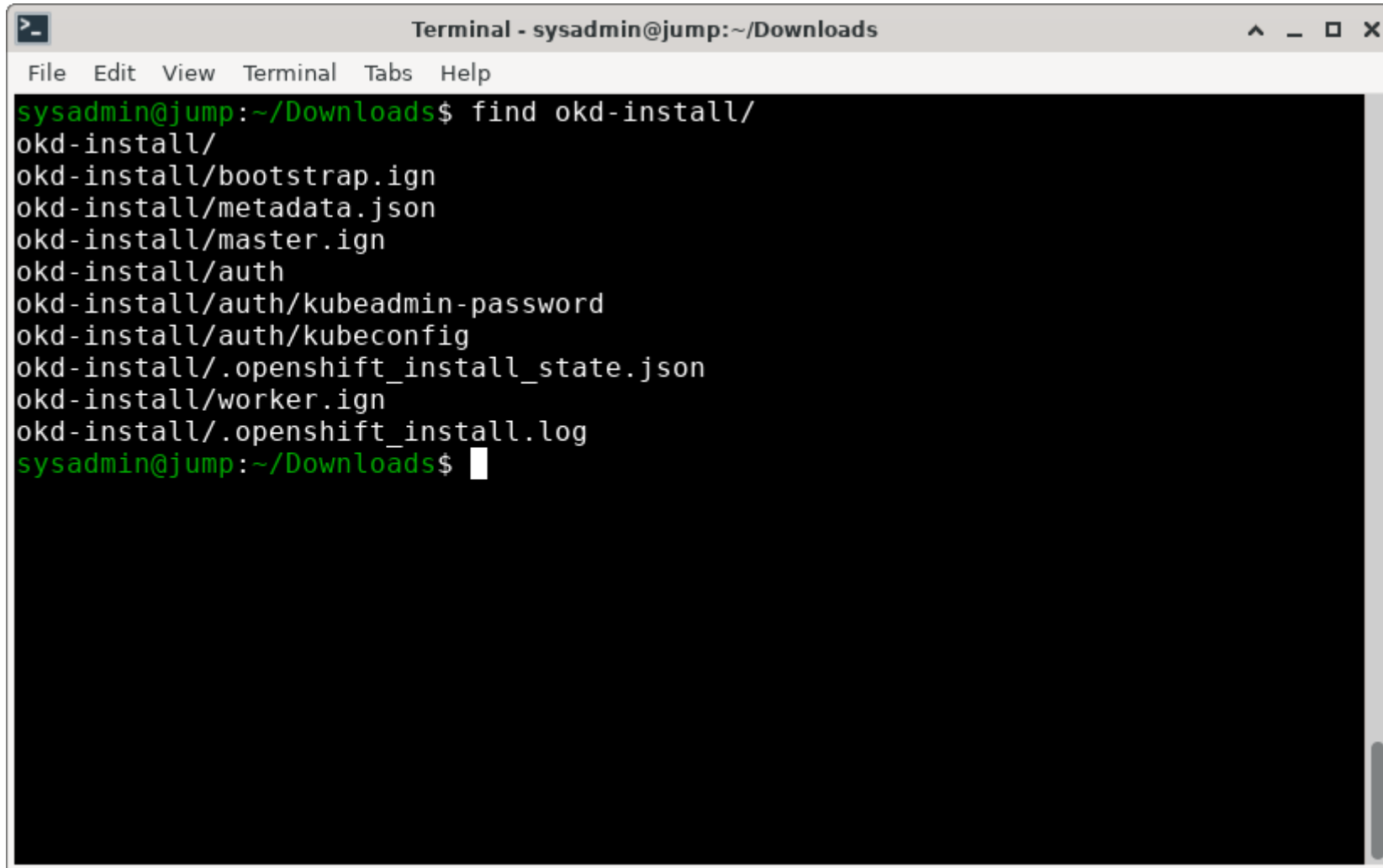


# Create installation files



```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ openshift-install create ignition-configs --dir okd-i
ninstall/
INFO Consuming Openshift Manifests from target directory
INFO Consuming Common Manifests from target directory
INFO Consuming Worker Machines from target directory
INFO Consuming Master Machines from target directory
INFO Consuming OpenShift Install (Manifests) from target directory
INFO Ignition-Configs created in: okd-install and okd-install/auth
sysadmin@jump:~/Downloads$
```

# Create installation files



```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ find okd-install/
okd-install/
okd-install/bootstrap.ign
okd-install/metadata.json
okd-install/master.ign
okd-install/auth
okd-install/auth/kubeadmin-password
okd-install/auth/kubeconfig
okd-install/.openshift_install_state.json
okd-install/worker.ign
okd-install/.openshift_install.log
sysadmin@jump:~/Downloads$
```

I am going to  
share my  
ignition files via  
web site

- The permissions are wrong, though

# Change permissions

```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ ls -l okd-install/
total 280
drwxr-x---. 2 sysadmin sysadmin 4096 Apr 12 16:26 auth
-rw-r-----. 1 sysadmin sysadmin 269796 Apr 12 16:29 bootstrap.ign
-rw-r-----. 1 sysadmin sysadmin 1713 Apr 12 16:29 master.ign
-rw-r-----. 1 sysadmin sysadmin 134 Apr 12 16:29 metadata.json
-rw-r-----. 1 sysadmin sysadmin 1713 Apr 12 16:29 worker.ign
sysadmin@jump:~/Downloads$ chmod 664 okd-install/*.ign
sysadmin@jump:~/Downloads$ chmod 664 okd-install/*.json
sysadmin@jump:~/Downloads$ chmod 775 okd-install/auth/
sysadmin@jump:~/Downloads$ ls -l okd-install/
total 280
drwxrwxr-x. 2 sysadmin sysadmin 4096 Apr 12 16:26 auth
-rw-rw-r--. 1 sysadmin sysadmin 269796 Apr 12 16:29 bootstrap.ign
-rw-rw-r--. 1 sysadmin sysadmin 1713 Apr 12 16:29 master.ign
-rw-rw-r--. 1 sysadmin sysadmin 134 Apr 12 16:29 metadata.json
-rw-rw-r--. 1 sysadmin sysadmin 1713 Apr 12 16:29 worker.ign
sysadmin@jump:~/Downloads$
```

Copy the ign  
files to the web  
server

- In my case, it's just my workstation, but it could be anything which is available from the 192.168.22.0/24 network. In my case, my workstation is dual-homed. I could have done this on the haproxy machine, too.

Click to start dragging "Index of /ign - Google Chrome"



Index of /ign - Google Chrome

192.168.22.15/ign/

Personal Sparksoft

## Index of /ign

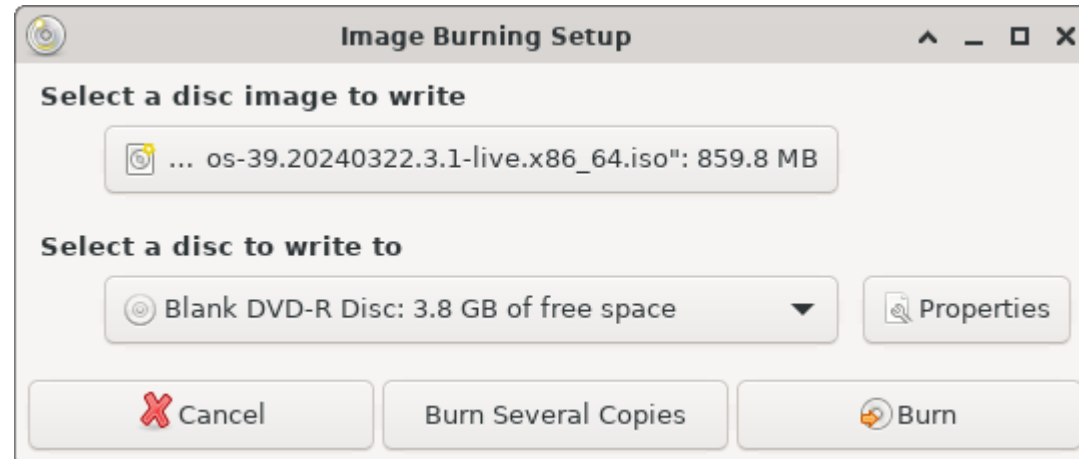
Name	Last modified	Size	Description
<a href="#">Parent Directory</a>	-	-	-
<a href="#">bootstrap.ign</a>	2024-04-12 16:37	263K	
<a href="#">master.ign</a>	2024-04-12 16:37	1.7K	
<a href="#">worker.ign</a>	2024-04-12 16:37	1.7K	



Burn media

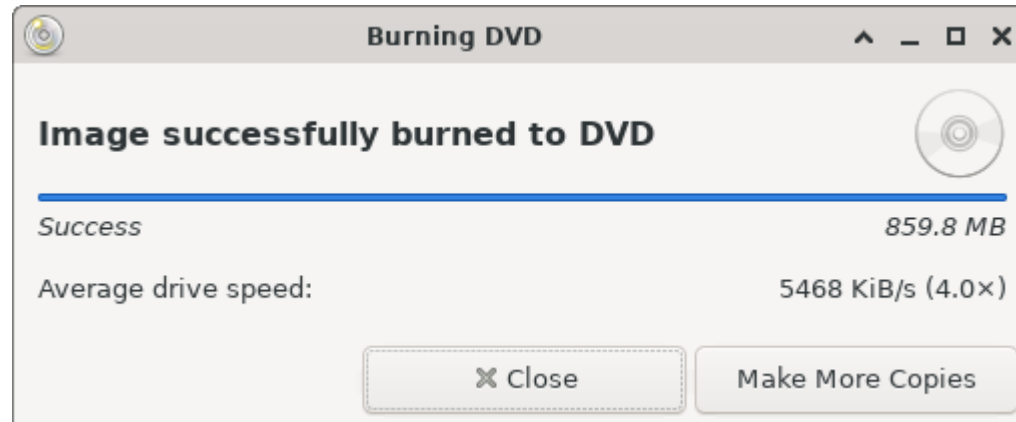
- I use Brasero

# Burn DVD





# Burn DVD



# Boot your hardware off the FCOS ISO

- In this case, I'm using a physical drive attached to my NUCs, so I'm burning the image to a DVD drive.
- I'm also doing this in KVM virtual machines so I can capture screenshots.

# Boot your nodes

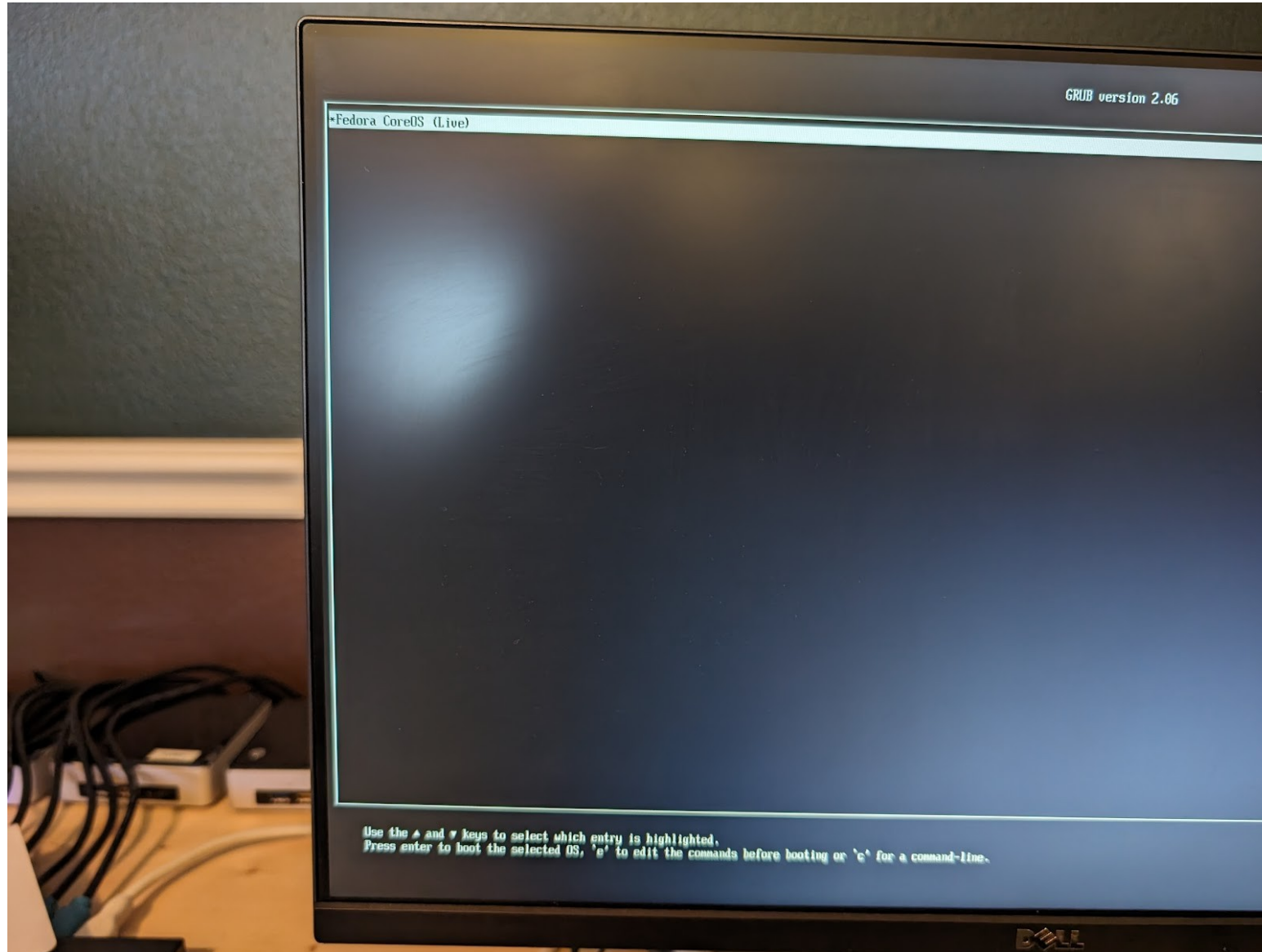


# Boot your nodes





# Boot your nodes



# Boot your nodes

```
Fedora CoreOS 39.20240322.3.1
Kernel 6.7.9-200.fc39.x86_64 on an x86_64 (tty1)

SSH host key: SHA256:icvFcAzA2r0MAJ5YRdQmq4RyG/INPM3/YOJZLhdTh+c (ECDSA)
SSH host key: SHA256:qJEqYzakCB9Tvt/zIDveoXAioSuBEIfTzTYJNJctxAw (ED25519)
SSH host key: SHA256:BaSgk4DZBuJgJdmbXZMEpxBPsj1URZBTkhXKEW4TXuE (RSA)
Ignition: ran on 2024/04/12 22:23:17 UTC (this boot)
Ignition: no config provided by user
No SSH authorized keys provided by Ignition or Afterburn
localhost login: core (automatic login)

Fedora CoreOS 39.20240322.3.1

#####
Welcome to the CoreOS live environment. This system is running completely
from memory, making it a good candidate for hardware discovery and
installing persistently to disk. Here is an example of running an install
to disk via coreos-installer:

sudo coreos-installer install /dev/sda \
  --ignition-url https://example.com/example.ign

You may configure networking via 'sudo nmcli' or 'sudo nmtui' and have
that configuration persist into the installed system by passing the
'--copy-network' argument to 'coreos-installer install'. Please run
'coreos-installer install --help' for more information on the possible
install options.
#####

Icore@localhost ~1$ sudo coreos-installer install /dev/nv
nume0      nume0n1      nume0n1p1  nume0n1p2  nume0n1p3  nume0n1p4  nvram
Icore@localhost ~1$ sudo coreos-installer install /dev/nume0n1 -I http://192.168.22.15/ign/bootstrap.ign --insecure-ignition
```

Fedora CoreOS 39.20240309.3.0  
Kernel 6.7.7-200.fc39.x86\_64 on an x86\_64 (tty1)

SSH host key: SHA256:mJyF4ZHwSM/CRTk0sF9/eJ5cRIWFS+dmDiQatSHAipI (ED25519)

SSH host key: SHA256:T35ARGMbnQ706N9/5MjFVJJVHzWfSGPVTCdJ1eiTJrk (ECDSA)

SSH host key: SHA256:TMd3FSGQBKJp.jpWmBJMf0yZDQTOkFu4Mo4RYIUZDyMA (RSA)

emp1s0: 192.168.22.200 fe80::cb14:904e:38e:e683

Ignition: ran on 2024/04/12 22:31:05 UTC (this boot)

Ignition: no config provided by user

No SSH authorized keys provided by Ignition or Afterburn

okd-bootstrap login: core (automatic login)

Fedora CoreOS 39.20240309.3.0

#####

Welcome to the CoreOS live environment. This system is running completely from memory, making it a good candidate for hardware discovery and installing persistently to disk. Here is an example of running an install to disk via coreos-installer:

```
sudo coreos-installer install /dev/sda \  
  --ignition-url https://example.com/example.ign
```

You may configure networking via 'sudo nmcli' or 'sudo nmtui' and have that configuration persist into the installed system by passing the '--copy-network' argument to 'coreos-installer install'. Please run 'coreos-installer install --help' for more information on the possible install options.

#####

```
[core@okd-bootstrap ~] $ sudo coreos-installer install /dev/vda -I http://192.168.22.15/ign/bootstrap.ign --insecure-ignition_
```

```
Fedora CoreOS 39.20240309.3.0
Kernel 6.7.7-200.fc39.x86_64 on an x86_64 (tty1)
```

```
SSH host key: SHA256:VNEdwKmj6svYqyzqL00fnhYvS6fdPu84AYyzIK03s+o (ECDSA)
SSH host key: SHA256:KWgJjRXIUr2A7frIAAdCw97FK4+7I2e3H0SiQBI+CIq0 (ED25519)
SSH host key: SHA256:e2Eg0I5ituo3gFb2AHJeerv/yUy6CI8Yrt1hP0mUNUg (RSA)
emp1s0: 192.168.22.201 fe80::2b3f:1fbf:8e45:f26b
Ignition: ran on 2024/04/12 22:36:10 UTC (this boot)
Ignition: no config provided by user
No SSH authorized keys provided by Ignition or Afterburn
okd-cp-1 login: core (automatic login)
```

```
Fedora CoreOS 39.20240309.3.0
```

```
#####
Welcome to the CoreOS live environment. This system is running completely
from memory, making it a good candidate for hardware discovery and
installing persistently to disk. Here is an example of running an install
to disk via coreos-installer:
```

```
sudo coreos-installer install /dev/sda \
  --ignition-url https://example.com/example.ign
```

```
You may configure networking via 'sudo nmcli' or 'sudo nmtui' and have
that configuration persist into the installed system by passing the
'--copy-network' argument to 'coreos-installer install'. Please run
'coreos-installer install --help' for more information on the possible
install options.
```

```
#####
```

```
[core@okd-cp-1 ~]# sudo coreos-installer install /dev/vda -I http://192.168.22.15/ign/master.ign --insecure-ignition_
```



```
Fedora CoreOS 39.20240309.3.0
Kernel 6.7.7-200.fc39.x86_64 on an x86_64 (tty1)
```

```
SSH host key: SHA256:Wh4evFoT0zkIPX+eG4/qLB3p66pKoCzm9pNNArNjuWE (ECDSA)
SSH host key: SHA256:IDoZiD/v8No8zuZB8JjaZeFX9aUzR2LP627Min5g48U (ED25519)
SSH host key: SHA256:4UjpfSIlp/3HGakqRhhzTZc0a9fBQJIHcHIqKgvT5JQ (RSA)
emp1s0: 192.168.22.211 fe80::52ee:6442:6946:d32f
Ignition: ran on 2024/04/12 22:36:26 UTC (this boot)
Ignition: no config provided by user
No SSH authorized keys provided by Ignition or Afterburn
okd-w-1 login: core (automatic login)
```

```
Fedora CoreOS 39.20240309.3.0
```

```
#####
Welcome to the CoreOS live environment. This system is running completely
from memory, making it a good candidate for hardware discovery and
installing persistently to disk. Here is an example of running an install
to disk via coreos-installer:
```

```
sudo coreos-installer install /dev/sda \
  --ignition-url https://example.com/example.ign
```

```
You may configure networking via 'sudo nmcli' or 'sudo nmtui' and have
that configuration persist into the installed system by passing the
'--copy-network' argument to 'coreos-installer install'. Please run
'coreos-installer install --help' for more information on the possible
install options.
```

```
#####
```

```
[core@okd-w-1 ~]$ sudo coreos-installer install /dev/vda -I http://192.168.22.15/ign/worker.ign --insecure-ignition_
```

```
Fedora CoreOS 39.20240309.3.0
Kernel 6.7.7-200.fc39.x86_64 on an x86_64 (tty1)
```

```
SSH host key: SHA256:mJyF4ZHwSM/CRTk0sF9/eJ5cRIWFS+dmDiQAtSHAipI (ED25519)
```

```
SSH host key: SHA256:T35ARGMbnQ706N9/5MjFVJJVHzWfSGPVTCdJ1eiTJrk (ECDSA)
```

```
SSH host key: SHA256:TMd3FSGQBKJp.jpWmBJMf0yZDQTOkFu4Mo4RYIUZDyMA (RSA)
```

```
emp1s0: 192.168.22.200 fe80::cb14:904e:38e:e683
```

```
Ignition: ran on 2024/04/12 22:31:05 UTC (this boot)
```

```
Ignition: no config provided by user
```

```
No SSH authorized keys provided by Ignition or Afterburn
```

```
okd-bootstrap login: core (automatic login)
```

```
Fedora CoreOS 39.20240309.3.0
```

```
#####
```

```
Welcome to the CoreOS live environment. This system is running completely
from memory, making it a good candidate for hardware discovery and
installing persistently to disk. Here is an example of running an install
to disk via coreos-installer:
```

```
sudo coreos-installer install /dev/sda \
  --ignition-url https://example.com/example.ign
```

```
You may configure networking via 'sudo nmcli' or 'sudo nmtui' and have
that configuration persist into the installed system by passing the
'--copy-network' argument to 'coreos-installer install'. Please run
'coreos-installer install --help' for more information on the possible
install options.
```

```
#####
```

```
[core@okd-bootstrap ~]# sudo coreos-installer install /dev/vda -I http://192.168.22.15/ign/bootstrap.ign --insecure-ignition
```

```
Installing Fedora CoreOS 39.20240309.3.0 x86_64 (512-byte sectors)
```

```
> Read disk 2.5 GiB/2.5 GiB (100%)
```

```
Writing Ignition config
```

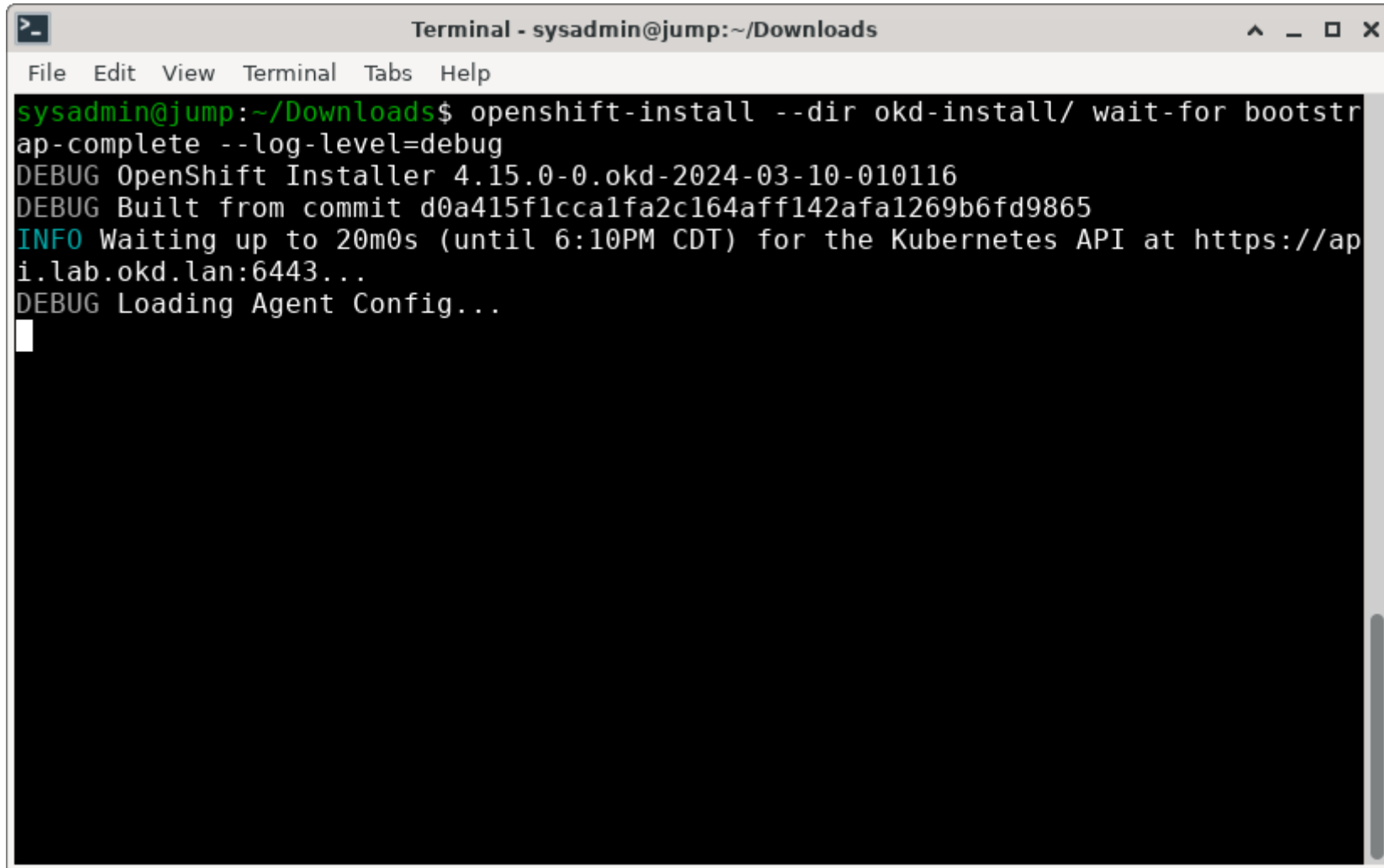
```
Install complete.
```

```
[core@okd-bootstrap ~]#
```

You can watch  
the installation

- `openshift-install --dir okd-install bootstrap-complete --log-level=debug`

# Watch the log

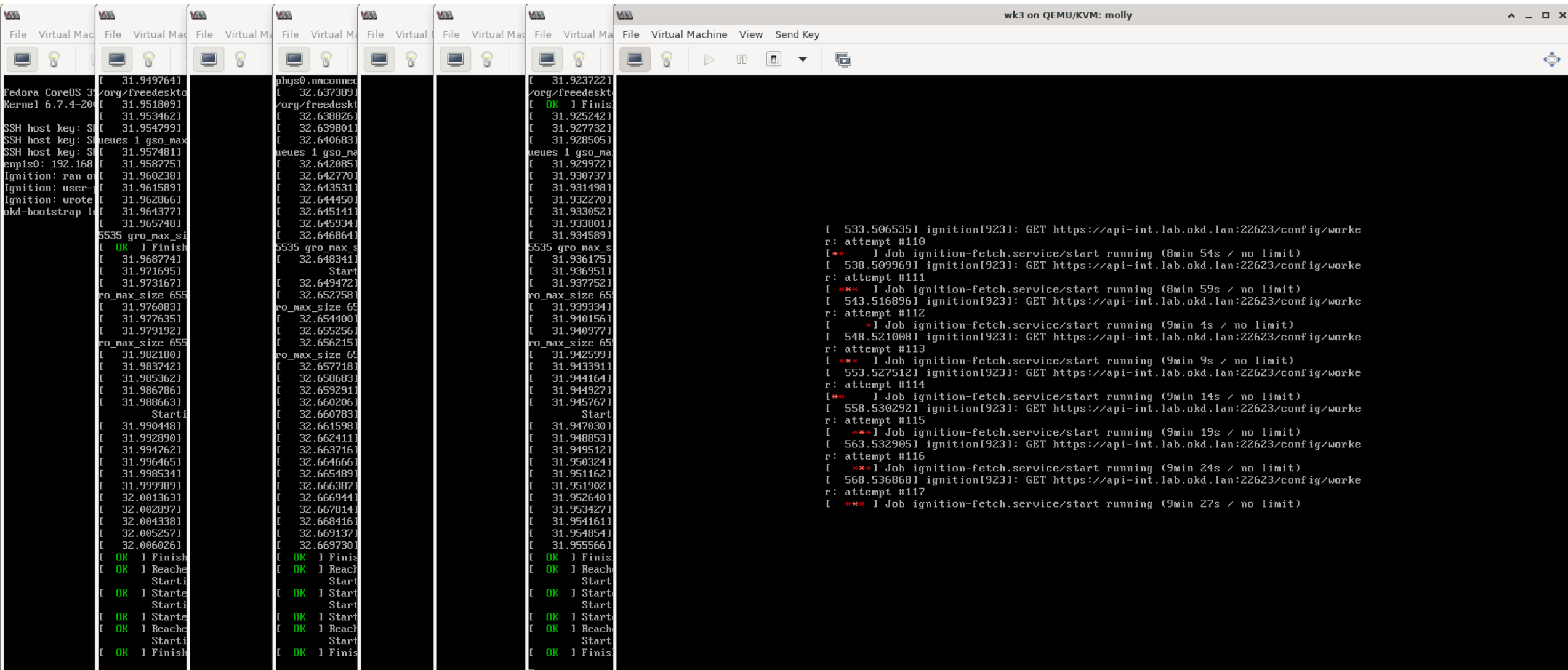
A terminal window titled "Terminal - sysadmin@jump:~/Downloads" with a menu bar (File, Edit, View, Terminal, Tabs, Help). The terminal shows the execution of the command "openshift-install --dir okd-install/ wait-for bootstrap-complete --log-level=debug". The output includes: "DEBUG OpenShift Installer 4.15.0-0.okd-2024-03-10-010116", "DEBUG Built from commit d0a415f1cca1fa2c164aff142afa1269b6fd9865", "INFO Waiting up to 20m0s (until 6:10PM CDT) for the Kubernetes API at https://api.lab.okd.lan:6443...", and "DEBUG Loading Agent Config...".

```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ openshift-install --dir okd-install/ wait-for bootstrap-complete --log-level=debug
DEBUG OpenShift Installer 4.15.0-0.okd-2024-03-10-010116
DEBUG Built from commit d0a415f1cca1fa2c164aff142afa1269b6fd9865
INFO Waiting up to 20m0s (until 6:10PM CDT) for the Kubernetes API at https://api.lab.okd.lan:6443...
DEBUG Loading Agent Config...
```

# Watch the systems

```
[ OK ] Finished systemd-tmpfiles-setup-device Create Static Device Nodes in /dev gracefully.
Starting systemd-sysusers.service - Create System Users...
Starting systemd-userdbd.service - User Database Manager...
[ OK ] Started systemd-userdbd.service - User Database Manager.
[ OK ] Finished systemd-sysusers.service - Create System Users.
Starting systemd-tmpfiles-setup-device Create Static Device Nodes in /dev...
[ OK ] Finished systemd-tmpfiles-setup-device Create Static Device Nodes in /dev.
[ OK ] Reached target local-fs-pre.target Preparation for Local File Systems.
Mounting var.mount - /var...
[ OK ] Mounted var.mount - /var.
[ OK ] Reached target machines.target - Containers.
Starting ostree-remount.service - OSTree Remount OS/ Bind Mounts...
[ OK ] Finished ostree-remount.service - OSTree Remount OS/ Bind Mounts.
Starting systemd-journal-flush.service - Flush Journal to Persistent Storage...
Starting systemd-random-seed.service - Load/Save OS Random Seed...
[ OK ] Finished systemd-random-seed.service - Load/Save OS Random Seed.
[ OK ] Finished systemd-hwdb-update.service - Rebuild Hardware Database.
Starting systemd-udev.service - Manager for Device Events and Files...
[ OK ] Finished systemd-journal-flush.service - Flush Journal to Persistent Storage.
[ OK ] Started systemd-udev.service - Manager for Device Events and Files.
Starting modprobe@configfs.service - Load Kernel Module configfs...
Starting modprobe@fuse.service - Load Kernel Module fuse...
[ OK ] Finished modprobe@configfs.service - Load Kernel Module configfs.
[ OK ] Finished modprobe@fuse.service - Load Kernel Module fuse.
```

# Watch the systems



The image shows a QEMU/KVM virtual machine monitor window titled "wk3 on QEMU/KVM: molly". The window contains several terminal windows, each displaying system boot logs. The logs show the progression of system startup, including kernel boot, SSH host key generation, Ignition configuration, and network connectivity. The logs are organized into columns, with each column representing a different virtual machine instance. The logs show the system booting up, reaching the Ignition configuration stage, and then starting the network services. The logs are organized into columns, with each column representing a different virtual machine instance. The logs show the system booting up, reaching the Ignition configuration stage, and then starting the network services.

```
[ 31.949764] /org/freedesktop
Kernel 6.7.4-200
[ 31.951809] /org/freedesktop
[ 31.953462] /org/freedesktop
SSH host key: S
[ 31.954799] ueues 1 gso_max
SSH host key: S
[ 31.957481] ueues 1 gso_max
emp1s0: 192.168
[ 31.958775] ueues 1 gso_max
Ignition: ran o
[ 31.960238] ueues 1 gso_max
Ignition: user-
[ 31.961589] ueues 1 gso_max
Ignition: wrote
[ 31.962866] ueues 1 gso_max
okd-bootstrap l
[ 31.964377] ueues 1 gso_max
[ 31.965748] ueues 1 gso_max
5535 gro_max_si
[ OK ] Finish
[ 31.968774] ueues 1 gso_max
[ 31.971695] ueues 1 gso_max
[ 31.973167] ueues 1 gso_max
ro_max_size 655
[ 31.976083] ueues 1 gso_max
[ 31.977635] ueues 1 gso_max
[ 31.979192] ueues 1 gso_max
ro_max_size 655
[ 31.982180] ueues 1 gso_max
[ 31.983742] ueues 1 gso_max
[ 31.985362] ueues 1 gso_max
[ 31.986786] ueues 1 gso_max
[ 31.988663] ueues 1 gso_max
Starti
[ 31.990448] ueues 1 gso_max
[ 31.992890] ueues 1 gso_max
[ 31.994762] ueues 1 gso_max
[ 31.996465] ueues 1 gso_max
[ 31.998534] ueues 1 gso_max
[ 31.999989] ueues 1 gso_max
[ 32.001363] ueues 1 gso_max
[ 32.002897] ueues 1 gso_max
[ 32.004338] ueues 1 gso_max
[ 32.005257] ueues 1 gso_max
[ 32.006026] ueues 1 gso_max
[ OK ] Finish
[ OK ] Reache
Starti
[ OK ] Starte
Starti
[ OK ] Starte
Starti
[ OK ] Reache
Starti
[ OK ] Finish

phys0.nmconnec
[ 32.637389] /org/freedesktop
[ 31.951809] /org/freedesktop
[ 32.638826] /org/freedesktop
[ 32.639801] ueues 1 gso_max
[ 32.640683] ueues 1 gso_max
[ 32.642085] ueues 1 gso_max
[ 32.642770] ueues 1 gso_max
[ 32.643531] ueues 1 gso_max
[ 32.644450] ueues 1 gso_max
[ 32.645141] ueues 1 gso_max
[ 32.645934] ueues 1 gso_max
[ 32.646864] ueues 1 gso_max
5535 gro_max_s
[ 32.648341] ueues 1 gso_max
Starti
[ 32.649472] ueues 1 gso_max
[ 32.652758] ueues 1 gso_max
ro_max_size 655
[ 31.933341] ueues 1 gso_max
[ 32.654400] ueues 1 gso_max
[ 32.655256] ueues 1 gso_max
[ 32.656215] ueues 1 gso_max
ro_max_size 655
[ 31.942599] ueues 1 gso_max
[ 31.943391] ueues 1 gso_max
[ 31.944164] ueues 1 gso_max
[ 31.944927] ueues 1 gso_max
[ 31.945767] ueues 1 gso_max
Starti
[ 31.947030] ueues 1 gso_max
[ 31.948853] ueues 1 gso_max
[ 31.949512] ueues 1 gso_max
[ 31.950324] ueues 1 gso_max
[ 31.951162] ueues 1 gso_max
[ 31.951902] ueues 1 gso_max
[ 31.952640] ueues 1 gso_max
[ 31.953427] ueues 1 gso_max
[ 31.954161] ueues 1 gso_max
[ 31.954854] ueues 1 gso_max
[ 31.955566] ueues 1 gso_max
[ OK ] Finis
[ OK ] Reache
Starti
[ OK ] Starte
Starti
[ OK ] Starte
Starti
[ OK ] Reache
Starti
[ OK ] Finis

[ 31.923722] ueues 1 gso_max
[ OK ] Finis
[ 31.925242] ueues 1 gso_max
[ 31.927732] ueues 1 gso_max
[ 31.928505] ueues 1 gso_max
[ 31.929972] ueues 1 gso_max
[ 31.930737] ueues 1 gso_max
[ 31.931498] ueues 1 gso_max
[ 31.932270] ueues 1 gso_max
[ 31.933052] ueues 1 gso_max
[ 31.933801] ueues 1 gso_max
[ 31.934589] ueues 1 gso_max
5535 gro_max_s
[ 31.936175] ueues 1 gso_max
[ 31.936951] ueues 1 gso_max
[ 31.937752] ueues 1 gso_max
ro_max_size 655
[ 31.939334] ueues 1 gso_max
[ 31.940156] ueues 1 gso_max
[ 31.940977] ueues 1 gso_max
ro_max_size 655
[ 31.942599] ueues 1 gso_max
[ 31.943391] ueues 1 gso_max
[ 31.944164] ueues 1 gso_max
[ 31.944927] ueues 1 gso_max
[ 31.945767] ueues 1 gso_max
Starti
[ 31.947030] ueues 1 gso_max
[ 31.948853] ueues 1 gso_max
[ 31.949512] ueues 1 gso_max
[ 31.950324] ueues 1 gso_max
[ 31.951162] ueues 1 gso_max
[ 31.951902] ueues 1 gso_max
[ 31.952640] ueues 1 gso_max
[ 31.953427] ueues 1 gso_max
[ 31.954161] ueues 1 gso_max
[ 31.954854] ueues 1 gso_max
[ 31.955566] ueues 1 gso_max
[ OK ] Finis
[ OK ] Reache
Starti
[ OK ] Starte
Starti
[ OK ] Starte
Starti
[ OK ] Reache
Starti
[ OK ] Finis

[ 533.506535] ignition[923]: GET https://api-int.lab.okd.lan:22623/config/workers: attempt #110
[** ] Job ignition-fetch.service/start running (8min 54s / no limit)
[ 538.509969] ignition[923]: GET https://api-int.lab.okd.lan:22623/config/workers: attempt #111
[** ] Job ignition-fetch.service/start running (8min 59s / no limit)
[ 543.516896] ignition[923]: GET https://api-int.lab.okd.lan:22623/config/workers: attempt #112
[** ] Job ignition-fetch.service/start running (9min 4s / no limit)
[ 548.521008] ignition[923]: GET https://api-int.lab.okd.lan:22623/config/workers: attempt #113
[** ] Job ignition-fetch.service/start running (9min 9s / no limit)
[ 553.527512] ignition[923]: GET https://api-int.lab.okd.lan:22623/config/workers: attempt #114
[** ] Job ignition-fetch.service/start running (9min 14s / no limit)
[ 558.530292] ignition[923]: GET https://api-int.lab.okd.lan:22623/config/workers: attempt #115
[** ] Job ignition-fetch.service/start running (9min 19s / no limit)
[ 563.532905] ignition[923]: GET https://api-int.lab.okd.lan:22623/config/workers: attempt #116
[** ] Job ignition-fetch.service/start running (9min 24s / no limit)
[ 568.536868] ignition[923]: GET https://api-int.lab.okd.lan:22623/config/workers: attempt #117
[** ] Job ignition-fetch.service/start running (9min 27s / no limit)
```

	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
Frontend				1	1	-	1	4	20 000	1 010			460 104	56 624 512	0	0	0					OPEN								
Backend	0	0		0	0		0	0	2 000	0	0	0s	460 104	56 624 512	0	0	0	0	0	0	0	2h49m UP		0/0	0	0		0		

**k8s api frontend**

	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
Frontend				0	31	-	9	11	20 000	535			238 954	794 037	0	0	0	0	0	0	0	OPEN								

**k8s api backend**

	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-bootstrap	0	0	-	0	31		9	11	-	235	235	7s	236 987	794 037	0	0	0	0	0	0	0	3m44s UP	L4OK in 0ms	1/1	Y	-	1	1	2h45m	-
okd-cp-1	0	0	-	0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	2h49m DOWN	L4CON in 1ms	1/1	Y	-	1	1	2h49m	-
okd-cp-2	0	0	-	0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	2h49m DOWN	L4CON in 0ms	1/1	Y	-	1	1	2h49m	-
okd-cp-3	0	0	-	0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	2h49m DOWN	L4CON in 1ms	1/1	Y	-	1	1	2h49m	-
Backend	0	0		0	31		9	11	2 000	535	235	7s	238 954	794 037	0	0	300	0	0	0	0	3m44s UP		1/1	1	0	1	1	2h45m	

**okd machine\_config\_server\_frontend**

	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
Frontend				0	8	-	4	5	20 000	509			5 709	1 112 541	0	0	0	0	0	0	0	OPEN								

**okd machine\_config\_server\_backend**

	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-bootstrap	0	0	-	0	3		4	5	-	7	7	4m12s	1 644	1 112 541	0	0	0	0	0	0	0	4m16s UP	L4OK in 0ms	1/1	Y	-	1	1	2h44m	-
okd-cp-1	0	0	-	0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	2h49m DOWN	L4CON in 1ms	1/1	Y	-	1	1	2h49m	-
okd-cp-2	0	0	-	0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	2h49m DOWN	L4CON in 0ms	1/1	Y	-	1	1	2h49m	-
okd-cp-3	0	0	-	0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	2h49m DOWN	L4CON in 0ms	1/1	Y	-	1	1	2h49m	-
Backend	0	0		0	8		4	5	2 000	509	7	4m12s	5 709	1 112 541	0	0	502	0	0	0	0	4m16s UP		1/1	1	0	1	1	2h44m	

**okd http ingress\_frontend**

	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
Frontend				0	0	-	0	0	20 000	0			0	0	0	0	0	0	0	0	0	OPEN								

**okd http ingress\_backend**

	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-w-1	0	0	-	0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	2h49m DOWN	L4CON in 1ms	1/1	Y	-	1	1	2h49m	-
okd-w-2	0	0	-	0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	2h49m DOWN	L4CON in 0ms	1/1	Y	-	1	1	2h49m	-
okd-w-3	0	0	-	0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	2h49m DOWN	L4CON in 0ms	1/1	Y	-	1	1	2h49m	-
okd-w-4	0	0	-	0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	2h49m DOWN	L4CON in 1ms	1/1	Y	-	1	1	2h49m	-
Backend	0	0		0	0		0	0	2 000	0	0	?	0	0	0	0	0	0	0	0	0	2h49m DOWN		0/0	0	0	1	1	2h49m	

**okd https ingress\_frontend**

	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
Frontend				0	68	-	0	5	20 000	26 674			336 380	0	0	0	0	0	0	0	0	OPEN								

**okd https ingress\_backend**

	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-w-1	0	0	-	0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	2h49m DOWN	L4CON in 0ms	1/1	Y	-	1	1	2h49m	-
okd-w-2	0	0	-	0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	2h49m DOWN	L4CON in 0ms	1/1	Y	-	1	1	2h49m	-
okd-w-3	0	0	-	0	1		0	1	-	1	1	2h49m	0	0	0	0	0	0	0	1	0	2h49m DOWN	L4CON in 0ms	1/1	Y	-	1	1	2h49m	-
okd-w-4	0	0	-	0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	2h49m DOWN	L4CON in 0ms	1/1	Y	-	1	1	2h49m	-
Backend	0	0		0	68		0	2	2 000	26 674	1	2h49m	336 380	0	0	0	26 674	0	0	1	0	2h49m DOWN		0/0	0	0	1	1	2h49m	

	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend				1	1	-	1	4	20 000	1 084			493 848	60 886 212	0	0	0	0	0	0	0	0	OPEN								
Backend	0	0		0	0		0	0	2 000	0	0	0s	493 848	60 886 212	0	0	0	0	0	0	0	0	3h1m UP		0/0	0	0			0	

k8s api frontend																															
	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings		Server									
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend				7	138	-	43	212	20 000	1 401			14 336 867	222 809 603	0	0	0	0	0	0	0	0	OPEN								

k8s api backend																														
	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings		Server								
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-bootstrap	0	0		0	191		0	38	-	1 133	721	1m39s	13 583 035	174 514 102	0	0	0	23	0	412	181	1m40s DOWN	L4CON in 0ms	1/1	Y	-	4	2	2h47m	-
okd-cp-1	0	0		4	168		38	150		399	399	0s	593 736	47 733 916	0	0	0	0	0	0	0	4m28s UP	L4OK in 0ms	1/1	Y	-	1	1	2h57m	-
okd-cp-2	0	0		4	28		5	8		162	162	0s	158 129	561 585	0	0	0	0	0	0	0	28s UP	L4OK in 0ms	1/1	Y	-	1	1	3h1m	-
okd-cp-3	0	0		0	0		0	0		0	0	?	0	0	0	0	0	0	0	0	0	3h1m DOWN	L4CON in 0ms	1/1	Y	-	1	1	3h1m	-
Backend	0	0		7	138		43	212	2 000	1 401	1 282	0s	14 336 867	222 809 603	0	0	0	323	0	412	181	16m9s UP		2/2	2	0		1	2h45m	-

okd_machine_config_server_frontend																															
	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings		Server									
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend				0	8		0	5	20 000	513			139 693	2 658 969	0	0	0	0	0	0	0	OPEN									

okd_machine_config_server_backend																														
	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings		Server								
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-bootstrap	0	0		0	3		0	5	-	10	8	3m50s	133 436	1 189 125	0	0	0	0	0	2	1	3m50s DOWN	L4CON in 0ms	1/1	Y	-	4	2	2h48m	-
okd-cp-1	0	0		0	1		0	1	-	2	2	3m50s	1 096	734 922	0	0	0	0	0	0	0	8m UP	L4OK in 0ms	1/1	Y	-	1	1	2h53m	-
okd-cp-2	0	0		0	1		0	1	-	1	1	3m53s	548	367 461	0	0	0	0	0	0	0	7m59s UP	L4OK in 0ms	1/1	Y	-	1	1	2h53m	-
okd-cp-3	0	0		0	1		0	1	-	1	1	3m54s	548	367 461	0	0	0	0	0	0	0	7m52s UP	L4OK in 0ms	1/1	Y	-	1	1	2h53m	-
Backend	0	0		0	8		0	5	2 000	513	12	3m50s	139 693	2 658 969	0	0	0	502	0	2	1	16m41s UP		3/3	3	0		1	2h44m	-

okd_http_ingress_frontend																															
	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings		Server									
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend				0	0		0	0	20 000	0			0	0	0	0	0	0	0	0	0	OPEN									

okd_http_ingress_backend																														
	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings		Server								
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-w-1	0	0		0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	3h1m DOWN	L4CON in 0ms	1/1	Y	-	1	1	3h1m	-
okd-w-2	0	0		0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	3h1m DOWN	L4CON in 0ms	1/1	Y	-	1	1	3h1m	-
okd-w-3	0	0		0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	3h1m DOWN	L4CON in 0ms	1/1	Y	-	1	1	3h1m	-
okd-w-4	0	0		0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	3h1m DOWN	L4CON in 0ms	1/1	Y	-	1	1	3h1m	-
Backend	0	0		0	0		0	0	2 000	0	0	?	0	0	0	0	0	0	0	0	0	3h1m DOWN		0/0	0	0		1	3h1m	-

okd_https_ingress_frontend																															
	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings		Server									
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend				0	68		0	5	20 000	26 674			336 380	0	0	0	0	0	0	0	0	OPEN									

okd_https_ingress_backend																														
	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings		Server								
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-w-1	0	0		0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	3h1m DOWN	L4CON in 1ms	1/1	Y	-	1	1	3h1m	-
okd-w-2	0	0		0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	3h1m DOWN	L4CON in 0ms	1/1	Y	-	1	1	3h1m	-
okd-w-3	0	0		0	1		0	1	-	1	1	3h1m	0	0	0	0	0	0	0	0	1	3h1m DOWN	L4CON in 0ms	1/1	Y	-	1	1	3h1m	-
okd-w-4	0	0		0	0		0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	3h1m DOWN	L4CON in 0ms	1/1	Y	-	1	1	3h1m	-
Backend	0	0		0	68		0	2	2 000	26 674	1	3h1m	336 380	0	0	0	26 674	0	0	0	1	3h1m DOWN		0/0	0	0		1	3h1m	-



# Watch the systems

```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
DEBUG Loading Agent Config...
DEBUG Still waiting for the Kubernetes API: Get "https://api.lab.okd.lan:6443/version": EOF
DEBUG Still waiting for the Kubernetes API: Get "https://api.lab.okd.lan:6443/version": EOF
INFO API v1.28.2-3598+6e2789bbd58938-dirty up
DEBUG Loading Install Config...
DEBUG Loading SSH Key...
DEBUG Loading Base Domain...
DEBUG Loading Platform...
DEBUG Loading Cluster Name...
DEBUG Loading Base Domain...
DEBUG Loading Platform...
DEBUG Loading Pull Secret...
DEBUG Loading Platform...
DEBUG Using Install Config loaded from state file
INFO Waiting up to 30m0s (until 6:25PM CDT) for bootstrapping to complete...
DEBUG Bootstrap status: complete
INFO It is now safe to remove the bootstrap resources
DEBUG Time elapsed per stage:
DEBUG Bootstrap Complete: 17m48s
DEBUG API: 5m29s
INFO Time elapsed: 17m48s
sysadmin@jump:~/Downloads$
```

# Watch the systems

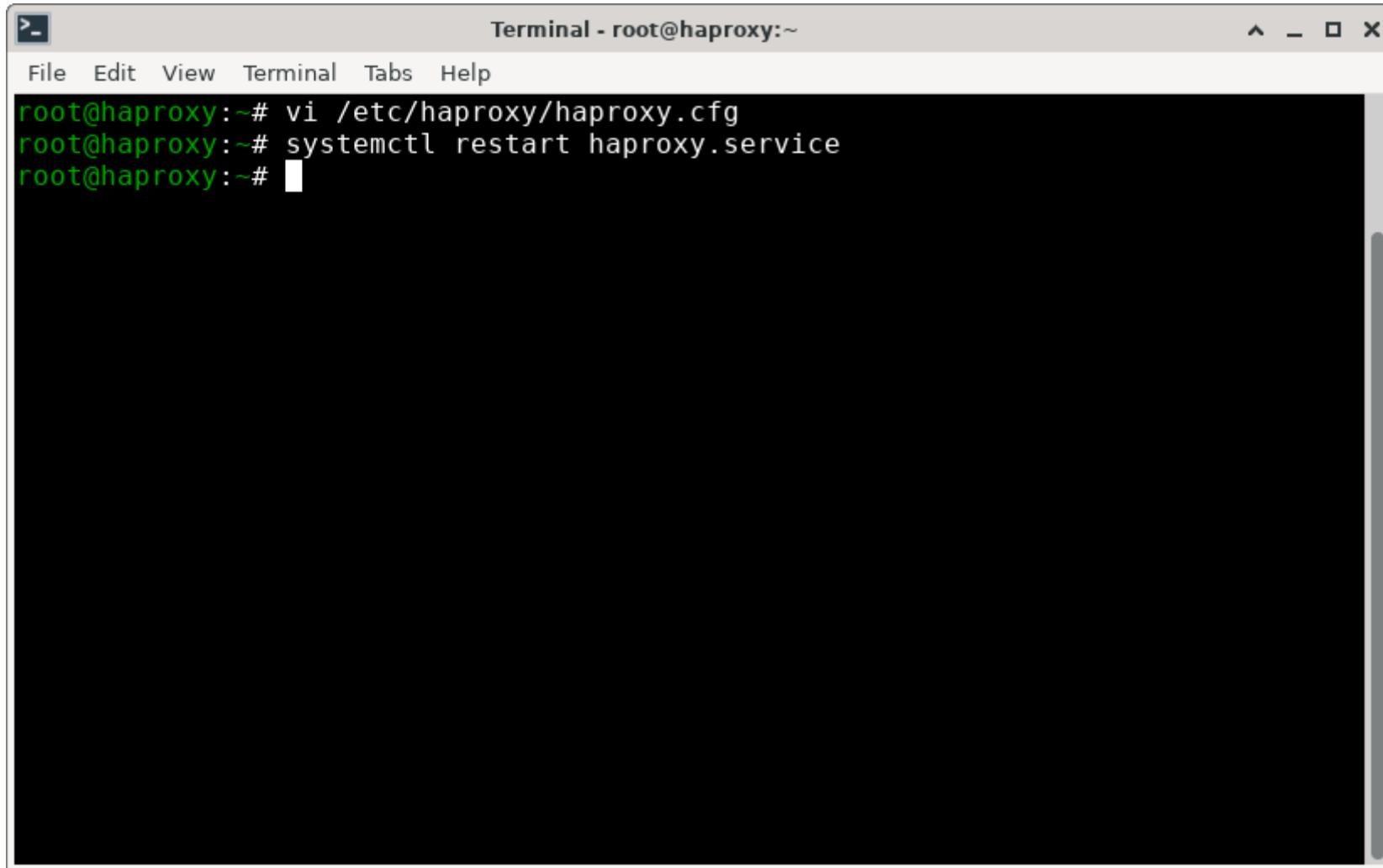
```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
mode tcp
balance source
#   server      okd-bootstrap 192.168.22.200:6443 check
server      okd-cp-1 192.168.22.201:6443 check
server      okd-cp-2 192.168.22.202:6443 check
server      okd-cp-3 192.168.22.203:6443 check

# OKD Machine Config Server
frontend okd_machine_config_server_frontend
mode tcp
bind :22623
default_backend okd_machine_config_server_backend

backend okd_machine_config_server_backend
mode tcp
balance source
##  server      okd-bootstrap 192.168.22.200:22623 check
server      okd-cp-1 192.168.22.201:22623 check
server      okd-cp-2 192.168.22.202:22623 check
server      okd-cp-3 192.168.22.203:22623 check

# OKD Ingress - layer 4 tcp mode for each. Ingress Controller will handle layer
7.
-- INSERT --                                     66,1                               65%
```

# Watch the systems



```
Terminal - root@haproxy:~
File Edit View Terminal Tabs Help
root@haproxy:~# vi /etc/haproxy/haproxy.cfg
root@haproxy:~# systemctl restart haproxy.service
root@haproxy:~#
```

	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend				1	1	-	1	1	1	20 000	2		456	52 891	0	0	0	0	0	0	0	0	OPEN								
Backend	0	0		0	0		0	0	2 000	0	0	0s	456	52 891	0	0	0	0	0	0	0	0	15s UP		0/0	0	0		0		

**k8s api frontend**

	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings		Server									
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend				7	117	-	43	93		20 000	199		159 573	503 499	0	0	0	0	0	0	0	0	OPEN								

**k8s api backend**

	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings		Server								
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-cp-1	0	0	-	1	50		16	41	-	70	70	0s	46 237	168 424	0	0	0	0	0	0	0	15s UP	L4OK in 0ms	1/1	Y	-	0	0	0s	-
okd-cp-2	0	0	-	1	26		13	19	-	46	46	0s	37 933	107 962	0	0	0	0	0	0	0	15s UP	L4OK in 0ms	1/1	Y	-	0	0	0s	-
okd-cp-3	0	0	-	4	43		14	33	-	83	83	0s	75 403	227 113	0	0	0	0	0	0	0	15s UP	L4OK in 0ms	1/1	Y	-	0	0	0s	-
Backend	0	0		7	117		43	93		2 000	199	0s	159 573	503 499	0	0	0	0	0	0	0	15s UP		3/3	3	0		0	0s	

**okd machine config server frontend**

	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings		Server									
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend				0	0	-	0	0	0	20 000	0		0	0	0	0	0	0	0	0	0	0	OPEN								

**okd machine config server backend**

	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings		Server								
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-cp-1	0	0	-	0	0		0	0	-	0	0	? 0s	0	0	0	0	0	0	0	0	0	15s UP	L4OK in 0ms	1/1	Y	-	0	0	0s	-
okd-cp-2	0	0	-	0	0		0	0	-	0	0	? 0s	0	0	0	0	0	0	0	0	0	15s UP	L4OK in 0ms	1/1	Y	-	0	0	0s	-
okd-cp-3	0	0	-	0	0		0	0	-	0	0	? 0s	0	0	0	0	0	0	0	0	0	15s UP	L4OK in 0ms	1/1	Y	-	0	0	0s	-
Backend	0	0		0	0		0	0	2 000	0	0	? 0s	0	0	0	0	0	0	0	0	0	15s UP		3/3	3	0		0	0s	

**okd http ingress frontend**

	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings		Server									
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend				0	0	-	0	0	0	20 000	0		0	0	0	0	0	0	0	0	0	0	OPEN								

**okd http ingress backend**

	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings		Server								
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-w-1	0	0	-	0	0		0	0	-	0	0	? 0s	0	0	0	0	0	0	0	0	0	14s DOWN	L4CON in 1ms	1/1	Y	-	1	1	14s	-
okd-w-2	0	0	-	0	0		0	0	-	0	0	? 0s	0	0	0	0	0	0	0	0	0	14s DOWN	L4CON in 0ms	1/1	Y	-	1	1	14s	-
okd-w-3	0	0	-	0	0		0	0	-	0	0	? 0s	0	0	0	0	0	0	0	0	0	14s DOWN	L4CON in 1ms	1/1	Y	-	1	1	14s	-
okd-w-4	0	0	-	0	0		0	0	-	0	0	? 0s	0	0	0	0	0	0	0	0	0	14s DOWN	L4CON in 0ms	1/1	Y	-	1	1	14s	-
Backend	0	0		0	0		0	0	2 000	0	0	? 0s	0	0	0	0	0	0	0	0	0	14s DOWN		0/0	0	0		1	14s	

**okd https ingress frontend**

	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings		Server									
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend				0	0	-	0	0	0	20 000	0		0	0	0	0	0	0	0	0	0	0	OPEN								

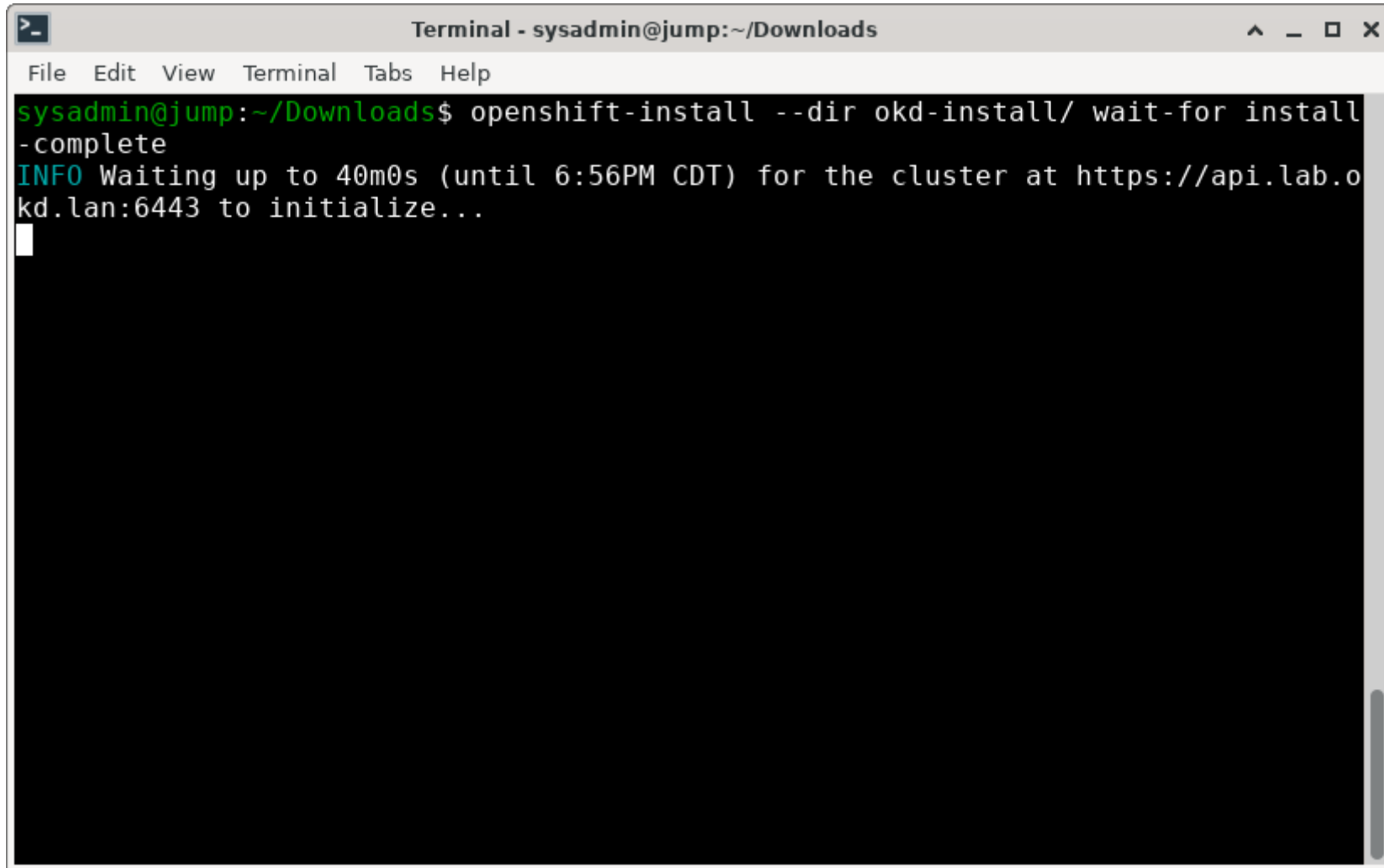
**okd https ingress backend**

	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings		Server								
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-w-1	0	0	-	0	0		0	0	-	0	0	? 0s	0	0	0	0	0	0	0	0	0	14s DOWN	L4CON in 0ms	1/1	Y	-	1	1	14s	-
okd-w-2	0	0	-	0	0		0	0	-	0	0	? 0s	0	0	0	0	0	0	0	0	0	14s DOWN	L4CON in 1ms	1/1	Y	-	1	1	14s	-
okd-w-3	0	0	-	0	0		0	0	-	0	0	? 0s	0	0	0	0	0	0	0	0	0	13s DOWN	L4CON in 1ms	1/1	Y	-	1	1	13s	-
okd-w-4	0	0	-	0	0		0	0	-	0	0	? 0s	0	0	0	0	0	0	0	0	0	13s DOWN	L4CON in 0ms	1/1	Y	-	1	1	13s	-
Backend	0	0		0	0		0	0	2 000	0	0	? 0s	0	0	0	0	0	0	0	0	0	13s DOWN		0/0	0	0		1	13s	

Now you can  
watch the rest  
of the  
installation

- `openshift-install --dir okd-install wait-for install-complete`

# Watch the installation

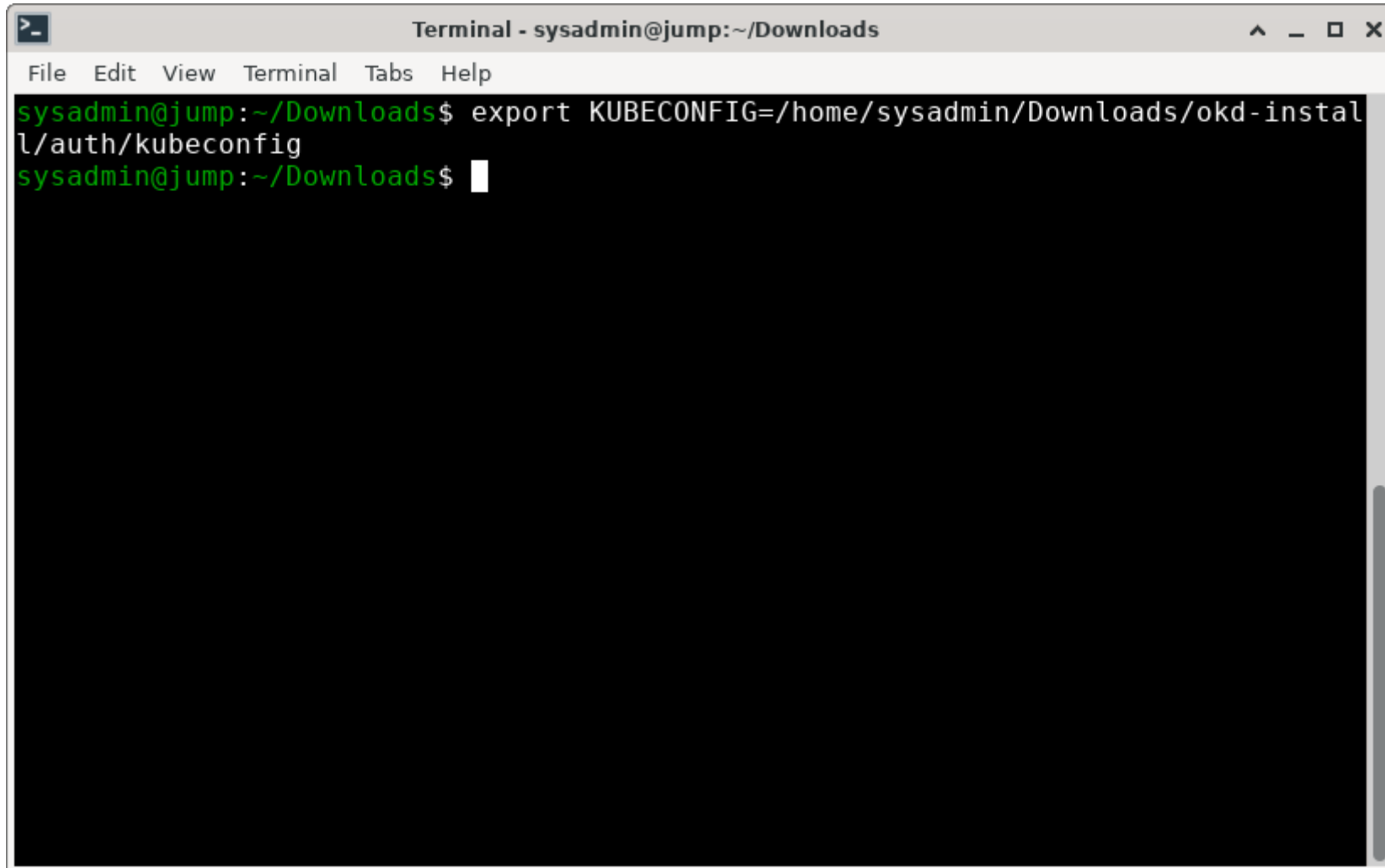


```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ openshift-install --dir okd-install/ wait-for install
-complete
INFO Waiting up to 40m0s (until 6:56PM CDT) for the cluster at https://api.lab.o
kd.lan:6443 to initialize...
```

# Join the worker nodes to the cluster

- Log into the workstation and authenticate to the cluster
- Set KUBECONFIG variable
- Check identity
- Approve certificate signing requests
- Approve with:
  - `oc get csr -o go-template='{{range .items}}{{if not .status}}{{.metadata.name}}{"\n"}}{{end}}{{end}}' | xargs oc adm certificate approve`
- You'll have to do it a couple of times

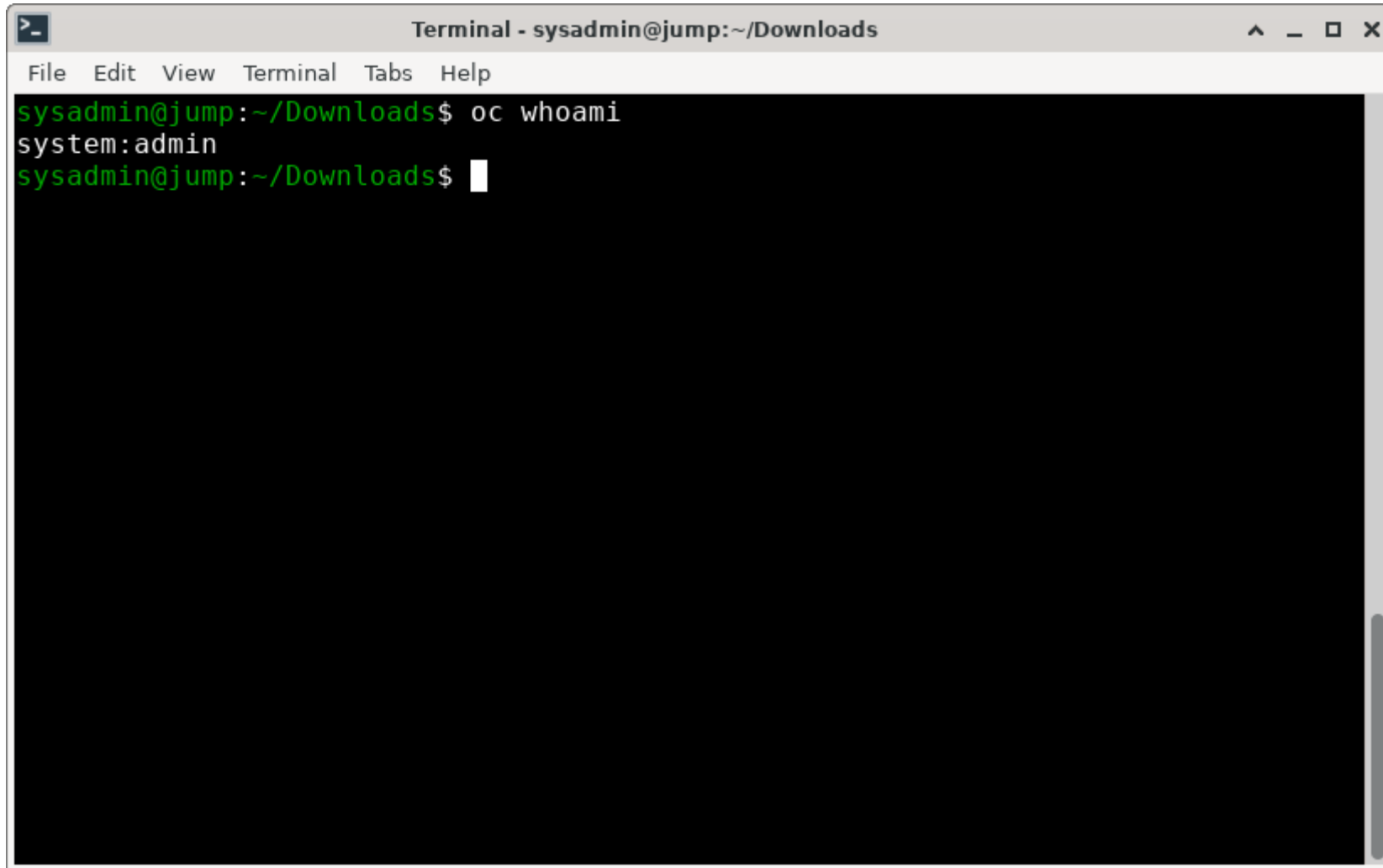
# Log in to the workstation

A terminal window titled "Terminal - sysadmin@jump:~/Downloads" with a menu bar (File, Edit, View, Terminal, Tabs, Help). The terminal shows the command `export KUBECONFIG=/home/sysadmin/Downloads/okd-install/auth/kubeconfig` being entered and executed. The prompt `sysadmin@jump:~/Downloads$` is visible on two lines.

```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ export KUBECONFIG=/home/sysadmin/Downloads/okd-install/auth/kubeconfig
sysadmin@jump:~/Downloads$
```



# Log in to the workstation



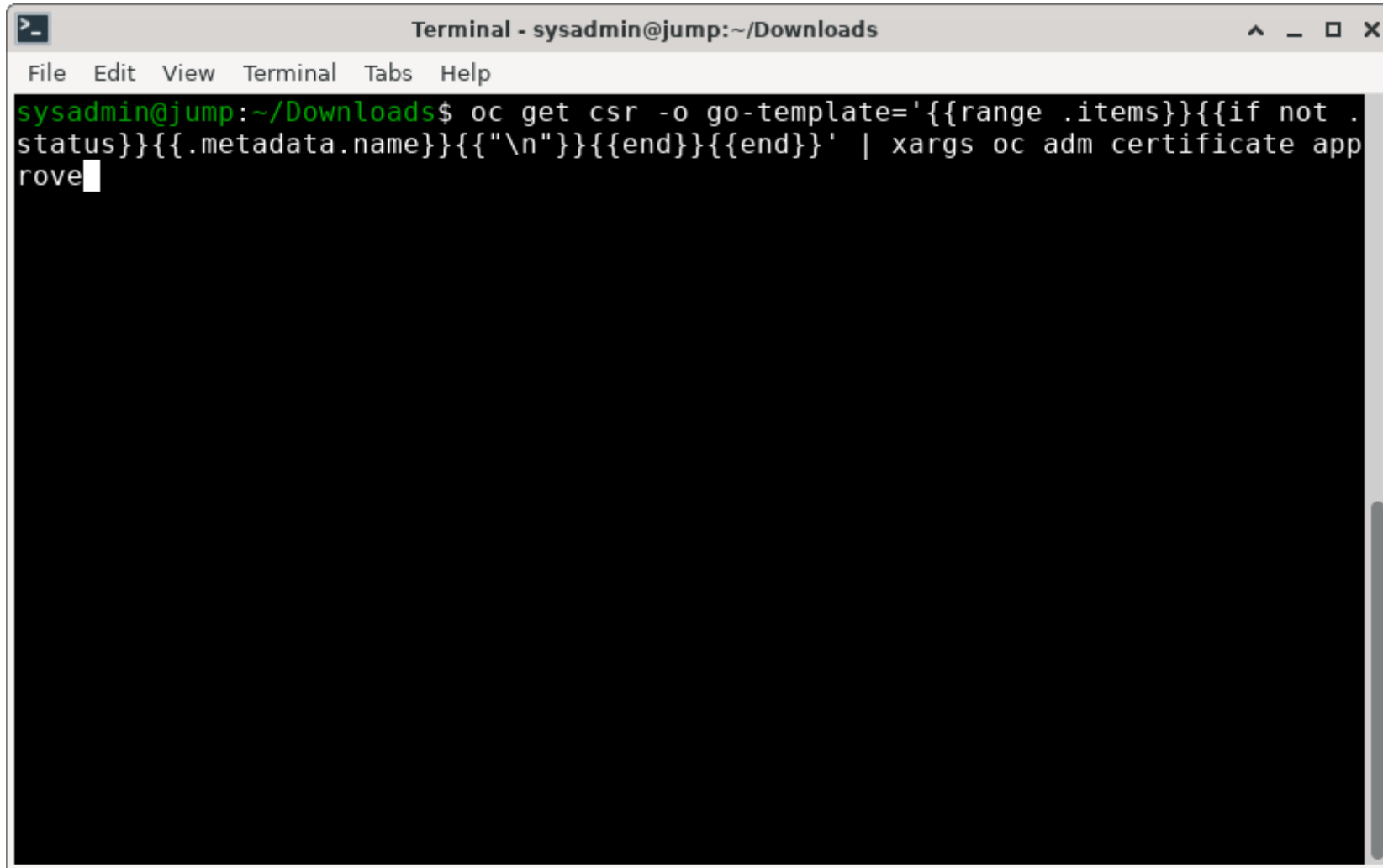
A terminal window titled "Terminal - sysadmin@jump:~/Downloads" is shown. The window has a menu bar with "File", "Edit", "View", "Terminal", "Tabs", and "Help". The terminal content shows the following sequence of text: a green prompt "sysadmin@jump:~/Downloads\$", a command "oc whoami" in green, the output "system:admin" in white, and a second green prompt "sysadmin@jump:~/Downloads\$" with a white cursor. The terminal background is black.

```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ oc whoami
system:admin
sysadmin@jump:~/Downloads$
```

# Check CSRs

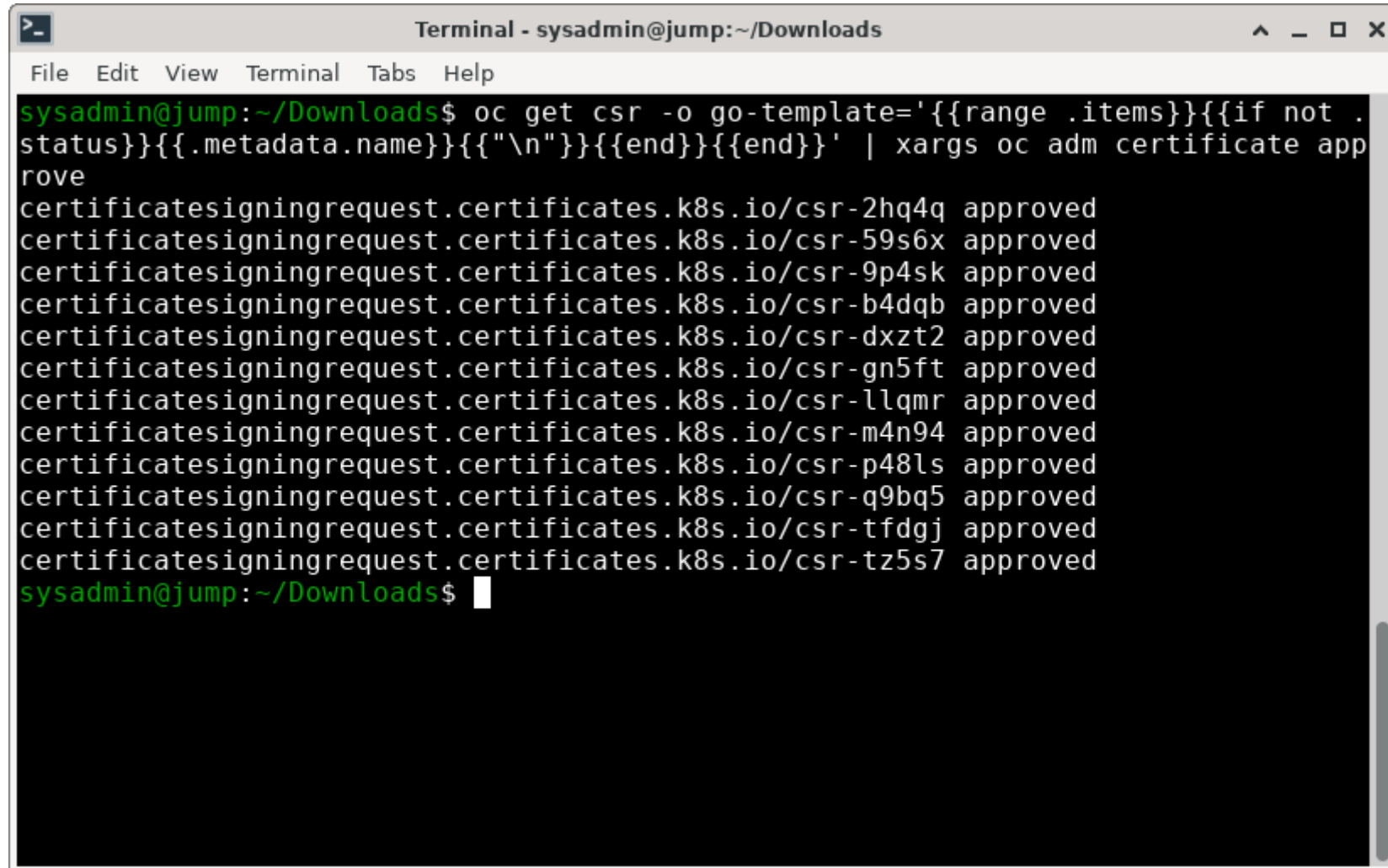
```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ oc get csr | grep Pending
csr-9p4sk                               13m   kubernetes.io/kube-apiser
ver-client-kubelet                       system:serviceaccount:openshift-machine-config-operator:nod
e-bootstrapper                           <none>   Pending
csr-b4dqb                               13m   kubernetes.io/kube-apiser
ver-client-kubelet                       system:serviceaccount:openshift-machine-config-operator:nod
e-bootstrapper                           <none>   Pending
csr-dxzt2                               13m   kubernetes.io/kube-apiser
ver-client-kubelet                       system:serviceaccount:openshift-machine-config-operator:nod
e-bootstrapper                           <none>   Pending
csr-gn5ft                               13m   kubernetes.io/kube-apiser
ver-client-kubelet                       system:serviceaccount:openshift-machine-config-operator:nod
e-bootstrapper                           <none>   Pending
csr-llqmr                               13m   kubernetes.io/kube-apiser
ver-client-kubelet                       system:serviceaccount:openshift-machine-config-operator:nod
e-bootstrapper                           <none>   Pending
csr-m4n94                               13m   kubernetes.io/kube-apiser
ver-client-kubelet                       system:serviceaccount:openshift-machine-config-operator:nod
e-bootstrapper                           <none>   Pending
csr-p48ls                               13m   kubernetes.io/kube-apiser
ver-client-kubelet                       system:serviceaccount:openshift-machine-config-operator:nod
e-bootstrapper                           <none>   Pending
csr-tfdgj                               13m   kubernetes.io/kube-apiser
ver-client-kubelet                       system:serviceaccount:openshift-machine-config-operator:nod
```

# Check CSRs



```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ oc get csr -o go-template='{{range .items}}{{if not .
status}}{{.metadata.name}}{"\n"}}{{end}}{{end}}' | xargs oc adm certificate app
rove
```

# Check CSRs

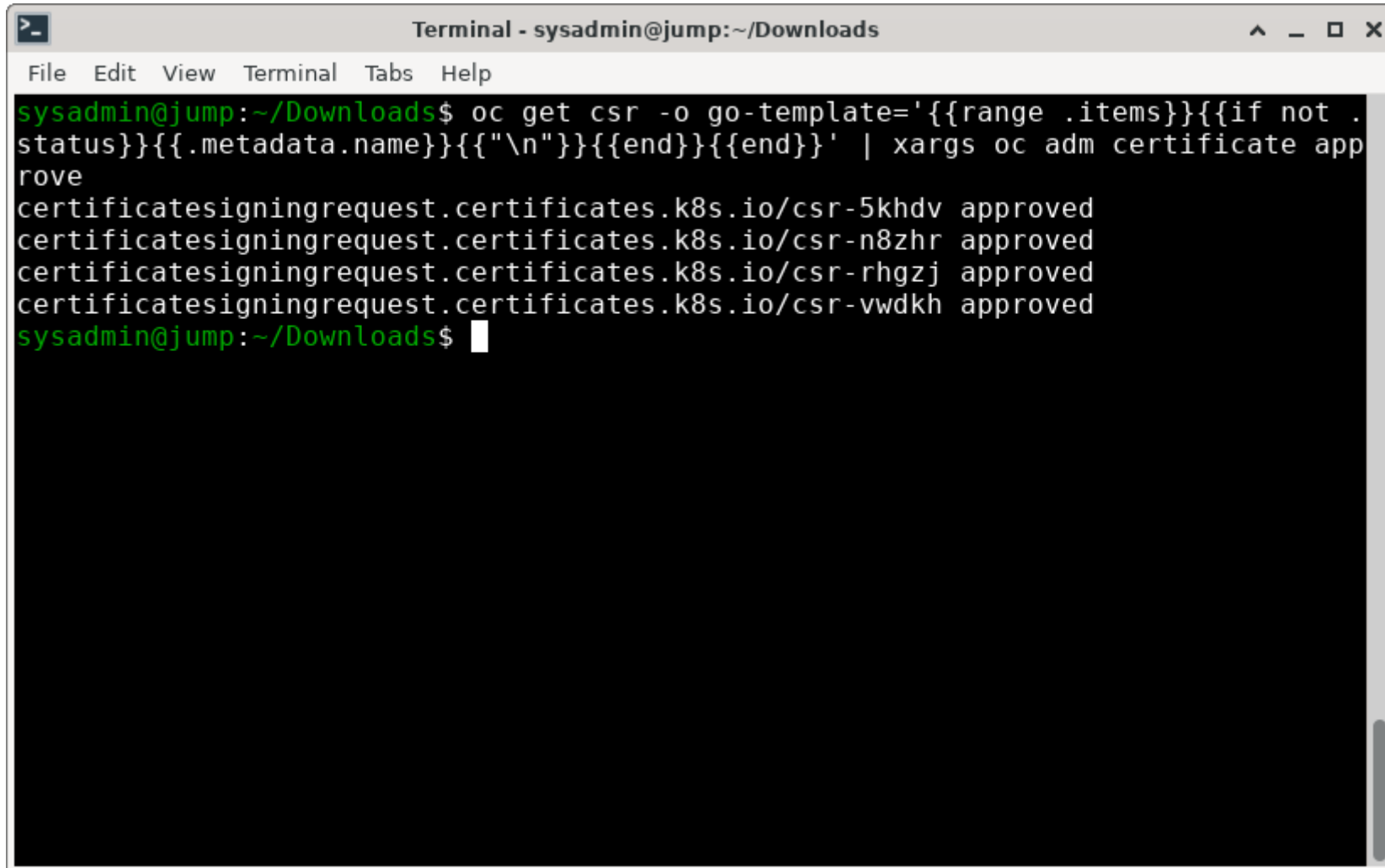


```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ oc get csr -o go-template='{{range .items}}{{if not .status}}{{.metadata.name}}{"\n"}}{{end}}{{end}}' | xargs oc adm certificate approve
certificatesigningrequest.certificates.k8s.io/csr-2hq4q approved
certificatesigningrequest.certificates.k8s.io/csr-59s6x approved
certificatesigningrequest.certificates.k8s.io/csr-9p4sk approved
certificatesigningrequest.certificates.k8s.io/csr-b4dqb approved
certificatesigningrequest.certificates.k8s.io/csr-dxzt2 approved
certificatesigningrequest.certificates.k8s.io/csr-gn5ft approved
certificatesigningrequest.certificates.k8s.io/csr-llqmr approved
certificatesigningrequest.certificates.k8s.io/csr-m4n94 approved
certificatesigningrequest.certificates.k8s.io/csr-p48ls approved
certificatesigningrequest.certificates.k8s.io/csr-q9bq5 approved
certificatesigningrequest.certificates.k8s.io/csr-tfdgj approved
certificatesigningrequest.certificates.k8s.io/csr-tz5s7 approved
sysadmin@jump:~/Downloads$
```

# Check CSRs

```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ oc get csr | grep Pending
csr-5khdv                               8s      kubernetes.io/kubelet-ser
ving                                     system:node:okd-w-1.lab.okd.lan
                                     <none>      Pending
csr-n8zhr                               15s     kubernetes.io/kubelet-ser
ving                                     system:node:okd-w-2.lab.okd.lan
                                     <none>      Pending
csr-rhgzj                               12s     kubernetes.io/kubelet-ser
ving                                     system:node:okd-w-4.lab.okd.lan
                                     <none>      Pending
csr-vwdkh                               10s     kubernetes.io/kubelet-ser
ving                                     system:node:okd-w-3.lab.okd.lan
                                     <none>      Pending
sysadmin@jump:~/Downloads$
```

# Check CSRs



```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ oc get csr -o go-template='{{range .items}}{{if not .
status}}{{.metadata.name}}{"\n"}}{{end}}{{end}}' | xargs oc adm certificate app
rove
certificatesigningrequest.certificates.k8s.io/csr-5khdv approved
certificatesigningrequest.certificates.k8s.io/csr-n8zhr approved
certificatesigningrequest.certificates.k8s.io/csr-rhgzj approved
certificatesigningrequest.certificates.k8s.io/csr-vwdkh approved
sysadmin@jump:~/Downloads$
```

# Check CSRs

```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ oc get nodes
NAME                                STATUS    ROLES    AGE    VERSION
okd-cp-1.lab.okd.lan                Ready    control-plane,master 29m    v1.28.7+6e2789b
okd-cp-2.lab.okd.lan                Ready    control-plane,master 29m    v1.28.7+6e2789b
okd-cp-3.lab.okd.lan                Ready    control-plane,master 29m    v1.28.7+6e2789b
okd-w-1.lab.okd.lan                 NotReady worker    99s    v1.28.7+6e2789b
okd-w-2.lab.okd.lan                 NotReady worker    105s   v1.28.7+6e2789b
okd-w-3.lab.okd.lan                 NotReady worker    101s   v1.28.7+6e2789b
okd-w-4.lab.okd.lan                 NotReady worker    103s   v1.28.7+6e2789b
sysadmin@jump:~/Downloads$
```

	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
Frontend				1	1	-	1	3		20 000	82		36 936	4 372 114	0	0	0					OPEN								
Backend	0	0		0	0		0	0	2 000	0	0	0s	36 936	4 372 114	0	0	0	0	0	0	0	13m40s UP		0/0	0	0		0		

k8s api frontend

	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings			Server							
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
Frontend				1	190	-	55	382		20 000	4 644		5 000 458	41 425 569	0	0	0	0	0	0	0	OPEN								

k8s api backend

	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings			Server							
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-cp-1	0	0	-	0	704		9	79	-	2 682	1 622	47s	1 940 008	25 524 399	0	0	0	350	7	1060	8	13m8s UP	L4OK in 0ms	1/1	Y	-	3	1	12s	-
okd-cp-2	0	0	-	1	26		18	21	-	1 013	1 013	0s	979 583	4 225 489	0	0	0	0	0	0	0	13m40s UP	L4OK in 0ms	1/1	Y	-	0	0	0s	-
okd-cp-3	0	0	-	0	61		28	66	-	2 017	2 017	36s	2 080 867	11 675 681	0	0	0	0	0	0	0	13m40s UP	L4OK in 0ms	1/1	Y	-	0	0	0s	-
Backend	0	0		1	190		55	381	2 000	4 644	4 652	0s	5 000 458	41 425 569	0	0	0	350	7	1060	8	13m40s UP		3/3	3	0	0	0s		

okd machine config server frontend

	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings			Server							
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
Frontend				0	0	-	0	0	0	20 000	0		0	0	0	0	0	0	0	0	0	OPEN								

okd machine config server backend

	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings			Server							
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-cp-1	0	0	-	0	0		0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	13m40s UP	L4OK in 0ms	1/1	Y	-	0	0	0s	-
okd-cp-2	0	0	-	0	0		0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	13m40s UP	L4OK in 0ms	1/1	Y	-	0	0	0s	-
okd-cp-3	0	0	-	0	0		0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	13m40s UP	L4OK in 0ms	1/1	Y	-	0	0	0s	-
Backend	0	0		0	0		0	0	2 000	0	0	?	0	0	0	0	0	0	0	0	0	13m40s UP		3/3	3	0	0	0s		

okd http ingress frontend

	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings			Server							
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
Frontend				0	0	-	0	0	0	20 000	0		0	0	0	0	0	0	0	0	0	OPEN								

okd http ingress backend

	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings			Server							
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-w-1	0	0	-	0	0		0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	13m39s DOWN	L4CON in 0ms	1/1	Y	-	1	1	13m39s	-
okd-w-2	0	0	-	0	0		0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	13m39s DOWN	L4CON in 0ms	1/1	Y	-	1	1	13m39s	-
okd-w-3	0	0	-	0	0		0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	13m39s DOWN	L4CON in 0ms	1/1	Y	-	1	1	13m39s	-
okd-w-4	0	0	-	0	0		0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	13m39s DOWN	L4CON in 0ms	1/1	Y	-	1	1	13m39s	-
Backend	0	0		0	0		0	0	2 000	0	0	?	0	0	0	0	0	0	0	0	0	13m39s DOWN		0/0	0	0	1	13m39s		

okd https ingress frontend

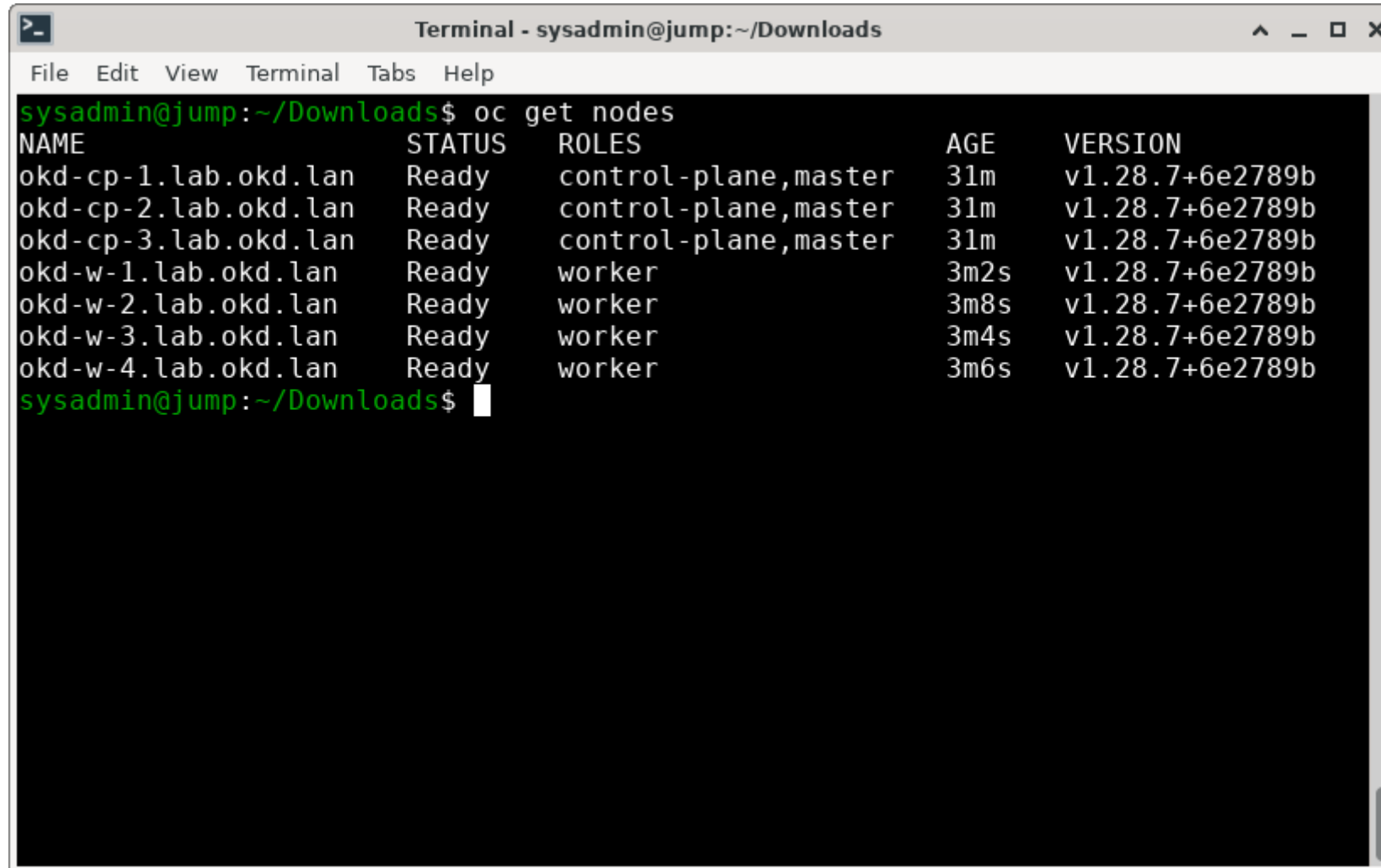
	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings			Server							
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
Frontend				0	0	-	0	0	0	20 000	0		0	0	0	0	0	0	0	0	0	OPEN								

okd https ingress backend

	Queue			Session rate			Sessions					Bytes			Denied		Errors			Warnings			Server							
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-w-1	0	0	-	0	0		0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	13m39s DOWN	L4CON in 0ms	1/1	Y	-	1	1	13m39s	-
okd-w-2	0	0	-	0	0		0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	13m39s DOWN	L4CON in 0ms	1/1	Y	-	1	1	13m39s	-
okd-w-3	0	0	-	0	0		0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	13m38s DOWN	L4CON in 1ms	1/1	Y	-	1	1	13m38s	-
okd-w-4	0	0	-	0	0		0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	13m38s DOWN	L4CON in 0ms	1/1	Y	-	1	1	13m38s	-
Backend	0	0		0	0		0	0	2 000	0	0	?	0	0	0	0	0	0	0	0	0	13m38s DOWN		0/0	0	0	1	13m38s		



# Check CSRs



```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ oc get nodes
NAME                                STATUS    ROLES                                AGE     VERSION
okd-cp-1.lab.okd.lan                Ready    control-plane,master                31m     v1.28.7+6e2789b
okd-cp-2.lab.okd.lan                Ready    control-plane,master                31m     v1.28.7+6e2789b
okd-cp-3.lab.okd.lan                Ready    control-plane,master                31m     v1.28.7+6e2789b
okd-w-1.lab.okd.lan                 Ready    worker                               3m2s    v1.28.7+6e2789b
okd-w-2.lab.okd.lan                 Ready    worker                               3m8s    v1.28.7+6e2789b
okd-w-3.lab.okd.lan                 Ready    worker                               3m4s    v1.28.7+6e2789b
okd-w-4.lab.okd.lan                 Ready    worker                               3m6s    v1.28.7+6e2789b
sysadmin@jump:~/Downloads$
```

	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend				1	1	-	1	3	20 000	89	0	0s	40 128	4 752 356	0	0	0	0	0	0	0	0	OPEN								
Backend	0	0	0	0	0	0	0	0	2 000	0	0	0s	40 128	4 752 356	0	0	0	0	0	0	0	0	14m51s UP		0/0	0	0	0	0		

k8s api frontend

	Queue			Session rate			Sessions					Bytes		Denied		Errors			Warnings		Server										
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend	0	0	0	0	190	-	75	382	20 000	4 733	0	0s	5 280 158	47 808 543	0	0	0	0	0	0	0	0	OPEN								

k8s api backend

	Queue			Session rate			Sessions					Bytes		Denied		Errors			Warnings		Server									
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-cp-1	0	0	-	0	704	-	14	79	-	2 715	1 655	32s	2 146 810	30 807 151	0	0	0	350	7	1060	8	14m19s UP	L4OK in 0ms	1/1	Y	-	3	1	12s	-
okd-cp-2	0	0	-	0	26	-	23	25	-	1 049	1 049	9s	1 040 908	5 297 365	0	0	0	0	0	0	0	14m51s UP	L4OK in 0ms	1/1	Y	-	0	0	0s	-
okd-cp-3	0	0	-	0	61	-	38	66	-	2 037	2 037	28s	2 092 440	11 704 027	0	0	0	0	0	0	0	14m51s UP	L4OK in 0ms	1/1	Y	-	0	0	0s	-
Backend	0	0	0	0	190	0	75	381	2 000	4 733	4 741	9s	5 280 158	47 808 543	0	0	0	350	7	1060	8	14m51s UP		3/3	3	0	0	0s		

okd machine config server frontend

	Queue			Session rate			Sessions					Bytes		Denied		Errors			Warnings		Server										
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend	0	0	0	0	0	-	0	0	0	20 000	0	0s	0	0	0	0	0	0	0	0	0	0	OPEN								

okd machine config server backend

	Queue			Session rate			Sessions					Bytes		Denied		Errors			Warnings		Server									
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-cp-1	0	0	-	0	0	-	0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	14m51s UP	L4OK in 1ms	1/1	Y	-	0	0	0s	-
okd-cp-2	0	0	-	0	0	-	0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	14m51s UP	L4OK in 0ms	1/1	Y	-	0	0	0s	-
okd-cp-3	0	0	-	0	0	-	0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	14m51s UP	L4OK in 0ms	1/1	Y	-	0	0	0s	-
Backend	0	0	0	0	0	0	0	0	2 000	0	0	?	0	0	0	0	0	0	0	0	0	14m51s UP		3/3	3	0	0	0s		

okd http ingress frontend

	Queue			Session rate			Sessions					Bytes		Denied		Errors			Warnings		Server										
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend	0	0	0	0	0	-	0	0	0	20 000	0	0s	0	0	0	0	0	0	0	0	0	0	OPEN								

okd http ingress backend

	Queue			Session rate			Sessions					Bytes		Denied		Errors			Warnings		Server									
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-w-1	0	0	-	0	0	-	0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	29s UP	L4OK in 1ms	1/1	Y	-	1	1	14m21s	-
okd-w-2	0	0	-	0	0	-	0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	14m50s DOWN	L4CON in 1ms	1/1	Y	-	1	1	14m50s	-
okd-w-3	0	0	-	0	0	-	0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	14m50s DOWN	L4CON in 1ms	1/1	Y	-	1	1	14m50s	-
okd-w-4	0	0	-	0	0	-	0	0	0	0	0	?	0	0	0	0	0	0	0	0	0	9s UP	L4OK in 1ms	1/1	Y	-	1	1	14m41s	-
Backend	0	0	0	0	0	0	0	0	2 000	0	0	?	0	0	0	0	0	0	0	0	0	29s UP		2/2	2	0	1	1	14m21s	

okd https ingress frontend

	Queue			Session rate			Sessions					Bytes		Denied		Errors			Warnings		Server										
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle	
Frontend	0	0	0	0	10	-	0	3	20 000	56	0	0s	21 919	158 761	0	0	0	0	0	0	0	0	OPEN								

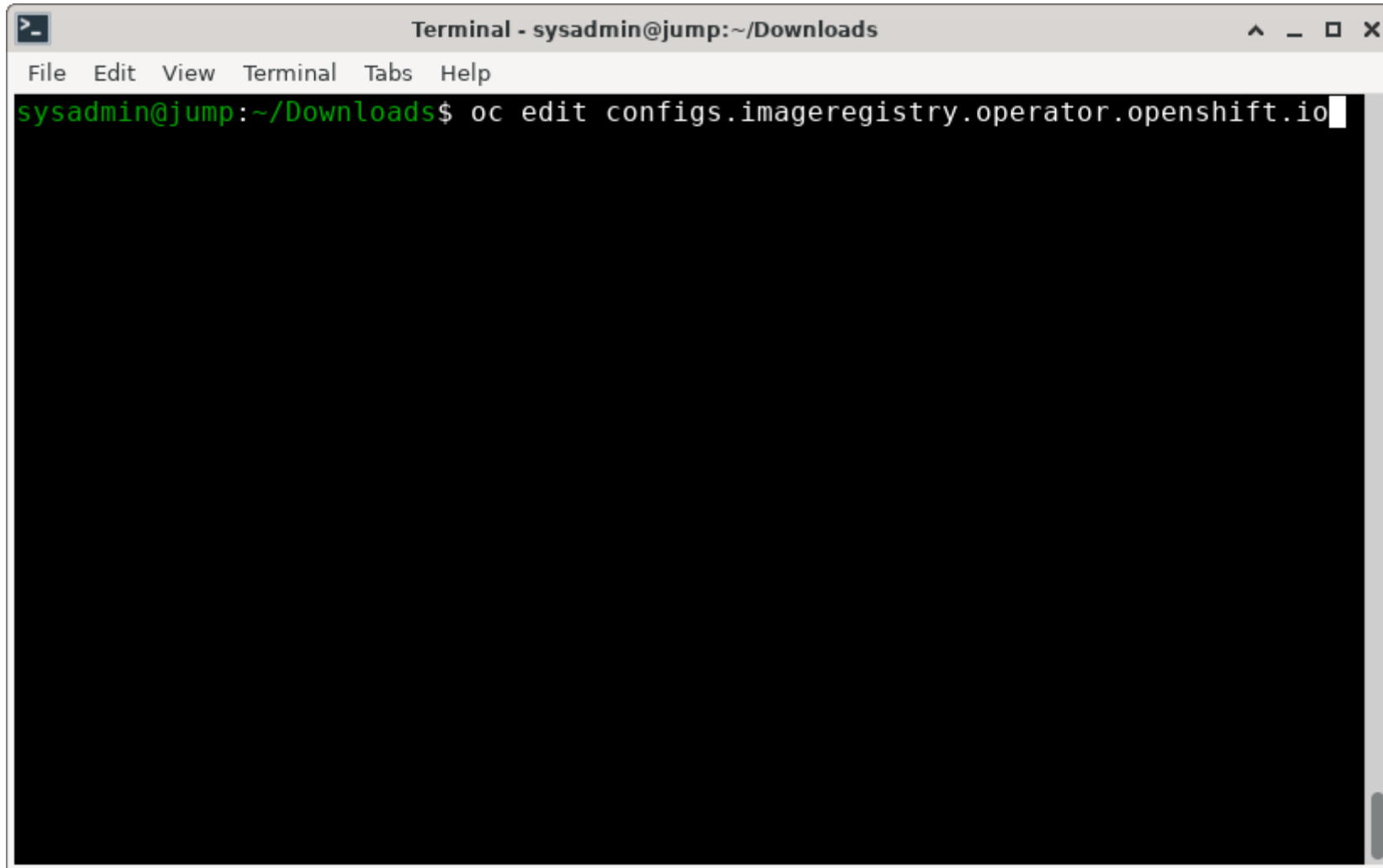
okd https ingress backend

	Queue			Session rate			Sessions					Bytes		Denied		Errors			Warnings		Server									
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	Req	Conn	Resp	Retr	Redis	Status	LastChk	Wght	Act	Bck	Chk	Dwn	Dwntme	Thrtle
okd-w-1	0	0	-	0	6	-	0	2	-	30	30	17s	12 045	81 795	0	0	0	0	0	0	0	29s UP	L4OK in 0ms	1/1	Y	-	1	1	14m21s	-
okd-w-2	0	0	-	0	0	-	0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	14m50s DOWN	L4CON in 1ms	1/1	Y	-	1	1	14m50s	-
okd-w-3	0	0	-	0	0	-	0	0	-	0	0	?	0	0	0	0	0	0	0	0	0	14m49s DOWN	L4CON in 1ms	1/1	Y	-	1	1	14m49s	-
okd-w-4	0	0	-	0	10	-	0	2	-	17	17	2s	9 024	76 966	0	0	0	0	0	0	0	8s UP	L4OK in 1ms	1/1	Y	-	1	1	14m41s	-
Backend	0	0	0	0	10	0	0	2	2 000	56	47	2s	21 919	158 761	0	0	9	0	0	0	0	29s UP		2/2	2	0	1	1	14m20s	

# Configure storage for registry

- We'll use the NFS storage we set up earlier for the registry
- `oc edit configs.imageregistry.operator.openshift.io`

# Set up storage



A terminal window titled "Terminal - sysadmin@jump:~/Downloads" with a menu bar containing "File", "Edit", "View", "Terminal", "Tabs", and "Help". The terminal shows the command `oc edit configs.imageregistry.operator.openshift.io` being entered at the prompt `sysadmin@jump:~/Downloads$`. The rest of the terminal area is black.

# Set up storage

```
Terminal - sysadmin@jump:~
File Edit View Terminal Tabs Help
1 # Please edit the object below. Lines beginning with a '#' will be ignored,$
2 # and an empty file will abort the edit. If an error occurs while saving thi
3 # reopened with the relevant failures.$
4 # $
5 apiVersion: imageregistry.operator.openshift.io/v1$
6 kind: Config$
7 metadata:$
8   creationTimestamp: "2024-04-12T23:09:55Z"$
9   finalizers:$
10  - imageregistry.operator.openshift.io/finalizers$
11  generation: 1$
12  name: cluster$
13  resourceVersion: "41614"$
14  uid: 130c52cf-b631-46d6-b267-8acbf03f1f6b$
15 spec:$
16   logLevel: Normal$
17   managementState: Removed$
18   observedConfig: null$
19   operatorLogLevel: Normal$
20   proxy: {}$
21   replicas: 1$
22   requests:$
17,20 Top
```

# Set up storage

```
Terminal - sysadmin@jump:~
File Edit View Terminal Tabs Help
1 # Please edit the object below. Lines beginning with a '#' will be ignored,$
2 # and an empty file will abort the edit. If an error occurs while saving thi
3 # reopened with the relevant failures.$
4 # $
5 apiVersion: imageregistry.operator.openshift.io/v1$
6 kind: Config$
7 metadata:$
8   creationTimestamp: "2024-04-12T23:09:55Z"$
9   finalizers:$
10  - imageregistry.operator.openshift.io/finalizers$
11  generation: 1$
12  name: cluster$
13  resourceVersion: "41614"$
14  uid: 130c52cf-b631-46d6-b267-8acbf03f1f6b$
15 spec:$
16   logLevel: Normal$
17   managementState: Managed$
18   observedConfig: null$
19   operatorLogLevel: Normal$
20   proxy: {}$
21   replicas: 1$
22   requests:$
-- INSERT --
17,27 Top
```

# Set up storage

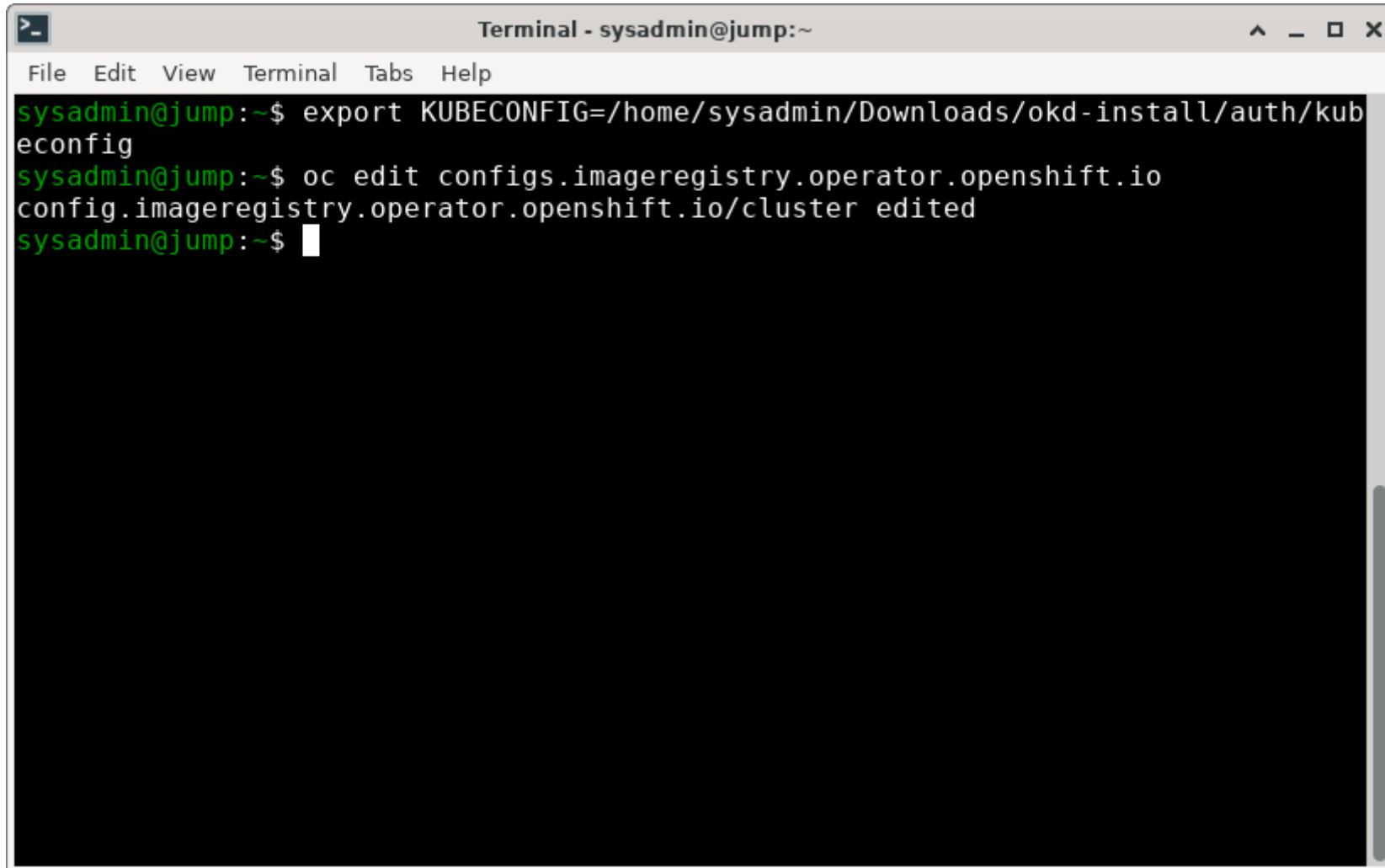
```
Terminal - sysadmin@jump:~
File Edit View Terminal Tabs Help
11 generation: 1$
12 name: cluster$
13 resourceVersion: "41614"$
14 uid: 130c52cf-b631-46d6-b267-8acbf03f1f6b$
15 spec:$
16   logLevel: Normal$
17   managementState: Managed$
18   observedConfig: null$
19   operatorLogLevel: Normal$
20   proxy: {}$
21   replicas: 1$
22   requests:$
23     read:$
24       maxWaitInQueue: 0s$
25     write:$
26       maxWaitInQueue: 0s$
27   rolloutStrategy: RollingUpdate$
28   storage: {}$
29   unsupportedConfigOverrides: null$
30 status:$
31   conditions:$
32     - lastTransitionTime: "2024-04-12T23:33:41Z"$
33     message: All registry resources are removed$
28,13 15%
```

# Set up storage

```
Terminal - sysadmin@jump:~
File Edit View Terminal Tabs Help
13 resourceVersion: "41614"$
14 uid: 130c52cf-b631-46d6-b267-8acbf03f1f6b$
15 spec:$
16   logLevel: Normal$
17   managementState: Managed$
18   observedConfig: null$
19   operatorLogLevel: Normal$
20   proxy: {}$
21   replicas: 1$
22   requests:$
23     read:$
24       maxWaitInQueue: 0s$
25     write:$
26       maxWaitInQueue: 0s$
27   rolloutStrategy: RollingUpdate$
28   storage: $
29     pvc: $
30       claim:$
31   unsupportedConfigOverrides: null$
32 status:$
33   conditions:$
34   - lastTransitionTime: "2024-04-12T23:33:41Z"$
35     message: All registry resources are removed$
-- INSERT --                                     30,13      17%
```



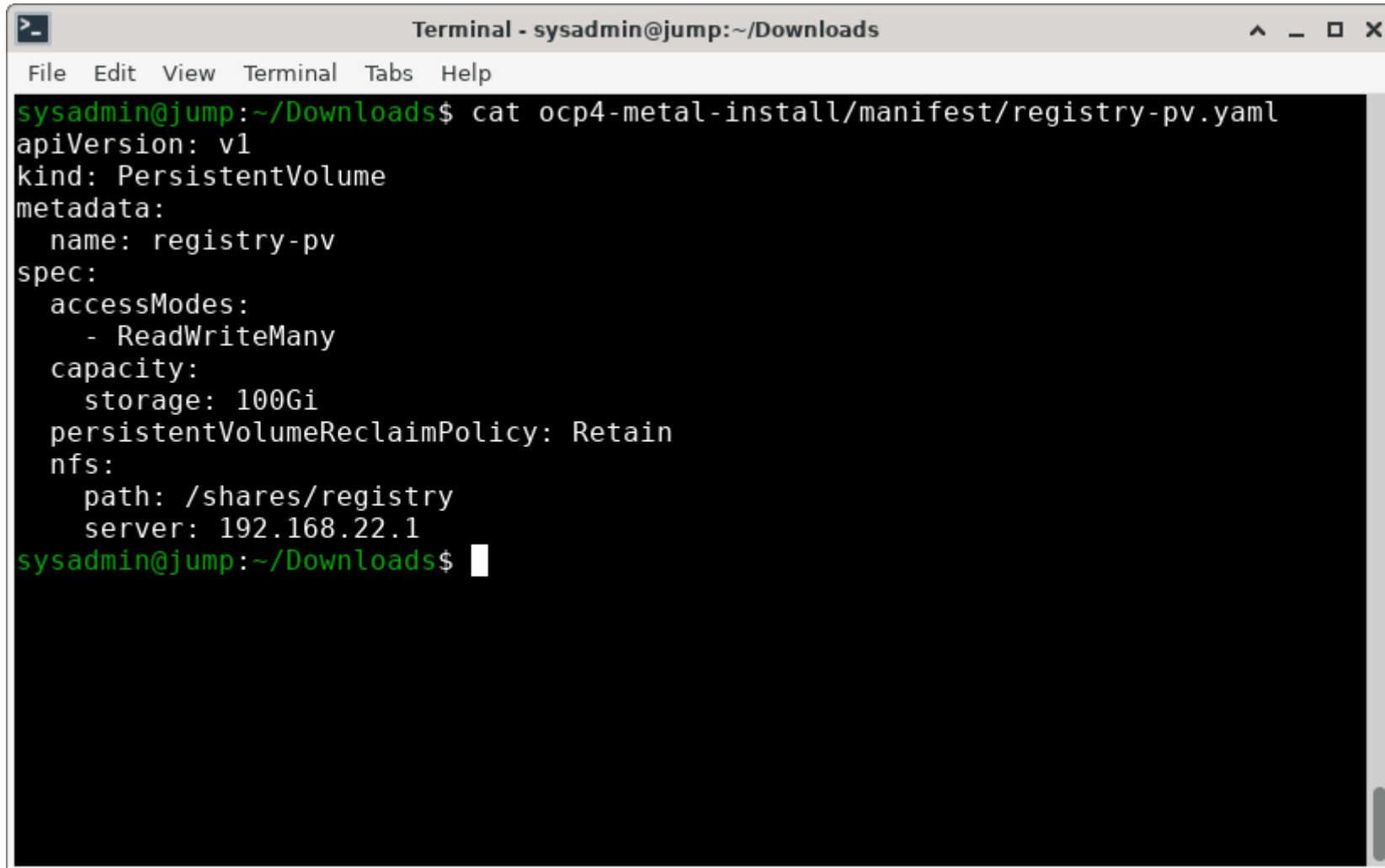
# Set up storage



```
Terminal - sysadmin@jump:~
File Edit View Terminal Tabs Help
sysadmin@jump:~$ export KUBECONFIG=/home/sysadmin/Downloads/okd-install/auth/kubeconfig
sysadmin@jump:~$ oc edit configs.imageregistry.operator.openshift.io/config.imageregistry.operator.openshift.io/cluster edited
sysadmin@jump:~$
```

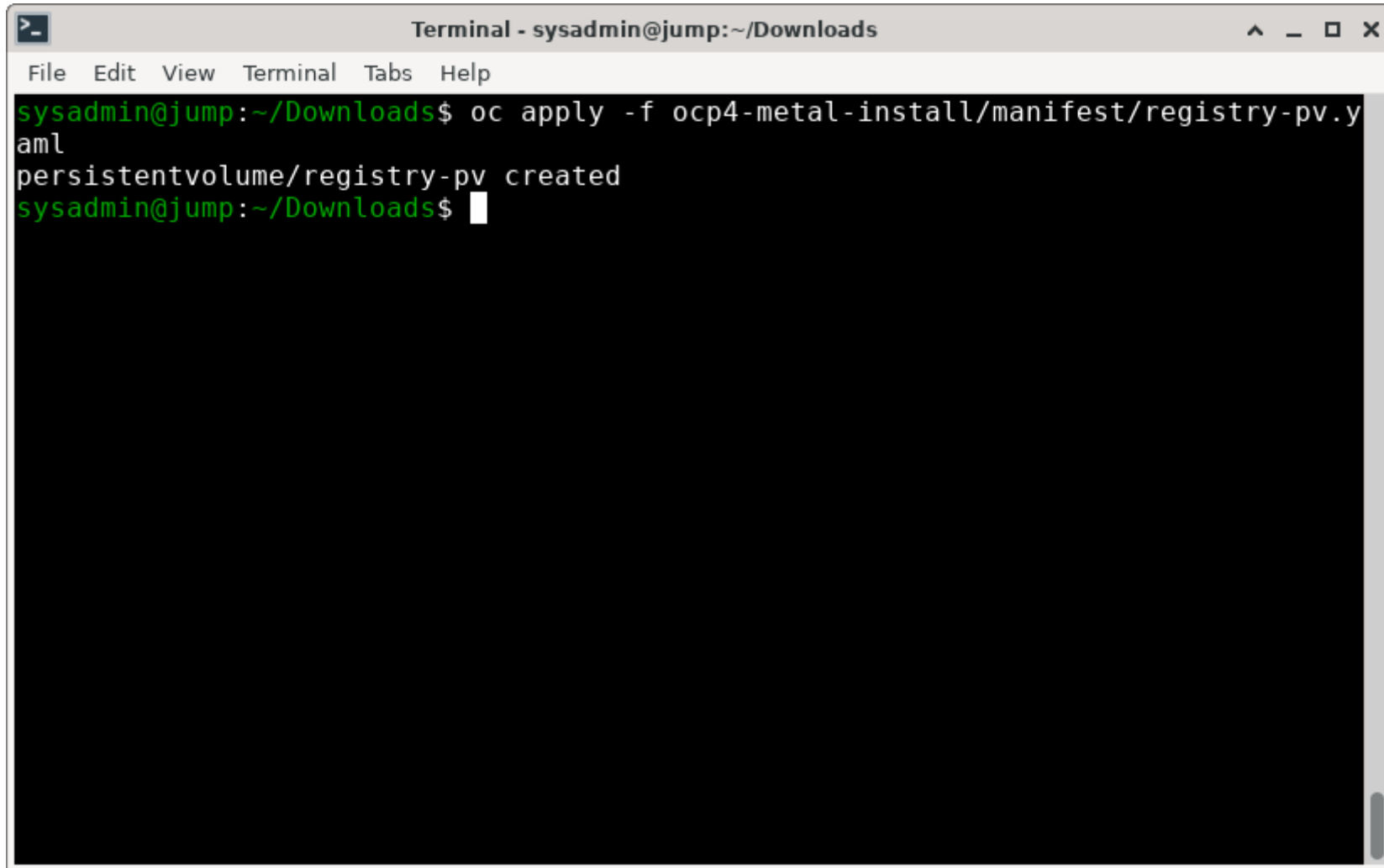


# Set up storage



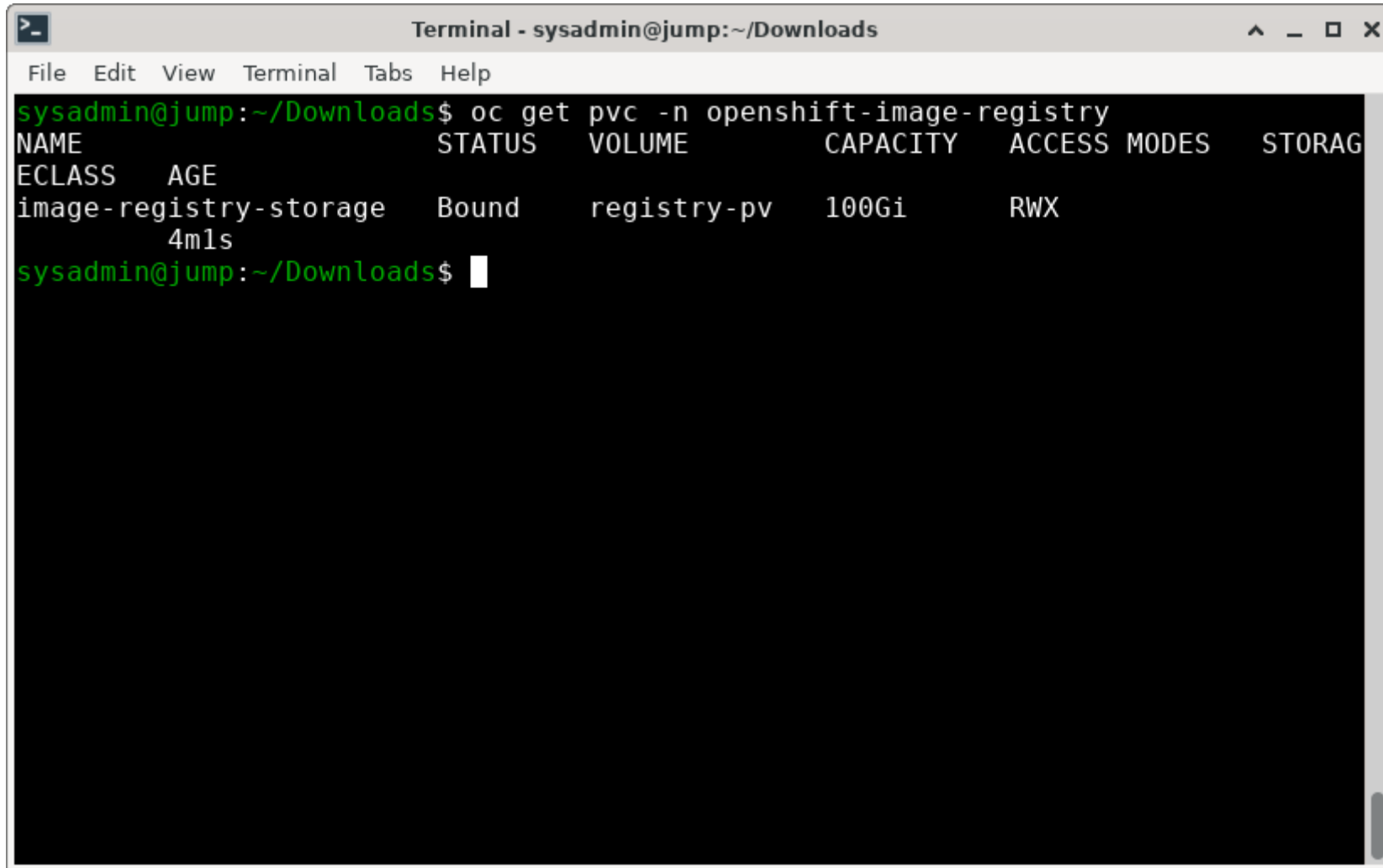
```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ cat ocp4-metal-install/manifest/registry-pv.yaml
apiVersion: v1
kind: PersistentVolume
metadata:
  name: registry-pv
spec:
  accessModes:
    - ReadWriteMany
  capacity:
    storage: 100Gi
  persistentVolumeReclaimPolicy: Retain
  nfs:
    path: /shares/registry
    server: 192.168.22.1
sysadmin@jump:~/Downloads$
```

# Set up storage



```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ oc apply -f ocp4-metal-install/manifest/registry-pv.y
aml
persistentvolume/registry-pv created
sysadmin@jump:~/Downloads$
```

# Set up storage



```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
sysadmin@jump:~/Downloads$ oc get pvc -n openshift-image-registry
NAME                                STATUS  VOLUME          CAPACITY  ACCESS MODES  STORAGECLASS  AGE
image-registry-storage              Bound   registry-pv     100Gi     RWX            registry-efs  4m1s
sysadmin@jump:~/Downloads$
```

# Setupp is finally complete

```
Terminal - sysadmin@jump:~/Downloads
File Edit View Terminal Tabs Help
level=debug msg=Cluster Operator node-tuning is stable
level=debug msg=Cluster Operator openshift-apiserver is stable
level=debug msg=Cluster Operator openshift-controller-manager is stable
level=debug msg=Cluster Operator openshift-samples is stable
level=debug msg=Cluster Operator operator-lifecycle-manager is stable
level=debug msg=Cluster Operator operator-lifecycle-manager-catalog is stable
level=debug msg=Cluster Operator operator-lifecycle-manager-packageserver is stable
level=debug msg=Cluster Operator service-ca is stable
level=debug msg=Cluster Operator storage is stable
level=info msg=All cluster operators have completed progressing
level=info msg=Checking to see if there is a route at openshift-console/console.
..
level=debug msg=Route found in openshift-console namespace: console
level=debug msg=OpenShift console route is admitted
level=info msg=Install complete!
level=info msg=To access the cluster as the system:admin user when using 'oc', run 'export KUBECONFIG=/home/sysadmin/Downloads/okd-install/auth/kubeconfig'
level=info msg=Access the OpenShift web-console here: https://console-openshift-console.apps.lab.okd.lan
level=info msg>Login to the console with user: "kubeadmin", and password: "aLoQj-QpaXa-eawJ8-IngrF"
level=info msg=Time elapsed: 0s
sysadmin@jump:~/Downloads$
```

Log into the  
console!

- <https://console-openshift-console.apps.lab.okd.lan>



```
File Edit View Ter  
sysadmin@jump:~  
sysadmin@jump:~  
UvULP-ZZ3FH-FDU
```

Log in . OKD - Google Chrome

Log in . OKD | openshift bare metal - Goog | Making OpenShift on Bare | Index of /ign

Not secure [https://oauth-openshift.apps.lab.okd.lan/login?then=%2Foauth%2Fauthorize%3Fclient\\_id%3Dconsole%26redirect\\_uri%3Dhttps%253A%252F%252Fconsole-openshift-console.ap...](https://oauth-openshift.apps.lab.okd.lan/login?then=%2Foauth%2Fauthorize%3Fclient_id%3Dconsole%26redirect_uri%3Dhttps%253A%252F%252Fconsole-openshift-console.ap...)


Personal Sparksoft

## Log in to your account

**Username \***

**Password \***

[Log in](#)



Welcome to OKD





- Trash
- File System
- Home
- password.txt
- okd-install

Overview · Cluster · OKD - Google Chrome

Not secure https://console-openshift-console.apps.lab.okd.io/dashboards

Personal Sparksoft

This cluster is updating from to 4.15.0-0.okd-2024-03-10-010116

okd

3 kube:admin

You are logged in as a temporary administrative user. Update the [cluster OAuth configuration](#) to allow others to log in.

## Overview

### Cluster

**Getting started resources**

- Set up your cluster**  
Finish setting up your cluster with recommended configurations.  
Add identity providers →  
Configure alert receivers →  
[View all steps in documentation](#)
- Build with guided documentation**  
Follow guided documentation to build applications and familiarize yourself with key features.  
Monitor your sample application →  
Install Red Hat Developer Hub (RHDH) with an Operator →  
[View all quick starts](#)
- Explore new admin features**  
Explore new features and resources within the admin perspective.  
API Explorer →  
OperatorHub →  
[See what's new in OpenShift 4.15](#)

Details <a href="#">View settings</a>	Status <a href="#">View alerts</a>	Activity <a href="#">View events</a>
<b>Cluster API address</b> https://api.lab.okd.io:6443  <b>Cluster ID</b> 1d370d57-5399-42df-84de-bff268aa9531	<div style="display: flex; justify-content: space-between;"> <div> <span>✓</span> Cluster           </div> <div> <span>✓</span> Control Plane           </div> <div> <span>✓</span> Operators           </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div> <span>⚠</span> Insights Disabled           </div> <div> <span>✓</span> Dynamic Plugins           </div> </div>	<p>Ongoing</p> <p>There are no ongoing activities.</p>

And that's a  
wrap!

- Now you have an on-prem OKD cluster to play with!
- Note that I did this in my office with some **really** old Intel NUC computers. It's running just fine.
- I hope you've enjoyed this, thank you so much for coming!

# Thank You!

Any questions?