HIGH-AVAILABILITY CLUSTERING IN RED HAT ENTERPRISE LINUX

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Agenda

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Agenda

- What is clustering?
  - HA
  - Computational
- What we're going to discuss today
- Host installation
- Set up the iSCSI target (server)
- Set up the iSCSI initiators (clients)

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Agenda

- Install the clustering software
- Start the cluster
- Configure STONITH
- Set up an active/passive Apache cluster
- Add a clustered filesystem
- Test

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Types of Clusters

- Generally speaking, there are two common types of clusters
  - High availability
  - Computational

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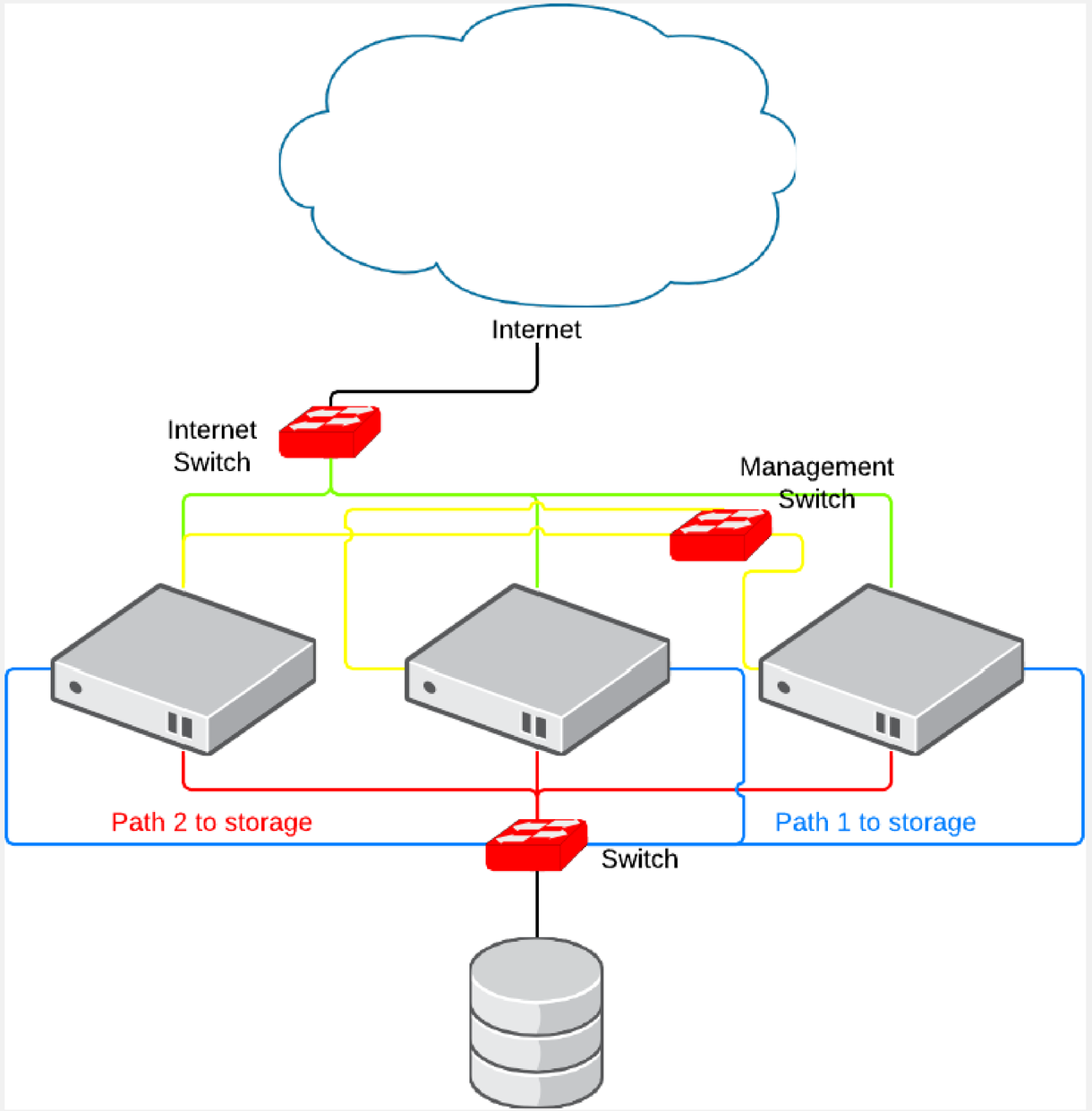
High Availability Clusters

- Multiple nodes serving the same workload. Primary design goal is that if one node goes down, the application continues with minimal interruption.
- Can use shared storage
  - Clustered DB
  - Clustered web apps
  - Clustered file servers

redhat.


Internet
Internet
Switch
Management
Switch
Path 2 to storage
Path 1 to storage
Switch

redhat.

Computational Clusters

- Multiple nodes working on the same or similar datasets. Design goal is to throw massive resources at a complex problem to solve it quickly.
- Typically uses local or network storage
  - Monte Carlo simulations for financial services
  - Oil field reservoir simulation and modeling
  - Chip design and simulation and modeling

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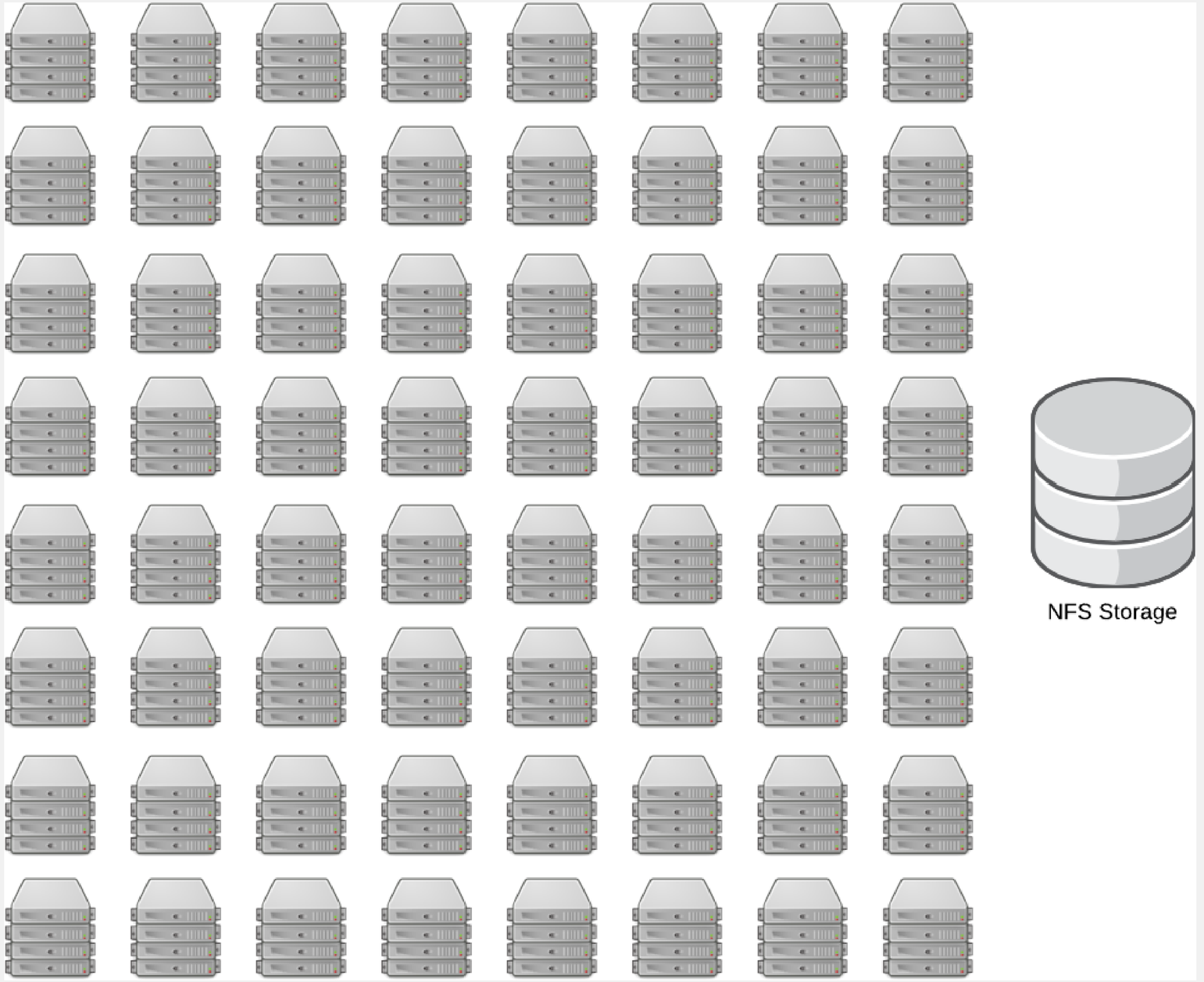
NFS Storage

What we're covering today

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High Availability Clustering

- We're going to do a **very** basic cluster. We'd never use this design for production, but it is great for self-study and attaining a basic understanding of clustering.
  - Single ethernet network
  - iSCSI storage
  - Three nodes

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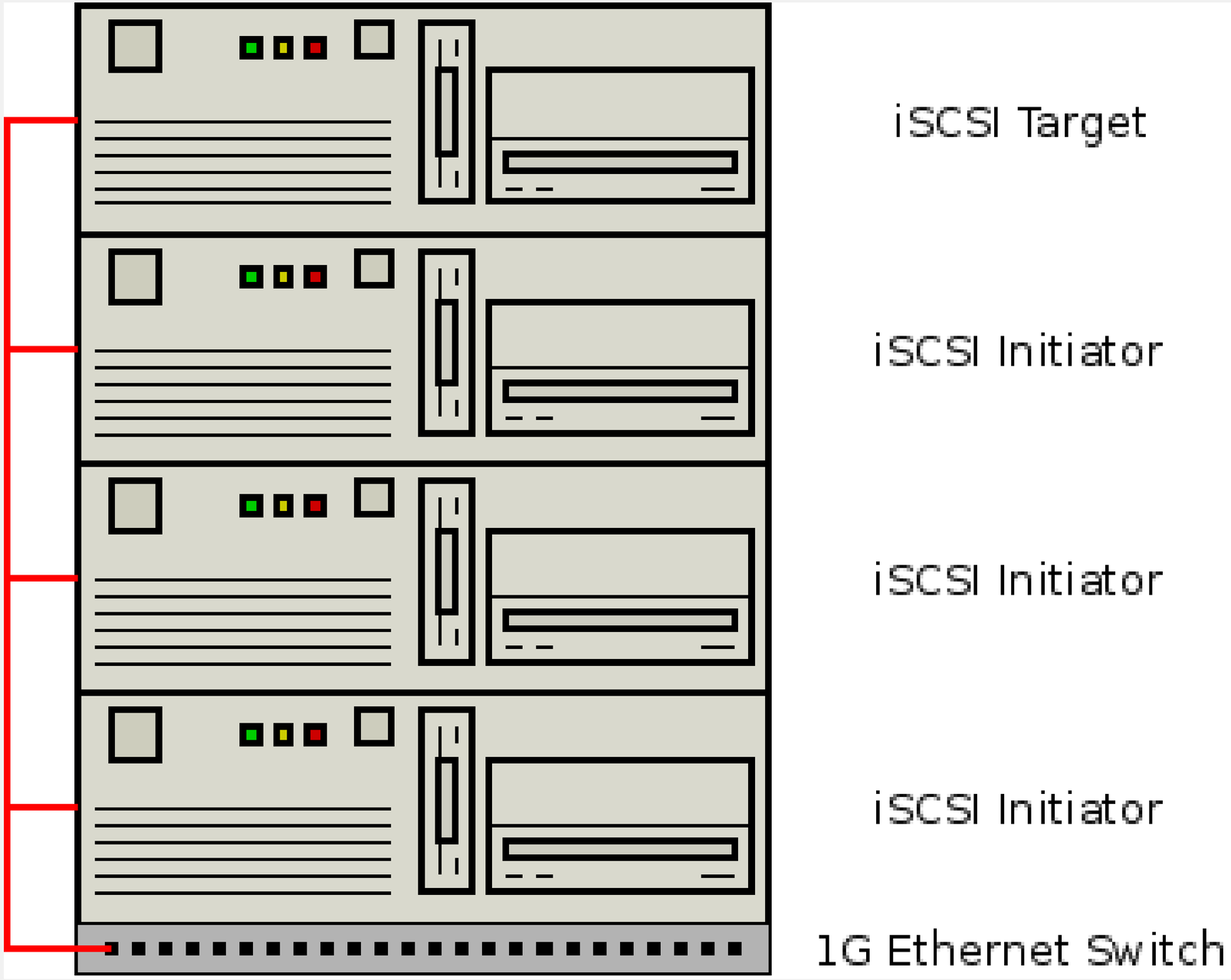
iSCSI Target
iSCSI Initiator
iSCSI Initiator
iSCSI Initiator
1G Ethernet Switch

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Host installation & requirements

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Kickstart

- Super basic kickstart – just @core and @base

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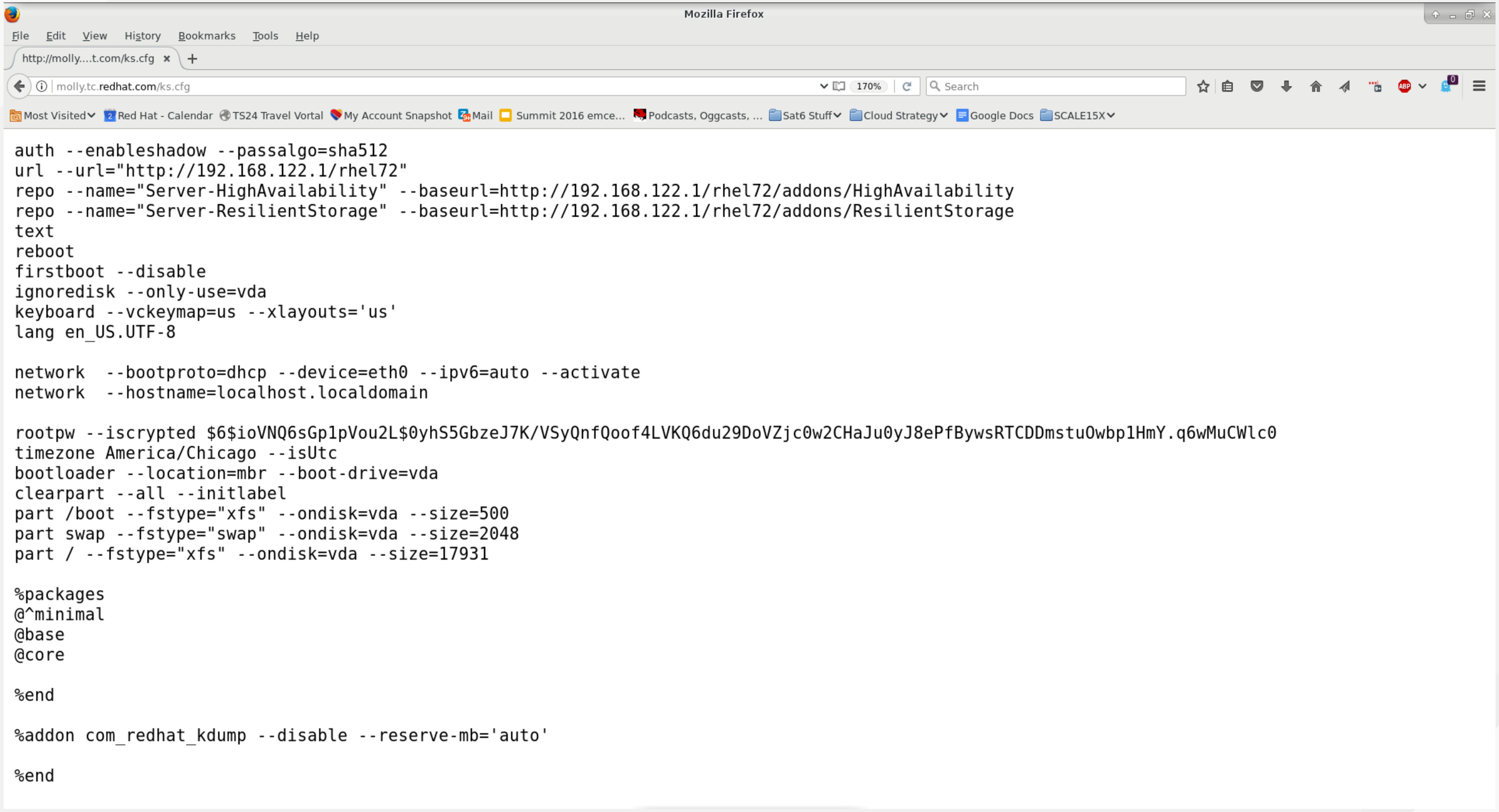
Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://molly....t.com/ks.cfg
molly.tc.redhat.com/ks.cfg
170%
Search
Most Visited Red Hat - Calendar TS24 Travel Vortal My Account Snapshot Mail Summit 2016 emce... Podcasts, Oggcasts, ... Sat6 Stuff Cloud Strategy Google Docs SCALE15X
auth --enableshadow --passalgo=sha512
url --url="http://192.168.122.1/rhel72"
repo --name="Server-HighAvailability" --baseurl=http://192.168.122.1/rhel72/addons/HighAvailability
repo --name="Server-ResilientStorage" --baseurl=http://192.168.122.1/rhel72/addons/ResilientStorage
text
reboot
firstboot --disable
ignoredisk --only-use=vda
keyboard --vckeymap=us --xlayouts='us'
lang en_US.UTF-8
network --bootproto=dhcp --device=eth0 --ipv6=auto --activate
network --hostname=localhost.localdomain
rootpw --iscrypted 6ioVNQ6sGp1pVou2L$0yhS5GbzeJ7K/VSyQnfQoof4LVKQ6du29DoVZjc0w2CHaJu0yJ8ePfBywsRTCDDmstuOwbp1HmY.q6wMuCWlc0
timezone America/Chicago --isUtc
bootloader --location=mbr --boot-drive=vda
clearpart --all --initlabel
part /boot --fstype="xfs" --ondisk=vda --size=500
part swap --fstype="swap" --ondisk=vda --size=2048
part / --fstype="xfs" --ondisk=vda --size=17931
%packages
@^minimal
@base
@core
%end
%addon com_redhat_kdump --disable --reserve-mb='auto'
%end

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Disable the Firewall

- We would not do this in production – this is only for lab purposes
  - systemctl disable firewalld
  - systemctl stop firewalld
  - iptables -L

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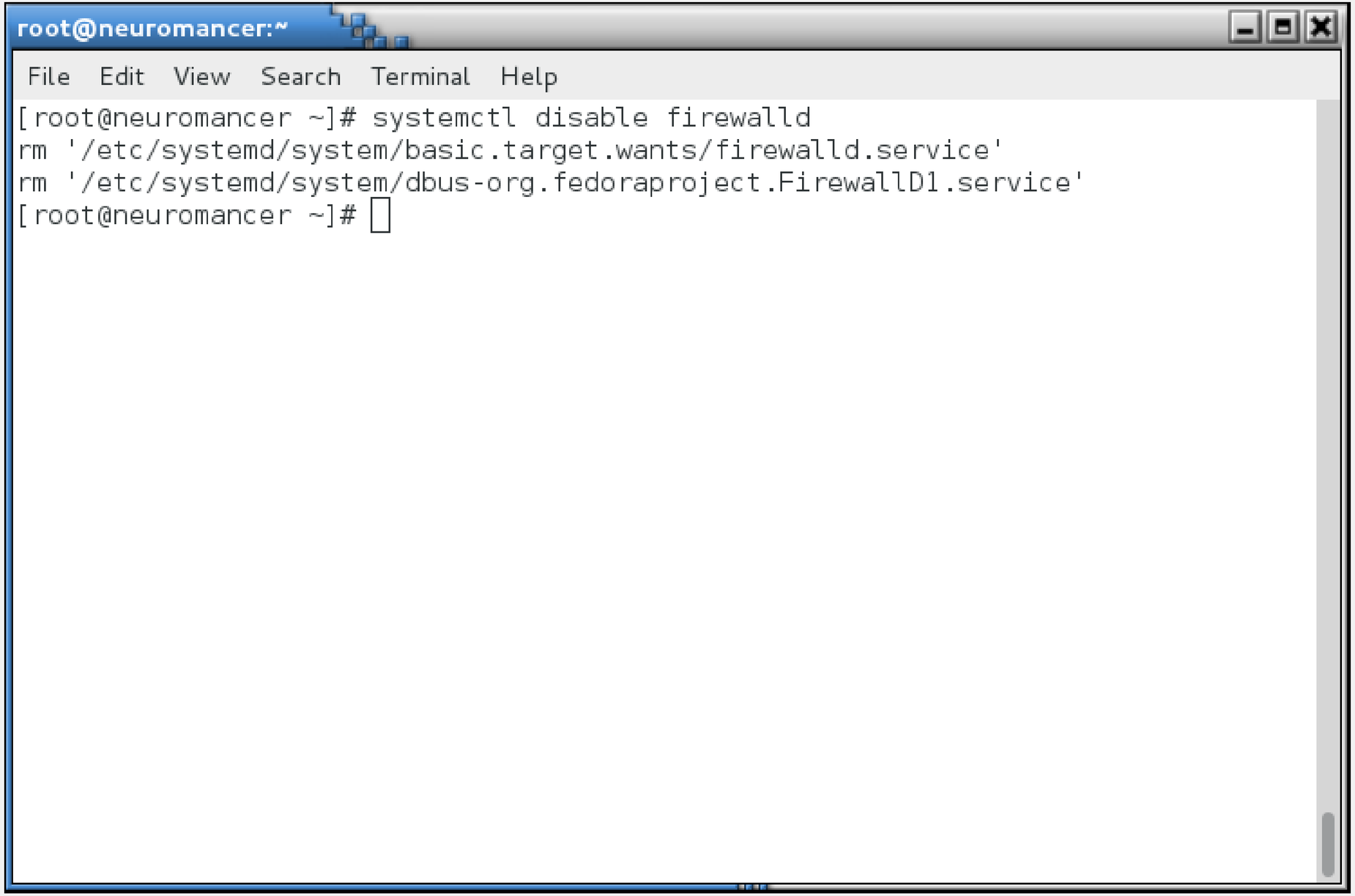
root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# systemctl disable firewalld
rm '/etc/systemd/system/basic.target.wants/firewalld.service'
rm '/etc/systemd/system/dbus-org.fedoraproject.FirewallD1.service'
[root@neuromancer ~]#

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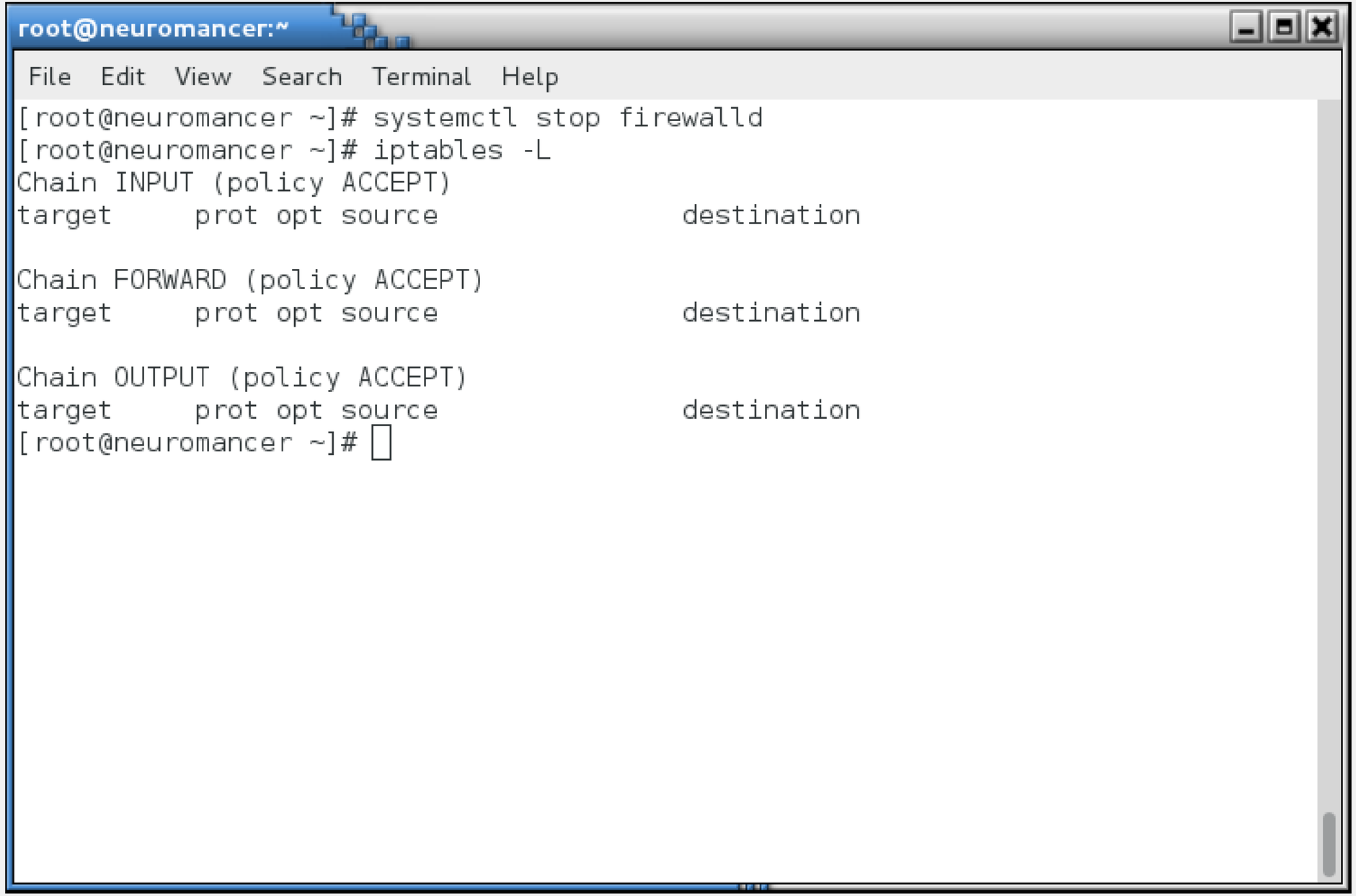
root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# systemctl stop firewalld
[root@neuromancer ~]# iptables -L
Chain INPUT (policy ACCEPT)
target prot opt source destination
Chain FORWARD (policy ACCEPT)
target prot opt source destination
Chain OUTPUT (policy ACCEPT)
target prot opt source destination
[root@neuromancer ~]#

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Set up time

- Run “timedatectl status” to make sure that the systemd time and date service is active and using NTP

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root@neuromancer:~

File Edit View Search Terminal Help

```
[root@neuromancer ~]# timedatectl status
      Local time: Sat 2014-03-22 15:48:47 CDT
  Universal time: Sat 2014-03-22 20:48:47 UTC
        RTC time: Sat 2014-03-22 20:48:48
        Timezone: America/Chicago (CDT, -0500)
     NTP enabled: yes
NTP synchronized: yes
 RTC in local TZ: no
      DST active: yes
 Last DST change: DST began at
                  Sun 2014-03-09 01:59:59 CST
                  Sun 2014-03-09 03:00:00 CDT
 Next DST change: DST ends (the clock jumps one hour backwards) at
                  Sun 2014-11-02 01:59:59 CDT
                  Sun 2014-11-02 01:00:00 CST
[root@neuromancer ~]#
```

root@hideo:~

File Edit View Search Terminal Help

```
[root@hideo ~]# timedatectl status
      Local time: Sat 2014-03-22 15:48:51 CDT
  Universal time: Sat 2014-03-22 20:48:51 UTC
        RTC time: Sat 2014-03-22 20:48:51
        Timezone: America/Chicago (CDT, -0500)
     NTP enabled: yes
NTP synchronized: yes
 RTC in local TZ: no
      DST active: yes
 Last DST change: DST began at
                  Sun 2014-03-09 01:59:59 CST
                  Sun 2014-03-09 03:00:00 CDT
 Next DST change: DST ends (the clock jumps one hour backwards) at
                  Sun 2014-11-02 01:59:59 CDT
                  Sun 2014-11-02 01:00:00 CST
[root@hideo ~]#
```

root@lady3jane:~

File Edit View Search Terminal Help

```
[root@lady3jane ~]# timedatectl status
      Local time: Sat 2014-03-22 15:48:52 CDT
  Universal time: Sat 2014-03-22 20:48:52 UTC
        RTC time: Sat 2014-03-22 20:48:51
        Timezone: America/Chicago (CDT, -0500)
     NTP enabled: yes
NTP synchronized: yes
 RTC in local TZ: no
      DST active: yes
 Last DST change: DST began at
                  Sun 2014-03-09 01:59:59 CST
                  Sun 2014-03-09 03:00:00 CDT
 Next DST change: DST ends (the clock jumps one hour backwards) at
                  Sun 2014-11-02 01:59:59 CDT
                  Sun 2014-11-02 01:00:00 CST
[root@lady3jane ~]#
```

root@maelcum:~

File Edit View Search Terminal Help

```
[root@maelcum ~]# timedatectl status
      Local time: Sat 2014-03-22 15:48:51 CDT
  Universal time: Sat 2014-03-22 20:48:51 UTC
        RTC time: Sat 2014-03-22 20:48:51
        Timezone: America/Chicago (CDT, -0500)
     NTP enabled: yes
NTP synchronized: yes
 RTC in local TZ: no
      DST active: yes
 Last DST change: DST began at
                  Sun 2014-03-09 01:59:59 CST
                  Sun 2014-03-09 03:00:00 CDT
 Next DST change: DST ends (the clock jumps one hour backwards) at
                  Sun 2014-11-02 01:59:59 CDT
                  Sun 2014-11-02 01:00:00 CST
[root@maelcum ~]#
```


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Set up passwordless ssh between hosts

- On each node, run ssh-keygen

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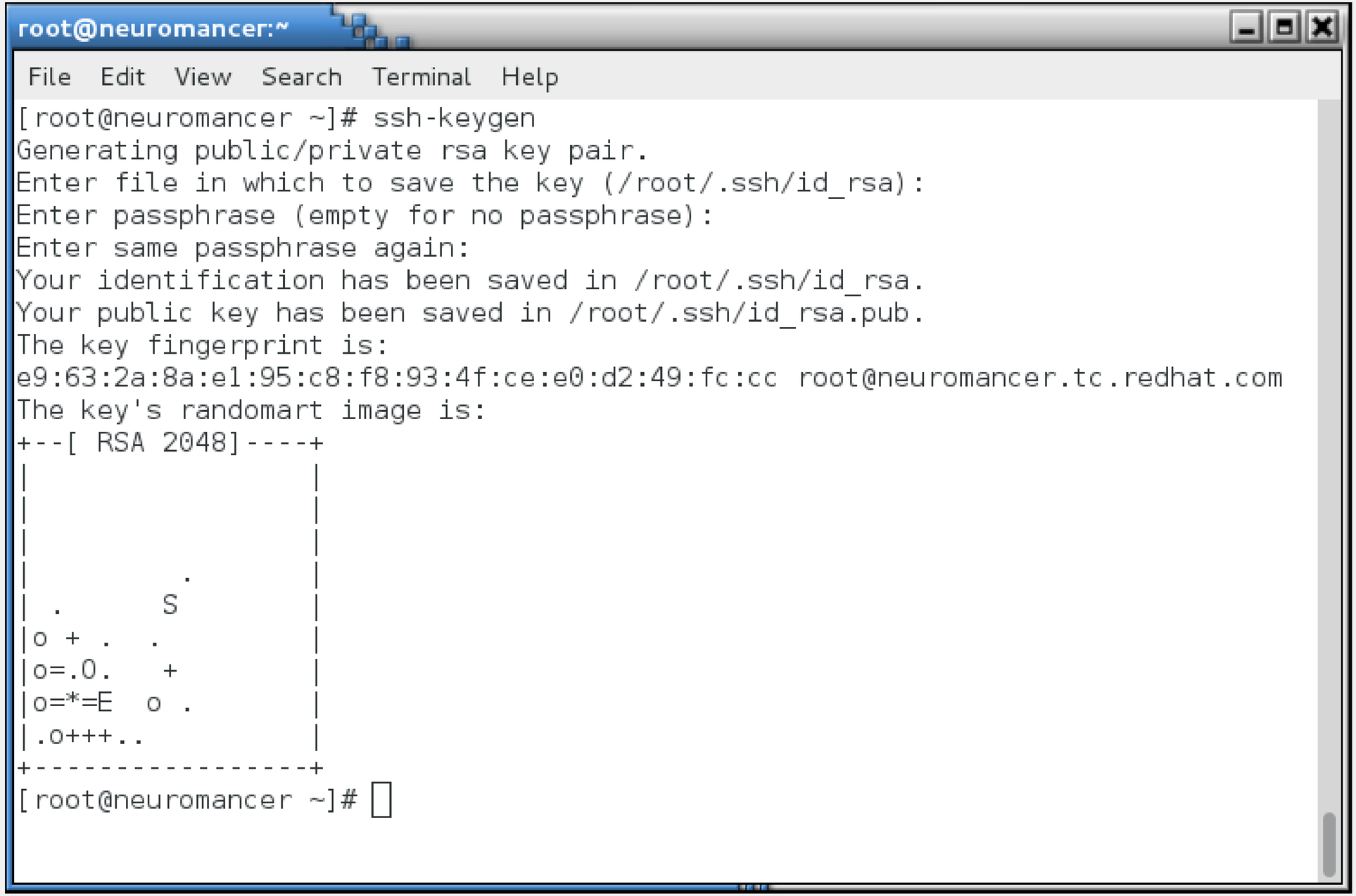
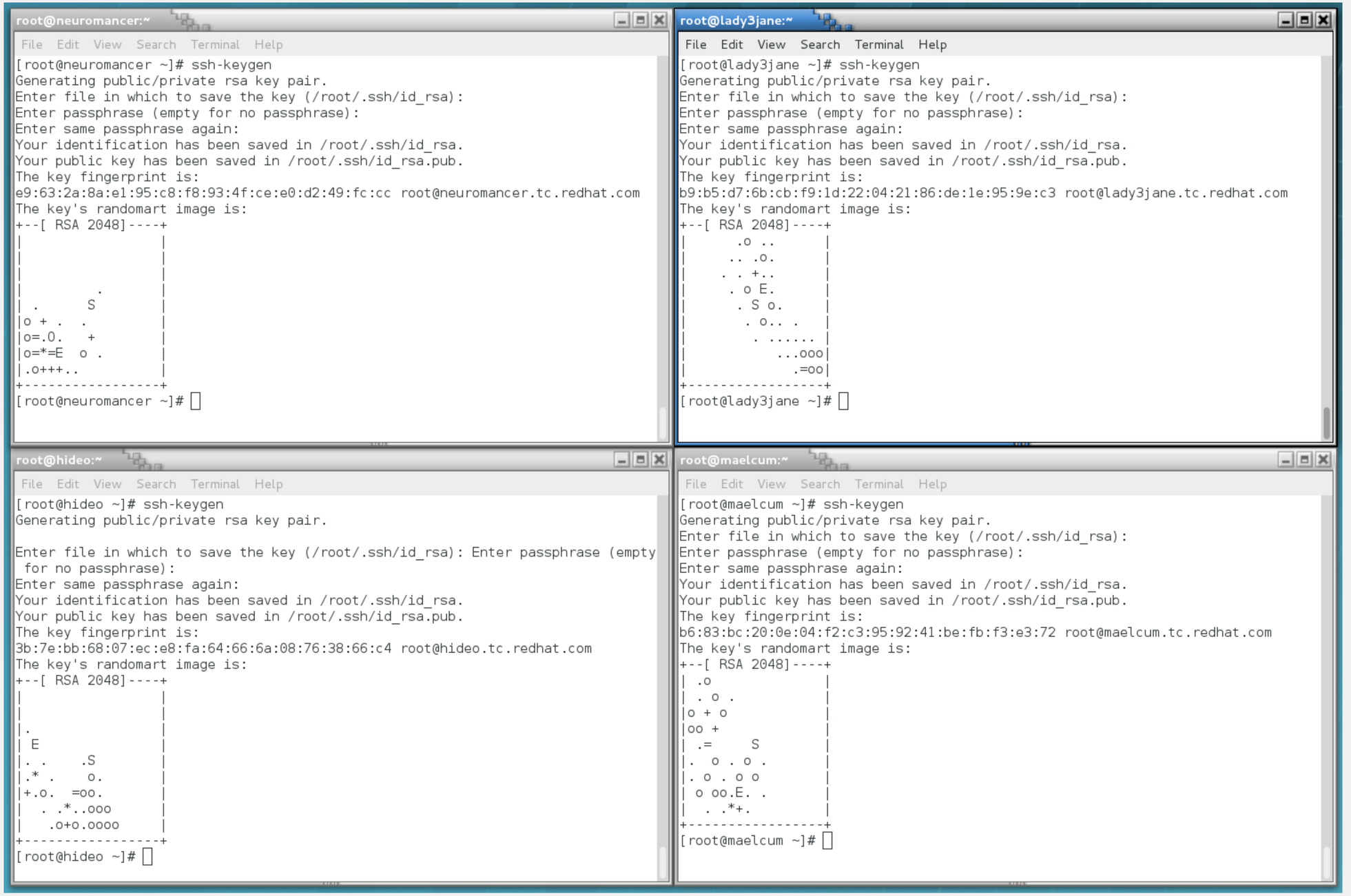

root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa.
Your public key has been saved in /root/.ssh/id_rsa.pub.
The key fingerprint is:
e9:63:2a:8a:e1:95:c8:f8:93:4f:ce:e0:d2:49:fc:cc root@neuromancer.tc.redhat.com
The key's randomart image is:
+--[RSA 2048]----+
| |
| |
| |
| |
| . |
| .   S |
|o + .   . |
|o=.O.   + |
|o=*=E   o . |
|.o+++.. |
+-----------------+
[root@neuromancer ~]#

redhat.


root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa.
Your public key has been saved in /root/.ssh/id_rsa.pub.
The key fingerprint is:
e9:63:2a:8a:e1:95:c8:f8:93:4f:ce:e0:d2:49:fc:cc root@neuromancer.tc.redhat.com
The key's randomart image is:
+--[RSA 2048]----+
| |
| |
| |
| . |
| .   S |
|o + . . |
|o=.0.   + |
|o=*=E o . |
|.o+++.. |
+-----------------+
[root@neuromancer ~]#
root@lady3jane:~
File Edit View Search Terminal Help
[root@lady3jane ~]# ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa.
Your public key has been saved in /root/.ssh/id_rsa.pub.
The key fingerprint is:
b9:b5:d7:6b:cb:f9:1d:22:04:21:86:de:1e:95:9e:c3 root@lady3jane.tc.redhat.com
The key's randomart image is:
+--[RSA 2048]----+
| .o .. |
| .. .o. |
| . . +.. |
| . o E. |
| . S o. |
| . o.. . |
| . ...|
| ...ooo|
| .=oo|
+-----------------+
[root@lady3jane ~]#
root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa): Enter passphrase (empty
 for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa.
Your public key has been saved in /root/.ssh/id_rsa.pub.
The key fingerprint is:
3b:7e:bb:68:07:ec:e8:fa:64:66:6a:08:76:38:66:c4 root@hideo.tc.redhat.com
The key's randomart image is:
+--[RSA 2048]----+
| |
| |
|. |
| E |
|. .   .S |
|.* .   o. |
|+.o. =oo. |
| . .*..ooo |
| .o+o.oooo |
+-----------------+
[root@hideo ~]#
root@maelcum:~
File Edit View Search Terminal Help
[root@maelcum ~]# ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa.
Your public key has been saved in /root/.ssh/id_rsa.pub.
The key fingerprint is:
b6:83:bc:20:0e:04:f2:c3:95:92:41:be:fb:f3:e3:72 root@maelcum.tc.redhat.com
The key's randomart image is:
+--[RSA 2048]----+
| .o |
| . o . |
|o + o |
|oo + |
| .=   S |
|. o . o . |
|. o . o o |
| o oo.E. . |
| . .*+. |
+-----------------+
[root@maelcum ~]#

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Distribute keys

- Use ssh-copy-id to distribute the keys to every host in the cluster (including itself)
  - Something like “for i in host1 host2 host3 host4; do ssh-copy-id $i; done”

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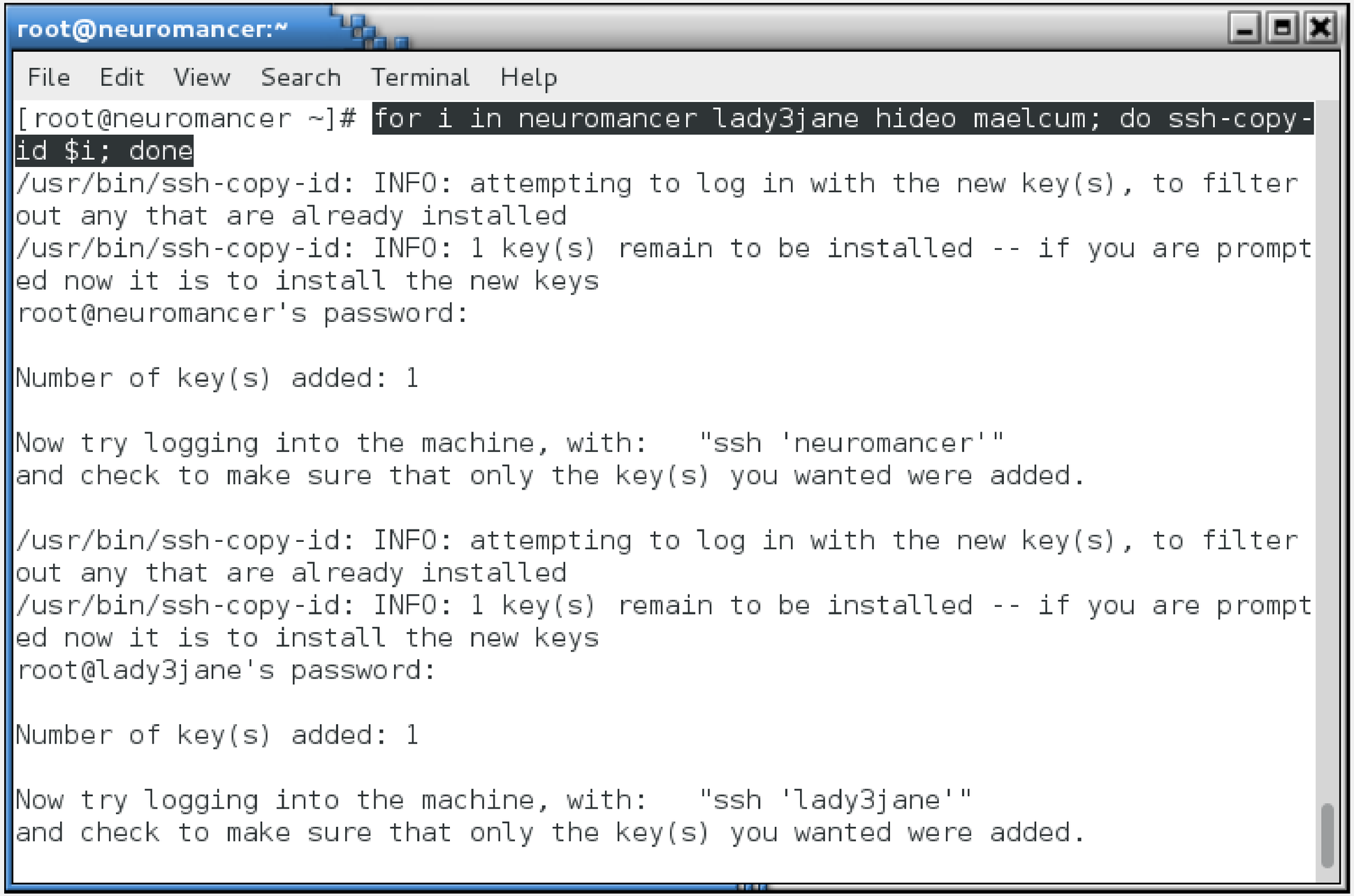
root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# for i in neuromancer lady3jane hideo maelcum; do ssh-copy-id $i; done
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
root@neuromancer's password:
Number of key(s) added: 1
Now try logging into the machine, with: "ssh 'neuromancer'"
and check to make sure that only the key(s) you wanted were added.
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
root@lady3jane's password:
Number of key(s) added: 1
Now try logging into the machine, with: "ssh 'lady3jane'"
and check to make sure that only the key(s) you wanted were added.

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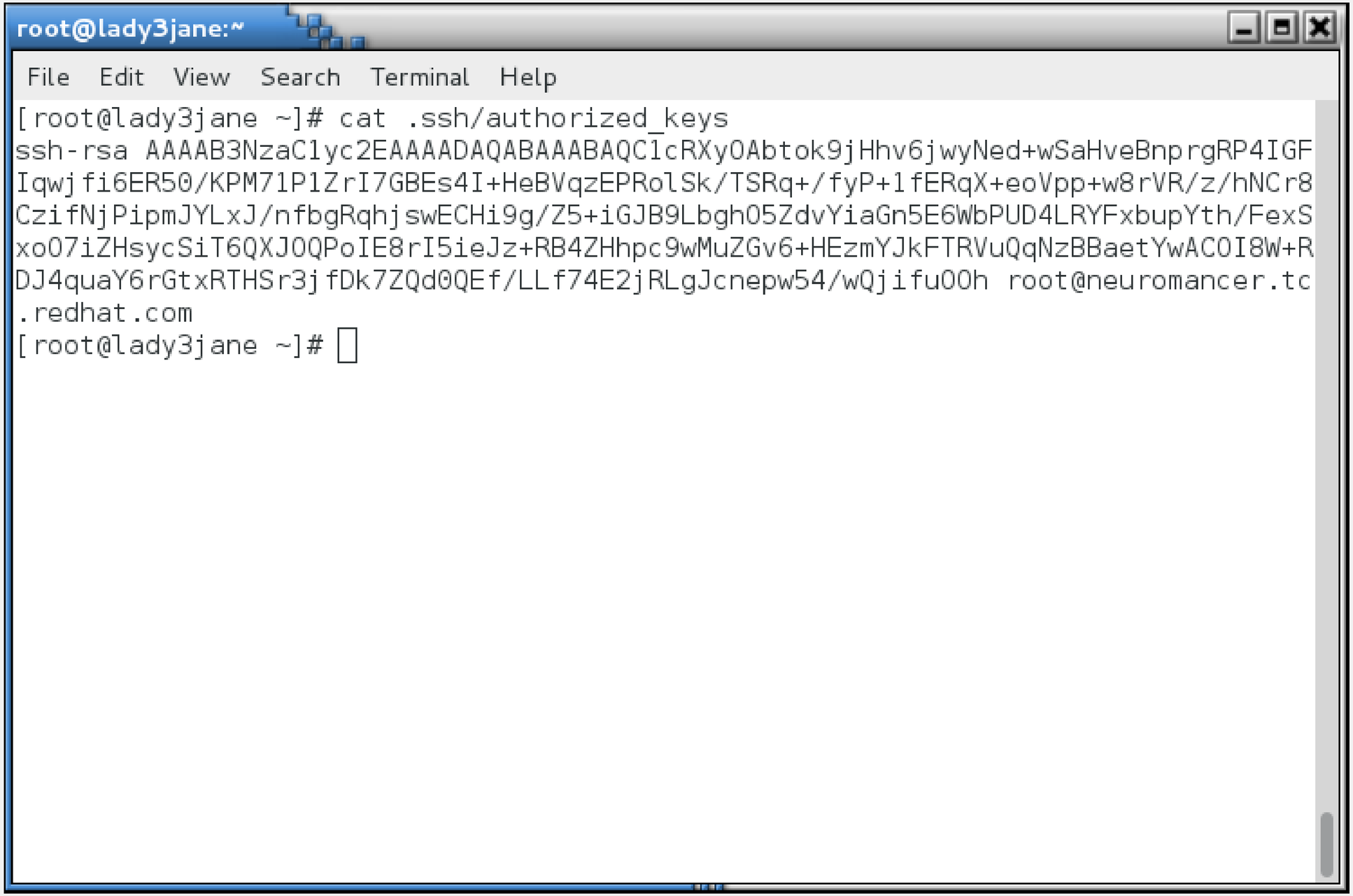
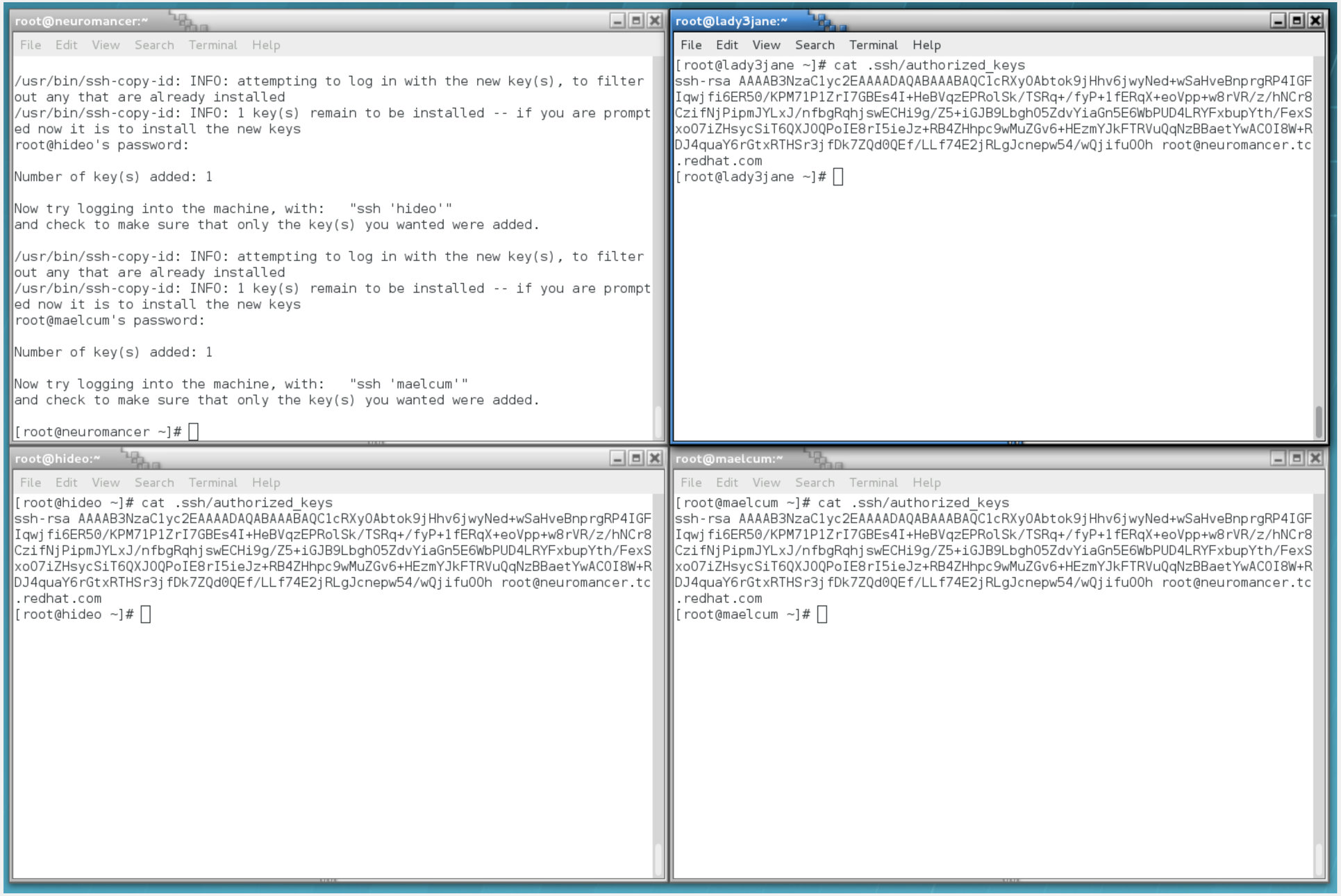
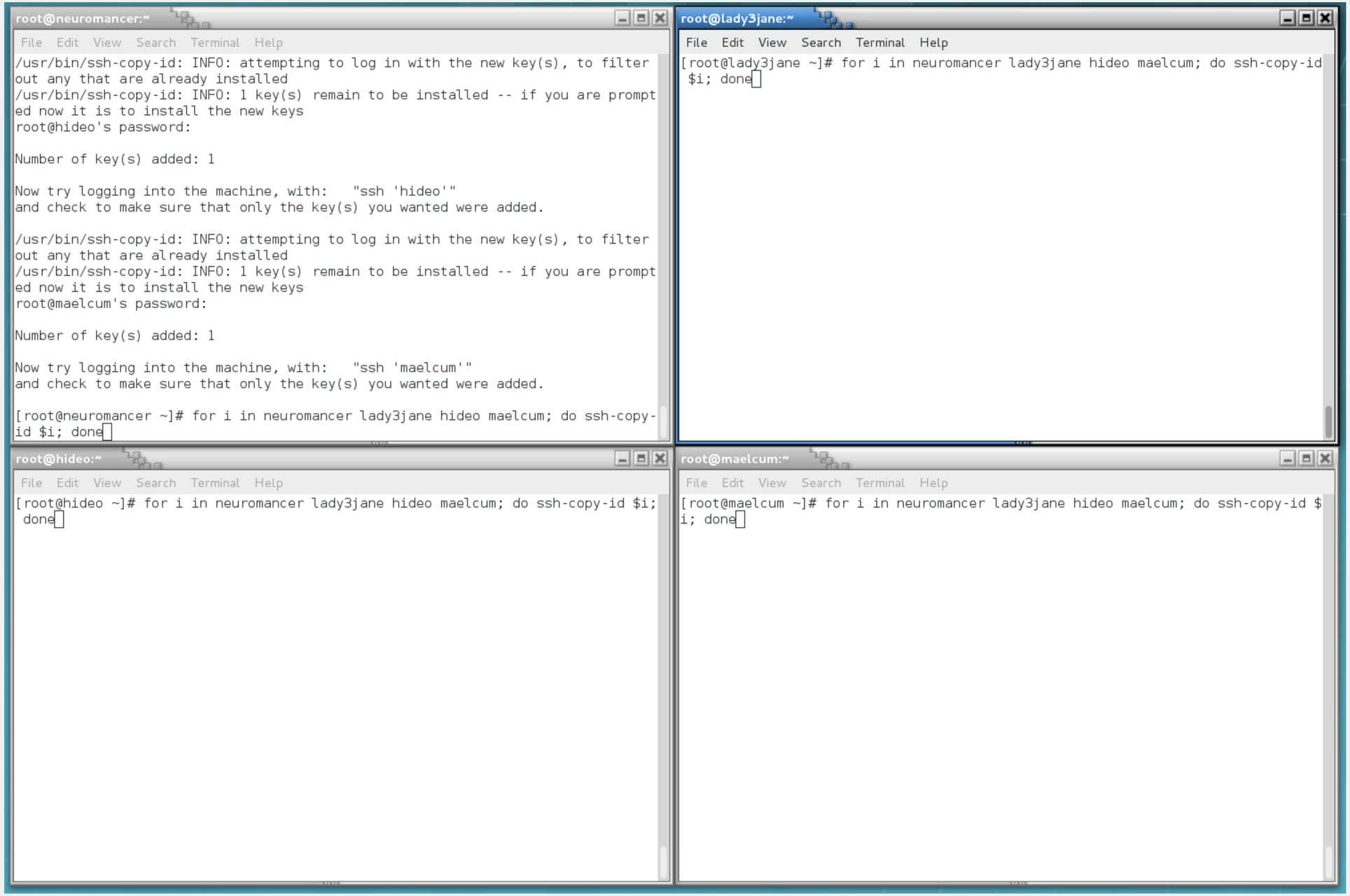

root@lady3jane:~
File Edit View Search Terminal Help
[root@lady3jane ~]# cat .ssh/authorized_keys
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQC1cRXyOAbtok9jHhv6jwyNed+wSaHveBnprgRP4IGF
Iqwjfi6ER50/KPM71P1ZrI7GBEs4I+HeBVqzEPRolSk/TSRq+/fyP+1fERqX+eoVpp+w8rVR/z/hNCr8
CzifNjPipmJYLxJ/nfbgRqhjswECHi9g/Z5+iGJB9Lbgh05ZdvYiaGn5E6WbPUD4LRYFxbupYth/FexS
xoO7iZHsycSiT6QXJOQPoIE8rI5ieJz+RB4ZHhpc9wMuZGv6+HEzmYJkFTRVuQqNzBBaetYwACOI8W+R
DJ4quaY6rGtxRTHSr3jfDk7ZQd0QEf/LLf74E2jRLgJcnepw54/wQjifuOOh root@neuromancer.tc
.redhat.com
[root@lady3jane ~]#

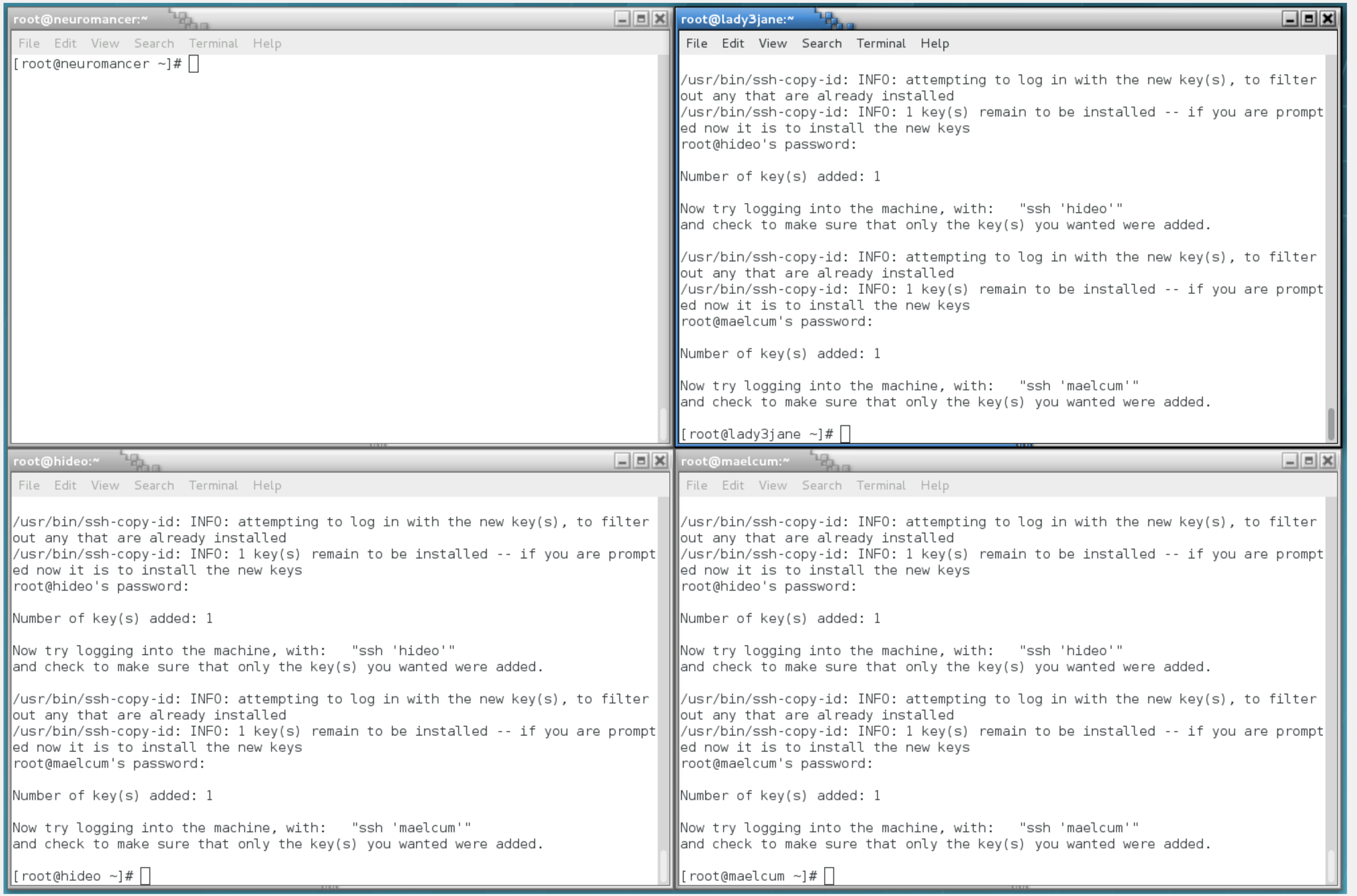
redhat.


root@neuromancer:~
File Edit View Search Terminal Help
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
root@hideo's password:
Number of key(s) added: 1
Now try logging into the machine, with: "ssh 'hideo'"
and check to make sure that only the key(s) you wanted were added.
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
root@maelcum's password:
Number of key(s) added: 1
Now try logging into the machine, with: "ssh 'maelcum'"
and check to make sure that only the key(s) you wanted were added.
[root@neuromancer ~]#
root@lady3jane:~
File Edit View Search Terminal Help
[root@lady3jane ~]# cat .ssh/authorized_keys
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQC1cRXyOAbtok9jHhv6jwyNed+wSaHveBnprgRP4IGF
Iqwjfi6ER50/KPM71P1ZrI7GBEs4I+HeBVqzEPRolSk/TSRq+/fyP+1fERqX+eoVpp+w8rVR/z/hNCr8
CzifNjPipmJYLxJ/nfbgRqhjswECHi9g/Z5+iGJB9Lbgh05ZdvYiaGn5E6WbPUD4LRYFxbupYth/FexS
xo07iZHsycSiT6QXJOQPoIE8rI5ieJz+RB4ZHhpc9wMuZGv6+HEzmYJkFTRVuQqNzBBaetYwAC0I8W+R
DJ4quaY6rGtxRTHSr3jfDk7ZQd0QEf/LLf74E2jRLgJcnepw54/wQjifuOOh root@neuromancer.tc
.redhat.com
[root@lady3jane ~]#
root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# cat .ssh/authorized_keys
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQC1cRXyOAbtok9jHhv6jwyNed+wSaHveBnprgRP4IGF
Iqwjfi6ER50/KPM71P1ZrI7GBEs4I+HeBVqzEPRolSk/TSRq+/fyP+1fERqX+eoVpp+w8rVR/z/hNCr8
CzifNjPipmJYLxJ/nfbgRqhjswECHi9g/Z5+iGJB9Lbgh05ZdvYiaGn5E6WbPUD4LRYFxbupYth/FexS
xo07iZHsycSiT6QXJOQPoIE8rI5ieJz+RB4ZHhpc9wMuZGv6+HEzmYJkFTRVuQqNzBBaetYwAC0I8W+R
DJ4quaY6rGtxRTHSr3jfDk7ZQd0QEf/LLf74E2jRLgJcnepw54/wQjifuOOh root@neuromancer.tc
.redhat.com
[root@hideo ~]#
root@maelcum:~
File Edit View Search Terminal Help
[root@maelcum ~]# cat .ssh/authorized_keys
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQC1cRXyOAbtok9jHhv6jwyNed+wSaHveBnprgRP4IGF
Iqwjfi6ER50/KPM71P1ZrI7GBEs4I+HeBVqzEPRolSk/TSRq+/fyP+1fERqX+eoVpp+w8rVR/z/hNCr8
CzifNjPipmJYLxJ/nfbgRqhjswECHi9g/Z5+iGJB9Lbgh05ZdvYiaGn5E6WbPUD4LRYFxbupYth/FexS
xo07iZHsycSiT6QXJOQPoIE8rI5ieJz+RB4ZHhpc9wMuZGv6+HEzmYJkFTRVuQqNzBBaetYwAC0I8W+R
DJ4quaY6rGtxRTHSr3jfDk7ZQd0QEf/LLf74E2jRLgJcnepw54/wQjifuOOh root@neuromancer.tc
.redhat.com
[root@maelcum ~]#

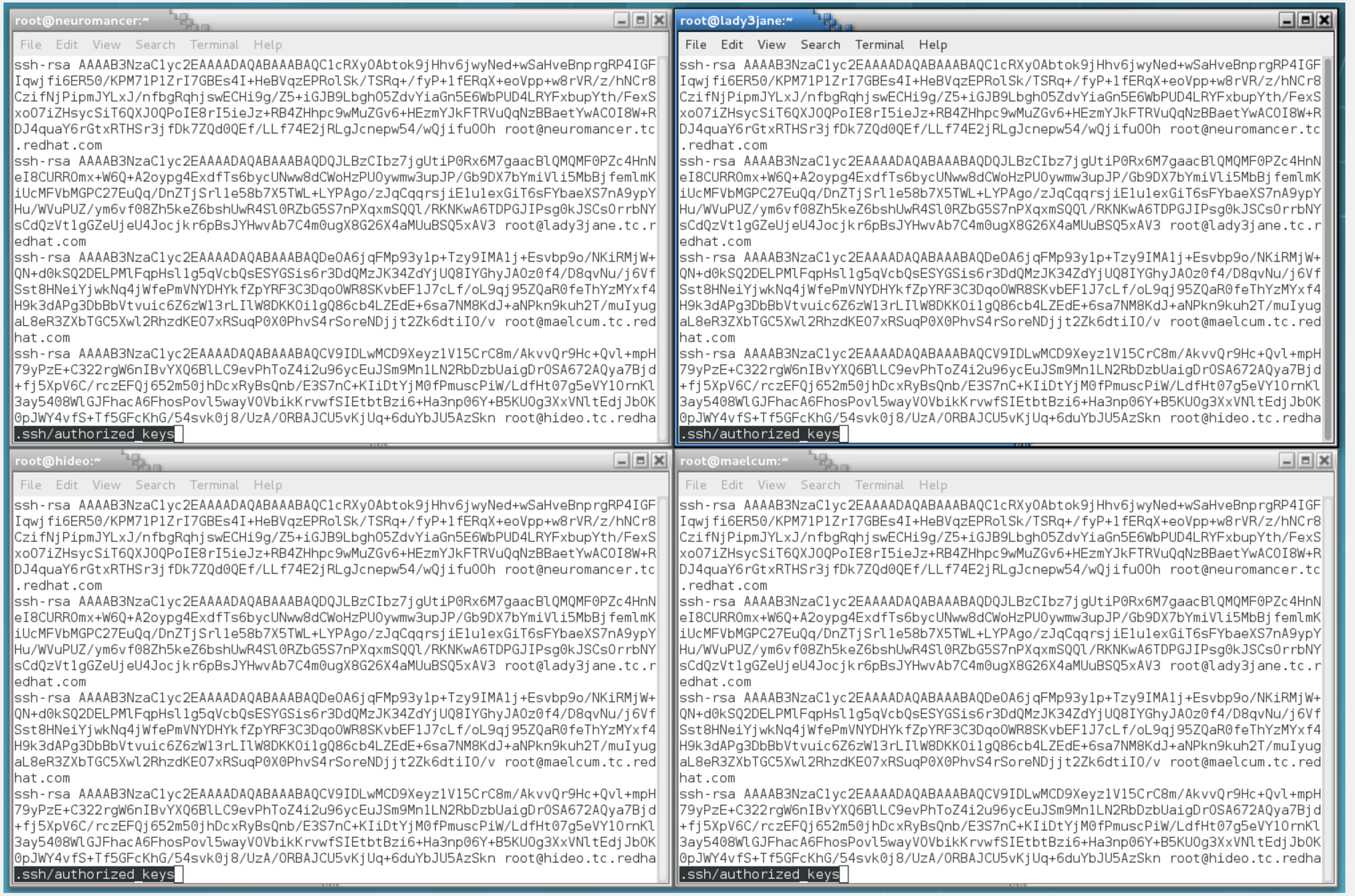
redhat.


root@neuromancer:~
File Edit View Search Terminal Help
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
root@hideo's password:
Number of key(s) added: 1
Now try logging into the machine, with: "ssh 'hideo'"
and check to make sure that only the key(s) you wanted were added.
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
root@maelcum's password:
Number of key(s) added: 1
Now try logging into the machine, with: "ssh 'maelcum'"
and check to make sure that only the key(s) you wanted were added.
[root@neuromancer ~]# for i in neuromancer lady3jane hideo maelcum; do ssh-copy-id $i; done
root@lady3jane:~
File Edit View Search Terminal Help
[root@lady3jane ~]# for i in neuromancer lady3jane hideo maelcum; do ssh-copy-id $i; done
root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# for i in neuromancer lady3jane hideo maelcum; do ssh-copy-id $i; done
root@maelcum:~
File Edit View Search Terminal Help
[root@maelcum ~]# for i in neuromancer lady3jane hideo maelcum; do ssh-copy-id $i; done

redhat.


root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]#
root@lady3jane:~
File Edit View Search Terminal Help
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
root@hideo's password:
Number of key(s) added: 1
Now try logging into the machine, with: "ssh 'hideo'"
and check to make sure that only the key(s) you wanted were added.
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
root@maelcum's password:
Number of key(s) added: 1
Now try logging into the machine, with: "ssh 'maelcum'"
and check to make sure that only the key(s) you wanted were added.
[root@lady3jane ~]#
root@hideo:~
File Edit View Search Terminal Help
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
root@hideo's password:
Number of key(s) added: 1
Now try logging into the machine, with: "ssh 'hideo'"
and check to make sure that only the key(s) you wanted were added.
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
root@maelcum's password:
Number of key(s) added: 1
Now try logging into the machine, with: "ssh 'maelcum'"
and check to make sure that only the key(s) you wanted were added.
[root@hideo ~]#
root@maelcum:~
File Edit View Search Terminal Help
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
root@hideo's password:
Number of key(s) added: 1
Now try logging into the machine, with: "ssh 'hideo'"
and check to make sure that only the key(s) you wanted were added.
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
root@maelcum's password:
Number of key(s) added: 1
Now try logging into the machine, with: "ssh 'maelcum'"
and check to make sure that only the key(s) you wanted were added.
[root@maelcum ~]#

redhat.


root@neuromancer:~
File Edit View Search Terminal Help
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQC1cRXyOAbtok9jHhv6jwyNed+wSaHveBnprgRP4IGF
Iqwjfi6ER50/KPM71P1ZrI7GBEs4I+HeBVqzEPRolSk/TSRq+/fyP+1fERqX+eoVpp+w8rVR/z/hNCr8
CzifNjPipmJYLxJ/nfbgRqhjswECHi9g/Z5+iGJB9Lbgh05ZdvYiaGn5E6WbPUD4LRYFxbupYth/FexS
xoO7iZHsycSiT6QXJOQPoIE8rI5ieJz+RB4ZHhpc9wMuZGv6+HEzmYJkFTRVuQqNzBBaetYwAC0I8W+R
DJ4quaY6rGtxRTHSr3jfDk7ZQd0QEf/LLf74E2jRLgJcnepw54/wQjifuOOh root@neuromancer.tc
.redhat.com
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQDQJLBzCIbz7jgUtiP0Rx6M7gaacBlQMQMF0PZc4HnN
eI8CURROmx+W6Q+A2oypg4ExdfTs6bycUNww8dCWoHzPUOywmw3upJP/Gb9DX7bYmiVli5MbBjfemlmK
iUcMFVbMGPC27EuQq/DnZTjSrl1e58b7X5TWL+LYPAgo/zJqCqqrsjiE1u1exGiT6sFYbaeXS7nA9ypY
Hu/WVuPUZ/ym6vf08Zh5keZ6bshUwR4Sl0RZbG5S7nPXqxmSQQl/RKNKwA6TDPGJIPsg0kJSCs0rrbNY
sCdQzVt1gGZeUjeU4Jocjkr6pBsJYHwvAb7C4m0ugX8G26X4aMUuBSQ5xAV3 root@lady3jane.tc.r
edhat.com
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQDeOA6jqFMp93y1p+Tzy9IMA1j+Esvbp9o/NKiRMjW+
QN+d0kSQ2DELPMlFqpHsl1g5qVcbQsESYGSis6r3DdQMzJK34ZdYjUQ8IYGhyJAOz0f4/D8qvNu/j6Vf
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H9k3dAPg3DbBbVtvuic6Z6zW13rLIlW8DKKOi1gQ86cb4LZEdE+6sa7NM8KdJ+aNPkn9kuh2T/muIyug
aL8eR3ZXbTGC5Xwl2RhzdKEO7xRSuqP0X0PhvS4rSoreNDjjt2Zk6dtiIO/v root@maelcum.tc.red
hat.com
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQCV9IDLwMCD9Xeyz1V15CrC8m/AkvvQr9Hc+Qvl+mpH
79yPzE+C322rgW6nIBvYXQ6BlLC9evPhToZ4i2u96ycEuJSm9Mn1LN2RbDzbUaigDrOSA672AQya7Bjd
+fj5XpV6C/rczEFQj652m50jhDcxRyBsQnb/E3S7nC+KIiDtYjM0fPmuscPiW/LdfHt07g5eVY1OrnKl
3ay5408WlGJFhacA6FhosPovl5wayVOVbikKrvwfSIEtbtBzi6+Ha3np06Y+B5KUOg3XxVNltEdjJbOK
0pJWY4vfS+Tf5GFcKhG/54svk0j8/UzA/ORBAJCU5vKjUq+6duYbJU5AzSkn root@hideo.tc.redha
.ssh/authorized_keys
root@lady3jane:~
File Edit View Search Terminal Help
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQC1cRXyOAbtok9jHhv6jwyNed+wSaHveBnprgRP4IGF
Iqwjfi6ER50/KPM71P1ZrI7GBEs4I+HeBVqzEPRolSk/TSRq+/fyP+1fERqX+eoVpp+w8rVR/z/hNCr8
CzifNjPipmJYLxJ/nfbgRqhjswECHi9g/Z5+iGJB9Lbgh05ZdvYiaGn5E6WbPUD4LRYFxbupYth/FexS
xoO7iZHsycSiT6QXJOQPoIE8rI5ieJz+RB4ZHhpc9wMuZGv6+HEzmYJkFTRVuQqNzBBaetYwAC0I8W+R
DJ4quaY6rGtxRTHSr3jfDk7ZQd0QEf/LLf74E2jRLgJcnepw54/wQjifuOOh root@neuromancer.tc
.redhat.com
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQDQJLBzCIbz7jgUtiP0Rx6M7gaacBlQMQMF0PZc4HnN
eI8CURROmx+W6Q+A2oypg4ExdfTs6bycUNww8dCWoHzPUOywmw3upJP/Gb9DX7bYmiVli5MbBjfemlmK
iUcMFVbMGPC27EuQq/DnZTjSrl1e58b7X5TWL+LYPAgo/zJqCqqrsjiE1u1exGiT6sFYbaeXS7nA9ypY
Hu/WVuPUZ/ym6vf08Zh5keZ6bshUwR4Sl0RZbG5S7nPXqxmSQQl/RKNKwA6TDPGJIPsg0kJSCs0rrbNY
sCdQzVt1gGZeUjeU4Jocjkr6pBsJYHwvAb7C4m0ugX8G26X4aMUuBSQ5xAV3 root@lady3jane.tc.r
edhat.com
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQDeOA6jqFMp93y1p+Tzy9IMA1j+Esvbp9o/NKiRMjW+
QN+d0kSQ2DELPMlFqpHsl1g5qVcbQsESYGSis6r3DdQMzJK34ZdYjUQ8IYGhyJAOz0f4/D8qvNu/j6Vf
Sst8HNeiYjwkNq4jWfePmVNYDHYkfZpYRF3C3DqoOWR8SKvbEF1J7cLf/oL9qj95ZQaR0feThYzMYxf4
H9k3dAPg3DbBbVtvuic6Z6zW13rLIlW8DKKOi1gQ86cb4LZEdE+6sa7NM8KdJ+aNPkn9kuh2T/muIyug
aL8eR3ZXbTGC5Xwl2RhzdKEO7xRSuqP0X0PhvS4rSoreNDjjt2Zk6dtiIO/v root@maelcum.tc.red
hat.com
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQCV9IDLwMCD9Xeyz1V15CrC8m/AkvvQr9Hc+Qvl+mpH
79yPzE+C322rgW6nIBvYXQ6BlLC9evPhToZ4i2u96ycEuJSm9Mn1LN2RbDzbUaigDrOSA672AQya7Bjd
+fj5XpV6C/rczEFQj652m50jhDcxRyBsQnb/E3S7nC+KIiDtYjM0fPmuscPiW/LdfHt07g5eVY1OrnKl
3ay5408WlGJFhacA6FhosPovl5wayVOVbikKrvwfSIEtbtBzi6+Ha3np06Y+B5KUOg3XxVNltEdjJbOK
0pJWY4vfS+Tf5GFcKhG/54svk0j8/UzA/ORBAJCU5vKjUq+6duYbJU5AzSkn root@hideo.tc.redha
.ssh/authorized_keys
root@hideo:~
File Edit View Search Terminal Help
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQC1cRXyOAbtok9jHhv6jwyNed+wSaHveBnprgRP4IGF
Iqwjfi6ER50/KPM71P1ZrI7GBEs4I+HeBVqzEPRolSk/TSRq+/fyP+1fERqX+eoVpp+w8rVR/z/hNCr8
CzifNjPipmJYLxJ/nfbgRqhjswECHi9g/Z5+iGJB9Lbgh05ZdvYiaGn5E6WbPUD4LRYFxbupYth/FexS
xoO7iZHsycSiT6QXJOQPoIE8rI5ieJz+RB4ZHhpc9wMuZGv6+HEzmYJkFTRVuQqNzBBaetYwAC0I8W+R
DJ4quaY6rGtxRTHSr3jfDk7ZQd0QEf/LLf74E2jRLgJcnepw54/wQjifuOOh root@neuromancer.tc
.redhat.com
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQDQJLBzCIbz7jgUtiP0Rx6M7gaacBlQMQMF0PZc4HnN
eI8CURROmx+W6Q+A2oypg4ExdfTs6bycUNww8dCWoHzPUOywmw3upJP/Gb9DX7bYmiVli5MbBjfemlmK
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sCdQzVt1gGZeUjeU4Jocjkr6pBsJYHwvAb7C4m0ugX8G26X4aMUuBSQ5xAV3 root@lady3jane.tc.r
edhat.com
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQDeOA6jqFMp93y1p+Tzy9IMA1j+Esvbp9o/NKiRMjW+
QN+d0kSQ2DELPMlFqpHsl1g5qVcbQsESYGSis6r3DdQMzJK34ZdYjUQ8IYGhyJAOz0f4/D8qvNu/j6Vf
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aL8eR3ZXbTGC5Xwl2RhzdKEO7xRSuqP0X0PhvS4rSoreNDjjt2Zk6dtiIO/v root@maelcum.tc.red
hat.com
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQCV9IDLwMCD9Xeyz1V15CrC8m/AkvvQr9Hc+Qvl+mpH
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+fj5XpV6C/rczEFQj652m50jhDcxRyBsQnb/E3S7nC+KIiDtYjM0fPmuscPiW/LdfHt07g5eVY1OrnKl
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0pJWY4vfS+Tf5GFcKhG/54svk0j8/UzA/ORBAJCU5vKjUq+6duYbJU5AzSkn root@hideo.tc.redha
.ssh/authorized_keys
root@maelcum:~
File Edit View Search Terminal Help
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQC1cRXyOAbtok9jHhv6jwyNed+wSaHveBnprgRP4IGF
Iqwjfi6ER50/KPM71P1ZrI7GBEs4I+HeBVqzEPRolSk/TSRq+/fyP+1fERqX+eoVpp+w8rVR/z/hNCr8
CzifNjPipmJYLxJ/nfbgRqhjswECHi9g/Z5+iGJB9Lbgh05ZdvYiaGn5E6WbPUD4LRYFxbupYth/FexS
xoO7iZHsycSiT6QXJOQPoIE8rI5ieJz+RB4ZHhpc9wMuZGv6+HEzmYJkFTRVuQqNzBBaetYwAC0I8W+R
DJ4quaY6rGtxRTHSr3jfDk7ZQd0QEf/LLf74E2jRLgJcnepw54/wQjifuOOh root@neuromancer.tc
.redhat.com
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQDQJLBzCIbz7jgUtiP0Rx6M7gaacBlQMQMF0PZc4HnN
eI8CURROmx+W6Q+A2oypg4ExdfTs6bycUNww8dCWoHzPUOywmw3upJP/Gb9DX7bYmiVli5MbBjfemlmK
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Hu/WVuPUZ/ym6vf08Zh5keZ6bshUwR4Sl0RZbG5S7nPXqxmSQQl/RKNKwA6TDPGJIPsg0kJSCs0rrbNY
sCdQzVt1gGZeUjeU4Jocjkr6pBsJYHwvAb7C4m0ugX8G26X4aMUuBSQ5xAV3 root@lady3jane.tc.r
edhat.com
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQDeOA6jqFMp93y1p+Tzy9IMA1j+Esvbp9o/NKiRMjW+
QN+d0kSQ2DELPMlFqpHsl1g5qVcbQsESYGSis6r3DdQMzJK34ZdYjUQ8IYGhyJAOz0f4/D8qvNu/j6Vf
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H9k3dAPg3DbBbVtvuic6Z6zW13rLIlW8DKKOi1gQ86cb4LZEdE+6sa7NM8KdJ+aNPkn9kuh2T/muIyug
aL8eR3ZXbTGC5Xwl2RhzdKEO7xRSuqP0X0PhvS4rSoreNDjjt2Zk6dtiIO/v root@maelcum.tc.red
hat.com
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQCV9IDLwMCD9Xeyz1V15CrC8m/AkvvQr9Hc+Qvl+mpH
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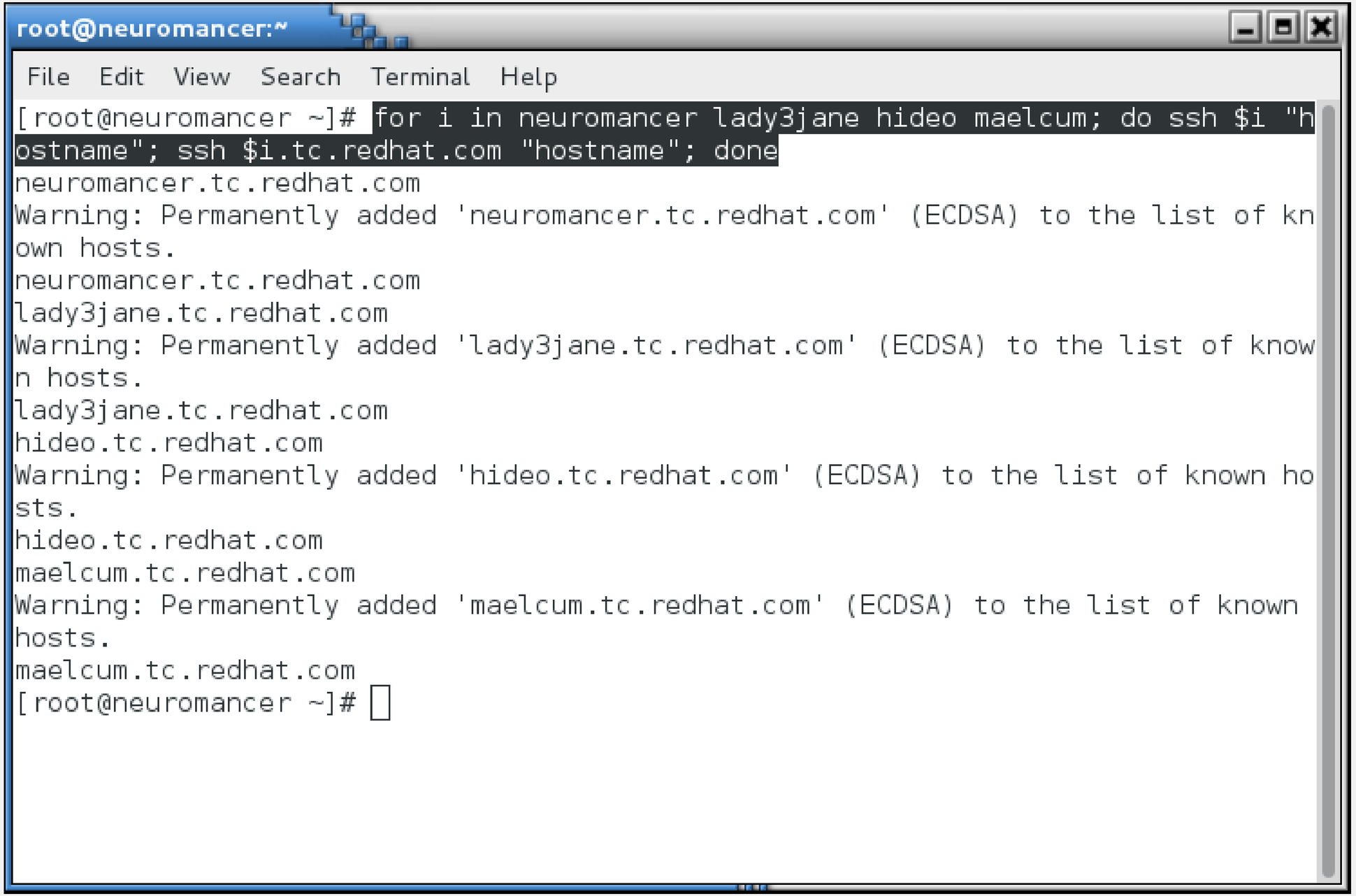
0pJWY4vfS+Tf5GFcKhG/54svk0j8/UzA/ORBAJCU5vKjUq+6duYbJU5AzSkn root@hideo.tc.redha
.ssh/authorized_keys

redhat.

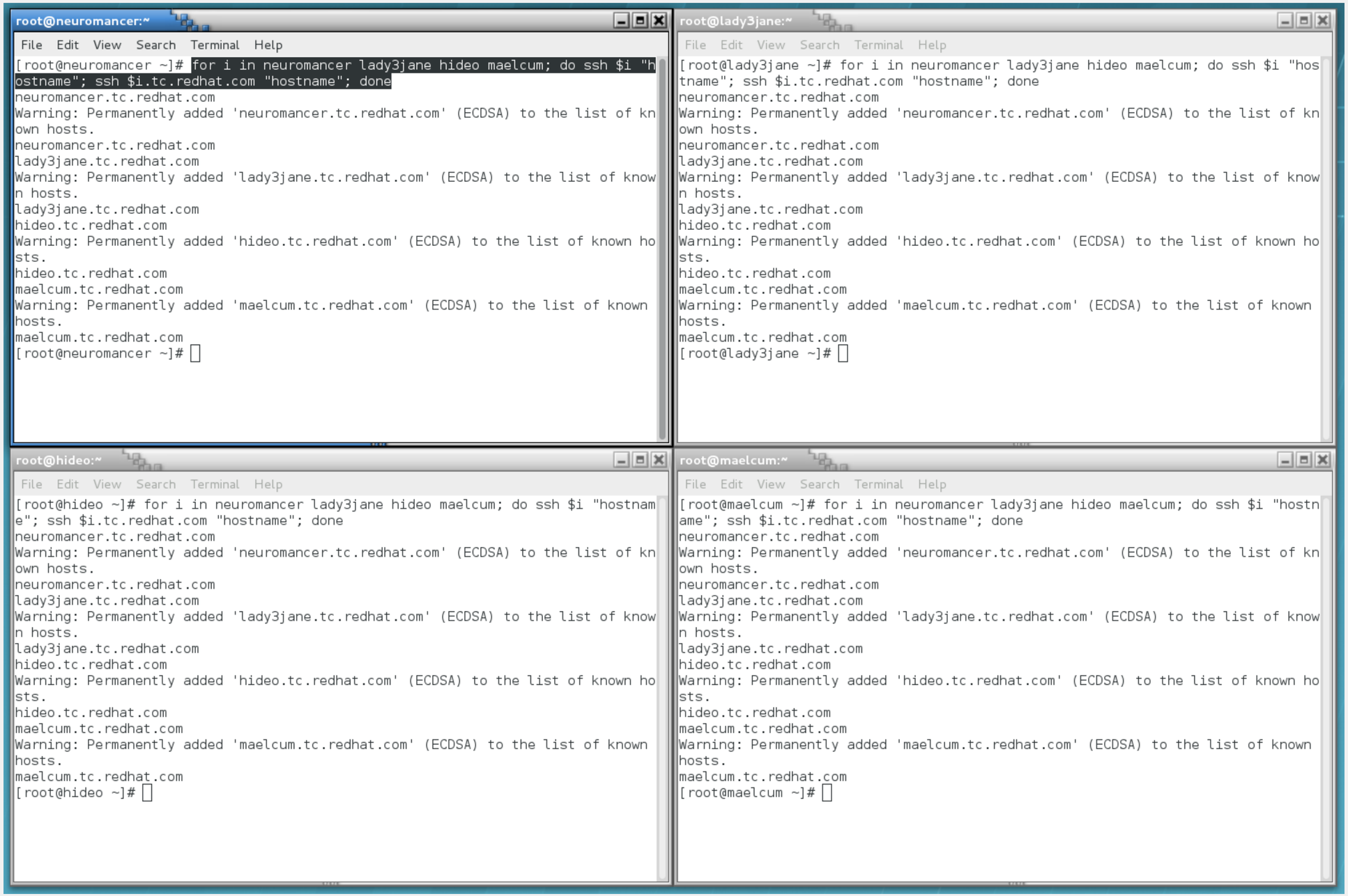
Distribute keys

- Make sure you can log into all of the machines without being prompted to accept the key

redhat.


root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# for i in neuromancer lady3jane hideo maelcum; do ssh $i "hostname"; ssh $i.tc.redhat.com "hostname"; done
neuromancer.tc.redhat.com
Warning: Permanently added 'neuromancer.tc.redhat.com' (ECDSA) to the list of known hosts.
neuromancer.tc.redhat.com
lady3jane.tc.redhat.com
Warning: Permanently added 'lady3jane.tc.redhat.com' (ECDSA) to the list of known hosts.
lady3jane.tc.redhat.com
hideo.tc.redhat.com
Warning: Permanently added 'hideo.tc.redhat.com' (ECDSA) to the list of known hosts.
hideo.tc.redhat.com
maelcum.tc.redhat.com
Warning: Permanently added 'maelcum.tc.redhat.com' (ECDSA) to the list of known hosts.
maelcum.tc.redhat.com
[root@neuromancer ~]#

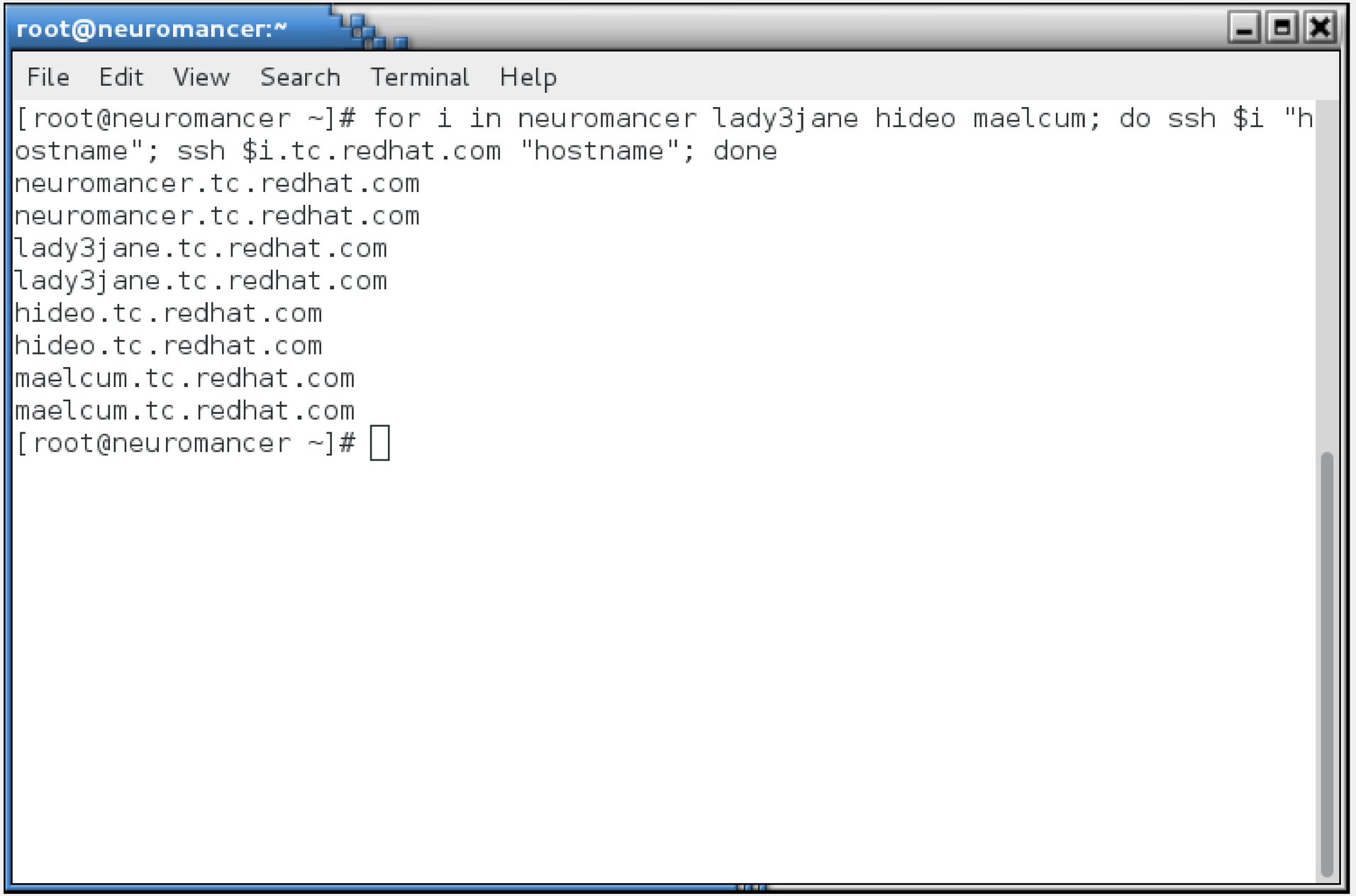
redhat.


root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# for i in neuromancer lady3jane hideo maelcum; do ssh $i "hostname"; ssh $i.tc.redhat.com "hostname"; done
neuromancer.tc.redhat.com
Warning: Permanently added 'neuromancer.tc.redhat.com' (ECDSA) to the list of known hosts.
neuromancer.tc.redhat.com
lady3jane.tc.redhat.com
Warning: Permanently added 'lady3jane.tc.redhat.com' (ECDSA) to the list of known hosts.
lady3jane.tc.redhat.com
hideo.tc.redhat.com
Warning: Permanently added 'hideo.tc.redhat.com' (ECDSA) to the list of known hosts.
hideo.tc.redhat.com
maelcum.tc.redhat.com
Warning: Permanently added 'maelcum.tc.redhat.com' (ECDSA) to the list of known hosts.
maelcum.tc.redhat.com
[root@neuromancer ~]#
root@lady3jane:~
File Edit View Search Terminal Help
[root@lady3jane ~]# for i in neuromancer lady3jane hideo maelcum; do ssh $i "hostname"; ssh $i.tc.redhat.com "hostname"; done
neuromancer.tc.redhat.com
Warning: Permanently added 'neuromancer.tc.redhat.com' (ECDSA) to the list of known hosts.
neuromancer.tc.redhat.com
lady3jane.tc.redhat.com
Warning: Permanently added 'lady3jane.tc.redhat.com' (ECDSA) to the list of known hosts.
lady3jane.tc.redhat.com
hideo.tc.redhat.com
Warning: Permanently added 'hideo.tc.redhat.com' (ECDSA) to the list of known hosts.
hideo.tc.redhat.com
maelcum.tc.redhat.com
Warning: Permanently added 'maelcum.tc.redhat.com' (ECDSA) to the list of known hosts.
maelcum.tc.redhat.com
[root@lady3jane ~]#
root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# for i in neuromancer lady3jane hideo maelcum; do ssh $i "hostname"; ssh $i.tc.redhat.com "hostname"; done
neuromancer.tc.redhat.com
Warning: Permanently added 'neuromancer.tc.redhat.com' (ECDSA) to the list of known hosts.
neuromancer.tc.redhat.com
lady3jane.tc.redhat.com
Warning: Permanently added 'lady3jane.tc.redhat.com' (ECDSA) to the list of known hosts.
lady3jane.tc.redhat.com
hideo.tc.redhat.com
Warning: Permanently added 'hideo.tc.redhat.com' (ECDSA) to the list of known hosts.
hideo.tc.redhat.com
maelcum.tc.redhat.com
Warning: Permanently added 'maelcum.tc.redhat.com' (ECDSA) to the list of known hosts.
maelcum.tc.redhat.com
[root@hideo ~]#
root@maelcum:~
File Edit View Search Terminal Help
[root@maelcum ~]# for i in neuromancer lady3jane hideo maelcum; do ssh $i "hostname"; ssh $i.tc.redhat.com "hostname"; done
neuromancer.tc.redhat.com
Warning: Permanently added 'neuromancer.tc.redhat.com' (ECDSA) to the list of known hosts.
neuromancer.tc.redhat.com
lady3jane.tc.redhat.com
Warning: Permanently added 'lady3jane.tc.redhat.com' (ECDSA) to the list of known hosts.
lady3jane.tc.redhat.com
hideo.tc.redhat.com
Warning: Permanently added 'hideo.tc.redhat.com' (ECDSA) to the list of known hosts.
hideo.tc.redhat.com
maelcum.tc.redhat.com
Warning: Permanently added 'maelcum.tc.redhat.com' (ECDSA) to the list of known hosts.
maelcum.tc.redhat.com
[root@maelcum ~]#

Distribute keys

- Make sure that you can log in via short and long hostname. Don't quit until get this result:

redhat.


root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# for i in neuromancer lady3jane hideo maelcum; do ssh $i "h
ostname"; ssh $i.tc.redhat.com "hostname"; done
neuromancer.tc.redhat.com
neuromancer.tc.redhat.com
lady3jane.tc.redhat.com
lady3jane.tc.redhat.com
hideo.tc.redhat.com
hideo.tc.redhat.com
maelcum.tc.redhat.com
maelcum.tc.redhat.com
[root@neuromancer ~]#

redhat.

Set up the iSCSI target (server)

redhat.

Linux-IO Target (LIO)

- Linux-IO Target (LIO™) has been the Linux SCSI target since kernel version 2.6.38.
  - Linux-IO Target is based on a SCSI engine that implements the semantics of a SCSI target as described in the SCSI Architecture Model (SAM), and supports its comprehensive SPC-3/SPC-4 feature set in a fabric-agnostic way. The SCSI target core does not directly communicate with initiators and it does not directly access data on disk.

Source: http://linux-iscsi.org/wiki/Target

redhat.

Cheat Sheet

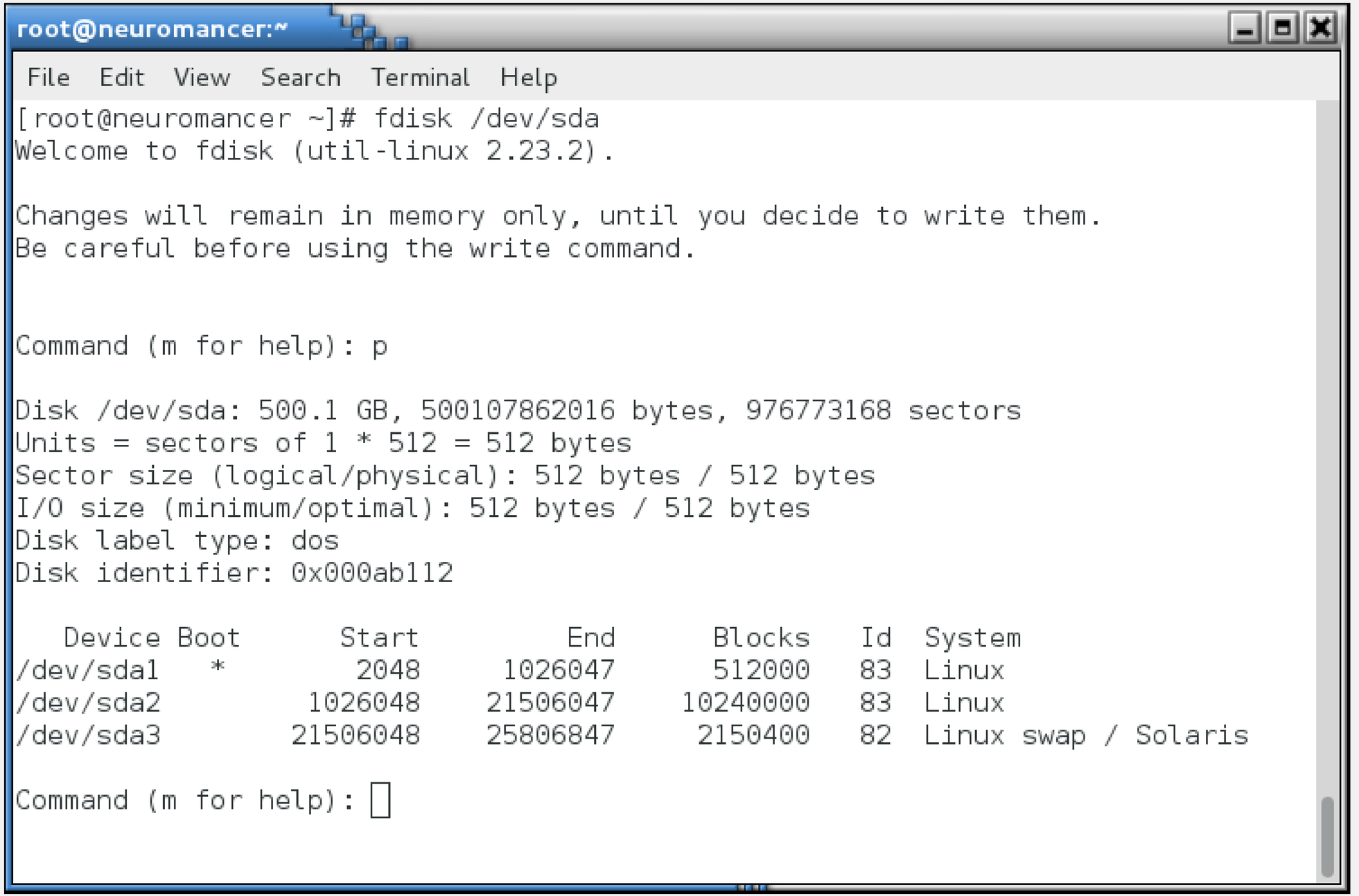
- I love the “cheat sheet” at http://linux-iscsi.org/wiki/ISCSI#Cheat_sheet

redhat.

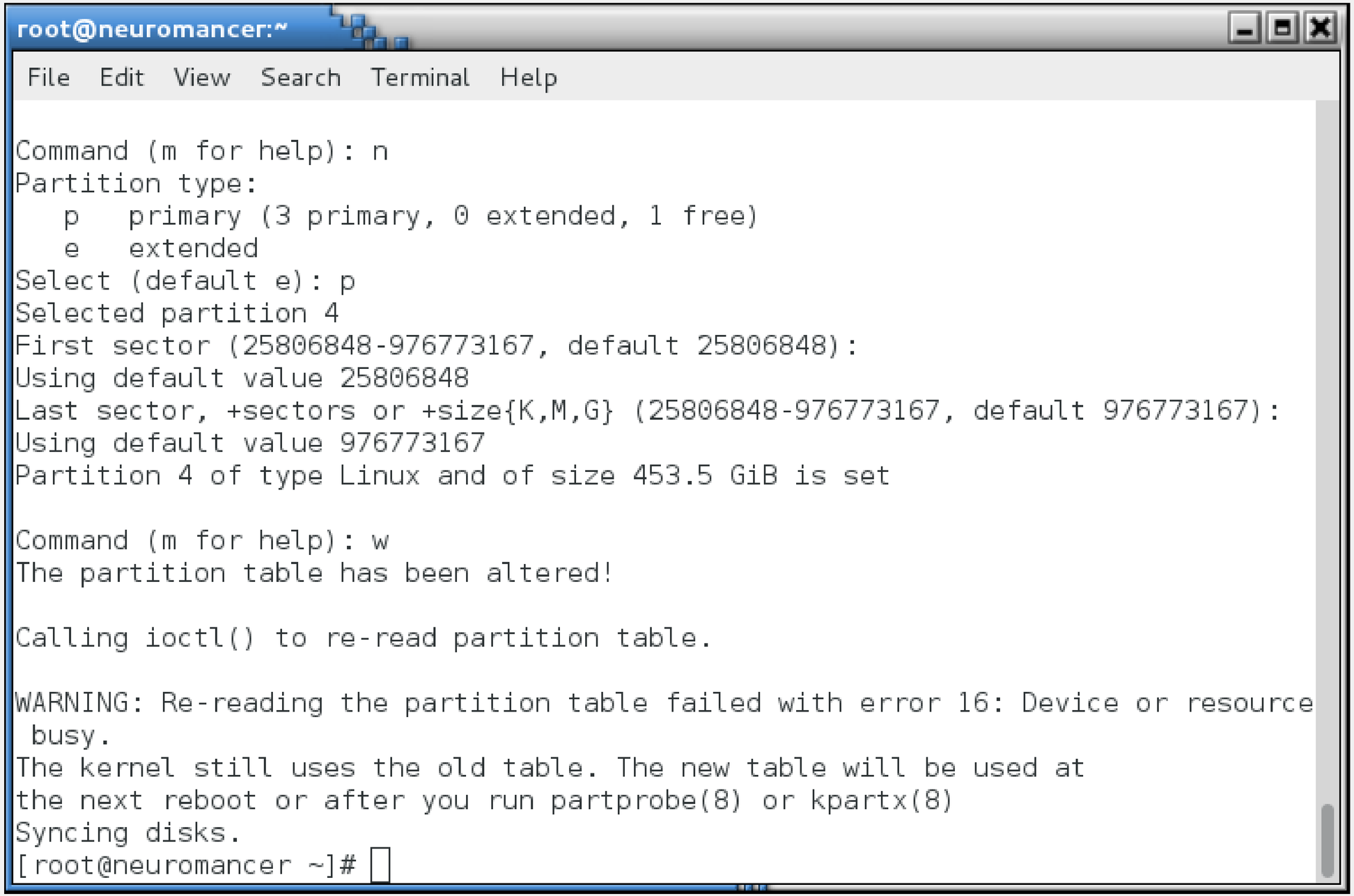
Create the partition

- Use your favorite partitioning tool. Since this is a small disk, I used fdisk. For larger disks, parted makes sense.
- I created a new primary partition, using the rest of the disk. Again, this is just for a lab, in the real world I would probably use LVM.
- Reboot if prompted

redhat.


root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# fdisk /dev/sda
Welcome to fdisk (util-linux 2.23.2).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.
Command (m for help): p
Disk /dev/sda: 500.1 GB, 500107862016 bytes, 976773168 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk label type: dos
Disk identifier: 0x000ab112
Device Boot Start End Blocks Id System
/dev/sda1 * 2048 1026047 512000 83 Linux
/dev/sda2 1026048 21506047 10240000 83 Linux
/dev/sda3 21506048 25806847 2150400 82 Linux swap / Solaris
Command (m for help):

redhat

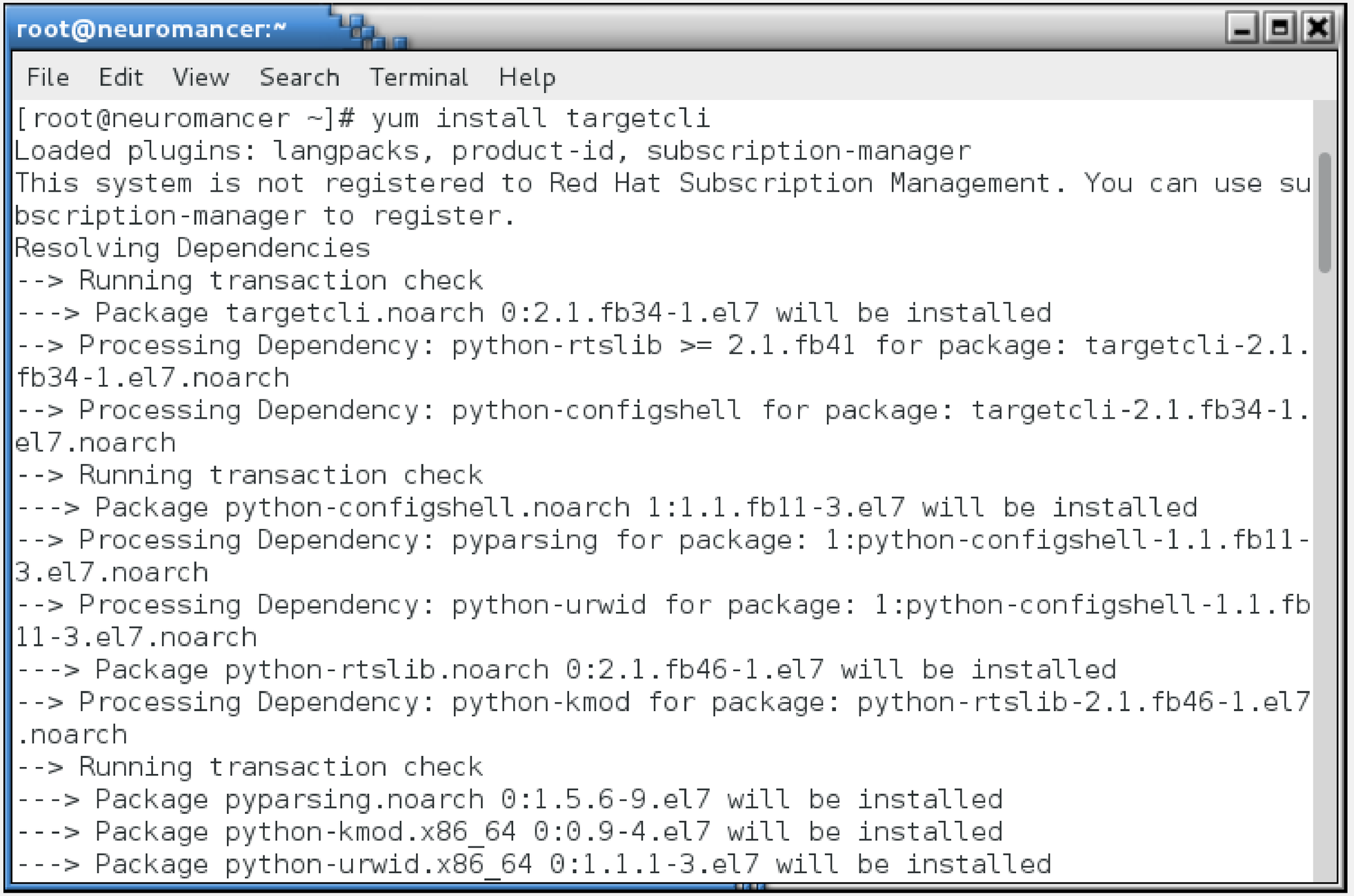

root@neuromancer:~
File Edit View Search Terminal Help
Command (m for help): n
Partition type:
p primary (3 primary, 0 extended, 1 free)
e extended
Select (default e): p
Selected partition 4
First sector (25806848-976773167, default 25806848):
Using default value 25806848
Last sector, +sectors or +size{K,M,G} (25806848-976773167, default 976773167):
Using default value 976773167
Partition 4 of type Linux and of size 453.5 GiB is set
Command (m for help): w
The partition table has been altered!
Calling ioctl() to re-read partition table.
WARNING: Re-reading the partition table failed with error 16: Device or resource
busy.
The kernel still uses the old table. The new table will be used at
the next reboot or after you run partprobe(8) or kpartx(8)
Syncing disks.
[root@neuromancer ~]#

redhat.

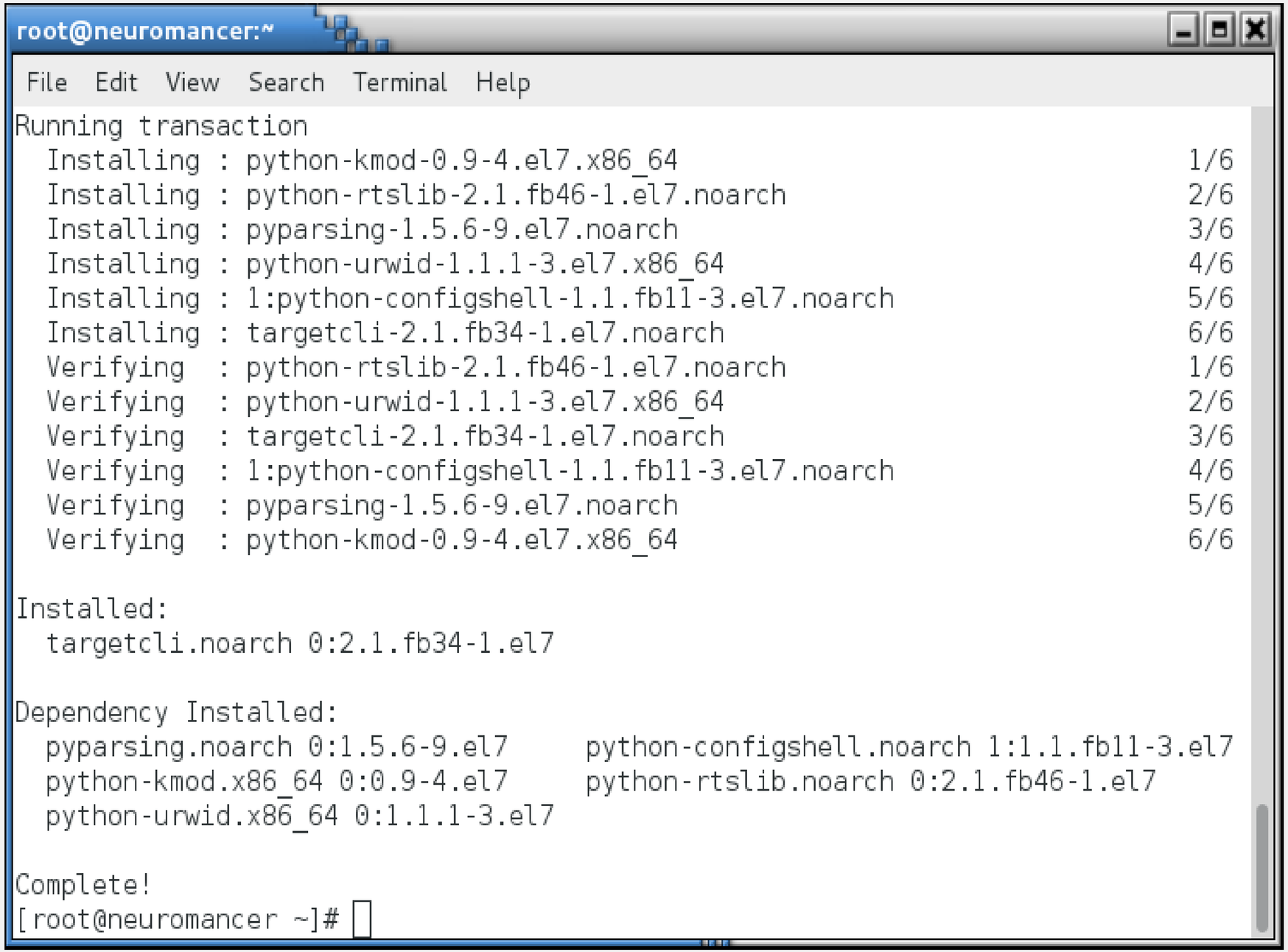
Install the iSCSI management software

- There are a number of ways we can create an iSCSI export. The simplest is probably targetcli
  - yum install targetcli
    - Brings in necessary python libs and utils as dependencies

redhat.


root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# yum install targetcli
Loaded plugins: langpacks, product-id, subscription-manager
This system is not registered to Red Hat Subscription Management. You can use su
bscription-manager to register.
Resolving Dependencies
--> Running transaction check
---> Package targetcli.noarch 0:2.1.fb34-1.el7 will be installed
--> Processing Dependency: python-rtslib >= 2.1.fb41 for package: targetcli-2.1.
fb34-1.el7.noarch
--> Processing Dependency: python-configshell for package: targetcli-2.1.fb34-1.
el7.noarch
--> Running transaction check
---> Package python-configshell.noarch 1:1.1.fb11-3.el7 will be installed
--> Processing Dependency: pyparsing for package: 1:python-configshell-1.1.fb11-
3.el7.noarch
--> Processing Dependency: python-urwid for package: 1:python-configshell-1.1.fb
11-3.el7.noarch
---> Package python-rtslib.noarch 0:2.1.fb46-1.el7 will be installed
--> Processing Dependency: python-kmod for package: python-rtslib-2.1.fb46-1.el7
.noarch
--> Running transaction check
---> Package pyparsing.noarch 0:1.5.6-9.el7 will be installed
---> Package python-kmod.x86_64 0:0.9-4.el7 will be installed
---> Package python-urwid.x86_64 0:1.1.1-3.el7 will be installed

redhat.

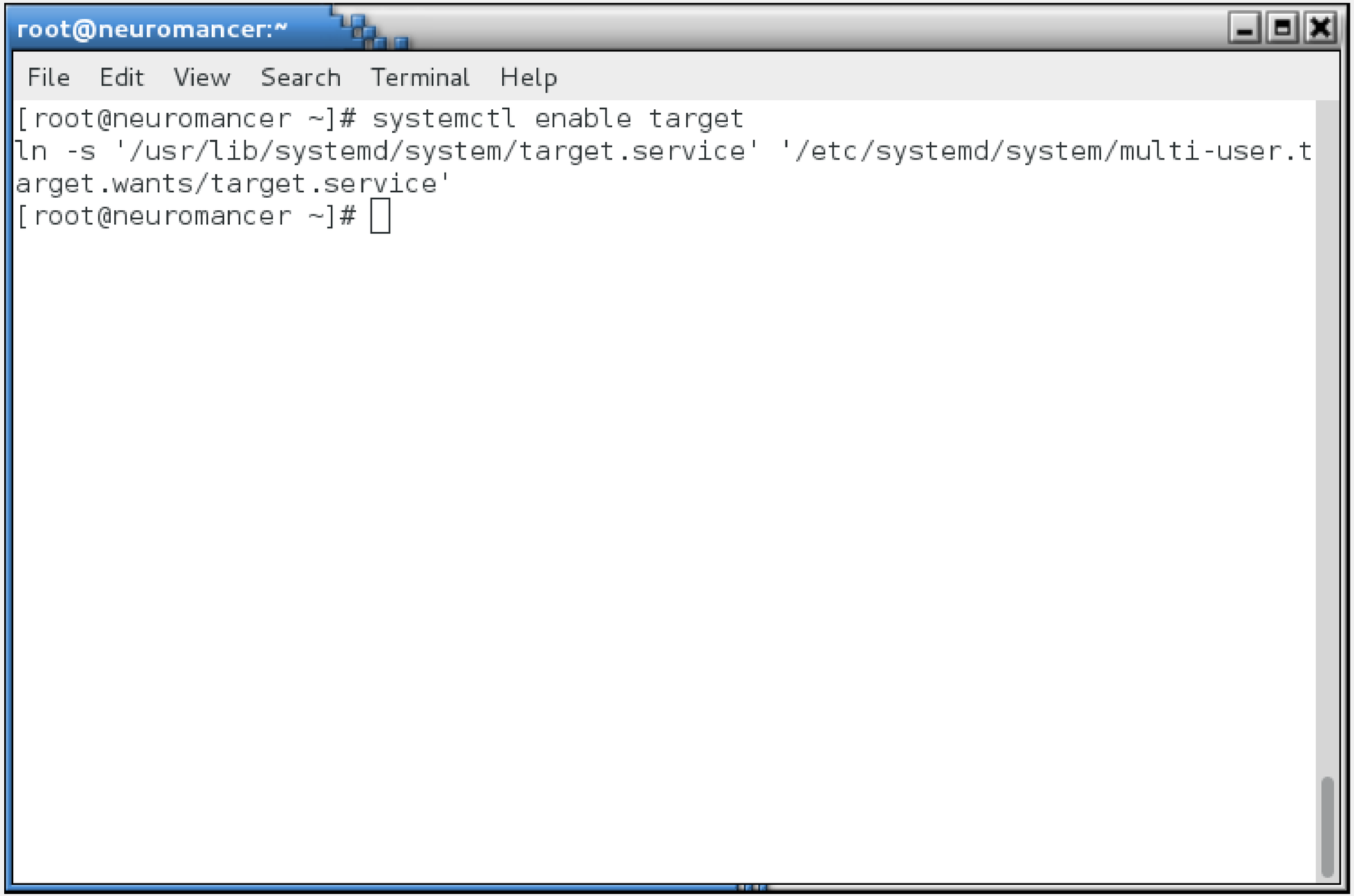

root@neuromancer:~
File Edit View Search Terminal Help
Running transaction
Installing : python-kmod-0.9-4.el7.x86_64 1/6
Installing : python-rtslib-2.1.fb46-1.el7.noarch 2/6
Installing : pyparsing-1.5.6-9.el7.noarch 3/6
Installing : python-urwid-1.1.1-3.el7.x86_64 4/6
Installing : 1:python-configshell-1.1.fb11-3.el7.noarch 5/6
Installing : targetcli-2.1.fb34-1.el7.noarch 6/6
Verifying : python-rtslib-2.1.fb46-1.el7.noarch 1/6
Verifying : python-urwid-1.1.1-3.el7.x86_64 2/6
Verifying : targetcli-2.1.fb34-1.el7.noarch 3/6
Verifying : 1:python-configshell-1.1.fb11-3.el7.noarch 4/6
Verifying : pyparsing-1.5.6-9.el7.noarch 5/6
Verifying : python-kmod-0.9-4.el7.x86_64 6/6
Installed:
targetcli.noarch 0:2.1.fb34-1.el7
Dependency Installed:
pyparsing.noarch 0:1.5.6-9.el7 python-configshell.noarch 1:1.1.fb11-3.el7
python-kmod.x86_64 0:0.9-4.el7 python-rtslib.noarch 0:2.1.fb46-1.el7
python-urwid.x86_64 0:1.1.1-3.el7
Complete!
[root@neuromancer ~]#

redhat.

Enable the “target” service

- The target service is what causes LIO to read its config at boot time.

redhat.

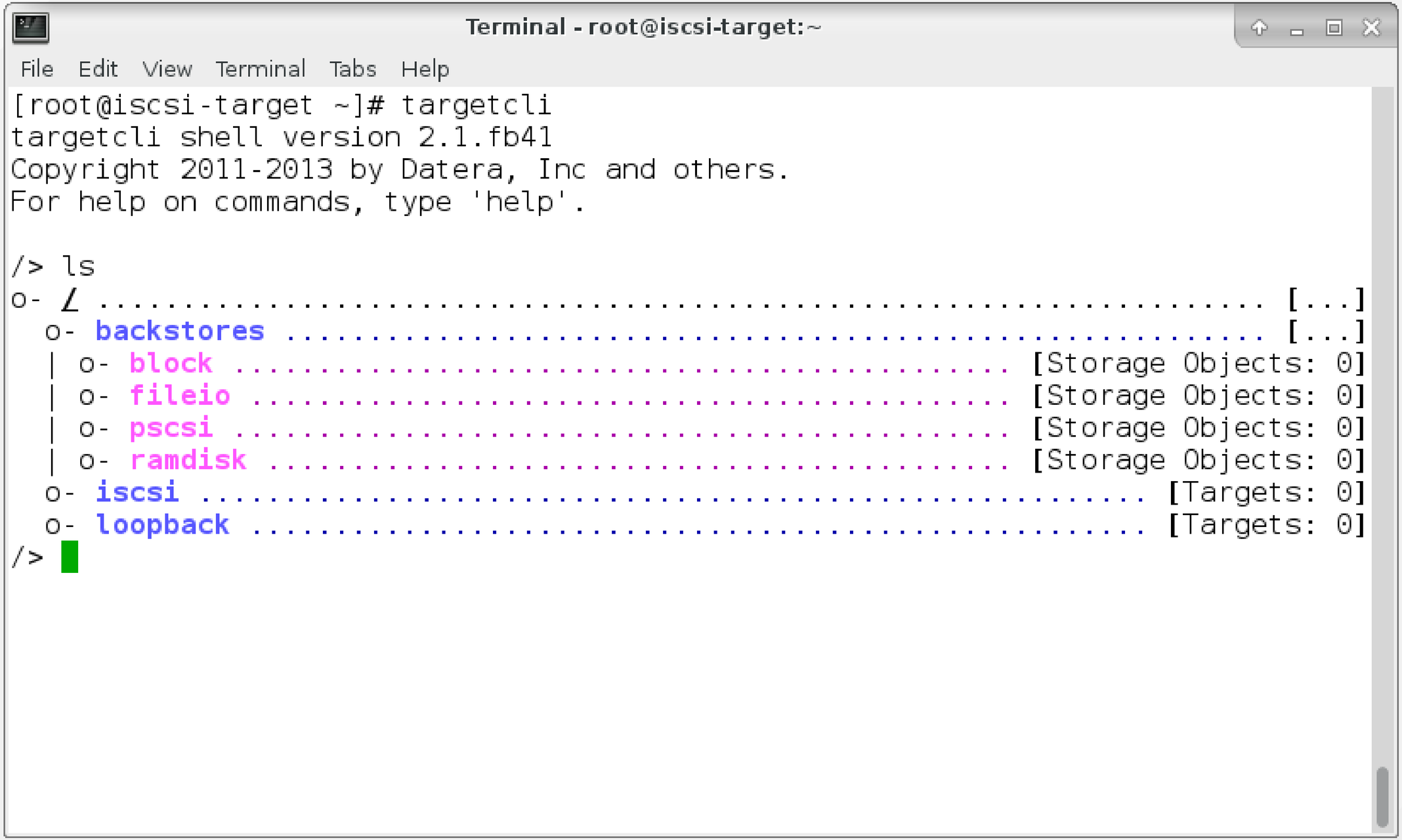

root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# systemctl enable target
ln -s '/usr/lib/systemd/system/target.service' '/etc/systemd/system/multi-user.target.wants/target.service'
[root@neuromancer ~]#

redhat.

Using targetcli

- targetcli can be used interactively via a shell or from the command line. We'll use the shell.
- Check the current config with “ls”

redhat.

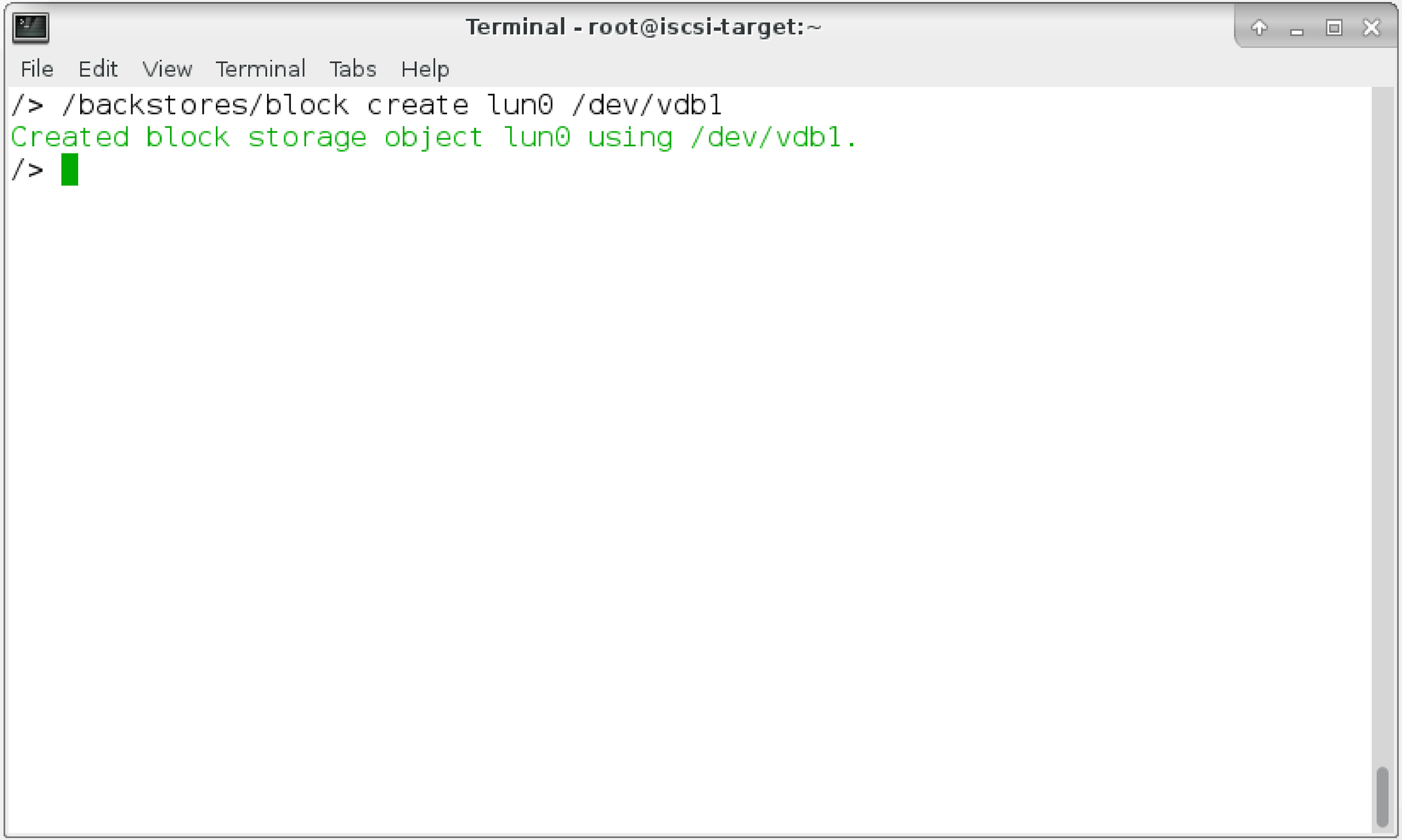

Terminal - root@iscsi-target:~
File Edit View Terminal Tabs Help
[root@iscsi-target ~]# targetcli
targetcli shell version 2.1.fb41
Copyright 2011-2013 by Datera, Inc and others.
For help on commands, type 'help'.
/> ls
o- / ..... [...]
o- backstores ..... [...]
| o- block ..... [Storage Objects: 0]
| o- fileio ..... [Storage Objects: 0]
| o- pscsi ..... [Storage Objects: 0]
| o- ramdisk ..... [Storage Objects: 0]
o- iscsi ..... [Targets: 0]
o- loopback ..... [Targets: 0]
/>

redhat.

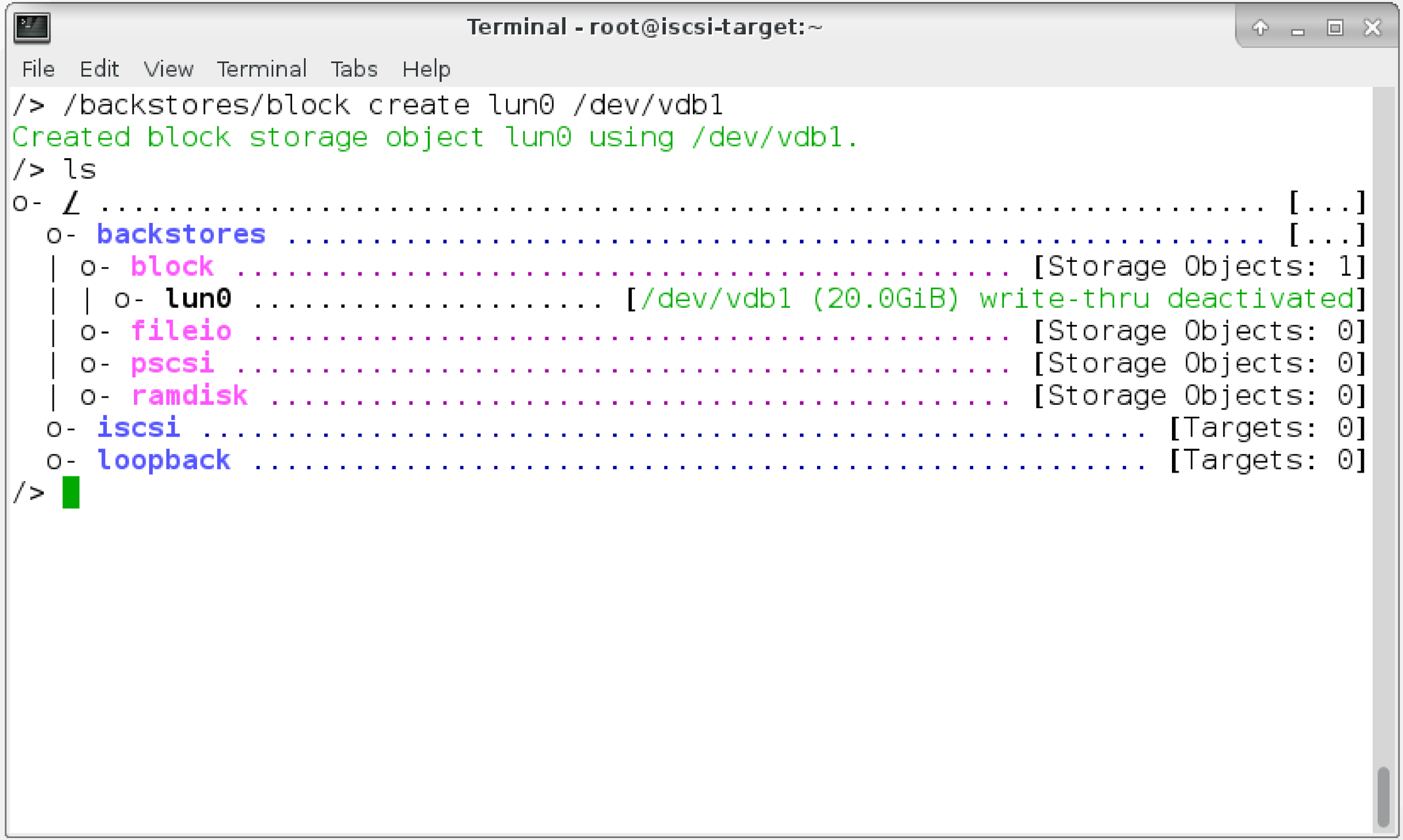
Define the backing store for your LUN

- You have to tell the LIO iSCSI target software about the block device you want to use
  - cd /backstores/block (“cd” is optional)
  - create [lun] /dev/[device] (I called mine lun0 on vdb1)
  - ls to check results
- /backstores/block create lun0 /dev/vdb1

redhat.


Terminal - root@iscsi-target:~
File Edit View Terminal Tabs Help
/> /backstores/block create lun0 /dev/vdb1
Created block storage object lun0 using /dev/vdb1.
/>

redhat.

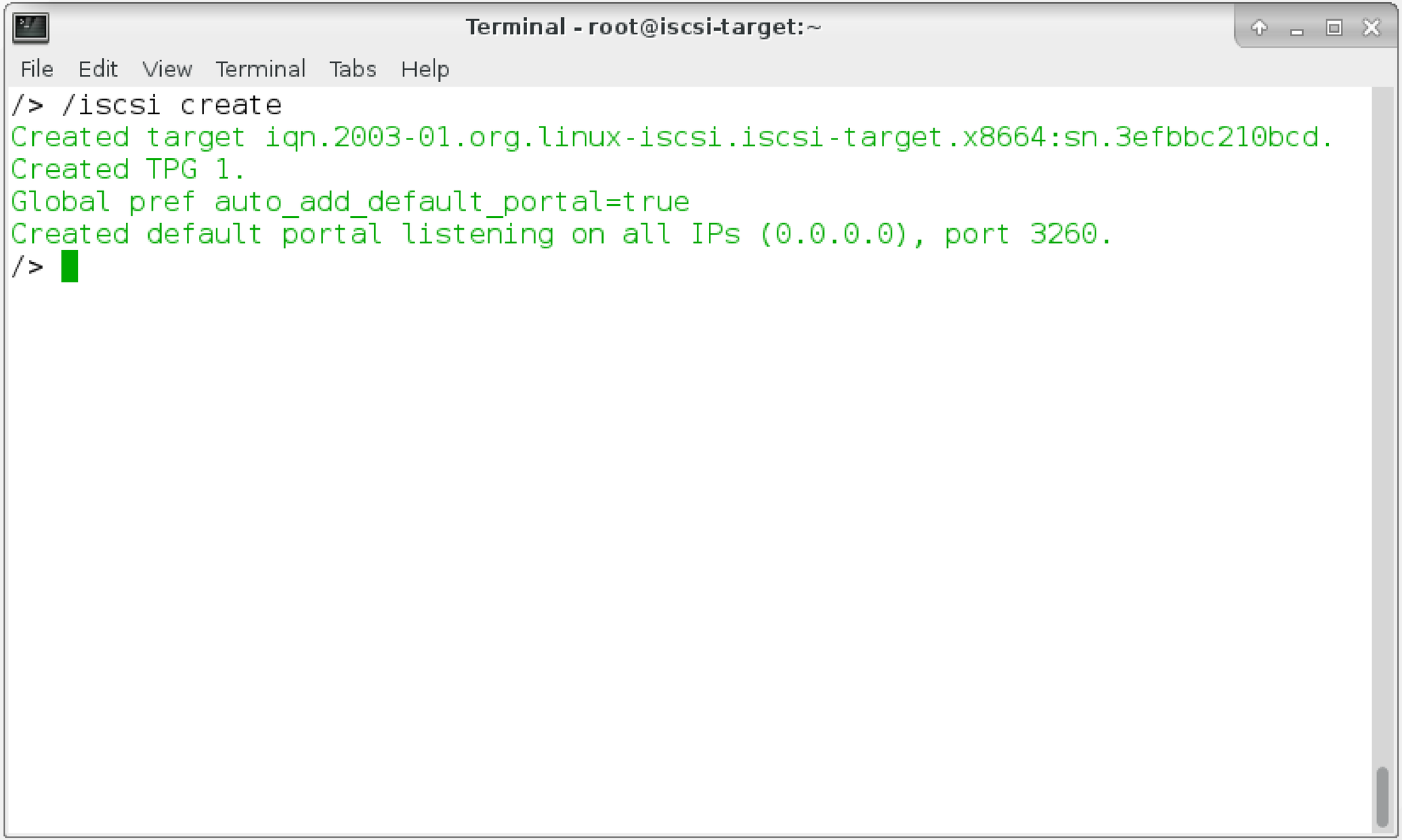

Terminal - root@iscsi-target:~
File Edit View Terminal Tabs Help
/> /backstores/block create lun0 /dev/vdb1
Created block storage object lun0 using /dev/vdb1.
/> ls
o- / ..... [...]
o- backstores ..... [...]
| o- block ..... [Storage Objects: 1]
| | o- lun0 ..... [/dev/vdb1 (20.0GiB) write-thru deactivated]
| o- fileio ..... [Storage Objects: 0]
| o- pscsi ..... [Storage Objects: 0]
| o- ramdisk ..... [Storage Objects: 0]
o- iscsi ..... [Targets: 0]
o- loopback ..... [Targets: 0]
/>

redhat.

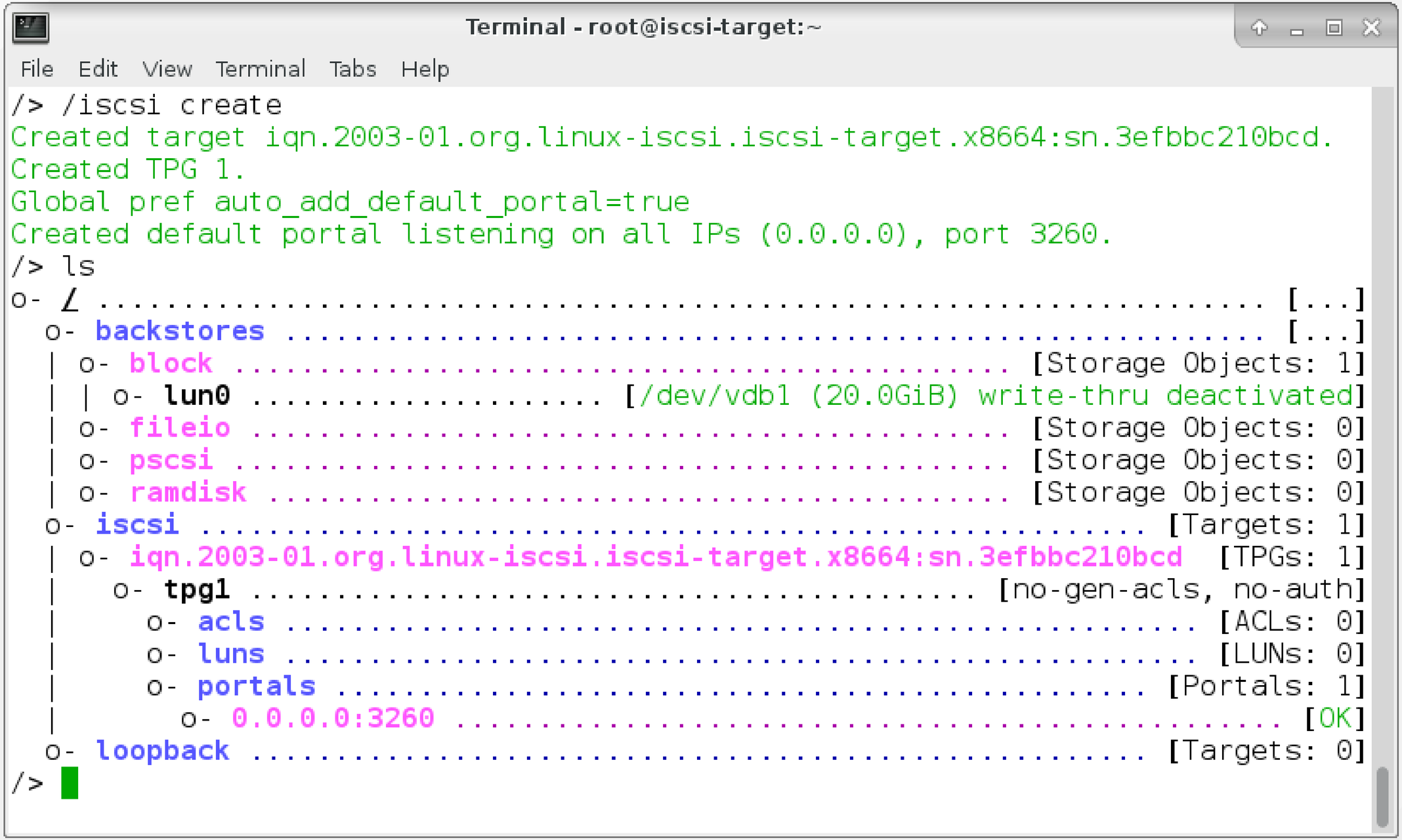
Create an iSCSI Qualified Name (IQN) record

- /iscsi
- create (you **can** specify and IQN, but it's easier to let it auto-generate it for you)

redhat.


Terminal - root@iscsi-target:~
File Edit View Terminal Tabs Help
/> /iscsi create
Created target iqn.2003-01.org.linux-iscsi.iscsi-target.x8664:sn.3efbbc210bcd.
Created TPG 1.
Global pref auto_add_default_portal=true
Created default portal listening on all IPs (0.0.0.0), port 3260.
/>

redhat.

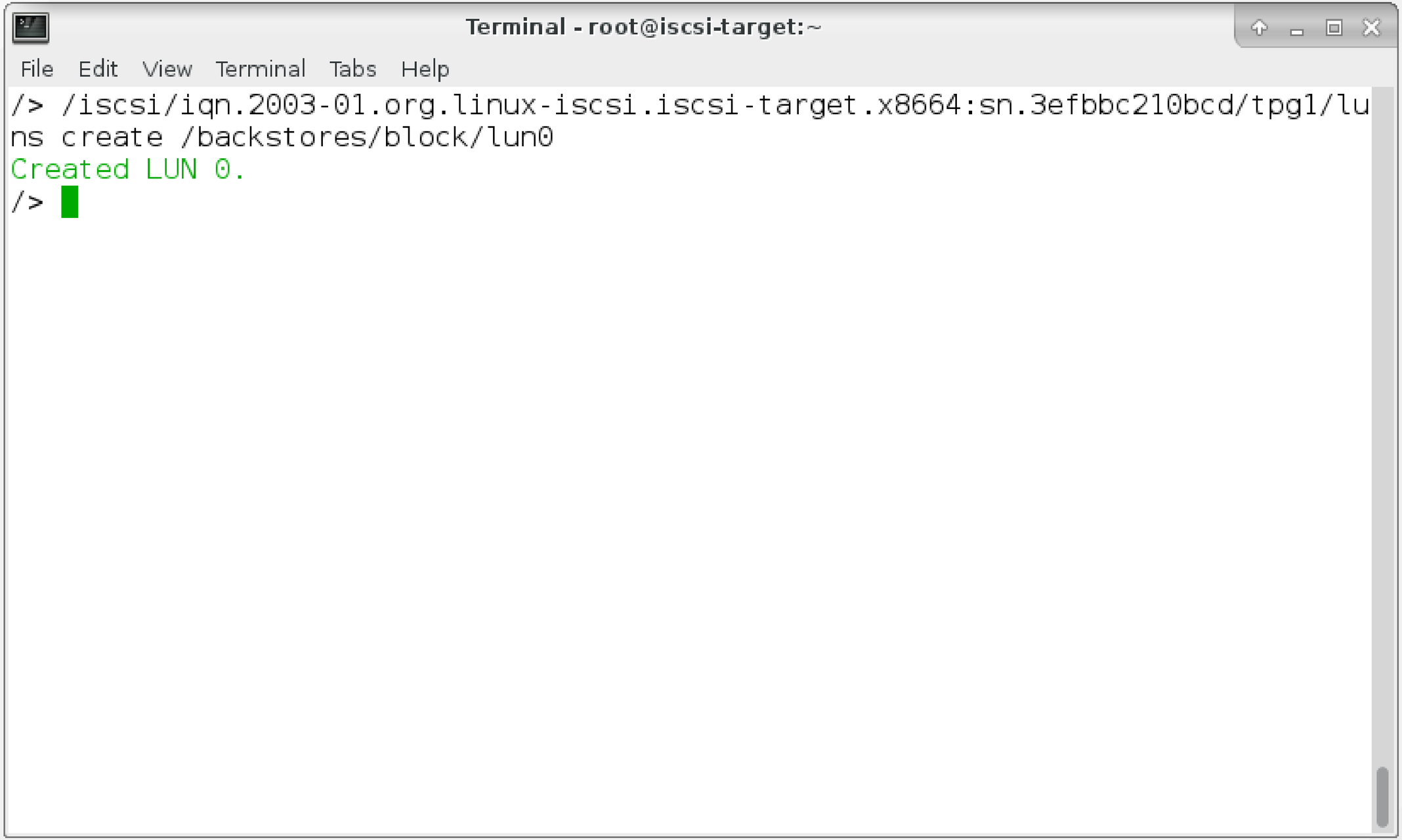

Terminal - root@iscsi-target:~
File Edit View Terminal Tabs Help
/> /iscsi create
Created target iqn.2003-01.org.linux-iscsi.iscsi-target.x8664:sn.3efbbc210bcd.
Created TPG 1.
Global pref auto_add_default_portal=true
Created default portal listening on all IPs (0.0.0.0), port 3260.
/> ls
o- / ..... [...]
o- backstores ..... [...]
o- block ..... [Storage Objects: 1]
o- lun0 ..... [/dev/vdb1 (20.0GiB) write-thru deactivated]
o- fileio ..... [Storage Objects: 0]
o- pscsi ..... [Storage Objects: 0]
o- ramdisk ..... [Storage Objects: 0]
o- iscsi ..... [Targets: 1]
o- iqn.2003-01.org.linux-iscsi.iscsi-target.x8664:sn.3efbbc210bcd [TPGs: 1]
o- tpg1 ..... [no-gen-acls, no-auth]
o- acls ..... [ACLs: 0]
o- luns ..... [LUNs: 0]
o- portals ..... [Portals: 1]
o- 0.0.0.0:3260 ..... [OK]
o- loopback ..... [Targets: 0]
/>

redhat.

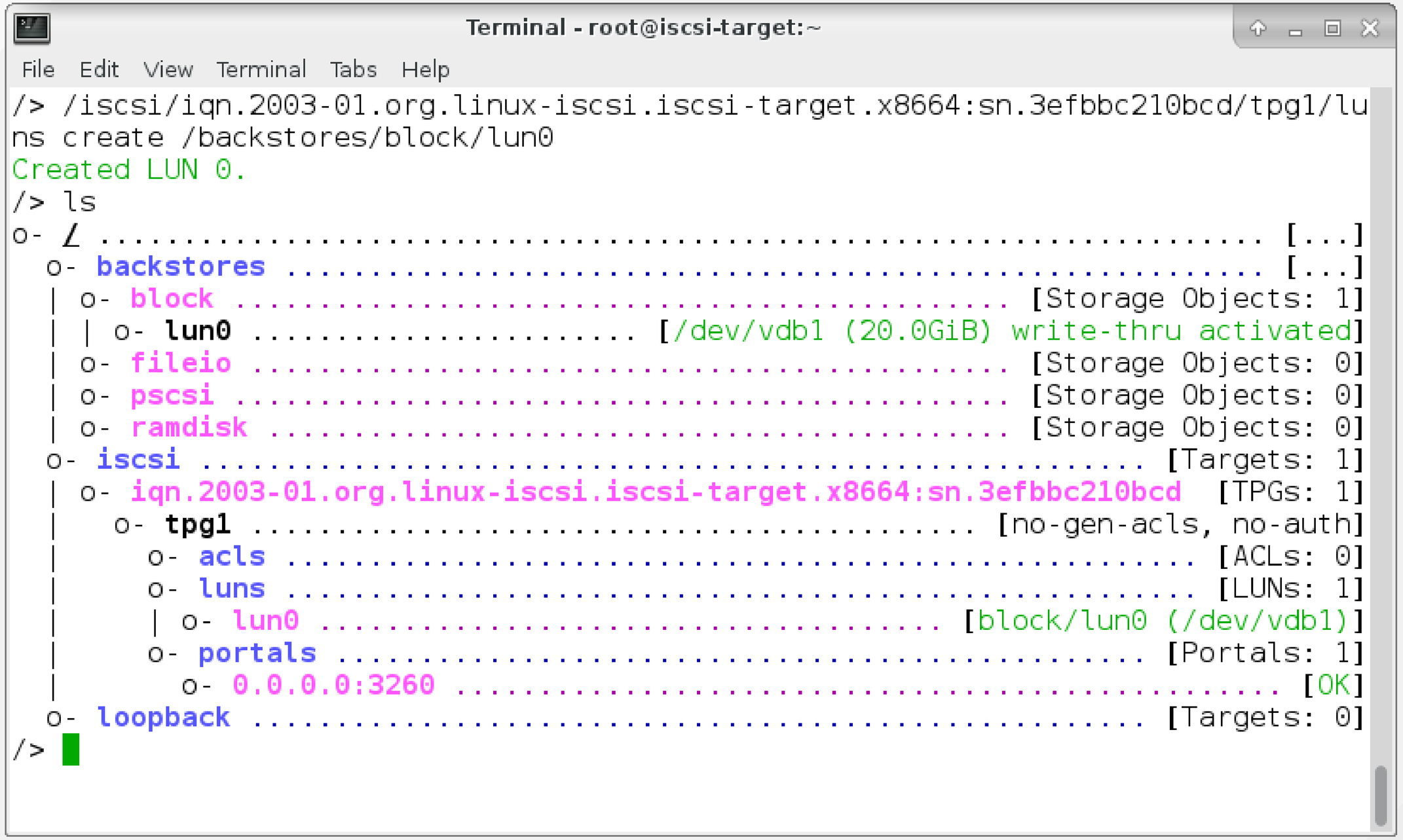
Export the LUN

- Now you need to make that LUN available via that portal and IQN
  - cd /iscsi/[your_iqn]/tpg1/luns
  - create /backstores/block/[lun]
  - ls

redhat.


Terminal - root@iscsi-target:~
File Edit View Terminal Tabs Help
/> /iscsi/iqn.2003-01.org.linux-iscsi.iscsi-target.x8664:sn.3efbbc210bcd/tpg1/luns create /backstores/block/lun0
Created LUN 0.
/>

redhat.

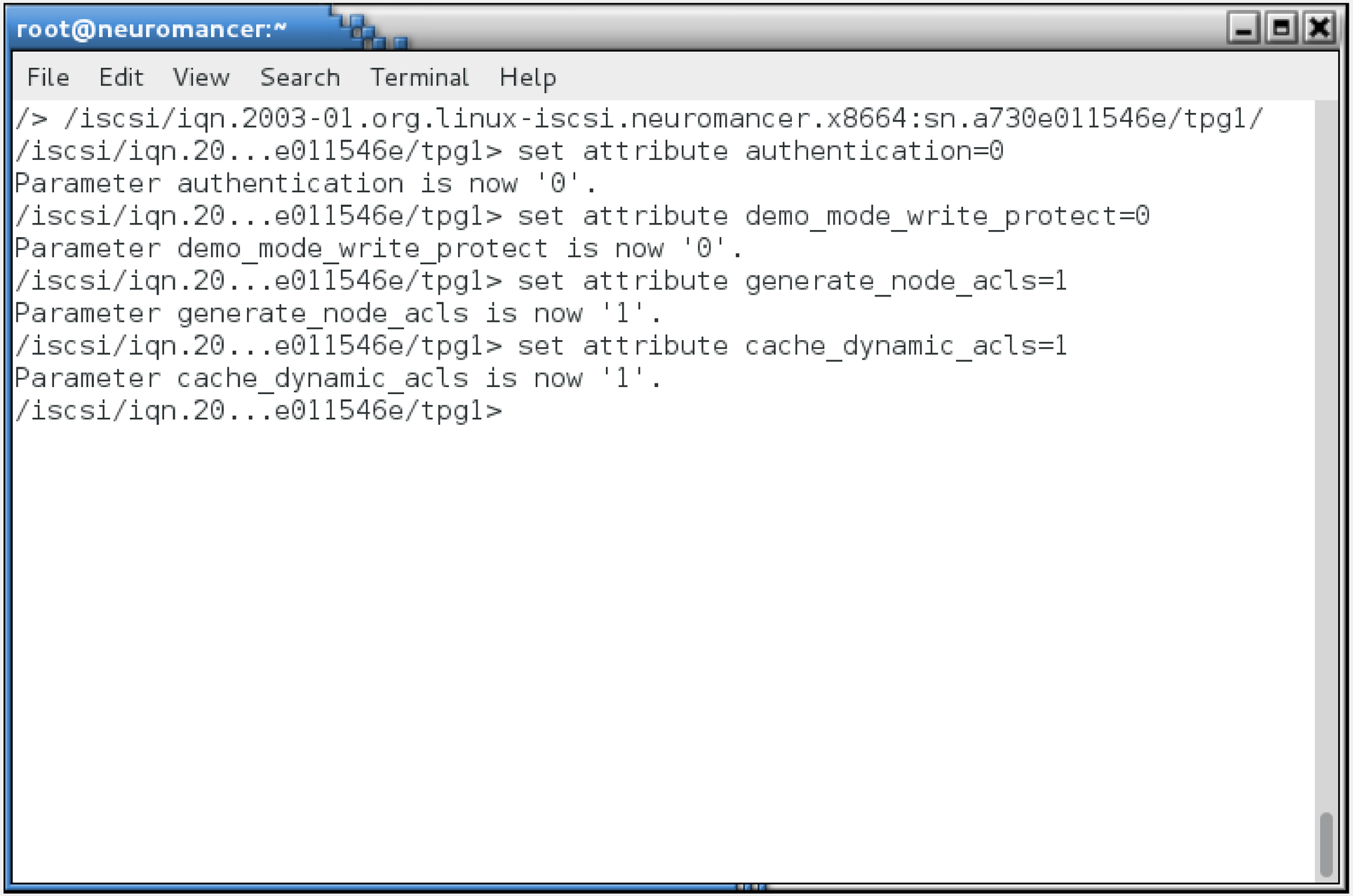

Terminal - root@iscsi-target:~
File Edit View Terminal Tabs Help
/> /iscsi/iqn.2003-01.org.linux-iscsi.iscsi-target.x8664:sn.3efbbc210bcd/tpg1/luns create /backstores/block/lun0
Created LUN 0.
/> ls
o- / ..... [...]
o- backstores ..... [...]
| o- block ..... [Storage Objects: 1]
| | o- lun0 ..... [/dev/vdb1 (20.0GiB) write-thru activated]
| o- fileio ..... [Storage Objects: 0]
| o- pscsi ..... [Storage Objects: 0]
| o- ramdisk ..... [Storage Objects: 0]
o- iscsi ..... [Targets: 1]
| o- iqn.2003-01.org.linux-iscsi.iscsi-target.x8664:sn.3efbbc210bcd [TPGs: 1]
| o- tpg1 ..... [no-gen-acls, no-auth]
| o- acls ..... [ACLs: 0]
| o- luns ..... [LUNs: 1]
| | o- lun0 ..... [block/lun0 (/dev/vdb1)]
| o- portals ..... [Portals: 1]
| o- 0.0.0.0:3260 ..... [OK]
o- loopback ..... [Targets: 0]
/>

redhat.

Enable Demo Mode

- This is dangerous! Don't do this in production, you'll want to set ACLs. We're doing this in a compressed time frame for a demo setup.
- Go to your target portal group (TPG) and set the following attributes:
  - cd /iscsi/[your_IQN]/tpg1/
  - set attribute authentication=0
  - set attribute demo_mode_write_protect=0
  - set attribute generate_node_acls=1
  - set attribute cache_dynamic_acls=1

redhat.

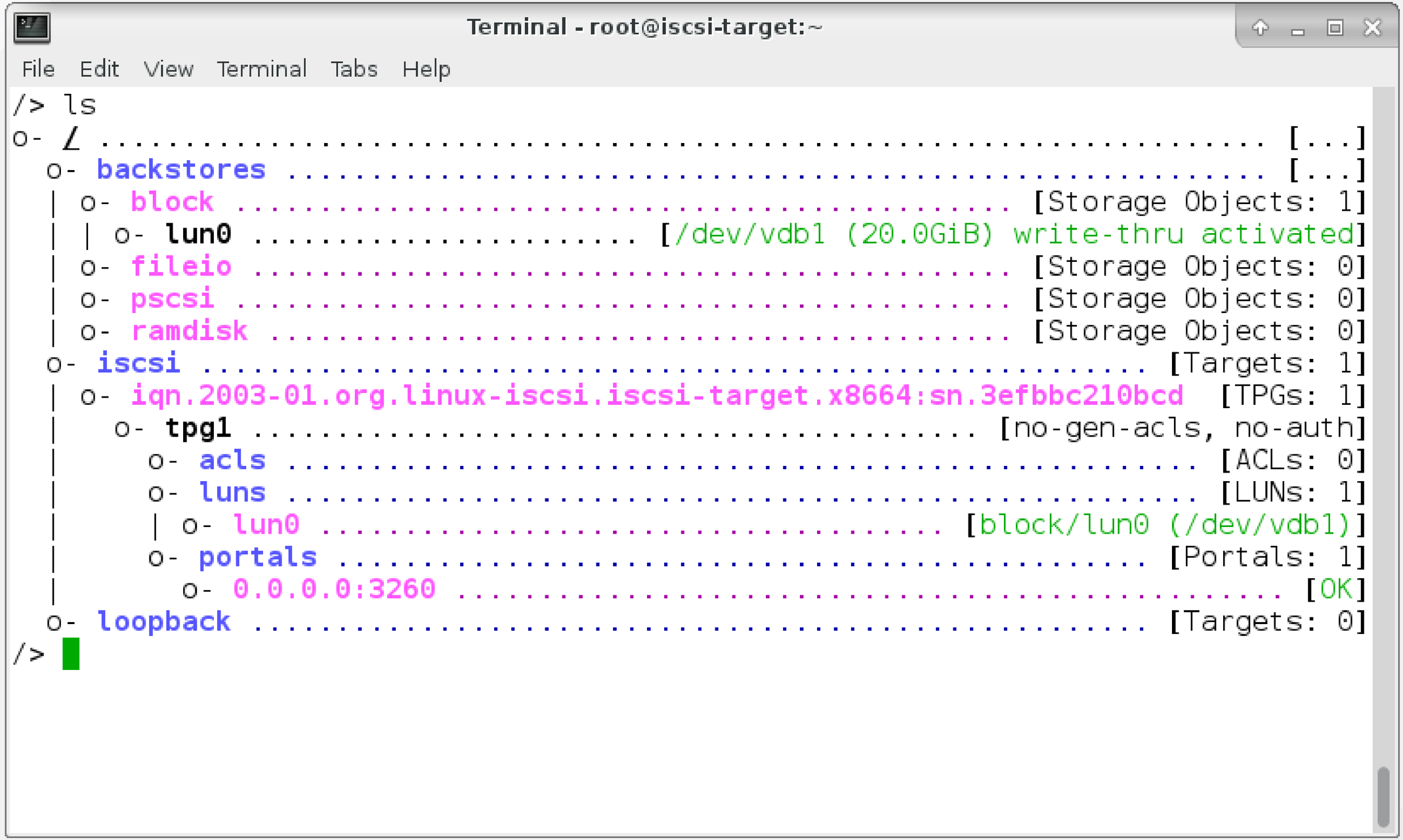

root@neuromancer:~
File Edit View Search Terminal Help
/> /iscsi/iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.a730e011546e/tpg1/
/iscsi/iqn.20...e011546e/tpg1> set attribute authentication=0
Parameter authentication is now '0'.
/iscsi/iqn.20...e011546e/tpg1> set attribute demo_mode_write_protect=0
Parameter demo_mode_write_protect is now '0'.
/iscsi/iqn.20...e011546e/tpg1> set attribute generate_node_acls=1
Parameter generate_node_acls is now '1'.
/iscsi/iqn.20...e011546e/tpg1> set attribute cache_dynamic_acls=1
Parameter cache_dynamic_acls is now '1'.
/iscsi/iqn.20...e011546e/tpg1>

redhat.

Check the top level view

- cd /
- ls

redhat.

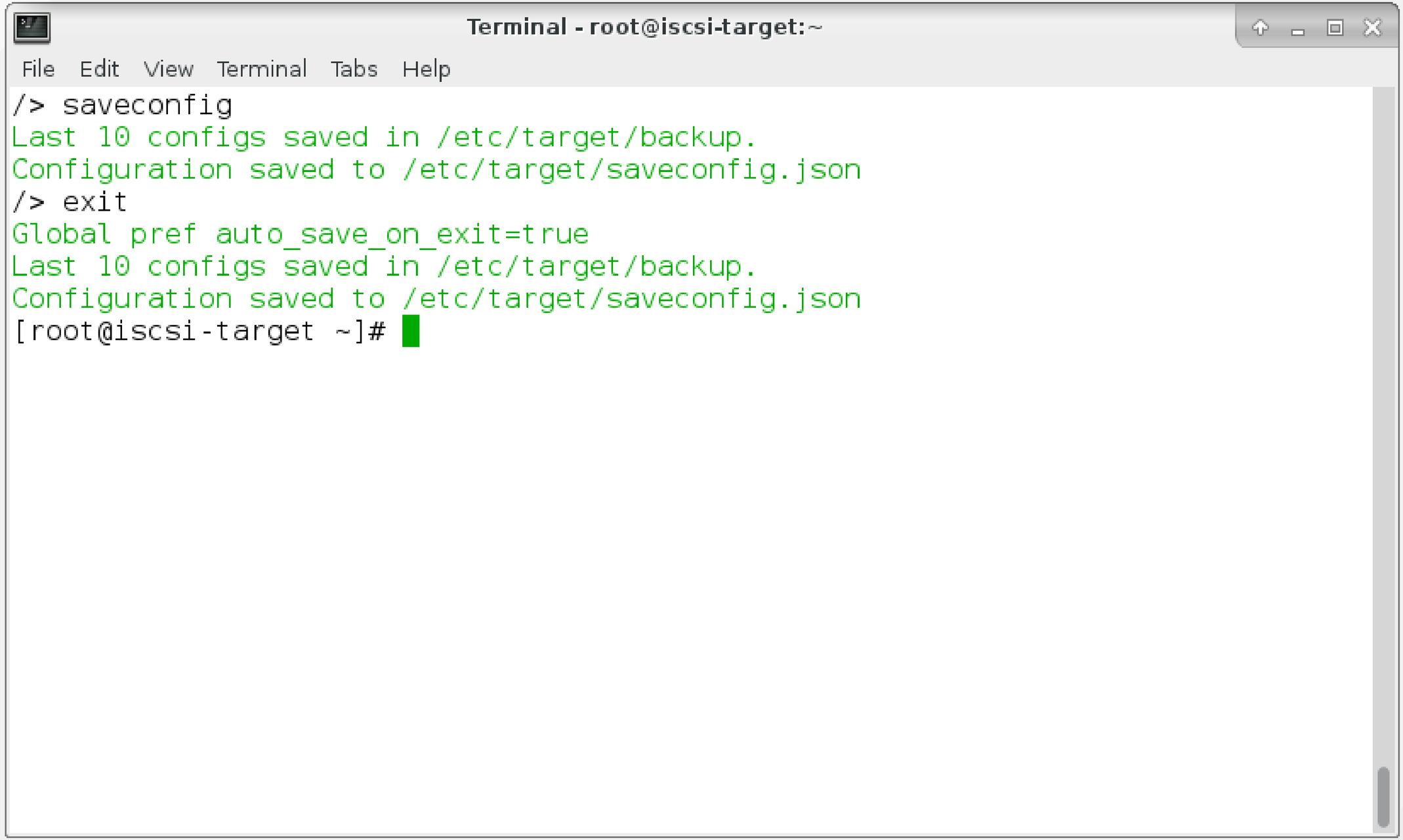

Terminal - root@iscsi-target:~
File Edit View Terminal Tabs Help
/> ls
o- / ..... [...]
o- backstores ..... [...]
| o- block ..... [Storage Objects: 1]
| | o- lun0 ..... [/dev/vdb1 (20.0GiB) write-thru activated]
| o- fileio ..... [Storage Objects: 0]
| o- pscsi ..... [Storage Objects: 0]
| o- ramdisk ..... [Storage Objects: 0]
o- iscsi ..... [Targets: 1]
| o- iqn.2003-01.org.linux-iscsi.iscsi-target.x8664:sn.3efbbc210bcd [TPGs: 1]
| o- tpg1 ..... [no-gen-acls, no-auth]
| o- acls ..... [ACLs: 0]
| o- luns ..... [LUNs: 1]
| | o- lun0 ..... [block/lun0 (/dev/vdb1)]
| o- portals ..... [Portals: 1]
| o- 0.0.0.0:3260 ..... [OK]
o- loopback ..... [Targets: 0]
/>

redhat.

Save the configuration

- saveconfig
- Exiting saves as well

redhat.


Terminal - root@iscsi-target:~
File Edit View Terminal Tabs Help
/> saveconfig
Last 10 configs saved in /etc/target/backup.
Configuration saved to /etc/target/saveconfig.json
/> exit
Global pref auto_save_on_exit=true
Last 10 configs saved in /etc/target/backup.
Configuration saved to /etc/target/saveconfig.json
[root@iscsi-target ~]#

redhat.

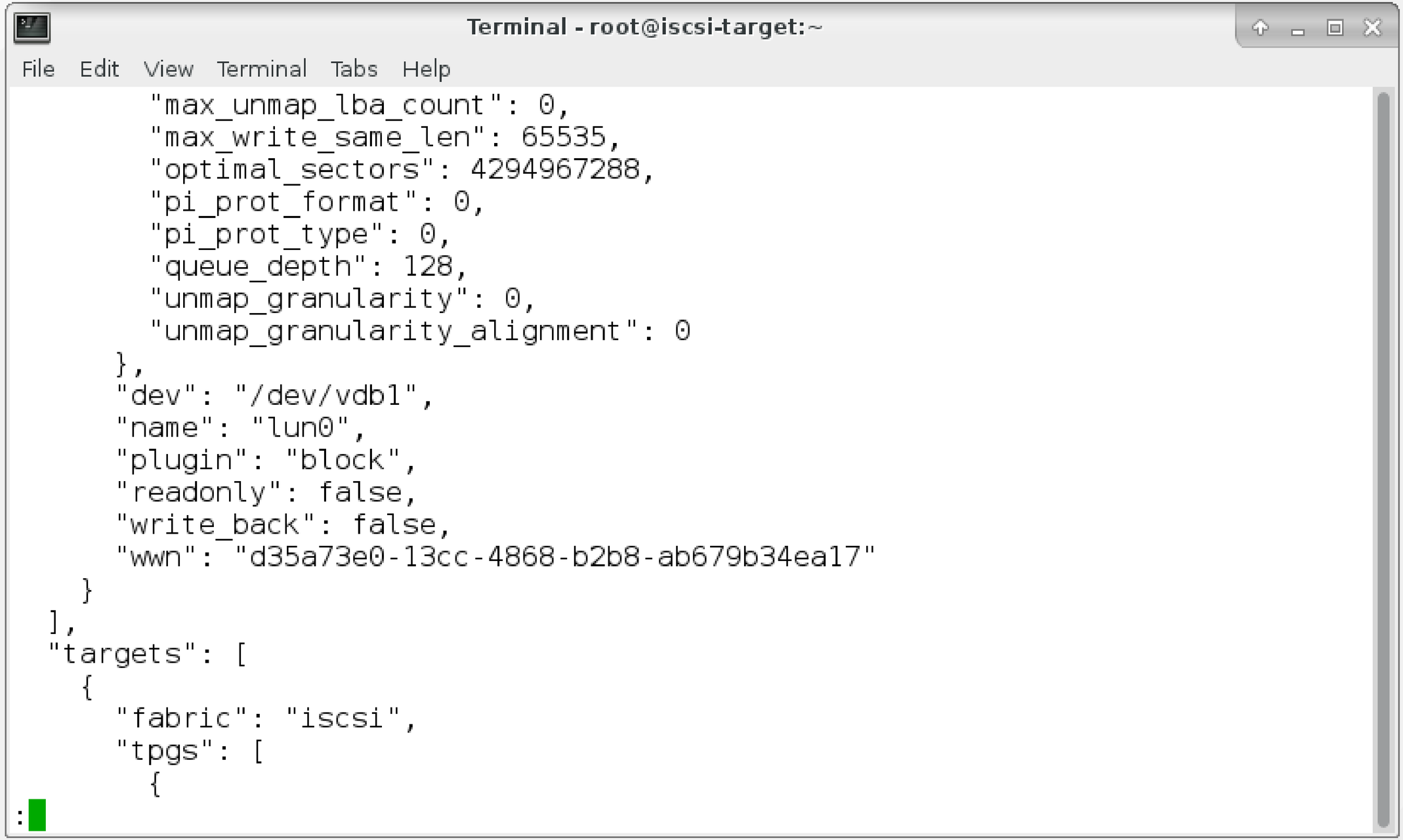
Check out /etc/target/saveconfig.json

- cat the file

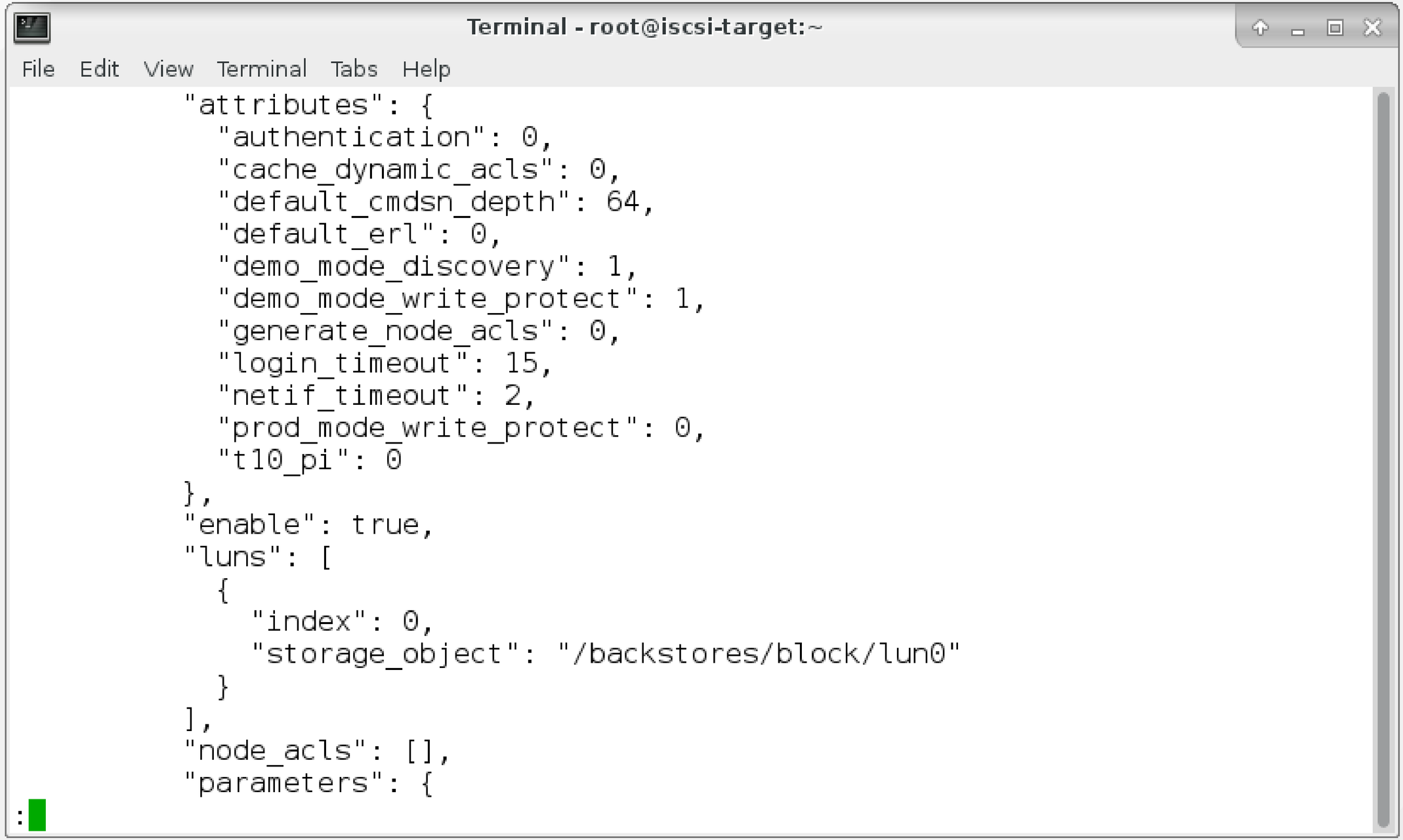
redhat.

Terminal - root@iscsi-target:~
File Edit View Terminal Tabs Help
{
"fabric_modules": [],
"storage_objects": [
{
"attributes": {
"block_size": 512,
"emulate_3pc": 1,
"emulate_caw": 1,
"emulate_dpo": 0,
"emulate_fua_read": 0,
"emulate_fua_write": 1,
"emulate_model_alias": 1,
"emulate_rest_reord": 0,
"emulate_tas": 1,
"emulate_tpu": 0,
"emulate_tpws": 0,
"emulate_ua_intlck_ctrl": 0,
"emulate_write_cache": 0,
"enforce_pr_isids": 1,
"force_pr_aptpl": 0,
"is_nonrot": 0,
"max_unmap_block_desc_count": 0,
/etc/target/saveconfig.json

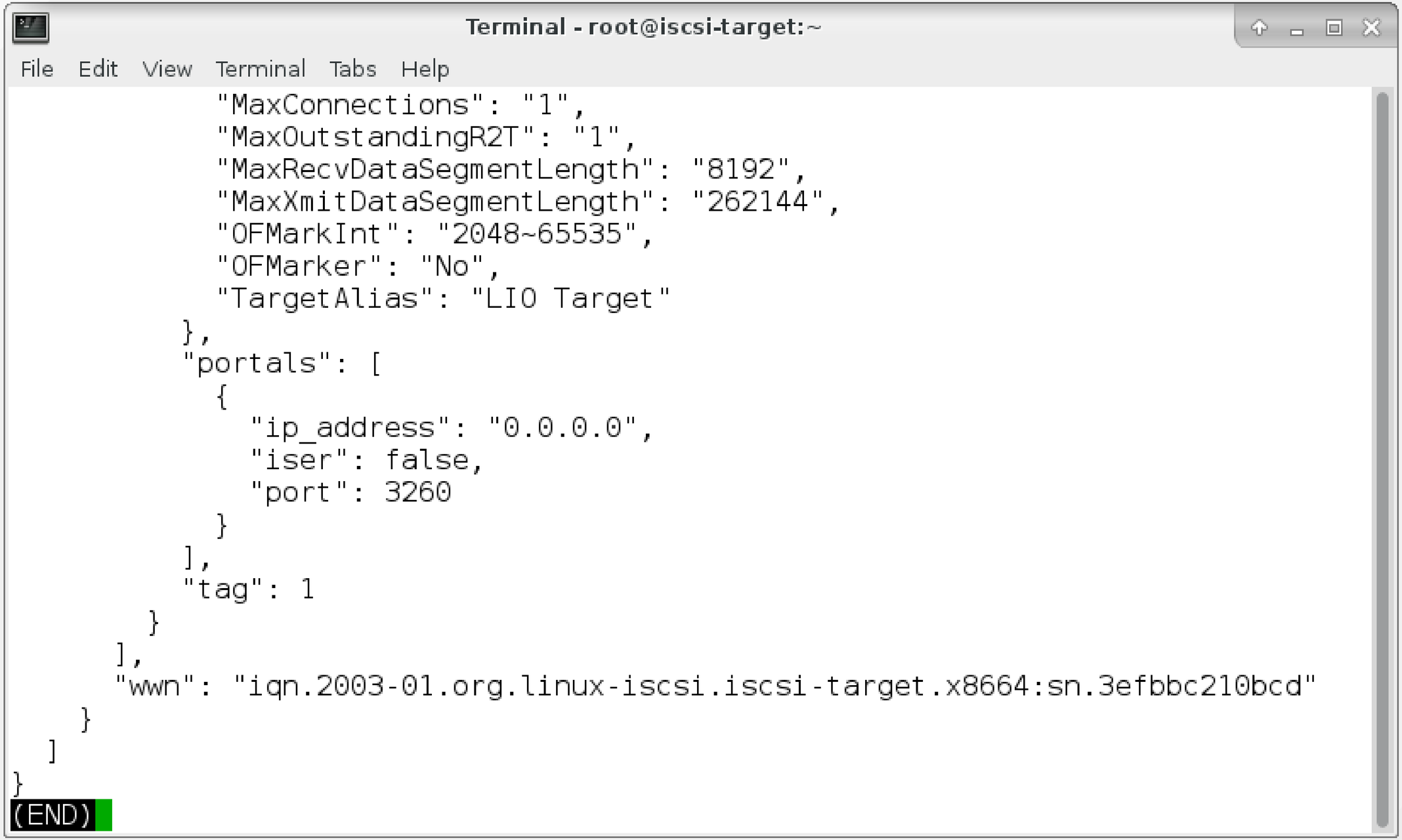
redhat.


Terminal - root@iscsi-target:~
File Edit View Terminal Tabs Help
"max_unmap_lba_count": 0,
"max_write_same_len": 65535,
"optimal_sectors": 4294967288,
"pi_prot_format": 0,
"pi_prot_type": 0,
"queue_depth": 128,
"unmap_granularity": 0,
"unmap_granularity_alignment": 0
},
"dev": "/dev/vdb1",
"name": "lun0",
"plugin": "block",
"readonly": false,
"write_back": false,
"wwn": "d35a73e0-13cc-4868-b2b8-ab679b34ea17"
}
],
"targets": [
{
"fabric": "iscsi",
"tpgs": [
{
:

redhat.


Terminal - root@iscsi-target:~
File Edit View Terminal Tabs Help
"attributes": {
"authentication": 0,
"cache_dynamic_acls": 0,
"default_cmdsn_depth": 64,
"default_erl": 0,
"demo_mode_discovery": 1,
"demo_mode_write_protect": 1,
"generate_node_acls": 0,
"login_timeout": 15,
"netif_timeout": 2,
"prod_mode_write_protect": 0,
"t10_pi": 0
},
"enable": true,
"luns": [
{
"index": 0,
"storage_object": "/backstores/block/lun0"
}
],
"node_acls": [],
"parameters": {
:

redhat.


Terminal - root@iscsi-target:~
File Edit View Terminal Tabs Help
"MaxConnections": "1",
"MaxOutstandingR2T": "1",
"MaxRecvDataSegmentLength": "8192",
"MaxXmitDataSegmentLength": "262144",
"OFMarkInt": "2048~65535",
"OFMarker": "No",
"TargetAlias": "LIO Target"
},
"portals": [
{
"ip_address": "0.0.0.0",
"iser": false,
"port": 3260
}
],
"tag": 1
}
],
"wwn": "iqn.2003-01.org.linux-iscsi.iscsi-target.x8664:sn.3efbbc210bcd"
}
]
}
(END)

redhat.

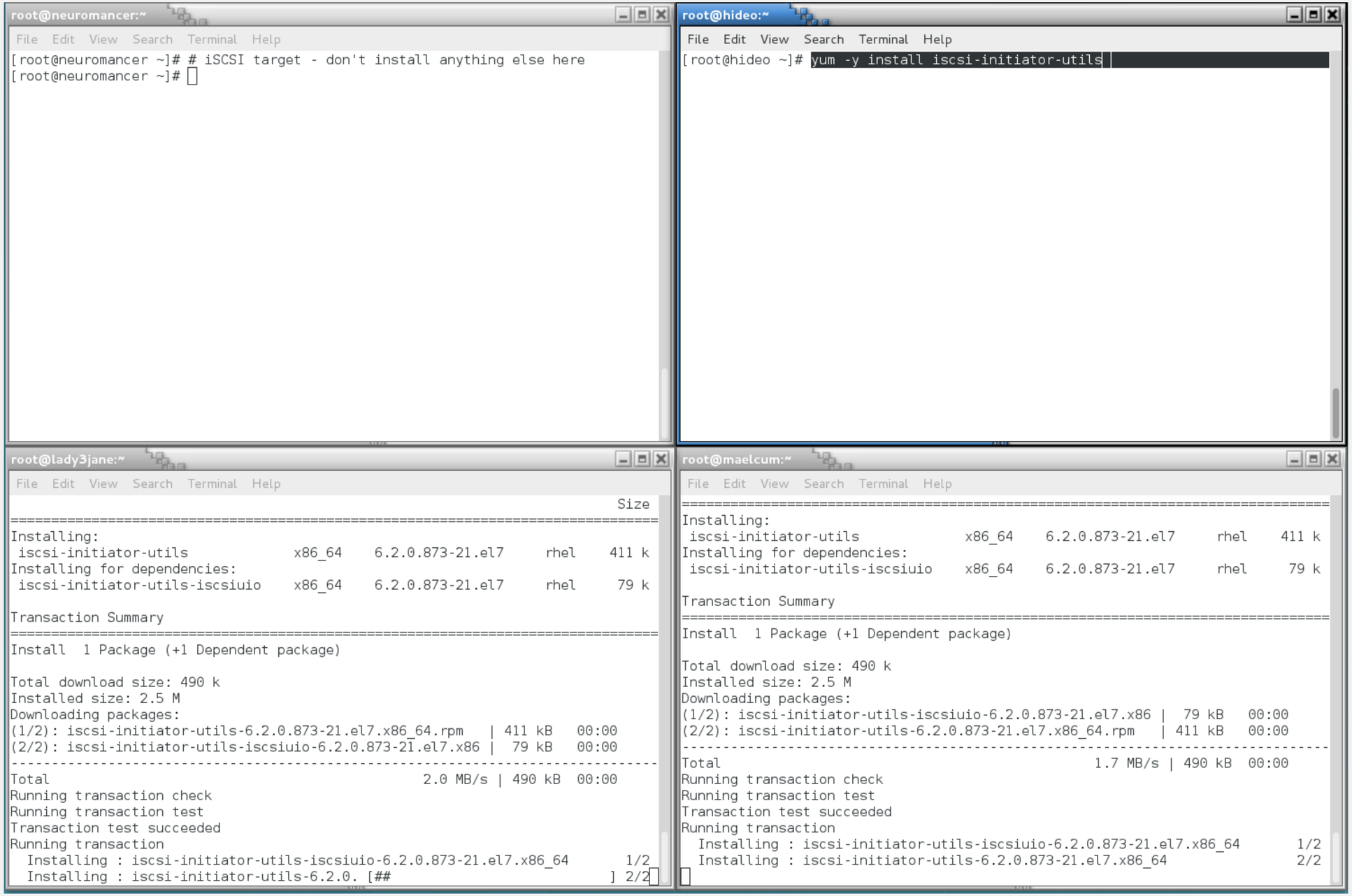
Set up the iSCSI initiators (clients)

redhat.

Install the software on each cluster node

- yum install iscsi-initiator-utils

redhat.

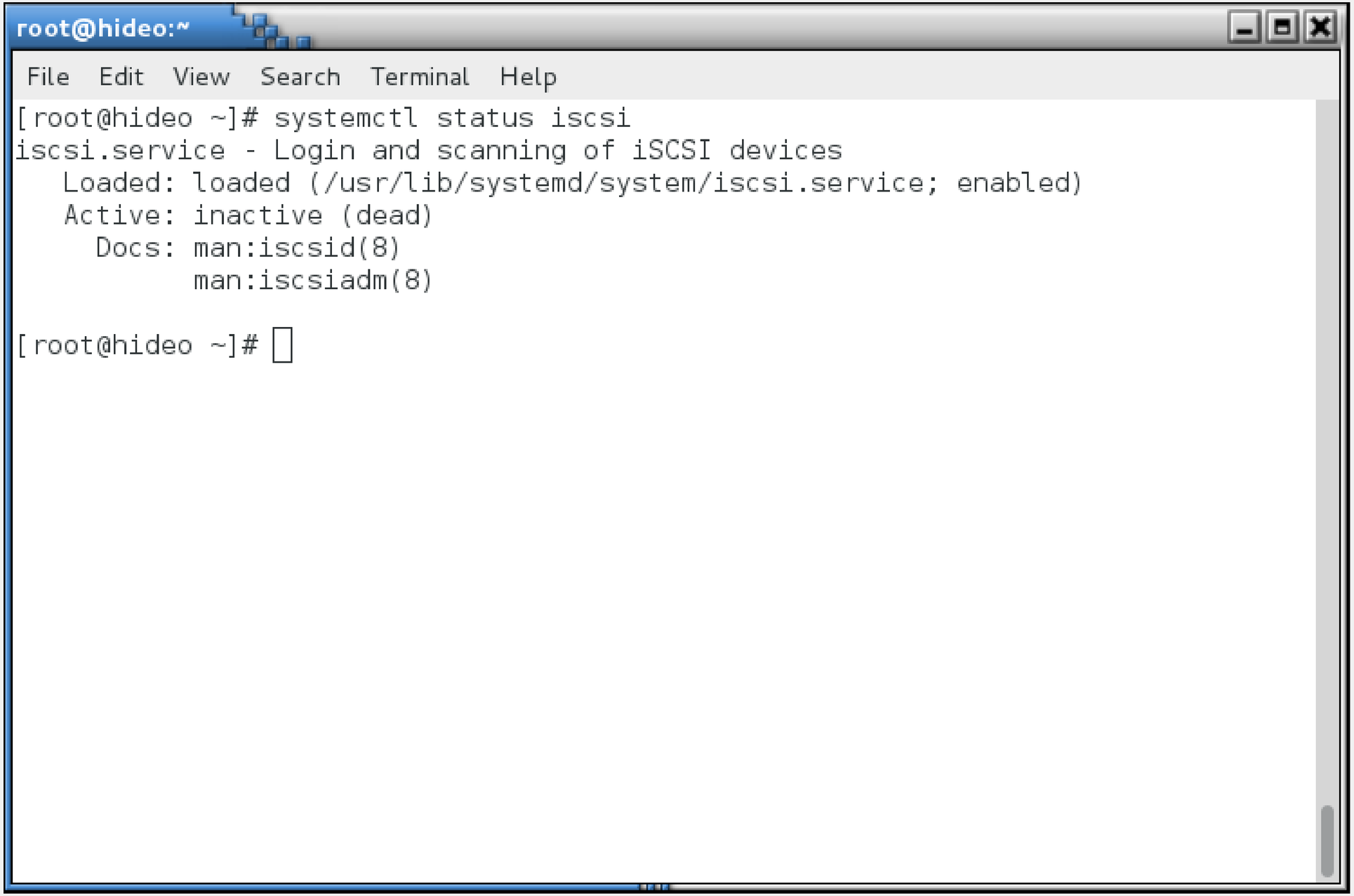

root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# # iSCSI target - don't install anything else here
[root@neuromancer ~]#
root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# yum -y install iscsi-initiator-utils
root@lady3jane:~
File Edit View Search Terminal Help
Size
Installing:
iscsi-initiator-utils x86_64 6.2.0.873-21.el7 rhel 411 k
Installing for dependencies:
iscsi-initiator-utils-iscsiuio x86_64 6.2.0.873-21.el7 rhel 79 k
Transaction Summary
Install 1 Package (+1 Dependent package)
Total download size: 490 k
Installed size: 2.5 M
Downloading packages:
(1/2): iscsi-initiator-utils-6.2.0.873-21.el7.x86_64.rpm | 411 kB 00:00
(2/2): iscsi-initiator-utils-iscsiuio-6.2.0.873-21.el7.x86 | 79 kB 00:00
Total 2.0 MB/s | 490 kB 00:00
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
Installing : iscsi-initiator-utils-iscsiuio-6.2.0.873-21.el7.x86_64 1/2
Installing : iscsi-initiator-utils-6.2.0. [##] 2/2
root@maelcum:~
File Edit View Search Terminal Help
Installing:
iscsi-initiator-utils x86_64 6.2.0.873-21.el7 rhel 411 k
Installing for dependencies:
iscsi-initiator-utils-iscsiuio x86_64 6.2.0.873-21.el7 rhel 79 k
Transaction Summary
Install 1 Package (+1 Dependent package)
Total download size: 490 k
Installed size: 2.5 M
Downloading packages:
(1/2): iscsi-initiator-utils-iscsiuio-6.2.0.873-21.el7.x86 | 79 kB 00:00
(2/2): iscsi-initiator-utils-6.2.0.873-21.el7.x86_64.rpm | 411 kB 00:00
Total 1.7 MB/s | 490 kB 00:00
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
Installing : iscsi-initiator-utils-iscsiuio-6.2.0.873-21.el7.x86_64 1/2
Installing : iscsi-initiator-utils-6.2.0.873-21.el7.x86_64 2/2

redhat.

Check that the iSCSI initiator service is enabled

- systemctl status iscsi
  - It should be enabled but dead since it has not been started yet

redhat.

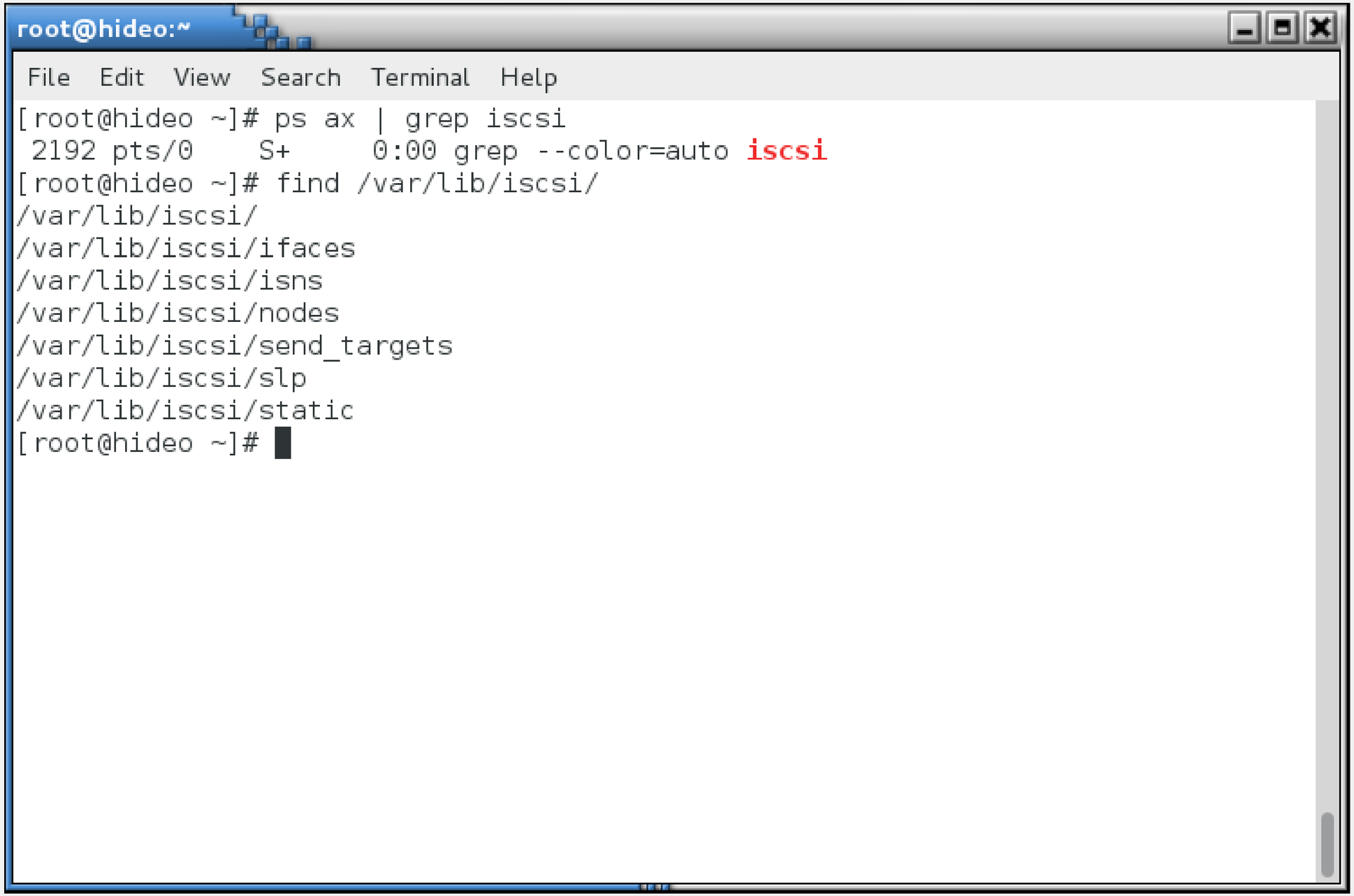

root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# systemctl status iscsi
iscsi.service - Login and scanning of iSCSI devices
Loaded: loaded (/usr/lib/systemd/system/iscsi.service; enabled)
Active: inactive (dead)
Docs: man:iscsid(8)
man:iscsiadm(8)
[root@hideo ~]#

redhat.

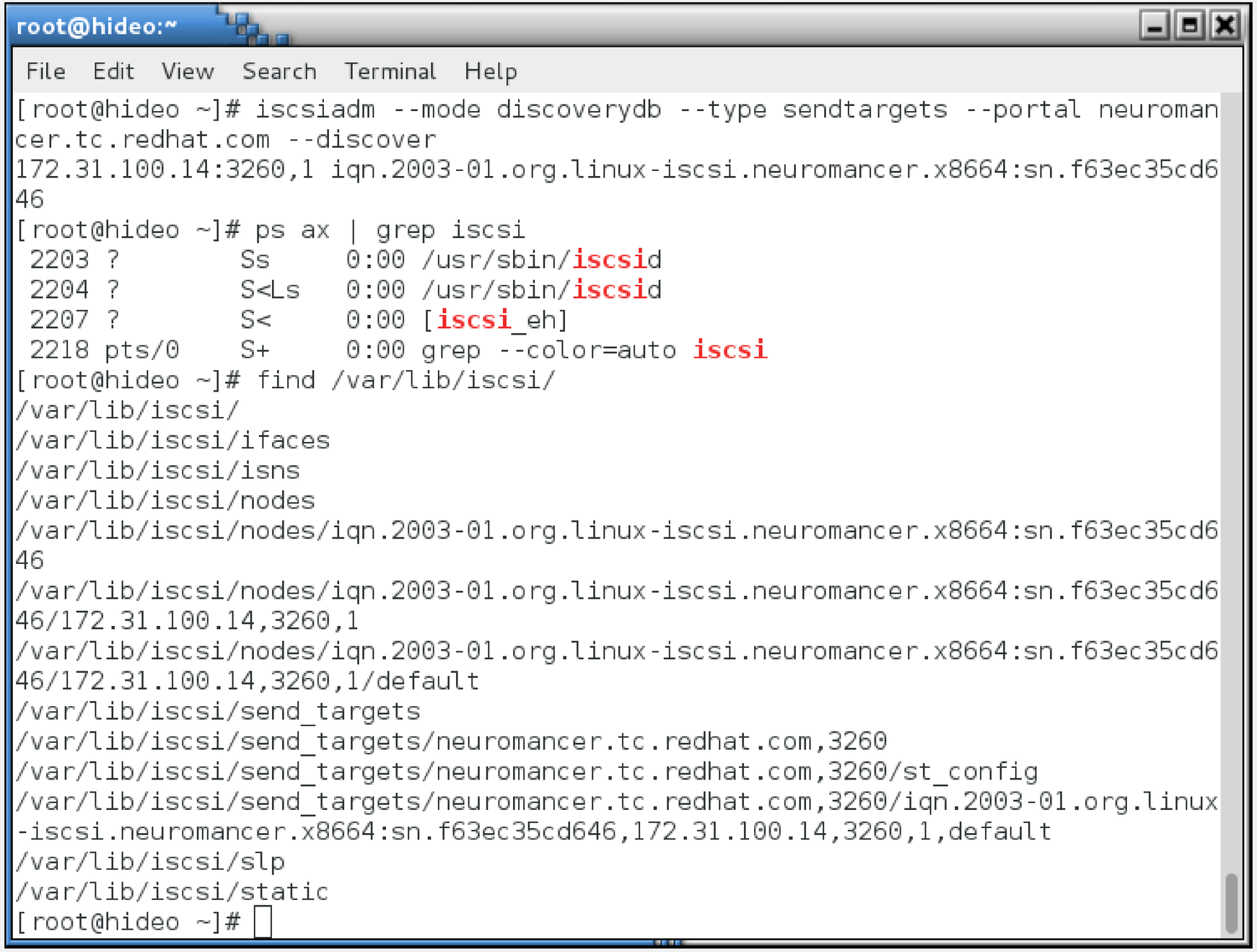
Discover the target

- Note that there are no iscsi processes running
- /var/lib/scsi is empty
- iscsiadm --mode discoverydb --type sendtargets --portal [portal] --discover
- Afterwards, the iscsid process is running
- /var/lib/iscsi is populated

redhat.


root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# ps ax | grep iscsi
2192 pts/0 S+ 0:00 grep --color=auto iscsi
[root@hideo ~]# find /var/lib/iscsi/
/var/lib/iscsi/
/var/lib/iscsi/ifaces
/var/lib/iscsi/isns
/var/lib/iscsi/nodes
/var/lib/iscsi/send_targets
/var/lib/iscsi/slp
/var/lib/iscsi/static
[root@hideo ~]#

redhat.

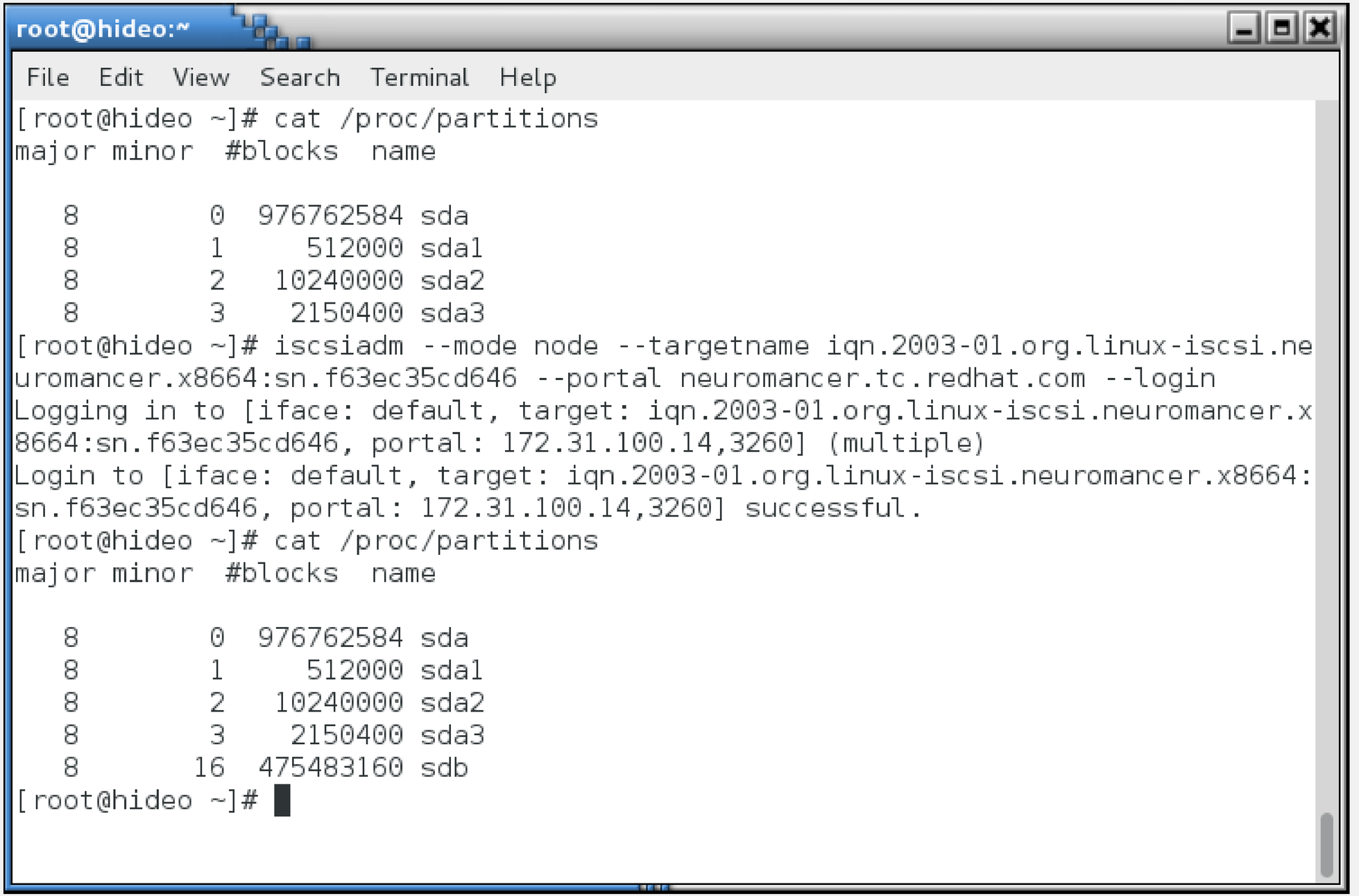

root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# iscsiadm --mode discoverydb --type sendtargets --portal neuroman
cer.tc.redhat.com --discover
172.31.100.14:3260,1 iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd6
46
[root@hideo ~]# ps ax | grep iscsi
2203 ? Ss 0:00 /usr/sbin/iscsid
2204 ? S<Ls 0:00 /usr/sbin/iscsid
2207 ? S< 0:00 [iscsi_eh]
2218 pts/0 S+ 0:00 grep --color=auto iscsi
[root@hideo ~]# find /var/lib/iscsi/
/var/lib/iscsi/
/var/lib/iscsi/ifaces
/var/lib/iscsi/isns
/var/lib/iscsi/nodes
/var/lib/iscsi/nodes/iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd6
46
/var/lib/iscsi/nodes/iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd6
46/172.31.100.14,3260,1
/var/lib/iscsi/nodes/iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd6
46/172.31.100.14,3260,1/default
/var/lib/iscsi/send_targets
/var/lib/iscsi/send_targets/neuromancer.tc.redhat.com,3260
/var/lib/iscsi/send_targets/neuromancer.tc.redhat.com,3260/st_config
/var/lib/iscsi/send_targets/neuromancer.tc.redhat.com,3260/iqn.2003-01.org.linux
-iscsi.neuromancer.x8664:sn.f63ec35cd646,172.31.100.14,3260,1,default
/var/lib/iscsi/slp
/var/lib/iscsi/static
[root@hideo ~]#

redhat.

Log into the target

- Note that the kernel only “sees” block devices for locally installed hard drives
- iscsiadm --mode node --targetname [iqn] --portal [portal] --login
- You should see a new block device

redhat.


root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# cat /proc/partitions
major minor #blocks name
8 0 976762584 sda
8 1 512000 sda1
8 2 10240000 sda2
8 3 2150400 sda3
[root@hideo ~]# iscsiadm --mode node --targetname iqn.2003-01.org.linux-iscsi.ne
uromancer.x8664:sn.f63ec35cd646 --portal neuromancer.tc.redhat.com --login
Logging in to [iface: default, target: iqn.2003-01.org.linux-iscsi.neuromancer.x
8664:sn.f63ec35cd646, portal: 172.31.100.14,3260] (multiple)
Login to [iface: default, target: iqn.2003-01.org.linux-iscsi.neuromancer.x8664:
sn.f63ec35cd646, portal: 172.31.100.14,3260] successful.
[root@hideo ~]# cat /proc/partitions
major minor #blocks name
8 0 976762584 sda
8 1 512000 sda1
8 2 10240000 sda2
8 3 2150400 sda3
8 16 475483160 sdb
[root@hideo ~]#

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Log into the target

- Lather, rinse, repeat for each initiator

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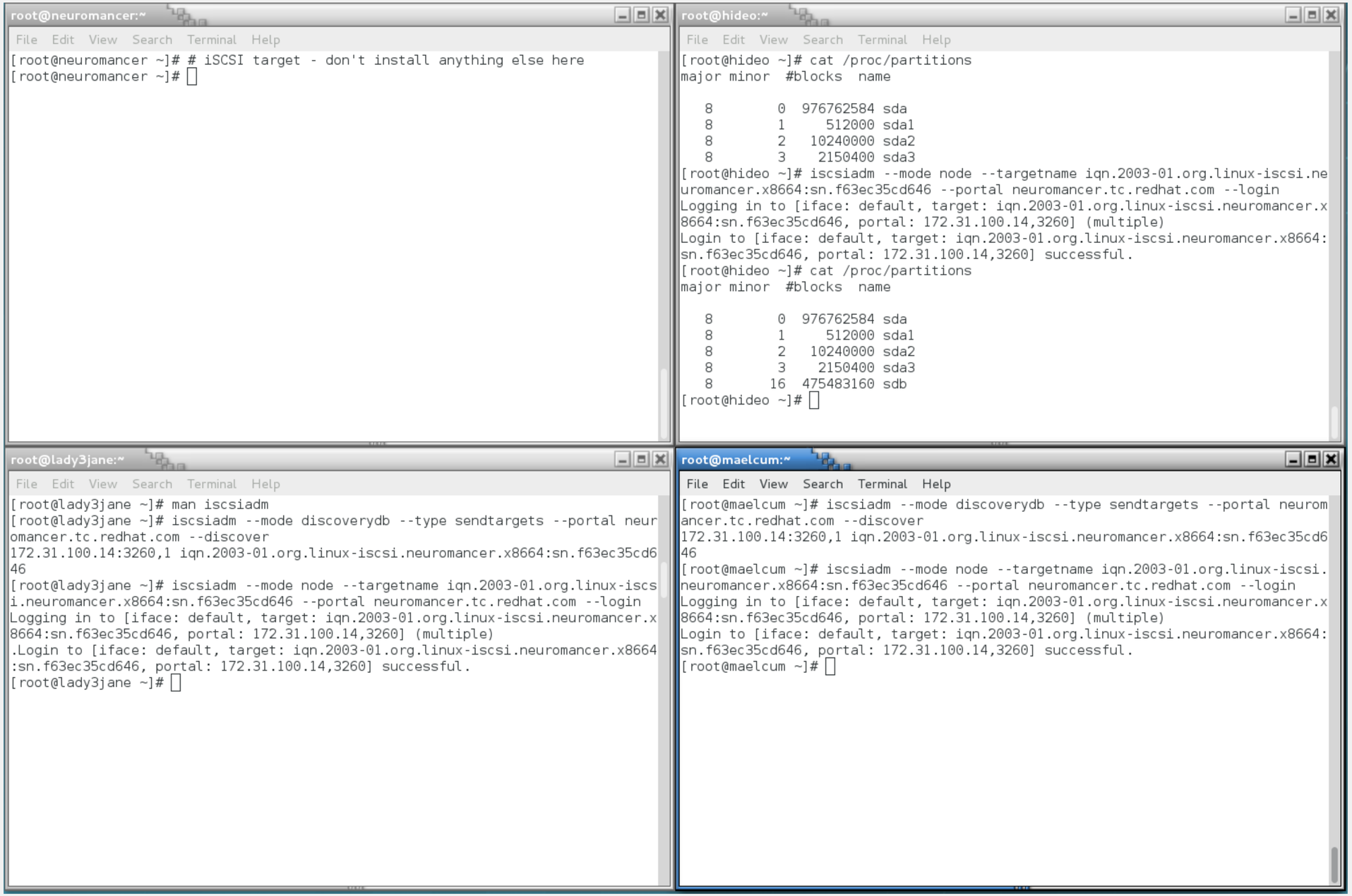
root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# # iSCSI target - don't install anything else here
[root@neuromancer ~]#
root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# cat /proc/partitions
major minor #blocks name
8 0 976762584 sda
8 1 512000 sda1
8 2 10240000 sda2
8 3 2150400 sda3
[root@hideo ~]# iscsiadm --mode node --targetname iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646 --portal neuromancer.tc.redhat.com --login
Logging in to [iface: default, target: iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646, portal: 172.31.100.14,3260] (multiple)
Login to [iface: default, target: iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646, portal: 172.31.100.14,3260] successful.
[root@hideo ~]# cat /proc/partitions
major minor #blocks name
8 0 976762584 sda
8 1 512000 sda1
8 2 10240000 sda2
8 3 2150400 sda3
8 16 475483160 sdb
[root@hideo ~]#
root@lady3jane:~
File Edit View Search Terminal Help
[root@lady3jane ~]# man iscsiadm
[root@lady3jane ~]# iscsiadm --mode discoverydb --type sendtargets --portal neuromancer.tc.redhat.com --discover
172.31.100.14:3260,1 iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646
[root@lady3jane ~]# iscsiadm --mode node --targetname iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646 --portal neuromancer.tc.redhat.com --login
Logging in to [iface: default, target: iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646, portal: 172.31.100.14,3260] (multiple)
.Login to [iface: default, target: iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646, portal: 172.31.100.14,3260] successful.
[root@lady3jane ~]#
root@maelcum:~
File Edit View Search Terminal Help
[root@maelcum ~]# iscsiadm --mode discoverydb --type sendtargets --portal neuromancer.tc.redhat.com --discover
172.31.100.14:3260,1 iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646
[root@maelcum ~]# iscsiadm --mode node --targetname iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646 --portal neuromancer.tc.redhat.com --login
Logging in to [iface: default, target: iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646, portal: 172.31.100.14,3260] (multiple)
Login to [iface: default, target: iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646, portal: 172.31.100.14,3260] successful.
[root@maelcum ~]#

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We'll come back to this shared storage later

- For now, let's move on to setting up the clustering software

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Corosync and Pacemaker

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About corosync and pacemaker

- Low level infrastructure corosync provides reliable messaging, membership and quorum information about the cluster (red)

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About corosync and pacemaker

- Resource management Pacemaker provides the brain (illustrated in blue) that processes and reacts to events regarding the cluster. These events include:
  - nodes joining or leaving the cluster
  - resource events caused by failures, maintenance, scheduled activities
  - other administrative actions

About corosync and pacemaker

- Pacemaker will compute the ideal state of the cluster and plot a path to achieve it after any of these events. This may include moving resources, stopping nodes and even forcing them offline with remote power switches.

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The Pacemaker Stack

- When combined with Corosync, Pacemaker also supports popular open source cluster filesystems.
- Due to recent standardization within the cluster filesystem community, they make use of a common distributed lock manager which makes use of Corosync for its messaging capabilities and Pacemaker for its membership (which nodes are up/down) and fencing services.

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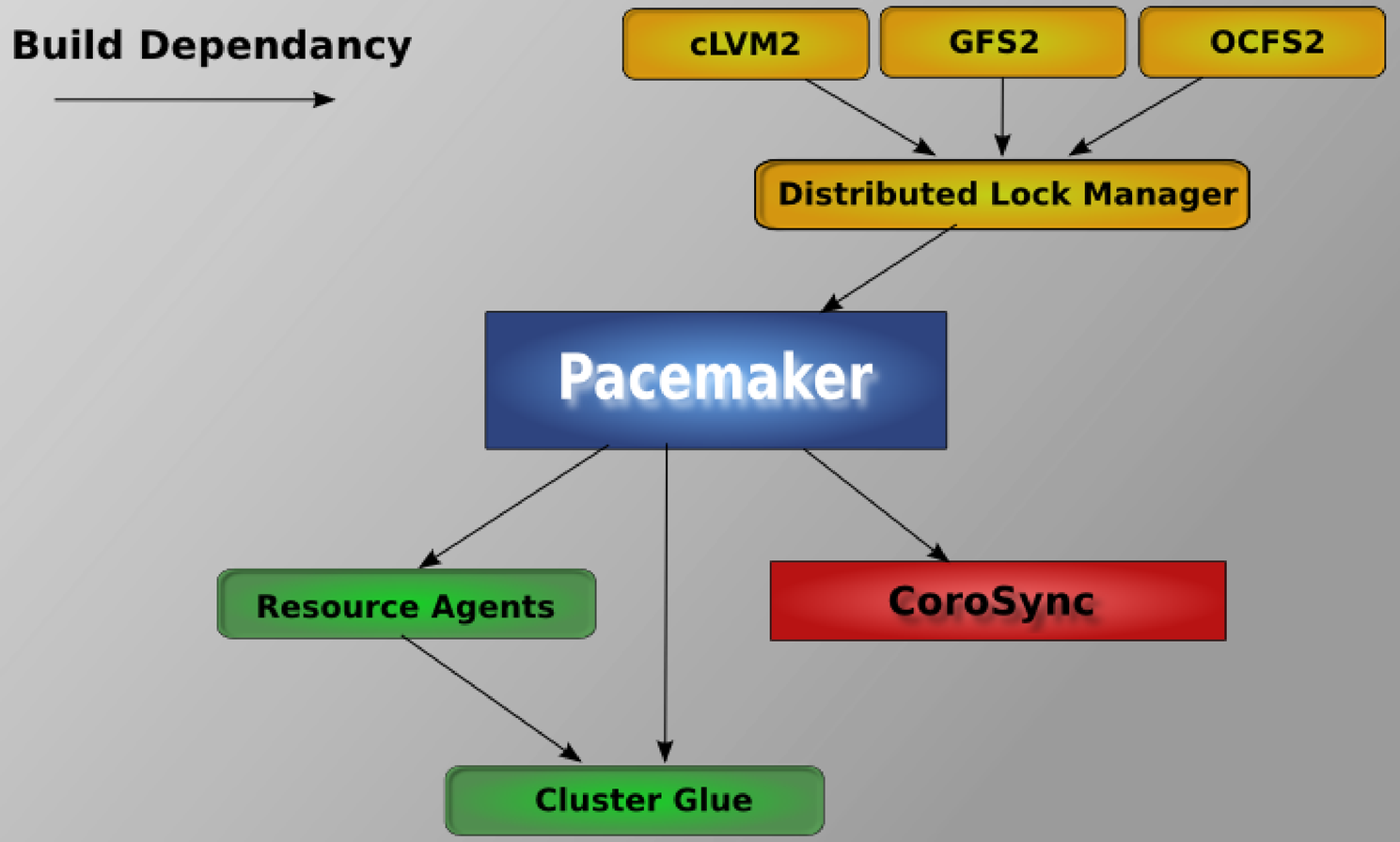
Pacemaker Stack



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Internal Components

- Pacemaker itself is composed of four key components (illustrated below in the same color scheme as the previous diagram):
  - CIB (aka. Cluster Information Base)
  - CRMd (aka. Cluster Resource Management daemon)
  - PEngine (aka. PE or Policy Engine)
  - STONITHd

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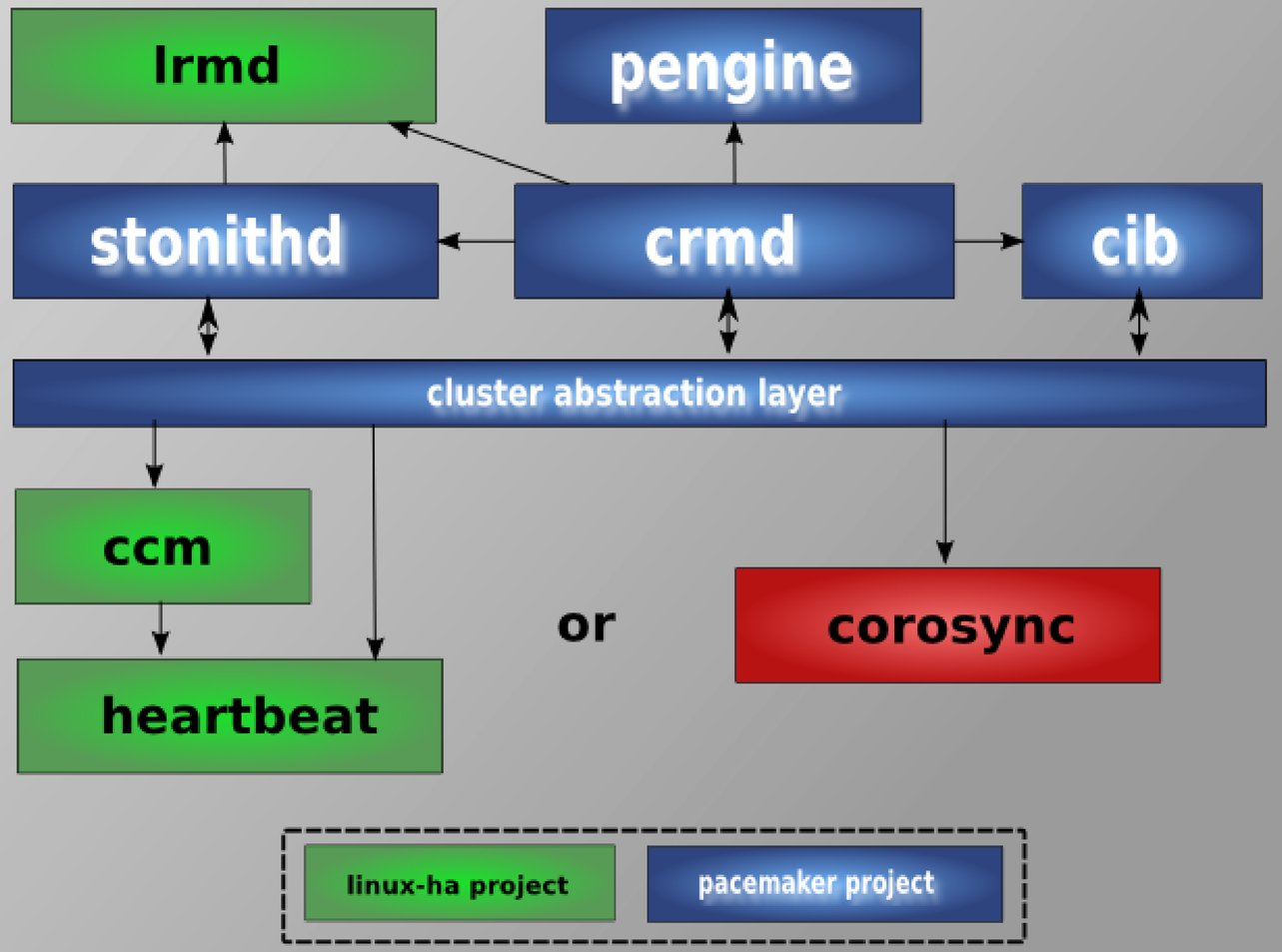
Pacemaker Internals



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Internal Components

- The CIB uses XML to represent both the cluster's configuration and current state of all resources in the cluster. The contents of the CIB are automatically kept in sync across the entire cluster and are used by the PEngine to compute the ideal state of the cluster and how it should be achieved.
- This list of instructions is then fed to the DC (Designated Co-ordinator). Pacemaker centralizes all cluster decision making by electing one of the CRMd instances to act as a master. Should the elected CRMd process, or the node it is on, fail… a new one is quickly established.

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Internal Components

- The DC carries out the PEngine’s instructions in the required order by passing them to either the LRMd (Local Resource Management daemon) or CRMd peers on other nodes via the cluster messaging infrastructure (which in turn passes them on to their LRMd process).
- The peer nodes all report the results of their operations back to the DC and based on the expected and actual results, will either execute any actions that needed to wait for the previous one to complete, or abort processing and ask the PEngine to recalculate the ideal cluster state based on the unexpected results.

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Internal Components

- In some cases, it may be necessary to power off nodes in order to protect shared data or complete resource recovery. For this Pacemaker comes with STONITHd. STONITH is an acronym for Shoot-The-Other-Node-In-The-Head and is usually implemented with a remote power switch. In Pacemaker, STONITH devices are modeled as resources (and configured in the CIB) to enable them to be easily monitored for failure, however STONITHd takes care of understanding the STONITH topology such that its clients simply request a node be fenced and it does the rest.

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Types of Pacemaker Clusters

- Pacemaker makes no assumptions about your environment, this allows it to support practically any redundancy configuration including Active/Active, Active/Passive, N+1, N+M, N-to-1 and N-to-N.
- In this document we will focus on the setup of a highly available Apache web server with an Active/Passive configuration using GFS2.

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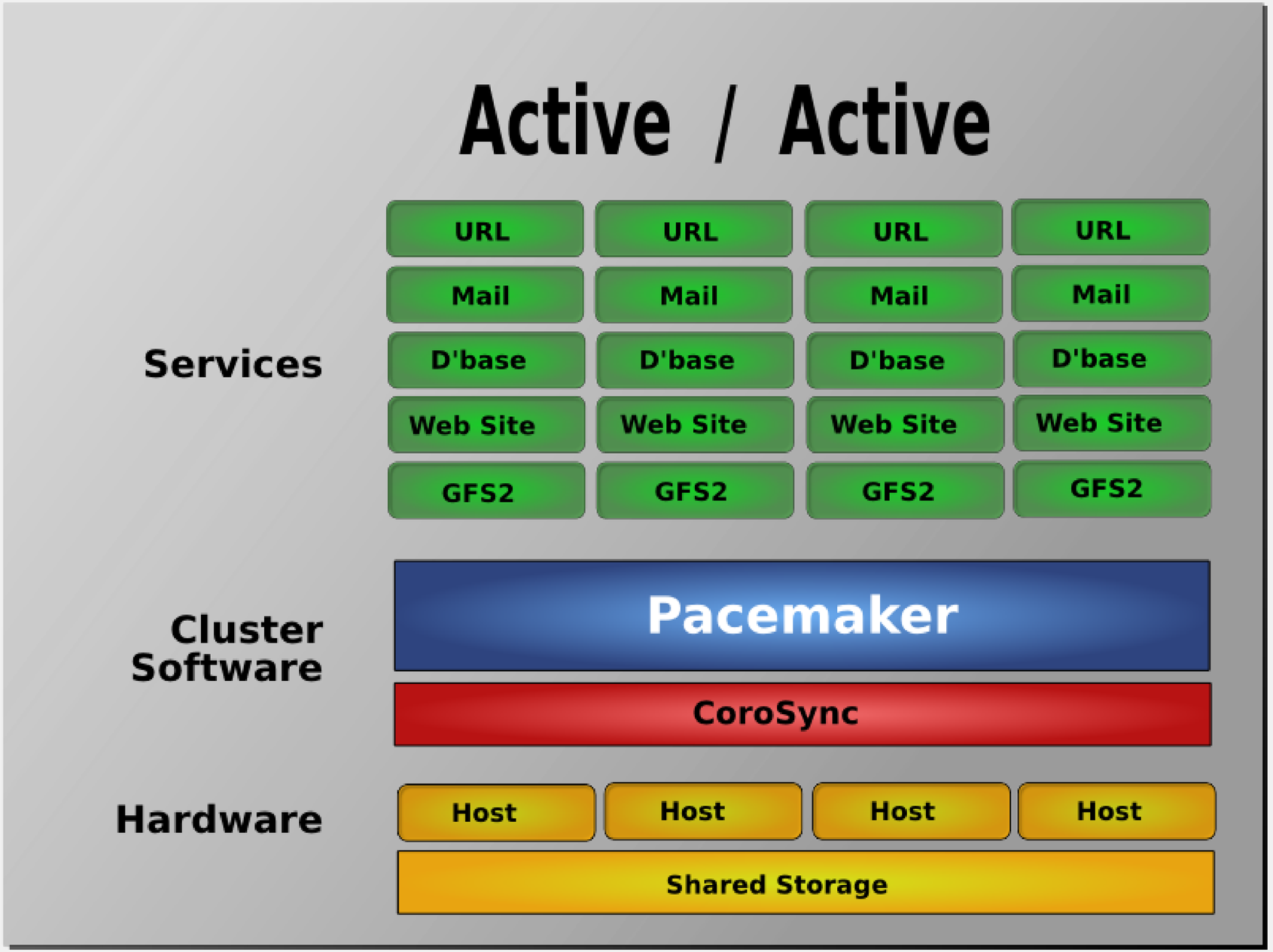
Active / Active
Services
URL
URL
URL
URL
Mail
Mail
Mail
Mail
D'base
D'base
D'base
D'base
Web Site
Web Site
Web Site
Web Site
GFS2
GFS2
GFS2
GFS2
Cluster Software
Pacemaker
CoroSync
Hardware
Host
Host
Host
Host
Shared Storage

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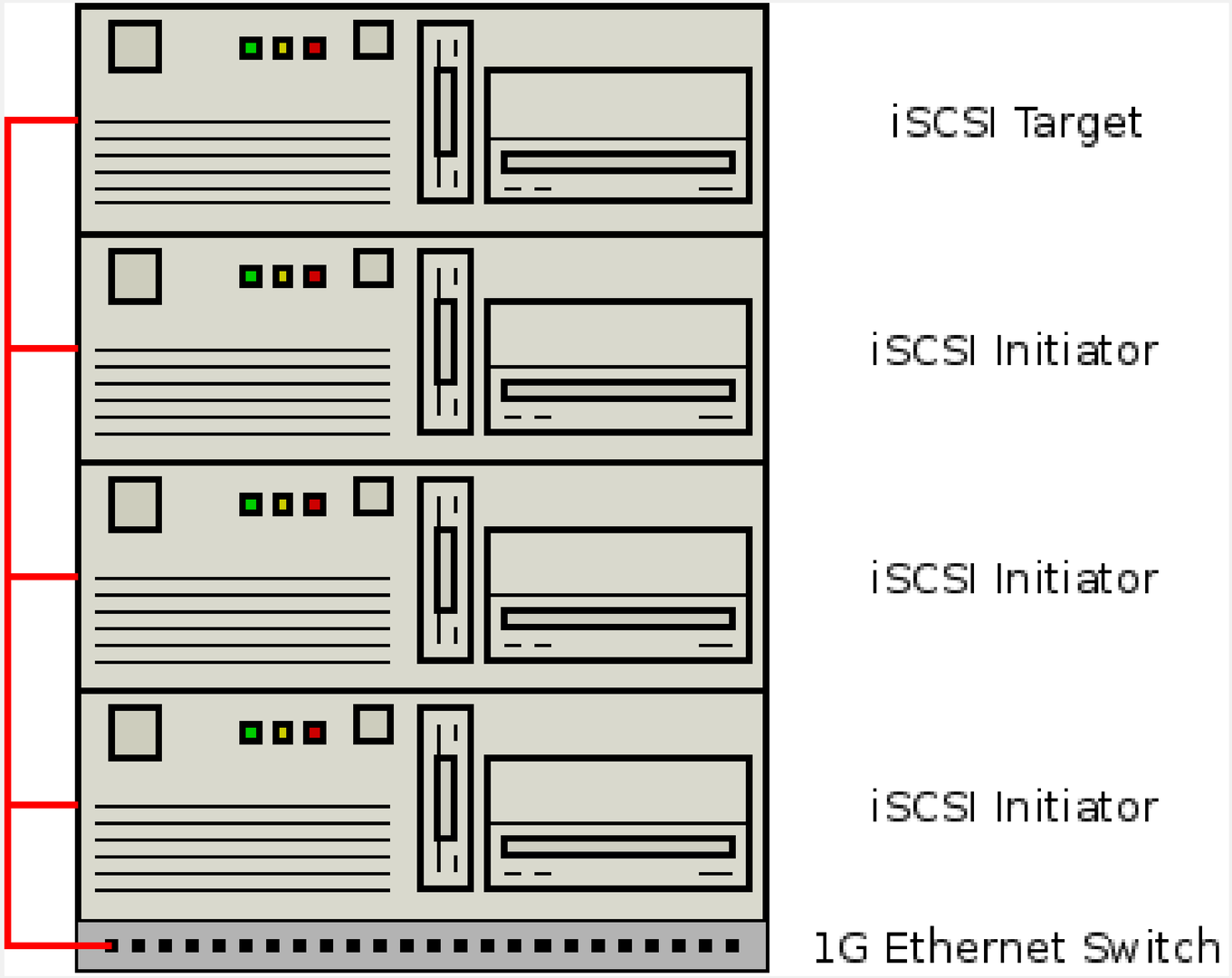
iSCSI Target
iSCSI Initiator
iSCSI Initiator
iSCSI Initiator
1G Ethernet Switch

References

Source:
http://clusterlabs.org/doc/en-US/Pacemaker/1.1-pcs/html/Clusters_from_Scratch/_pacemaker_architecture.html

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Install the clustering software

redhat.

Make sure the correct repositories are set up

- The Cluster software is in the High Availability repo. You'll have access to it if you buy a subscription to this add-on.

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Install corosync and pacemaker on the nodes

- yum -y install lvm2-cluster corosync pacemaker pcs fence-agents-all
  - lvm2-cluster provides cluster-aware logical volume capabilities
  - corosync and pacemaker (as described before)
  - pcs is the pacemaker and corosync administration tool. It can be used from the command line, and it also provides pcsd, which exposes a web-based UI. We'll use the web UI for today.
  - fence-agents-all provides fence agents for all supported fence devices

redhat.

root@hideo:~

File Edit View Search Terminal Help

Dependencies Resolved

Package	Arch	Version	Repository	Size
Installing:				
corosync	x86_64	2.3.3-2.el7	ha	186 k
fence-agents-all	x86_64	4.0.2-21.el7	rhel	7.3 k
lvm2-cluster	x86_64	7:2.02.105-13.el7	ha	492 k
pacemaker	x86_64	1.1.10-27.el7	ha	406 k
pcs	x86_64	0.9.115-31.el7	ha	5.0 M
Installing for dependencies:				
OpenIPMI-modalias	x86_64	2.0.19-11.el7	rhel	15 k
autogen-libopts	x86_64	5.18-5.el7	rhel	66 k
corosynclib	x86_64	2.3.3-2.el7	ha	108 k
dlm	x86_64	4.0.2-3.el7	ha	88 k
dlm-lib	x86_64	4.0.2-3.el7	ha	22 k
fence-agents-apc	x86_64	4.0.2-21.el7	rhel	12 k
fence-agents-apc-snmp	x86_64	4.0.2-21.el7	rhel	11 k
fence-agents-bladecenter	x86_64	4.0.2-21.el7	rhel	11 k
fence-agents-brocade	x86_64	4.0.2-21.el7	rhel	11 k
fence-agents-cisco-mds	x86_64	4.0.2-21.el7	rhel	11 k
fence-agents-cisco-ucs	x86_64	4.0.2-21.el7	rhel	11 k
fence-agents-common	x86_64	4.0.2-21.el7	rhel	44 k
fence-agents-drac5	x86_64	4.0.2-21.el7	rhel	11 k
fence-agents-eaton-snmp	x86_64	4.0.2-21.el7	rhel	12 k
fence-agents-eps	x86_64	4.0.2-21.el7	rhel	11 k
fence-agents-hpblade	x86_64	4.0.2-21.el7	rhel	10 k
fence-agents-ibmblade	x86_64	4.0.2-21.el7	rhel	10 k
fence-agents-ifmib	x86_64	4.0.2-21.el7	rhel	11 k
fence-agents-ilo-mp	x86_64	4.0.2-21.el7	rhel	9.8 k
fence-agents-ilo2	x86_64	4.0.2-21.el7	rhel	11 k
fence-agents-intelmodular	x86_64	4.0.2-21.el7	rhel	11 k
fence-agents-ipdu	x86_64	4.0.2-21.el7	rhel	11 k
fence-agents-ipmilan	x86_64	4.0.2-21.el7	rhel	22 k
fence-agents-kdump	x86_64	4.0.2-21.el7	rhel	21 k
fence-agents-rhevm	x86_64	4.0.2-21.el7	rhel	11 k
fence-agents-rsb	x86_64	4.0.2-21.el7	rhel	10 k
fence-agents-scsi	x86_64	4.0.2-21.el7	rhel	14 k
fence-agents-vmware-soap	x86_64	4.0.2-21.el7	rhel	12 k
fence-agents-wti	x86_64	4.0.2-21.el7	rhel	12 k
fence-virt	x86_64	0.3.0-16.el7	rhel	39 k
gnutls-dane	x86_64	3.1.18-8.el7	rhel	51 k
gnutls-utils	x86_64	3.1.18-8.el7	rhel	206 k
ipmitool	x86_64	1.8.13-7.el7	rhel	381 k
ldns	x86_64	1.6.16-7.el7	rhel	473 k
libevent	x86_64	2.0.21-4.el7	rhel	214 k
libqb	x86_64	0.16.0-6.el7	ha	89 k
libtool-ltdl	x86_64	2.4.2-20.el7	rhel	49 k
libyaml	x86_64	0.1.4-8.el7	rhel	54 k
net-snmp-libs	x86_64	1:5.7.2-18.el7	rhel	745 k
net-snmp-utils	x86_64	1:5.7.2-18.el7	rhel	195 k
pacemaker-cli	x86_64	1.1.10-27.el7	ha	208 k
pacemaker-cluster-libs	x86_64	1.1.10-27.el7	ha	79 k
pacemaker-libs	x86_64	1.1.10-27.el7	ha	458 k
perl-TimeDate	noarch	1:2.30-2.el7	rhel	52 k

redhat.

root@hideo:~

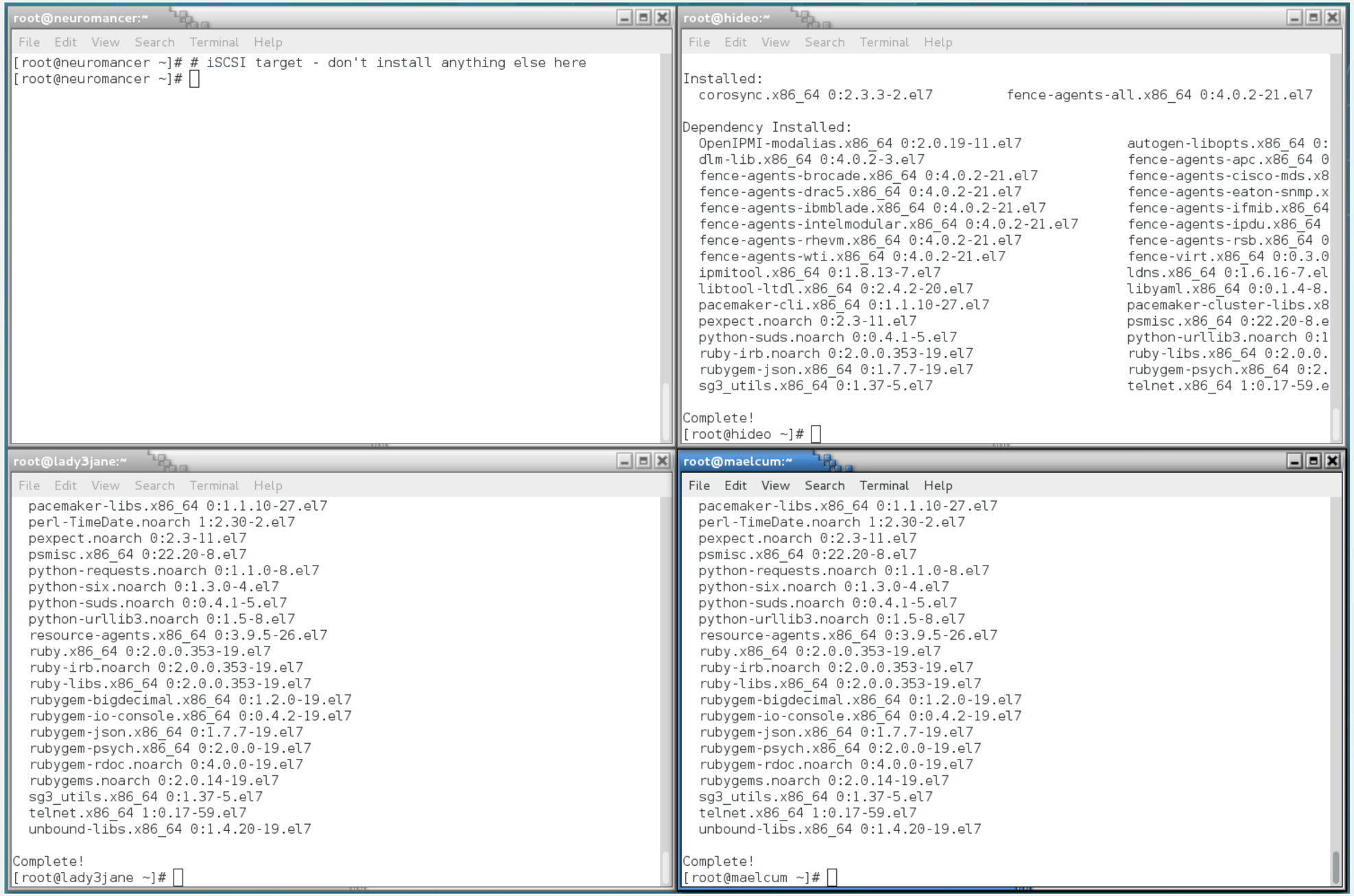
File Edit View Search Terminal Help

```
 fence-agents-hpblade                    x86_64    4.0.2-21.el7                rhel                 10 k
 fence-agents-ibmblade                   x86_64    4.0.2-21.el7                rhel                 10 k
 fence-agents-ifmib                      x86_64    4.0.2-21.el7                rhel                 11 k
 fence-agents-ilo-mp                     x86_64    4.0.2-21.el7                rhel                9.8 k
 fence-agents-ilo2                       x86_64    4.0.2-21.el7                rhel                 11 k
 fence-agents-intelmodular               x86_64    4.0.2-21.el7                rhel                 11 k
 fence-agents-ipdu                       x86_64    4.0.2-21.el7                rhel                 11 k
 fence-agents-ipmilan                    x86_64    4.0.2-21.el7                rhel                 22 k
 fence-agents-kdump                      x86_64    4.0.2-21.el7                rhel                 21 k
 fence-agents-rhevm                      x86_64    4.0.2-21.el7                rhel                 11 k
 fence-agents-rsb                        x86_64    4.0.2-21.el7                rhel                 10 k
 fence-agents-scsi                       x86_64    4.0.2-21.el7                rhel                 14 k
 fence-agents-vmware-soap                x86_64    4.0.2-21.el7                rhel                 12 k
 fence-agents-wti                        x86_64    4.0.2-21.el7                rhel                 12 k
 fence-virt                              x86_64    0.3.0-16.el7                rhel                 39 k
 gnutls-dane                             x86_64    3.1.18-8.el7                rhel                 51 k
 gnutls-utils                            x86_64    3.1.18-8.el7                rhel                206 k
 ipmitool                                x86_64    1.8.13-7.el7                rhel                381 k
 ldns                                    x86_64    1.6.16-7.el7                rhel                473 k
 libevent                                x86_64    2.0.21-4.el7                rhel                214 k
 libqb                                   x86_64    0.16.0-6.el7                ha                   89 k
 libtool-ltdl                            x86_64    2.4.2-20.el7                rhel                 49 k
 libyaml                                 x86_64    0.1.4-8.el7                 rhel                 54 k
 net-snmp-libs                           x86_64    1:5.7.2-18.el7              rhel                745 k
 net-snmp-utils                          x86_64    1:5.7.2-18.el7              rhel                195 k
 pacemaker-cli                           x86_64    1.1.10-27.el7               ha                  208 k
 pacemaker-cluster-libs                  x86_64    1.1.10-27.el7               ha                   79 k
 pacemaker-libs                          x86_64    1.1.10-27.el7               ha                  458 k
 perl-TimeDate                           noarch    1:2.30-2.el7                rhel                 52 k
 pexpect                                 noarch    2.3-11.el7                  rhel                142 k
 psmisc                                  x86_64    22.20-8.el7                 rhel                140 k
 python-requests                         noarch    1.1.0-8.el7                 rhel                 70 k
 python-six                              noarch    1.3.0-4.el7                 rhel                 18 k
 python-suds                             noarch    0.4.1-5.el7                 rhel                204 k
 python-urllib3                          noarch    1.5-8.el7                   rhel                 41 k
 resource-agents                         x86_64    3.9.5-26.el7                ha                  257 k
 ruby                                    x86_64    2.0.0.353-19.el7            rhel                 66 k
 ruby-irb                                noarch    2.0.0.353-19.el7            rhel                 87 k
 ruby-libs                               x86_64    2.0.0.353-19.el7            rhel                2.8 M
 rubygem-bigdecimal                      x86_64    1.2.0-19.el7                rhel                 78 k
 rubygem-io-console                      x86_64    0.4.2-19.el7                rhel                 49 k
 rubygem-json                            x86_64    1.7.7-19.el7                rhel                 74 k
 rubygem-psych                           x86_64    2.0.0-19.el7                rhel                 76 k
 rubygem-rdoc                            noarch    4.0.0-19.el7                rhel                317 k
 rubygems                                noarch    2.0.14-19.el7               rhel                211 k
 sg3_utils                               x86_64    1.37-5.el7                  rhel                640 k
 telnet                                  x86_64    1:0.17-59.el7               rhel                 63 k
 unbound-libs                            x86_64    1.4.20-19.el7               rhel                294 k

Transaction Summary
================================================================================================================================
Install  5 Packages (+63 Dependent packages)

Total download size: 15 M
Installed size: 44 M
Is this ok [y/d/N]:
```

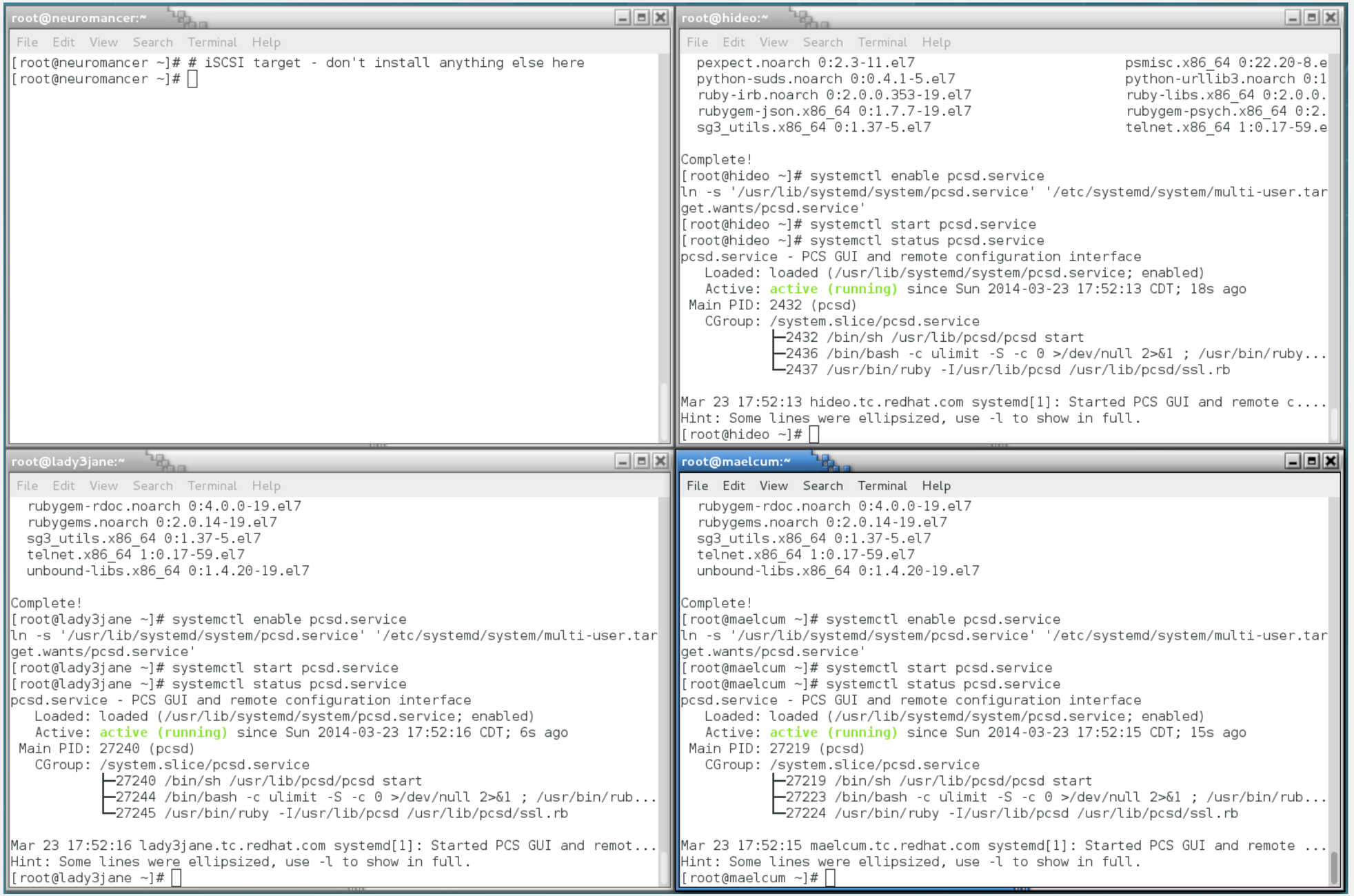
```
root@hideo:~
File  Edit  View  Search  Terminal  Help
  Verifying  : fence-agents-rhevm-4.0.2-21.el7.x86_64                                                
```


root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# # iSCSI target - don't install anything else here
[root@neuromancer ~]#
root@hideo:~
File Edit View Search Terminal Help
Installed:
corosync.x86_64 0:2.3.3-2.el7 fence-agents-all.x86_64 0:4.0.2-21.el7
Dependency Installed:
OpenIPMI-modalias.x86_64 0:2.0.19-11.el7 autogen-libopts.x86_64 0:
dlm-lib.x86_64 0:4.0.2-3.el7 fence-agents-apc.x86_64 0
fence-agents-brocade.x86_64 0:4.0.2-21.el7 fence-agents-cisco-mds.x8
fence-agents-drac5.x86_64 0:4.0.2-21.el7 fence-agents-eaton-snmp.x
fence-agents-ibmblade.x86_64 0:4.0.2-21.el7 fence-agents-ifmib.x86_64
fence-agents-intelmodular.x86_64 0:4.0.2-21.el7 fence-agents-ipdu.x86_64
fence-agents-rhevm.x86_64 0:4.0.2-21.el7 fence-agents-rsb.x86_64 0
fence-agents-wti.x86_64 0:4.0.2-21.el7 fence-virt.x86_64 0:0.3.0
ipmitool.x86_64 0:1.8.13-7.el7 ldns.x86_64 0:1.6.16-7.el
libtool-ltdl.x86_64 0:2.4.2-20.el7 libyaml.x86_64 0:0.1.4-8.
pacemaker-cli.x86_64 0:1.1.10-27.el7 pacemaker-cluster-libs.x8
pexpect.noarch 0:2.3-11.el7 psmisc.x86_64 0:22.20-8.e
python-suds.noarch 0:0.4.1-5.el7 python-urllib3.noarch 0:1
ruby-irb.noarch 0:2.0.0.353-19.el7 ruby-libs.x86_64 0:2.0.0.
rubygem-json.x86_64 0:1.7.7-19.el7 rubygem-psych.x86_64 0:2.
sg3_utils.x86_64 0:1.37-5.el7 telnet.x86_64 1:0.17-59.e
Complete!
[root@hideo ~]#
root@lady3jane:~
File Edit View Search Terminal Help
pacemaker-libs.x86_64 0:1.1.10-27.el7
perl-TimeDate.noarch 1:2.30-2.el7
pexpect.noarch 0:2.3-11.el7
psmisc.x86_64 0:22.20-8.el7
python-requests.noarch 0:1.1.0-8.el7
python-six.noarch 0:1.3.0-4.el7
python-suds.noarch 0:0.4.1-5.el7
python-urllib3.noarch 0:1.5-8.el7
resource-agents.x86_64 0:3.9.5-26.el7
ruby.x86_64 0:2.0.0.353-19.el7
ruby-irb.noarch 0:2.0.0.353-19.el7
ruby-libs.x86_64 0:2.0.0.353-19.el7
rubygem-bigdecimal.x86_64 0:1.2.0-19.el7
rubygem-io-console.x86_64 0:0.4.2-19.el7
rubygem-json.x86_64 0:1.7.7-19.el7
rubygem-psych.x86_64 0:2.0.0-19.el7
rubygem-rdoc.noarch 0:4.0.0-19.el7
rubygems.noarch 0:2.0.14-19.el7
sg3_utils.x86_64 0:1.37-5.el7
telnet.x86_64 1:0.17-59.el7
unbound-libs.x86_64 0:1.4.20-19.el7
Complete!
[root@lady3jane ~]#
root@maelcum:~
File Edit View Search Terminal Help
pacemaker-libs.x86_64 0:1.1.10-27.el7
perl-TimeDate.noarch 1:2.30-2.el7
pexpect.noarch 0:2.3-11.el7
psmisc.x86_64 0:22.20-8.el7
python-requests.noarch 0:1.1.0-8.el7
python-six.noarch 0:1.3.0-4.el7
python-suds.noarch 0:0.4.1-5.el7
python-urllib3.noarch 0:1.5-8.el7
resource-agents.x86_64 0:3.9.5-26.el7
ruby.x86_64 0:2.0.0.353-19.el7
ruby-irb.noarch 0:2.0.0.353-19.el7
ruby-libs.x86_64 0:2.0.0.353-19.el7
rubygem-bigdecimal.x86_64 0:1.2.0-19.el7
rubygem-io-console.x86_64 0:0.4.2-19.el7
rubygem-json.x86_64 0:1.7.7-19.el7
rubygem-psych.x86_64 0:2.0.0-19.el7
rubygem-rdoc.noarch 0:4.0.0-19.el7
rubygems.noarch 0:2.0.14-19.el7
sg3_utils.x86_64 0:1.37-5.el7
telnet.x86_64 1:0.17-59.el7
unbound-libs.x86_64 0:1.4.20-19.el7
Complete!
[root@maelcum ~]#

Enable and start the pcsd service

- systemctl enable pcsd.service
- systemctl start pcsd.service

redhat.

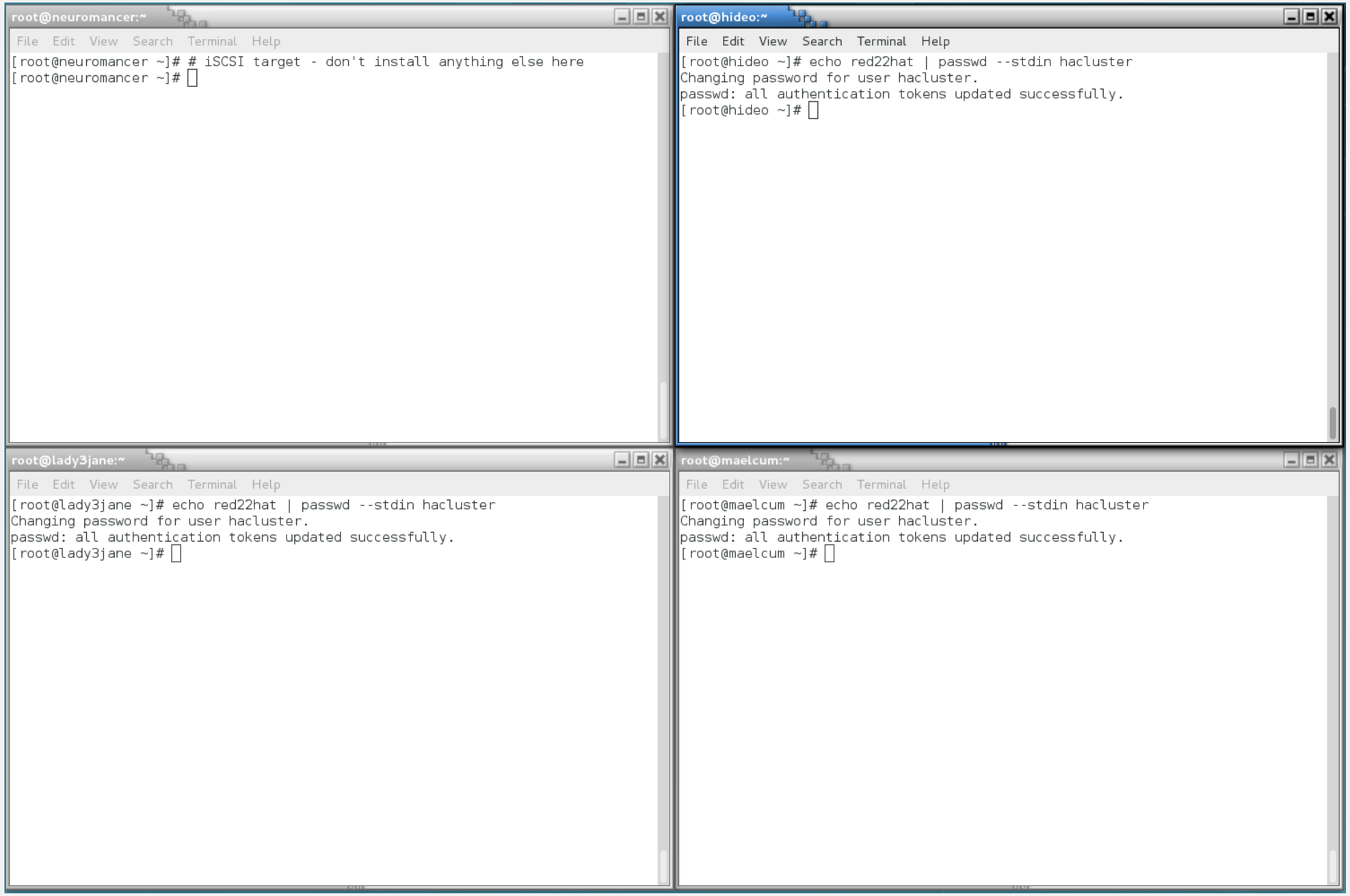

root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# # iSCSI target - don't install anything else here
[root@neuromancer ~]#
root@hideo:~
File Edit View Search Terminal Help
pexpect.noarch 0:2.3-11.el7 psmisc.x86_64 0:22.20-8.e
python-suds.noarch 0:0.4.1-5.el7 python-urllib3.noarch 0:1
ruby-irb.noarch 0:2.0.0.353-19.el7 ruby-libs.x86_64 0:2.0.0.
rubygem-json.x86_64 0:1.7.7-19.el7 rubygem-psych.x86_64 0:2.
sg3_utils.x86_64 0:1.37-5.el7 telnet.x86_64 1:0.17-59.e
Complete!
[root@hideo ~]# systemctl enable pcsd.service
ln -s '/usr/lib/systemd/system/pcsd.service' '/etc/systemd/system/multi-user.tar
get.wants/pcsd.service'
[root@hideo ~]# systemctl start pcsd.service
[root@hideo ~]# systemctl status pcsd.service
pcsd.service - PCS GUI and remote configuration interface
Loaded: loaded (/usr/lib/systemd/system/pcsd.service; enabled)
Active: active (running) since Sun 2014-03-23 17:52:13 CDT; 18s ago
Main PID: 2432 (pcsd)
CGroup: /system.slice/pcsd.service
├2432 /bin/sh /usr/lib/pcsd/pcsd start
├2436 /bin/bash -c ulimit -S -c 0 >/dev/null 2>&1 ; /usr/bin/ruby...
└2437 /usr/bin/ruby -I/usr/lib/pcsd /usr/lib/pcsd/ssl.rb
Mar 23 17:52:13 hideo.tc.redhat.com systemd[1]: Started PCS GUI and remote c....
Hint: Some lines were ellipsized, use -l to show in full.
[root@hideo ~]#
root@lady3jane:~
File Edit View Search Terminal Help
rubygem-rdoc.noarch 0:4.0.0-19.el7
rubygems.noarch 0:2.0.14-19.el7
sg3_utils.x86_64 0:1.37-5.el7
telnet.x86_64 1:0.17-59.el7
unbound-libs.x86_64 0:1.4.20-19.el7
Complete!
[root@lady3jane ~]# systemctl enable pcsd.service
ln -s '/usr/lib/systemd/system/pcsd.service' '/etc/systemd/system/multi-user.tar
get.wants/pcsd.service'
[root@lady3jane ~]# systemctl start pcsd.service
[root@lady3jane ~]# systemctl status pcsd.service
pcsd.service - PCS GUI and remote configuration interface
Loaded: loaded (/usr/lib/systemd/system/pcsd.service; enabled)
Active: active (running) since Sun 2014-03-23 17:52:16 CDT; 6s ago
Main PID: 27240 (pcsd)
CGroup: /system.slice/pcsd.service
├27240 /bin/sh /usr/lib/pcsd/pcsd start
├27244 /bin/bash -c ulimit -S -c 0 >/dev/null 2>&1 ; /usr/bin/rub...
└27245 /usr/bin/ruby -I/usr/lib/pcsd /usr/lib/pcsd/ssl.rb
Mar 23 17:52:16 lady3jane.tc.redhat.com systemd[1]: Started PCS GUI and remot...
Hint: Some lines were ellipsized, use -l to show in full.
[root@lady3jane ~]#
root@maelcum:~
File Edit View Search Terminal Help
rubygem-rdoc.noarch 0:4.0.0-19.el7
rubygems.noarch 0:2.0.14-19.el7
sg3_utils.x86_64 0:1.37-5.el7
telnet.x86_64 1:0.17-59.el7
unbound-libs.x86_64 0:1.4.20-19.el7
Complete!
[root@maelcum ~]# systemctl enable pcsd.service
ln -s '/usr/lib/systemd/system/pcsd.service' '/etc/systemd/system/multi-user.tar
get.wants/pcsd.service'
[root@maelcum ~]# systemctl start pcsd.service
[root@maelcum ~]# systemctl status pcsd.service
pcsd.service - PCS GUI and remote configuration interface
Loaded: loaded (/usr/lib/systemd/system/pcsd.service; enabled)
Active: active (running) since Sun 2014-03-23 17:52:15 CDT; 15s ago
Main PID: 27219 (pcsd)
CGroup: /system.slice/pcsd.service
├27219 /bin/sh /usr/lib/pcsd/pcsd start
├27223 /bin/bash -c ulimit -S -c 0 >/dev/null 2>&1 ; /usr/bin/rub...
└27224 /usr/bin/ruby -I/usr/lib/pcsd /usr/lib/pcsd/ssl.rb
Mar 23 17:52:15 maelcum.tc.redhat.com systemd[1]: Started PCS GUI and remote ...
Hint: Some lines were ellipsized, use -l to show in full.
[root@maelcum ~]#

redhat.

Administrative user

- For now, the clustering software used the “hacluster” account for administration. Set this user's password across all the nodes:
- echo [password] | passwd --stdin hacluster

redhat.


root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# # iSCSI target - don't install anything else here
[root@neuromancer ~]#
root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# echo red22hat | passwd --stdin hacluster
Changing password for user hacluster.
passwd: all authentication tokens updated successfully.
[root@hideo ~]#
root@lady3jane:~
File Edit View Search Terminal Help
[root@lady3jane ~]# echo red22hat | passwd --stdin hacluster
Changing password for user hacluster.
passwd: all authentication tokens updated successfully.
[root@lady3jane ~]#
root@maelcum:~
File Edit View Search Terminal Help
[root@maelcum ~]# echo red22hat | passwd --stdin hacluster
Changing password for user hacluster.
passwd: all authentication tokens updated successfully.
[root@maelcum ~]#

redhat.

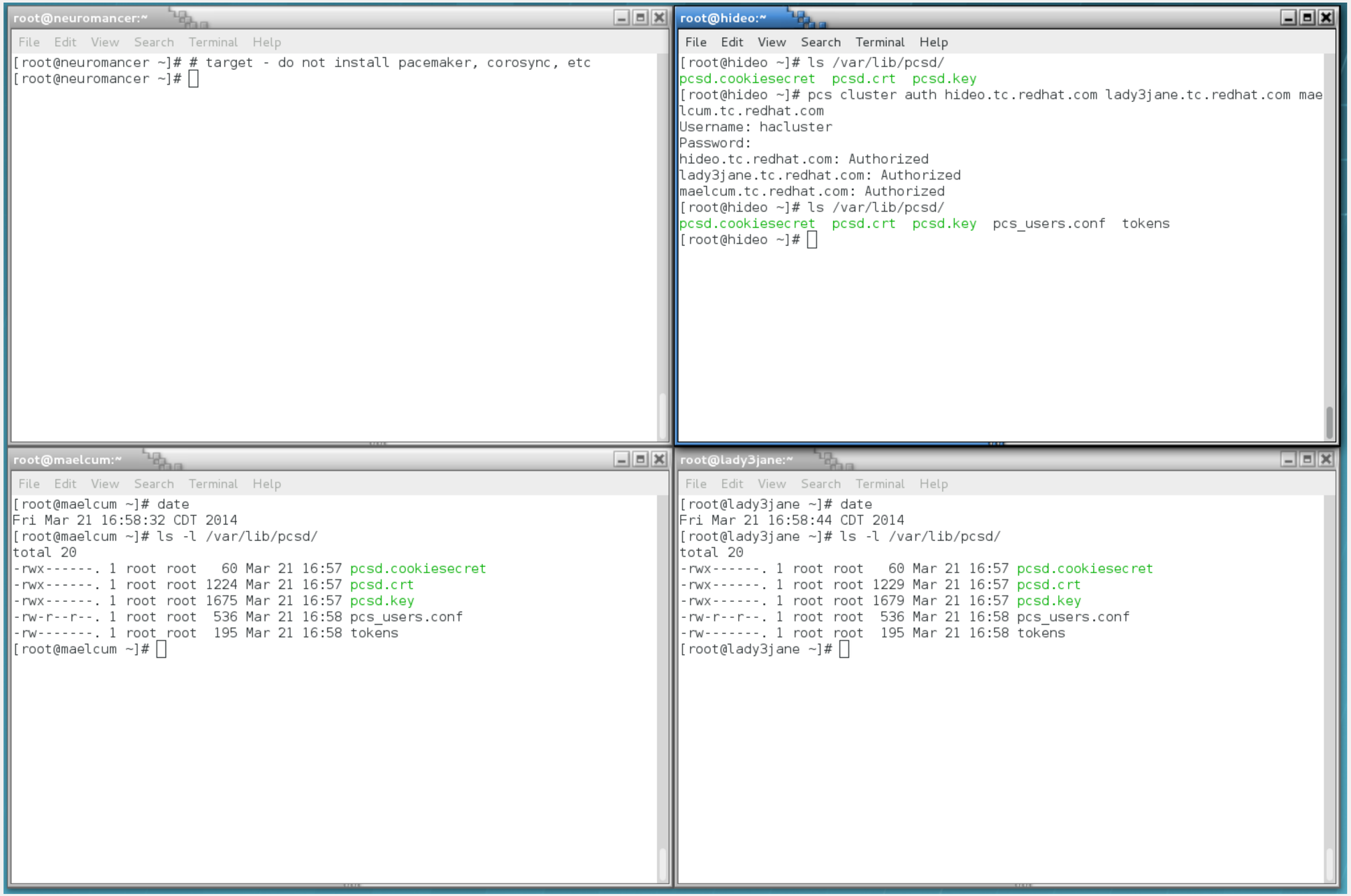
Configure the Cluster

redhat.

Authorize the Nodes

- From any node: pcs cluster auth [node, node, node]
- Note that the user configuration file and security token files are created in /var/lib/pcsd

redhat.

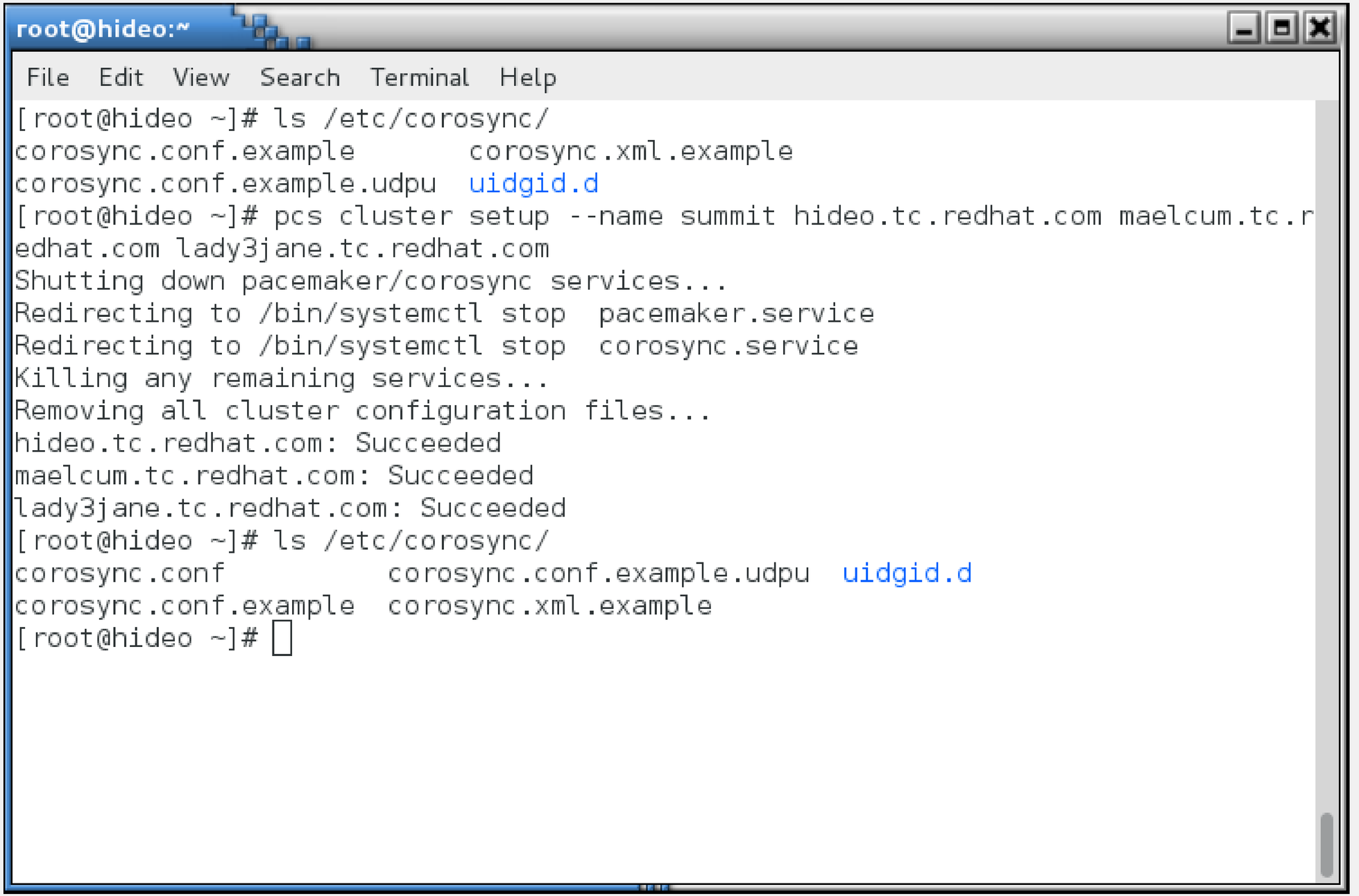

root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# # target - do not install pacemaker, corosync, etc
[root@neuromancer ~]#
root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# ls /var/lib/pcsd/
pcsd.cookiesecret pcsd.crt pcsd.key
[root@hideo ~]# pcs cluster auth hideo.tc.redhat.com lady3jane.tc.redhat.com mae
lcum.tc.redhat.com
Username: hacluster
Password:
hideo.tc.redhat.com: Authorized
lady3jane.tc.redhat.com: Authorized
maelcum.tc.redhat.com: Authorized
[root@hideo ~]# ls /var/lib/pcsd/
pcsd.cookiesecret pcsd.crt pcsd.key pcs_users.conf tokens
[root@hideo ~]#
root@maelcum:~
File Edit View Search Terminal Help
[root@maelcum ~]# date
Fri Mar 21 16:58:32 CDT 2014
[root@maelcum ~]# ls -l /var/lib/pcsd/
total 20
-rwx------. 1 root root 60 Mar 21 16:57 pcsd.cookiesecret
-rwx------. 1 root root 1224 Mar 21 16:57 pcsd.crt
-rwx------. 1 root root 1675 Mar 21 16:57 pcsd.key
-rw-r--r--. 1 root root 536 Mar 21 16:58 pcs_users.conf
-rw-------. 1 root root 195 Mar 21 16:58 tokens
[root@maelcum ~]#
root@lady3jane:~
File Edit View Search Terminal Help
[root@lady3jane ~]# date
Fri Mar 21 16:58:44 CDT 2014
[root@lady3jane ~]# ls -l /var/lib/pcsd/
total 20
-rwx------. 1 root root 60 Mar 21 16:57 pcsd.cookiesecret
-rwx------. 1 root root 1229 Mar 21 16:57 pcsd.crt
-rwx------. 1 root root 1679 Mar 21 16:57 pcsd.key
-rw-r--r--. 1 root root 536 Mar 21 16:58 pcs_users.conf
-rw-------. 1 root root 195 Mar 21 16:58 tokens
[root@lady3jane ~]#

redhat.

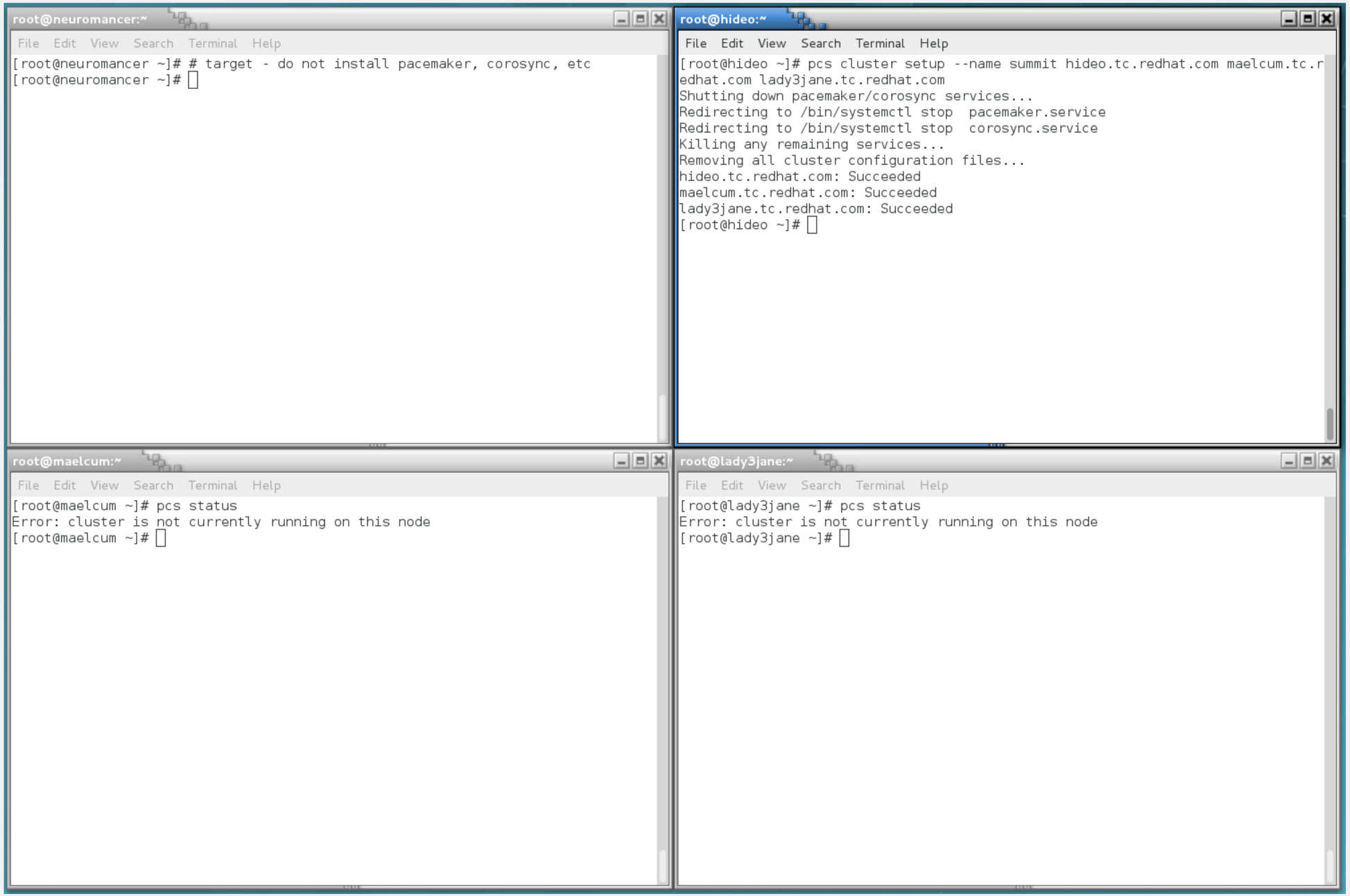
Set up the cluster

- From any node: pcs cluster setup --name [name] [node, node, node]
- Note that there is now a corosync.conf file in /etc/corosync

redhat.


root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# ls /etc/corosync/
corosync.conf.example corosync.xml.example
corosync.conf.example.udpu uidgid.d
[root@hideo ~]# pcs cluster setup --name summit hideo.tc.redhat.com maelcum.tc.r
edhat.com lady3jane.tc.redhat.com
Shutting down pacemaker/corosync services...
Redirecting to /bin/systemctl stop pacemaker.service
Redirecting to /bin/systemctl stop corosync.service
Killing any remaining services...
Removing all cluster configuration files...
hideo.tc.redhat.com: Succeeded
maelcum.tc.redhat.com: Succeeded
lady3jane.tc.redhat.com: Succeeded
[root@hideo ~]# ls /etc/corosync/
corosync.conf corosync.conf.example.udpu uidgid.d
corosync.conf.example corosync.xml.example
[root@hideo ~]#

redhat.

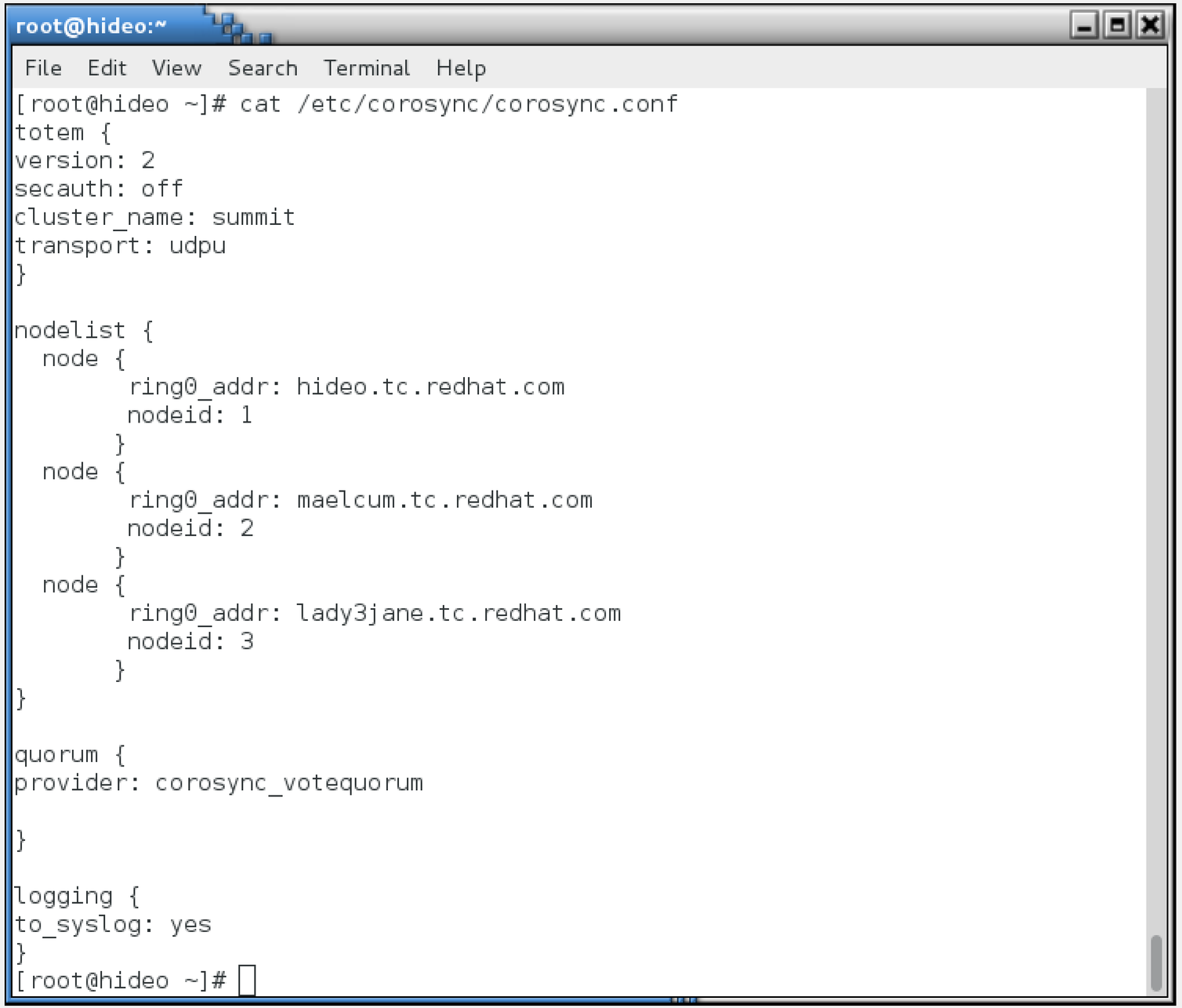

root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# # target - do not install pacemaker, corosync, etc
[root@neuromancer ~]#
root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# pcs cluster setup --name summit hideo.tc.redhat.com maelcum.tc.redhat.com lady3jane.tc.redhat.com
Shutting down pacemaker/corosync services...
Redirecting to /bin/systemctl stop pacemaker.service
Redirecting to /bin/systemctl stop corosync.service
Killing any remaining services...
Removing all cluster configuration files...
hideo.tc.redhat.com: Succeeded
maelcum.tc.redhat.com: Succeeded
lady3jane.tc.redhat.com: Succeeded
[root@hideo ~]#
root@maelcum:~
File Edit View Search Terminal Help
[root@maelcum ~]# pcs status
Error: cluster is not currently running on this node
[root@maelcum ~]#
root@lady3jane:~
File Edit View Search Terminal Help
[root@lady3jane ~]# pcs status
Error: cluster is not currently running on this node
[root@lady3jane ~]#

redhat.

This generates the corosync config file

- /etc/corosync/corosync.conf

redhat.


root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# cat /etc/corosync/corosync.conf
totem {
version: 2
secauth: off
cluster_name: summit
transport: udpu
}
nodelist {
node {
ring0_addr: hideo.tc.redhat.com
nodeid: 1
}
node {
ring0_addr: maelcum.tc.redhat.com
nodeid: 2
}
node {
ring0_addr: lady3jane.tc.redhat.com
nodeid: 3
}
}
quorum {
provider: corosync_votequorum
}
logging {
to_syslog: yes
}
[root@hideo ~]#

Anable the cluster services on all nodes

- From any node: pcs cluster enable --all
- Note that this does not start the services, it only enables them

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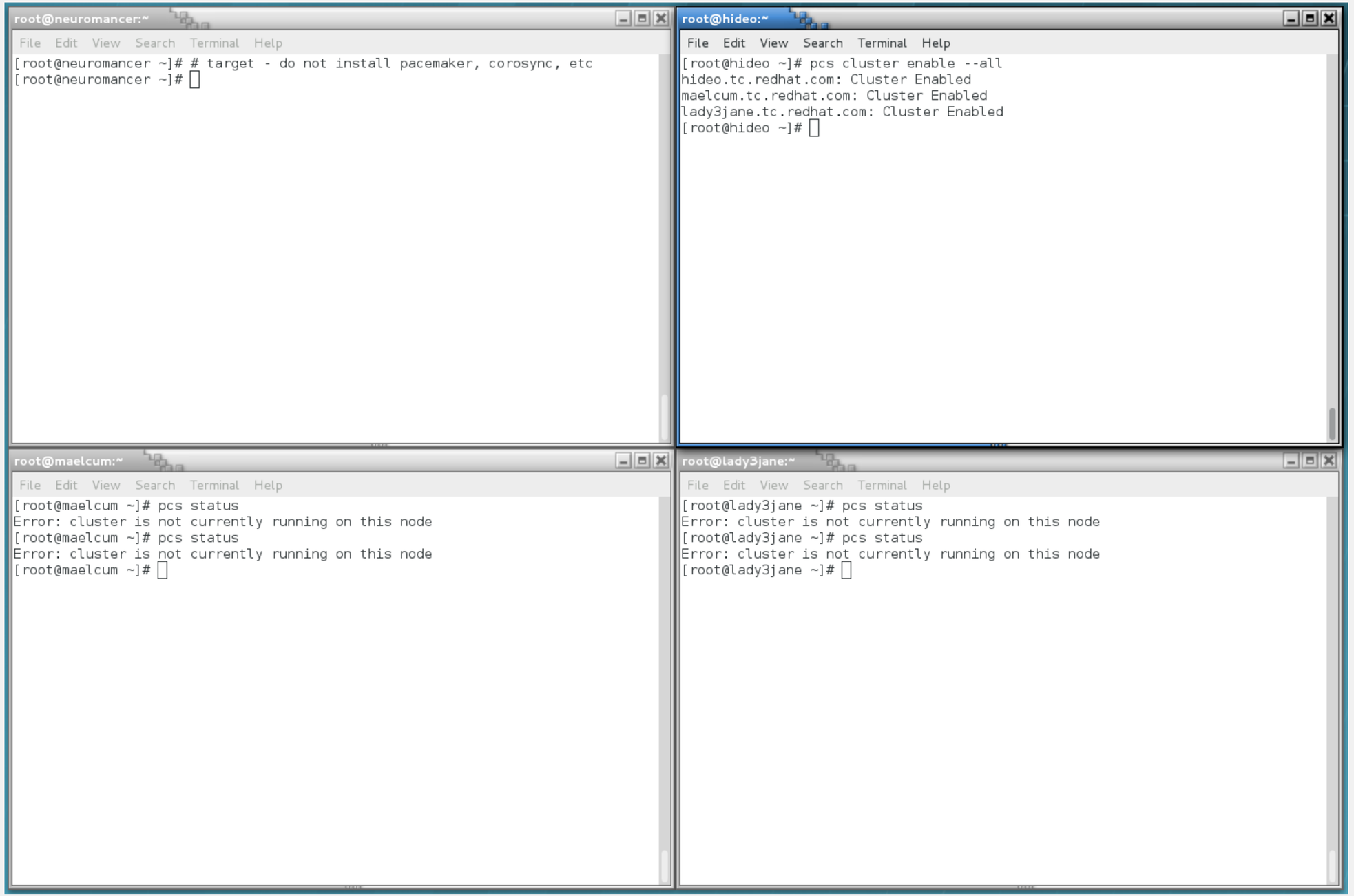
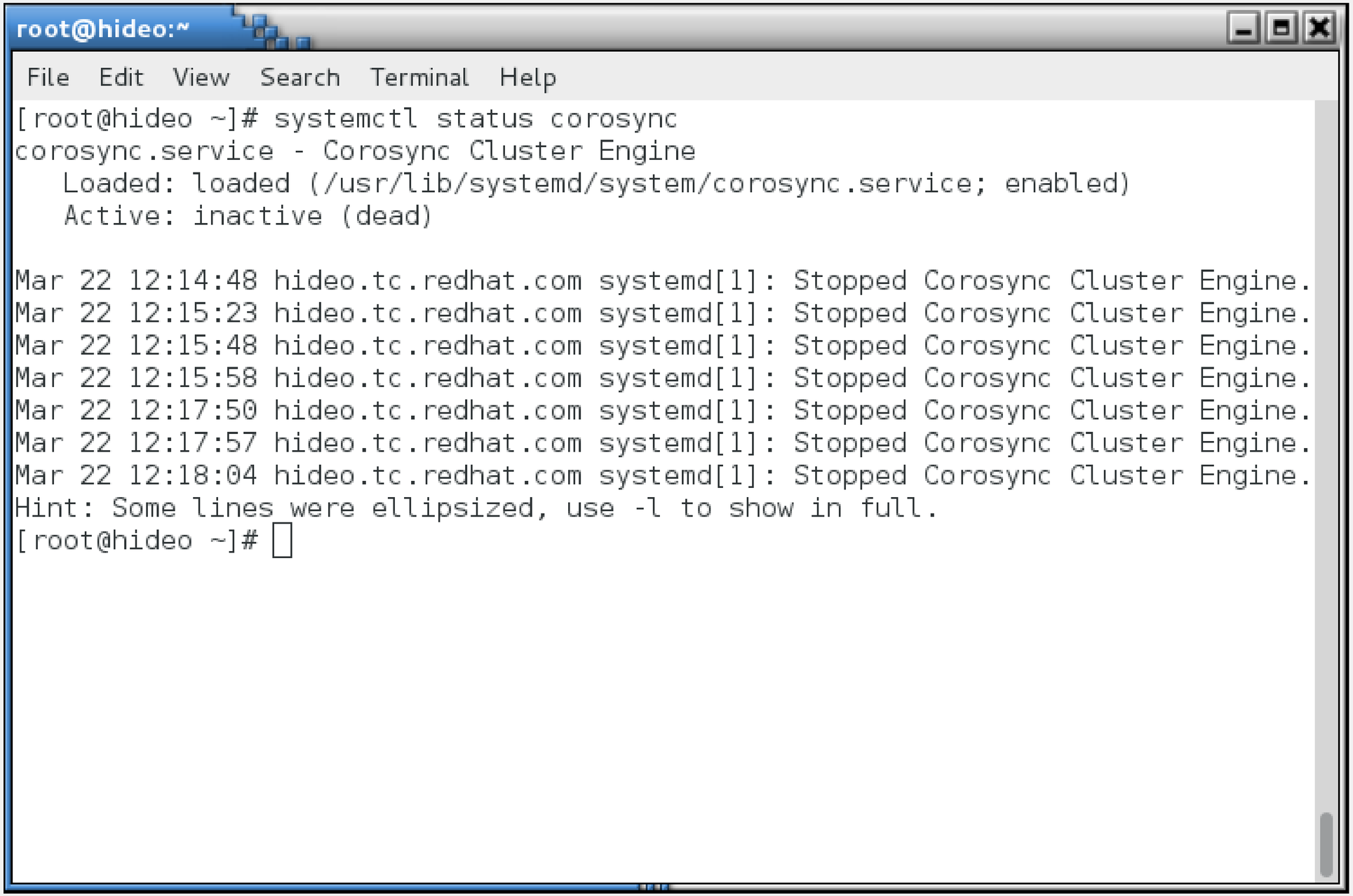
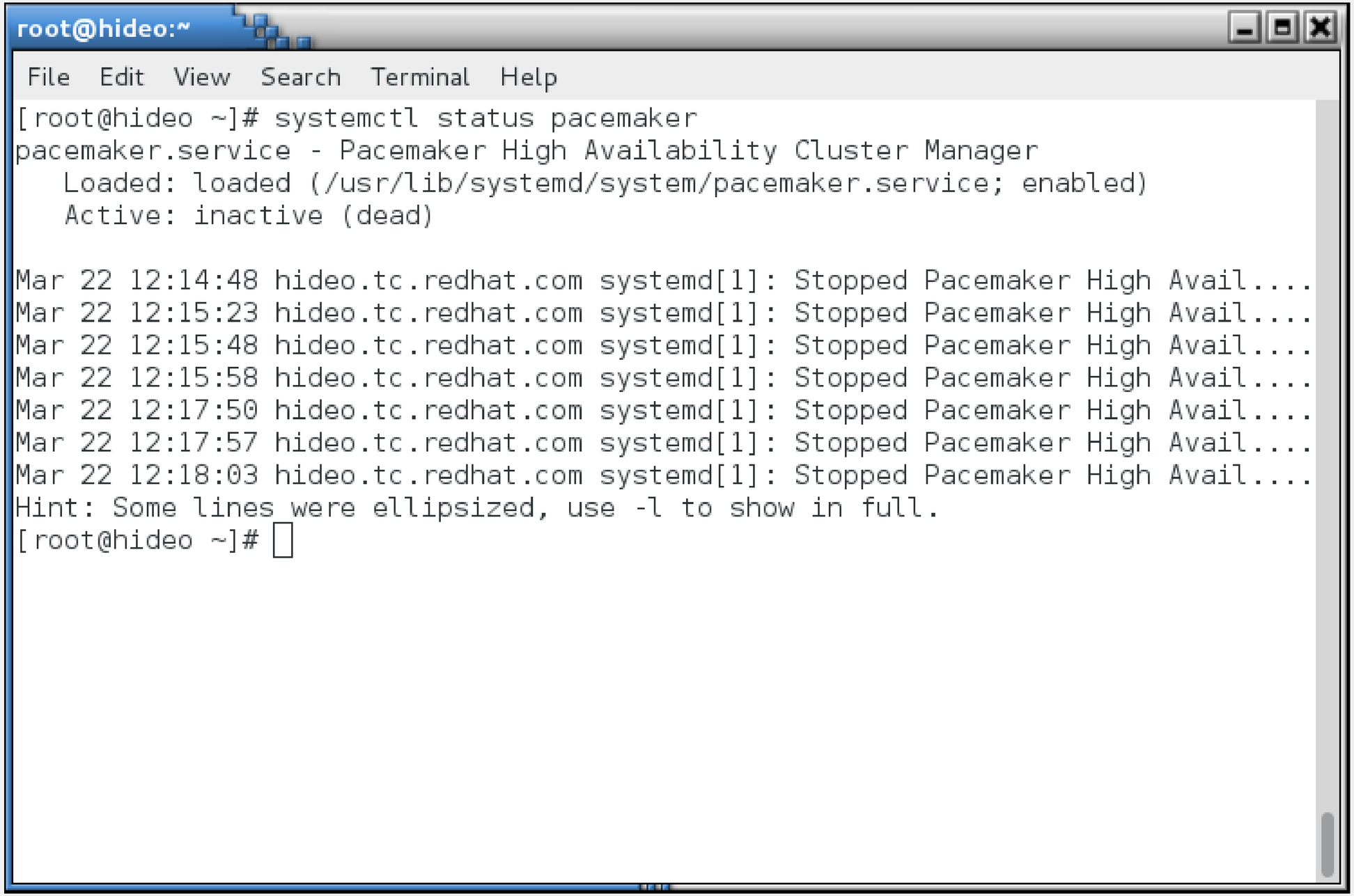

root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# # target - do not install pacemaker, corosync, etc
[root@neuromancer ~]#
root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# pcs cluster enable --all
hideo.tc.redhat.com: Cluster Enabled
maelcum.tc.redhat.com: Cluster Enabled
lady3jane.tc.redhat.com: Cluster Enabled
[root@hideo ~]#
root@maelcum:~
File Edit View Search Terminal Help
[root@maelcum ~]# pcs status
Error: cluster is not currently running on this node
[root@maelcum ~]# pcs status
Error: cluster is not currently running on this node
[root@maelcum ~]#
root@lady3jane:~
File Edit View Search Terminal Help
[root@lady3jane ~]# pcs status
Error: cluster is not currently running on this node
[root@lady3jane ~]# pcs status
Error: cluster is not currently running on this node
[root@lady3jane ~]#

redhat.


root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# systemctl status corosync
corosync.service - Corosync Cluster Engine
Loaded: loaded (/usr/lib/systemd/system/corosync.service; enabled)
Active: inactive (dead)
Mar 22 12:14:48 hideo.tc.redhat.com systemd[1]: Stopped Corosync Cluster Engine.
Mar 22 12:15:23 hideo.tc.redhat.com systemd[1]: Stopped Corosync Cluster Engine.
Mar 22 12:15:48 hideo.tc.redhat.com systemd[1]: Stopped Corosync Cluster Engine.
Mar 22 12:15:58 hideo.tc.redhat.com systemd[1]: Stopped Corosync Cluster Engine.
Mar 22 12:17:50 hideo.tc.redhat.com systemd[1]: Stopped Corosync Cluster Engine.
Mar 22 12:17:57 hideo.tc.redhat.com systemd[1]: Stopped Corosync Cluster Engine.
Mar 22 12:18:04 hideo.tc.redhat.com systemd[1]: Stopped Corosync Cluster Engine.
Hint: Some lines were ellipsized, use -l to show in full.
[root@hideo ~]#

redhat.

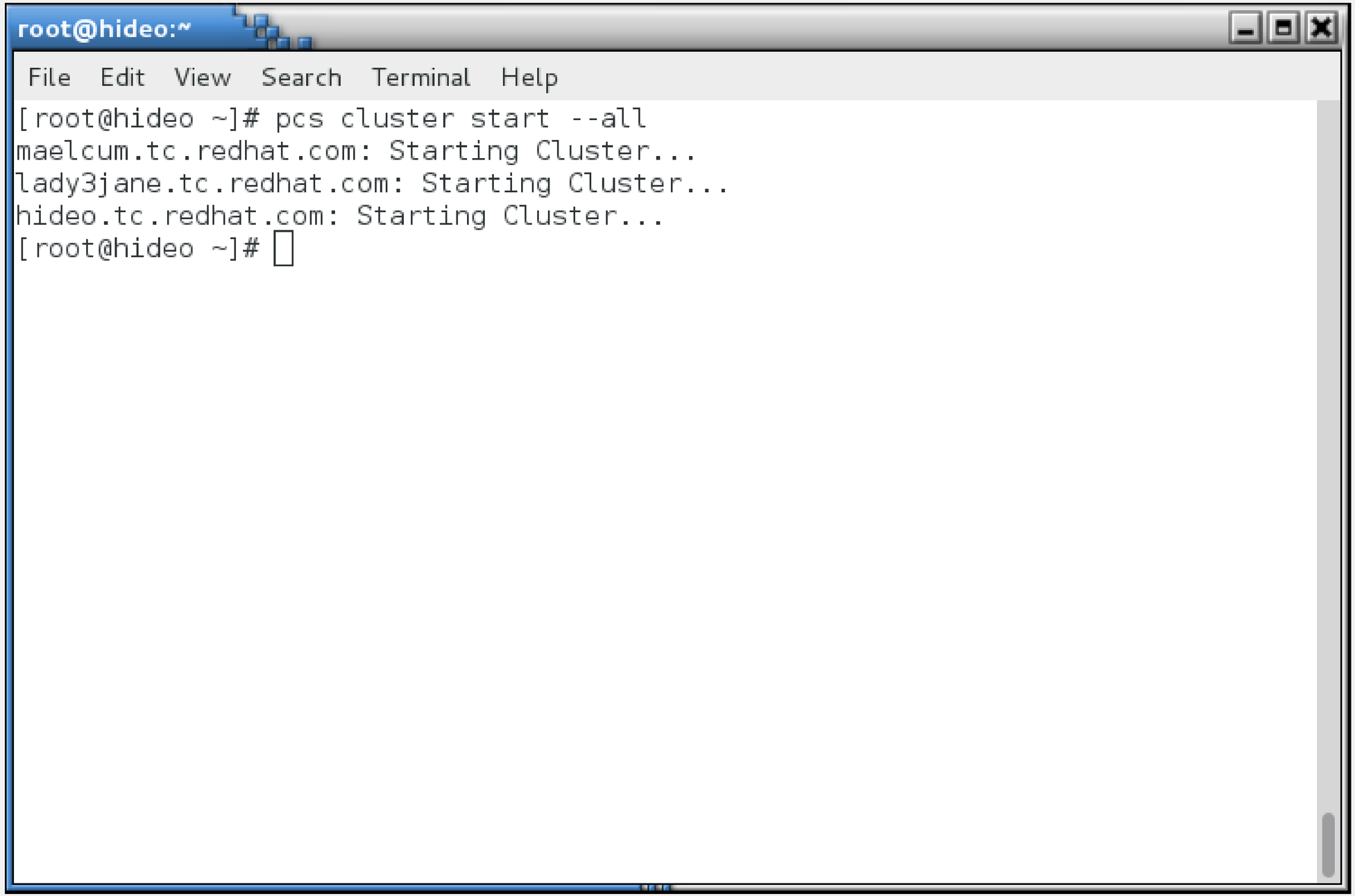

root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# systemctl status pacemaker
pacemaker.service - Pacemaker High Availability Cluster Manager
Loaded: loaded (/usr/lib/systemd/system/pacemaker.service; enabled)
Active: inactive (dead)
Mar 22 12:14:48 hideo.tc.redhat.com systemd[1]: Stopped Pacemaker High Avail....
Mar 22 12:15:23 hideo.tc.redhat.com systemd[1]: Stopped Pacemaker High Avail....
Mar 22 12:15:48 hideo.tc.redhat.com systemd[1]: Stopped Pacemaker High Avail....
Mar 22 12:15:58 hideo.tc.redhat.com systemd[1]: Stopped Pacemaker High Avail....
Mar 22 12:17:50 hideo.tc.redhat.com systemd[1]: Stopped Pacemaker High Avail....
Mar 22 12:17:57 hideo.tc.redhat.com systemd[1]: Stopped Pacemaker High Avail....
Mar 22 12:18:03 hideo.tc.redhat.com systemd[1]: Stopped Pacemaker High Avail....
Hint: Some lines were ellipsized, use -l to show in full.
[root@hideo ~]#

redhat.

Start the cluster

- From any node: pcs cluster start --all

redhat.

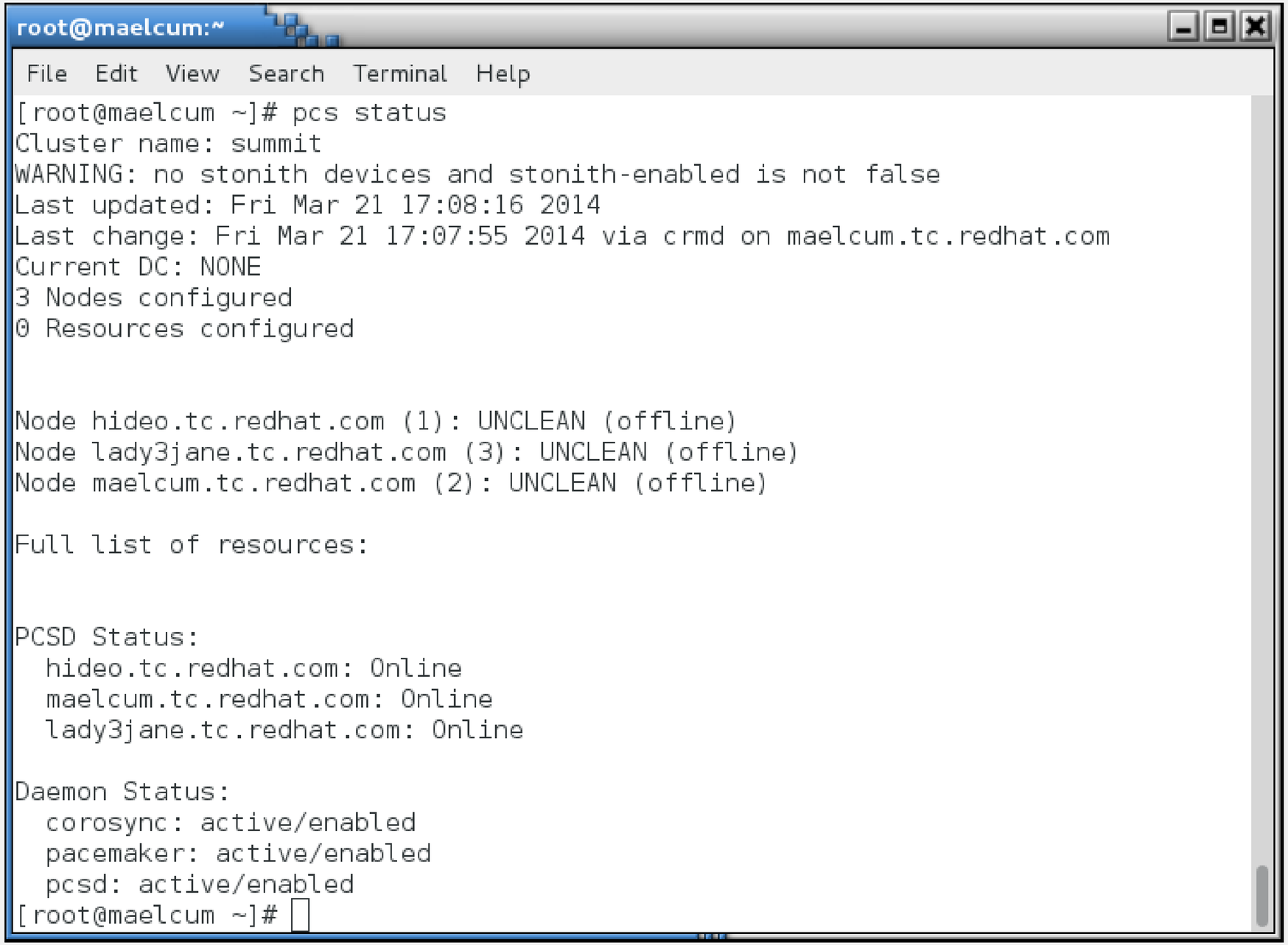

root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# pcs cluster start --all
maelcum.tc.redhat.com: Starting Cluster...
lady3jane.tc.redhat.com: Starting Cluster...
hideo.tc.redhat.com: Starting Cluster...
[root@hideo ~]#

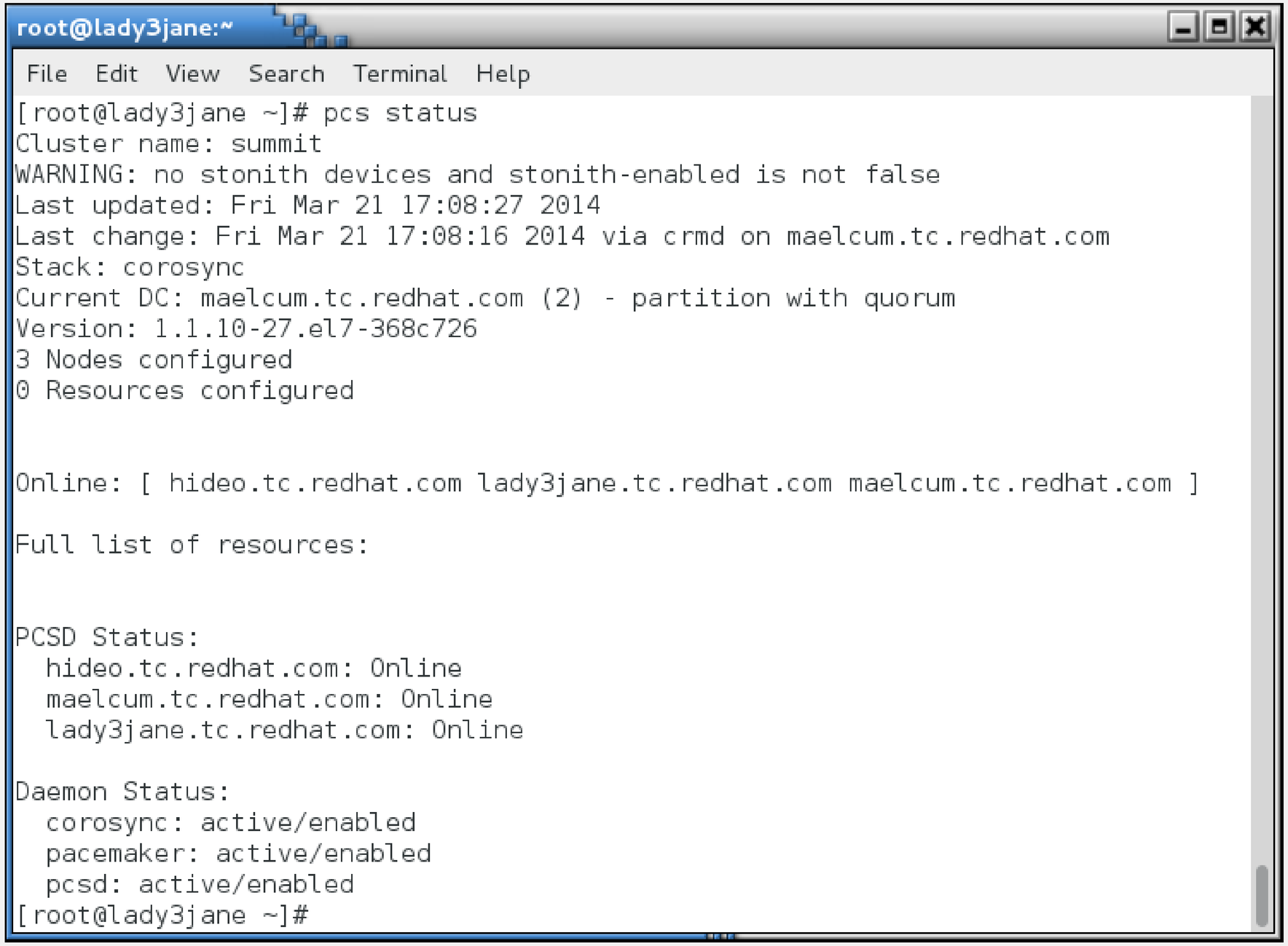
redhat.

It will take a few seconds for the nodes to sync

- This is normal and expected

redhat.


root@maelcum:~
File Edit View Search Terminal Help
[root@maelcum ~]# pcs status
Cluster name: summit
WARNING: no stonith devices and stonith-enabled is not false
Last updated: Fri Mar 21 17:08:16 2014
Last change: Fri Mar 21 17:07:55 2014 via crmd on maelcum.tc.redhat.com
Current DC: NONE
3 Nodes configured
0 Resources configured
Node hideo.tc.redhat.com (1): UNCLEAN (offline)
Node lady3jane.tc.redhat.com (3): UNCLEAN (offline)
Node maelcum.tc.redhat.com (2): UNCLEAN (offline)
Full list of resources:
PCSD Status:
hideo.tc.redhat.com: Online
maelcum.tc.redhat.com: Online
lady3jane.tc.redhat.com: Online
Daemon Status:
corosync: active/enabled
pacemaker: active/enabled
pcsd: active/enabled
[root@maelcum ~]#

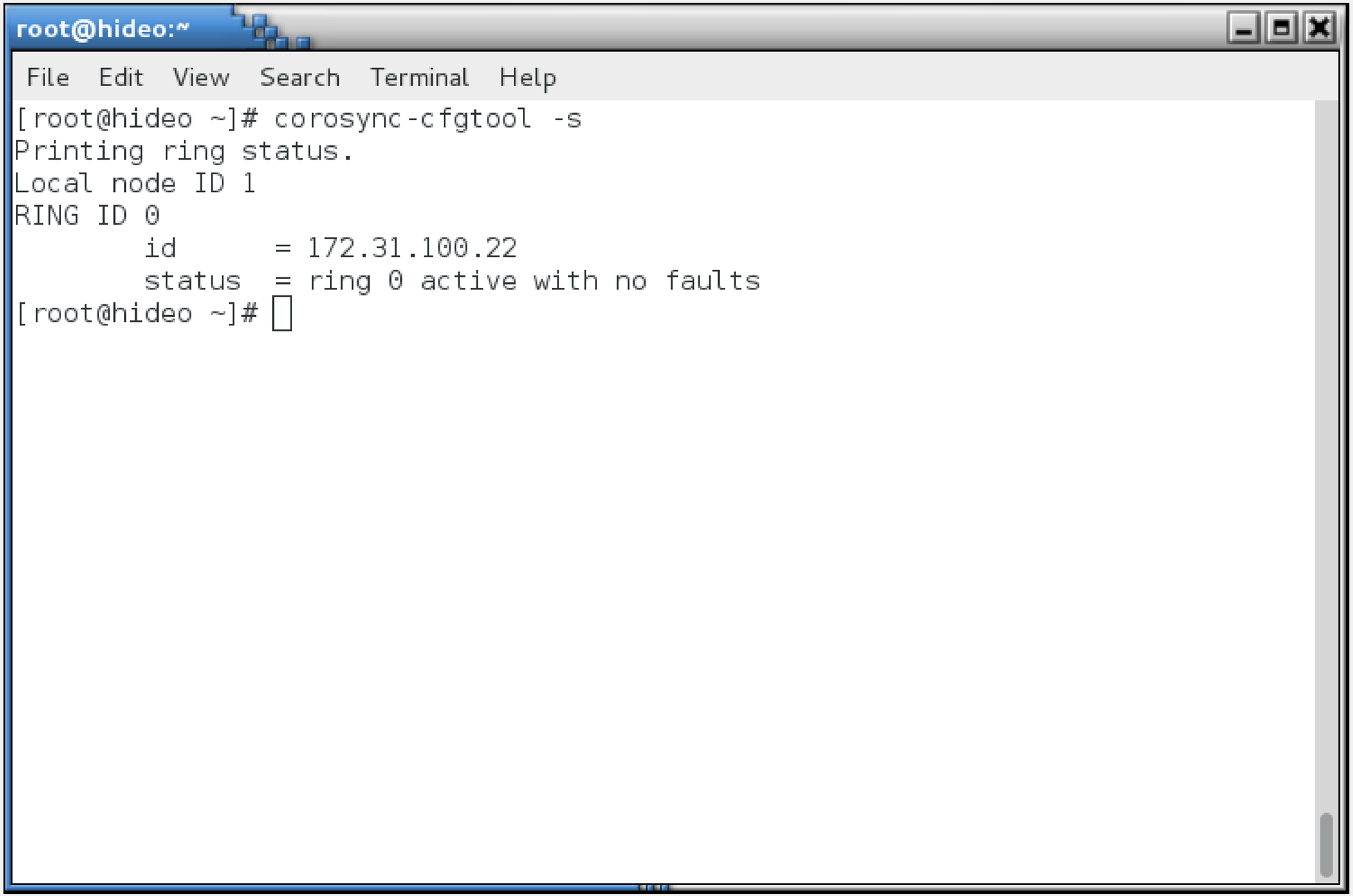

root@lady3jane:~
File Edit View Search Terminal Help
[root@lady3jane ~]# pcs status
Cluster name: summit
WARNING: no stonith devices and stonith-enabled is not false
Last updated: Fri Mar 21 17:08:27 2014
Last change: Fri Mar 21 17:08:16 2014 via crmd on maelcum.tc.redhat.com
Stack: corosync
Current DC: maelcum.tc.redhat.com (2) - partition with quorum
Version: 1.1.10-27.el7-368c726
3 Nodes configured
0 Resources configured
Online: [hideo.tc.redhat.com lady3jane.tc.redhat.com maelcum.tc.redhat.com]
Full list of resources:
PCSD Status:
hideo.tc.redhat.com: Online
maelcum.tc.redhat.com: Online
lady3jane.tc.redhat.com: Online
Daemon Status:
corosync: active/enabled
pacemaker: active/enabled
pcsd: active/enabled
[root@lady3jane ~]#

redhat.

Verify Corosync Installation

- corosync-cfgtool -s

redhat.

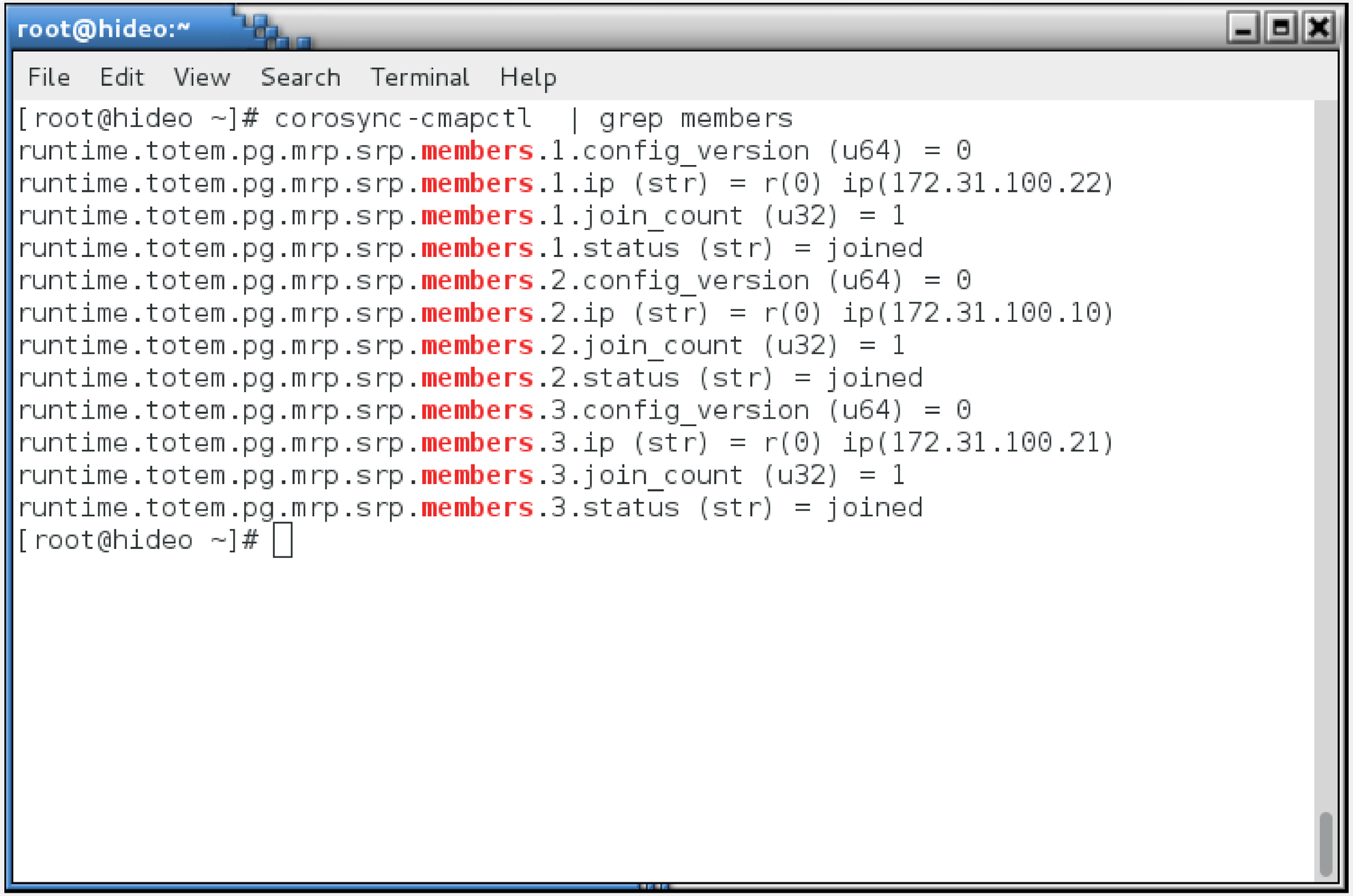

root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# corosync-cfgtool -s
Printing ring status.
Local node ID 1
RING ID 0
id = 172.31.100.22
status = ring 0 active with no faults
[root@hideo ~]#

redhat.

Verify Corosync Installation

- corosync-cmapctl | grep members

redhat.

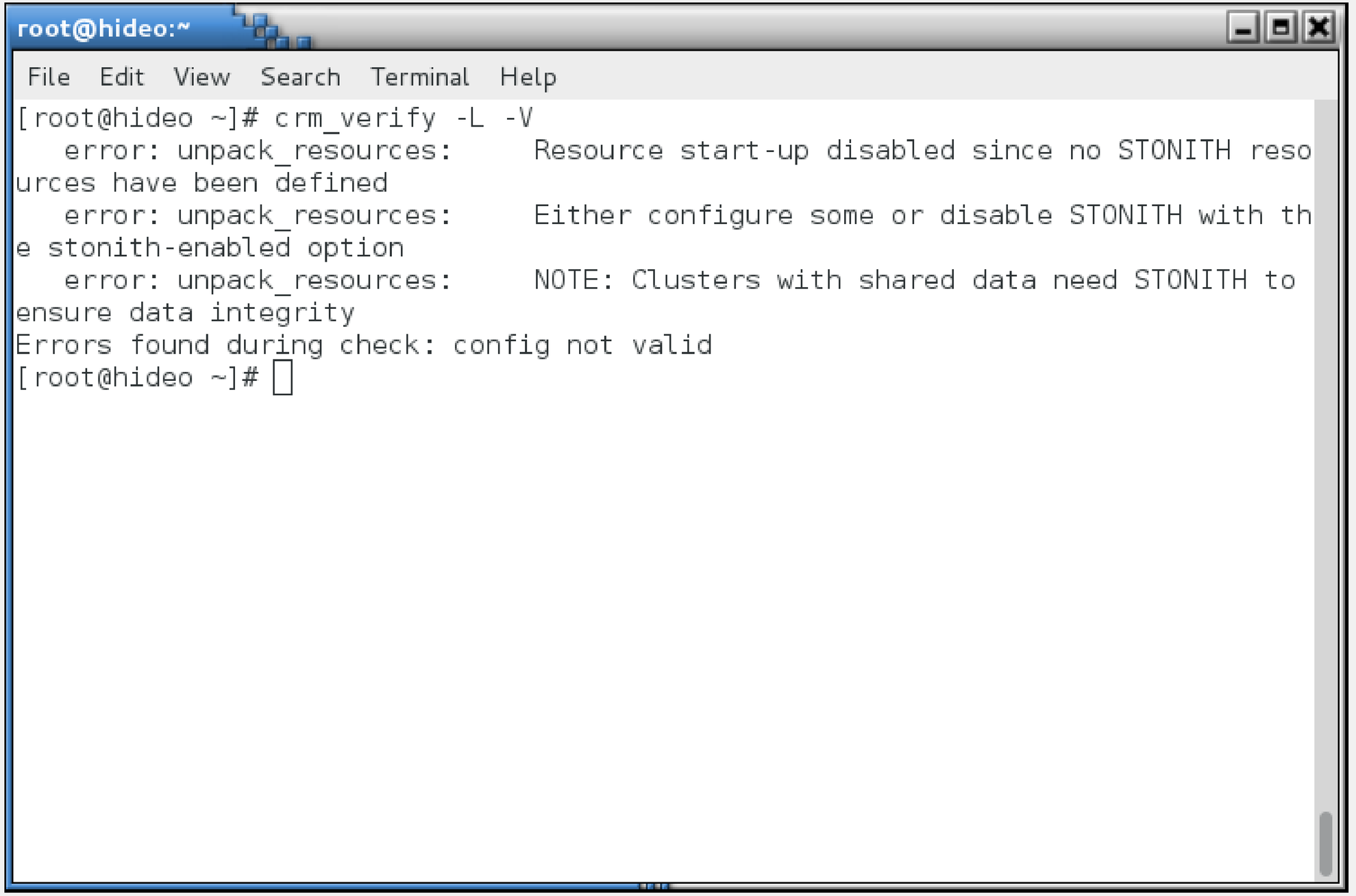

root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# corosync-cmapctl | grep members
runtime.totem.pg.mrp.srp.members.1.config_version (u64) = 0
runtime.totem.pg.mrp.srp.members.1.ip (str) = r(0) ip(172.31.100.22)
runtime.totem.pg.mrp.srp.members.1.join_count (u32) = 1
runtime.totem.pg.mrp.srp.members.1.status (str) = joined
runtime.totem.pg.mrp.srp.members.2.config_version (u64) = 0
runtime.totem.pg.mrp.srp.members.2.ip (str) = r(0) ip(172.31.100.10)
runtime.totem.pg.mrp.srp.members.2.join_count (u32) = 1
runtime.totem.pg.mrp.srp.members.2.status (str) = joined
runtime.totem.pg.mrp.srp.members.3.config_version (u64) = 0
runtime.totem.pg.mrp.srp.members.3.ip (str) = r(0) ip(172.31.100.21)
runtime.totem.pg.mrp.srp.members.3.join_count (u32) = 1
runtime.totem.pg.mrp.srp.members.3.status (str) = joined
[root@hideo ~]#

redhat.

Verify Corosync Installation

- crm_verify -L -V

redhat.


root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# crm_verify -L -V
error: unpack_resources: Resource start-up disabled since no STONITH reso
urces have been defined
error: unpack_resources: Either configure some or disable STONITH with th
e stonith-enabled option
error: unpack_resources: NOTE: Clusters with shared data need STONITH to
ensure data integrity
Errors found during check: config not valid
[root@hideo ~]#

redhat.

Log into the web UI

redhat.

Connect via https to port 2224

- Any system in the cluster can be used (no more single management node!).

redhat.

Connect via https to port 2224

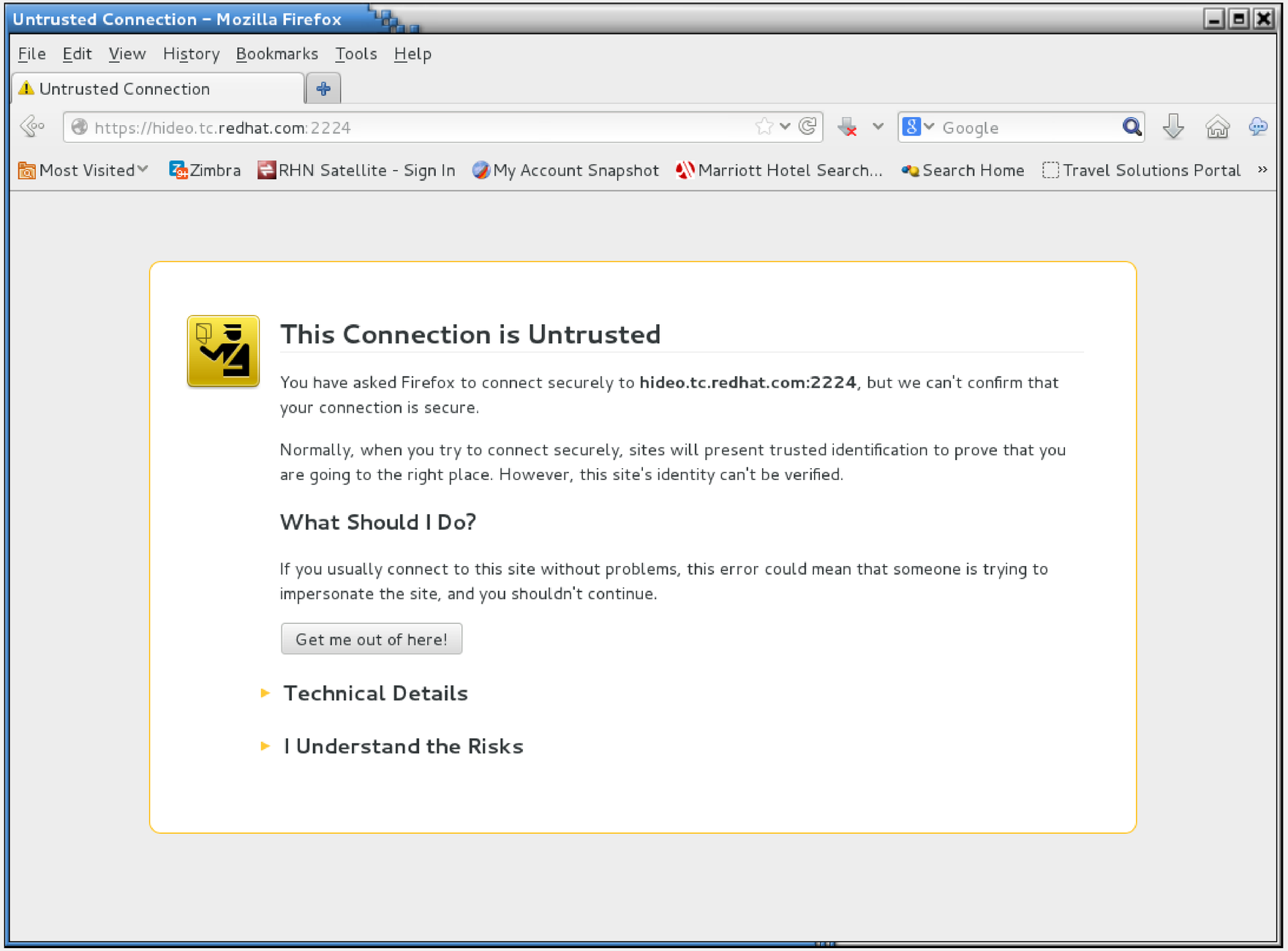
- Any system in the cluster can be used (no more single management node!).
- And there was much rejoicing!!!

redhat.

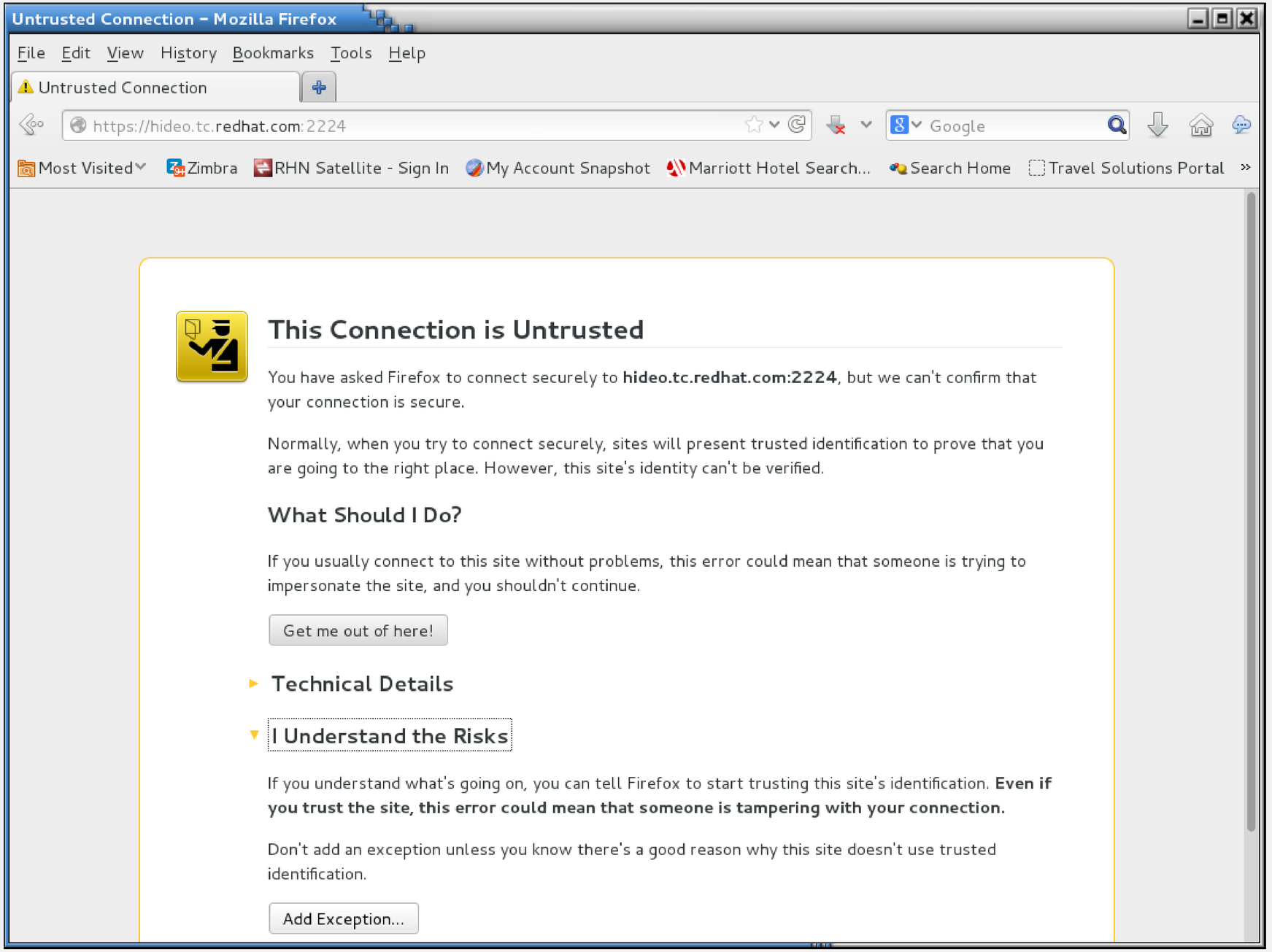
Accept the self-signed certificate

- Pretty standard process

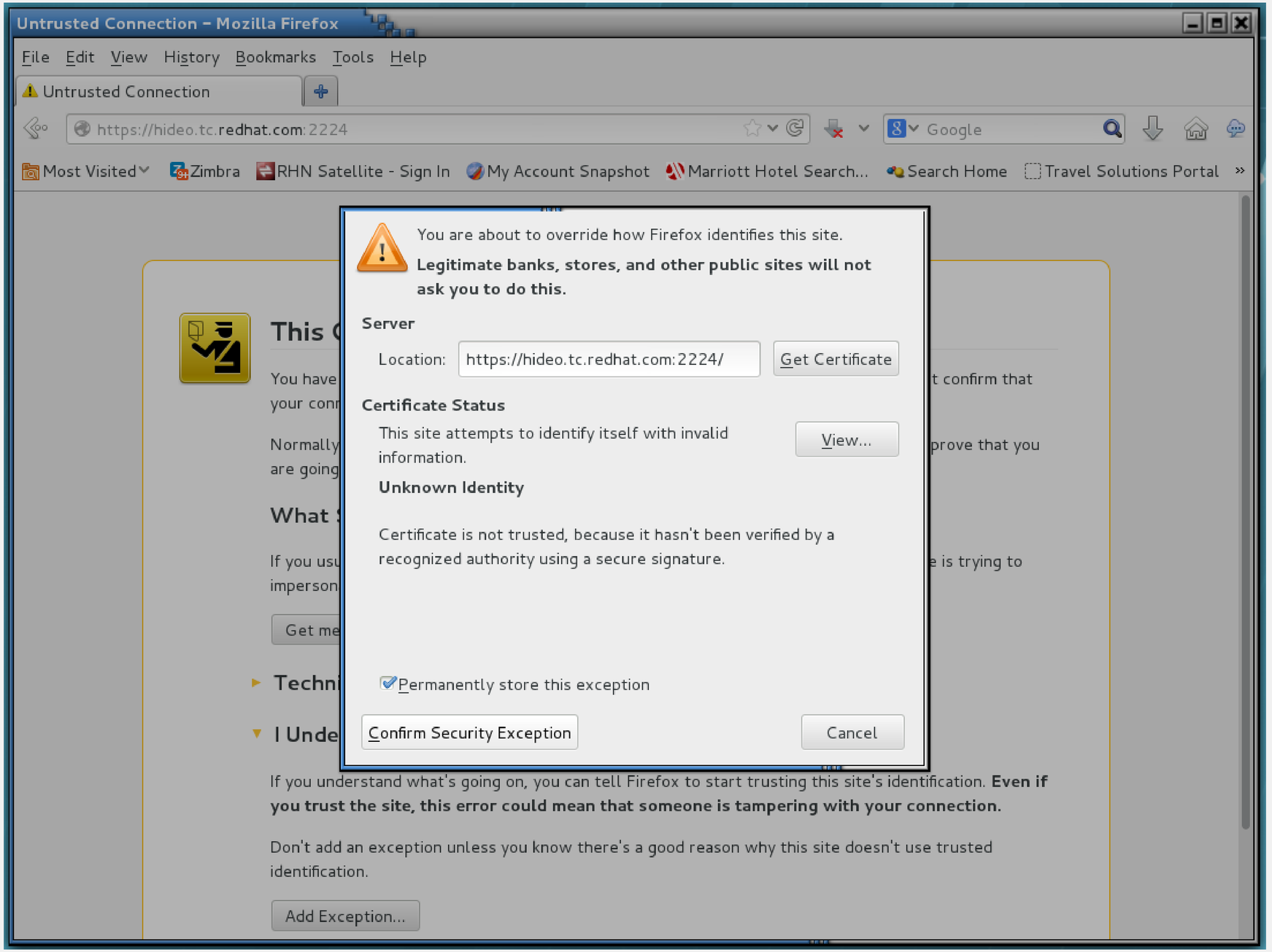
redhat.


Untrusted Connection – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Untrusted Connection
https://hideo.tc.redhat.com:2224
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
This Connection is Untrusted
You have asked Firefox to connect securely to hideo.tc.redhat.com:2224, but we can't confirm that your connection is secure.
Normally, when you try to connect securely, sites will present trusted identification to prove that you are going to the right place. However, this site's identity can't be verified.
What Should I Do?
If you usually connect to this site without problems, this error could mean that someone is trying to impersonate the site, and you shouldn't continue.
Get me out of here!
Technical Details
I Understand the Risks

redhat.


Untrusted Connection – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Untrusted Connection
https://hideo.tc.redhat.com:2224
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
This Connection is Untrusted
You have asked Firefox to connect securely to hideo.tc.redhat.com:2224, but we can't confirm that your connection is secure.
Normally, when you try to connect securely, sites will present trusted identification to prove that you are going to the right place. However, this site's identity can't be verified.
What Should I Do?
If you usually connect to this site without problems, this error could mean that someone is trying to impersonate the site, and you shouldn't continue.
Get me out of here!
Technical Details
I Understand the Risks
If you understand what's going on, you can tell Firefox to start trusting this site's identification. Even if you trust the site, this error could mean that someone is tampering with your connection.
Don't add an exception unless you know there's a good reason why this site doesn't use trusted identification.
Add Exception...

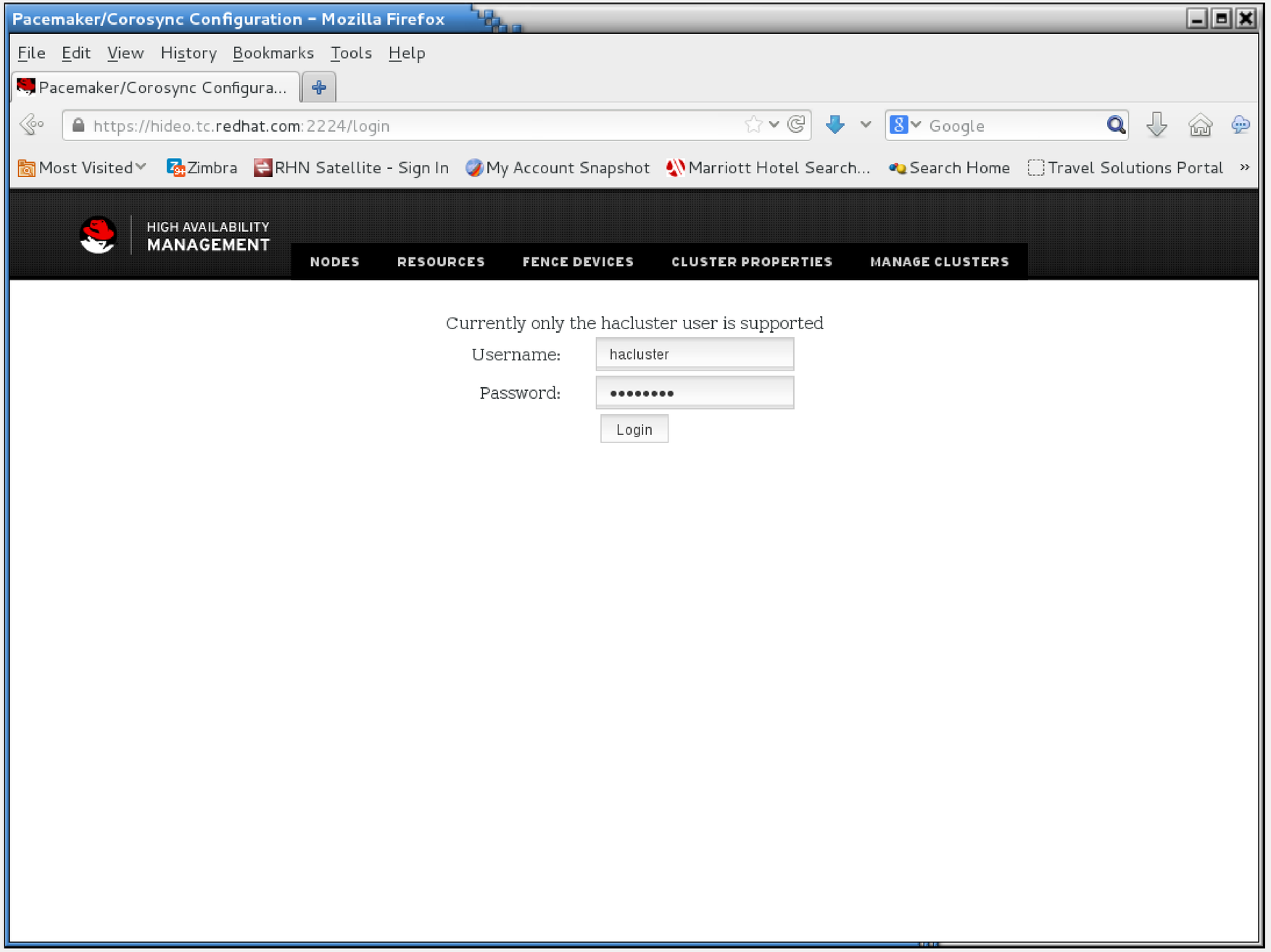
redhat.


Untrusted Connection – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Untrusted Connection
https://hideo.tc.redhat.com:2224
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
You are about to override how Firefox identifies this site.
Legitimate banks, stores, and other public sites will not ask you to do this.
Server
Location:
https://hideo.tc.redhat.com:2224/
Get Certificate
Certificate Status
This site attempts to identify itself with invalid information.
View...
Unknown Identity
Certificate is not trusted, because it hasn't been verified by a recognized authority using a secure signature.
Permanently store this exception
Confirm Security Exception
Cancel
Add Exception...

Log in as hacluster

- Use the password set earlier for hacluster

redhat.

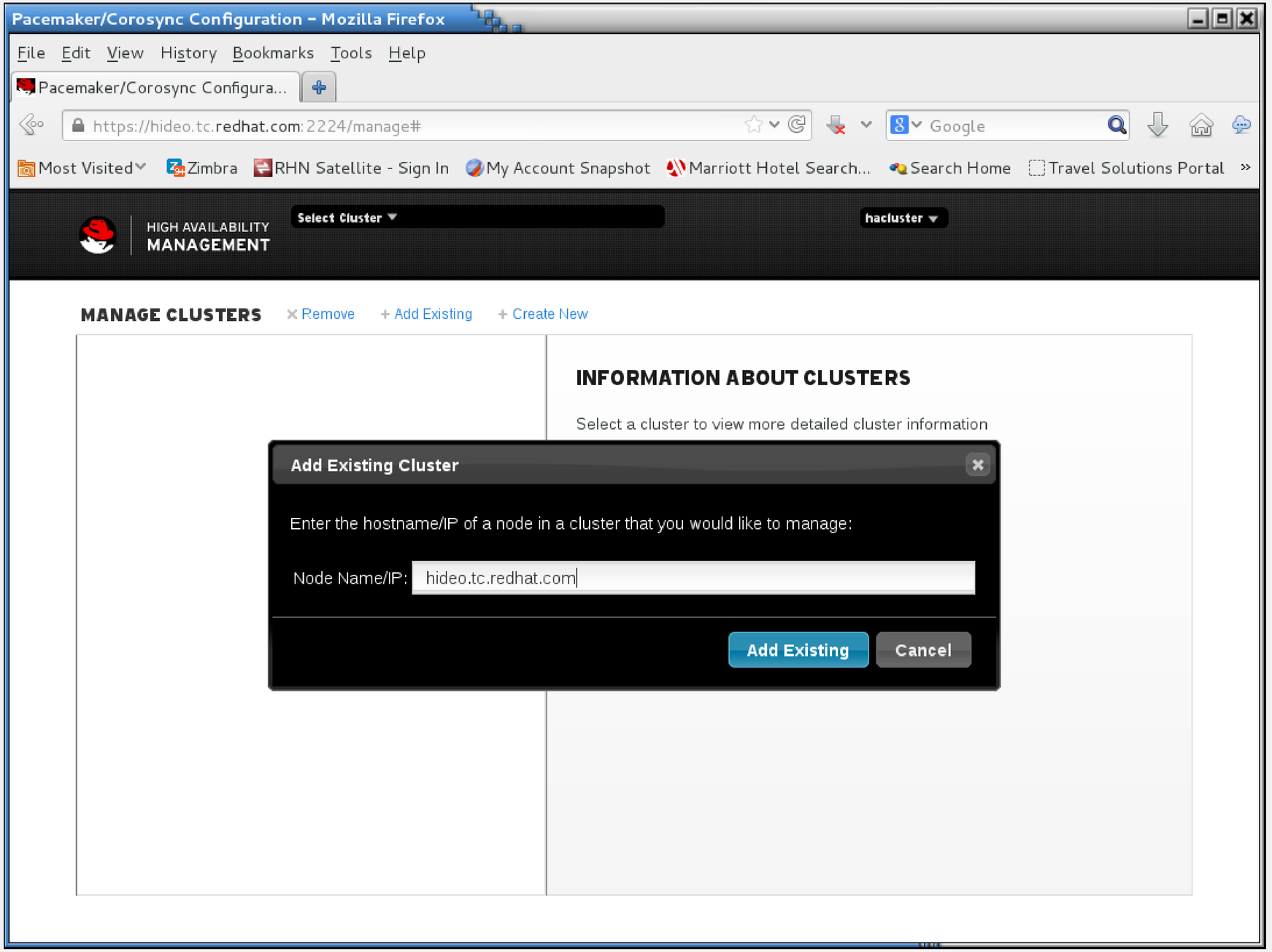

Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/login
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY
MANAGEMENT
NODES
RESOURCES
FENCE DEVICES
CLUSTER PROPERTIES
MANAGE CLUSTERS
Currently only the hacluster user is supported
Username:
hacluster
Password:
Login

redhat.

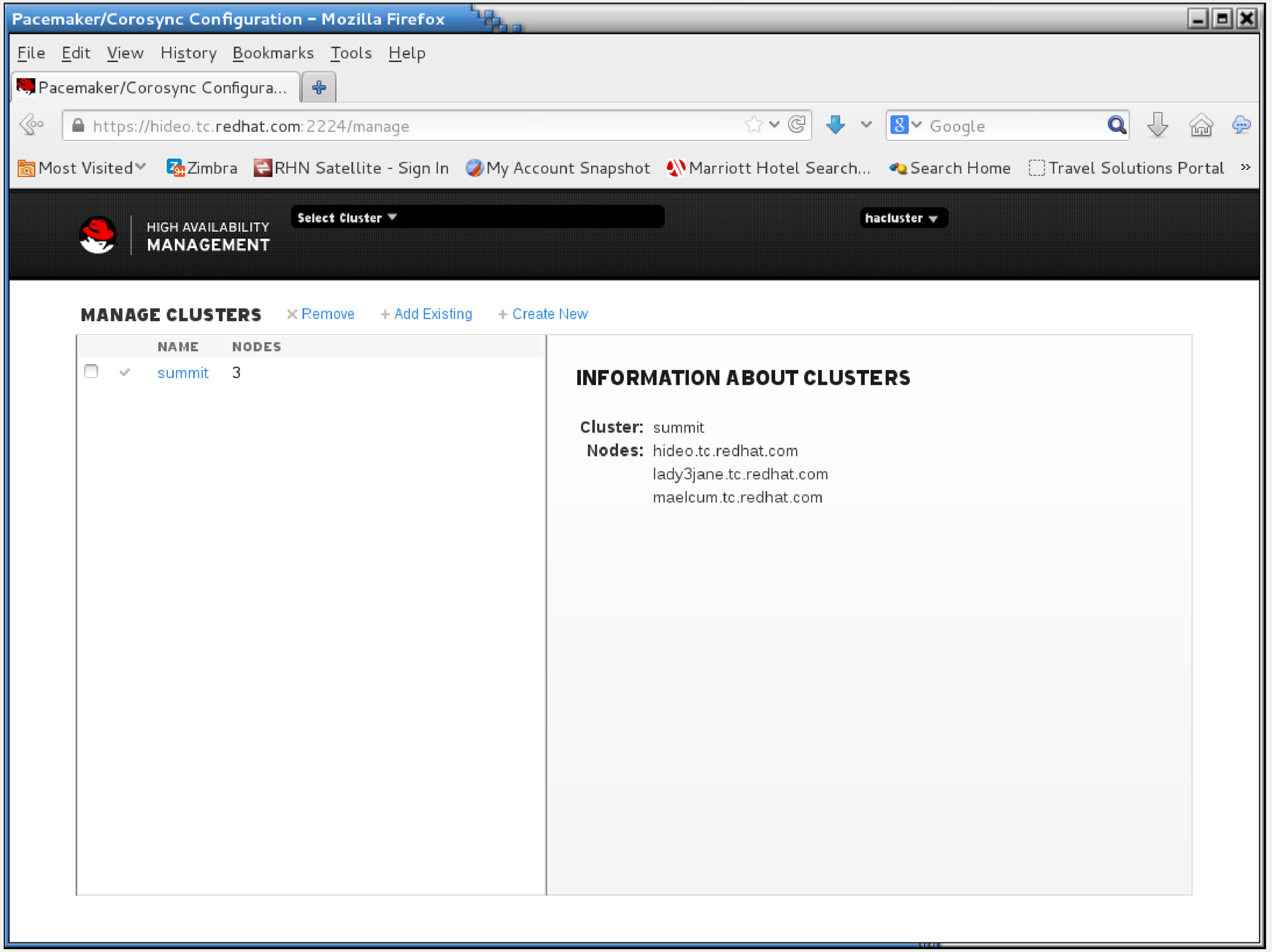
Connect to any of the nodes

- In this case, hideo.tc.redhat.com
- Choose “add existing”

redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/manage#
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY
MANAGEMENT
Select Cluster
hacluster
MANAGE CLUSTERS
Remove
Add Existing
Create New
INFORMATION ABOUT CLUSTERS
Select a cluster to view more detailed cluster information
Add Existing Cluster
Enter the hostname/IP of a node in a cluster that you would like to manage:
Node Name/IP:
hideo.tc.redhat.com
Add Existing
Cancel

redhat.


Pacemaker/Corosync Configuration - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/manage
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY
MANAGEMENT
Select Cluster
hacluster
MANAGE CLUSTERS
Remove
Add Existing
Create New
NAME
NODES
summit
3
INFORMATION ABOUT CLUSTERS
Cluster: summit
Nodes: hideo.tc.redhat.com
lady3jane.tc.redhat.com
maelcum.tc.redhat.com

redhat.

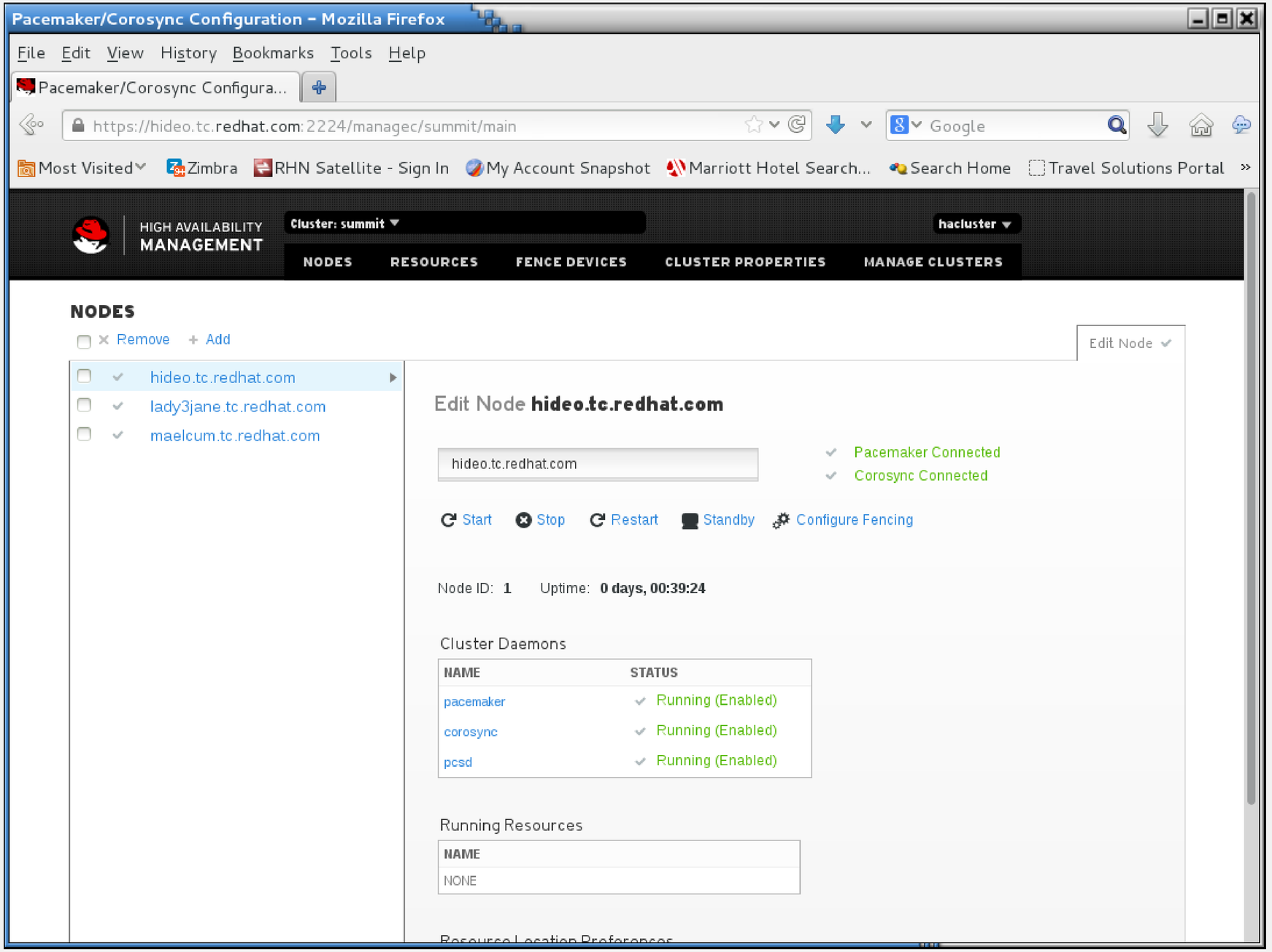
Accessing the nodes

redhat.

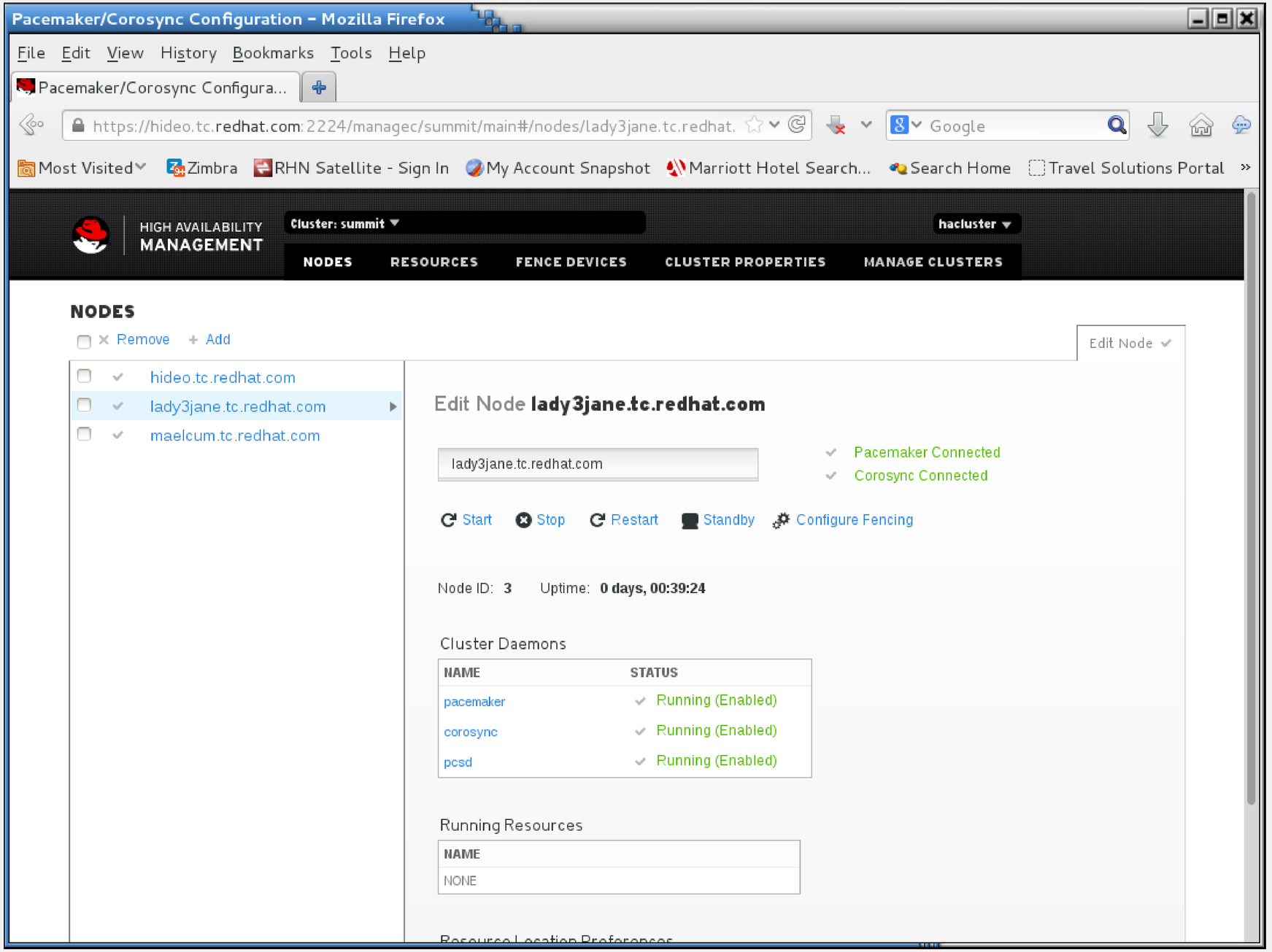
Navigate through and check each node

- They should all have pacemaker, corosync, and pcsd running

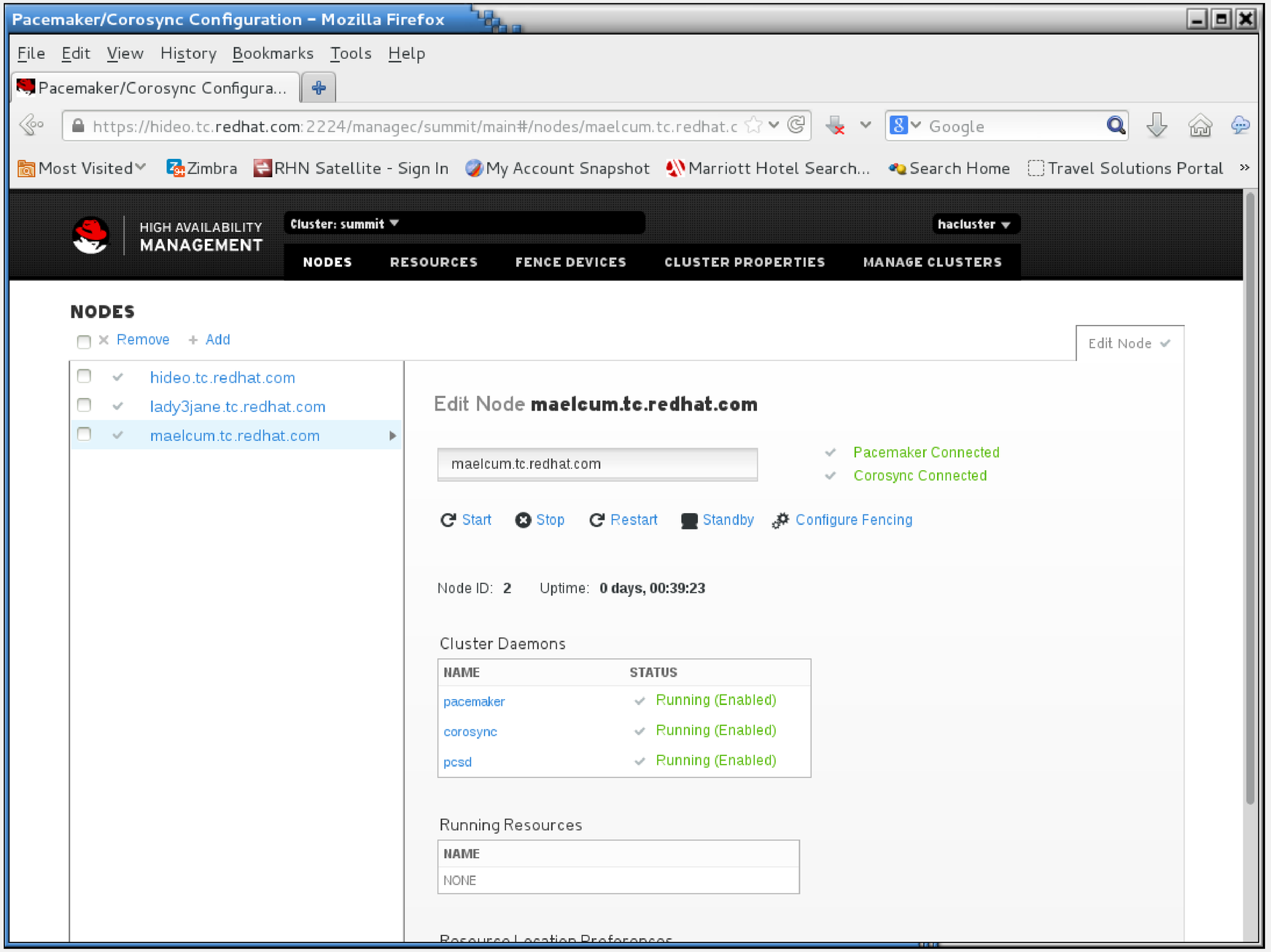
redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY MANAGEMENT
Cluster: summit
hacluster
NODES
RESOURCES
FENCE DEVICES
CLUSTER PROPERTIES
MANAGE CLUSTERS
NODES
Remove
Add
Edit Node
hideo.tc.redhat.com
lady3jane.tc.redhat.com
maelcum.tc.redhat.com
Edit Node hideo.tc.redhat.com
hideo.tc.redhat.com
Pacemaker Connected
Corosync Connected
Start
Stop
Restart
Standby
Configure Fencing
Node ID: 1
Uptime: 0 days, 00:39:24
Cluster Daemons
NAME
STATUS
pacemaker
Running (Enabled)
corosync
Running (Enabled)
pcsd
Running (Enabled)
Running Resources
NAME
NONE

redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/nodes/lady3jane.tc.redhat.
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY MANAGEMENT
Cluster: summit
hacluster
NODES
RESOURCES
FENCE DEVICES
CLUSTER PROPERTIES
MANAGE CLUSTERS
NODES
Remove
Add
Edit Node
hideo.tc.redhat.com
lady3jane.tc.redhat.com
maelcum.tc.redhat.com
Edit Node lady3jane.tc.redhat.com
lady3jane.tc.redhat.com
Pacemaker Connected
Corosync Connected
Start
Stop
Restart
Standby
Configure Fencing
Node ID: 3
Uptime: 0 days, 00:39:24
Cluster Daemons
NAME
STATUS
pacemaker
Running (Enabled)
corosync
Running (Enabled)
pcsd
Running (Enabled)
Running Resources
NAME
NONE

redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/nodes/maelcum.tc.redhat.c
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY MANAGEMENT
Cluster: summit
hacluster
NODES
RESOURCES
FENCE DEVICES
CLUSTER PROPERTIES
MANAGE CLUSTERS
NODES
Remove
Add
Edit Node
hideo.tc.redhat.com
lady3jane.tc.redhat.com
maelcum.tc.redhat.com
Edit Node maelcum.tc.redhat.com
maelcum.tc.redhat.com
Pacemaker Connected
Corosync Connected
Start
Stop
Restart
Standby
Configure Fencing
Node ID: 2
Uptime: 0 days, 00:39:23
Cluster Daemons
NAME
STATUS
pacemaker
Running (Enabled)
corosync
Running (Enabled)
pcsd
Running (Enabled)
Running Resources
NAME
NONE

redhat.

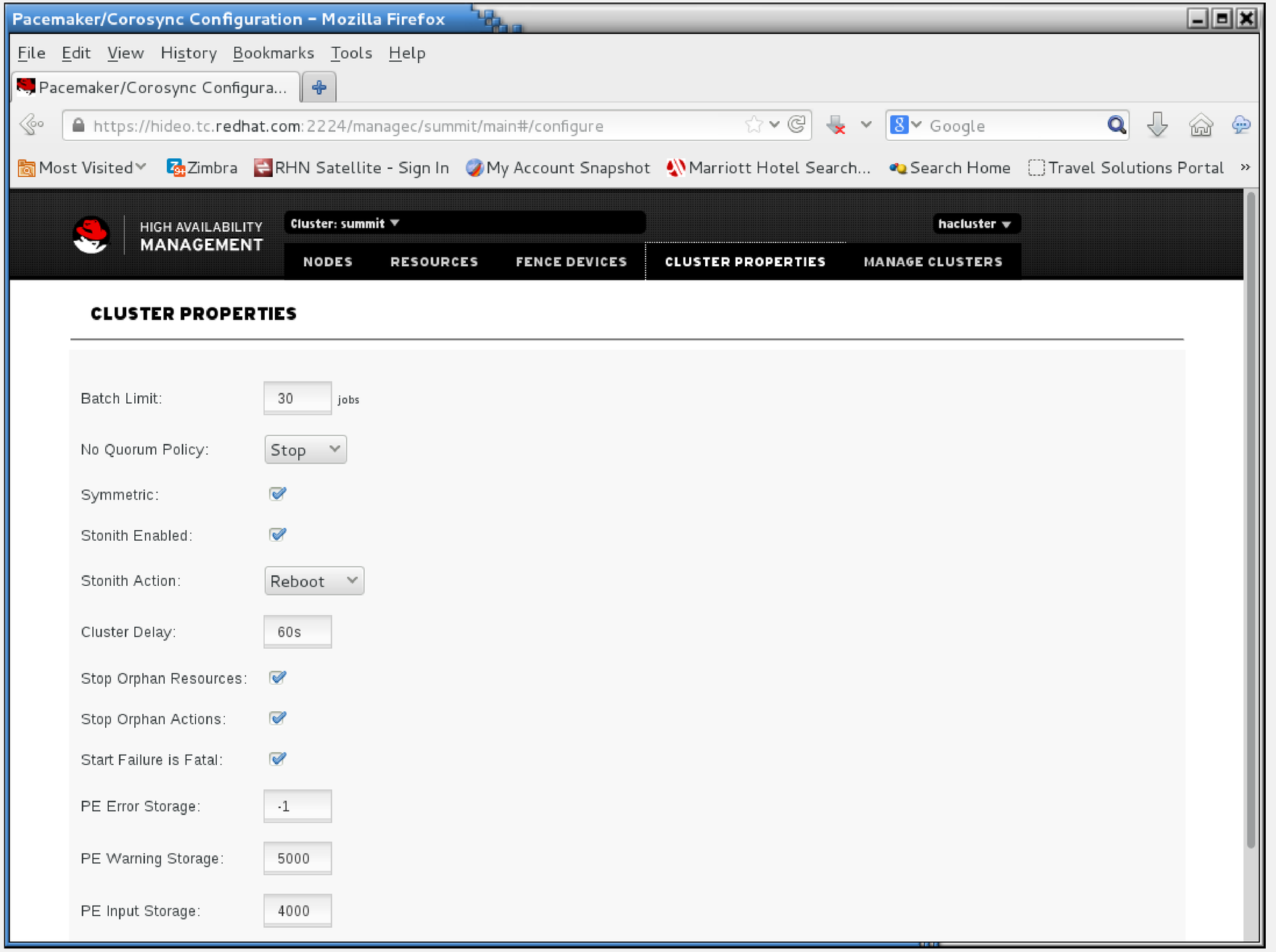
Accessing the cluster

redhat.

Inspect the Cluster Properties Tab

- This is where general options which affect cluster-wide settings

redhat.

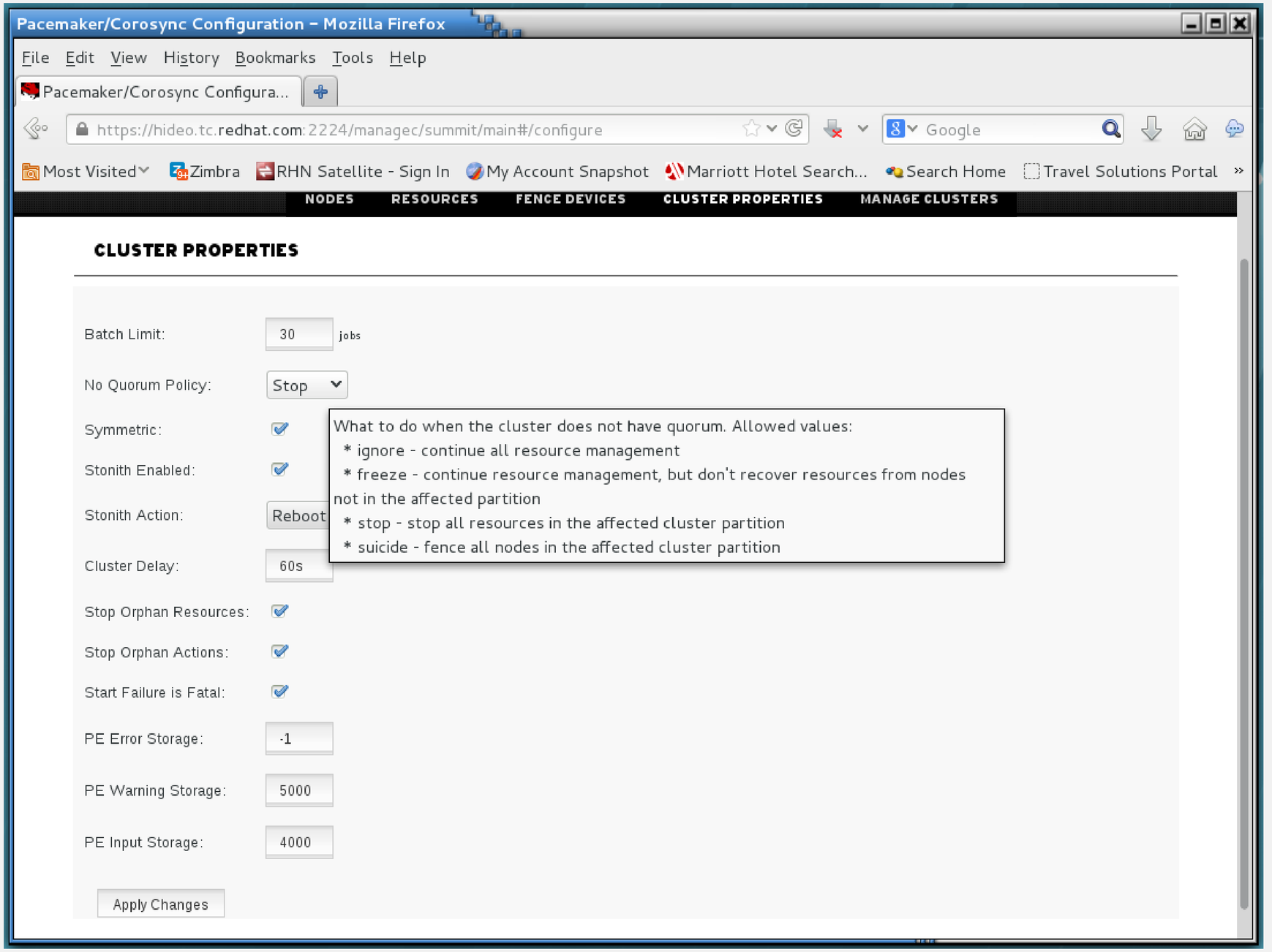

Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/configure
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY MANAGEMENT
Cluster: summit
hacluster
NODES
RESOURCES
FENCE DEVICES
CLUSTER PROPERTIES
MANAGE CLUSTERS
CLUSTER PROPERTIES
Batch Limit: 30 jobs
No Quorum Policy: Stop
Symmetric:
Stonith Enabled:
Stonith Action: Reboot
Cluster Delay: 60s
Stop Orphan Resources:
Stop Orphan Actions:
Start Failure is Fatal:
PE Error Storage: -1
PE Warning Storage: 5000
PE Input Storage: 4000

redhat.

Context-dependent Help Available

- Hover the mouse over a setting for more information

redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/configure
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
NODES
RESOURCES
FENCE DEVICES
CLUSTER PROPERTIES
MANAGE CLUSTERS
CLUSTER PROPERTIES
Batch Limit:
30
jobs
No Quorum Policy:
Stop
Symmetric:
Stonith Enabled:
Stonith Action:
Reboot
Cluster Delay:
60s
Stop Orphan Resources:
Stop Orphan Actions:
Start Failure is Fatal:
PE Error Storage:
-1
PE Warning Storage:
5000
PE Input Storage:
4000
Apply Changes
What to do when the cluster does not have quorum. Allowed values:
* ignore - continue all resource management
* freeze - continue resource management, but don't recover resources from nodes not in the affected partition
* stop - stop all resources in the affected cluster partition
* suicide - fence all nodes in the affected cluster partition

redhat.

Configure fencing

redhat.

What is Fencing?

- If a node stops responding, the cluster will attempt to remove that node from the cluster.
- This is referred to as STONITH (Shoot The Other Node In The Head)
- You don't want multiple machines to e.g. write to the same datastore without doing distributed lock management, so it's best to just take the unresponsive node out of the equation.

redhat.

What is Fencing?

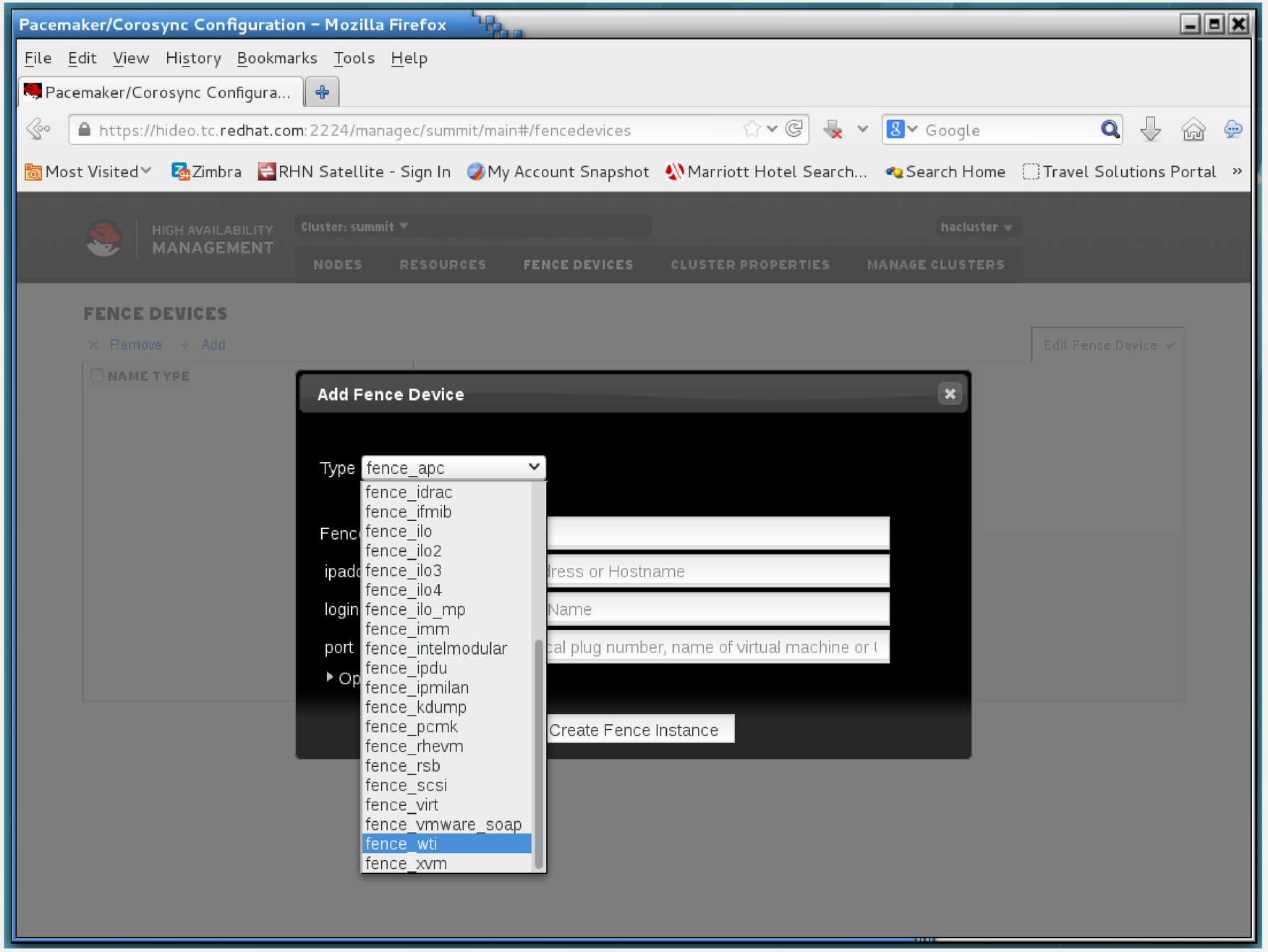
- There are numerous ways to do this.
  - Managed power devices from WTI, APC and others
  - Fiber channel fencing
  - IPMI
  - Out of band management devices (DRAC, iLO, RSA, etc.)
  - SCSI reservations
  - Virtual Machine fencing

redhat.

Configure Fence Devices

- Choose +Add
- Choose the fence device (in this case, my lab has a manageable WTI ips-800-d20 power switch - they are typically a couple of hundred bucks on eBay, they work amazingly well, and they are very rugged).

redhat.

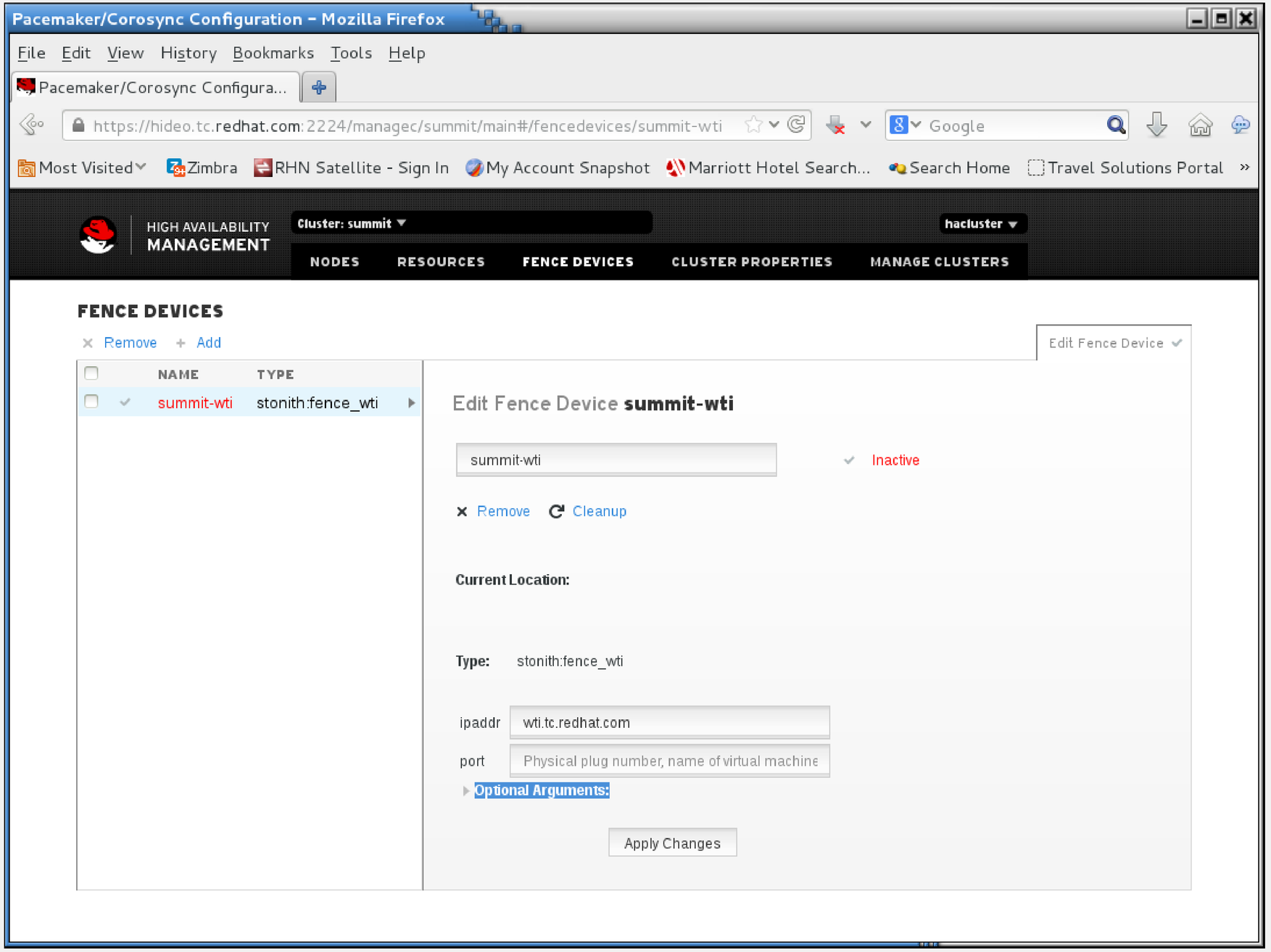

Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/fencedevices
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY MANAGEMENT
Cluster: summit
hacluster
NODES
RESOURCES
FENCE DEVICES
CLUSTER PROPERTIES
MANAGE CLUSTERS
FENCE DEVICES
Remove
Add
Edit Fence Device
NAME TYPE
Add Fence Device
Type
fence_apc
fence_idrac
fence_ifmib
fence_ilo
fence_ilo2
fence_ilo3
fence_ilo4
fence_ilo_mp
fence_imm
fence_intelmodular
fence_ipdu
fence_ipmilan
fence_kdump
fence_pcmk
fence_rhevm
fence_rsb
fence_scsi
fence_virt
fence_vmware_soap
fence_wti
fence_xvm
Fenc
ipad
login
port
Op
dress or Hostname
Name
cal plug number, name of virtual machine or
Create Fence Instance

redhat.

Configure Fence Devices

- Assign a friendly name (in this case, “summit-wti”)
- Enter the IP address or hostname (in this case, “wti.tc.redhat.com”)

redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/fencedevices/summit-wti
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY MANAGEMENT
Cluster: summit
hacluster
NODES
RESOURCES
FENCE DEVICES
CLUSTER PROPERTIES
MANAGE CLUSTERS
FENCE DEVICES
Remove
Add
Edit Fence Device
NAME
TYPE
summit-wti
stonith:fence_wti
Edit Fence Device summit-wti
summit-wti
Inactive
Remove
Cleanup
Current Location:
Type:
stonith:fence_wti
ipaddr
wti.tc.redhat.com
port
Physical plug number, name of virtual machine
Optional Arguments:
Apply Changes

redhat.

Configure Fence Devices

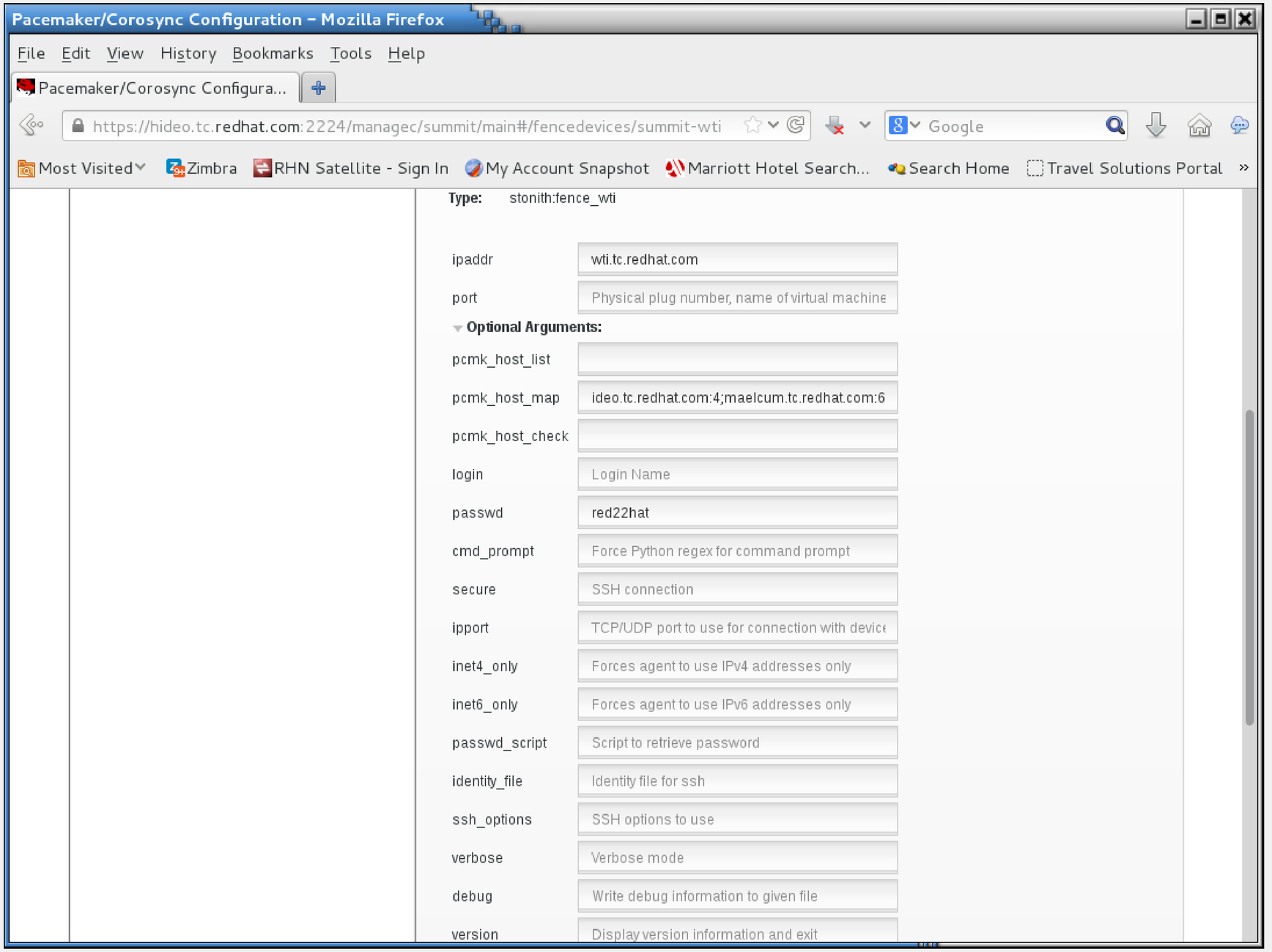
- Go into “Optional Arguments” to set the following extra settings:
  - “pcmk_host_map” in the format [hostname]:[power_port],[hostname]:[power_port], [hostname]:[power_port]. So for my lab:
    - lady3jane.tc.redhat.com:5;hideo.tc.redhat.com:4;maelcum.tc.redhat.com:6

redhat.

Configure Fence Devices

- Go into “Optional Arguments” to set the following extra settings:
  - For the WTI, you don't need to define a user, only “passwd”

redhat.

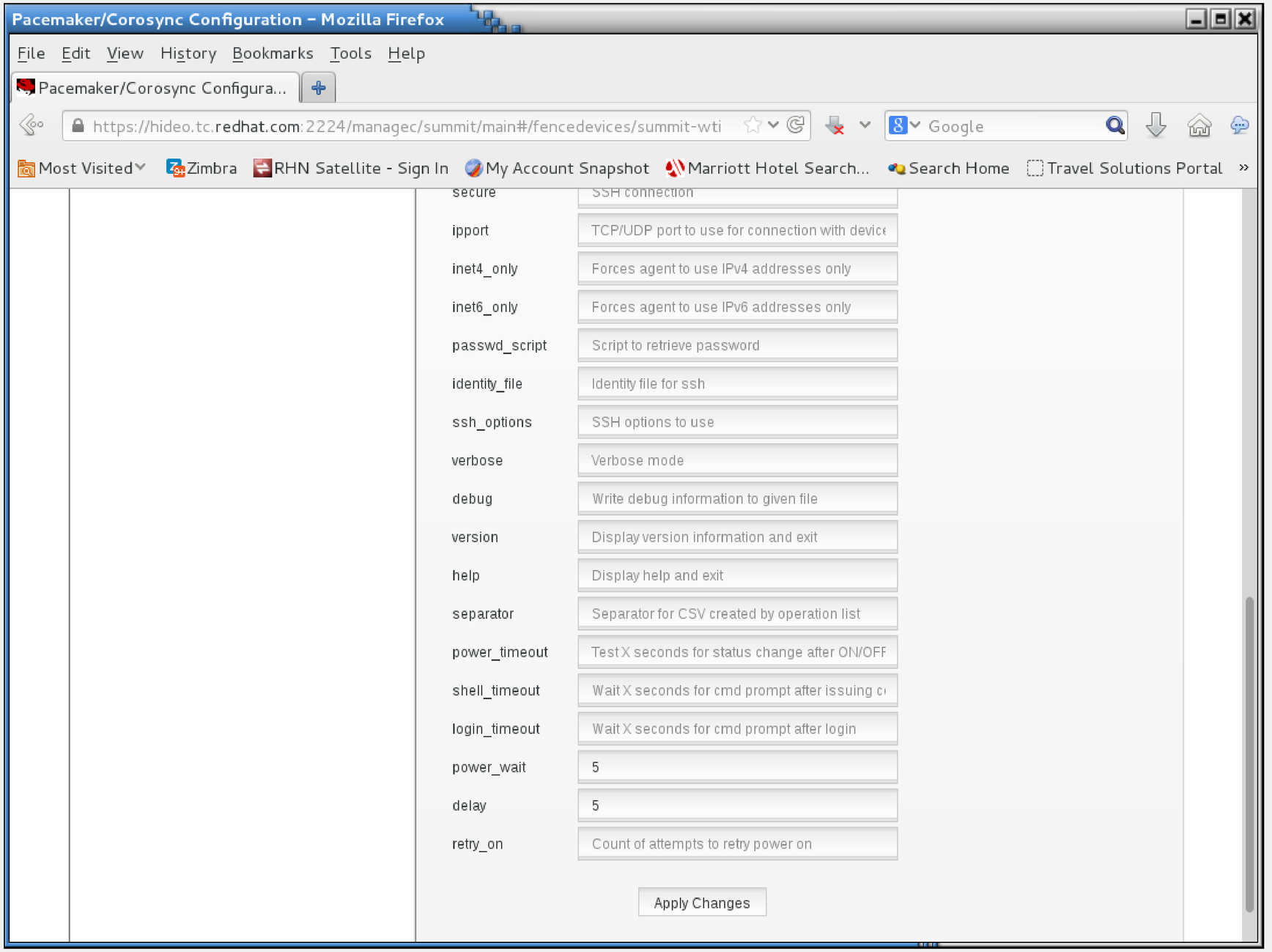

Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/fencedevices/summit-wti
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
Type: stonith:fence_wti
ipaddr wti.tc.redhat.com
port Physical plug number, name of virtual machine
Optional Arguments:
pcmk_host_list
pcmk_host_map ideo.tc.redhat.com:4;maelcum.tc.redhat.com:6
pcmk_host_check
login Login Name
passwd red22hat
cmd_prompt Force Python regex for command prompt
secure SSH connection
ipport TCP/UDP port to use for connection with device
inet4_only Forces agent to use IPv4 addresses only
inet6_only Forces agent to use IPv6 addresses only
passwd_script Script to retrieve password
identity_file Identity file for ssh
ssh_options SSH options to use
verbose Verbose mode
debug Write debug information to given file
version Display version information and exit

redhat.

Configure Fence Devices

- Go into “Optional Arguments” to set the following extra settings:
  - I also prefer to set power_wait to 5 seconds so the system being power cycled doesn't get damaged.
  - I set “delay” to about 5 seconds, as well. We don't want to fence systems instantly when it's only temporarily unavailable.

redhat.

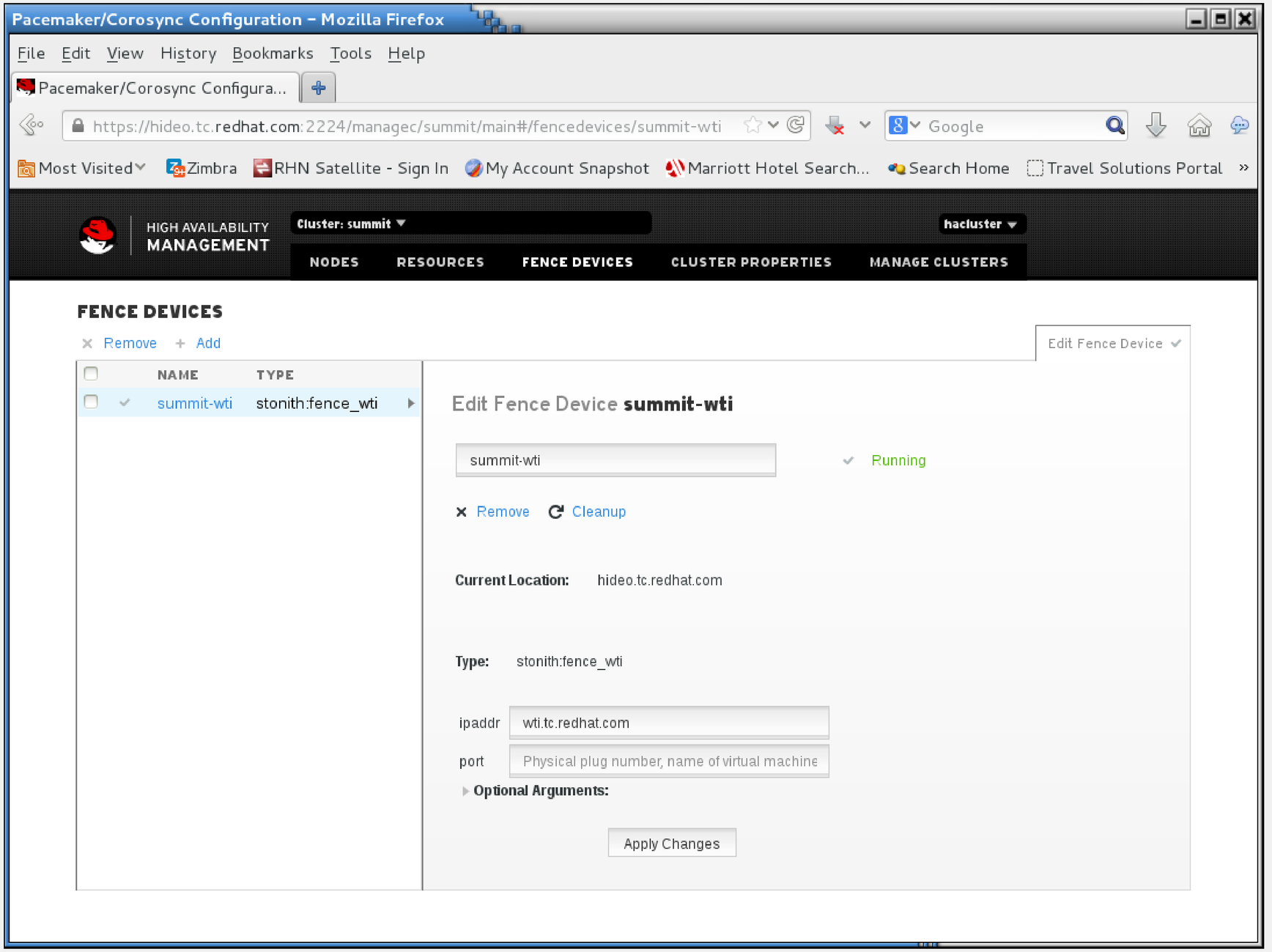

Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/fencedevices/summit-wti
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
secure
SSH connection
ipport
TCP/UDP port to use for connection with device
inet4_only
Forces agent to use IPv4 addresses only
inet6_only
Forces agent to use IPv6 addresses only
passwd_script
Script to retrieve password
identity_file
Identity file for ssh
ssh_options
SSH options to use
verbose
Verbose mode
debug
Write debug information to given file
version
Display version information and exit
help
Display help and exit
separator
Separator for CSV created by operation list
power_timeout
Test X seconds for status change after ON/OFF
shell_timeout
Wait X seconds for cmd prompt after issuing c
login_timeout
Wait X seconds for cmd prompt after login
power_wait
5
delay
5
retry_on
Count of attempts to retry power on
Apply Changes

redhat.

Configure Fence Devices

- After a few seconds, the fence device should turn green, indicating all of the systems are aware of it and it's active.

redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
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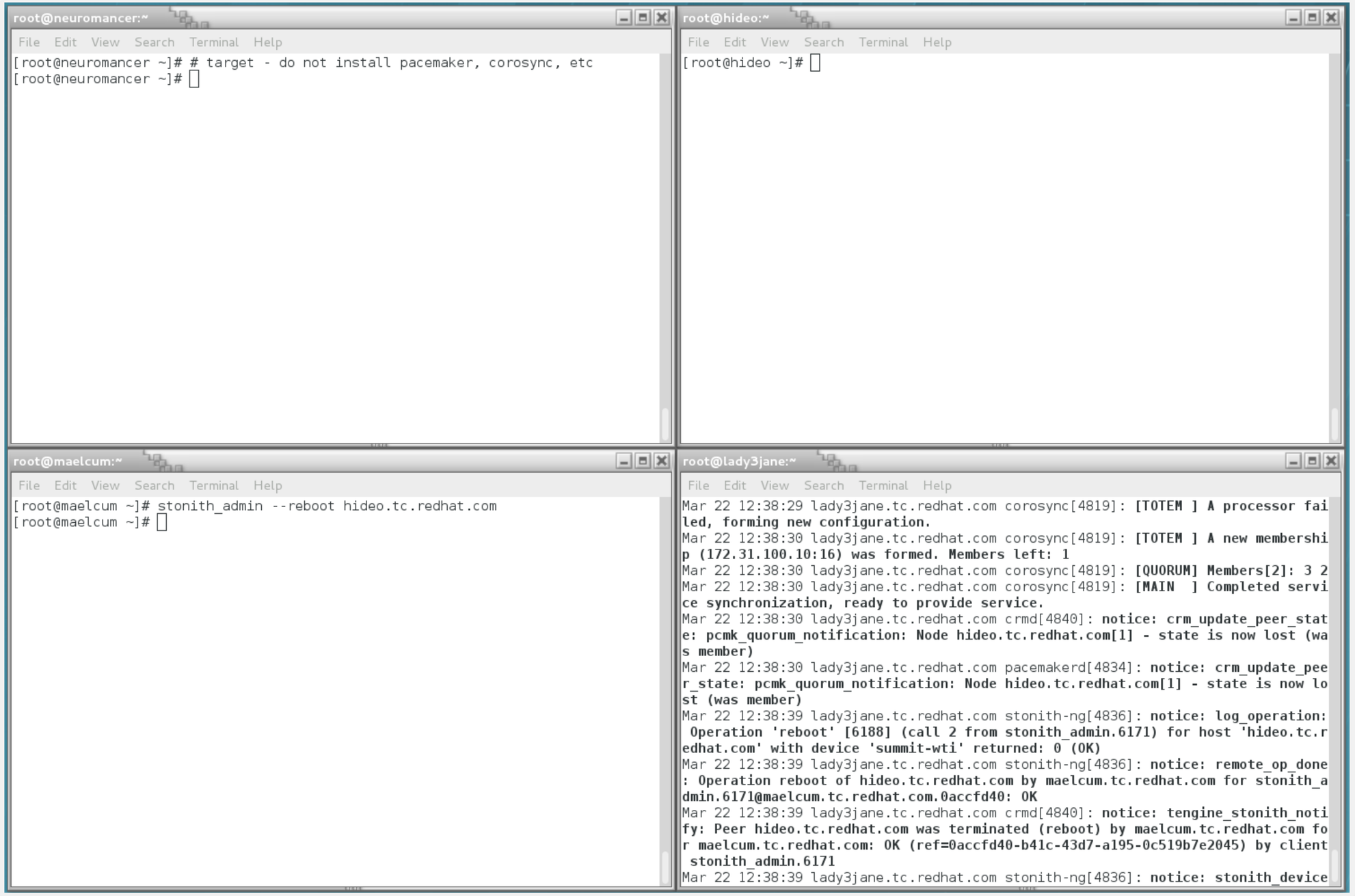
HIGH AVAILABILITY MANAGEMENT
Cluster: summit
hacluster
NODES
RESOURCES
FENCE DEVICES
CLUSTER PROPERTIES
MANAGE CLUSTERS
FENCE DEVICES
Remove
Add
Edit Fence Device
NAME
TYPE
summit-wti
stonith:fence_wti
Edit Fence Device summit-wti
summit-wti
Running
Remove
Cleanup
Current Location:
hideo.tc.redhat.com
Type:
stonith:fence_wti
ipaddr
wti.tc.redhat.com
port
Physical plug number, name of virtual machine
Optional Arguments:
Apply Changes

redhat.

Test Fence Devices

- You can test the fence device and host mapping using stonith_admin

redhat.


root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# # target - do not install pacemaker, corosync, etc
[root@neuromancer ~]#
root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]#
root@maelcum:~
File Edit View Search Terminal Help
[root@maelcum ~]# stonith_admin --reboot hideo.tc.redhat.com
[root@maelcum ~]#
root@lady3jane:~
File Edit View Search Terminal Help
Mar 22 12:38:29 lady3jane.tc.redhat.com corosync[4819]: [TOTEM] A processor failed, forming new configuration.
Mar 22 12:38:30 lady3jane.tc.redhat.com corosync[4819]: [TOTEM] A new membership (172.31.100.10:16) was formed. Members left: 1
Mar 22 12:38:30 lady3jane.tc.redhat.com corosync[4819]: [QUORUM] Members[2]: 3 2
Mar 22 12:38:30 lady3jane.tc.redhat.com corosync[4819]: [MAIN] Completed service synchronization, ready to provide service.
Mar 22 12:38:30 lady3jane.tc.redhat.com crmd[4840]: notice: crm_update_peer_state: pcmk_quorum_notification: Node hideo.tc.redhat.com[1] - state is now lost (was member)
Mar 22 12:38:30 lady3jane.tc.redhat.com pacemakerd[4834]: notice: crm_update_peer_state: pcmk_quorum_notification: Node hideo.tc.redhat.com[1] - state is now lost (was member)
Mar 22 12:38:39 lady3jane.tc.redhat.com stonith-ng[4836]: notice: log_operation: Operation 'reboot' [6188] (call 2 from stonith_admin.6171) for host 'hideo.tc.redhat.com' with device 'summit-wti' returned: 0 (OK)
Mar 22 12:38:39 lady3jane.tc.redhat.com stonith-ng[4836]: notice: remote_op_done: Operation reboot of hideo.tc.redhat.com by maelcum.tc.redhat.com for stonith_admin.6171@maelcum.tc.redhat.com.0accfd40: OK
Mar 22 12:38:39 lady3jane.tc.redhat.com crmd[4840]: notice: tengine_stonith_notify: Peer hideo.tc.redhat.com was terminated (reboot) by maelcum.tc.redhat.com for maelcum.tc.redhat.com: OK (ref=0accfd40-b41c-43d7-a195-0c519b7e2045) by client stonith_admin.6171
Mar 22 12:38:39 lady3jane.tc.redhat.com stonith-ng[4836]: notice: stonith_device

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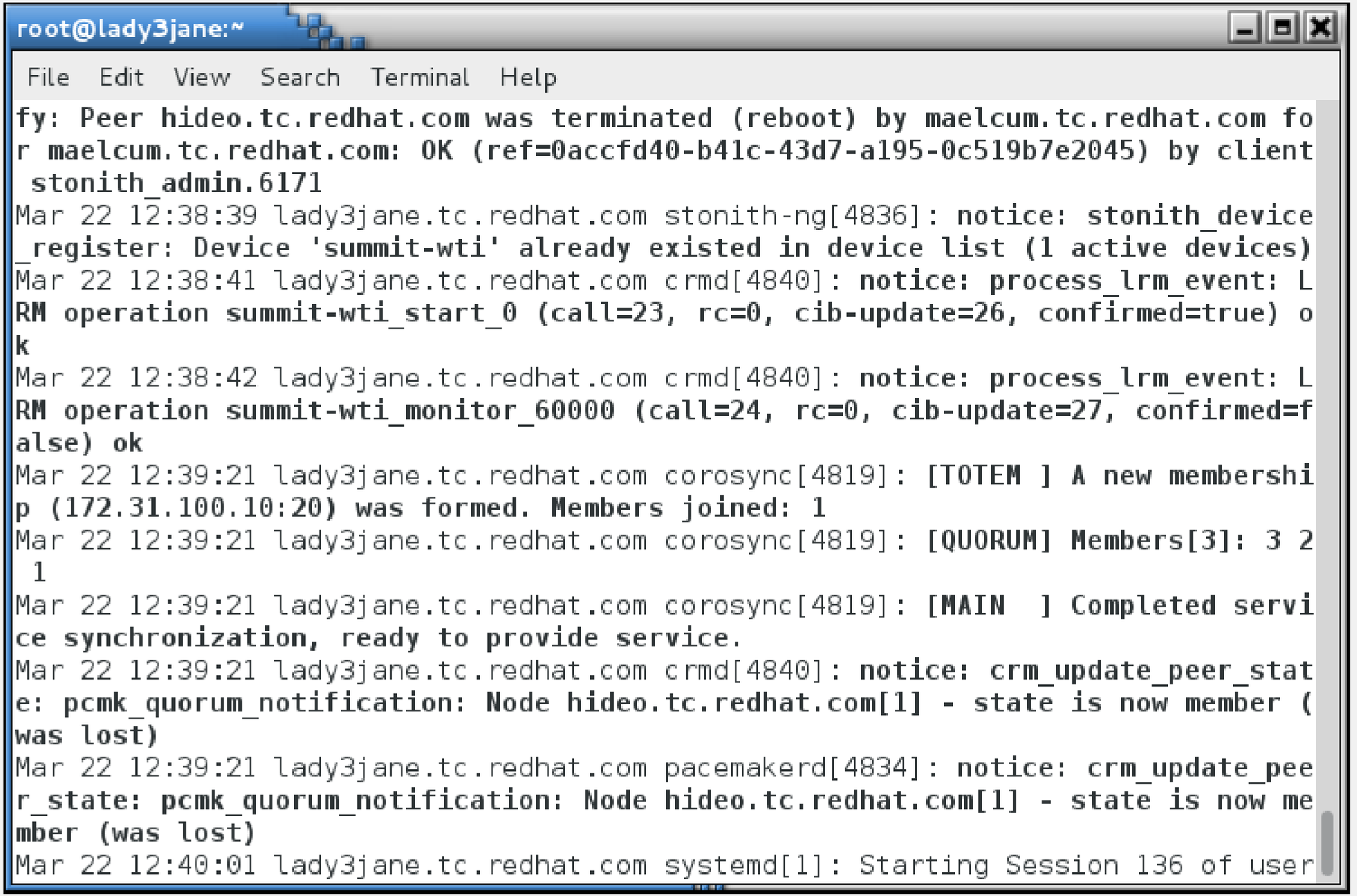

root@lady3jane:~
File Edit View Search Terminal Help
fy: Peer hideo.tc.redhat.com was terminated (reboot) by maelcum.tc.redhat.com fo
r maelcum.tc.redhat.com: OK (ref=0accfd40-b41c-43d7-a195-0c519b7e2045) by client
stonith_admin.6171
Mar 22 12:38:39 lady3jane.tc.redhat.com stonith-ng[4836]: notice: stonith_device
_register: Device 'summit-wti' already existed in device list (1 active devices)
Mar 22 12:38:41 lady3jane.tc.redhat.com crmd[4840]: notice: process_lrm_event: L
RM operation summit-wti_start_0 (call=23, rc=0, cib-update=26, confirmed=true) o
k
Mar 22 12:38:42 lady3jane.tc.redhat.com crmd[4840]: notice: process_lrm_event: L
RM operation summit-wti_monitor_60000 (call=24, rc=0, cib-update=27, confirmed=f
alse) ok
Mar 22 12:39:21 lady3jane.tc.redhat.com corosync[4819]: [TOTEM] A new membershi
p (172.31.100.10:20) was formed. Members joined: 1
Mar 22 12:39:21 lady3jane.tc.redhat.com corosync[4819]: [QUORUM] Members[3]: 3 2
1
Mar 22 12:39:21 lady3jane.tc.redhat.com corosync[4819]: [MAIN] Completed servi
ce synchronization, ready to provide service.
Mar 22 12:39:21 lady3jane.tc.redhat.com crmd[4840]: notice: crm_update_peer_stat
e: pcmk_quorum_notification: Node hideo.tc.redhat.com[1] - state is now member (
was lost)
Mar 22 12:39:21 lady3jane.tc.redhat.com pacemakerd[4834]: notice: crm_update_pee
r_state: pcmk_quorum_notification: Node hideo.tc.redhat.com[1] - state is now me
mber (was lost)
Mar 22 12:40:01 lady3jane.tc.redhat.com systemd[1]: Starting Session 136 of user

redhat.

Configure resources

redhat.

Create Resources

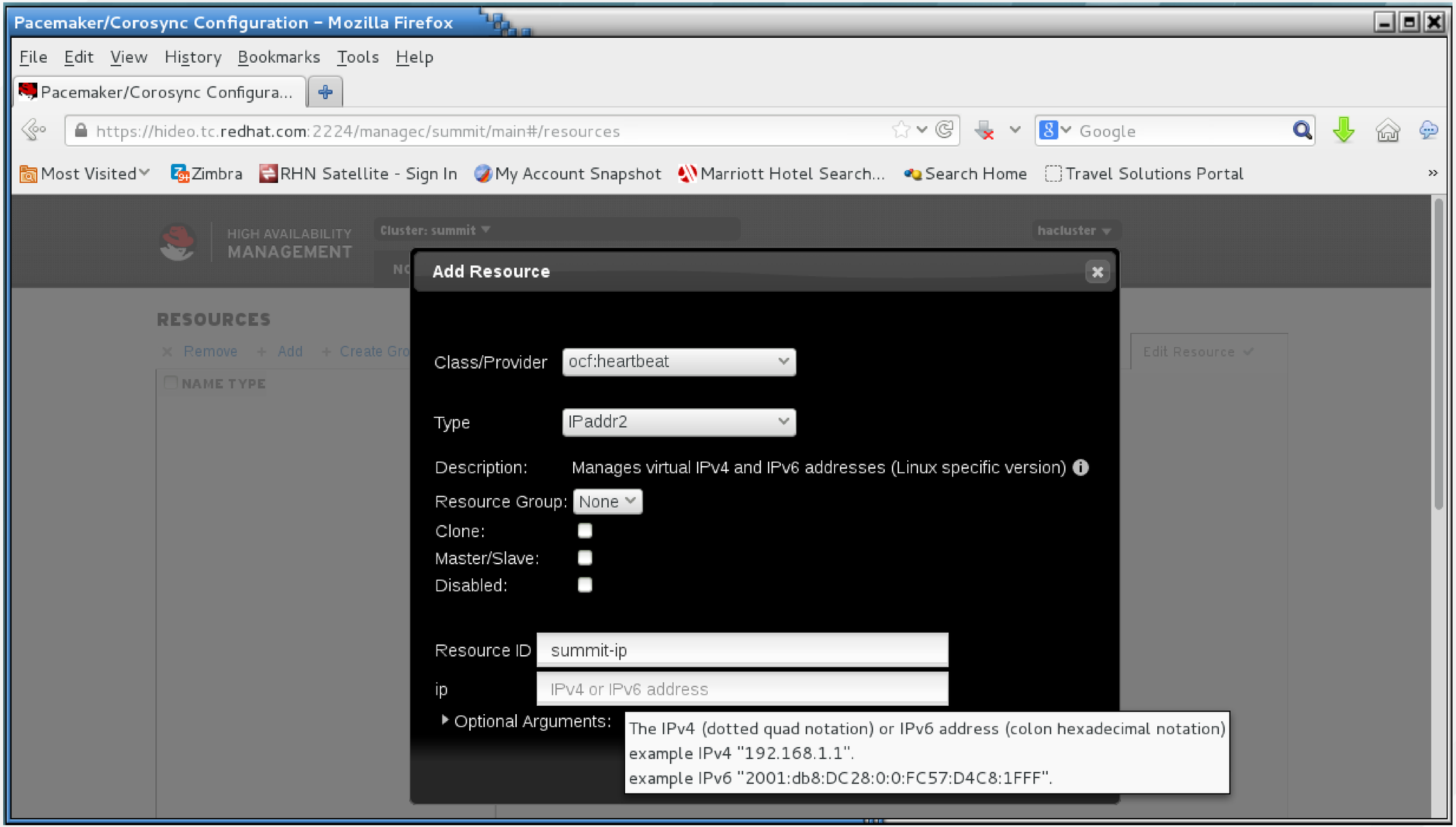
- We'll start out very simple: with an Apache web server instance which does not use shared storage. We'll add in shared storage later.
- There will be two components we need to define:
  - The floating IP address
  - The apache server

redhat.

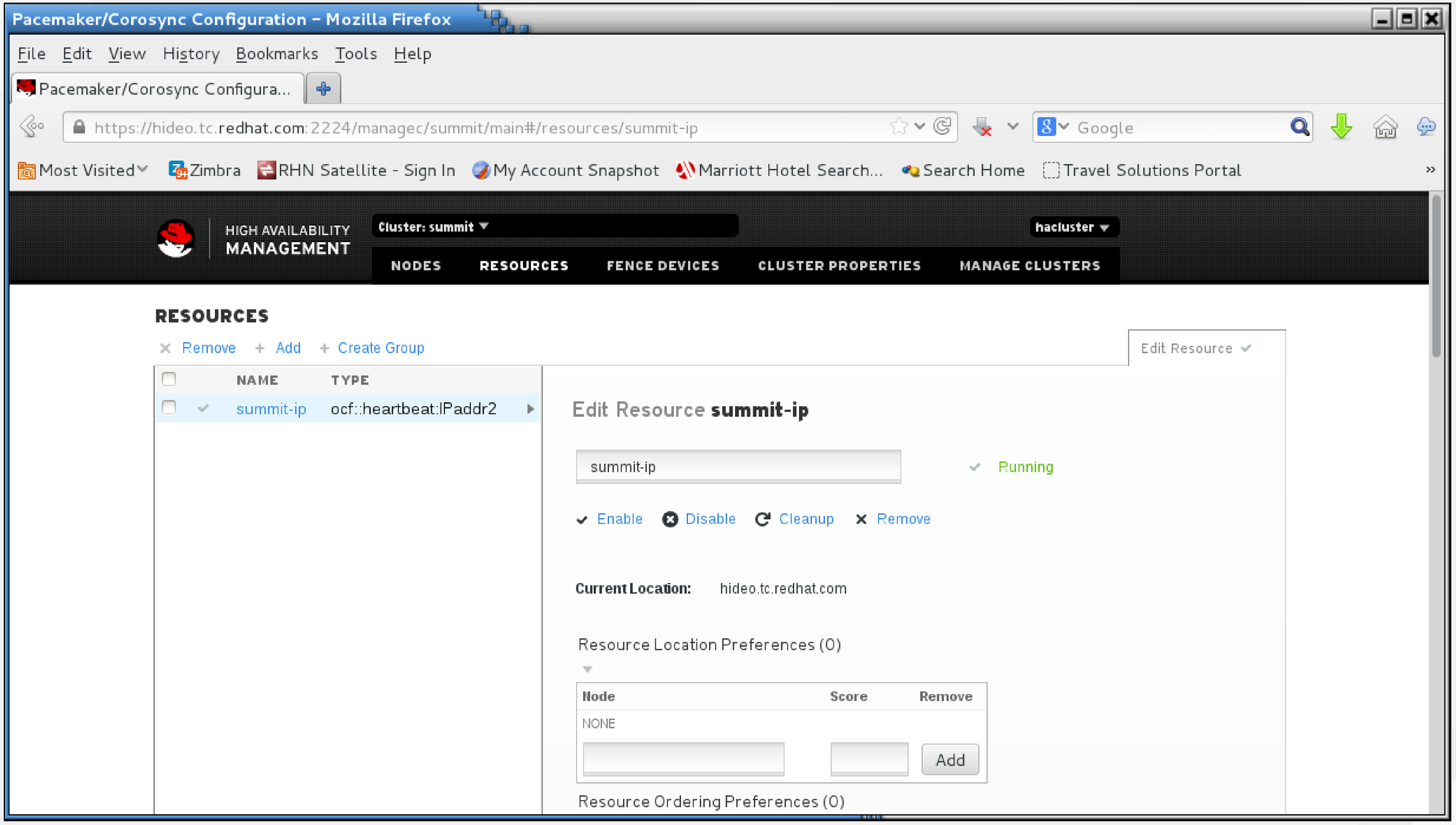
Configure the floating IP address

- Choose Add
- Choose Open Cluster Framework (OCF) heartbeat Class/Provider
- Choose IPaddr2 (this is new, and Linux specific, don't use the old IPaddr) type
- Give it a Resource ID (friendly name)
- Assign the IP address
- Note that you get context-sensitive hover help!

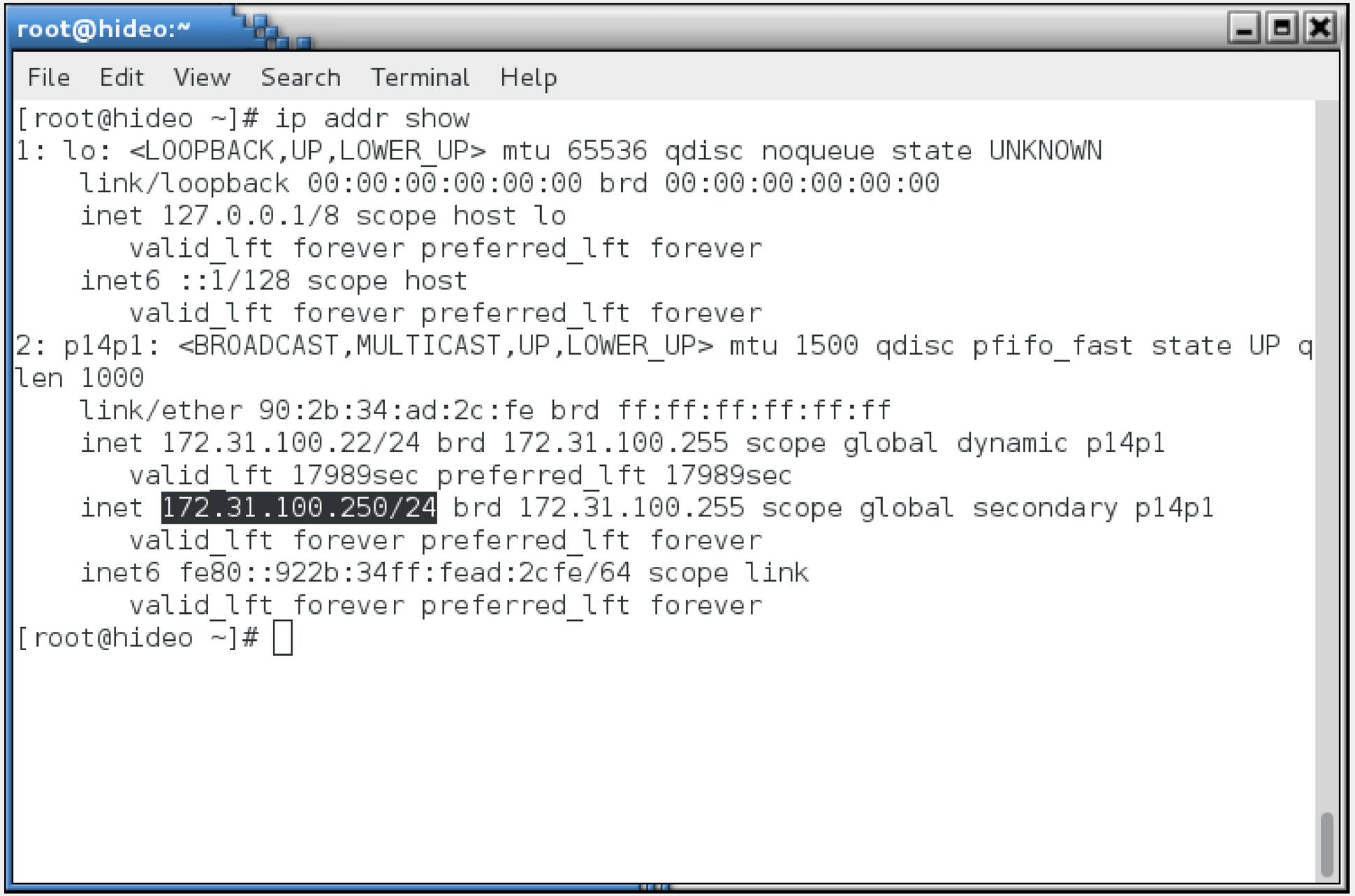
redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY MANAGEMENT
Cluster: summit
hacluster
RESOURCES
Remove
Add
NAME TYPE
Edit Resource
Add Resource
Class/Provider
ocf:heartbeat
Type
IPaddr2
Description:
Manages virtual IPv4 and IPv6 addresses (Linux specific version)
Resource Group:
None
Clone:
Master/Slave:
Disabled:
Resource ID
summit-ip
ip
IPv4 or IPv6 address
Optional Arguments:
The IPv4 (dotted quad notation) or IPv6 address (colon hexadecimal notation)
example IPv4 "192.168.1.1".
example IPv6 "2001:db8:DC28:0:0:FC57:D4C8:1FFF".

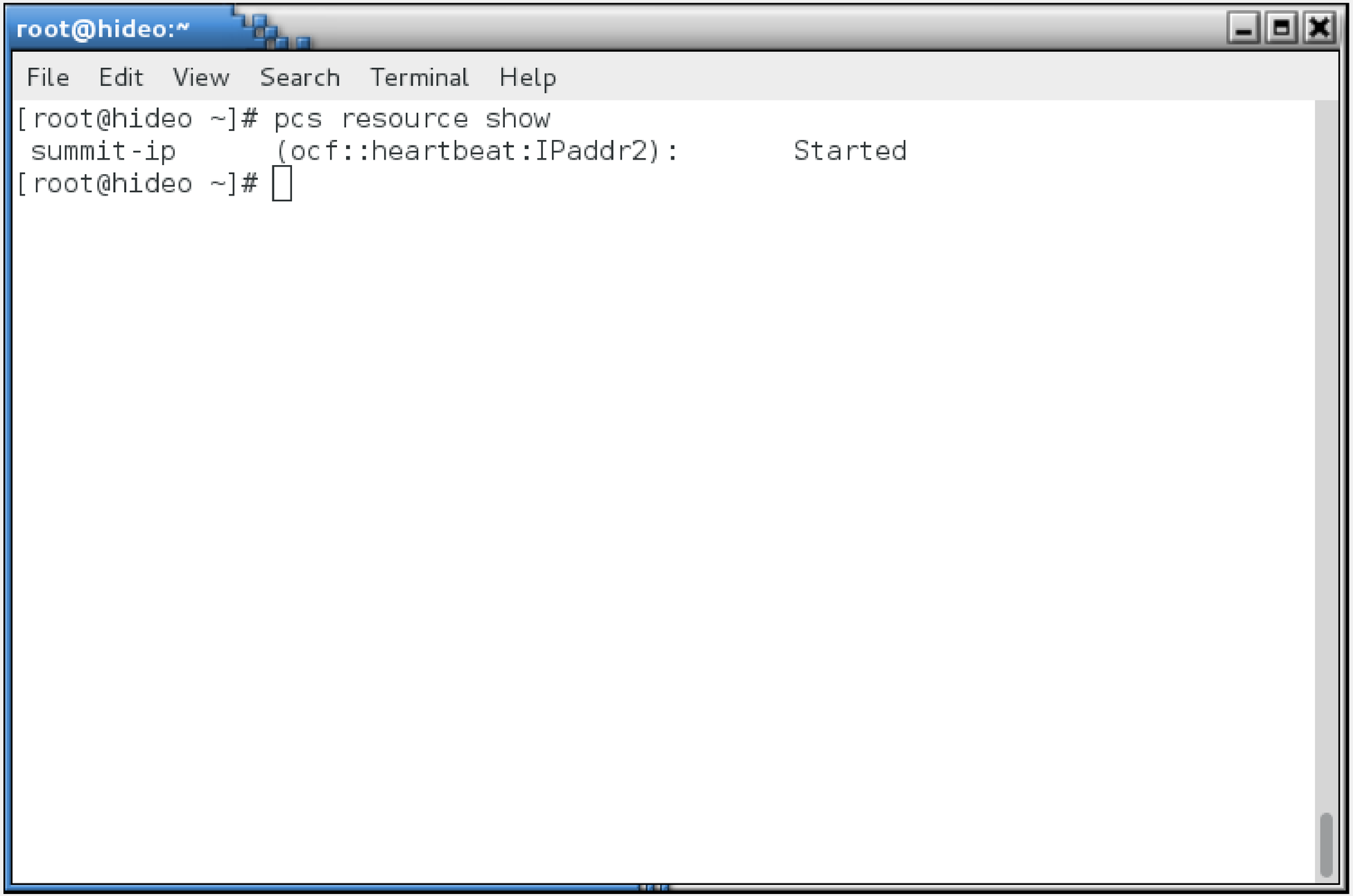
redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-ip
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY MANAGEMENT
Cluster: summit
hacluster
NODES
RESOURCES
FENCE DEVICES
CLUSTER PROPERTIES
MANAGE CLUSTERS
RESOURCES
Remove
Add
Create Group
Edit Resource
NAME
TYPE
summit-ip
ocf::heartbeat:IPaddr2
Edit Resource summit-ip
summit-ip
Running
Enable
Disable
Cleanup
Remove
Current Location:
hideo.tc.redhat.com
Resource Location Preferences (0)
Node
Score
Remove
NONE
Add
Resource Ordering Preferences (0)

redhat.


root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN
link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
inet 127.0.0.1/8 scope host lo
valid_lft forever preferred_lft forever
inet6 ::1/128 scope host
valid_lft forever preferred_lft forever
2: p14p1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP q
len 1000
link/ether 90:2b:34:ad:2c:fe brd ff:ff:ff:ff:ff:ff
inet 172.31.100.22/24 brd 172.31.100.255 scope global dynamic p14p1
valid_lft 17989sec preferred_lft 17989sec
inet 172.31.100.250/24 brd 172.31.100.255 scope global secondary p14p1
valid_lft forever preferred_lft forever
inet6 fe80::922b:34ff:fead:2cfe/64 scope link
valid_lft forever preferred_lft forever
[root@hideo ~]#

redhat.

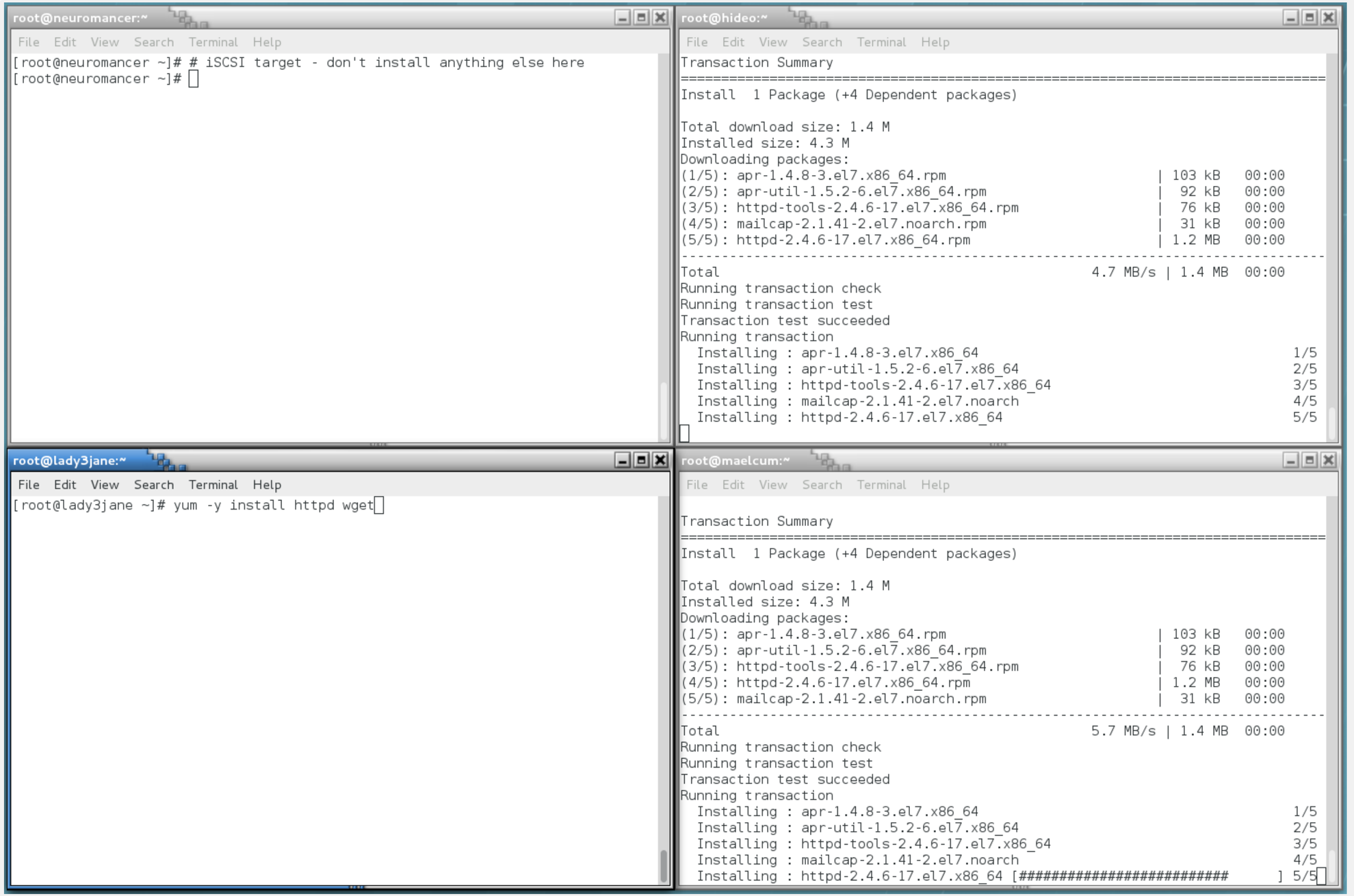

root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# pcs resource show
summit-ip (ocf::heartbeat:IPaddr2): Started
[root@hideo ~]#

redhat.

Install httpd and wget on all the nodes

- yum -y install httpd wget

redhat.


root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# # iSCSI target - don't install anything else here
[root@neuromancer ~]#
root@hideo:~
File Edit View Search Terminal Help
Transaction Summary
Install 1 Package (+4 Dependent packages)
Total download size: 1.4 M
Installed size: 4.3 M
Downloading packages:
(1/5): apr-1.4.8-3.el7.x86_64.rpm | 103 kB 00:00
(2/5): apr-util-1.5.2-6.el7.x86_64.rpm | 92 kB 00:00
(3/5): httpd-tools-2.4.6-17.el7.x86_64.rpm | 76 kB 00:00
(4/5): mailcap-2.1.41-2.el7.noarch.rpm | 31 kB 00:00
(5/5): httpd-2.4.6-17.el7.x86_64.rpm | 1.2 MB 00:00
Total 4.7 MB/s | 1.4 MB 00:00
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
Installing : apr-1.4.8-3.el7.x86_64 1/5
Installing : apr-util-1.5.2-6.el7.x86_64 2/5
Installing : httpd-tools-2.4.6-17.el7.x86_64 3/5
Installing : mailcap-2.1.41-2.el7.noarch 4/5
Installing : httpd-2.4.6-17.el7.x86_64 5/5
root@lady3jane:~
File Edit View Search Terminal Help
[root@lady3jane ~]# yum -y install httpd wget
root@maelcum:~
File Edit View Search Terminal Help
Transaction Summary
Install 1 Package (+4 Dependent packages)
Total download size: 1.4 M
Installed size: 4.3 M
Downloading packages:
(1/5): apr-1.4.8-3.el7.x86_64.rpm | 103 kB 00:00
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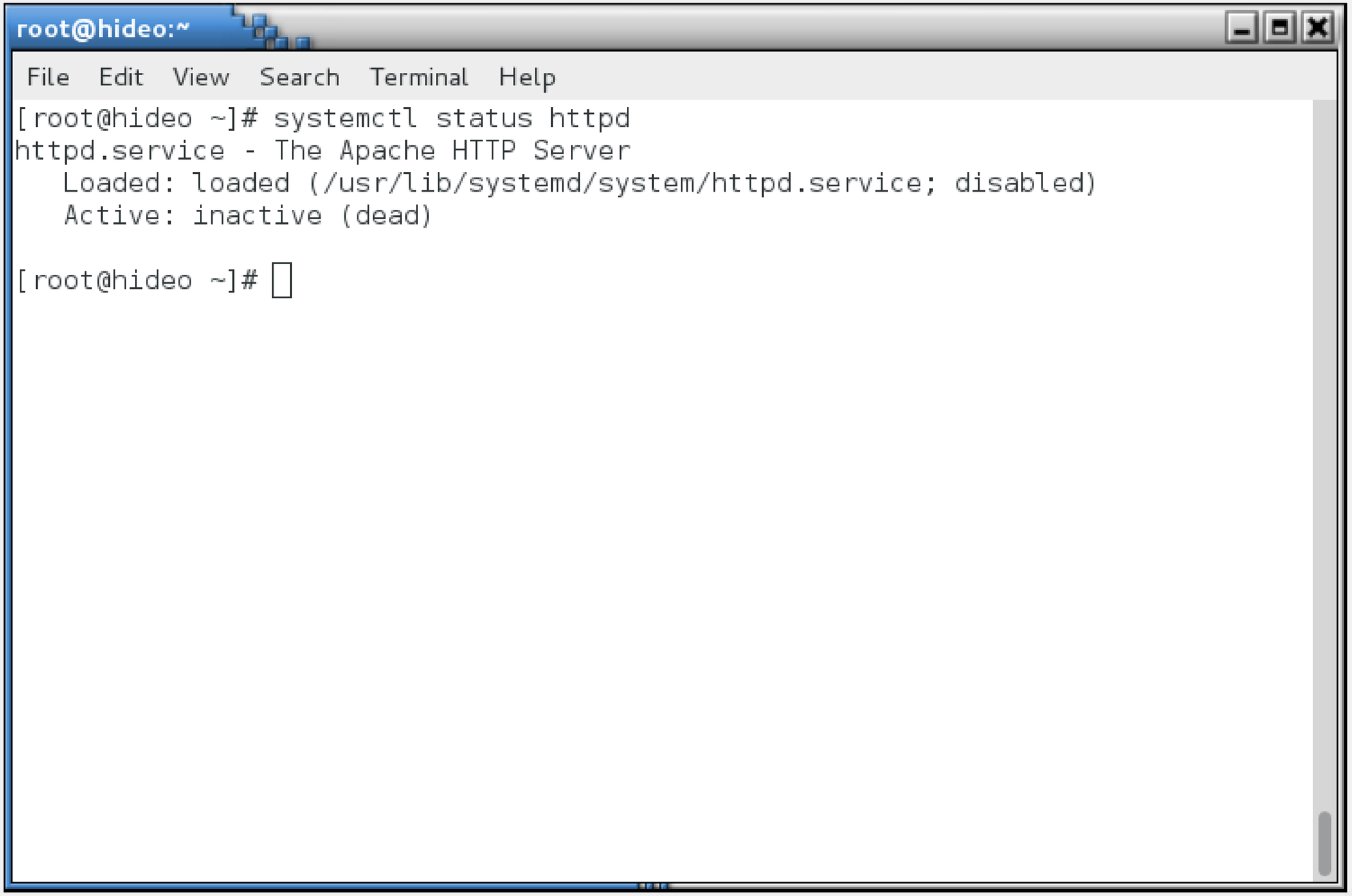
(3/5): httpd-tools-2.4.6-17.el7.x86_64.rpm | 76 kB 00:00
(4/5): httpd-2.4.6-17.el7.x86_64.rpm | 1.2 MB 00:00
(5/5): mailcap-2.1.41-2.el7.noarch.rpm | 31 kB 00:00
Total 5.7 MB/s | 1.4 MB 00:00
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
Installing : apr-1.4.8-3.el7.x86_64 1/5
Installing : apr-util-1.5.2-6.el7.x86_64 2/5
Installing : httpd-tools-2.4.6-17.el7.x86_64 3/5
Installing : mailcap-2.1.41-2.el7.noarch 4/5
Installing : httpd-2.4.6-17.el7.x86_64 [##########################] 5/5

redhat.

Install httpd and wget on all the nodes

- Confirm that httpd is disabled - we want it started by the cluster software, not at boot time!

redhat.

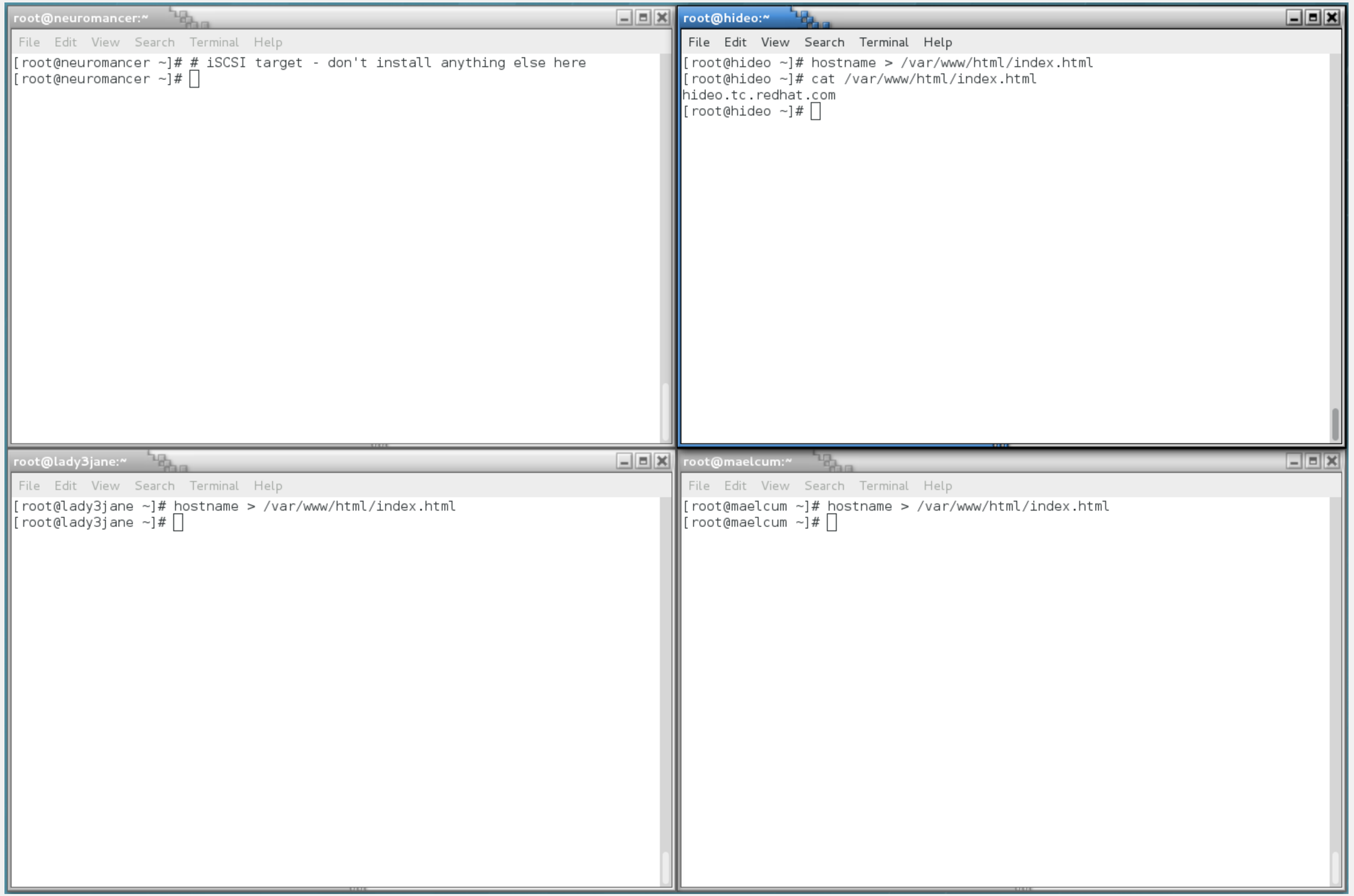

root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# systemctl status httpd
httpd.service - The Apache HTTP Server
Loaded: loaded (/usr/lib/systemd/system/httpd.service; disabled)
Active: inactive (dead)
[root@hideo ~]#

redhat.

Configure the Apache service

- For testing, echo the hostname into index.html on each node:
  - hostname > /var/www/html/index.html

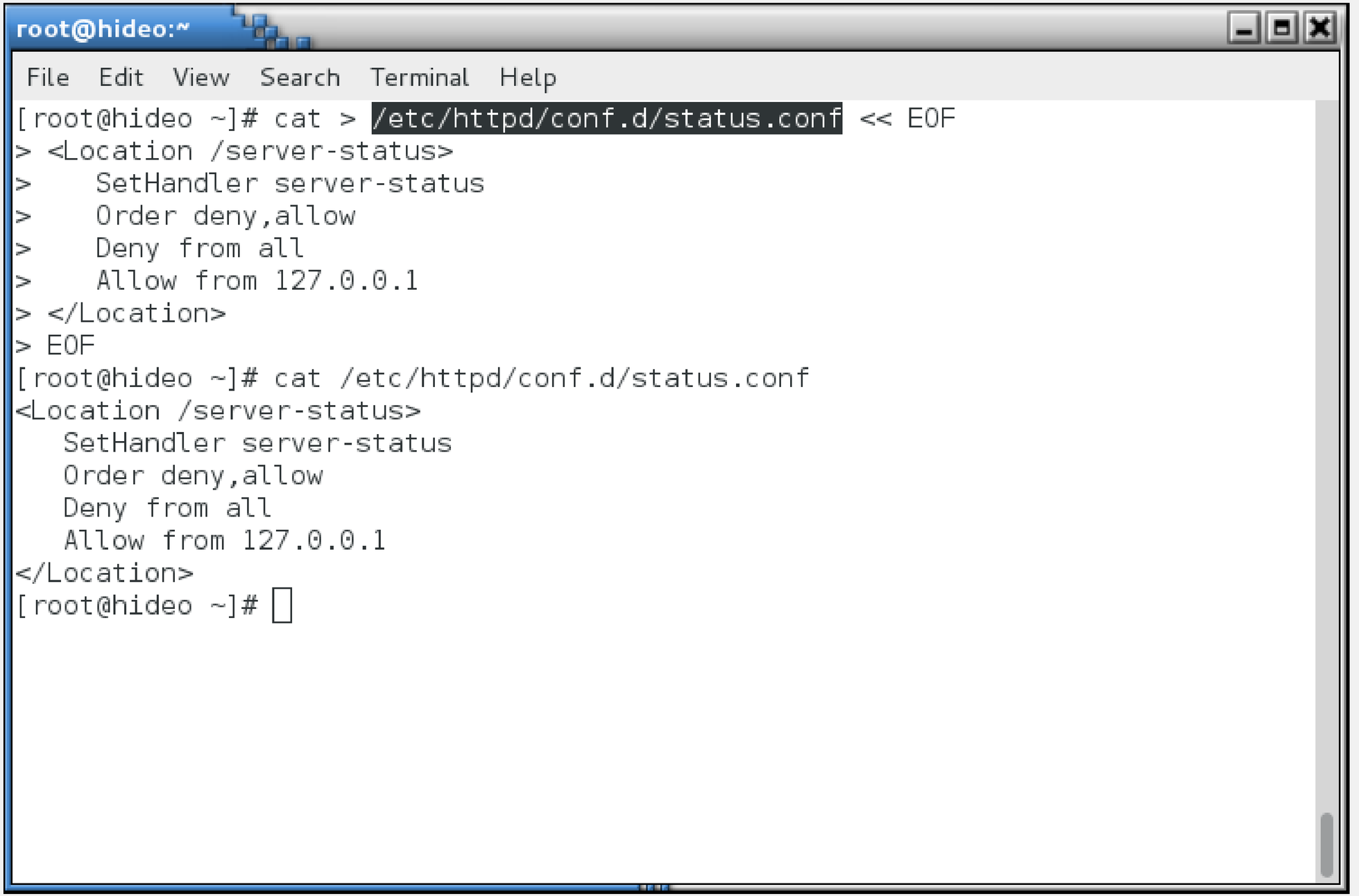
redhat.


root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# # iSCSI target - don't install anything else here
[root@neuromancer ~]#
root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# hostname > /var/www/html/index.html
[root@hideo ~]# cat /var/www/html/index.html
hideo.tc.redhat.com
[root@hideo ~]#
root@lady3jane:~
File Edit View Search Terminal Help
[root@lady3jane ~]# hostname > /var/www/html/index.html
[root@lady3jane ~]#
root@maelcum:~
File Edit View Search Terminal Help
[root@maelcum ~]# hostname > /var/www/html/index.html
[root@maelcum ~]#

Enable Apache monitoring

```
cat > /etc/httpd/conf.d/status.conf << EOF
<Location /server-status>
   SetHandler server-status
   Order deny,allow
   Deny from all
   Allow from 127.0.0.1
</Location>
EOF
```


redhat.

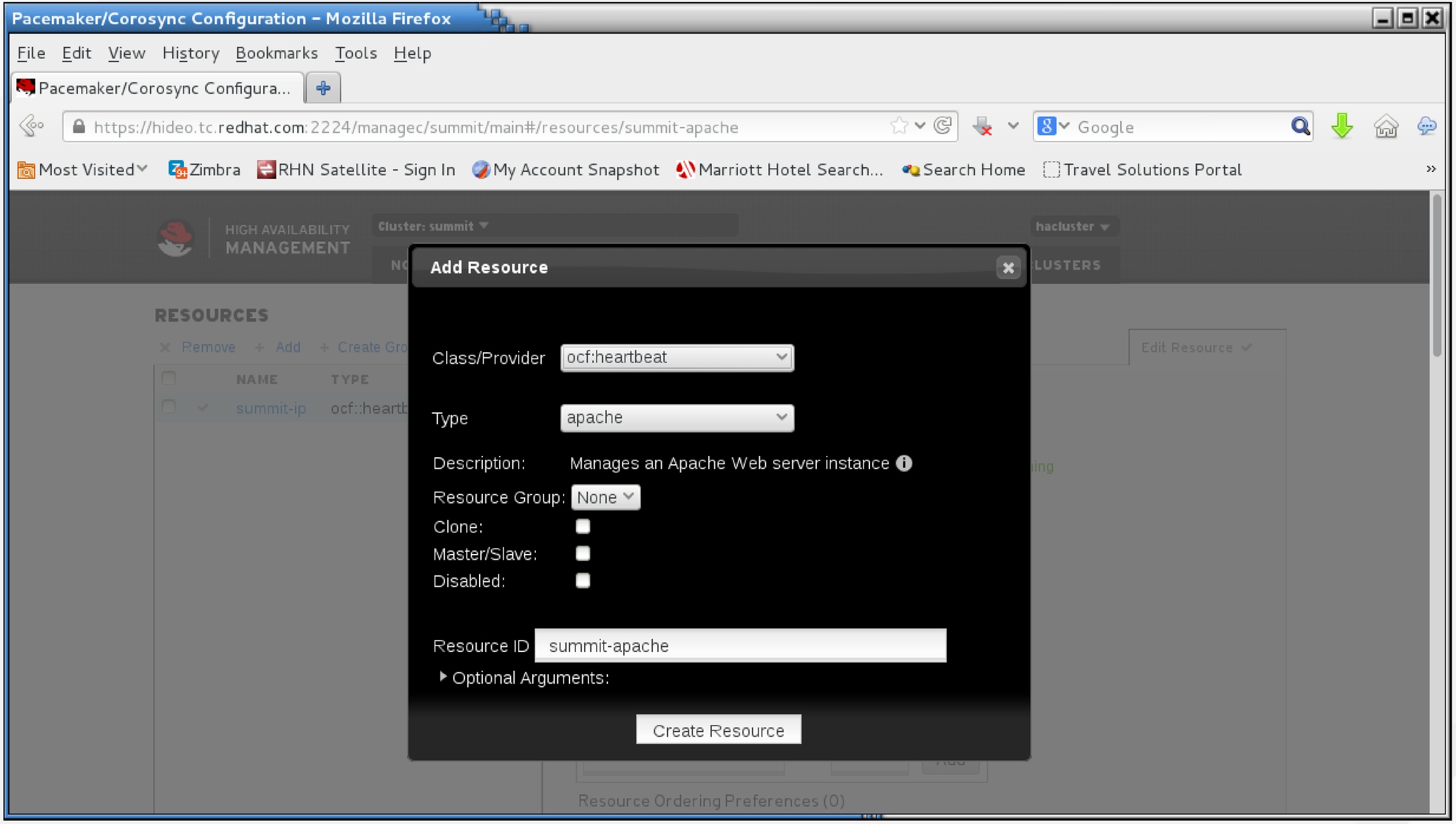

root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# cat > /etc/httpd/conf.d/status.conf << EOF
> <Location /server-status>
>   SetHandler server-status
>   Order deny,allow
>   Deny from all
>   Allow from 127.0.0.1
> </Location>
> EOF
[root@hideo ~]# cat /etc/httpd/conf.d/status.conf
<Location /server-status>
   SetHandler server-status
   Order deny,allow
   Deny from all
   Allow from 127.0.0.1
</Location>
[root@hideo ~]#

redhat.

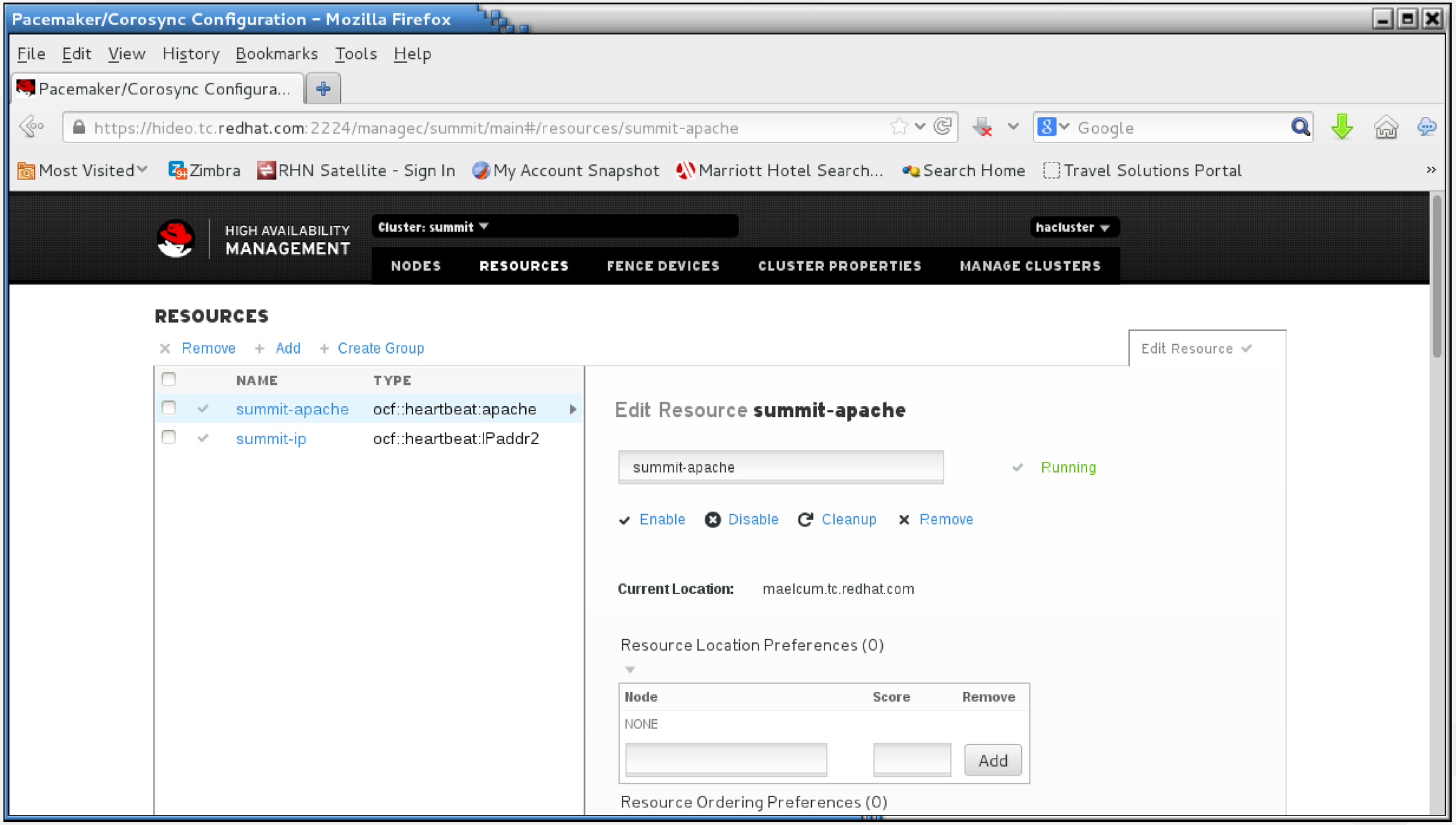
Configure the Apache service

- Choose Add
- Choose Open Cluster Framework (OCF) heartbeat Class/Provider
- Choose the apache type
- Give it a Resource ID (friendly name)

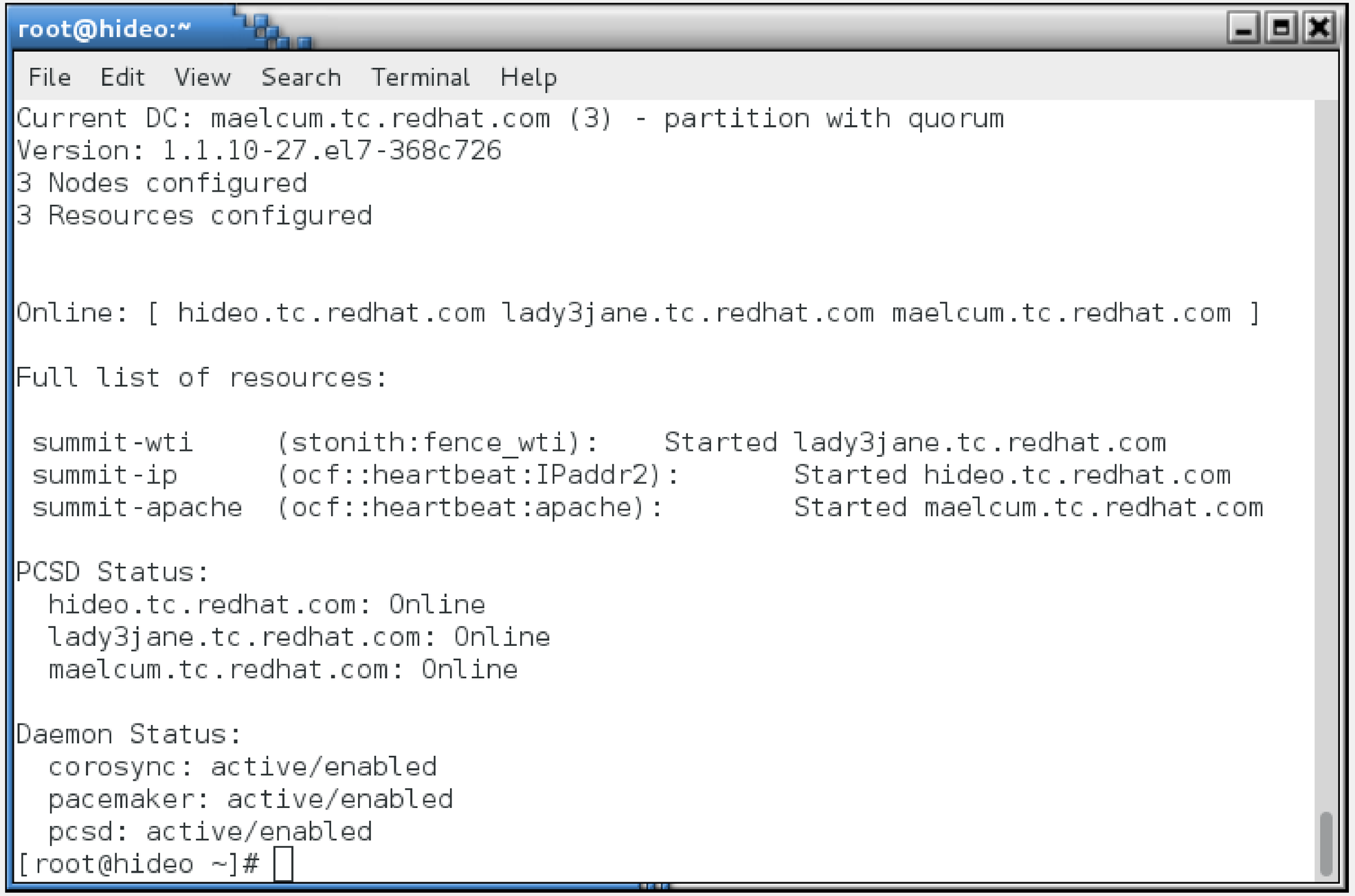
redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-apache
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY MANAGEMENT
Cluster: summit
hacluster
RESOURCES
Remove
Add
NAME
TYPE
summit-ip
Edit Resource
Resource Ordering Preferences (0)
Add Resource
Class/Provider
ocf:heartbeat
Type
apache
Description:
Manages an Apache Web server instance
Resource Group:
None
Clone:
Master/Slave:
Disabled:
Resource ID
summit-apache
Optional Arguments:
Create Resource

redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-apache
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY MANAGEMENT
Cluster: summit
hacluster
NODES
RESOURCES
FENCE DEVICES
CLUSTER PROPERTIES
MANAGE CLUSTERS
RESOURCES
Remove
Add
Create Group
Edit Resource
NAME
TYPE
summit-apache
ocf::heartbeat:apache
summit-ip
ocf::heartbeat:IPaddr2
Edit Resource summit-apache
summit-apache
Running
Enable
Disable
Cleanup
Remove
Current Location:
maelcum.tc.redhat.com
Resource Location Preferences (0)
Node
Score
Remove
NONE
Add
Resource Ordering Preferences (0)

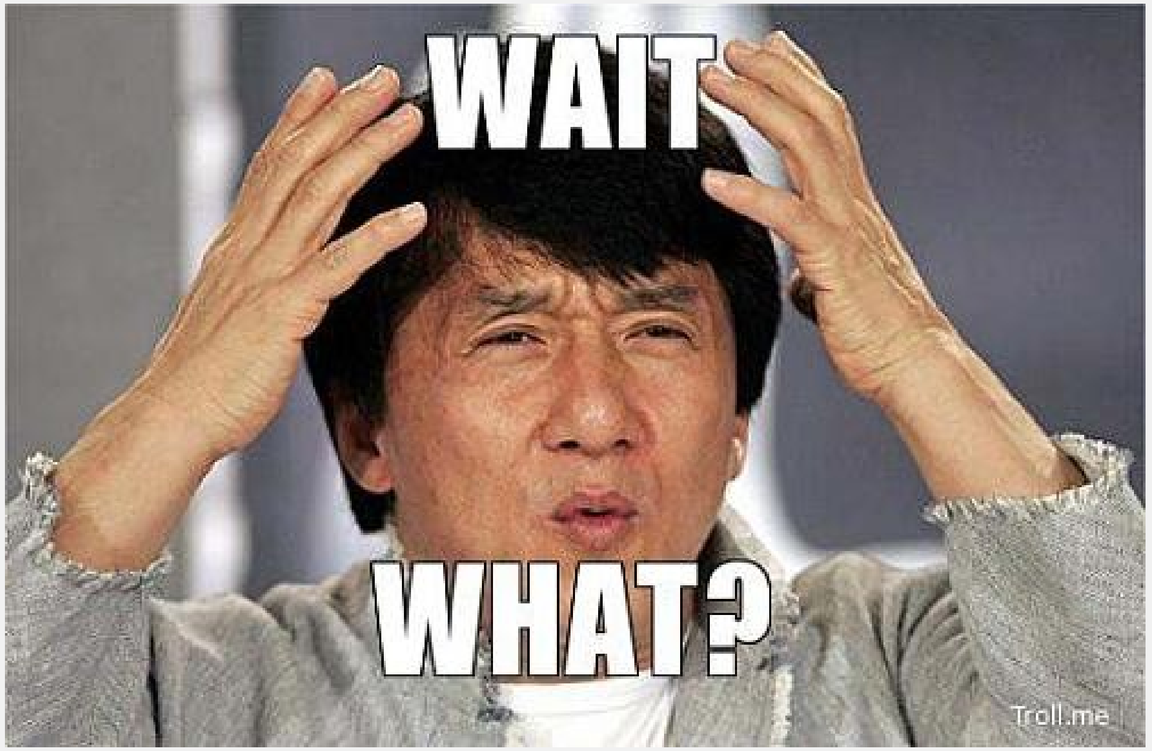
redhat.


root@hideo:~
File Edit View Search Terminal Help
Current DC: maelcum.tc.redhat.com (3) - partition with quorum
Version: 1.1.10-27.el7-368c726
3 Nodes configured
3 Resources configured
Online: [hideo.tc.redhat.com lady3jane.tc.redhat.com maelcum.tc.redhat.com]
Full list of resources:
summit-wti (stonith:fence_wti): Started lady3jane.tc.redhat.com
summit-ip (ocf::heartbeat:IPaddr2): Started hideo.tc.redhat.com
summit-apache (ocf::heartbeat:apache): Started maelcum.tc.redhat.com
PCSD Status:
hideo.tc.redhat.com: Online
lady3jane.tc.redhat.com: Online
maelcum.tc.redhat.com: Online
Daemon Status:
corosync: active/enabled
pacemaker: active/enabled
pcsd: active/enabled
[root@hideo ~]#

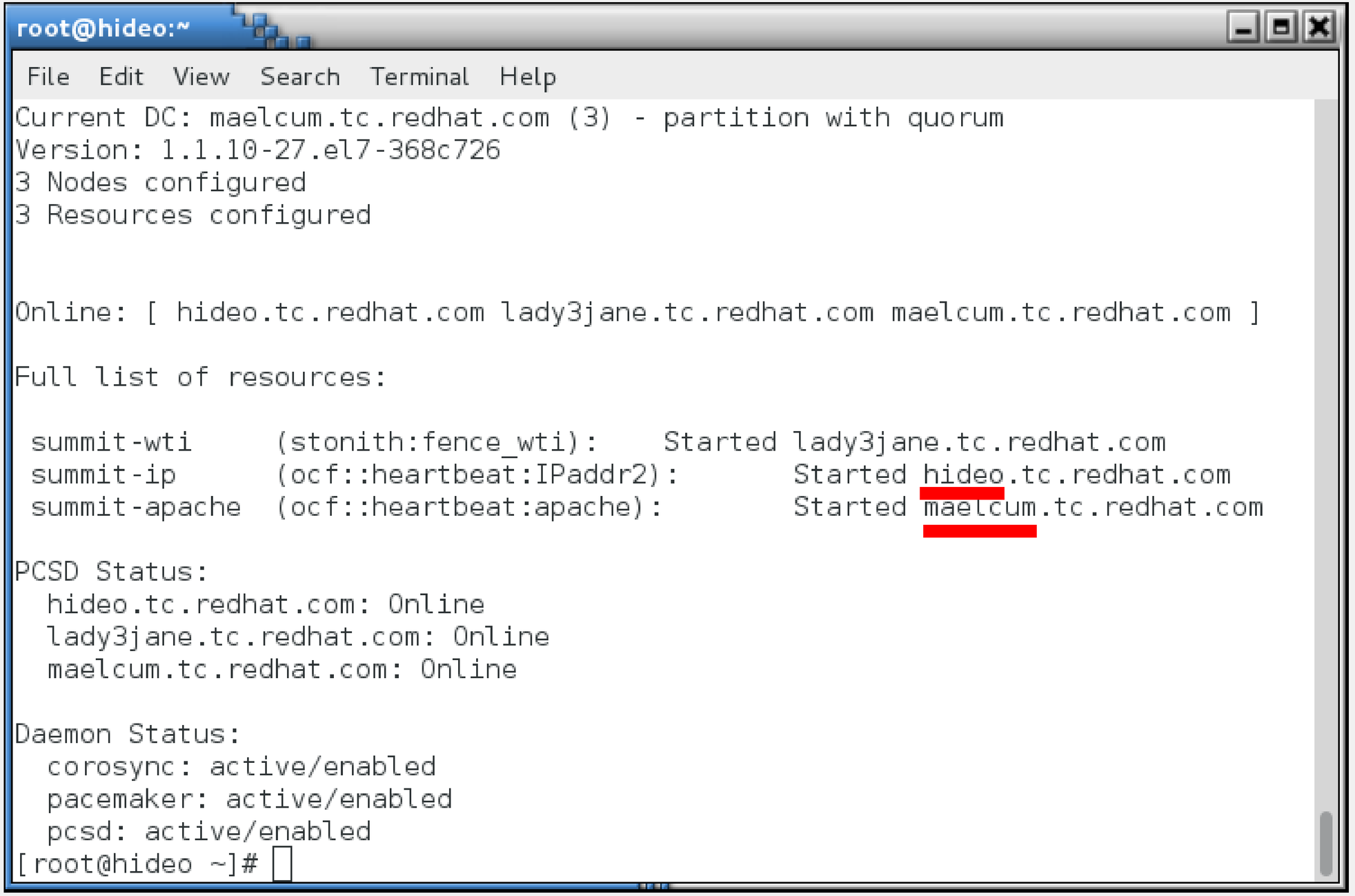
redhat.

Wait, what?

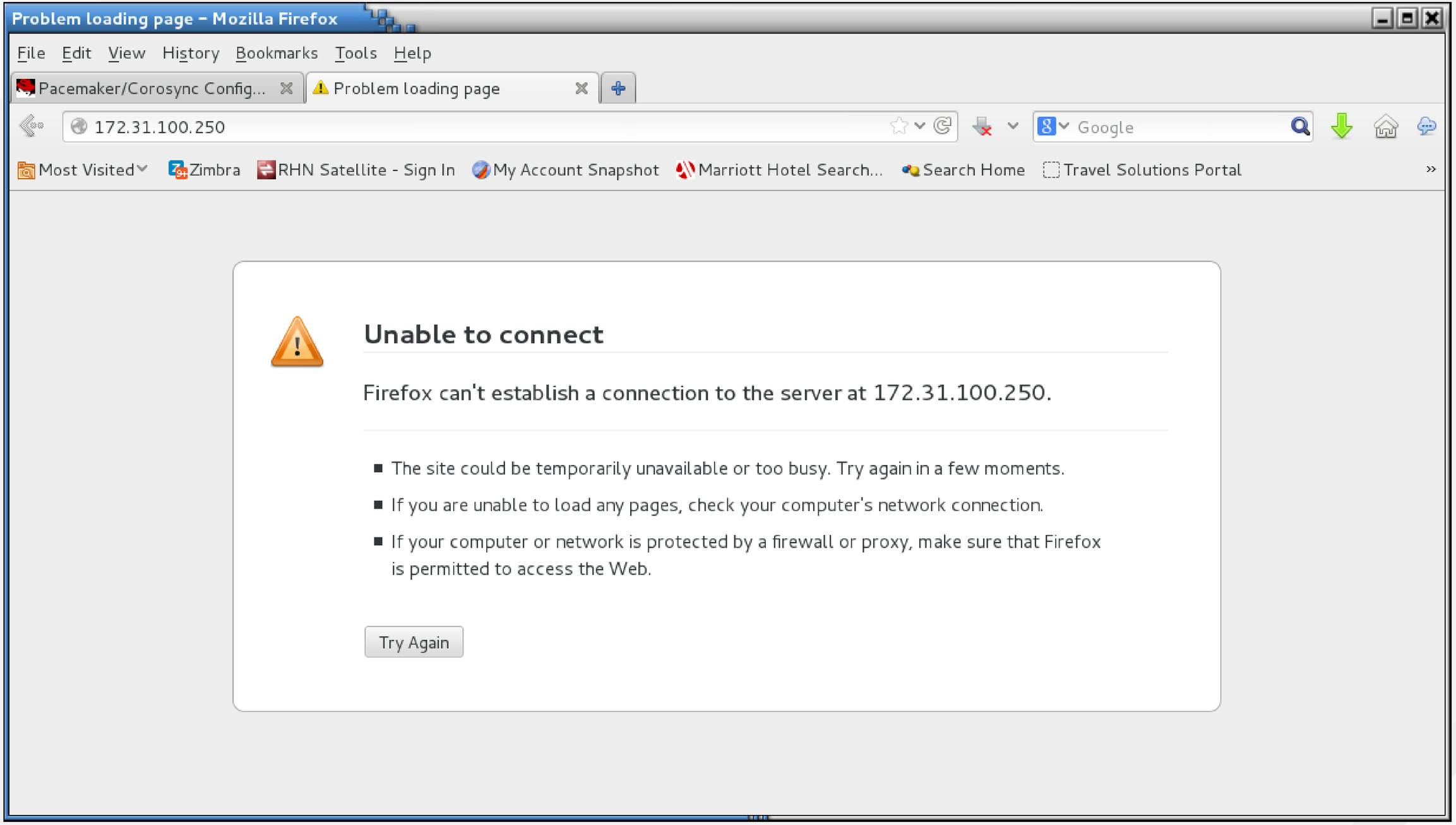
- You see anything wrong with this picture?



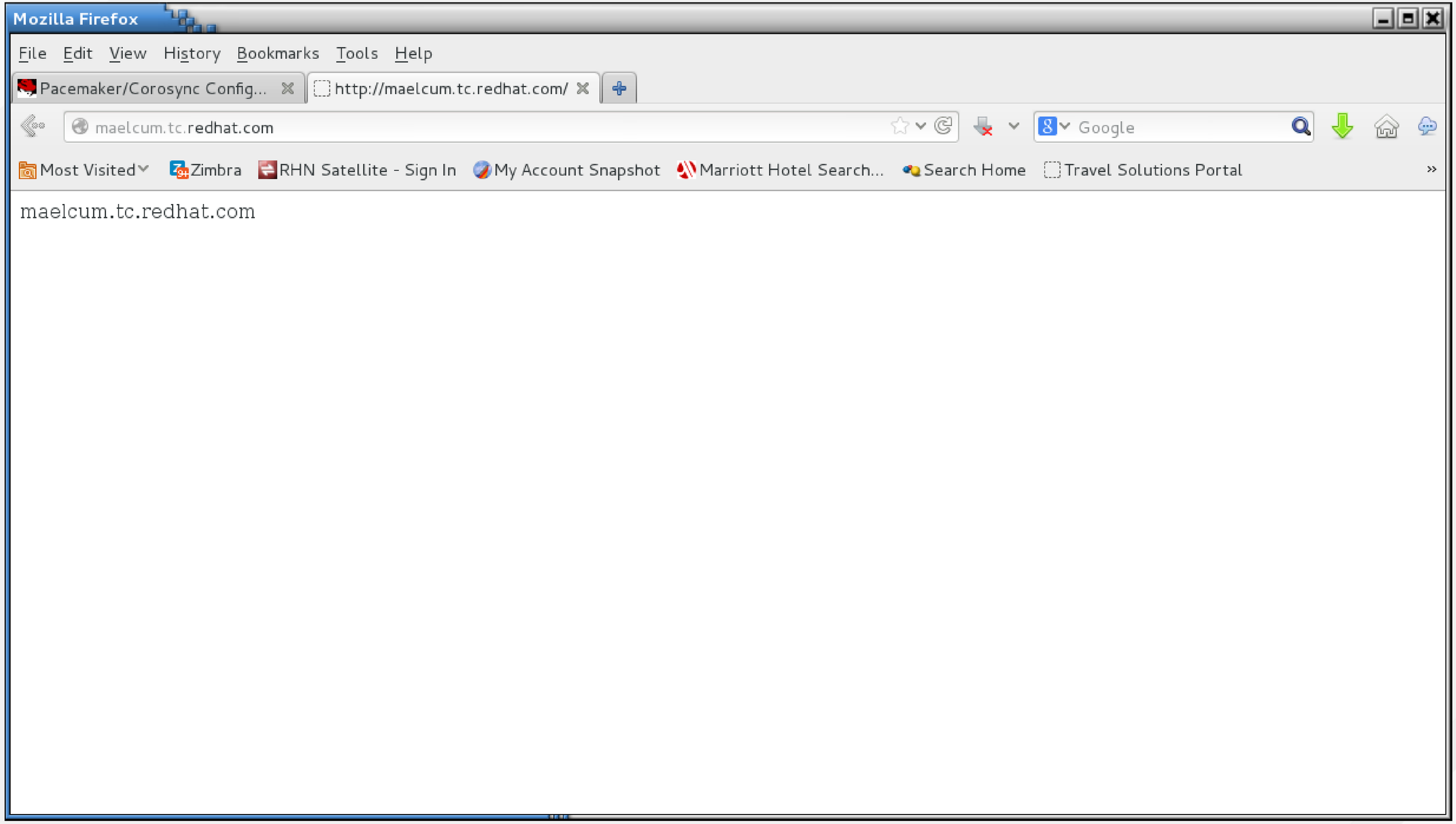
redhat.


root@hideo:~
File Edit View Search Terminal Help
Current DC: maelcum.tc.redhat.com (3) - partition with quorum
Version: 1.1.10-27.el7-368c726
3 Nodes configured
3 Resources configured
Online: [hideo.tc.redhat.com lady3jane.tc.redhat.com maelcum.tc.redhat.com]
Full list of resources:
summit-wti (stonith:fence_wti): Started lady3jane.tc.redhat.com
summit-ip (ocf::heartbeat:IPaddr2): Started hideo.tc.redhat.com
summit-apache (ocf::heartbeat:apache): Started maelcum.tc.redhat.com
PCSD Status:
hideo.tc.redhat.com: Online
lady3jane.tc.redhat.com: Online
maelcum.tc.redhat.com: Online
Daemon Status:
corosync: active/enabled
pacemaker: active/enabled
pcsd: active/enabled
[root@hideo ~]#

redhat.


Problem loading page – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Config...
Problem loading page
172.31.100.250
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
Unable to connect
Firefox can't establish a connection to the server at 172.31.100.250.
The site could be temporarily unavailable or too busy. Try again in a few moments.
If you are unable to load any pages, check your computer's network connection.
If your computer or network is protected by a firewall or proxy, make sure that Firefox is permitted to access the Web.
Try Again

redhat.


Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Config...
http://maelcum.tc.redhat.com/
maelcum.tc.redhat.com
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
maelcum.tc.redhat.com

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We need to set two resource features

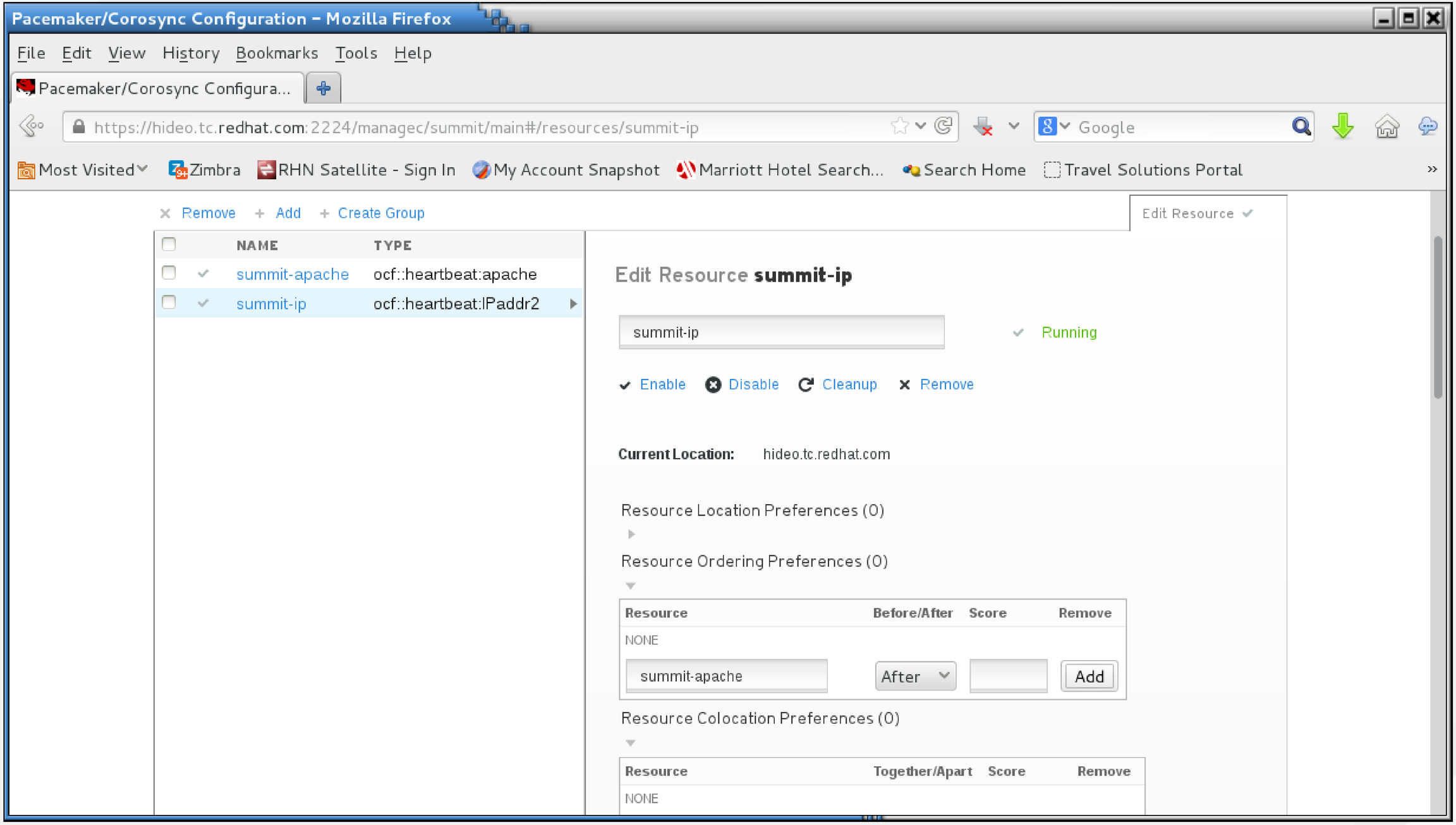
- Resource Ordering Preferences
- Resource Colocation Preferences

redhat.

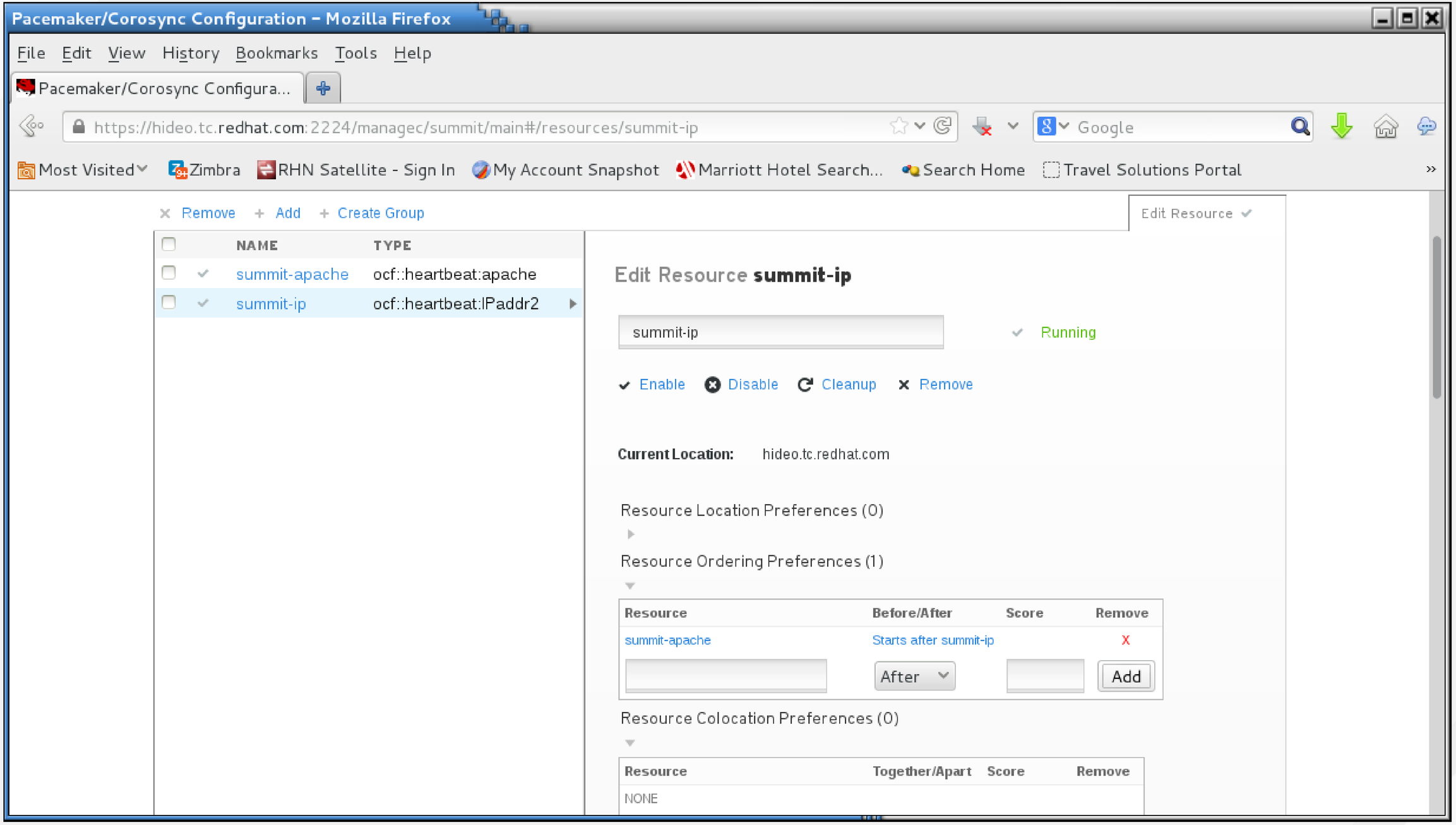
Resource Ordering Preferences

- Choose the summit-ip resource
- Go to Resource Ordering Preferences
- Add in the resource summit-apache
- Set summit-apache to start after summit-ip
- Click add

redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-ip
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
Remove
Add
Create Group
Edit Resource
NAME
TYPE
summit-apache
ocf::heartbeat:apache
summit-ip
ocf::heartbeat:IPaddr2
Edit Resource summit-ip
summit-ip
Running
Enable
Disable
Cleanup
Remove
Current Location:
hideo.tc.redhat.com
Resource Location Preferences (0)
Resource Ordering Preferences (0)
Resource
Before/After
Score
Remove
NONE
summit-apache
After
Add
Resource Colocation Preferences (0)
Resource
Together/Apart
Score
Remove
NONE

redhat.

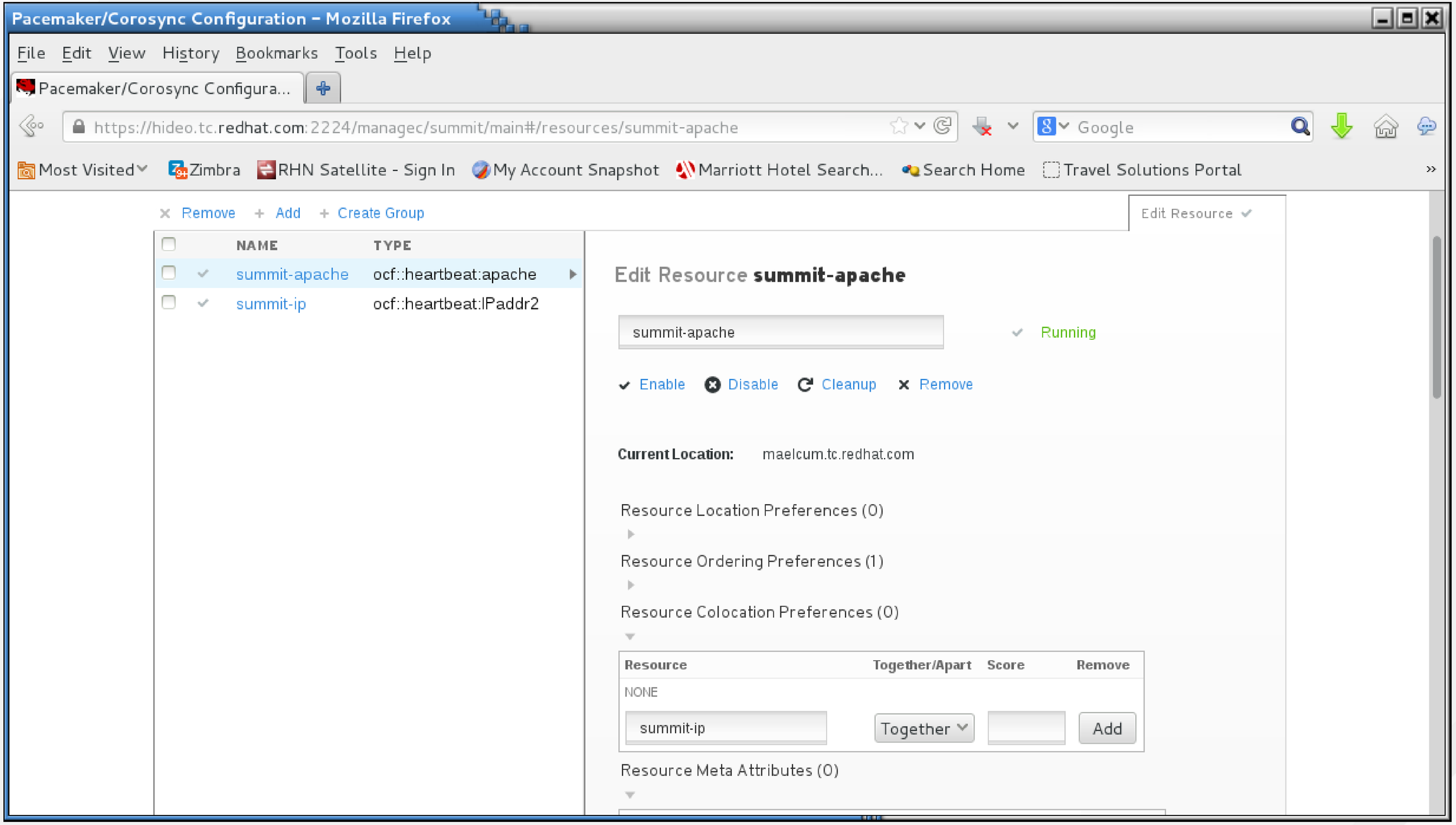

Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-ip
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
Remove
Add
Create Group
Edit Resource
NAME
TYPE
summit-apache
ocf::heartbeat:apache
summit-ip
ocf::heartbeat:IPaddr2
Edit Resource summit-ip
summit-ip
Running
Enable
Disable
Cleanup
Remove
Current Location:
hideo.tc.redhat.com
Resource Location Preferences (0)
Resource Ordering Preferences (1)
Resource
Before/After
Score
Remove
summit-apache
Starts after summit-ip
X
After
Add
Resource Colocation Preferences (0)
Resource
Together/Apart
Score
Remove
NONE

redhat.

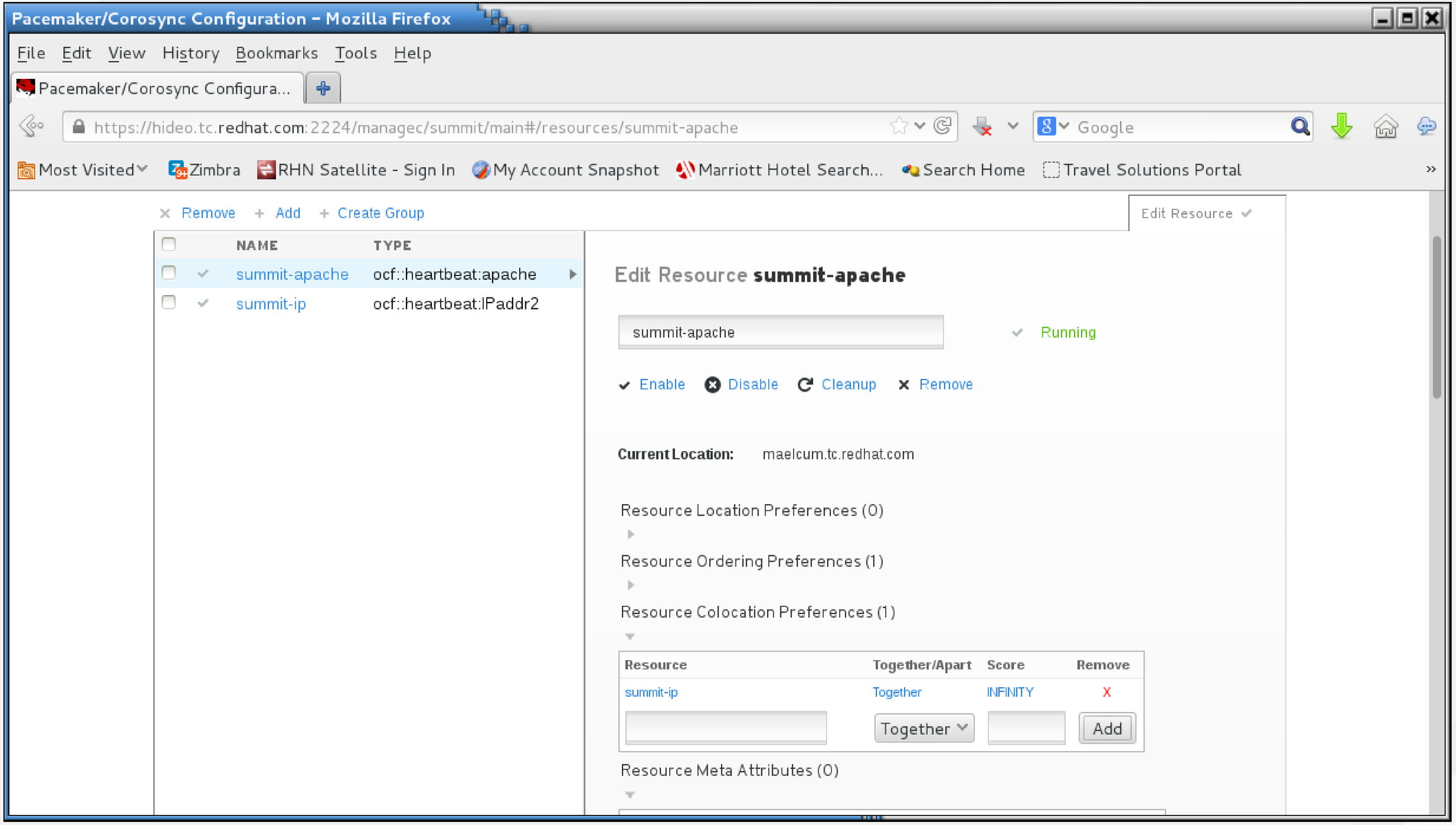
Resource Colocation Preferences

- Choose the summit-apache resource
- Choose Resource Colocation Preferences
- Enter summit-ip and set it to start together with summit-apache
- Click add

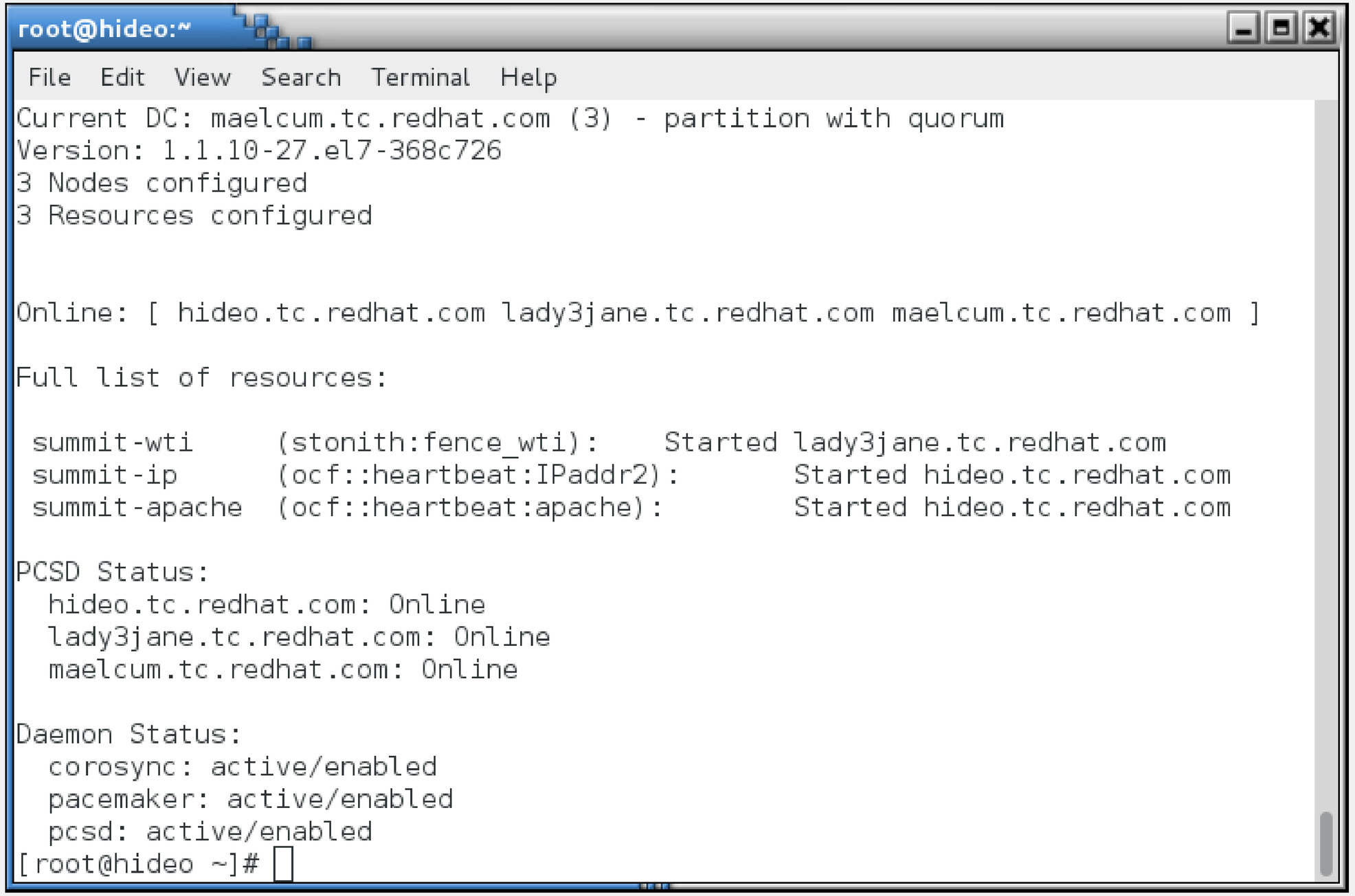
redhat.

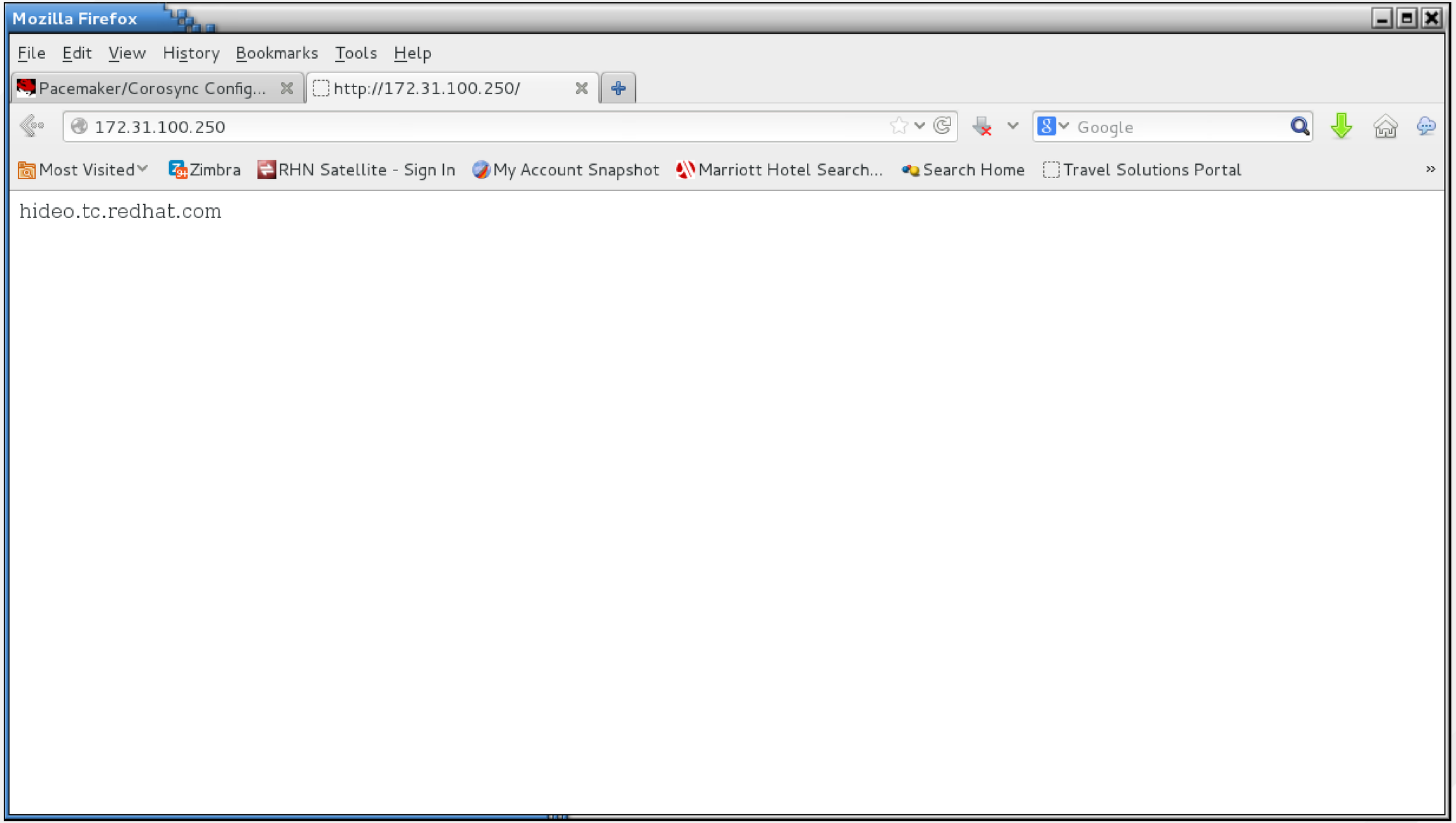

Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-apache
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
Remove
Add
Create Group
Edit Resource
NAME
TYPE
summit-apache
ocf::heartbeat:apache
summit-ip
ocf::heartbeat:IPaddr2
Edit Resource summit-apache
summit-apache
Running
Enable
Disable
Cleanup
Remove
Current Location:
maelcum.tc.redhat.com
Resource Location Preferences (0)
Resource Ordering Preferences (1)
Resource Colocation Preferences (0)
Resource
Together/Apart
Score
Remove
NONE
summit-ip
Together
Add
Resource Meta Attributes (0)

redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-apache
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
Remove
Add
Create Group
Edit Resource
NAME
TYPE
summit-apache
ocf::heartbeat:apache
summit-ip
ocf::heartbeat:IPaddr2
Edit Resource summit-apache
summit-apache
Running
Enable
Disable
Cleanup
Remove
Current Location:
maelcum.tc.redhat.com
Resource Location Preferences (0)
Resource Ordering Preferences (1)
Resource Colocation Preferences (1)
Resource
Together/Apart
Score
Remove
summit-ip
Together
INFINITY
X
Together
Add
Resource Meta Attributes (0)

redhat.


root@hideo:~
File Edit View Search Terminal Help
Current DC: maelcum.tc.redhat.com (3) - partition with quorum
Version: 1.1.10-27.el7-368c726
3 Nodes configured
3 Resources configured
Online: [hideo.tc.redhat.com lady3jane.tc.redhat.com maelcum.tc.redhat.com]
Full list of resources:
summit-wti (stonith:fence_wti): Started lady3jane.tc.redhat.com
summit-ip (ocf::heartbeat:IPaddr2): Started hideo.tc.redhat.com
summit-apache (ocf::heartbeat:apache): Started hideo.tc.redhat.com
PCSD Status:
hideo.tc.redhat.com: Online
lady3jane.tc.redhat.com: Online
maelcum.tc.redhat.com: Online
Daemon Status:
corosync: active/enabled
pacemaker: active/enabled
pcsd: active/enabled
[root@hideo ~]#

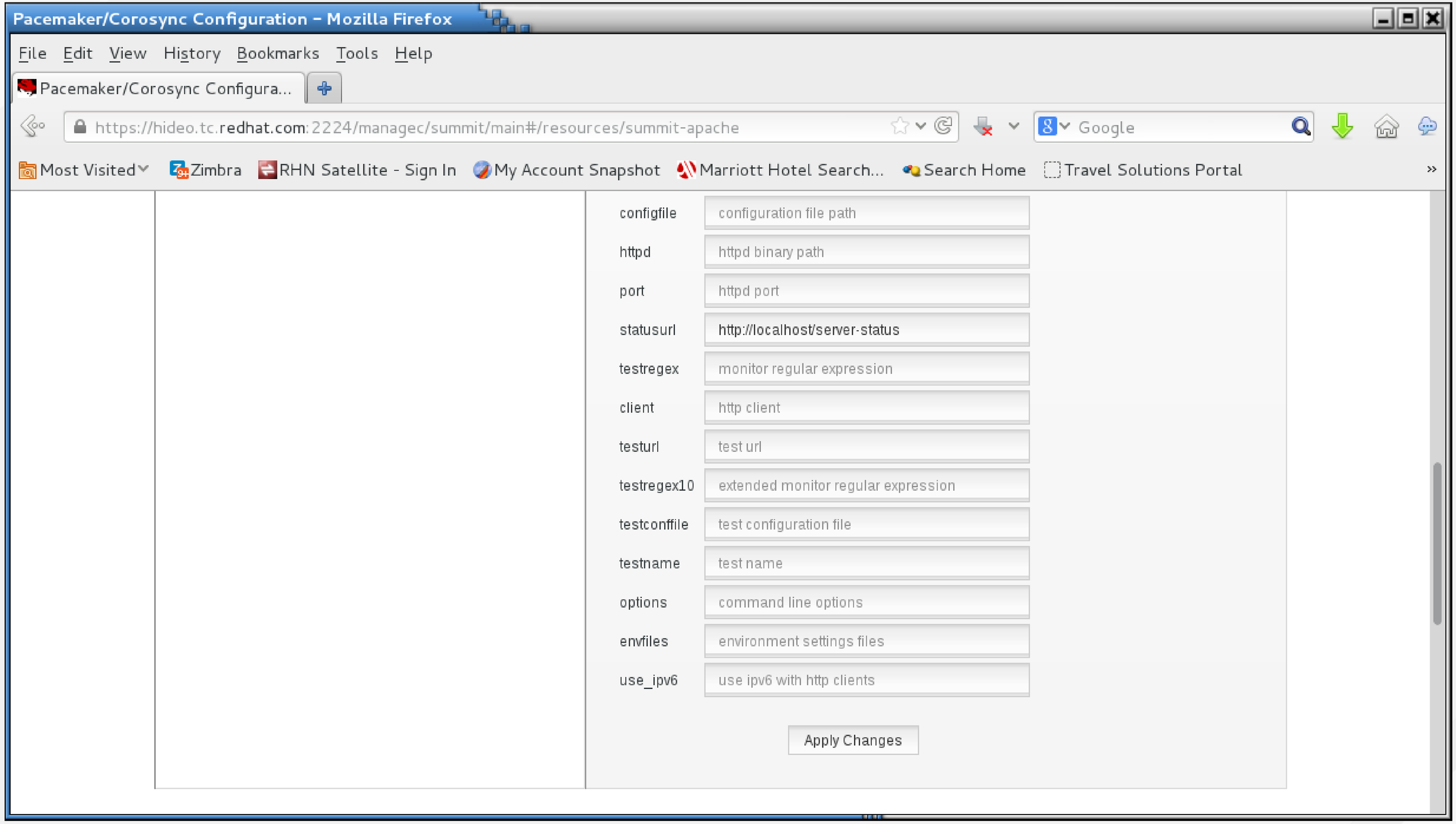

Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Config...
http://172.31.100.250/
172.31.100.250
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
hideo.tc.redhat.com

redhat.

Apache Monitoring

- Go into the summit-apache resource and choose Optional Arguments
- Because we set up monitoring, use the URL we defined - http://localhost/server-status

redhat.

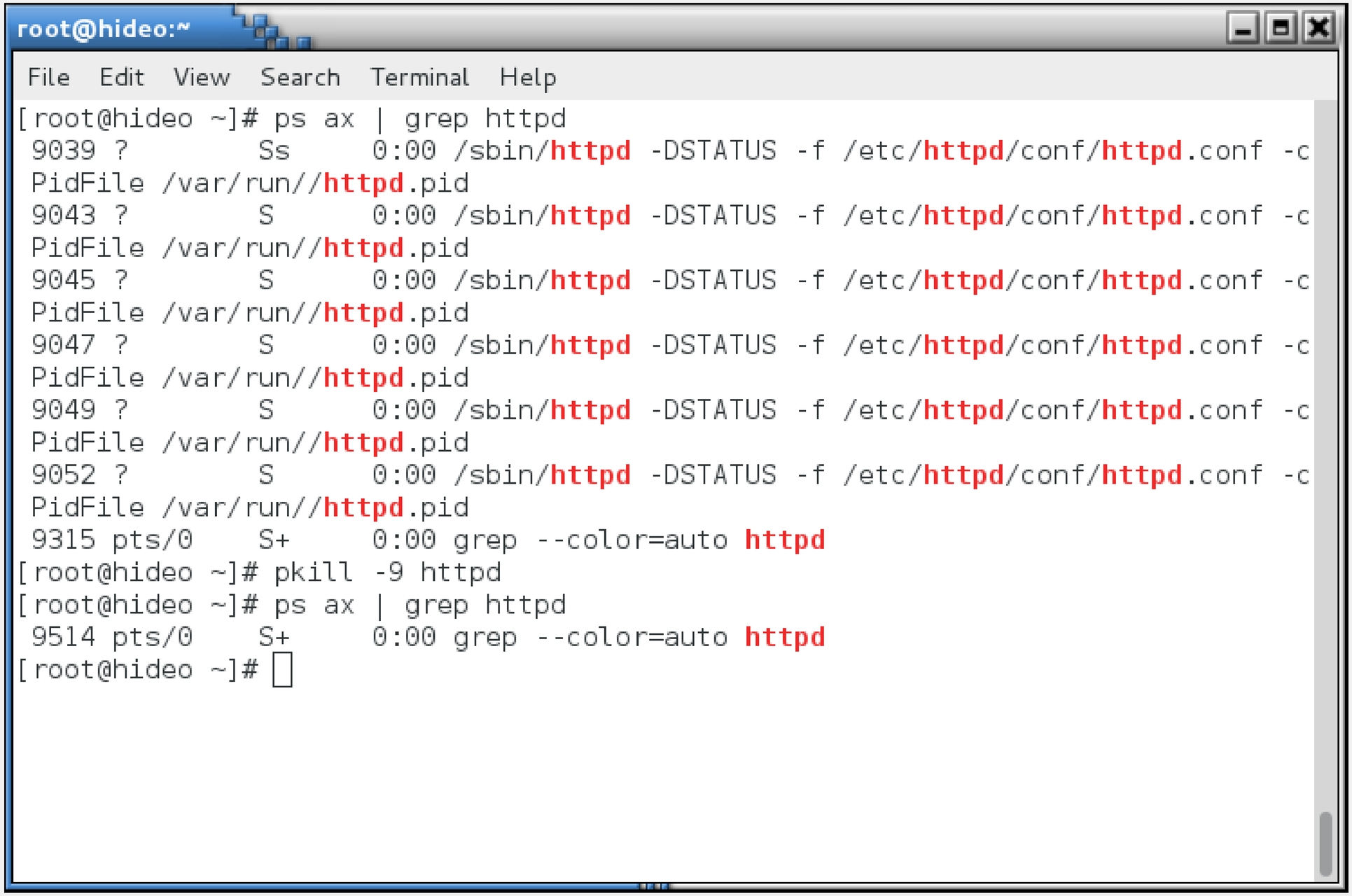

Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-apache
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
configfile
configuration file path
httpd
httpd binary path
port
httpd port
statusurl
http://localhost/server-status
testregex
monitor regular expression
client
http client
testurl
test url
testregex10
extended monitor regular expression
testconffile
test configuration file
testname
test name
options
command line options
envfiles
environment settings files
use_ipv6
use ipv6 with http clients
Apply Changes

redhat.

Test Apache

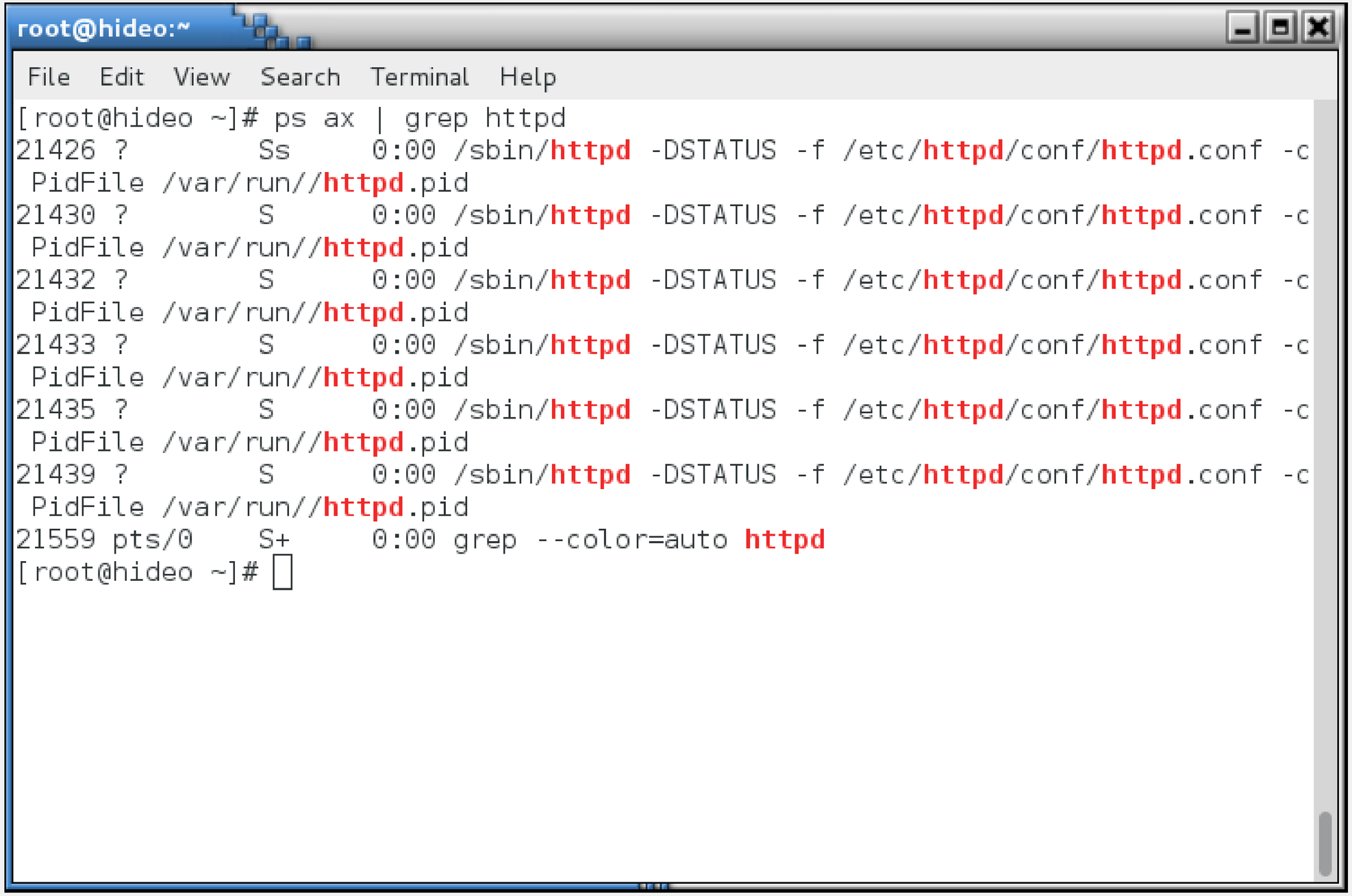
- You can kill the httpd process to test that it gets restarted

redhat.


root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# ps ax | grep httpd
9039 ? Ss 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
PidFile /var/run//httpd.pid
9043 ? S 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
PidFile /var/run//httpd.pid
9045 ? S 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
PidFile /var/run//httpd.pid
9047 ? S 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
PidFile /var/run//httpd.pid
9049 ? S 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
PidFile /var/run//httpd.pid
9052 ? S 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
PidFile /var/run//httpd.pid
9315 pts/0 S+ 0:00 grep --color=auto httpd
[root@hideo ~]# pkill -9 httpd
[root@hideo ~]# ps ax | grep httpd
9514 pts/0 S+ 0:00 grep --color=auto httpd
[root@hideo ~]#

redhat.

Mar 24 11:29:23 hideo.tc.redhat.com apache(summit-apache)[11054]: INFO: apache not running
Mar 24 11:29:23 hideo.tc.redhat.com crmd[2106]: notice: process_lrm_event: LRM operation summit-apache_monitor_10000 (call=68, rc=7, cib-update=54, confirmed=false) not running
Mar 24 11:29:23 hideo.tc.redhat.com attrd[2103]: notice: attrd_cs_dispatch: Update relayed from maelcum.tc.redhat.com
Mar 24 11:29:23 hideo.tc.redhat.com attrd[2103]: notice: attrd_trigger_update: Sending flush op to all hosts for: fail-count-summit-apache (3)
Mar 24 11:29:23 hideo.tc.redhat.com attrd[2103]: notice: attrd_perform_update: Sent update 65: fail-count-summit-apache=3
Mar 24 11:29:23 hideo.tc.redhat.com attrd[2103]: notice: attrd_cs_dispatch: Update relayed from maelcum.tc.redhat.com
Mar 24 11:29:23 hideo.tc.redhat.com attrd[2103]: notice: attrd_trigger_update: Sending flush op to all hosts for: last-failure-summit-apache (1395678563)
Mar 24 11:29:23 hideo.tc.redhat.com attrd[2103]: notice: attrd_perform_update: Sent update 67: last-failure-summit-apache=1395678563
Mar 24 11:29:23 hideo.tc.redhat.com apache(summit-apache)[11099]: INFO: apache is not running.
Mar 24 11:29:24 hideo.tc.redhat.com crmd[2106]: notice: process_lrm_event: LRM operation summit-apache_stop_0 (call=70, rc=0, cib-update=55, confirmed=true) ok
Mar 24 11:29:24 hideo.tc.redhat.com systemd[1]: pacemaker.service: Got notification message from PID 11146, but reception only permitted for PID 1749
Mar 24 11:29:24 hideo.tc.redhat.com apache(summit-apache)[11165]: INFO: Successfully retrieved http header at http://localhost:80

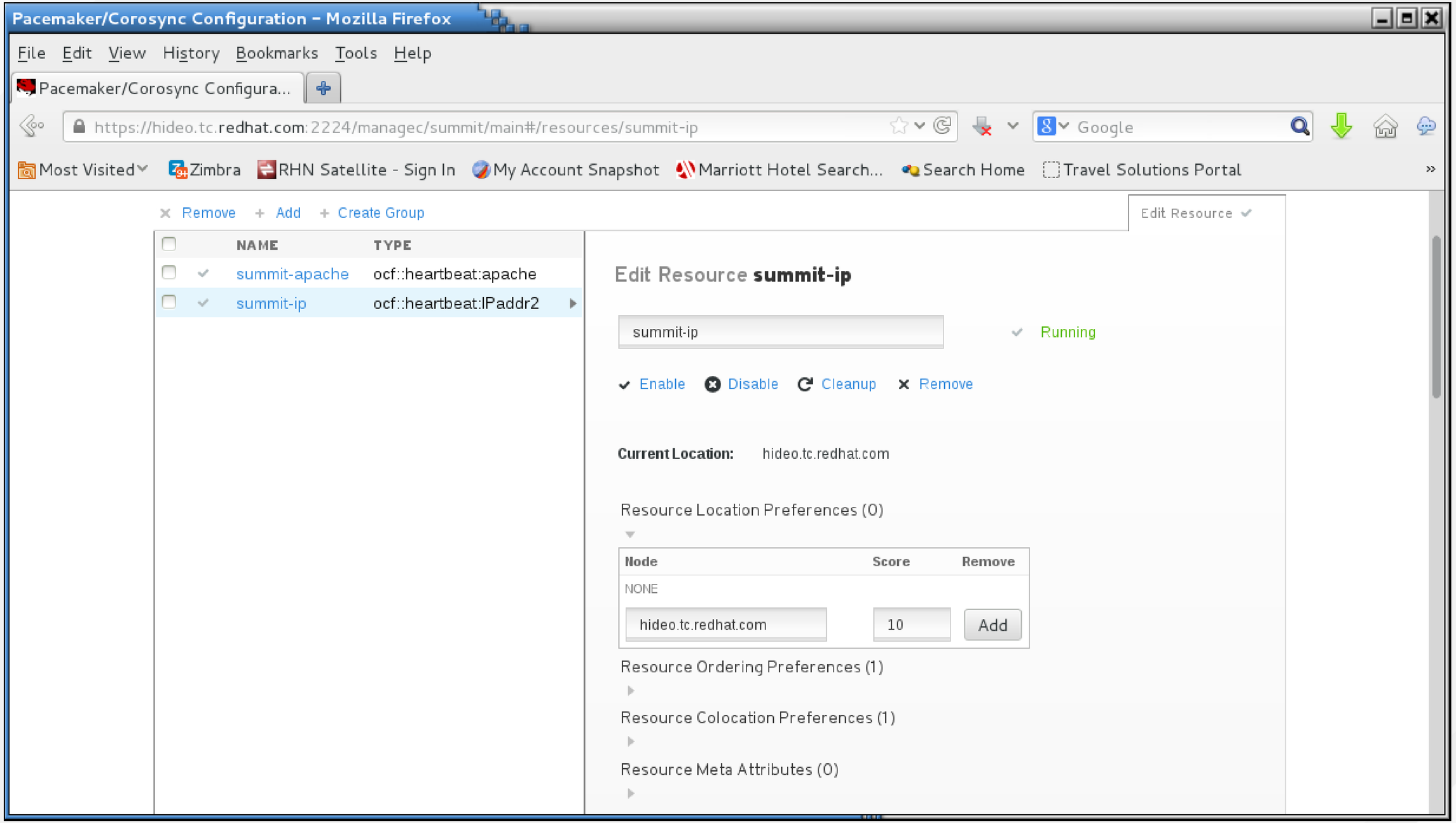

root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# ps ax | grep httpd
21426 ? Ss 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
PidFile /var/run//httpd.pid
21430 ? S 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
PidFile /var/run//httpd.pid
21432 ? S 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
PidFile /var/run//httpd.pid
21433 ? S 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
PidFile /var/run//httpd.pid
21435 ? S 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
PidFile /var/run//httpd.pid
21439 ? S 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
PidFile /var/run//httpd.pid
21559 pts/0 S+ 0:00 grep --color=auto httpd
[root@hideo ~]#

redhat.

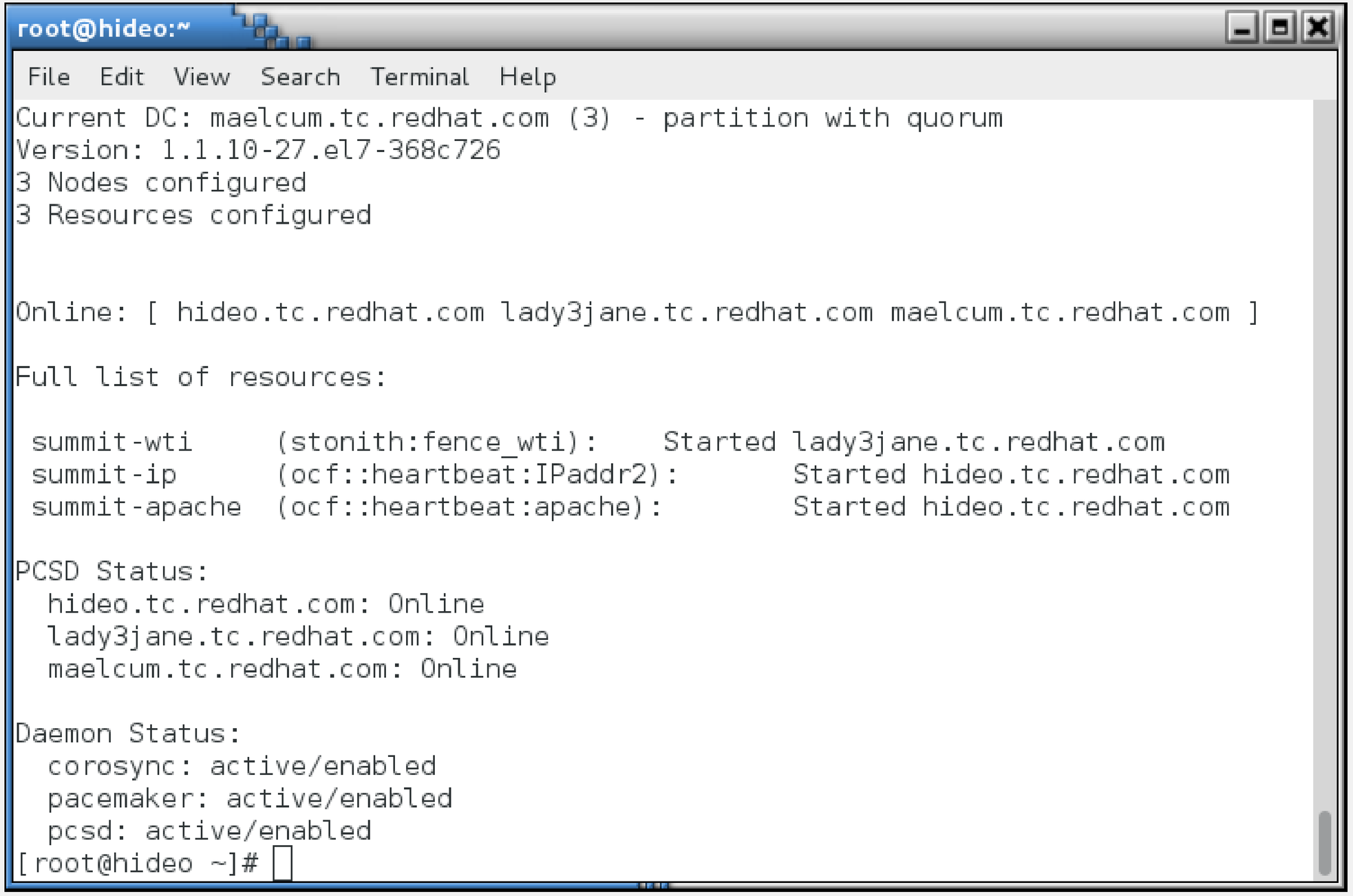
Resource Location Preferences

- You can also set up host affinity via Resource Location Preferences
- Add each of the hosts you want to run the service on and add a score. The higher the score, the more likely the service is to run on that node.

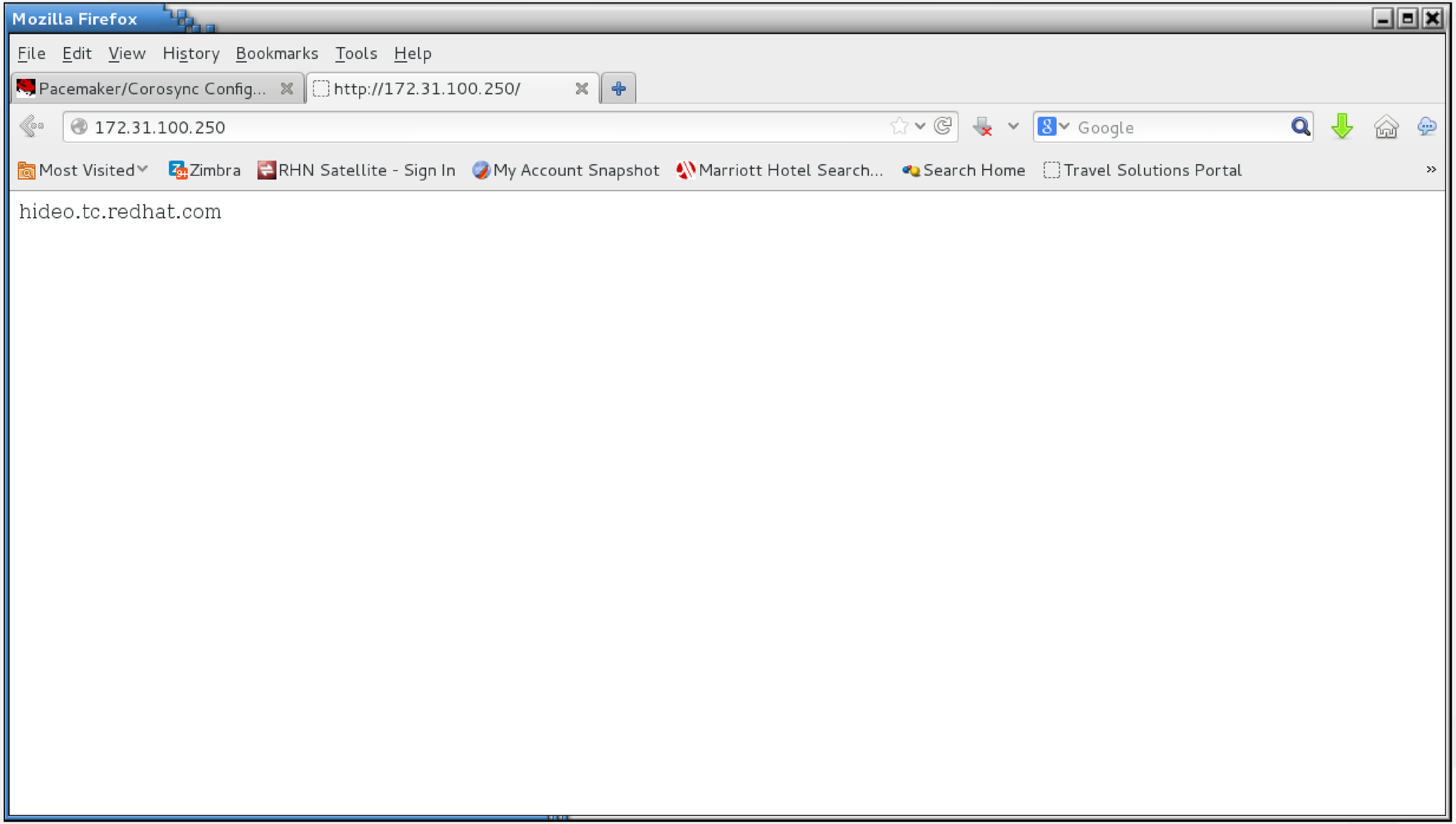
redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-ip
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
Remove
Add
Create Group
Edit Resource
NAME
TYPE
summit-apache
ocf::heartbeat:apache
summit-ip
ocf::heartbeat:IPaddr2
Edit Resource summit-ip
summit-ip
Running
Enable
Disable
Cleanup
Remove
Current Location:
hideo.tc.redhat.com
Resource Location Preferences (0)
Node
Score
Remove
NONE
hideo.tc.redhat.com
10
Add
Resource Ordering Preferences (1)
Resource Colocation Preferences (1)
Resource Meta Attributes (0)

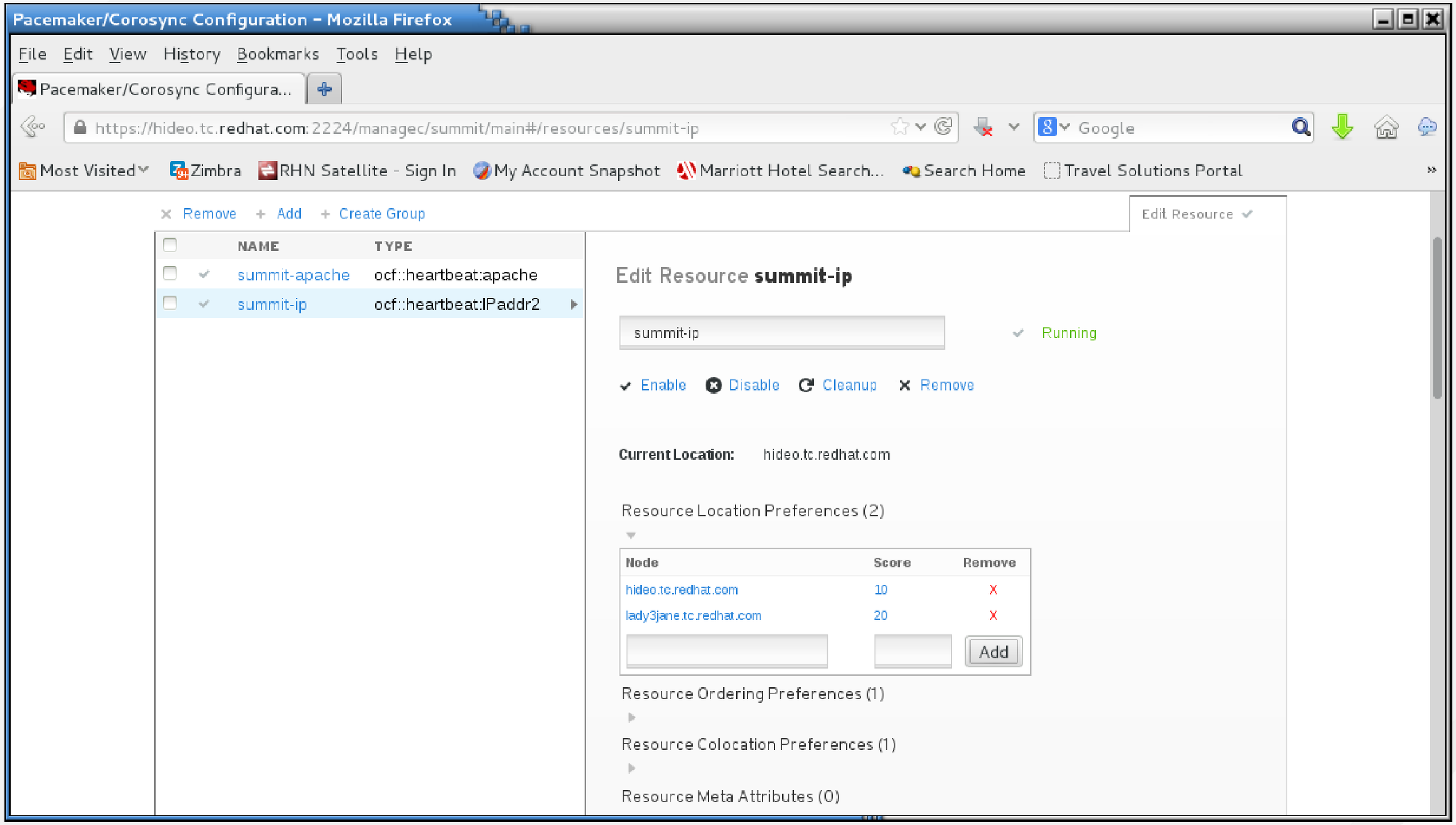
redhat.


root@hideo:~
File Edit View Search Terminal Help
Current DC: maelcum.tc.redhat.com (3) - partition with quorum
Version: 1.1.10-27.el7-368c726
3 Nodes configured
3 Resources configured
Online: [hideo.tc.redhat.com lady3jane.tc.redhat.com maelcum.tc.redhat.com]
Full list of resources:
summit-wti (stonith:fence_wti): Started lady3jane.tc.redhat.com
summit-ip (ocf::heartbeat:IPaddr2): Started hideo.tc.redhat.com
summit-apache (ocf::heartbeat:apache): Started hideo.tc.redhat.com
PCSD Status:
hideo.tc.redhat.com: Online
lady3jane.tc.redhat.com: Online
maelcum.tc.redhat.com: Online
Daemon Status:
corosync: active/enabled
pacemaker: active/enabled
pcsd: active/enabled
[root@hideo ~]#

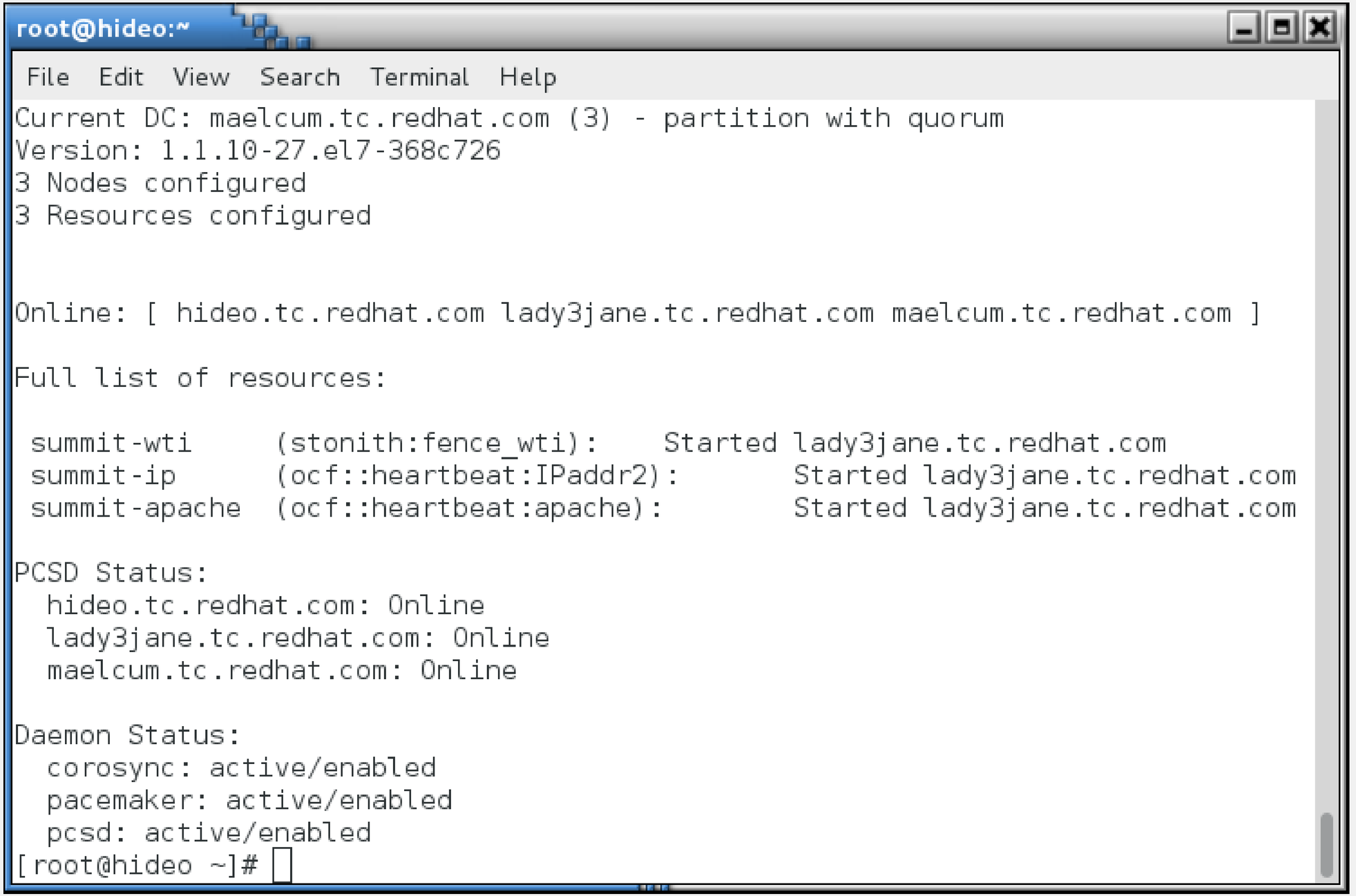
redhat.


Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Config...
http://172.31.100.250/
172.31.100.250
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
hideo.tc.redhat.com

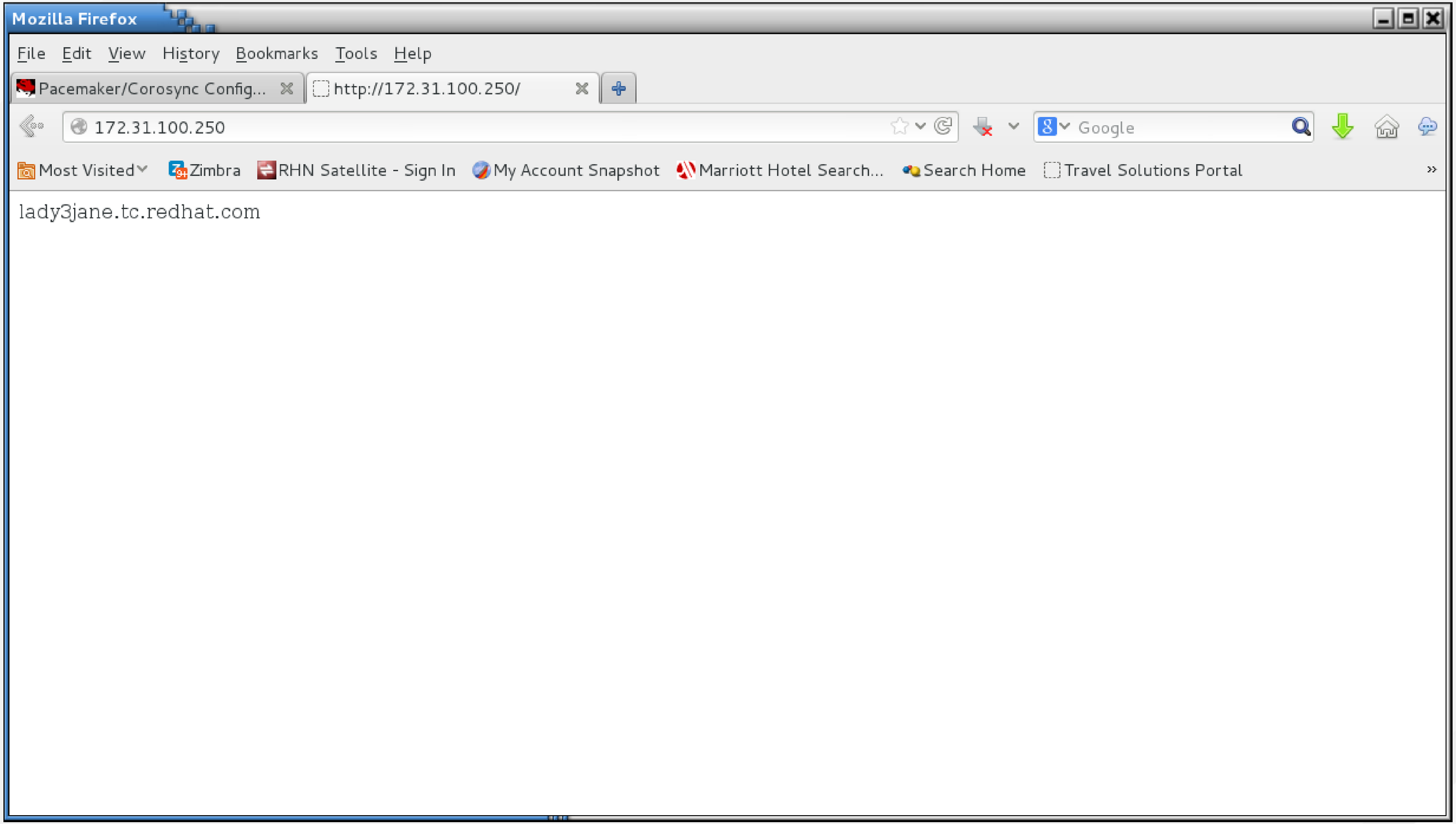
redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-ip
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
Remove
Add
Create Group
Edit Resource
NAME
TYPE
summit-apache
ocf::heartbeat:apache
summit-ip
ocf::heartbeat:IPaddr2
Edit Resource summit-ip
summit-ip
Running
Enable
Disable
Cleanup
Remove
Current Location:
hideo.tc.redhat.com
Resource Location Preferences (2)
Node
Score
Remove
hideo.tc.redhat.com
10
X
lady3jane.tc.redhat.com
20
X
Add
Resource Ordering Preferences (1)
Resource Colocation Preferences (1)
Resource Meta Attributes (0)

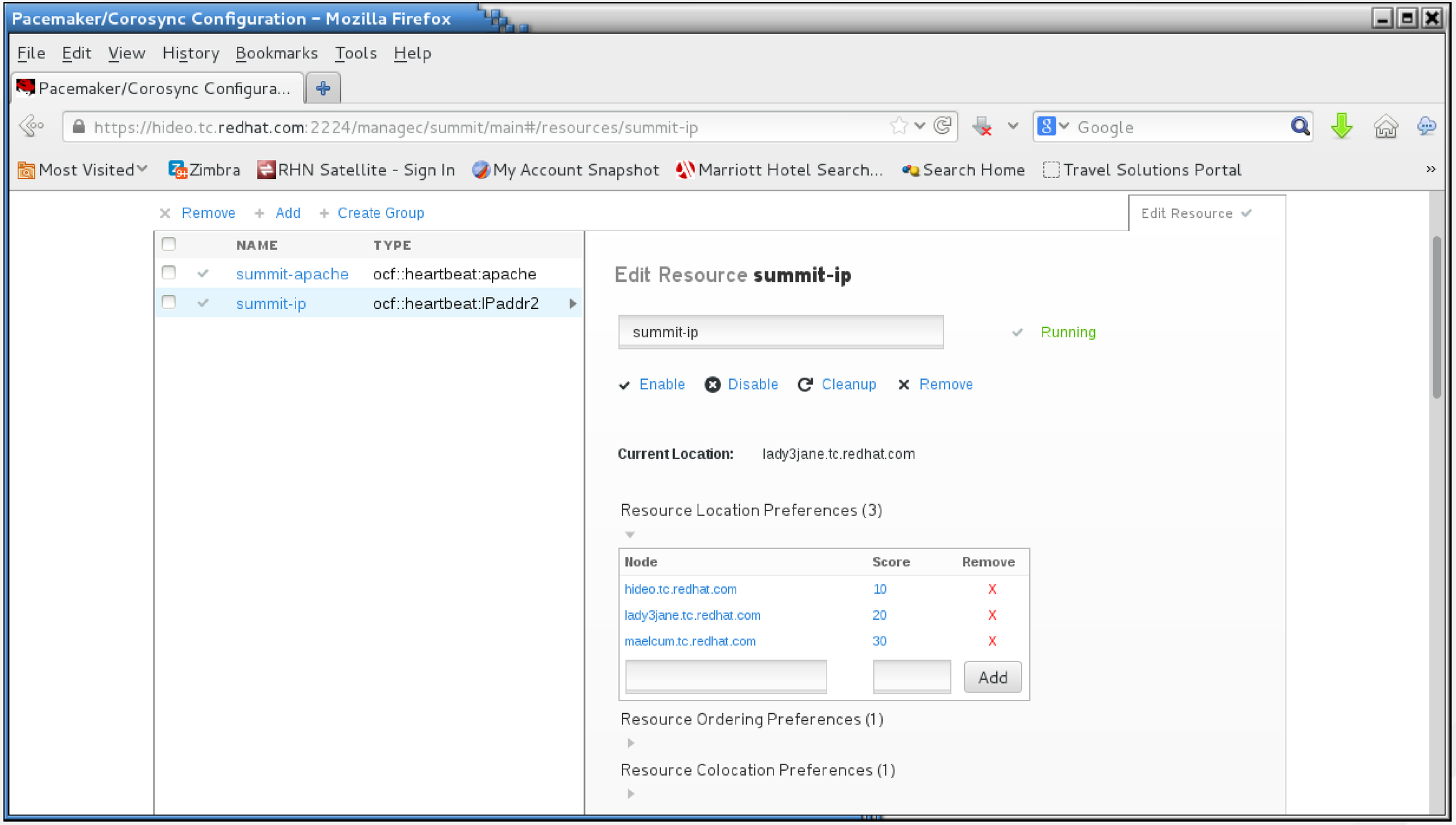
redhat.


root@hideo:~
File Edit View Search Terminal Help
Current DC: maelcum.tc.redhat.com (3) - partition with quorum
Version: 1.1.10-27.el7-368c726
3 Nodes configured
3 Resources configured
Online: [hideo.tc.redhat.com lady3jane.tc.redhat.com maelcum.tc.redhat.com]
Full list of resources:
summit-wti (stonith:fence_wti): Started lady3jane.tc.redhat.com
summit-ip (ocf::heartbeat:IPaddr2): Started lady3jane.tc.redhat.com
summit-apache (ocf::heartbeat:apache): Started lady3jane.tc.redhat.com
PCSD Status:
hideo.tc.redhat.com: Online
lady3jane.tc.redhat.com: Online
maelcum.tc.redhat.com: Online
Daemon Status:
corosync: active/enabled
pacemaker: active/enabled
pcsd: active/enabled
[root@hideo ~]#

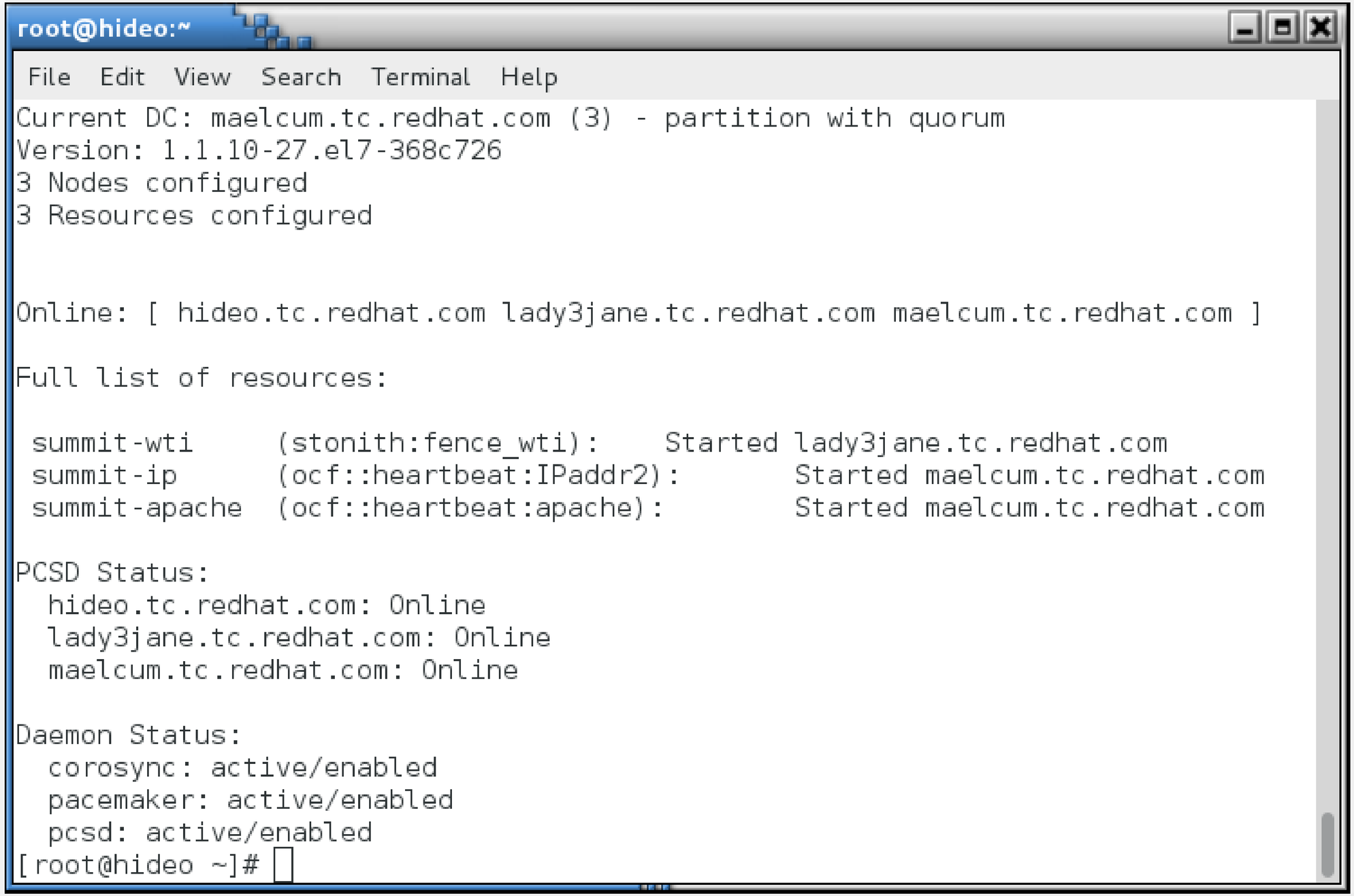
redhat.


Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Config...
http://172.31.100.250/
172.31.100.250
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
lady3jane.tc.redhat.com

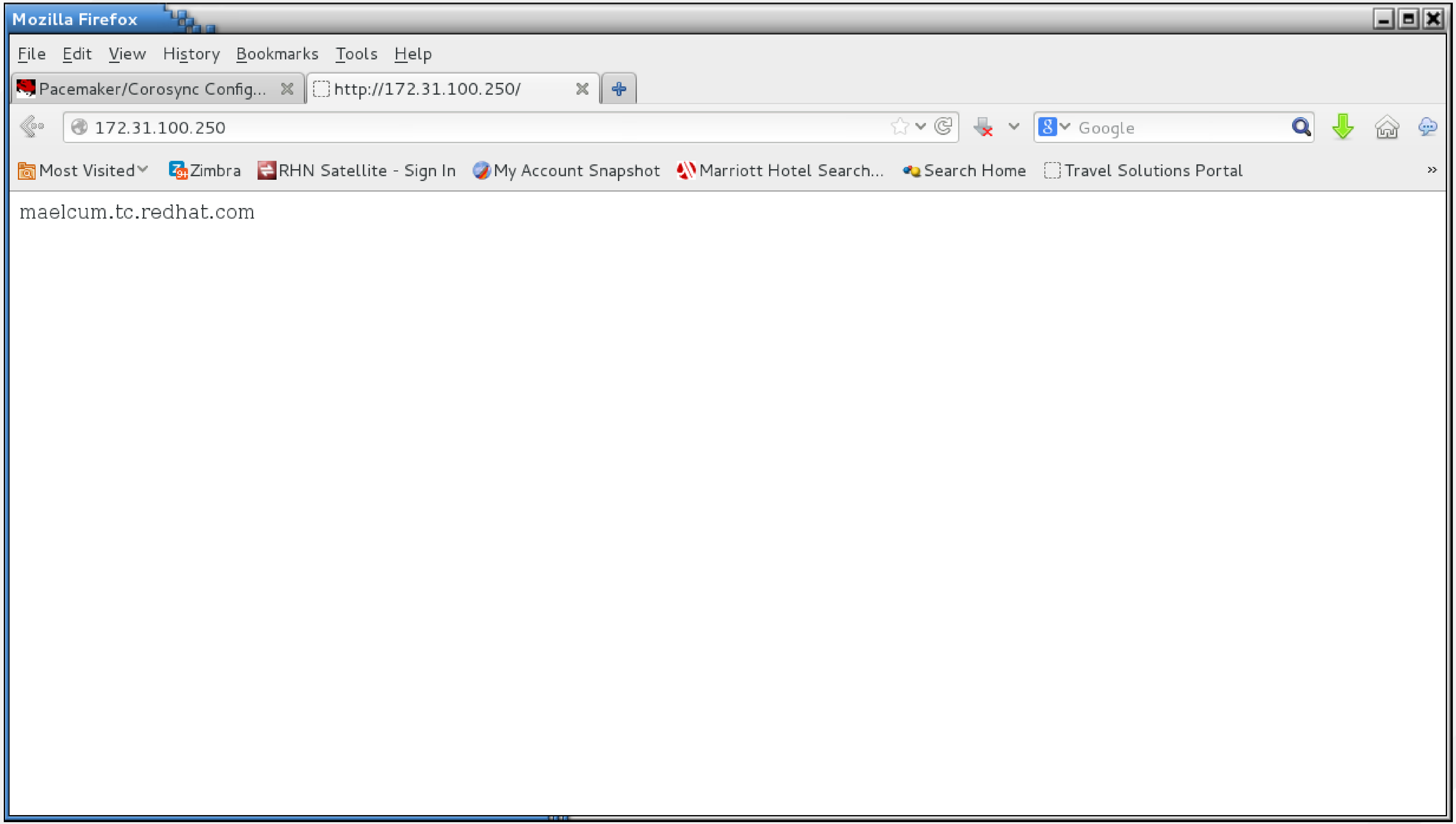
redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-ip
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
Remove
Add
Create Group
Edit Resource
NAME
TYPE
summit-apache
ocf::heartbeat:apache
summit-ip
ocf::heartbeat:IPaddr2
Edit Resource summit-ip
summit-ip
Running
Enable
Disable
Cleanup
Remove
Current Location:
lady3jane.tc.redhat.com
Resource Location Preferences (3)
Node
Score
Remove
hideo.tc.redhat.com
10
X
lady3jane.tc.redhat.com
20
X
maelcum.tc.redhat.com
30
X
Add
Resource Ordering Preferences (1)
Resource Colocation Preferences (1)

redhat.


root@hideo:~
File Edit View Search Terminal Help
Current DC: maelcum.tc.redhat.com (3) - partition with quorum
Version: 1.1.10-27.el7-368c726
3 Nodes configured
3 Resources configured
Online: [hideo.tc.redhat.com lady3jane.tc.redhat.com maelcum.tc.redhat.com]
Full list of resources:
summit-wti (stonith:fence_wti): Started lady3jane.tc.redhat.com
summit-ip (ocf::heartbeat:IPaddr2): Started maelcum.tc.redhat.com
summit-apache (ocf::heartbeat:apache): Started maelcum.tc.redhat.com
PCSD Status:
hideo.tc.redhat.com: Online
lady3jane.tc.redhat.com: Online
maelcum.tc.redhat.com: Online
Daemon Status:
corosync: active/enabled
pacemaker: active/enabled
pcsd: active/enabled
[root@hideo ~]#

redhat.

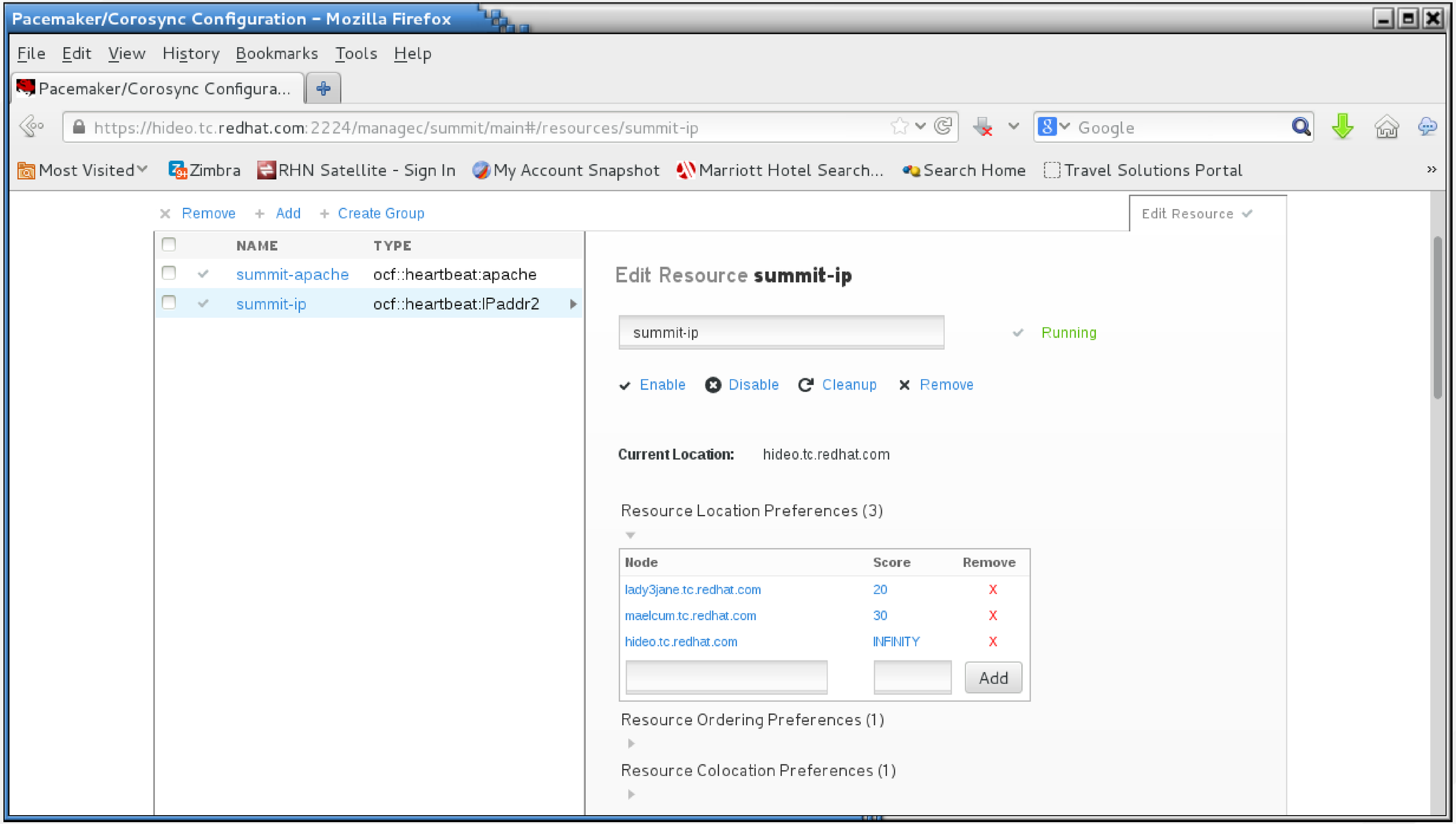

Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Config...
http://172.31.100.250/
172.31.100.250
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
maelcum.tc.redhat.com

redhat.

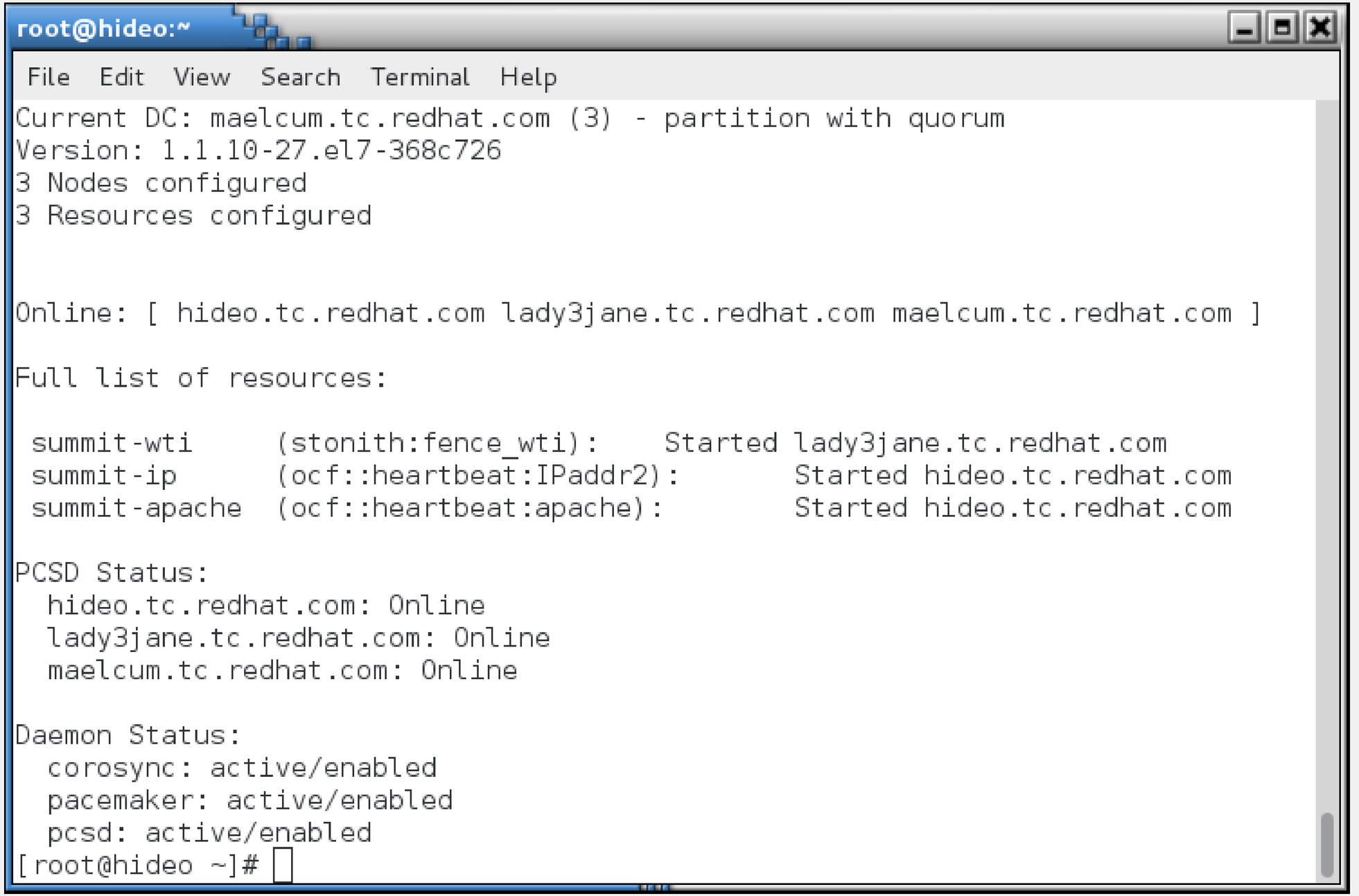
To force a service to a host

- Use a score of INFINITY

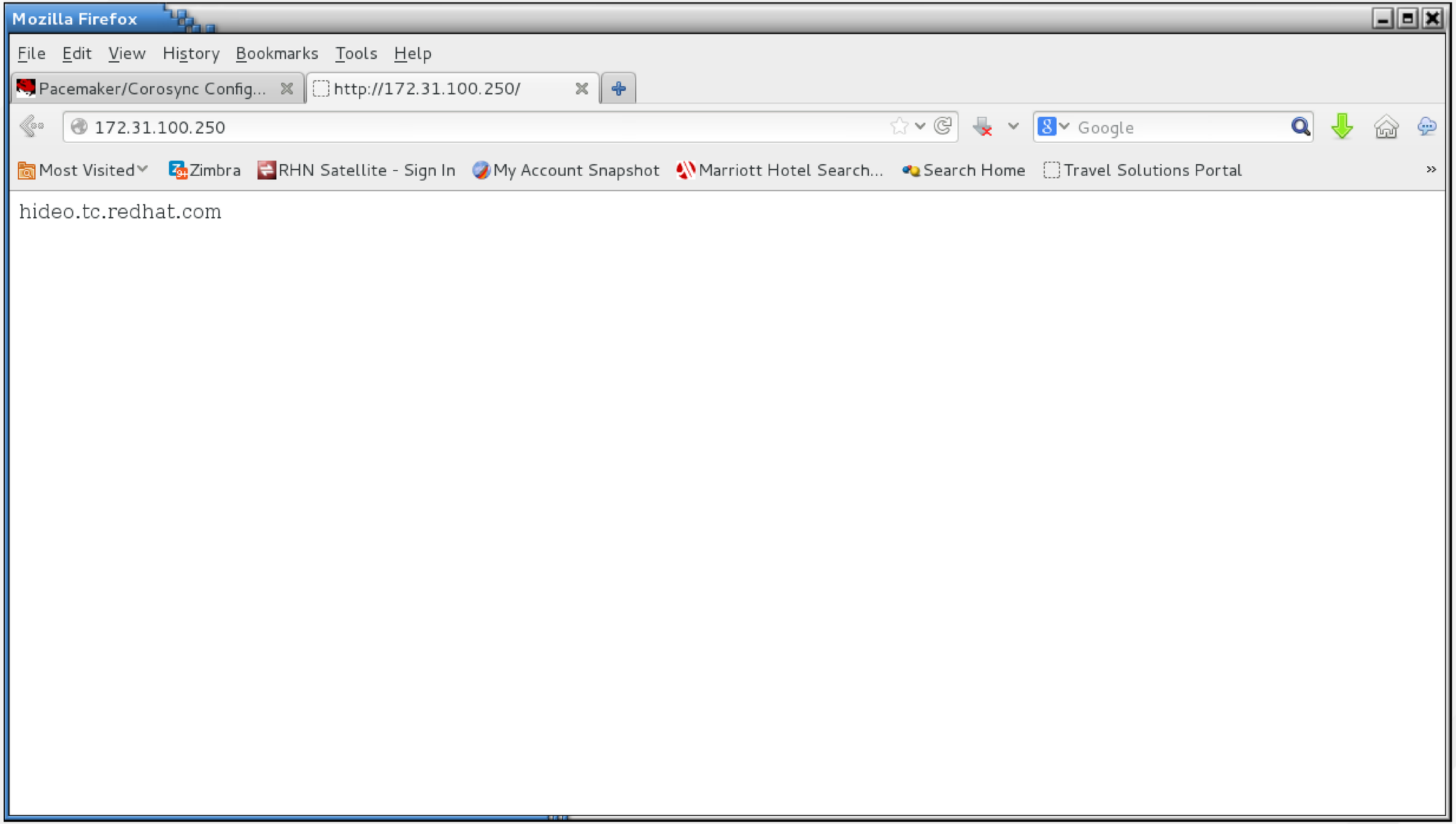
redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-ip
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
Remove
Add
Create Group
Edit Resource
NAME
TYPE
summit-apache
ocf::heartbeat:apache
summit-ip
ocf::heartbeat:IPaddr2
Edit Resource summit-ip
summit-ip
Running
Enable
Disable
Cleanup
Remove
Current Location:
hideo.tc.redhat.com
Resource Location Preferences (3)
Node
Score
Remove
lady3jane.tc.redhat.com
20
X
maelcum.tc.redhat.com
30
X
hideo.tc.redhat.com
INFINITY
X
Add
Resource Ordering Preferences (1)
Resource Colocation Preferences (1)

redhat.


root@hideo:~
File Edit View Search Terminal Help
Current DC: maelcum.tc.redhat.com (3) - partition with quorum
Version: 1.1.10-27.el7-368c726
3 Nodes configured
3 Resources configured
Online: [hideo.tc.redhat.com lady3jane.tc.redhat.com maelcum.tc.redhat.com]
Full list of resources:
summit-wti (stonith:fence_wti): Started lady3jane.tc.redhat.com
summit-ip (ocf::heartbeat:IPaddr2): Started hideo.tc.redhat.com
summit-apache (ocf::heartbeat:apache): Started hideo.tc.redhat.com
PCSD Status:
hideo.tc.redhat.com: Online
lady3jane.tc.redhat.com: Online
maelcum.tc.redhat.com: Online
Daemon Status:
corosync: active/enabled
pacemaker: active/enabled
pcsd: active/enabled
[root@hideo ~]#

redhat.

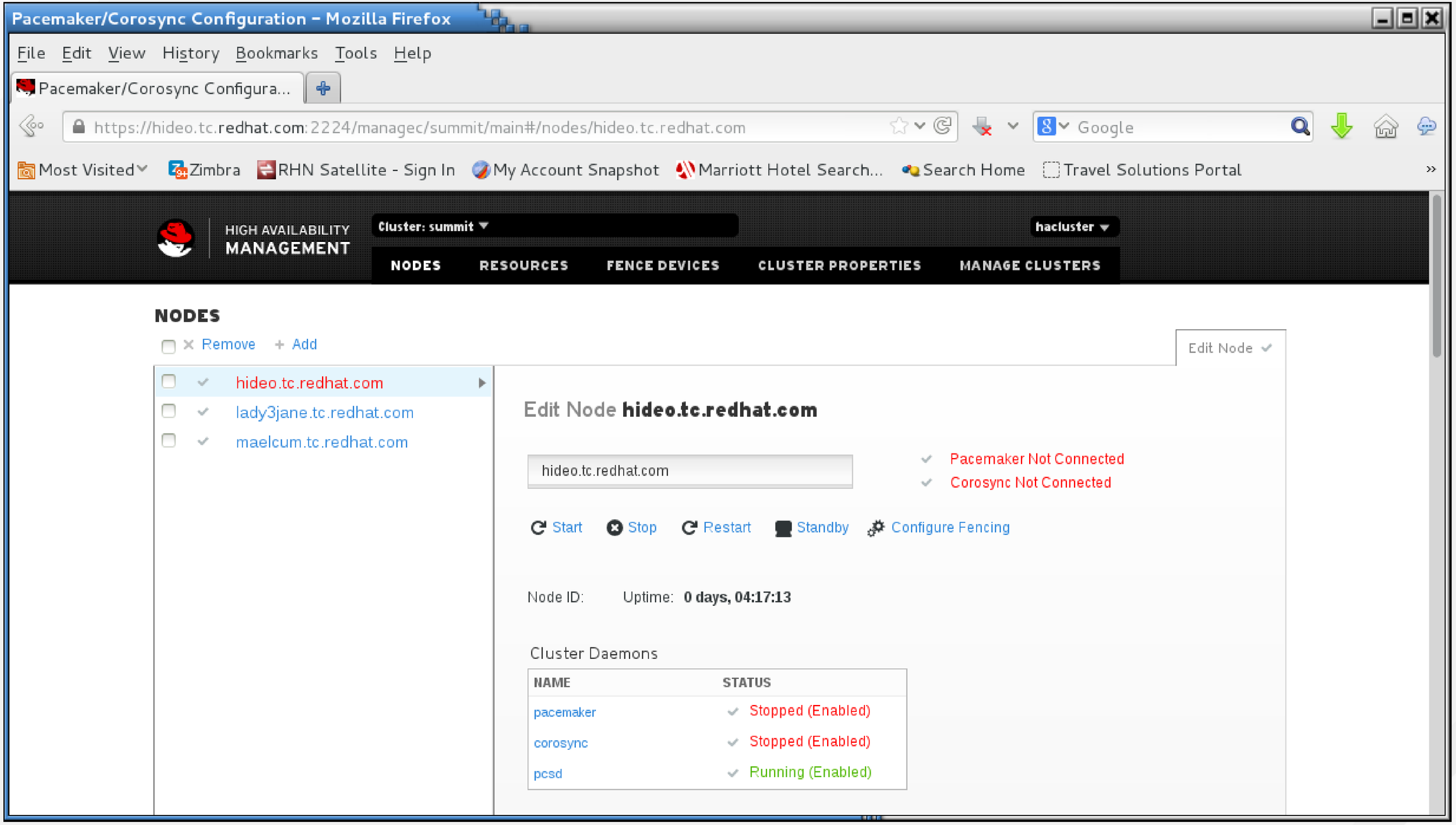

Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Config...
http://172.31.100.250/
172.31.100.250
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
hideo.tc.redhat.com

redhat.

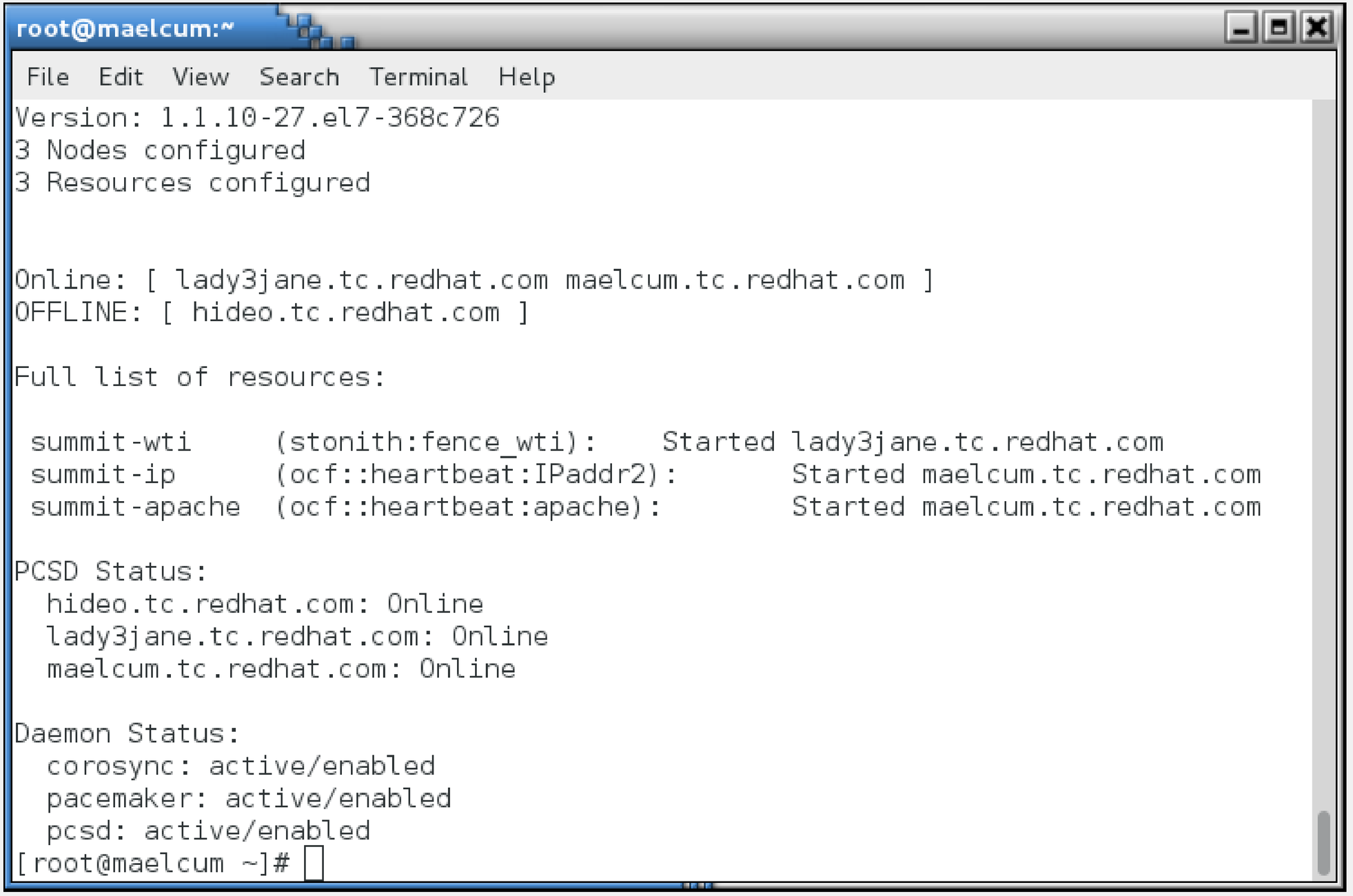
To offline a host

- Go to Nodes
- Choose the host
- Choose “Stop”

redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/nodes/hideo.tc.redhat.com
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY MANAGEMENT
Cluster: summit
hacluster
NODES
RESOURCES
FENCE DEVICES
CLUSTER PROPERTIES
MANAGE CLUSTERS
NODES
Remove
Add
Edit Node
hideo.tc.redhat.com
lady3jane.tc.redhat.com
maelcum.tc.redhat.com
Edit Node hideo.tc.redhat.com
hideo.tc.redhat.com
Pacemaker Not Connected
Corosync Not Connected
Start
Stop
Restart
Standby
Configure Fencing
Node ID:
Uptime: 0 days, 04:17:13
Cluster Daemons
NAME
STATUS
pacemaker
Stopped (Enabled)
corosync
Stopped (Enabled)
pcsd
Running (Enabled)

redhat.

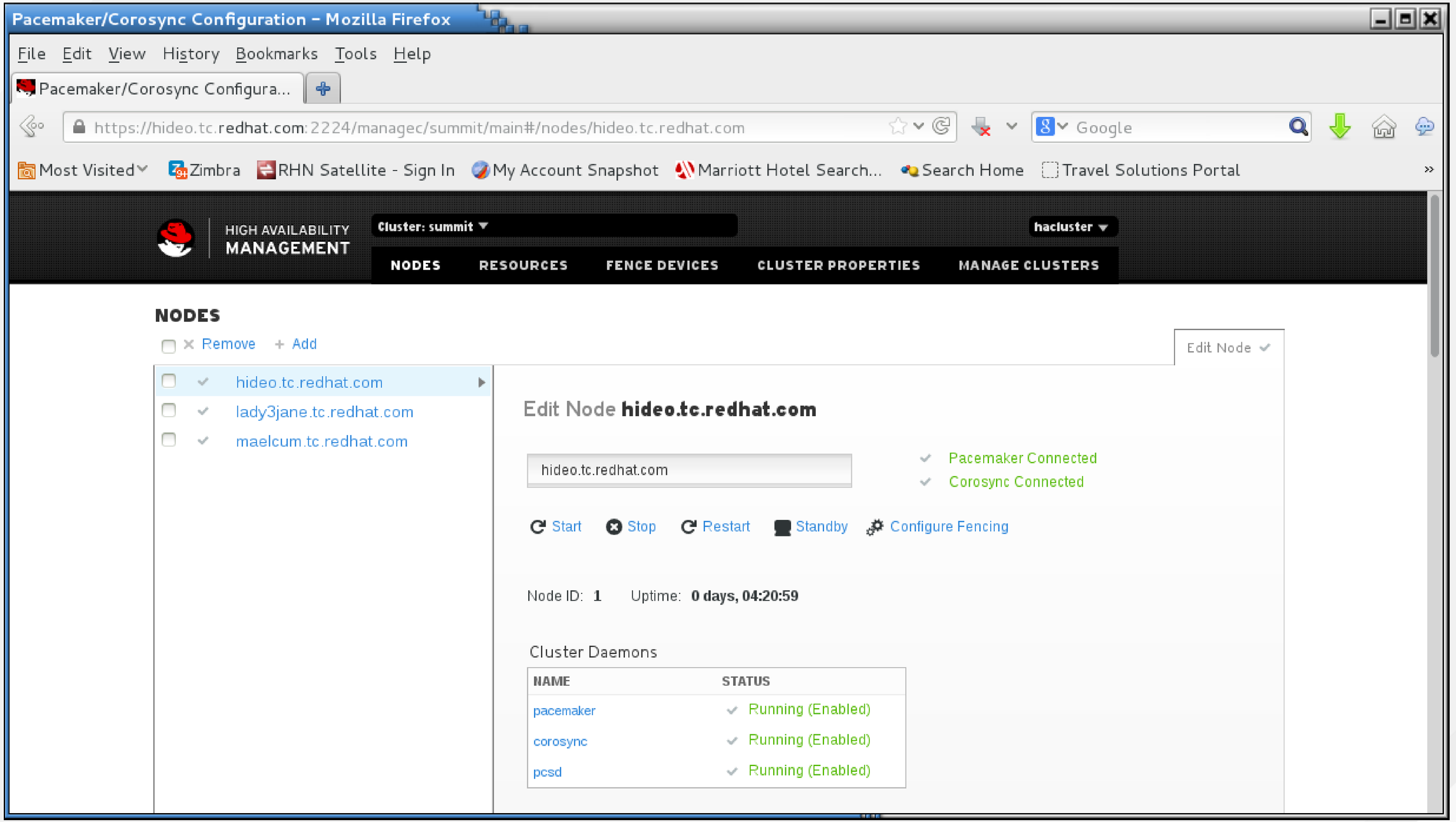

root@maelcum:~
File Edit View Search Terminal Help
Version: 1.1.10-27.el7-368c726
3 Nodes configured
3 Resources configured
Online: [lady3jane.tc.redhat.com maelcum.tc.redhat.com]
OFFLINE: [hideo.tc.redhat.com]
Full list of resources:
summit-wti (stonith:fence_wti): Started lady3jane.tc.redhat.com
summit-ip (ocf::heartbeat:IPaddr2): Started maelcum.tc.redhat.com
summit-apache (ocf::heartbeat:apache): Started maelcum.tc.redhat.com
PCSD Status:
hideo.tc.redhat.com: Online
lady3jane.tc.redhat.com: Online
maelcum.tc.redhat.com: Online
Daemon Status:
corosync: active/enabled
pacemaker: active/enabled
pcsd: active/enabled
[root@maelcum ~]#

redhat.

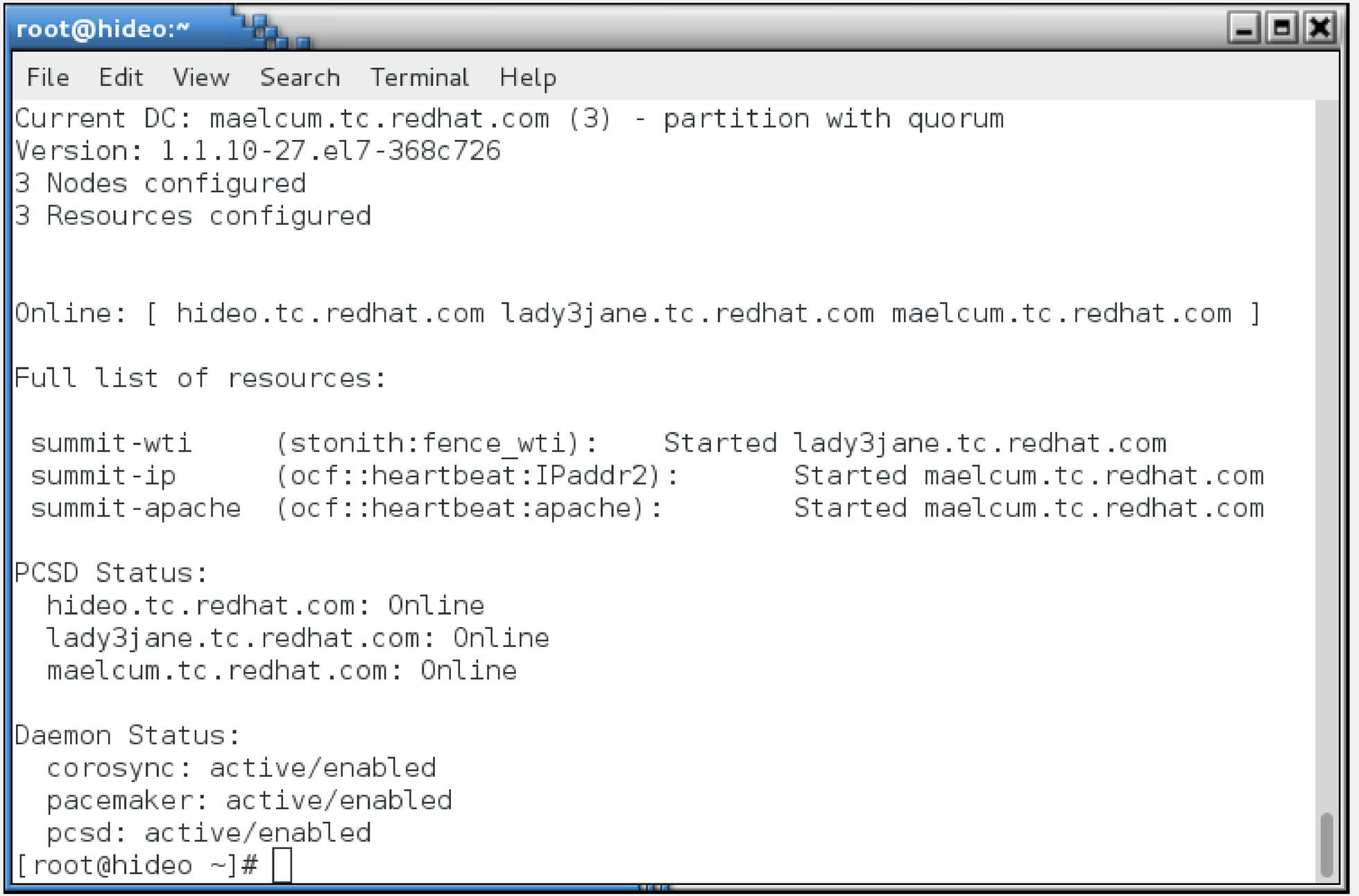
To online a host

- Go to Nodes
- Choose the host
- Choose “Start”

redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/nodes/hideo.tc.redhat.com
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY MANAGEMENT
Cluster: summit
hacluster
NODES
RESOURCES
FENCE DEVICES
CLUSTER PROPERTIES
MANAGE CLUSTERS
NODES
Remove
Add
Edit Node
hideo.tc.redhat.com
lady3jane.tc.redhat.com
maelcum.tc.redhat.com
Edit Node hideo.tc.redhat.com
hideo.tc.redhat.com
Pacemaker Connected
Corosync Connected
Start
Stop
Restart
Standby
Configure Fencing
Node ID: 1
Uptime: 0 days, 04:20:59
Cluster Daemons
NAME
STATUS
pacemaker
Running (Enabled)
corosync
Running (Enabled)
pcsd
Running (Enabled)

redhat.


root@hideo:~
File Edit View Search Terminal Help
Current DC: maelcum.tc.redhat.com (3) - partition with quorum
Version: 1.1.10-27.el7-368c726
3 Nodes configured
3 Resources configured
Online: [hideo.tc.redhat.com lady3jane.tc.redhat.com maelcum.tc.redhat.com]
Full list of resources:
summit-wti (stonith:fence_wti): Started lady3jane.tc.redhat.com
summit-ip (ocf::heartbeat:IPaddr2): Started maelcum.tc.redhat.com
summit-apache (ocf::heartbeat:apache): Started maelcum.tc.redhat.com
PCSD Status:
hideo.tc.redhat.com: Online
lady3jane.tc.redhat.com: Online
maelcum.tc.redhat.com: Online
Daemon Status:
corosync: active/enabled
pacemaker: active/enabled
pcsd: active/enabled
[root@hideo ~]#

redhat.

To reboot a host

- Go to Nodes
- Choose the host
- Choose “Restart”
  - Note: this will execute a controlled reboot within the OS (shutdown -r now), **not** a fencing event

redhat.

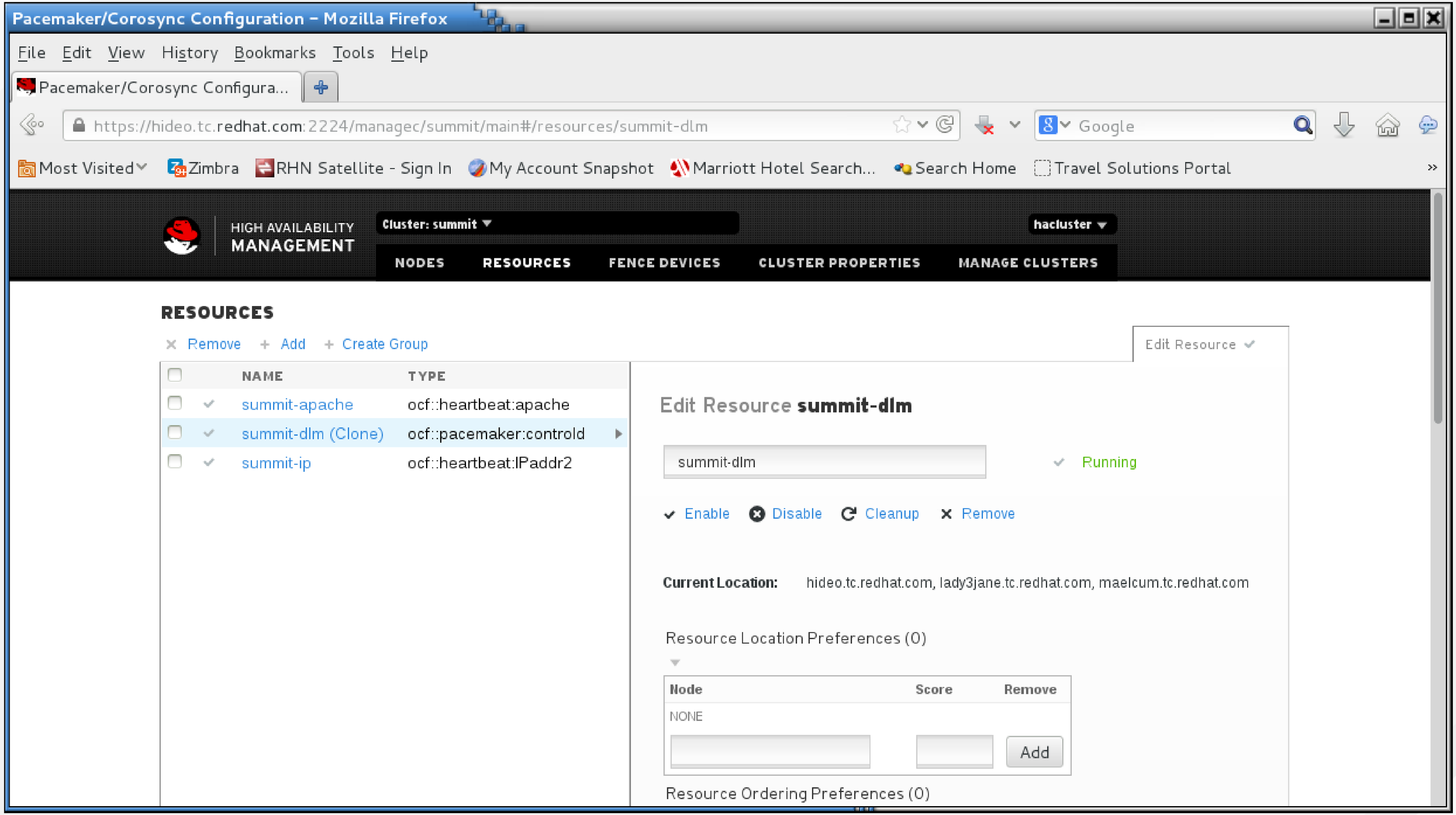
Configuring distributed lock management

redhat.

Enable distributed lock management

- Create a new ocf:pacemaker class resource of controld
- Check the box for “clone” - we want this service cloned across all the nodes
- Give it a Resource ID - in this case, summit-dlm
- After a few seconds it should start and turn green

redhat.

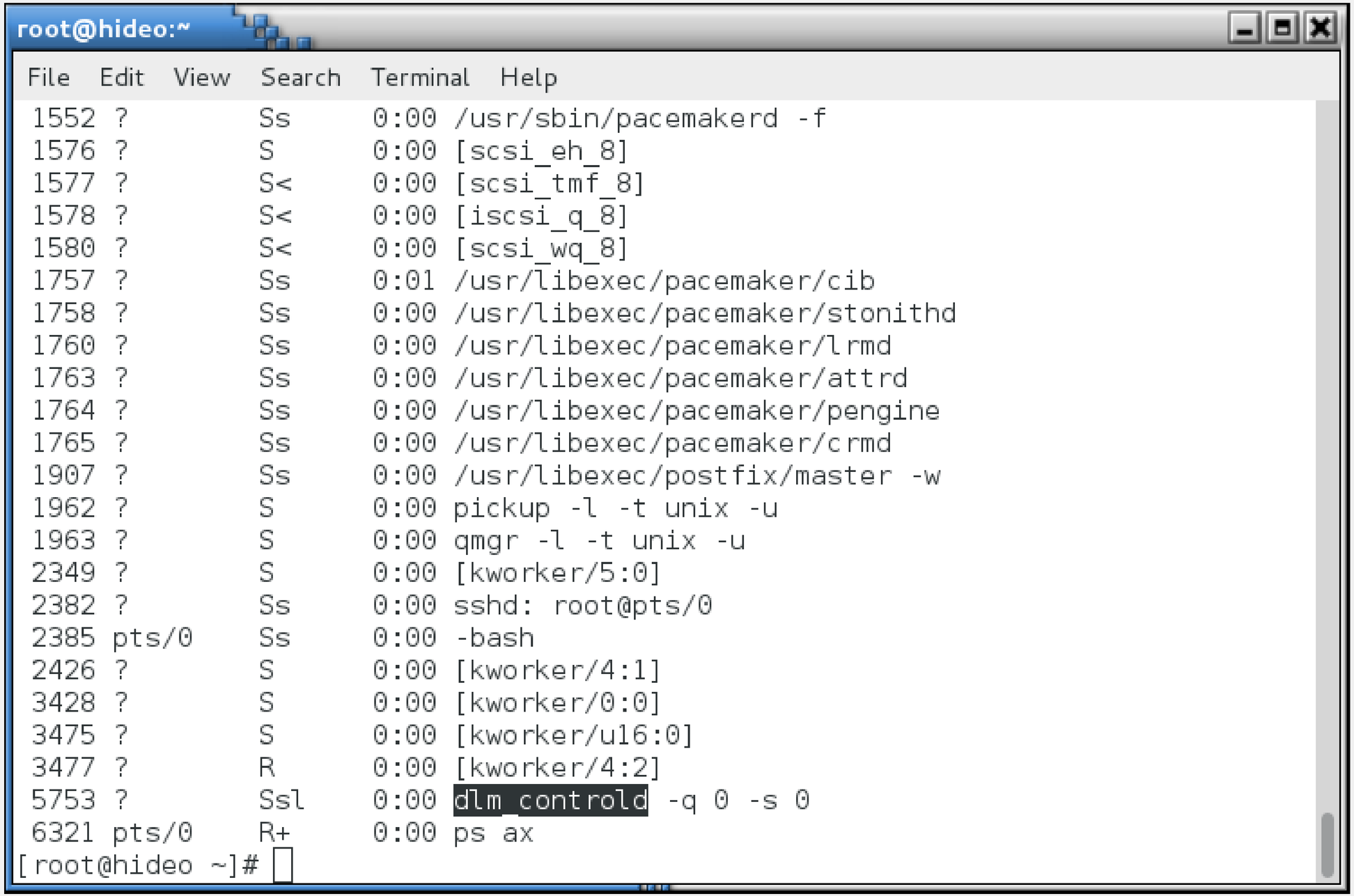

Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-dlm
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY MANAGEMENT
Cluster: summit
hacluster
NODES
RESOURCES
FENCE DEVICES
CLUSTER PROPERTIES
MANAGE CLUSTERS
RESOURCES
Remove
Add
Create Group
Edit Resource
NAME
TYPE
summit-apache
ocf::heartbeat:apache
summit-dlm (Clone)
ocf::pacemaker:controld
summit-ip
ocf::heartbeat:IPaddr2
Edit Resource summit-dlm
summit-dlm
Running
Enable
Disable
Cleanup
Remove
Current Location:
hideo.tc.redhat.com, lady3jane.tc.redhat.com, maelcum.tc.redhat.com
Resource Location Preferences (0)
Node
Score
Remove
NONE
Add
Resource Ordering Preferences (0)

redhat.

Enable distributed lock management

- You can also make sure the dlm_controld process is running on all nodes

redhat.


root@hideo:~
File Edit View Search Terminal Help
1552 ? Ss 0:00 /usr/sbin/pacemakerd -f
1576 ? S 0:00 [scsi_eh_8]
1577 ? S< 0:00 [scsi_tmf_8]
1578 ? S< 0:00 [iscsi_q_8]
1580 ? S< 0:00 [scsi_wq_8]
1757 ? Ss 0:01 /usr/libexec/pacemaker/cib
1758 ? Ss 0:00 /usr/libexec/pacemaker/stonithd
1760 ? Ss 0:00 /usr/libexec/pacemaker/lrmd
1763 ? Ss 0:00 /usr/libexec/pacemaker/attrd
1764 ? Ss 0:00 /usr/libexec/pacemaker/pengine
1765 ? Ss 0:00 /usr/libexec/pacemaker/crmd
1907 ? Ss 0:00 /usr/libexec/postfix/master -w
1962 ? S 0:00 pickup -l -t unix -u
1963 ? S 0:00 qmgr -l -t unix -u
2349 ? S 0:00 [kworker/5:0]
2382 ? Ss 0:00 sshd: root@pts/0
2385 pts/0 Ss 0:00 -bash
2426 ? S 0:00 [kworker/4:1]
3428 ? S 0:00 [kworker/0:0]
3475 ? S 0:00 [kworker/u16:0]
3477 ? R 0:00 [kworker/4:2]
5753 ? Ssl 0:00 dlm_controld -q 0 -s 0
6321 pts/0 R+ 0:00 ps ax
[root@hideo ~]#

redhat.

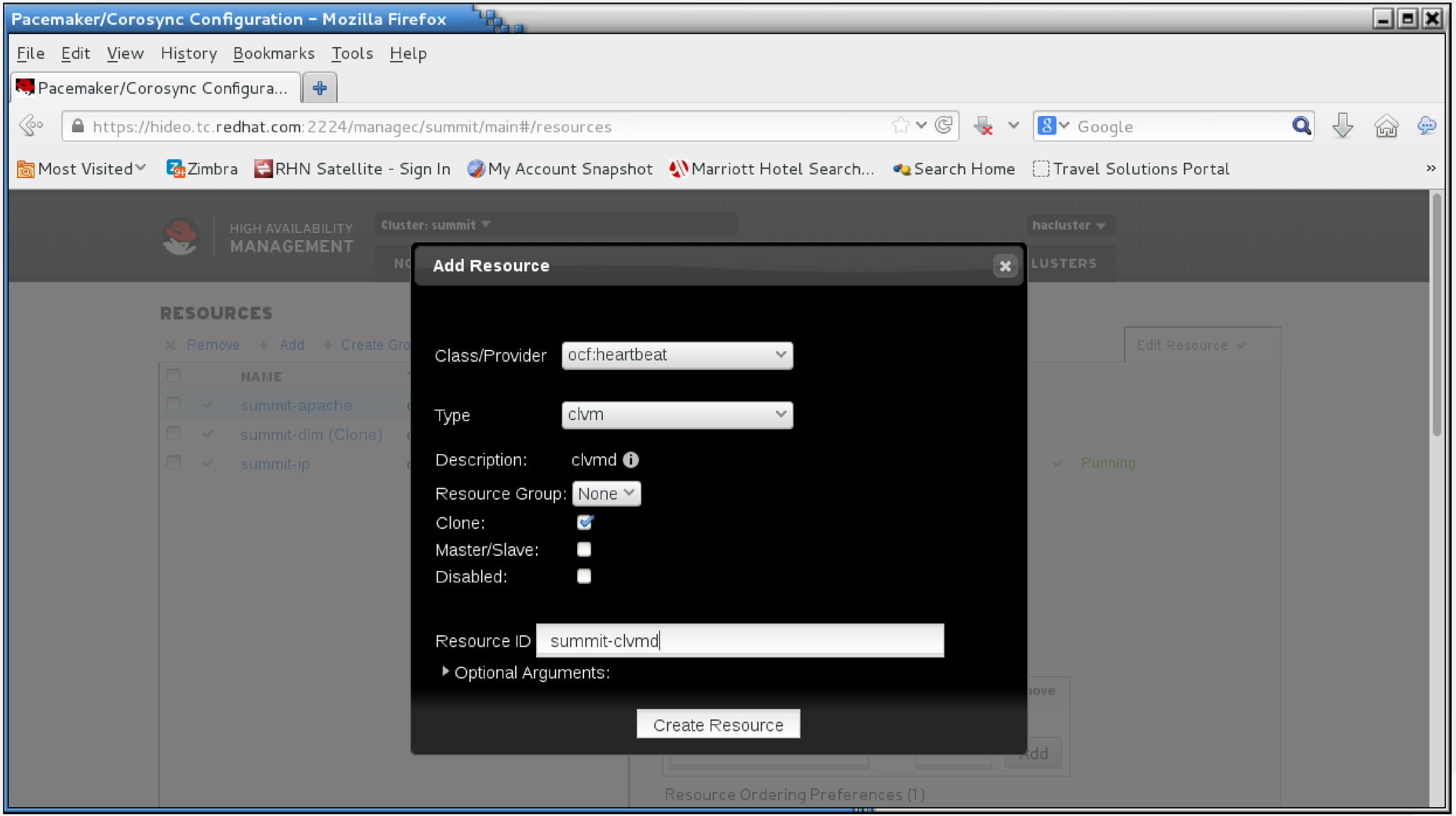
Configuring distributed logical volume management

redhat.

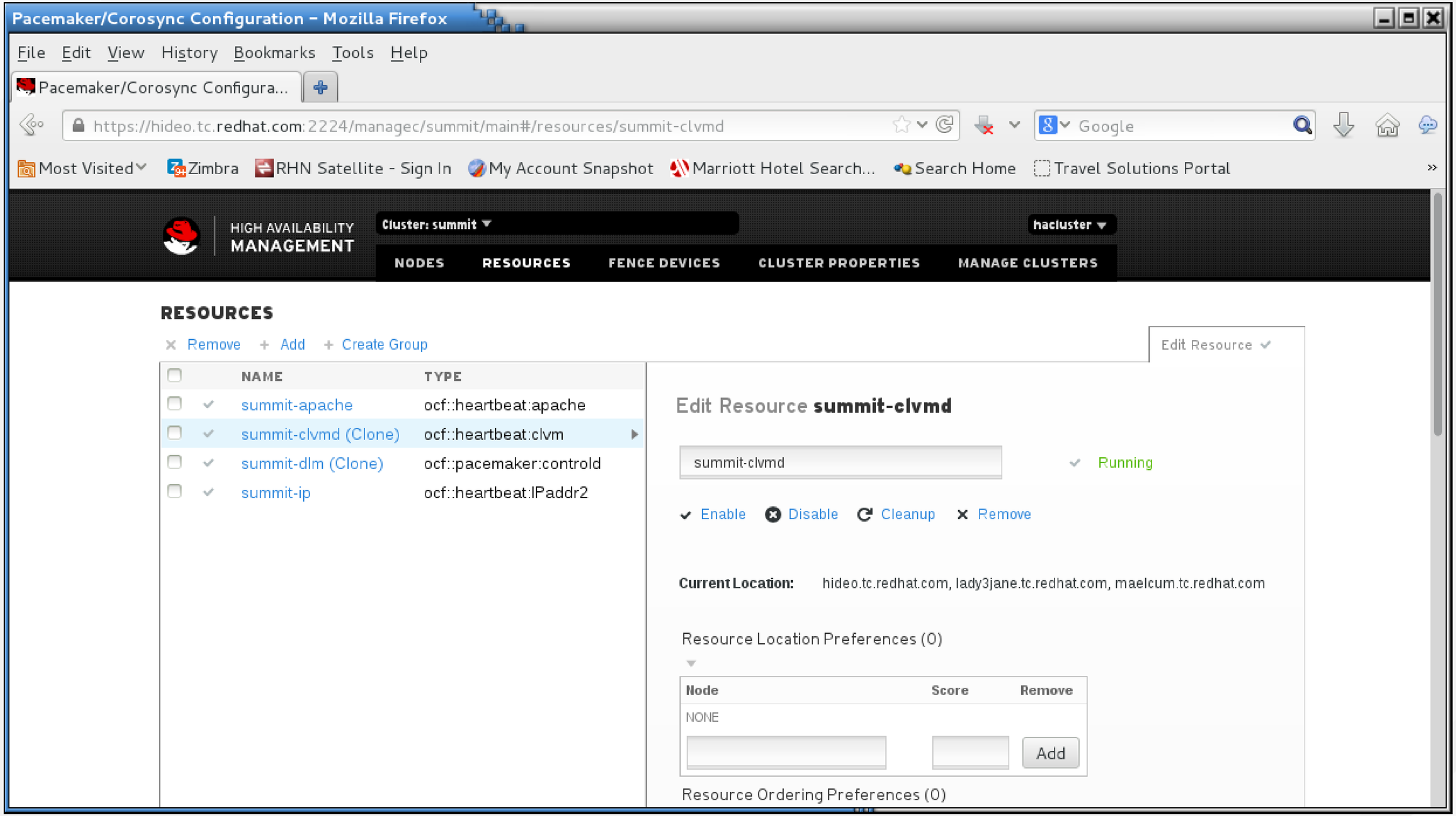
Enable Clustered Logical Volume Management

- Add an ofc:heartbeat Class/Provider for clvm
- Set it as cloned - we want this running on all nodes
- Give it a Resource ID - in this case, summit-clvmd

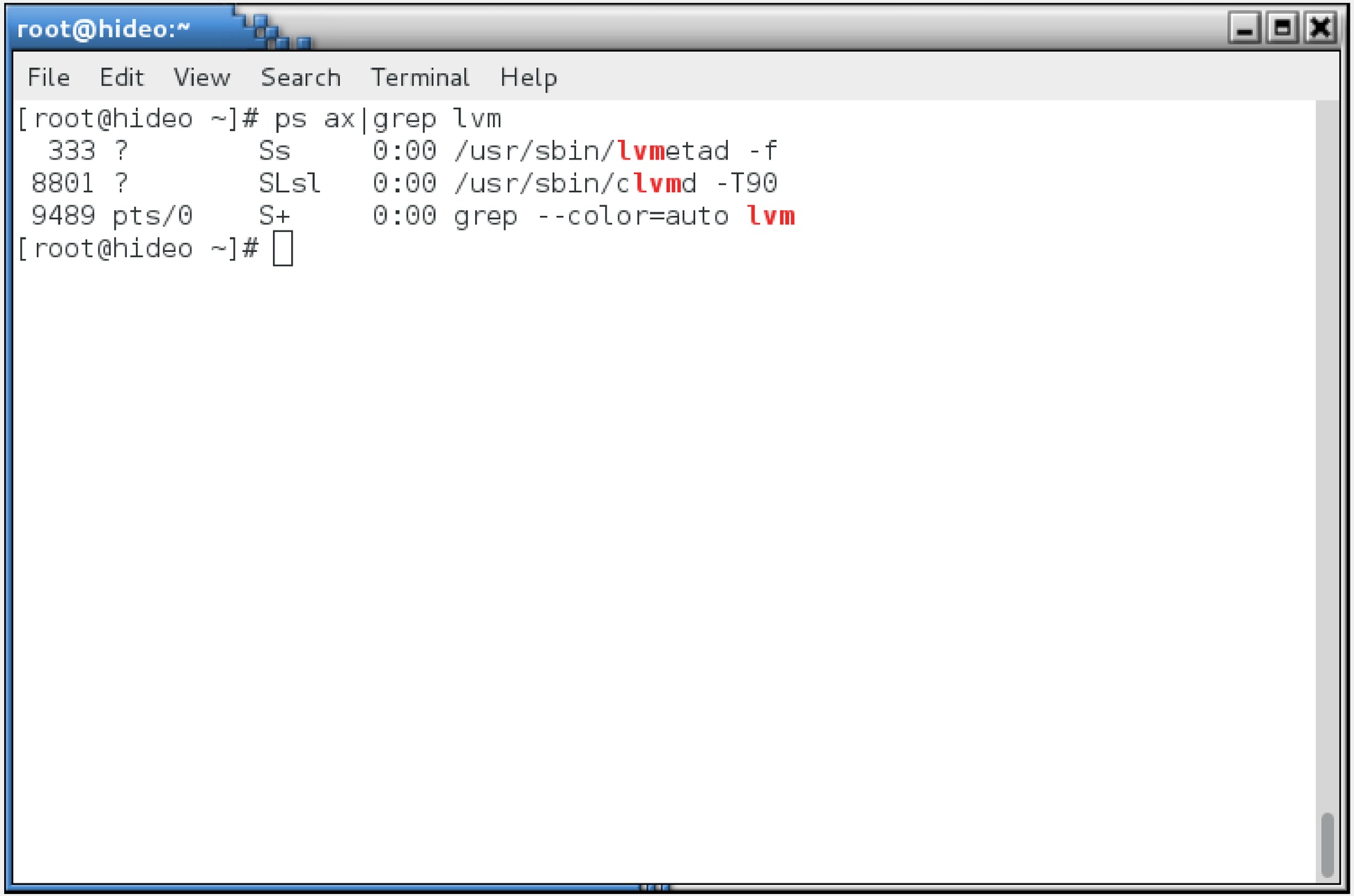
redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY MANAGEMENT
Cluster: summit
hacluster
RESOURCES
Remove
Add
NAME
summit-apache
summit-dlm (Clone)
summit-ip
Edit Resource
Running
Add Resource
Class/Provider
ocf:heartbeat
Type
clvm
Description:
clvmd
Resource Group:
None
Clone:
Master/Slave:
Disabled:
Resource ID
summit-clvmd
Optional Arguments:
Create Resource
Resource Ordering Preferences (1)

redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-clvmd
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
HIGH AVAILABILITY MANAGEMENT
Cluster: summit
hacluster
NODES
RESOURCES
FENCE DEVICES
CLUSTER PROPERTIES
MANAGE CLUSTERS
RESOURCES
Remove
Add
Create Group
Edit Resource
NAME
TYPE
summit-apache
ocf::heartbeat:apache
summit-clvmd (Clone)
ocf::heartbeat:clvm
summit-dlm (Clone)
ocf::pacemaker:controld
summit-ip
ocf::heartbeat:IPaddr2
Edit Resource summit-clvmd
summit-clvmd
Running
Enable
Disable
Cleanup
Remove
Current Location:
hideo.tc.redhat.com, lady3jane.tc.redhat.com, maelcum.tc.redhat.com
Resource Location Preferences (0)
Node
Score
Remove
NONE
Add
Resource Ordering Preferences (0)

redhat.


root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# ps ax|grep lvm
333 ? Ss 0:00 /usr/sbin/lvmetad -f
8801 ? SLsl 0:00 /usr/sbin/clvmd -T90
9489 pts/0 S+ 0:00 grep --color=auto lvm
[root@hideo ~]#

redhat.

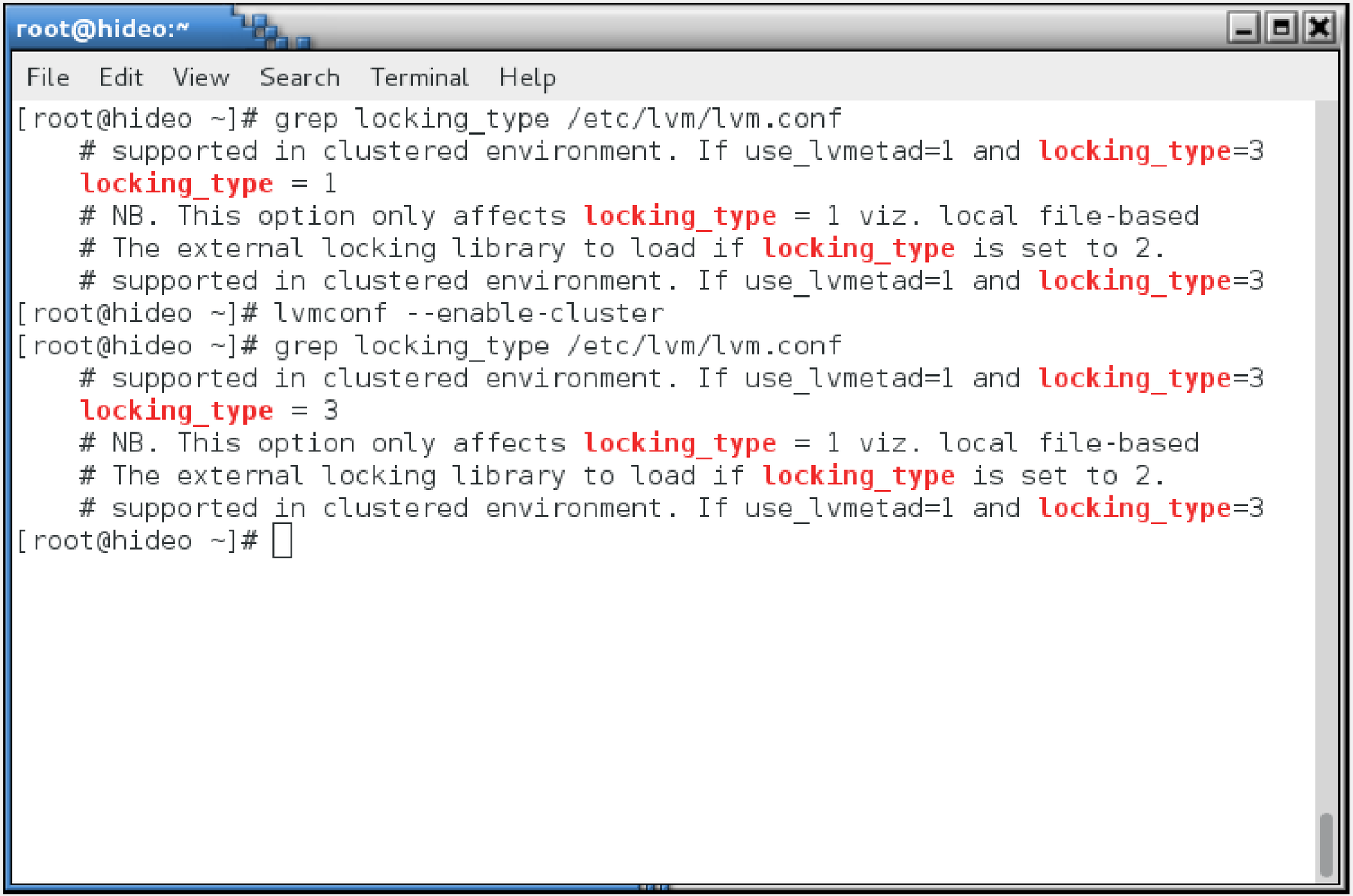
Configure clustered logical volume management

redhat.

Change locking_type from 1 to 3 in /etc/lvm/lvm.conf

- lvmconf --enable-cluster

redhat.


root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# grep locking_type /etc/lvm/lvm.conf
# supported in clustered environment. If use_lvmetad=1 and locking_type=3
locking_type = 1
# NB. This option only affects locking_type = 1 viz. local file-based
# The external locking library to load if locking_type is set to 2.
# supported in clustered environment. If use_lvmetad=1 and locking_type=3
[root@hideo ~]# lvmconf --enable-cluster
[root@hideo ~]# grep locking_type /etc/lvm/lvm.conf
# supported in clustered environment. If use_lvmetad=1 and locking_type=3
locking_type = 3
# NB. This option only affects locking_type = 1 viz. local file-based
# The external locking library to load if locking_type is set to 2.
# supported in clustered environment. If use_lvmetad=1 and locking_type=3
[root@hideo ~]#

redhat.

Note About the LVM Metadata Cache Daemon (lvmetad)

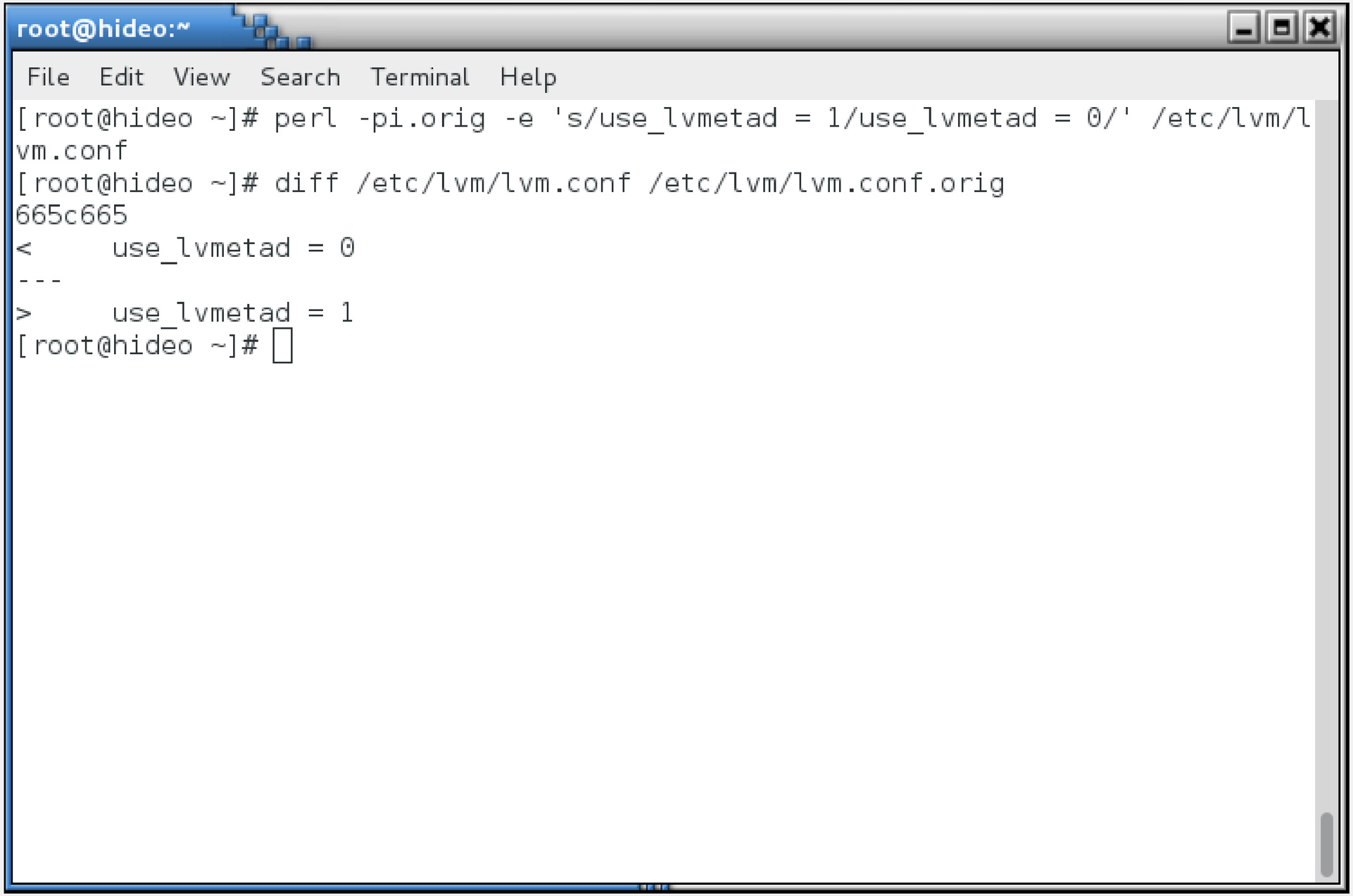
- From lvmetad(8): lvmetad is a metadata caching daemon for LVM. The daemon receives notifications from udev rules (which must be installed for LVM to work correctly when lvmetad is in use). Through these notifications, lvmetad has an up-to-date and consistent image of the volume groups available in the system.
- From /etc/lvm/lvm.conf: Don't use lvmetad with locking type 3 as lvmetad is not yet supported in clustered environment. If use_lvmetad=1 and locking_type=3 is set at the same time, LVM always issues a warning message about this and then it automatically disables lvmetad use.

redhat.

Note About the LVM Metadata Cache Daemon (lvmetad)

- Change use_lvmetad = 1 to use_lvmetad = 0
- perl -pi.orig -e 's/use_lvmetad = 1/use_lvmetad = 0/' /etc/lvm/lvm.conf

redhat.


root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# perl -pi.orig -e 's/use_lvmetad = 1/use_lvmetad = 0/' /etc/lvm/l
vm.conf
[root@hideo ~]# diff /etc/lvm/lvm.conf /etc/lvm/lvm.conf.orig
665c665
<   use_lvmetad = 0

>   use_lvmetad = 1
[root@hideo ~]#

redhat.

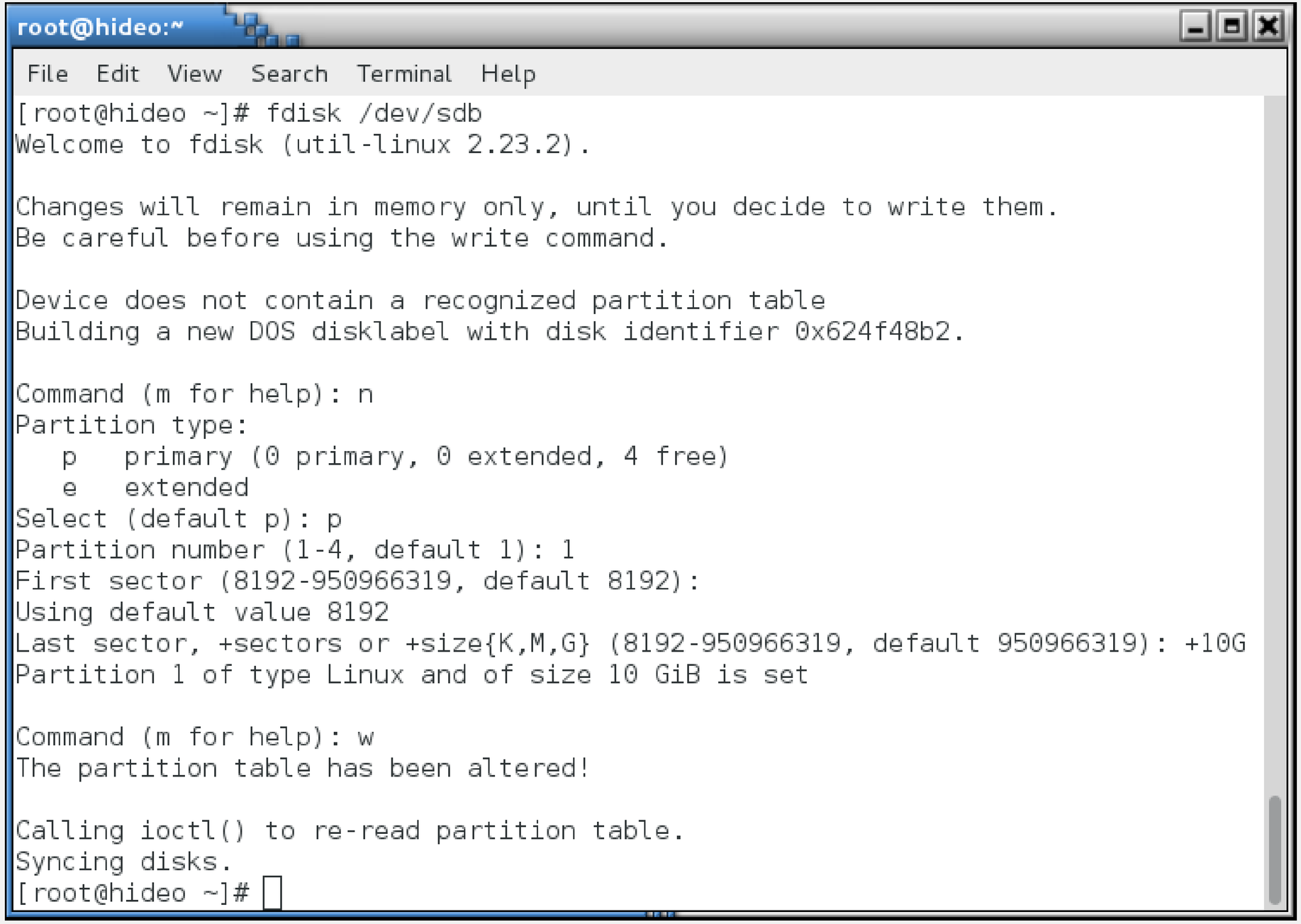
Configure shared storage

redhat.

Create a partition on the iSCSI block device

- Use your favorite partitioning tool. Here, I use fdisk to create a 10G partition

redhat.

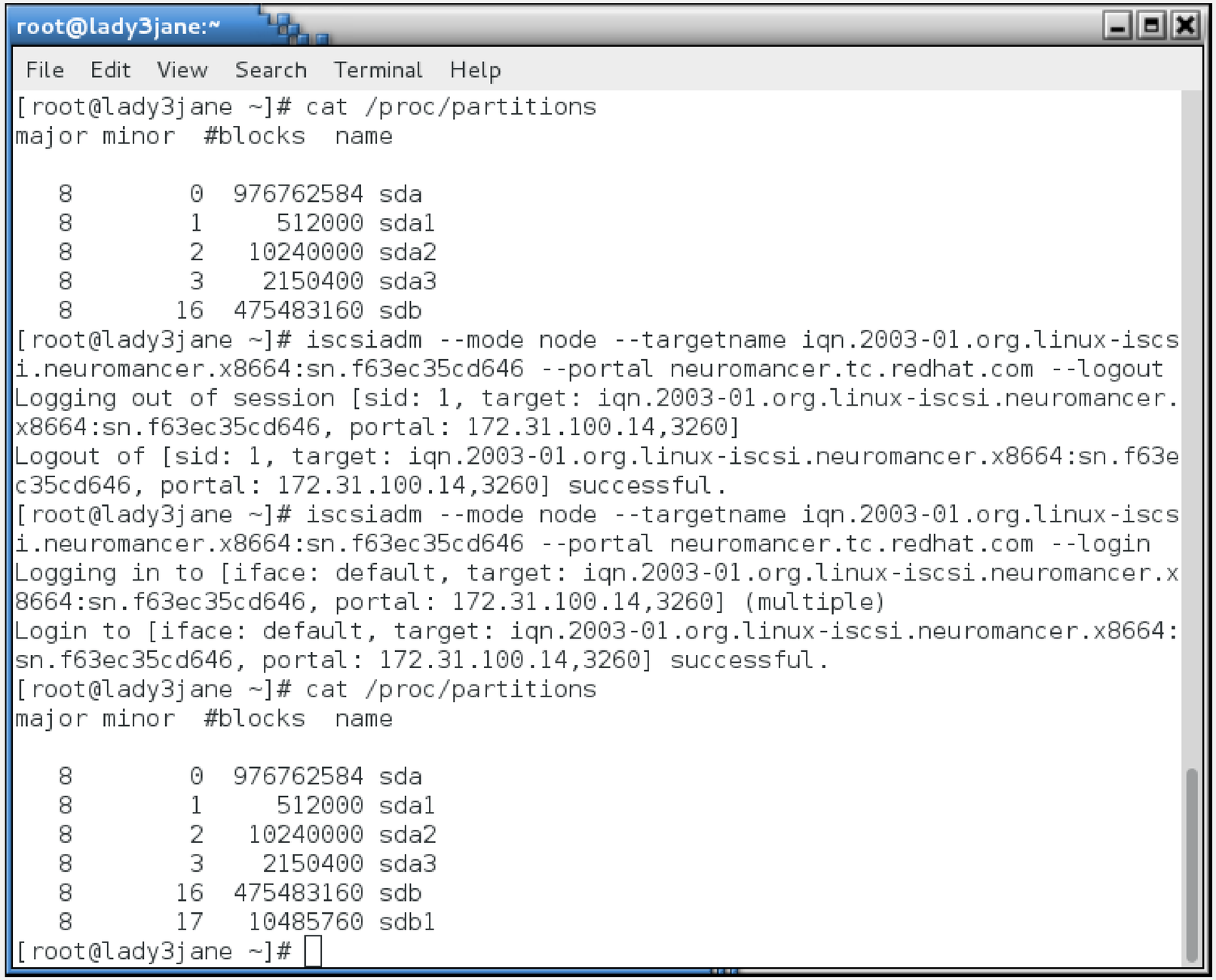

root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# fdisk /dev/sdb
Welcome to fdisk (util-linux 2.23.2).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.
Device does not contain a recognized partition table
Building a new DOS disklabel with disk identifier 0x624f48b2.
Command (m for help): n
Partition type:
p primary (0 primary, 0 extended, 4 free)
e extended
Select (default p): p
Partition number (1-4, default 1): 1
First sector (8192-950966319, default 8192):
Using default value 8192
Last sector, +sectors or +size{K,M,G} (8192-950966319, default 950966319): +10G
Partition 1 of type Linux and of size 10 GiB is set
Command (m for help): w
The partition table has been altered!
Calling ioctl() to re-read partition table.
Syncing disks.
[root@hideo ~]#

redhat.

Log out and back in to discover the partitions on the other nodes

- iscsiadm --mode node --targetname iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646 --portal neuromancer.tc.redhat.com --logout
- iscsiadm --mode node --targetname iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646 --portal neuromancer.tc.redhat.com --login

redhat.

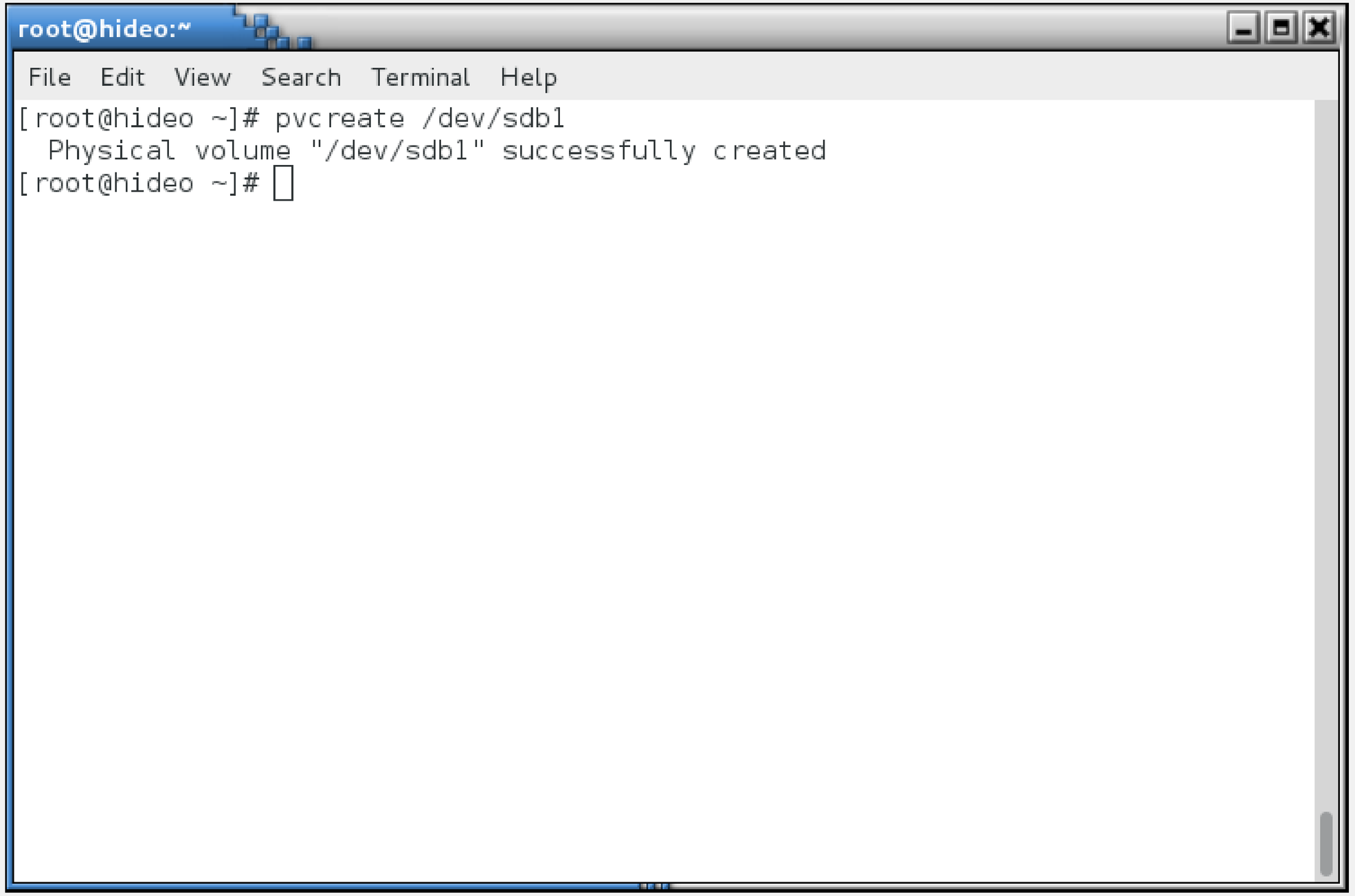

root@lady3jane:~
File Edit View Search Terminal Help
[root@lady3jane ~]# cat /proc/partitions
major minor #blocks name
8 0 976762584 sda
8 1 512000 sda1
8 2 10240000 sda2
8 3 2150400 sda3
8 16 475483160 sdb
[root@lady3jane ~]# iscsiadm --mode node --targetname iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646 --portal neuromancer.tc.redhat.com --logout
Logging out of session [sid: 1, target: iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646, portal: 172.31.100.14,3260]
Logout of [sid: 1, target: iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646, portal: 172.31.100.14,3260] successful.
[root@lady3jane ~]# iscsiadm --mode node --targetname iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646 --portal neuromancer.tc.redhat.com --login
Logging in to [iface: default, target: iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646, portal: 172.31.100.14,3260] (multiple)
Login to [iface: default, target: iqn.2003-01.org.linux-iscsi.neuromancer.x8664:sn.f63ec35cd646, portal: 172.31.100.14,3260] successful.
[root@lady3jane ~]# cat /proc/partitions
major minor #blocks name
8 0 976762584 sda
8 1 512000 sda1
8 2 10240000 sda2
8 3 2150400 sda3
8 16 475483160 sdb
8 17 10485760 sdb1
[root@lady3jane ~]#

redhat.

Create a Physical Volume

- pvcreate /dev/sdb1

redhat.

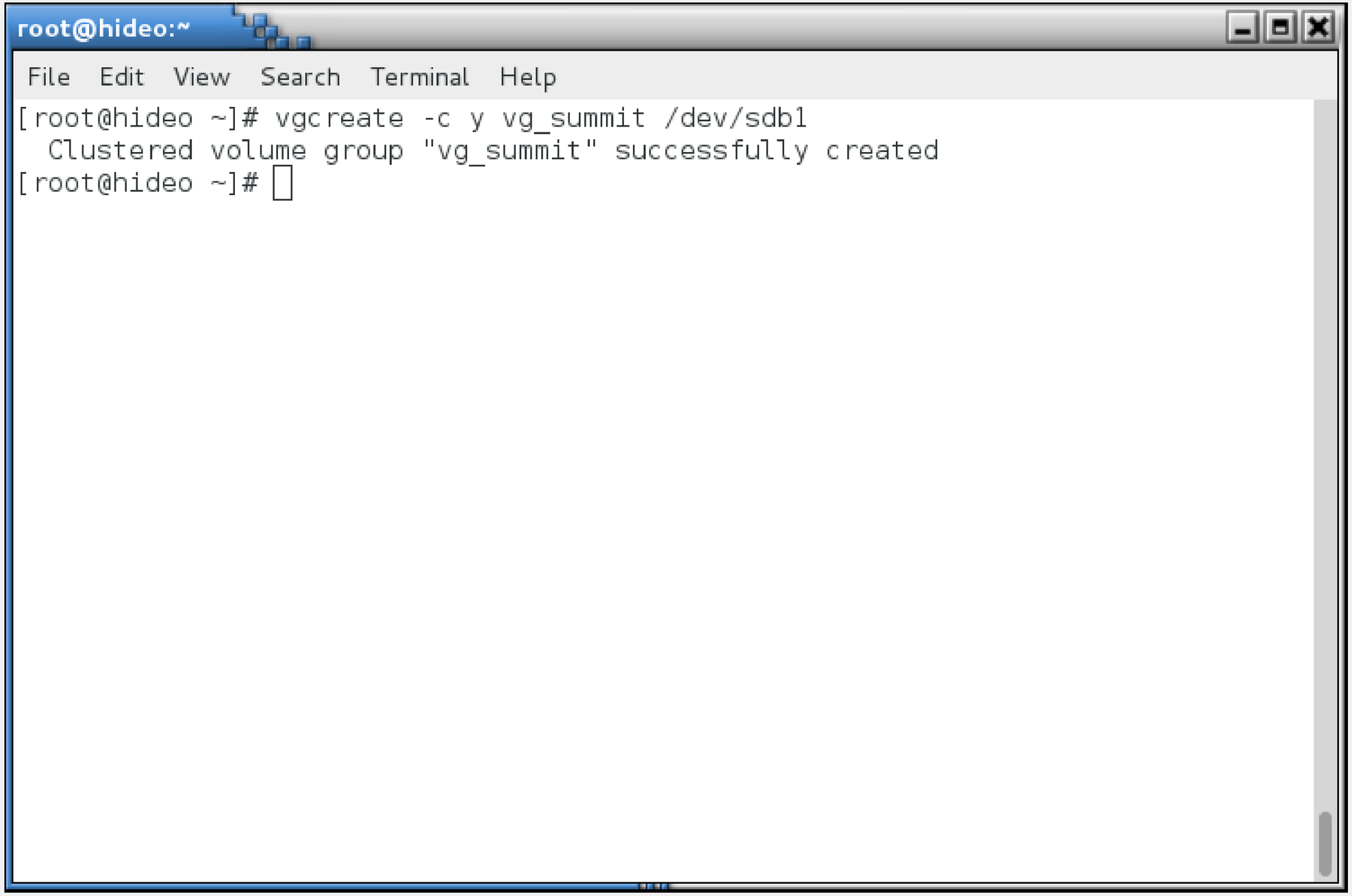

root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# pvcreate /dev/sdb1
Physical volume "/dev/sdb1" successfully created
[root@hideo ~]#

redhat.

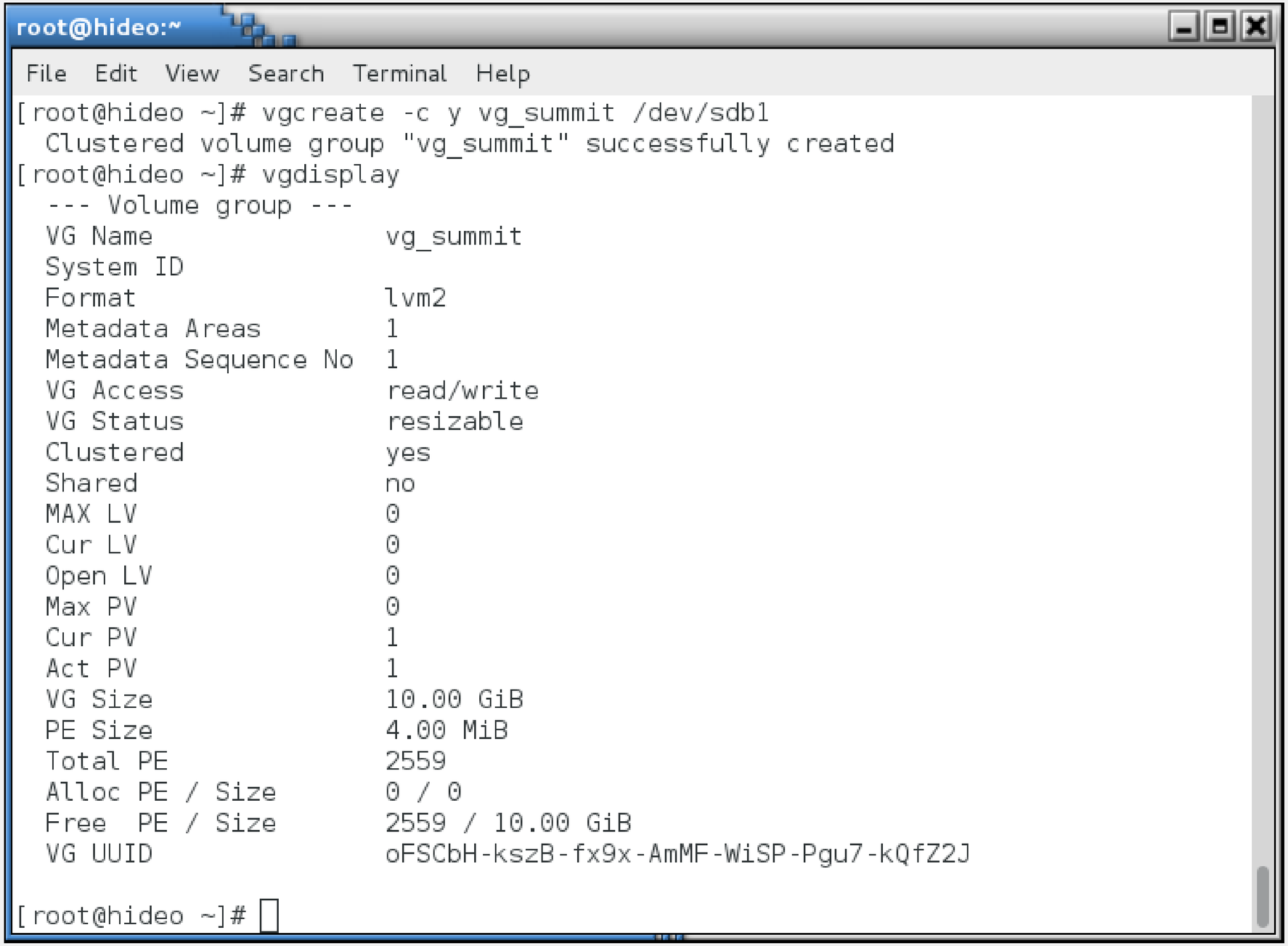
Create a Volume Group

- vgcreate --clustered y vg_summit /dev/sdb1
  - Don't forget the “--clustered y” argument!

redhat.


root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# vgcreate -c y vg_summit /dev/sdb1
Clustered volume group "vg_summit" successfully created
[root@hideo ~]#

redhat.


root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# vgcreate -c y vg_summit /dev/sdb1
Clustered volume group "vg_summit" successfully created
[root@hideo ~]# vgdisplay
--- Volume group ---
VG Name vg_summit
System ID
Format lvm2
Metadata Areas 1
Metadata Sequence No 1
VG Access read/write
VG Status resizable
Clustered yes
Shared no
MAX LV 0
Cur LV 0
Open LV 0
Max PV 0
Cur PV 1
Act PV 1
VG Size 10.00 GiB
PE Size 4.00 MiB
Total PE 2559
Alloc PE / Size 0 / 0
Free PE / Size 2559 / 10.00 GiB
VG UUID oFSCbH-kszB-fx9x-AmMF-WiSP-Pgu7-kQfZ2J
[root@hideo ~]#

redhat.

Create a Logical Volume

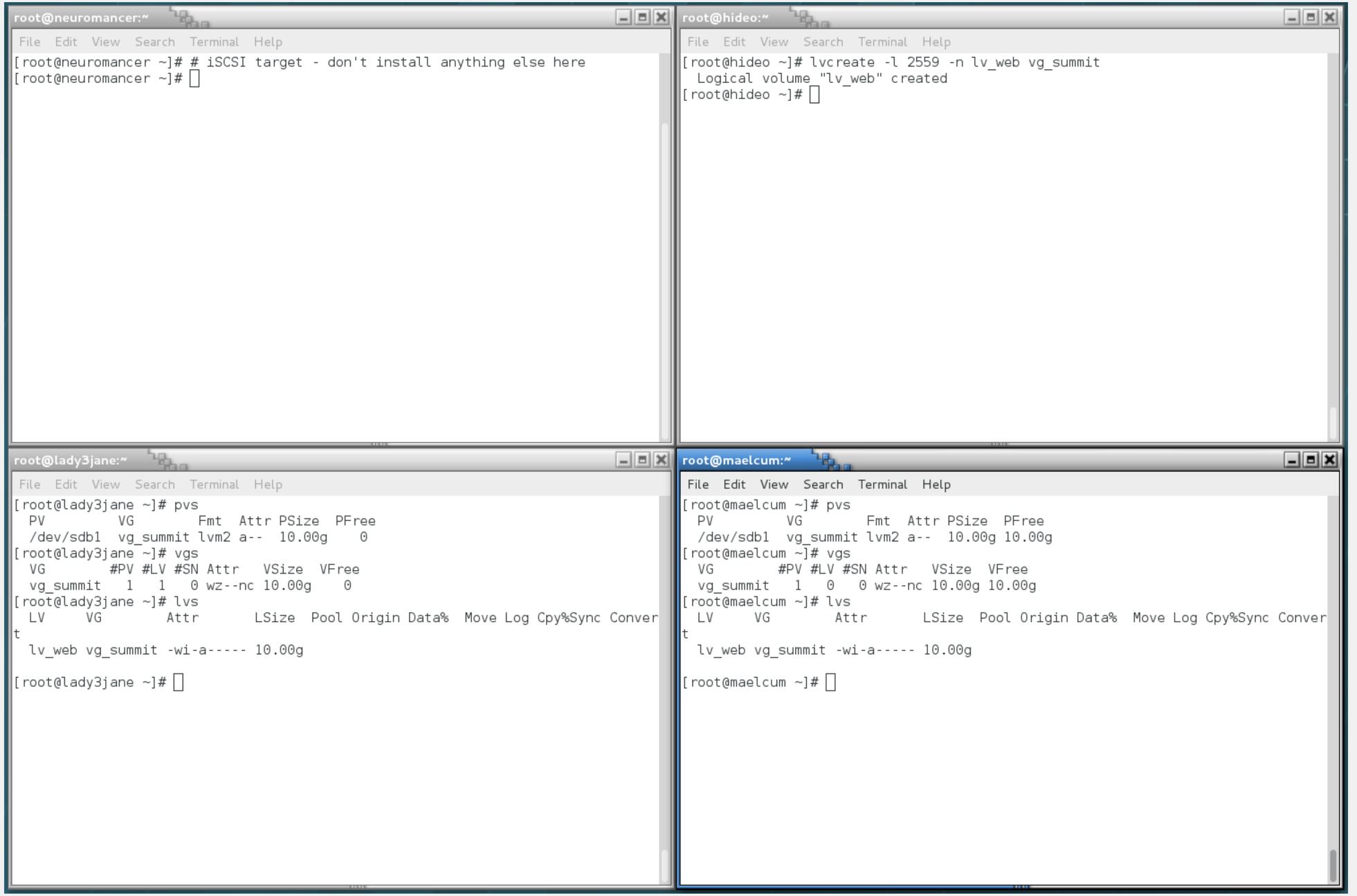
- lvcreate -l 2559 -n lv_web vg_summit

redhat.

You can use pvs, lvs and vgs to scan LVM components from the other nodes

- From each node, just run those commands:
  - pvs (reports info about physical volumes)
  - vgs (reports information about volume groups)
  - lvs (reports information about logical volumes)

redhat.

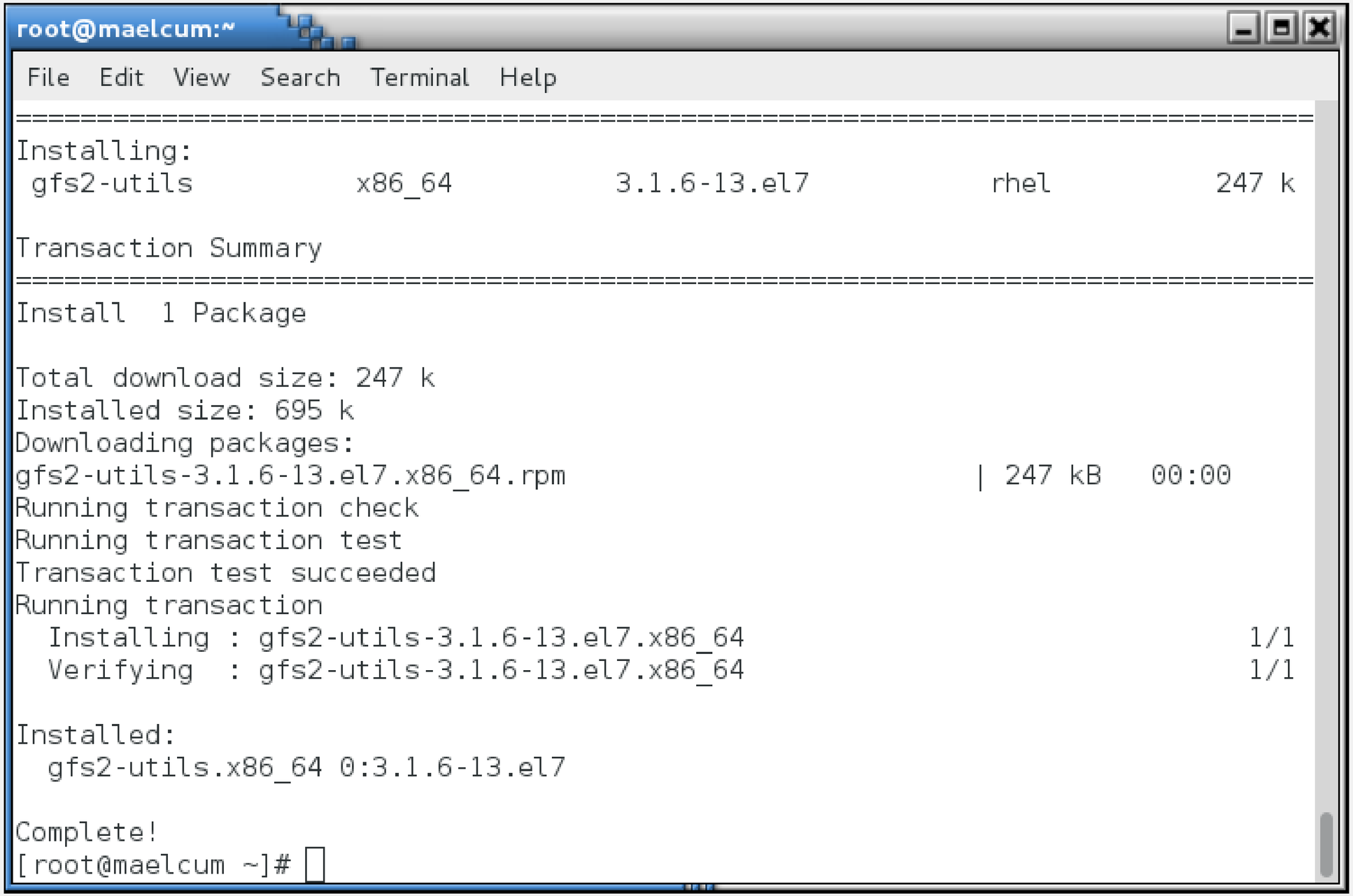

root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# # iSCSI target - don't install anything else here
[root@neuromancer ~]#
root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# lvcreate -l 2559 -n lv_web vg_summit
Logical volume "lv_web" created
[root@hideo ~]#
root@lady3jane:~
File Edit View Search Terminal Help
[root@lady3jane ~]# pvs
PV VG Fmt Attr PSize PFree
/dev/sdb1 vg_summit lvm2 a-- 10.00g 0
[root@lady3jane ~]# vgs
VG #PV #LV #SN Attr VSize VFree
vg_summit 1 1 0 wz--nc 10.00g 0
[root@lady3jane ~]# lvs
LV VG Attr LSize Pool Origin Data% Move Log Cpy%Sync Convert
lv_web vg_summit -wi-a----- 10.00g
[root@lady3jane ~]#
root@maelcum:~
File Edit View Search Terminal Help
[root@maelcum ~]# pvs
PV VG Fmt Attr PSize PFree
/dev/sdb1 vg_summit lvm2 a-- 10.00g 10.00g
[root@maelcum ~]# vgs
VG #PV #LV #SN Attr VSize VFree
vg_summit 1 0 0 wz--nc 10.00g 10.00g
[root@maelcum ~]# lvs
LV VG Attr LSize Pool Origin Data% Move Log Cpy%Sync Convert
lv_web vg_summit -wi-a----- 10.00g
[root@maelcum ~]#

redhat.

Install gfs2-utils

- yum -y install gfs2-utils

redhat.


root@maelcum:~
File Edit View Search Terminal Help
==
Installing:
 gfs2-utils   x86_64   3.1.6-13.el7   rhel   247 k

Transaction Summary
==
Install 1 Package

Total download size: 247 k
Installed size: 695 k
Downloading packages:
gfs2-utils-3.1.6-13.el7.x86_64.rpm | 247 kB   00:00
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
  Installing : gfs2-utils-3.1.6-13.el7.x86_64   1/1
  Verifying : gfs2-utils-3.1.6-13.el7.x86_64   1/1

Installed:
  gfs2-utils.x86_64 0:3.1.6-13.el7

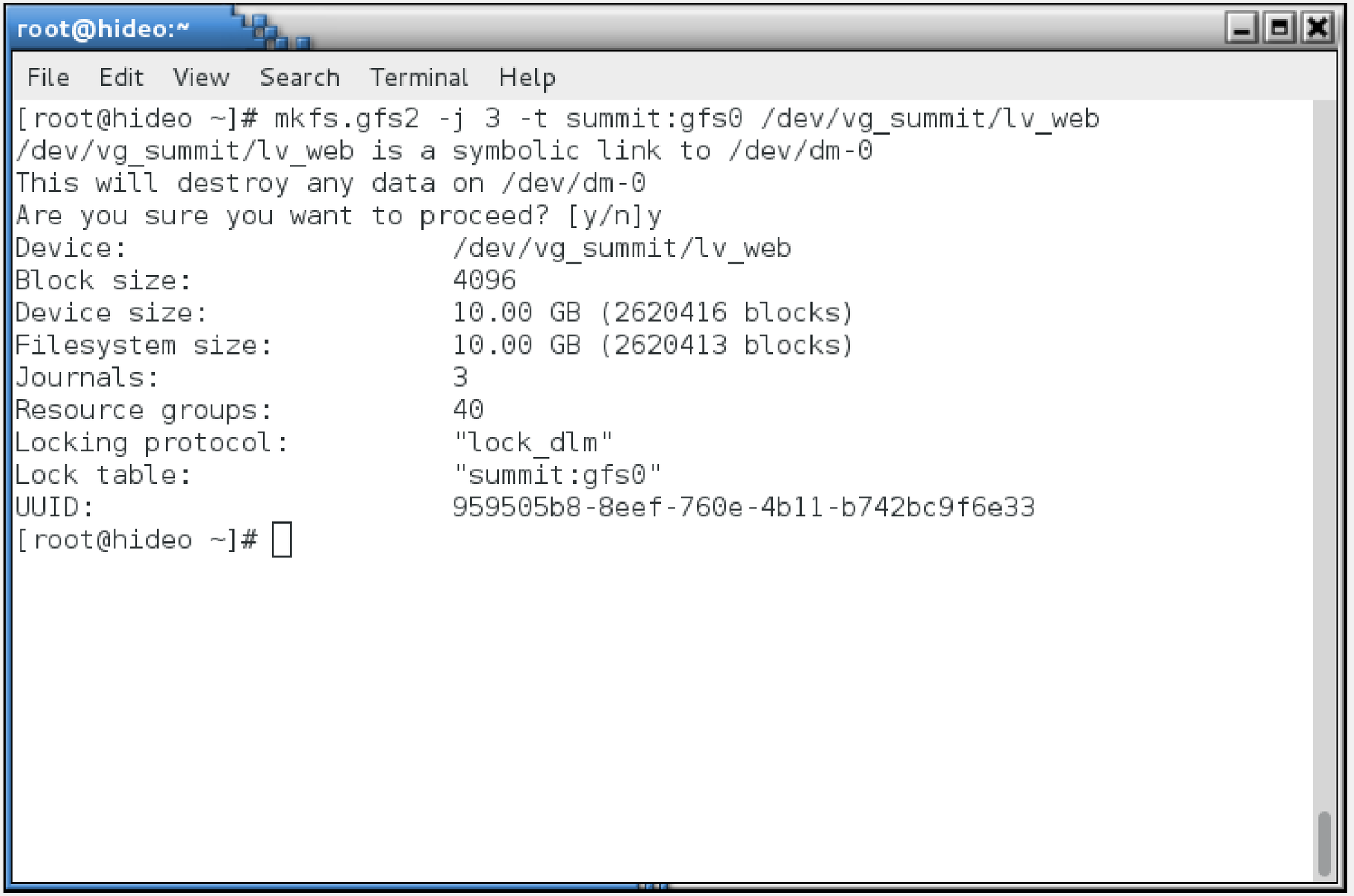
Complete!
[root@maelcum ~]#

redhat.

Create a GFS2 Filesystem on the Clustered Logical Volume

- mkfs.gfs2 -j 3 -t summit:gfs0 /dev/vg_summit/lv_web
  - -j 3 is the number of journals - one per node. Extras are fine, too.
  - -t summit:gfs0 is [clustername]:[fsname]. “summit” is the name of the cluster we defined, and “gfs0” is the name I gave the filesystem being created.
  - /dev/vg_summit/lv_web is the block device being formatted. In this case, a clustered logical volume

redhat.


root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# mkfs.gfs2 -j 3 -t summit:gfs0 /dev/vg_summit/lv_web
/dev/vg_summit/lv_web is a symbolic link to /dev/dm-0
This will destroy any data on /dev/dm-0
Are you sure you want to proceed? [y/n]y
Device: /dev/vg_summit/lv_web
Block size: 4096
Device size: 10.00 GB (2620416 blocks)
Filesystem size: 10.00 GB (2620413 blocks)
Journals: 3
Resource groups: 40
Locking protocol: "lock_dlm"
Lock table: "summit:gfs0"
UUID: 959505b8-8eef-760e-4b11-b742bc9f6e33
[root@hideo ~]#

redhat.

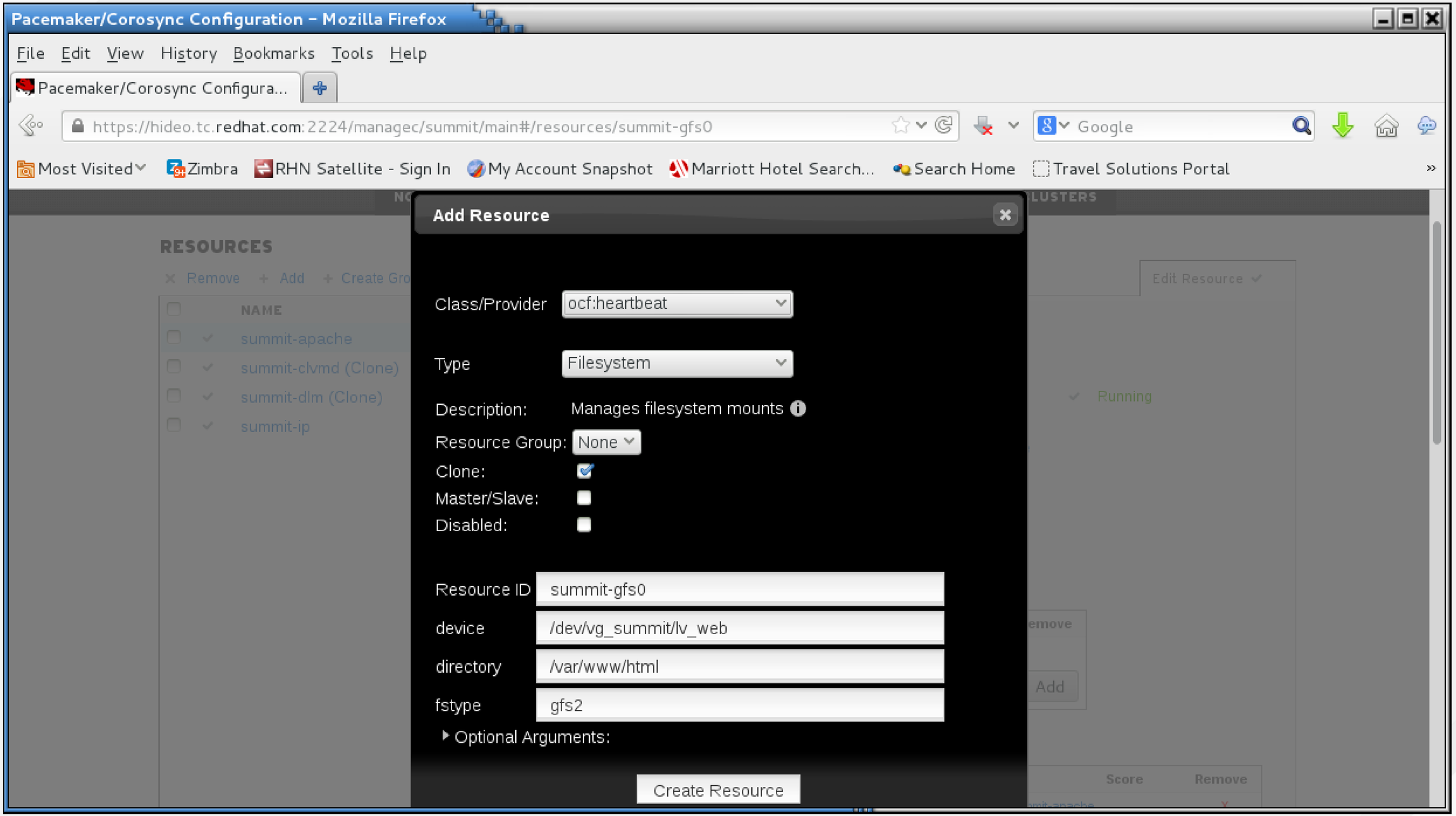
Add shared storage resource

redhat.

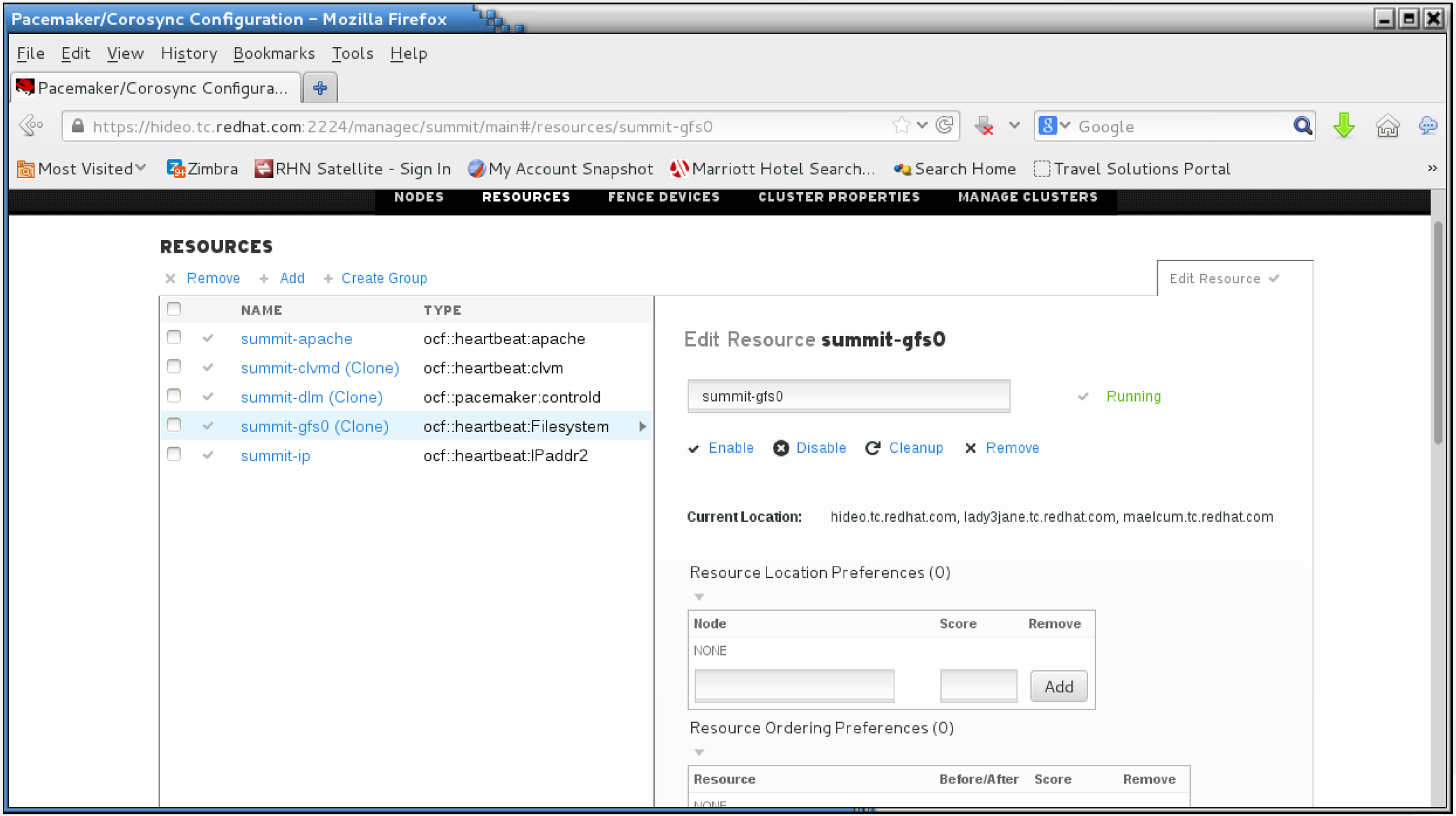
Create a New Filesystem Resource

- Create a new ofc:heartbeat resource of type Filesystem
- Check the box to clone the resource - we wanted it mounted on all the servers
- Give it a Resource ID - in this case, “summit-gfs0”
- Define the block device - in this case, the clustered logical volume “/dev/vg_summit/lv_web”
- Define the filesystem type - in this case, gfs2
- Click “Create Resource”

redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-gfs0
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
RESOURCES
Remove
Add
NAME
summit-apache
summit-clvmd (Clone)
summit-dlm (Clone)
summit-ip
Edit Resource
Running
Add
Score
Remove
Add Resource
Class/Provider
ocf:heartbeat
Type
Filesystem
Description:
Manages filesystem mounts
Resource Group:
None
Clone:
Master/Slave:
Disabled:
Resource ID
summit-gfs0
device
/dev/vg_summit/lv_web
directory
/var/www/html
fstype
gfs2
Optional Arguments:
Create Resource

redhat.

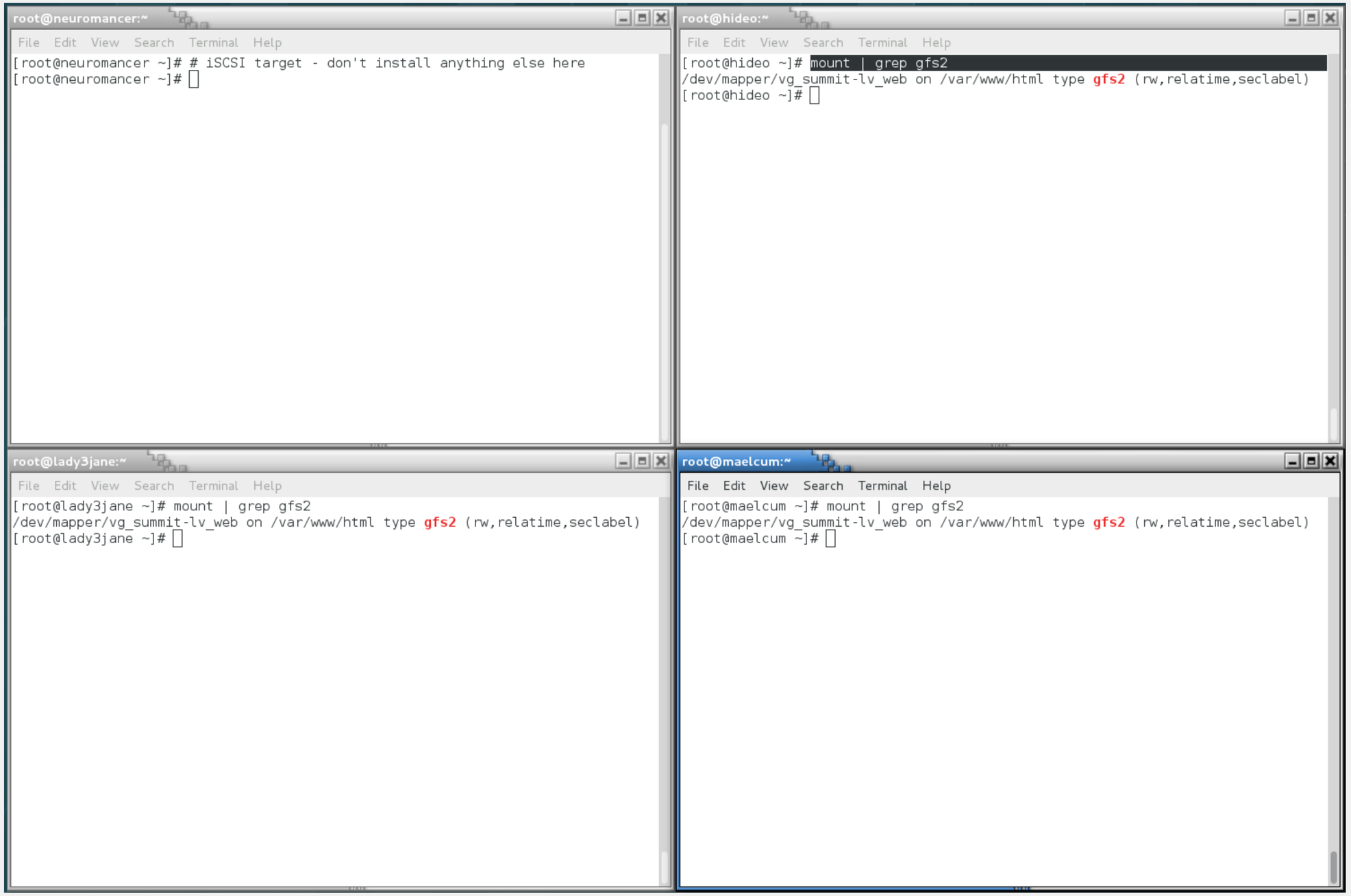

Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-gfs0
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
NODES
RESOURCES
FENCE DEVICES
CLUSTER PROPERTIES
MANAGE CLUSTERS
RESOURCES
Remove
Add
Create Group
Edit Resource
NAME
TYPE
summit-apache
ocf::heartbeat:apache
summit-clvmd (Clone)
ocf::heartbeat:clvm
summit-dlm (Clone)
ocf::pacemaker:controld
summit-gfs0 (Clone)
ocf::heartbeat:Filesystem
summit-ip
ocf::heartbeat:IPaddr2
Edit Resource summit-gfs0
summit-gfs0
Running
Enable
Disable
Cleanup
Remove
Current Location:
hideo.tc.redhat.com, lady3jane.tc.redhat.com, maelcum.tc.redhat.com
Resource Location Preferences (0)
Node
Score
Remove
NONE
Add
Resource Ordering Preferences (0)
Resource
Before/After
Score
Remove
NONE

redhat.

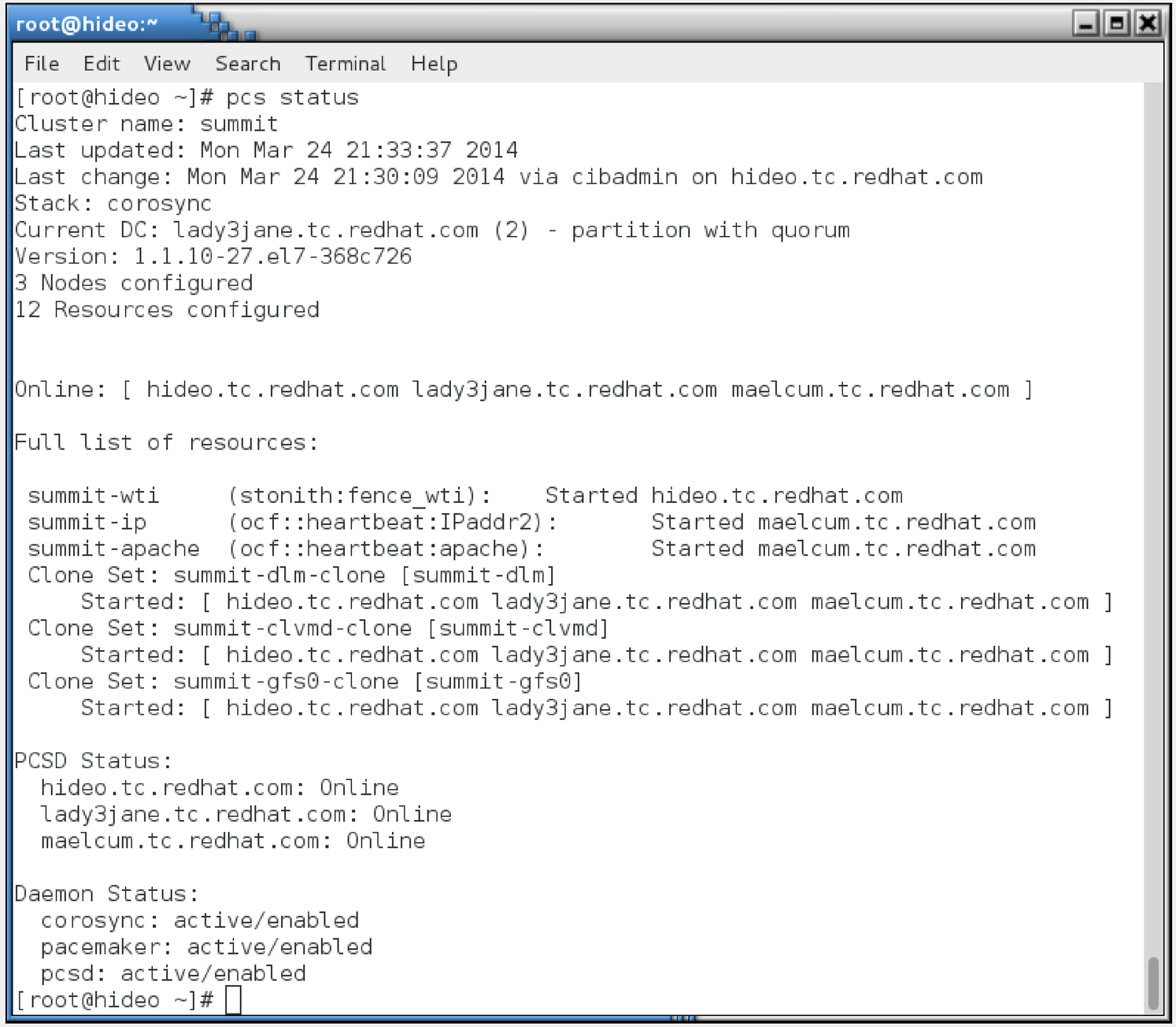
The GFS2 Mountpoint Should Be Visible on All Nodes

- Run “mount | grep gfs2” on each node

redhat.


root@neuromancer:~
File Edit View Search Terminal Help
[root@neuromancer ~]# # iSCSI target - don't install anything else here
[root@neuromancer ~]#
root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# mount | grep gfs2
/dev/mapper/vg_summit-lv_web on /var/www/html type gfs2 (rw,relatime,seclabel)
[root@hideo ~]#
root@lady3jane:~
File Edit View Search Terminal Help
[root@lady3jane ~]# mount | grep gfs2
/dev/mapper/vg_summit-lv_web on /var/www/html type gfs2 (rw,relatime,seclabel)
[root@lady3jane ~]#
root@maelcum:~
File Edit View Search Terminal Help
[root@maelcum ~]# mount | grep gfs2
/dev/mapper/vg_summit-lv_web on /var/www/html type gfs2 (rw,relatime,seclabel)
[root@maelcum ~]#

redhat.

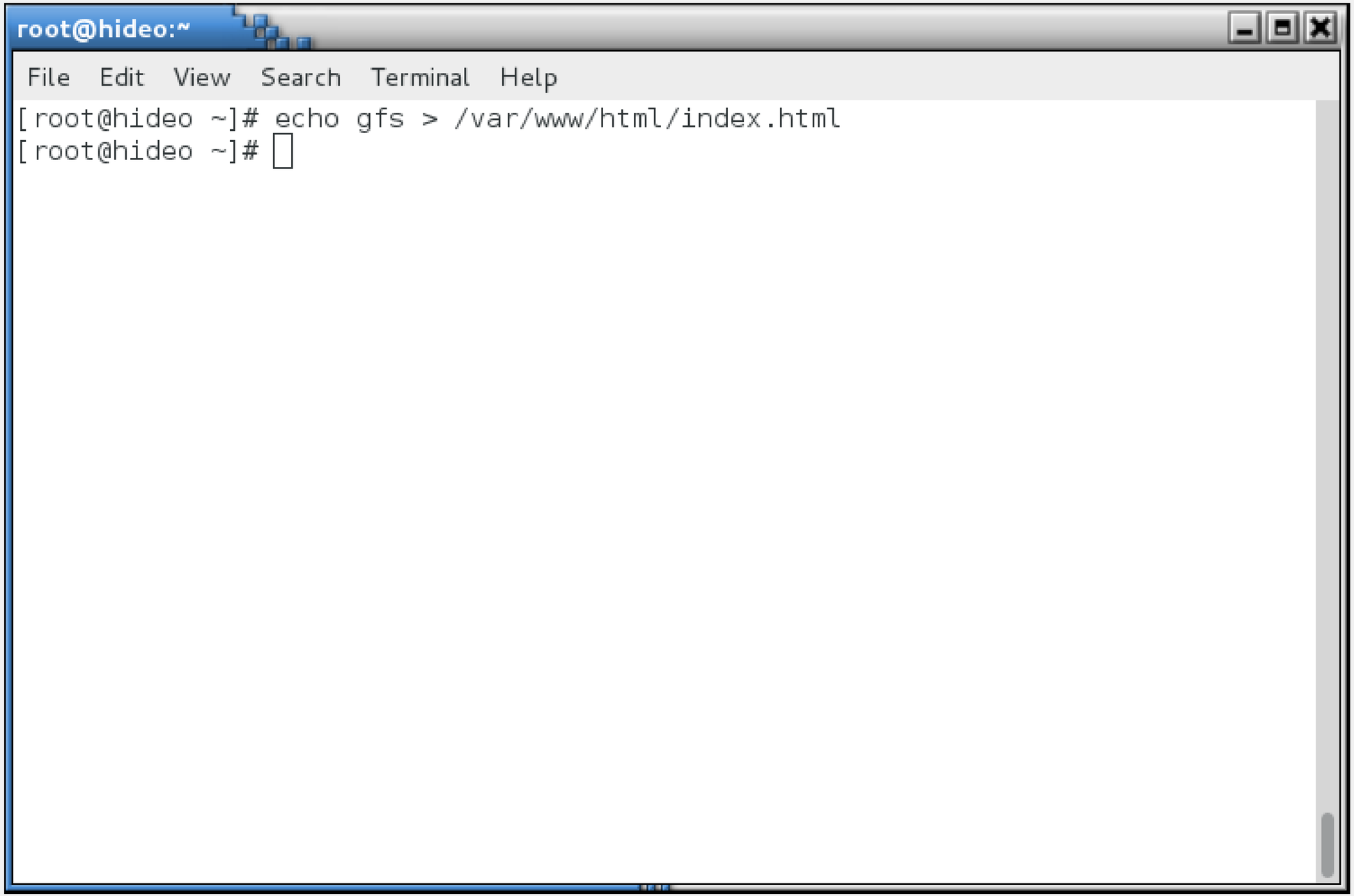

root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# pcs status
Cluster name: summit
Last updated: Mon Mar 24 21:33:37 2014
Last change: Mon Mar 24 21:30:09 2014 via cibadmin on hideo.tc.redhat.com
Stack: corosync
Current DC: lady3jane.tc.redhat.com (2) - partition with quorum
Version: 1.1.10-27.el7-368c726
3 Nodes configured
12 Resources configured
Online: [hideo.tc.redhat.com lady3jane.tc.redhat.com maelcum.tc.redhat.com]
Full list of resources:
summit-wti (stonith:fence_wti): Started hideo.tc.redhat.com
summit-ip (ocf::heartbeat:IPaddr2): Started maelcum.tc.redhat.com
summit-apache (ocf::heartbeat:apache): Started maelcum.tc.redhat.com
Clone Set: summit-dlm-clone [summit-dlm]
Started: [hideo.tc.redhat.com lady3jane.tc.redhat.com maelcum.tc.redhat.com]
Clone Set: summit-clvmd-clone [summit-clvmd]
Started: [hideo.tc.redhat.com lady3jane.tc.redhat.com maelcum.tc.redhat.com]
Clone Set: summit-gfs0-clone [summit-gfs0]
Started: [hideo.tc.redhat.com lady3jane.tc.redhat.com maelcum.tc.redhat.com]
PCSD Status:
hideo.tc.redhat.com: Online
lady3jane.tc.redhat.com: Online
maelcum.tc.redhat.com: Online
Daemon Status:
corosync: active/enabled
pacemaker: active/enabled
pcsd: active/enabled
[root@hideo ~]#

redhat.

Test Your Web Site

- Create an index.html
  - echo gfs > /var/www/html/index.html

redhat.

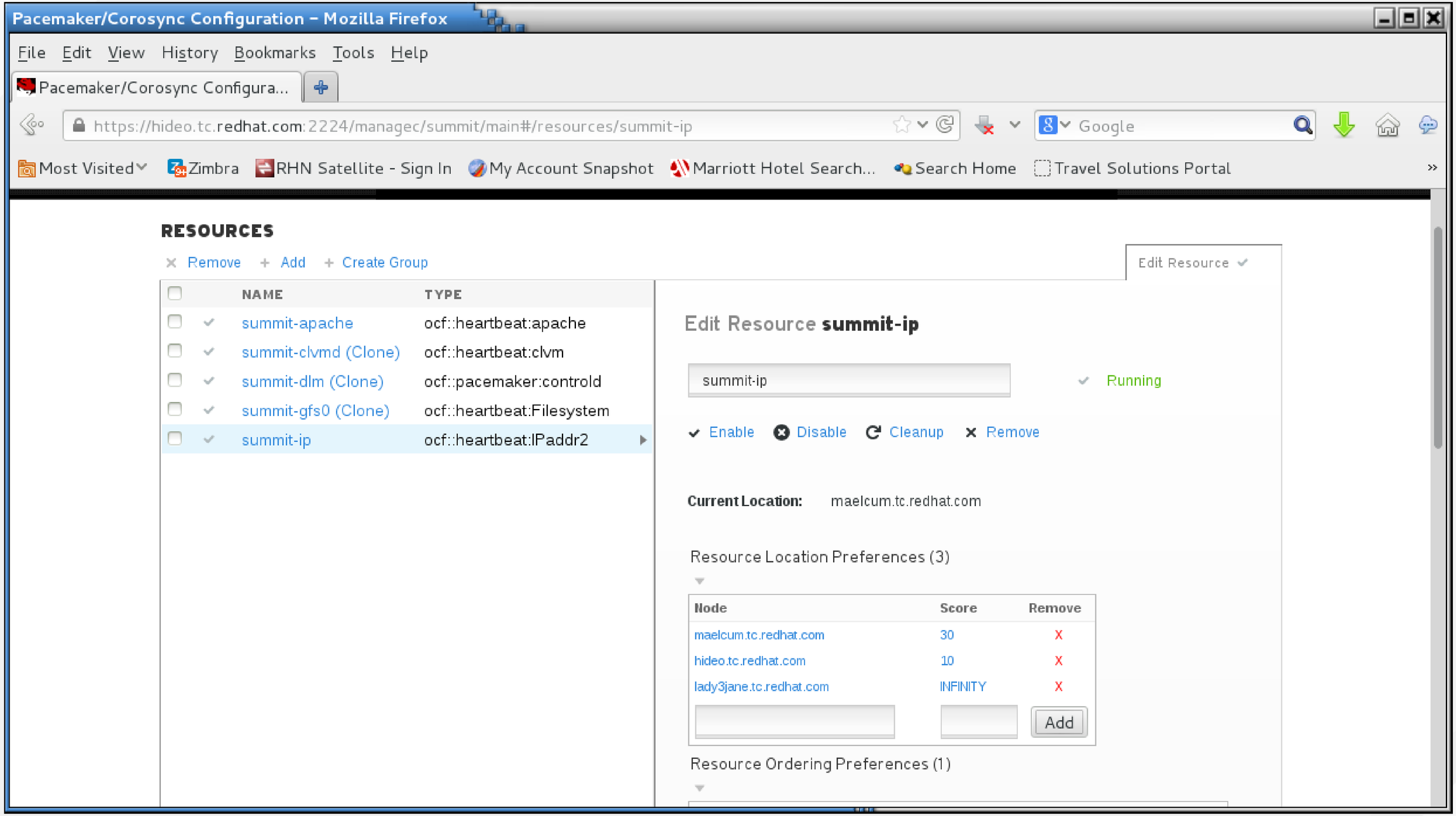

root@hideo:~
File Edit View Search Terminal Help
[root@hideo ~]# echo gfs > /var/www/html/index.html
[root@hideo ~]#

redhat.

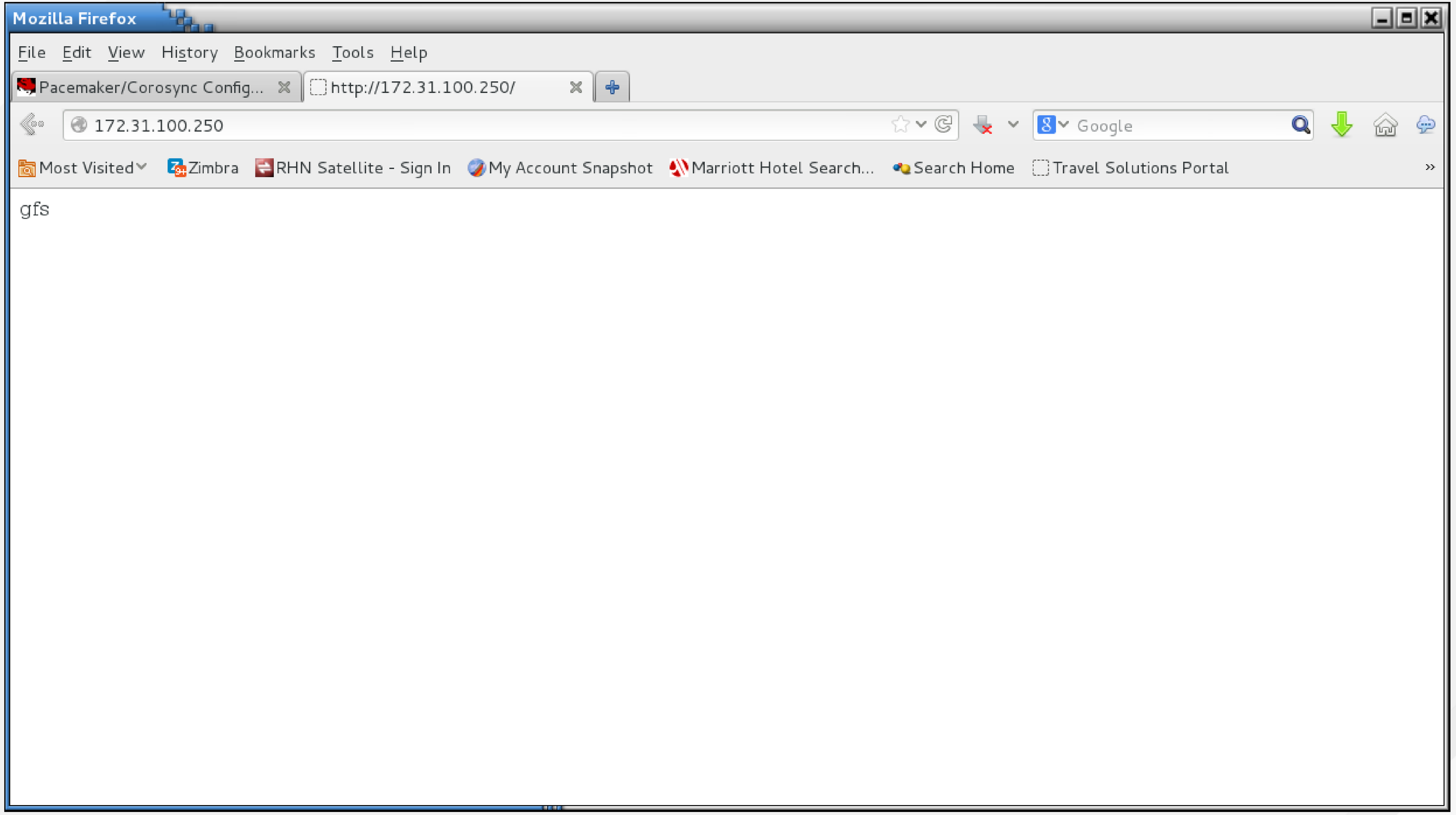
Migrate the Web Site

- Set the priority of the ip address resource to INFINITY (one at a time) on each node

redhat.


Pacemaker/Corosync Configuration – Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Configura...
https://hideo.tc.redhat.com:2224/managec/summit/main#/resources/summit-ip
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
RESOURCES
Remove
Add
Create Group
Edit Resource
NAME
TYPE
summit-apache
ocf::heartbeat:apache
summit-clvmd (Clone)
ocf::heartbeat:clvm
summit-dlm (Clone)
ocf::pacemaker:controld
summit-gfs0 (Clone)
ocf::heartbeat:Filesystem
summit-ip
ocf::heartbeat:IPaddr2
Edit Resource summit-ip
summit-ip
Running
Enable
Disable
Cleanup
Remove
Current Location:
maelcum.tc.redhat.com
Resource Location Preferences (3)
Node
Score
Remove
maelcum.tc.redhat.com
30
X
hideo.tc.redhat.com
10
X
lady3jane.tc.redhat.com
INFINITY
X
Add
Resource Ordering Preferences (1)

redhat.


Mozilla Firefox
File Edit View History Bookmarks Tools Help
Pacemaker/Corosync Config...
http://172.31.100.250/
172.31.100.250
Google
Most Visited
Zimbra
RHN Satellite - Sign In
My Account Snapshot
Marriott Hotel Search...
Search Home
Travel Solutions Portal
gfs

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Test crashes

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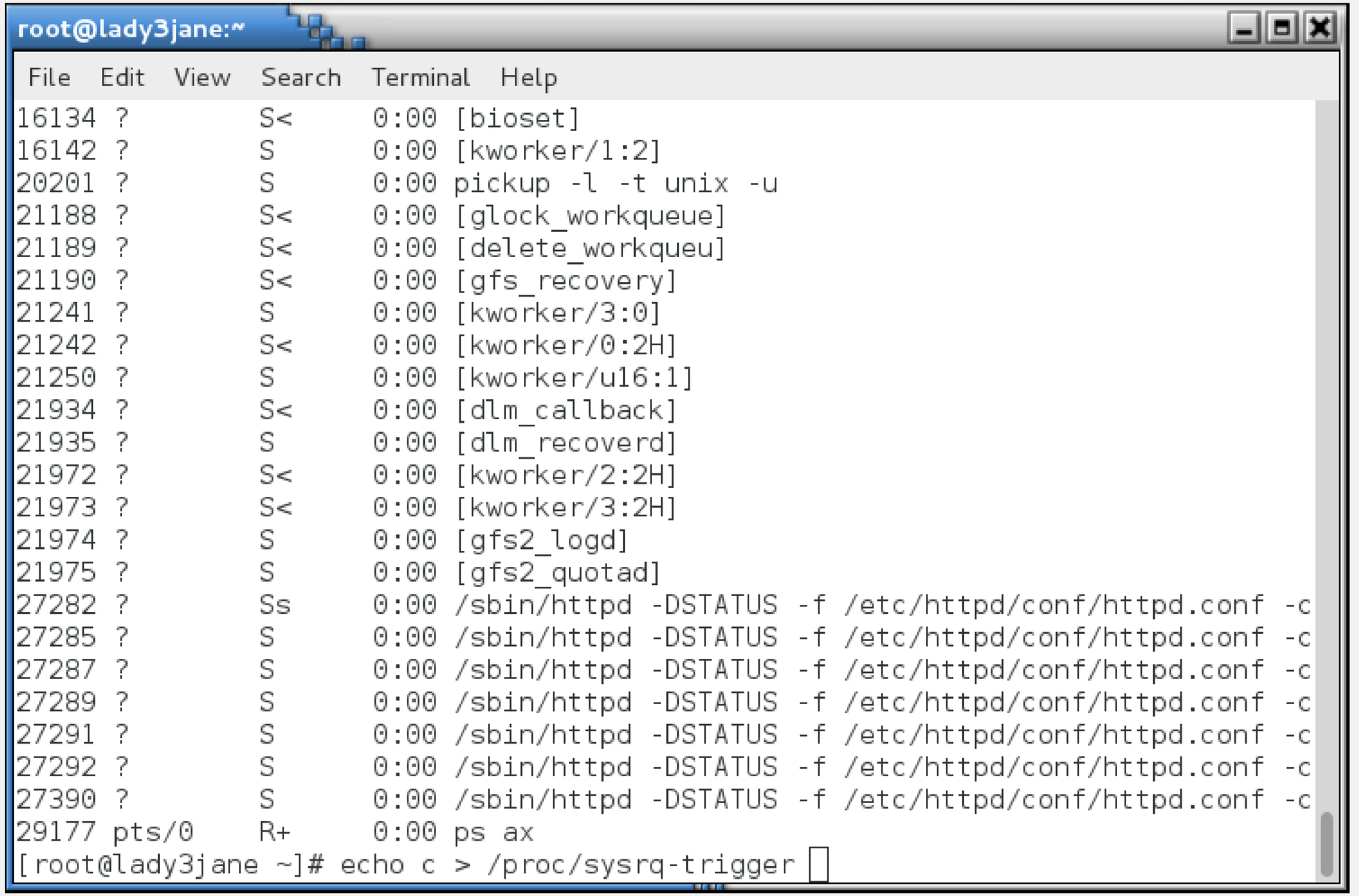
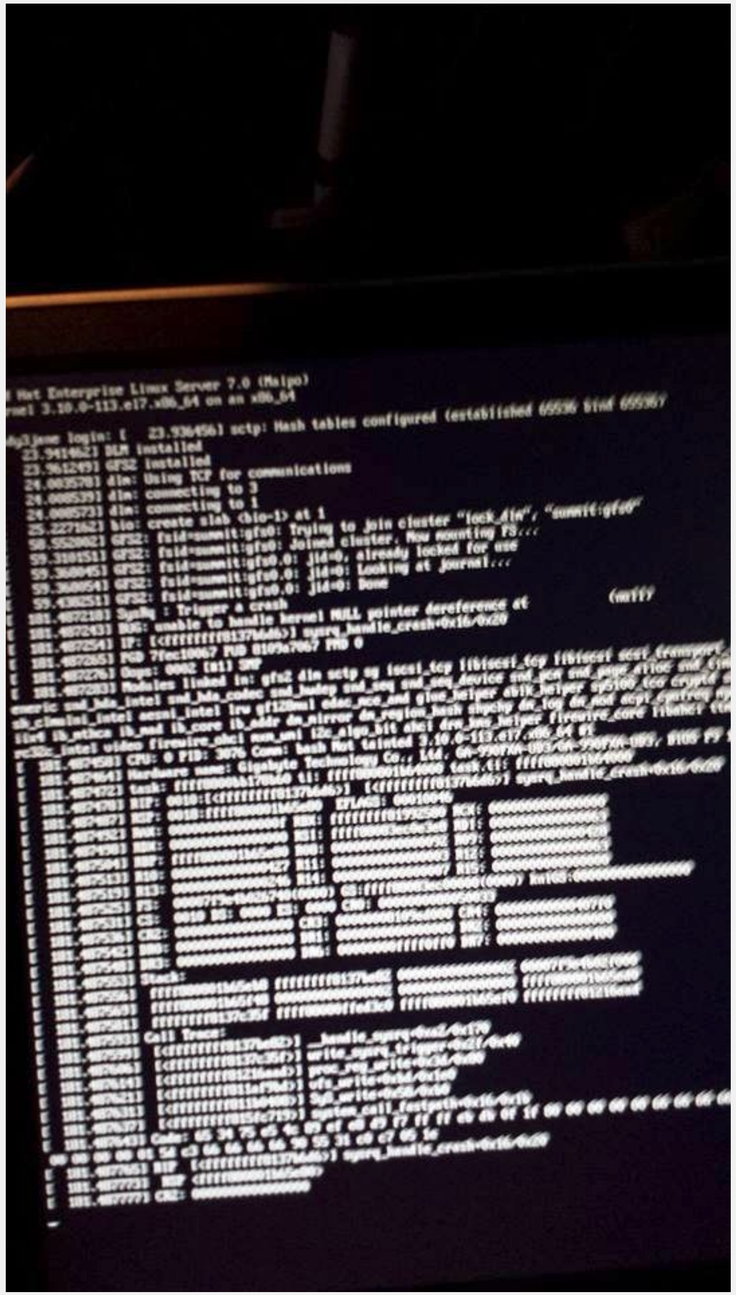
We've Already Crashed httpd

- Now let's crash the cluster nodes!
- sync the filesystem first!
- sync; echo s > /proc/sysrq-trigger
- echo c > /proc/sysrq-trigger

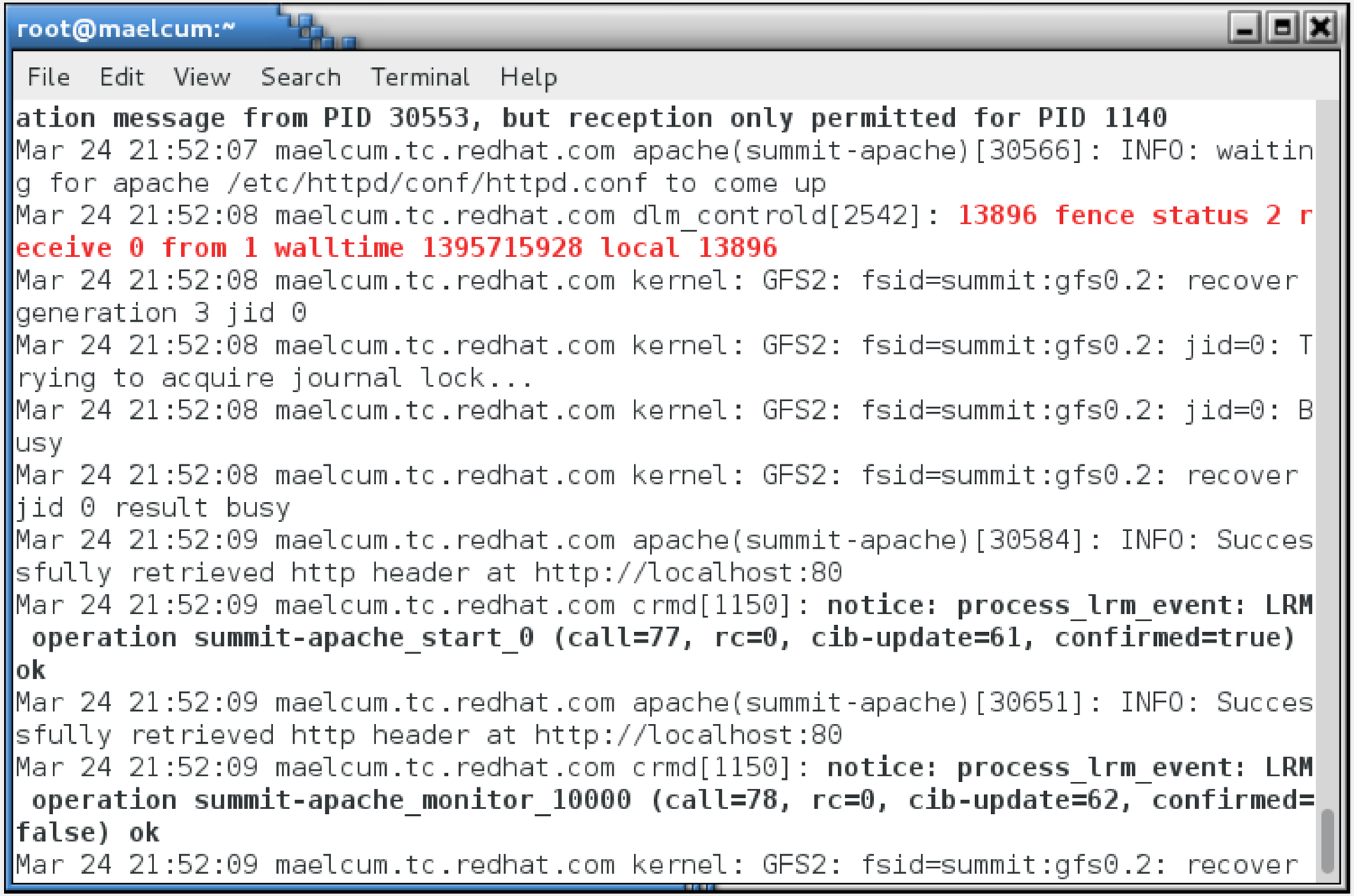
redhat.


root@lady3jane:~
File Edit View Search Terminal Help
16134 ? S< 0:00 [bioset]
16142 ? S 0:00 [kworker/1:2]
20201 ? S 0:00 pickup -l -t unix -u
21188 ? S< 0:00 [glock_workqueue]
21189 ? S< 0:00 [delete_workqueu]
21190 ? S< 0:00 [gfs_recovery]
21241 ? S 0:00 [kworker/3:0]
21242 ? S< 0:00 [kworker/0:2H]
21250 ? S 0:00 [kworker/u16:1]
21934 ? S< 0:00 [dlm_callback]
21935 ? S 0:00 [dlm_recoverd]
21972 ? S< 0:00 [kworker/2:2H]
21973 ? S< 0:00 [kworker/3:2H]
21974 ? S 0:00 [gfs2_logd]
21975 ? S 0:00 [gfs2_quotad]
27282 ? Ss 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
27285 ? S 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
27287 ? S 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
27289 ? S 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
27291 ? S 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
27292 ? S 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
27390 ? S 0:00 /sbin/httpd -DSTATUS -f /etc/httpd/conf/httpd.conf -c
29177 pts/0 R+ 0:00 ps ax
[root@lady3jane ~]# echo c > /proc/sysrq-trigger

redhat.



redhat.


root@maelcum:~
File Edit View Search Terminal Help
ation message from PID 30553, but reception only permitted for PID 1140
Mar 24 21:52:07 maelcum.tc.redhat.com apache(summit-apache)[30566]: INFO: waitin
g for apache /etc/httpd/conf/httpd.conf to come up
Mar 24 21:52:08 maelcum.tc.redhat.com dlm_controld[2542]: 13896 fence status 2 r
eceive 0 from 1 walltime 1395715928 local 13896
Mar 24 21:52:08 maelcum.tc.redhat.com kernel: GFS2: fsid=summit:gfs0.2: recover
generation 3 jid 0
Mar 24 21:52:08 maelcum.tc.redhat.com kernel: GFS2: fsid=summit:gfs0.2: jid=0: T
rying to acquire journal lock...
Mar 24 21:52:08 maelcum.tc.redhat.com kernel: GFS2: fsid=summit:gfs0.2: jid=0: B
usy
Mar 24 21:52:08 maelcum.tc.redhat.com kernel: GFS2: fsid=summit:gfs0.2: recover
jid 0 result busy
Mar 24 21:52:09 maelcum.tc.redhat.com apache(summit-apache)[30584]: INFO: Succes
sfully retrieved http header at http://localhost:80
Mar 24 21:52:09 maelcum.tc.redhat.com crmd[1150]: notice: process_lrm_event: LRM
operation summit-apache_start_0 (call=77, rc=0, cib-update=61, confirmed=true)
ok
Mar 24 21:52:09 maelcum.tc.redhat.com apache(summit-apache)[30651]: INFO: Succes
sfully retrieved http header at http://localhost:80
Mar 24 21:52:09 maelcum.tc.redhat.com crmd[1150]: notice: process_lrm_event: LRM
operation summit-apache_monitor_10000 (call=78, rc=0, cib-update=62, confirmed=
false) ok
Mar 24 21:52:09 maelcum.tc.redhat.com kernel: GFS2: fsid=summit:gfs0.2: recover

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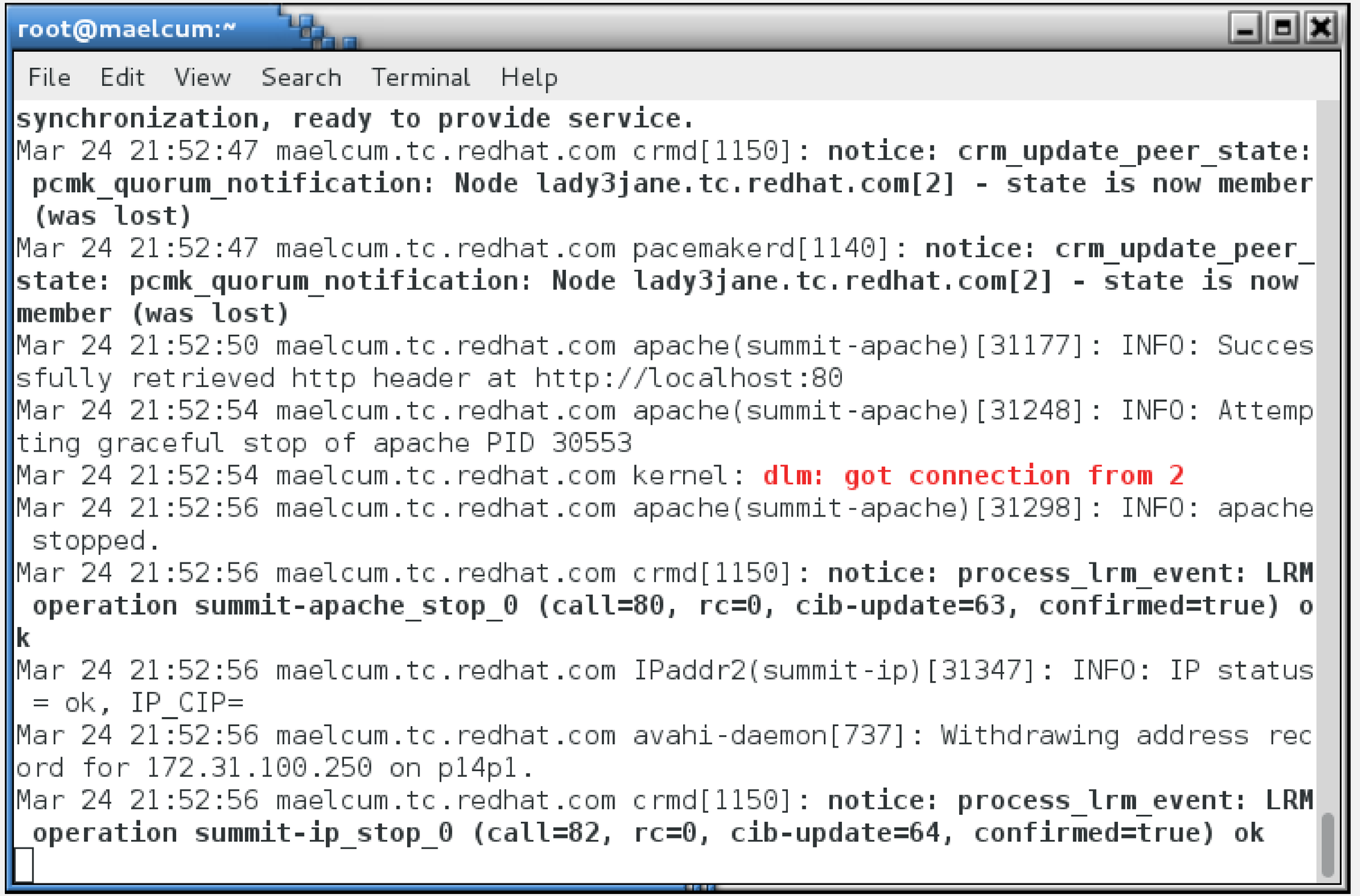
root@maelcum:~
File Edit View Search Terminal Help
synchronization, ready to provide service.
Mar 24 21:52:47 maelcum.tc.redhat.com crmd[1150]: notice: crm_update_peer_state: pcmk_quorum_notification: Node lady3jane.tc.redhat.com[2] - state is now member (was lost)
Mar 24 21:52:47 maelcum.tc.redhat.com pacemakerd[1140]: notice: crm_update_peer_state: pcmk_quorum_notification: Node lady3jane.tc.redhat.com[2] - state is now member (was lost)
Mar 24 21:52:50 maelcum.tc.redhat.com apache(summit-apache)[31177]: INFO: Successfully retrieved http header at http://localhost:80
Mar 24 21:52:54 maelcum.tc.redhat.com apache(summit-apache)[31248]: INFO: Attempting graceful stop of apache PID 30553
Mar 24 21:52:54 maelcum.tc.redhat.com kernel: dlm: got connection from 2
Mar 24 21:52:56 maelcum.tc.redhat.com apache(summit-apache)[31298]: INFO: apache stopped.
Mar 24 21:52:56 maelcum.tc.redhat.com crmd[1150]: notice: process_lrm_event: LRM operation summit-apache_stop_0 (call=80, rc=0, cib-update=63, confirmed=true) ok
Mar 24 21:52:56 maelcum.tc.redhat.com IPaddr2(summit-ip)[31347]: INFO: IP status = ok, IP_CIP=
Mar 24 21:52:56 maelcum.tc.redhat.com avahi-daemon[737]: Withdrawing address record for 172.31.100.250 on p14p1.
Mar 24 21:52:56 maelcum.tc.redhat.com crmd[1150]: notice: process_lrm_event: LRM operation summit-ip_stop_0 (call=82, rc=0, cib-update=64, confirmed=true) ok

redhat.

Now go forth and cluster!

redhat.

THANK YOU!

- If you liked today's session, please leave feedback!
- Slides available at http://people.redhat.com/tcameron and on the Summit 2016 web site!

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QUESTIONS?

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SECTION HEADLINE

SECTION HEADLINE

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Log into the web UI

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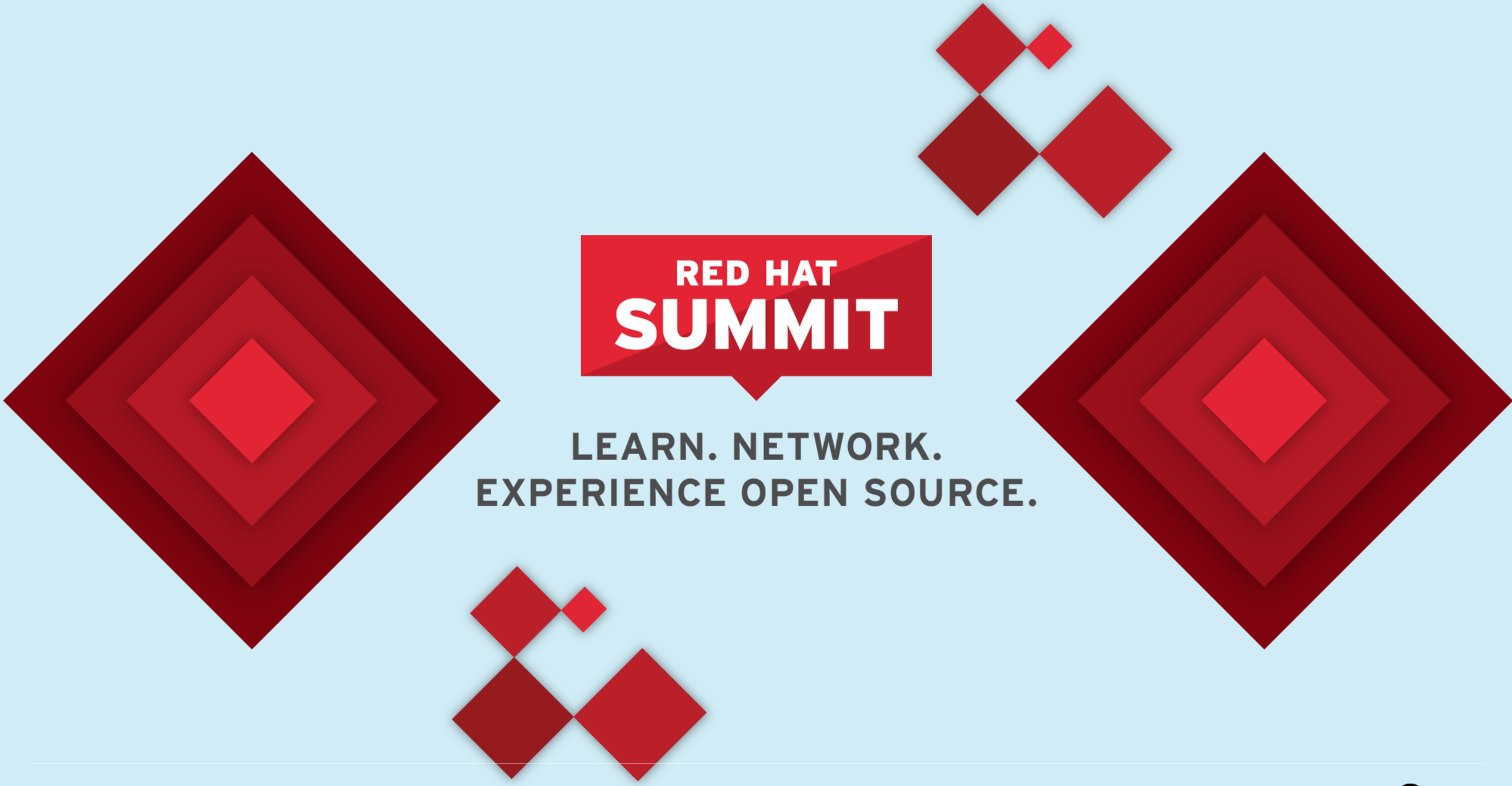
SECTION HEADLINE



redhat.