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Clustered Applications with Red Hat Enterprise Linux 6

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Red Hat

Wednesday, May 4th, 2011

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Agenda

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Agenda

- Disclaimer
- Red Hat and Clustering
- Architecture
- Configure the Shared Storage (iSCSI Target)
- Configure the Shared Storage (Raw Storage)
- Configure the Shared Storage (iSCSI Initiator)
- Install web server software on both nodes



Agenda

- Install the clustering software on the nodes
 - High Availability
 - Resilient Storage
- Install the cluster management software on the management server
 - High Availability Management
- Connect to the web management UI
- Define a Cluster
- Create Cluster Filesystem



Agenda

- Mount point clustered vs. persistent
- Define the fence device
- Assign hosts to fence device ports
- Define Failover Domains
- Define Resources For Clustered Web Service
- Define Clustered Web Service
- Test Clustered Web Service
- Test Failover



Disclaimer

- This presentation was developed on Red Hat Enterprise Linux 6.1 beta. You may see slight differences in the UI between now and 6.1 release. Then again, this presentation might burst into flames, too.

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Red Hat and Clustering

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Red Hat and Clustering

- Red Hat leads the way in Open Source clustering
- Acquired Sistina for \$31 million in early 2004, including Global Filesystem and ClusterSuite.
- Made the code Open Source in mid-2004.
- Red Hat now offers Resilient Storage (clustered filesystem - GFS2) and High Availability (high availability application services) as layered products.

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Architecture

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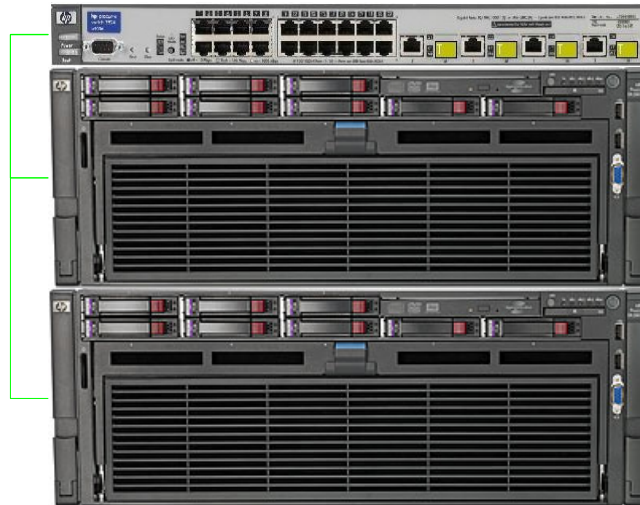
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Architecture

- Two node cluster – neuromancer.tc.redhat.com and finn.tc.redhat.com – each installed with @base



neuromancer

finn

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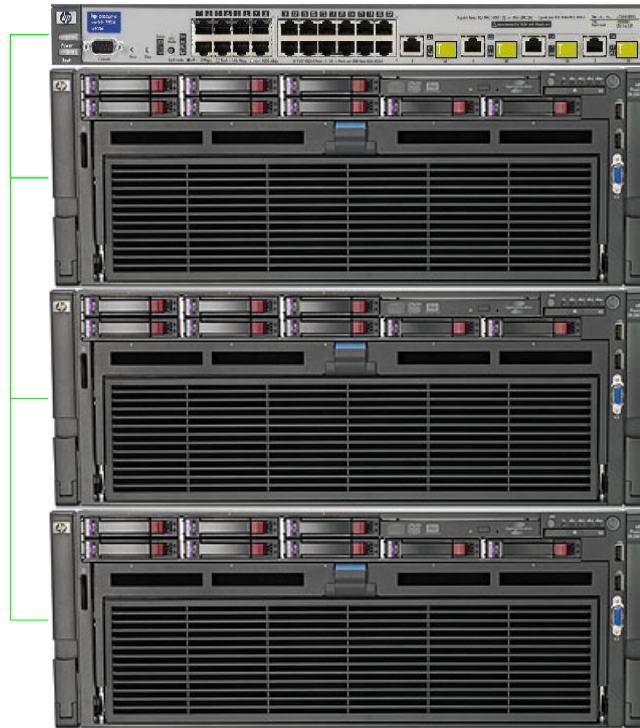
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Architecture

- neuromancer and finn are managed by lady3jane.tc.redhat.com – also installed with @base



neuromancer

finn

lady3jane (conga)

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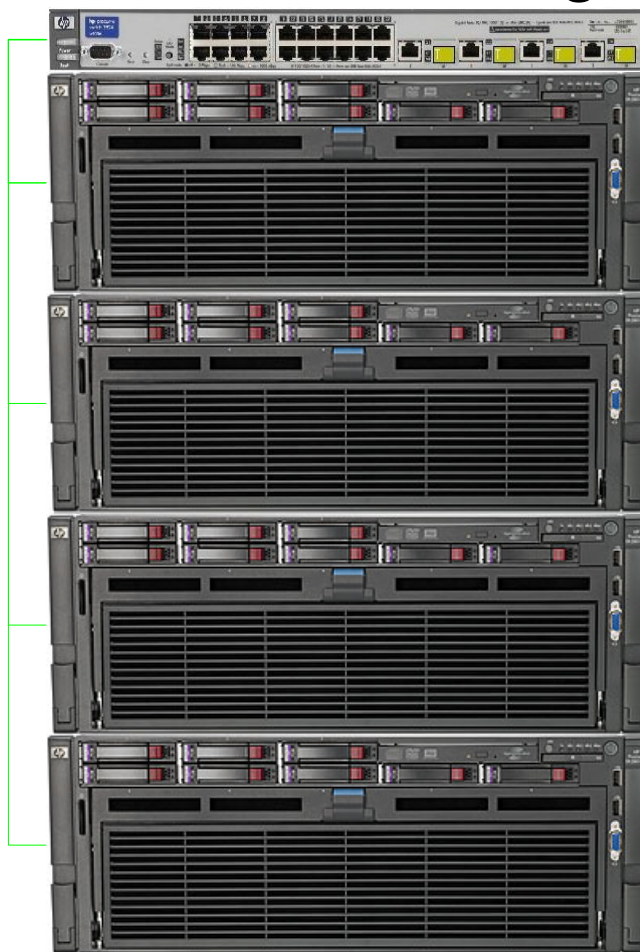
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Architecture

- neuromancer and finn are iSCSI initiators connecting to molly.tc.redhat.com, an iSCSI target



neuromancer (initiator)

finn (initiator)

lady3jane (conga)

molly (target)

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Architecture

- Two examples will demonstrated today
 - Apache web server cluster
 - Cluster of virtual machines (time permitting)



Configure the Shared Storage (iSCSI Target)

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Configure the Shared Storage (iSCSI Target)

- The machine which will be the target should be subscribed to the Red Hat Enterprise Linux Server (v. 6 for [arch]) on RHN or RHN Satellite



```
root@molly:~  
File Edit View Search Terminal Help  
[root@molly ~]# yum repolist  
Loaded plugins: refresh-packagekit, rhnplugin  
repo id                                repo name                                status  
rhel-x86_64-server-6                   Red Hat Enterprise Linux Server (v. 6    3,928  
rhel-x86_64-server-optional-6          RHEL Server Optional (v. 6 64-bit x86_    2,998  
rhel-x86_64-server-supplementary-6     RHEL Server Supplementary (v. 6 64-bit    99  
rhn-tools-rhel-x86_64-server-6         RHN Tools for RHEL (v. 6 for 64-bit x8    31  
repolist: 7,056  
[root@molly ~]#
```

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Configure the Shared Storage (iSCSI Target)

- Install the Network Storage Server (storage-server) group using yum

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```
root@molly:~
File Edit View Search Terminal Help
[root@molly ~]# yum groupinstall "Network Storage Server"
Loaded plugins: refresh-packagekit, rhnplugin
Setting up Group Process
Resolving Dependencies
--> Running transaction check
---> Package scsi-target-utils.x86_64 0:1.0.4-3.el6_0.1 set to be updated
--> Processing Dependency: perl(Config::General) for package: scsi-target-utils-1.0.4-3.el6_0.1.x86_64
--> Processing Dependency: librdmacm.so.1()(64bit) for package: scsi-target-utils-1.0.4-3.el6_0.1.x86_64
--> Processing Dependency: libibverbs.so.1()(64bit) for package: scsi-target-utils-1.0.4-3.el6_0.1.x86_64
--> Running transaction check
---> Package libibverbs.x86_64 0:1.1.4-2.el6 set to be updated
--> Processing Dependency: libibverbs-driver for package: libibverbs-1.1.4-2.el6.x86_64
---> Package librdmacm.x86_64 0:1.0.10-2.el6 set to be updated
---> Package perl-Config-General.noarch 0:2.44-1.el6 set to be updated
--> Running transaction check
---> Package libmlx4.x86_64 0:1.0.1-7.el6 set to be updated

```

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```
root@molly:~
File Edit View Search Terminal Help
(3/5): librdmacm-1.0.10-2.el6.x86_64.rpm | 22 kB 00:00
(4/5): perl-Config-General-2.44-1.el6.noarch.rpm | 68 kB 00:00
(5/5): scsi-target-utils-1.0.4-3.el6_0.1.x86_64.rpm | 137 kB 00:00
-----
Total 172 kB/s | 297 kB 00:01
Running rpm_check_debug
Running Transaction Test
Transaction Test Succeeded
Running Transaction
  Installing      : libibverbs-1.1.4-2.el6.x86_64 1/5
  Installing      : libmlx4-1.0.1-7.el6.x86_64 2/5
  Installing      : librdmacm-1.0.10-2.el6.x86_64 3/5
  Installing      : perl-Config-General-2.44-1.el6.noarch 4/5
  Installing      : scsi-target-utils-1.0.4-3.el6_0.1.x86_64 5/5

Installed:
  scsi-target-utils.x86_64 0:1.0.4-3.el6_0.1

Dependency Installed:
  libibverbs.x86_64 0:1.1.4-2.el6 libmlx4.x86_64 0:1.0.1-7.el6
  librdmacm.x86_64 0:1.0.10-2.el6 perl-Config-General.noarch 0:2.44-1.el6

Complete!
[root@molly ~]#
```

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Configure the Shared Storage (Raw Storage)

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Configure the Shared Storage (Raw Storage)

- In this example, we'll use set up a logical volume on molly.
 - fdisk
 - pvcreate
 - vgcreate
 - lvcreate



```
root@molly:~
File Edit View Search Terminal Help
255 heads, 63 sectors/track, 19452 cylinders, total 312500000 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 identifier: 0x00084c8d

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1  *        2048         411647       204800    83   Linux
/dev/sda2                411648       2459647      1024000    82   Linux swap / Solaris
/dev/sda3                2459648       86427647     41984000    83   Linux
/dev/sda4                86427648     312499999     113036176    83   Linux

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@molly ~]#
[root@molly ~]# init 6
```



```
root@molly:~  
File Edit View Search Terminal Help  
[tcameron@case ~]$ ping molly  
PING molly.tc.redhat.com (172.31.100.3) 56(84) bytes of data.  
64 bytes from molly.tc.redhat.com (172.31.100.3): icmp_seq=1 ttl=64 time=0.135 m  
s  
^C  
--- molly.tc.redhat.com ping statistics ---  
1 packets transmitted, 1 received, 0% packet loss, time 731ms  
rtt min/avg/max/mdev = 0.135/0.135/0.135/0.000 ms  
[tcameron@case ~]$ ssh -X root@molly  
Last login: Thu Apr 14 21:14:59 2011 from case.tc.redhat.com  
[root@molly ~]# pvcreate /dev/sda4  
Physical volume "/dev/sda4" successfully created  
[root@molly ~]# vgcreate vg_molly /dev/sda4  
Volume group "vg_molly" successfully created  
[root@molly ~]#
```



```
root@molly:~  
File Edit View Search Terminal Help  
Volume group "vg_molly" successfully created  
[root@molly ~]# vgdisk  
--- Volume group ---  
VG Name                vg_molly  
System ID  
Format                 lvm2  
Metadata Areas         1  
Metadata Sequence No   1  
VG Access              read/write  
VG Status              resizable  
MAX LV                 0  
Cur LV                0  
Open LV                0  
Max PV                 0  
Cur PV                1  
Act PV                 1  
VG Size                107.80 GiB  
PE Size                4.00 MiB  
Total PE               27596  
Alloc PE / Size        0 / 0  
Free PE / Size         27596 / 107.80 GiB  
VG UUID                Nuln8H-4oBC-73se-WAym-Hi0J-TWUc-q0gCNE  
[root@molly ~]#
```



```
root@molly:~  
File Edit View Search Terminal Help  
[root@molly ~]# vgdisplay  
--- Volume group ---  
VG Name                vg_molly  
System ID  
Format                 lvm2  
Metadata Areas         1  
Metadata Sequence No   1  
VG Access              read/write  
VG Status              resizable  
MAX LV                 0  
Cur LV                0  
Open LV                0  
Max PV                 0  
Cur PV                1  
Act PV                1  
VG Size                107.80 GiB  
PE Size                4.00 MiB  
Total PE              27596  
Alloc PE / Size        0 / 0  
Free PE / Size         27596 / 107.80 GiB  
VG UUID                Nuln8H-4oBC-73se-WAym-Hi0J-TWUc-q0gCNE  
  
[root@molly ~]# lvcreate -n lv_lun0 -L 80G vg_molly  
Logical volume "lv_lun0" created
```

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```
root@molly:~  
File Edit View Search Terminal Help  
Total PE                27596  
Alloc PE / Size         0 / 0  
Free PE / Size          27596 / 107.80 GiB  
VG UUID                 NuIn8H-4oBC-73se-WAym-Hi0J-TWUc-q0gCNE  
  
[root@molly ~]# lvcreate -n lv_lun0 -L 80G vg_molly  
Logical volume "lv_lun0" created  
[root@molly ~]# lvdisplay  
--- Logical volume ---  
LV Name                  /dev/vg_molly/lv_lun0  
VG Name                  vg_molly  
LV UUID                  BerSg2-L80N-2UnN-2TiS-fcFY-3NeA-a3Cty3  
LV Write Access          read/write  
LV Status                available  
# open                   0  
LV Size                  80.00 GiB  
Current LE               20480  
Segments                 1  
Allocation               inherit  
Read ahead sectors       auto  
- currently set to       256  
Block device             253:0  
  
[root@molly ~]#
```



Configure the Shared Storage (iSCSI Target)

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Configure the Shared Storage (iSCSI Target)

- In this example, we'll set up molly as an iSCSI target
 - `/etc/tgtd/targets.conf`



```
root@molly:~
File Edit View Search Terminal Help
# --ignore-errors command line option)
#ignore-errors yes

# Sample target with one LUN only. Defaults to allow access for all initiators:

#<target iqn.2008-09.com.example:server.target1>
#   backing-store /dev/LVM/somedevice
#</target>

# Added Thomas Cameron
<target iqn.2011-04.com.redhat.tc:molly.lun0>
    backing-store /dev/mapper/vg_molly-lv_lun0
    initiator-address 172.31.100.13
    initiator-address 172.31.100.14
</target>

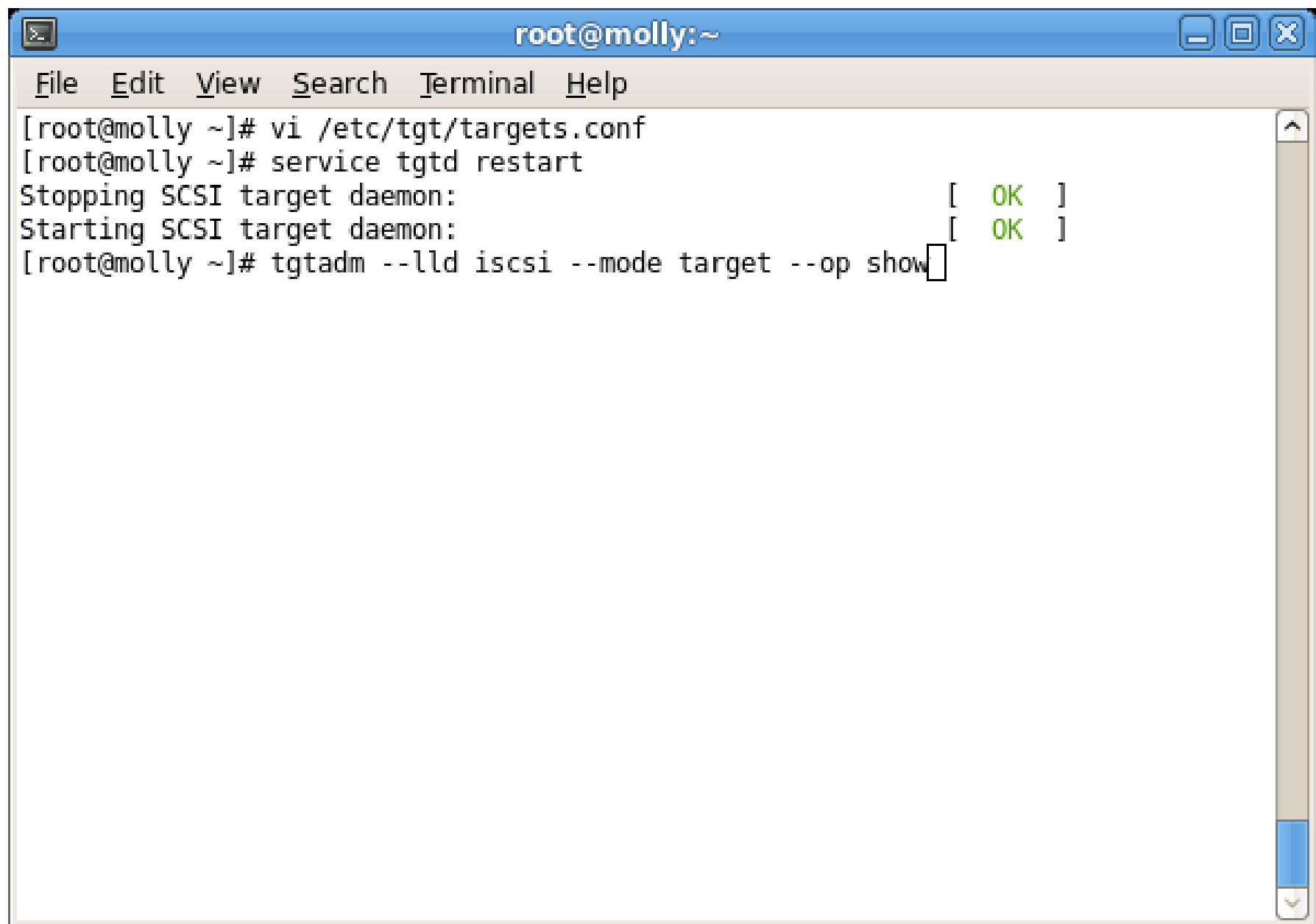
# Similar, but we use "direct-store" instead of "backing-store".
# "direct-store" reads drive parameters with sg_inq command and sets them to
# the target.
# Parameters fatched with sg_inq are:
# - Vendor identification
# - Product identification
```



Configure the Shared Storage (iSCSI Target)

- `chkconfig tgtd on`
- `service tgtd restart`
- `tgtadm --lld iscsi --mode target --op show`





```
root@molly:~
File Edit View Search Terminal Help
[root@molly ~]# vi /etc/tgt/targets.conf
[root@molly ~]# service tgtd restart
Stopping SCSI target daemon: [ OK ]
Starting SCSI target daemon: [ OK ]
[root@molly ~]# tgtadm --lld iscsi --mode target --op show
```



```
root@molly:~  
File Edit View Search Terminal Help  
[root@molly ~]# tgtadm --lld iscsi --mode target --op show  
Target 1: iqn.2011-04.com.redhat.tc:molly.lun0  
System information:  
  Driver: iscsi  
  State: ready  
I_T nexus information:  
LUN information:  
  LUN: 0  
    Type: controller  
    SCSI ID: IET      00010000  
    SCSI SN: beaf10  
    Size: 0 MB, Block size: 1  
    Online: Yes  
    Removable media: No  
    Readonly: No  
    Backing store type: null  
    Backing store path: None  
    Backing store flags:  
  LUN: 1  
    Type: disk  
    SCSI ID: IET      00010001  
    SCSI SN: beaf11  
    Size: 85899 MB, Block size: 512  
    Online: Yes  
    Removable media: No  
    Readonly: No  
    Backing store type: rdwr  
    Backing store path: /dev/mapper/vg_molly-lv_lun0  
    Backing store flags:  
Account information:  
ACL information:  
  172.31.100.13  
  172.31.100.14  
[root@molly ~]#
```



Configure the Shared Storage (iSCSI Initiator)

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Configure the Shared Storage (iSCSI Initiator)

- Subscribe the server to the “High Availability” and “Resilient Storage” child channel for RHEL Server

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```
root@finn:~
File Edit View Search Terminal Help
[root@finn ~]# yum repolist
Loaded plugins: product-id, rhnplugin, subscription-manager
Updating Red Hat repositories.
INFO:rhsm-app.repolib:repos updated: 0
repo id                                repo name                                status
rhel-x86_64-server-6                   Red Hat Enterprise Linux Server (v. 6 3,945
rhel-x86_64-server-6-beta               Red Hat Enterprise Linux Server Beta     903
rhel-x86_64-server-ha-6                 RHEL Server High Availability (v. 6 f    44
rhel-x86_64-server-ha-6-beta            RHEL Server High Availability Beta (v    37
rhel-x86_64-server-rs-6                 RHEL Server Resilient Storage (v. 6 f   44
rhel-x86_64-server-rs-6-beta            RHEL Server Resilient Storage Beta (v    37
rhn-tools-rhel-x86_64-server-6          RHN Tools for RHEL (v. 6 for 64-bit x    31
rhn-tools-rhel-x86_64-server-6-beta     RHN Tools for RHEL (v. 6 for 64-bit x    0
repolist: 5,041
[root@finn ~]#
```

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Configure the Shared Storage (iSCSI Initiator)

- Install the “iSCSI Storage Client” group

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```
root@neuromancer:~  
File Edit View Search Terminal Help  
Loaded plugins: rhnplugin  
Setting up Group Process  
Installed Groups:  
  Base  
  E-mail server  
  Graphical Administration Tools  
  Hardware monitoring utilities  
  Large Systems Performance  
  Legacy UNIX compatibility  
  Network Infrastructure Server  
  Network file system client  
  Networking Tools  
  Performance Tools  
  Perl Support  
  System administration tools  
  Virtualization Platform  
  iSCSI Storage Client  
Available Groups:  
  Additional Development  
  Backup Client  
  Backup Server  
  CIFS file server  
  Compatibility libraries  
:
```

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Configure the Shared Storage (iSCSI Initiator)

- chkconfig on and restart the iscsid (first) and iscsi services



```
root@neuromancer:~  
File Edit View Search Terminal Help  
[root@neuromancer ~]# for i in iscsid iscsi; do chkconfig $i on; service $i stop  
; service $i start; done  
Starting iscsid: [ OK ]  
Stopping iscsi: [ OK ]  
Starting iscsi: [ OK ]  
[root@neuromancer ~]#
```

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Configure the Shared Storage (iSCSI Initiator)

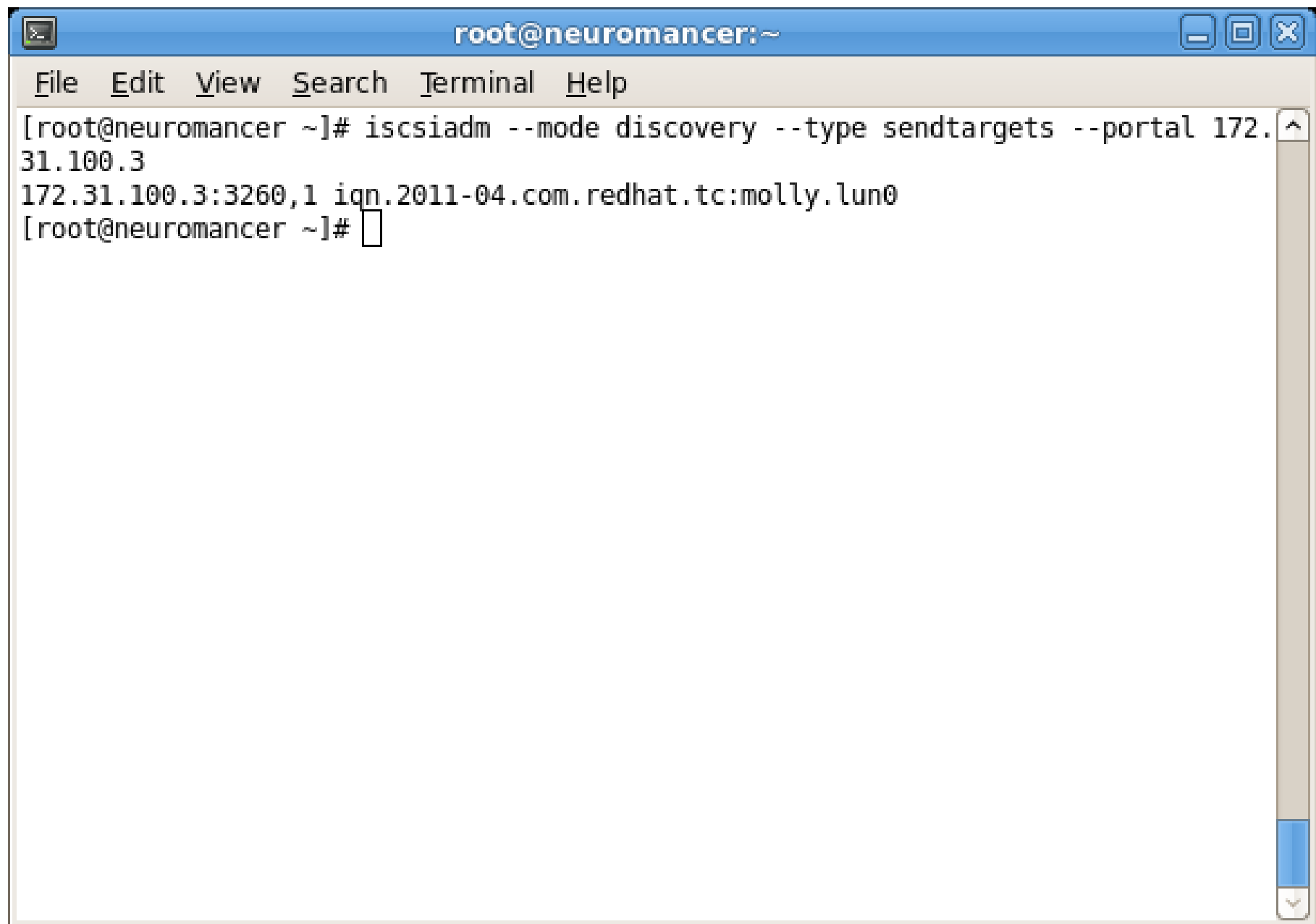
- Use iscsiadm to query the target (use the ip address, not the domain name)

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A terminal window titled "root@neuromancer:~" with a menu bar containing "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal shows the execution of the command "iscsiadm --mode discovery --type sendtargets --portal 172.31.100.3", which returns the output "172.31.100.3:3260,1 iqn.2011-04.com.redhat.tc:molly.lun0". The prompt "[root@neuromancer ~]#" is visible at the end of the line.

```
root@neuromancer:~  
File Edit View Search Terminal Help  
[root@neuromancer ~]# iscsiadm --mode discovery --type sendtargets --portal 172.31.100.3  
172.31.100.3:3260,1 iqn.2011-04.com.redhat.tc:molly.lun0  
[root@neuromancer ~]#
```

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Configure the Shared Storage (iSCSI Initiator)

- Use iscsiadm to log in (use the ip address, not the domain name)

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```
root@neuromancer:~  
File Edit View Search Terminal Help  
[root@neuromancer ~]# cat /proc/partitions  
major minor #blocks name  
  
8          0 488386584 sda  
8          1   204800 sda1  
8          2  1024000 sda2  
8          3 41984000 sda3  
[root@neuromancer ~]# iscsiadm --mode node --targetname iqn.2011-04.com.redhat.t  
c:molly.lun0 --portal 172.31.100.3 --login  
Logging in to [iface: default, target: iqn.2011-04.com.redhat.tc:molly.lun0, por  
tal: 172.31.100.3,3260]  
Login to [iface: default, target: iqn.2011-04.com.redhat.tc:molly.lun0, portal:  
172.31.100.3,3260] successful.  
[root@neuromancer ~]#
```

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Configure the Shared Storage (iSCSI Initiator)

- Verify there is a new block device available

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```
root@neuromancer:~  
File Edit View Search Terminal Help  
[root@neuromancer ~]# cat /proc/partitions  
major minor #blocks name  
  
8          0  488386584 sda  
8          1    204800 sda1  
8          2   1024000 sda2  
8          3  41984000 sda3  
[root@neuromancer ~]# iscsiadm --mode node --targetname iqn.2011-04.com.redhat.t  
c:molly.lun0 --portal 172.31.100.3 --login  
Logging in to [iface: default, target: iqn.2011-04.com.redhat.tc:molly.lun0, por  
tal: 172.31.100.3,3260]  
Login to [iface: default, target: iqn.2011-04.com.redhat.tc:molly.lun0, portal:  
172.31.100.3,3260] successful.  
[root@neuromancer ~]# cat /proc/partitions  
major minor #blocks name  
  
8          0  488386584 sda  
8          1    204800 sda1  
8          2   1024000 sda2  
8          3  41984000 sda3  
8         16  83886080 sdb  
[root@neuromancer ~]#
```

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Configure the Shared Storage (iSCSI Initiator)

- Repeat these steps on the other node(s)

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```
root@finn:~
File Edit View Search Terminal Help
[root@finn ~]# cat /proc/partitions
major minor #blocks name

 8          0 488386584 sda
 8          1   204800 sda1
 8          2  1024000 sda2
 8          3 41984000 sda3
[root@finn ~]# iscsiadm --mode node --targetname iqn.2011-04.com.redhat.tc:molly
.lun0 --portal 172.31.100.3 --login
Logging in to [iface: default, target: iqn.2011-04.com.redhat.tc:molly.lun0, por
tal: 172.31.100.3,3260]
Login to [iface: default, target: iqn.2011-04.com.redhat.tc:molly.lun0, portal:
172.31.100.3,3260] successful.
[root@finn ~]# cat /proc/partitions
major minor #blocks name

 8          0 488386584 sda
 8          1   204800 sda1
 8          2  1024000 sda2
 8          3 41984000 sda3
 8         16 83886080 sdb
[root@finn ~]#
```

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Configure the Shared Storage (iSCSI Initiator)

- We'll create the filesystem later, after the cluster is defined



Install web server software on both nodes

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Install web server software on both nodes

- `yum groupinstall "Web Server"`
- Verify `httpd` is `chkconfig'd` off (we'll let the cluster manage it), later
- Set the "Listen" address to the IP address we're going to run the clustered web server on (`armitage.tc.redhat.com` or `172.31.100.17`)



```
root@neuromancer:~  
File Edit View Search Terminal Help  
crypto-utils.x86_64 0:2.4.1-24.2.el6      httpd.x86_64 0:2.2.15-7.el6  
httpd-manual.noarch 0:2.2.15-7.el6        mod_perl.x86_64 0:2.0.4-10.el6  
mod_ssl.x86_64 1:2.2.15-7.el6           mod_wsgi.x86_64 0:3.2-1.el6  
webalizer.x86_64 0:2.21_02-3.3.el6  
  
Dependency Installed:  
apr.x86_64 0:1.3.9-3.el6  
apr-util.x86_64 0:1.3.9-3.el6_0.1  
apr-util-ldap.x86_64 0:1.3.9-3.el6_0.1  
gd.x86_64 0:2.0.35-10.el6  
httpd-tools.x86_64 0:2.2.15-7.el6  
libXpm.x86_64 0:3.5.8-2.el6  
mailcap.noarch 0:2.1.31-1.1.el6  
perl-BSD-Resource.x86_64 0:1.29.03-3.el6  
perl-ExtUtils-MakeMaker.x86_64 0:6.55-118.el6  
perl-ExtUtils-ParseXS.x86_64 1:2.2003.0-118.el6  
perl-Newt.x86_64 0:1.08-26.el6  
perl-Test-Harness.x86_64 0:3.17-118.el6  
perl-devel.x86_64 4:5.10.1-118.el6  
  
Complete!  
[root@neuromancer ~]# chkconfig httpd --list  
httpd          0:off    1:off    2:off    3:off    4:off    5:off    6:off  
[root@neuromancer ~]#
```



```
root@neuromancer:~  
File Edit View Search Terminal Help  
# MaxRequestsPerChild: maximum number of requests a server process serves  
<IfModule worker.c>  
StartServers          4  
MaxClients            300  
MinSpareThreads       25  
MaxSpareThreads       75  
ThreadsPerChild       25  
MaxRequestsPerChild   0  
</IfModule>  
  
#  
# Listen: Allows you to bind Apache to specific IP addresses and/or  
# ports, in addition to the default. See also the <VirtualHost>  
# directive.  
#  
# Change this to Listen on specific IP addresses as shown below to  
# prevent Apache from glomming onto all bound IP addresses (0.0.0.0)  
#  
#Listen 12.34.56.78:80  
Listen 172.31.100.17:80  
  
#  
# Dynamic Shared Object (DSO) Support  
-- INSERT --
```

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Install the clustering software on the nodes

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Install the clustering software on the nodes

- There are two components of the cluster
 - High availability application service (“High Availability” package group)
 - Clustered filesystem (GFS2, or “Resilient Storage” package group)



Install the clustering software on the nodes

- Install the High Availability group first
 - `yum groupinstall "High Availability"`



```
root@neuromancer:~  
File Edit View Search Terminal Help  
Installing : cman-3.0.12-35.el6.x86_64 29/30  
Installing : rgmanager-3.0.12-11.el6.x86_64 30/30  
  
Installed:  
  cman.x86_64 0:3.0.12-35.el6      rgmanager.x86_64 0:3.0.12-11.el6  
  
Dependency Installed:  
  cifs-utils.x86_64 0:4.8.1-1.el6      cluster-glue-libs.x86_64 0:1.0.5-2.el6  
  clusterlib.x86_64 0:3.0.12-35.el6     corosync.x86_64 0:1.2.3-29.el6  
  corosynclib.x86_64 0:1.2.3-29.el6     fence-agents.x86_64 0:3.0.12-14.el6  
  fence-virt.x86_64 0:0.2.1-7.el6       ipmitool.x86_64 0:1.8.11-7.el6  
  keyutils.x86_64 0:1.4-1.el6           libibverbs.x86_64 0:1.1.4-2.el6  
  libmlx4.x86_64 0:1.0.1-7.el6          librdmacm.x86_64 0:1.0.10-2.el6  
  libtalloc.x86_64 0:2.0.1-1.1.el6      lm_sensors-libs.x86_64 0:3.1.1-10.el6  
  modcluster.x86_64 0:0.16.2-10.el6     net-snmp-libs.x86_64 1:5.5-31.el6  
  net-snmp-utils.x86_64 1:5.5-31.el6     nss-tools.x86_64 0:3.12.9-5.el6  
  oddjob.x86_64 0:0.30-5.el6            openais.x86_64 0:1.1.1-7.el6  
  openaislib.x86_64 0:1.1.1-7.el6       perl-Net-Telnet.noarch 0:3.03-11.el6  
  pexpect.noarch 0:2.3-6.el6            resource-agents.x86_64 0:3.0.12-19.el6  
  ricci.x86_64 0:0.16.2-29.el6          sg3_utils.x86_64 0:1.28-3.el6  
  sg3_utils-libs.x86_64 0:1.28-3.el6     telnet.x86_64 1:0.17-46.el6  
  
Complete!  
[root@neuromancer ~]#
```

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Install the clustering software on the nodes

- `chkconfig ricci on`
- `passwd ricci`
- `service ricci start`



```
root@neuromancer:~  
File Edit View Search Terminal Help  
net-snmp-libs.x86_64 1:5.5-31.el6  
netcf-libs.x86_64 0:0.1.7-1.el6  
nfs-utils-lib.x86_64 0:1.1.5-3.el6  
numactl.x86_64 0:2.0.3-9.el6  
openais.x86_64 0:1.1.1-7.el6  
perl-Net-Telnet.noarch 0:3.03-11.el6  
resource-agents.x86_64 0:3.0.12-19.el6  
rpcbind.x86_64 0:0.2.0-8.el6  
sg3_utils-libs.x86_64 0:1.28-3.el6  
yajl.x86_64 0:1.0.7-3.el6  
net-snmp-utils.x86_64 1:5.5-31.el6  
nfs-utils.x86_64 1:1.2.3-4.el6  
nss-tools.x86_64 0:3.12.9-5.el6  
oddjob.x86_64 0:0.30-5.el6  
openaislib.x86_64 0:1.1.1-7.el6  
pexpect.noarch 0:2.3-6.el6  
ricci.x86_64 0:0.16.2-29.el6  
sg3_utils.x86_64 0:1.28-3.el6  
telnet.x86_64 1:0.17-46.el6  
  
Complete!  
[root@neuromancer ~]# chkconfig ricci on  
[root@neuromancer ~]# passwd ricci  
Changing password for user ricci.  
New password:  
Retype new password:  
passwd: all authentication tokens updated successfully.  
[root@neuromancer ~]# service ricci start  
Starting oddjobd: [ OK ]  
generating SSL certificates... done  
Generating NSS database... done  
Starting ricci: [ OK ]  
[root@neuromancer ~]#
```

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Install the clustering software on the nodes

- Install the Resilient Storage package group next
 - `yum groupinstall "Resilient Storage"`



```
root@neuromancer:~  
File Edit View Search Terminal Help  
lvm2-cluster x86_64 2.02.83-2.el6 rhel-x86_64-server-rs-6-beta 314 k  
  
Transaction Summary  
=====
```

Install	2 Package(s)
---------	--------------

```
  
Total download size: 571 k  
Installed size: 0  
Is this ok [y/N]: y  
Downloading Packages:  
-----  
Total 1.6 MB/s | 571 kB 00:00  
Running rpm_check_debug  
Running Transaction Test  
Transaction Test Succeeded  
Running Transaction  
  Installing : gfs2-utils-3.0.12-35.el6.x86_64 1/2  
  Installing : lvm2-cluster-2.02.83-2.el6.x86_64 2/2  
  
Installed:  
  gfs2-utils.x86_64 0:3.0.12-35.el6 lvm2-cluster.x86_64 0:2.02.83-2.el6  
  
Complete!  
[root@neuromancer ~]#
```

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Install the cluster management software on the management server

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Install the cluster management software on the management server

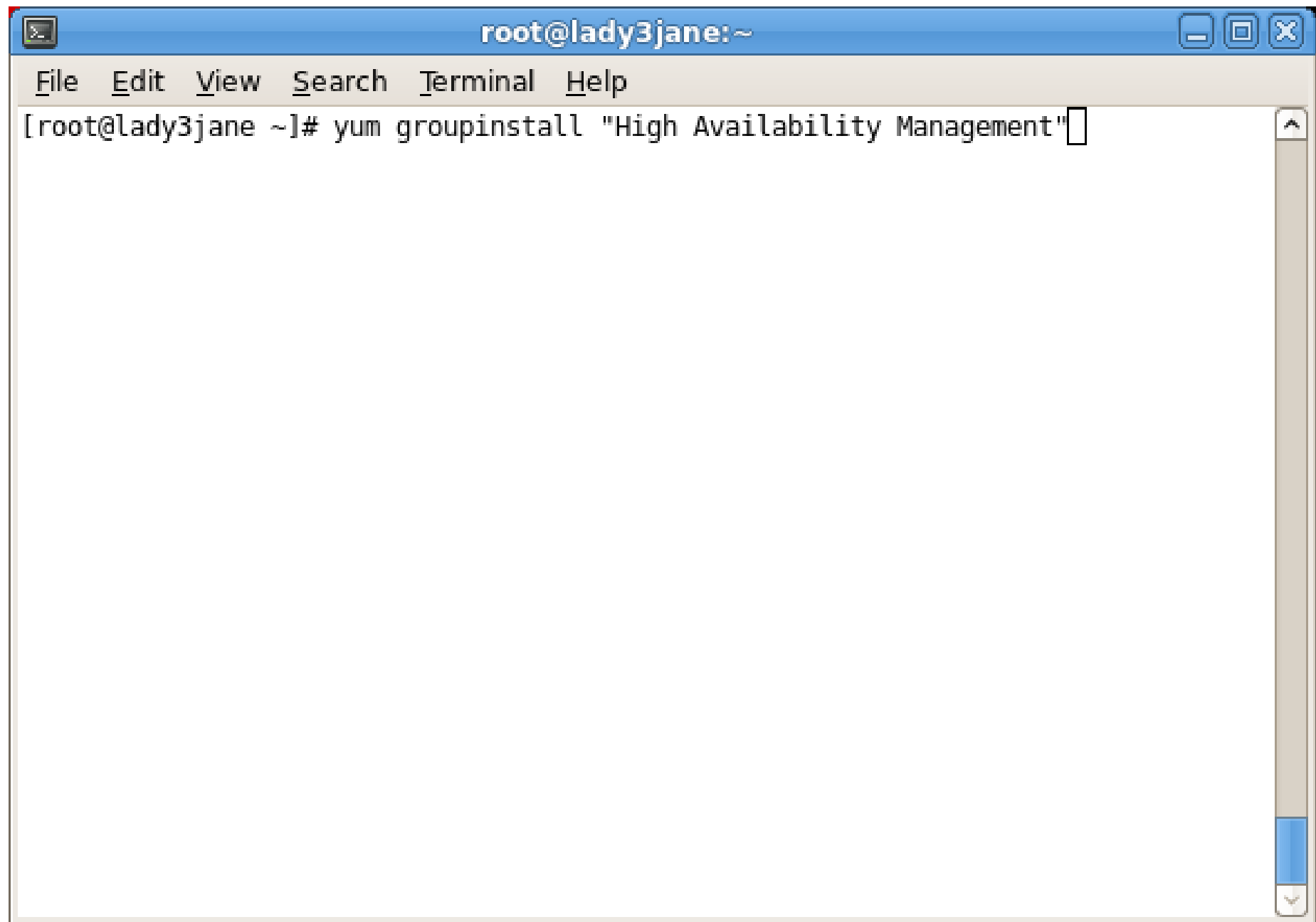
- Install the High Availability Management package group
 - `yum groupinstall "High Availability Management"`

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A terminal window titled "root@lady3jane:~" with a menu bar containing "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal content shows the command "[root@lady3jane ~]# yum groupinstall "High Availability Management"" followed by a cursor. A vertical scrollbar is on the right side of the terminal area.

```
root@lady3jane:~  
File Edit View Search Terminal Help  
[root@lady3jane ~]# yum groupinstall "High Availability Management"
```

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```
root@lady3jane:~  
File Edit View Search Terminal Help  
python-repoze-what-pylons.noarch 0:1.0-4.el6  
python-repoze-who.noarch 0:1.0.13-2.el6  
python-repoze-who-friendlyform.noarch 0:1.0-0.3.b3.el6  
python-repoze-who-testutil.noarch 0:1.0-0.4.rc1.el6  
python-routes.noarch 0:1.10.3-2.el6  
python-setuptools.noarch 0:0.6.10-3.el6  
python-simplejson.x86_64 0:2.0.9-3.1.el6  
python-sqlalchemy.noarch 0:0.5.5-2.1.el6  
python-tempita.noarch 0:0.4-2.el6  
python-toscawidgets.noarch 0:0.9.8-1.el6  
python-transaction.noarch 0:1.0.1-1.el6  
python-turbojson.noarch 0:1.2.1-8.1.el6  
python-tw-forms.noarch 0:0.9.9-1.el6  
python-weberror.noarch 0:0.10.2-1.el6  
python-webflash.noarch 0:0.1-0.2.a9.el6  
python-webhelpers.noarch 0:0.6.4-4.el6  
python-webob.noarch 0:0.9.6.1-3.el6  
python-webtest.noarch 0:1.2-2.el6  
python-zope-filesystem.x86_64 0:1-5.el6  
python-zope-interface.x86_64 0:3.5.2-2.1.el6  
python-zope-sqlalchemy.noarch 0:0.4-3.el6  
  
Complete!  
[root@lady3jane ~]#
```

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Install the cluster management software on the management server

- `chkconfig luci on`
- `service luci start`
- Open the URL listed when luci starts (<https://host.domain.tld:8084>)



```
root@lady3jane:~  
File Edit View Search Terminal Help  
[root@lady3jane ~]# chkconfig luci on  
[root@lady3jane ~]# service luci start  
Adding following auto-detected host IDs (IP addresses/domain names), corresponding to 'lady3jane.tc.redhat.com' address, to the configuration of self-managed certificate '/var/lib/luci/etc/cacert.config' (you can change them by editing '/var/lib/luci/etc/cacert.config', removing the generated certificate '/var/lib/luci/certs/host.pem' and restarting luci):  
    (none suitable found, you can still do it manually as mentioned above)  
  
Generating a 2048 bit RSA private key  
writing new private key to '/var/lib/luci/certs/host.pem'  
Starting saslauthd: [ OK ]  
Start luci... [ OK ]  
Point your web browser to https://lady3jane.tc.redhat.com:8084 (or equivalent) to access luci  
[root@lady3jane ~]#
```

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Connect to the web management UI

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Connect to the web management UI

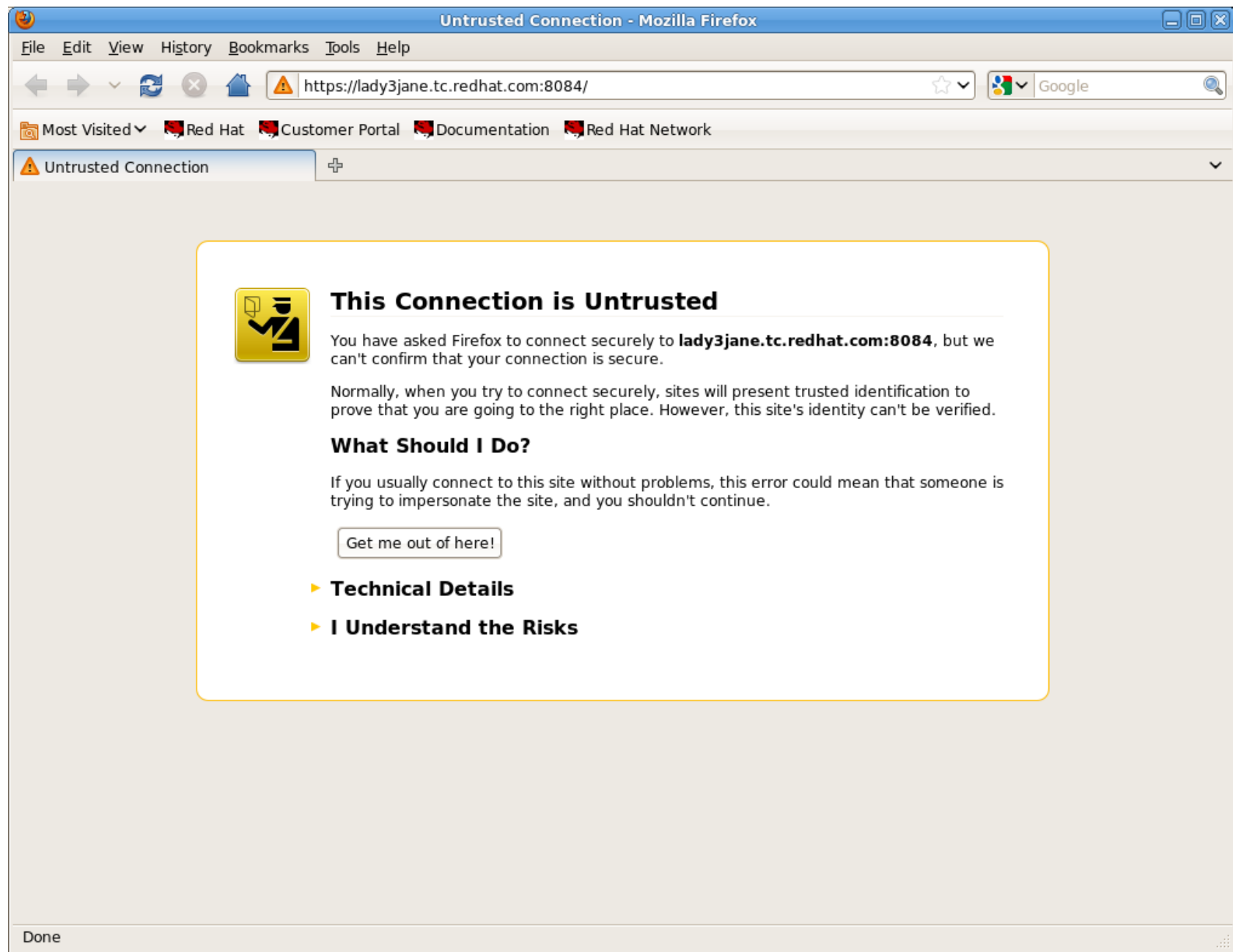
- You will get an SSL warning, that's expected and normal

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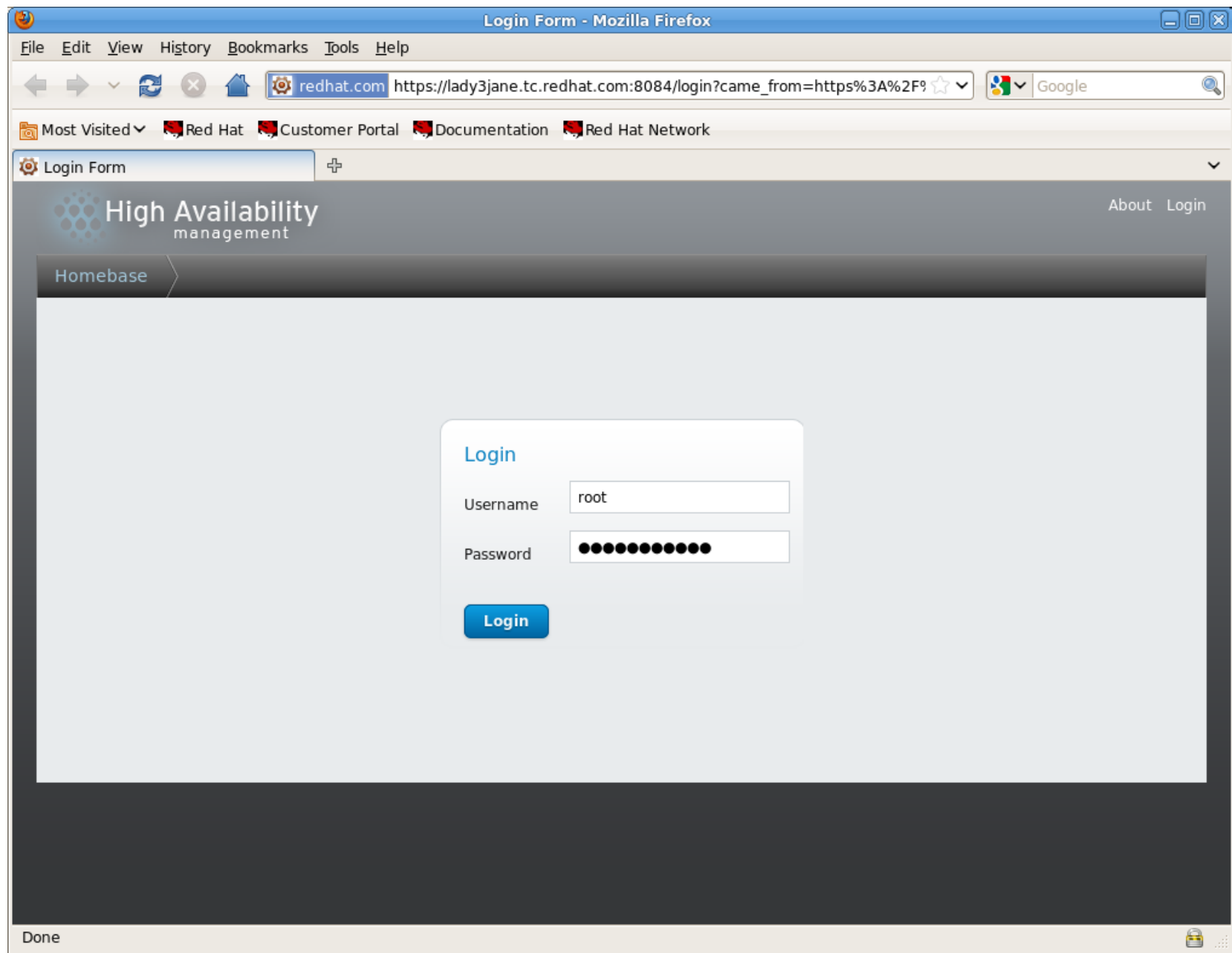


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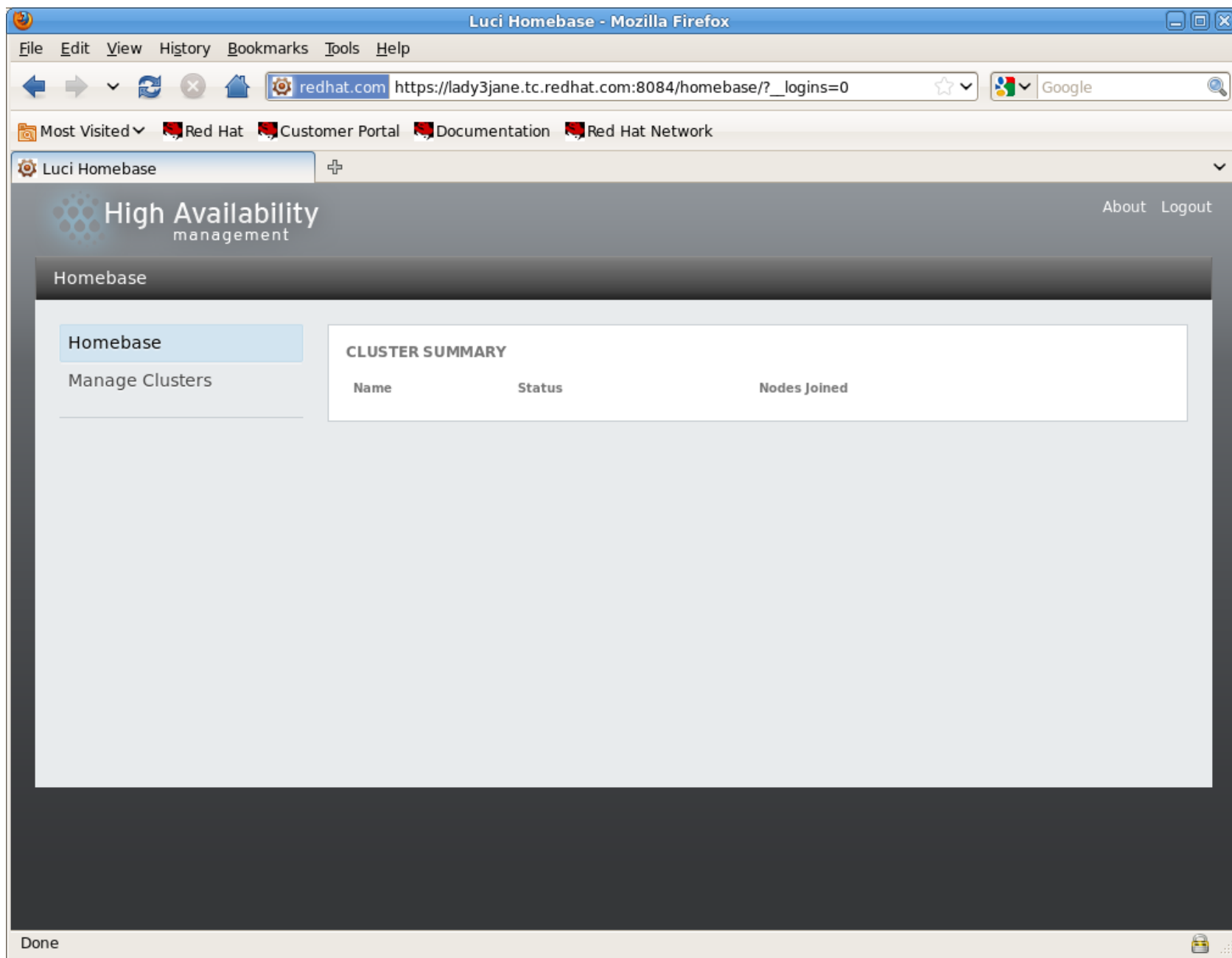


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Define a Cluster

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Define a Cluster

- In this case, two nodes
 - neuromancer.tc.redhat.com
 - finn.tc.redhat.com

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High Availability Management - Mozilla Firefox

File Edit View History Bookmarks Tools Help

redhat.com https://lady3jane.tc.redhat.com:8084/cluster

Most Visited Red Hat Customer Portal Documentation Red Hat Network

High Availability Management

High Availability management About Logout

Homebase Clusters

Homebase

Manage Clusters

+ Add * Create x Delete

Name	Status	Possible Votes	Current Votes	Quorum	Nodes Joined
------	--------	----------------	---------------	--------	--------------

https://lady3jane.tc.redhat.com:8084/clusters

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Manage Clusters

+ Add ★ Create ✕ Delete

Name	Status	Possible Votes	Current Votes	Quorum	Nodes Joined
------	--------	----------------	---------------	--------	--------------

https://lady3jane.tc.redhat.com:8084/cluster#

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Connect to the web management UI

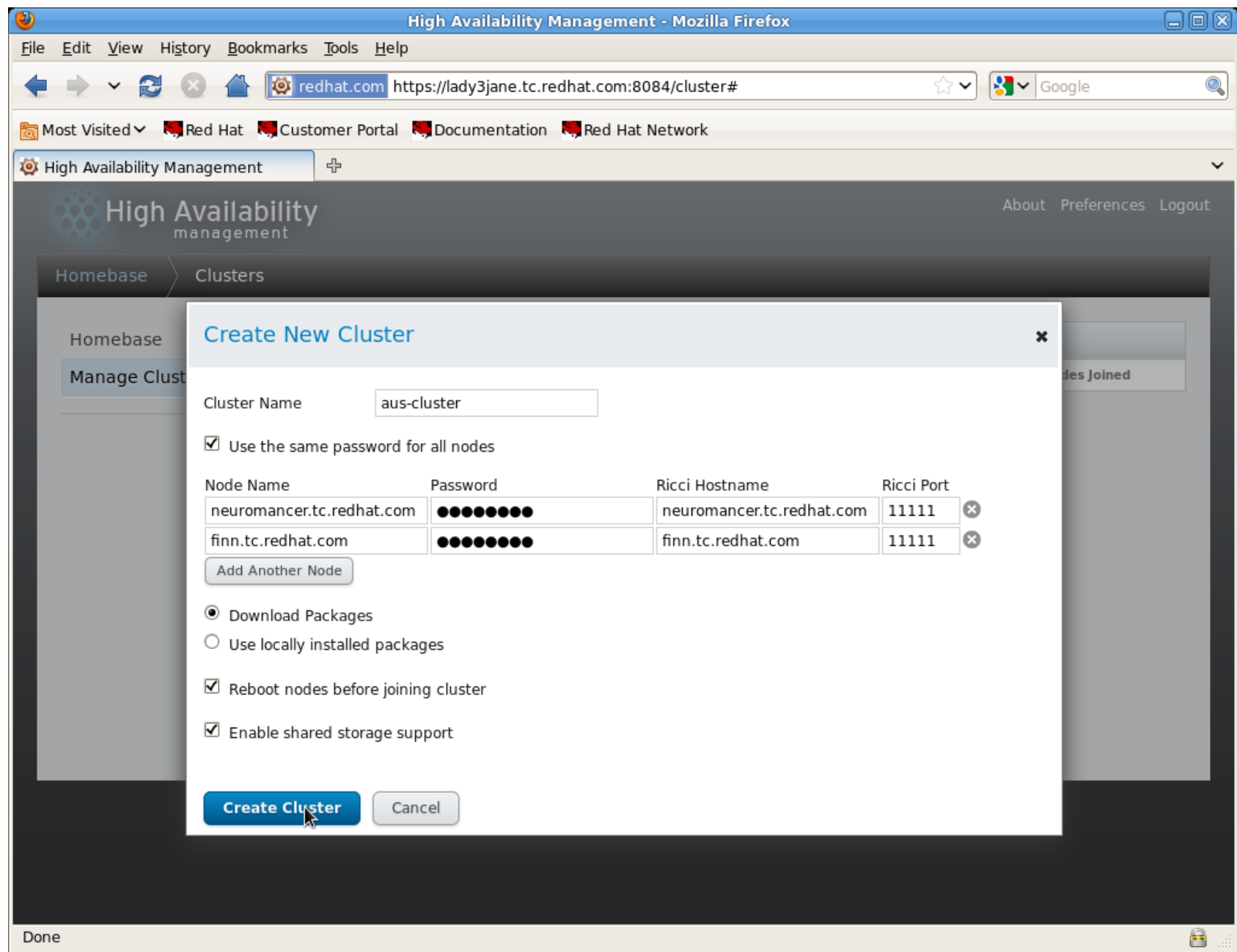
- Note that when dealing with RHEL 6.1 clusters, the UI is asking for ricci's password, not root's!

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High Availability Management - Mozilla Firefox

File Edit View History Bookmarks Tools Help

redhat.com https://lady3jane.tc.redhat.com:8084/cluster/aus-cluster

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High Availability Management

High Availability management About Preferences Logout

Homebase Clusters aus-cluster

i Creating the cluster "aus-cluster"...

Homebase
Manage Clusters

Nodes Fence Devices Failover Domains Resources Service Groups Configure

+ Add

! Node Name Hostname

Please wait...

Unable to retrieve the status for batch id 354719510 on neuromancer.tc.redhat.com. The node may be temporarily unreachable

Unable to retrieve the status for batch id 1164442708 on finn.tc.redhat.com. The node may be temporarily unreachable

Done

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High Availability Management - Mozilla Firefox

File Edit View History Bookmarks Tools Help

redhat.com https://lady3jane.tc.redhat.com:8084/cluster/aus-cluster

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High Availability Management

About Preferences Logout

Homebase Clusters aus-cluster

Homebase
Manage Clusters

aus-cluster

Nodes Fence Devices Failover Domains Resources Service Groups Configure

+ Add ↺ Reboot ↻ Join Cluster ↻ Leave Cluster ✕ Delete

!	Node Name	Node ID	Votes	Status	Uptime	Hostname
☐	neuromancer.tc.redhat.com	1	1	Cluster Member	00:00:00:31	neuromancer.tc.redhat.com
☐	finn.tc.redhat.com	2	1	Cluster Member	00:00:00:33	finn.tc.redhat.com

Select an item to view details

Done

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```
root@neuromancer:~
File Edit View Search Terminal Help
[tcameron@case ~]$ ssh -X root@neuromancer
Last login: Fri Apr 15 09:31:28 2011 from case.tc.redhat.com
[root@neuromancer ~]# clustat
Cluster Status for aus-cluster @ Fri Apr 15 09:33:55 2011
Member Status: Quorate

Member Name                                ID    Status
-----
neuromancer.tc.redhat.com                  1 Online, Local
finn.tc.redhat.com                         2 Online

[root@neuromancer ~]#
```



Create Cluster Filesystem

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Create Cluster Filesystem

- Now that the cluster is up, we can set up the shared storage from the hosts.
- Verify each node is using clustered logical volumes



```
root@neuromancer:~  
File Edit View Search Terminal Help  
[root@neuromancer ~]# grep locking_type /etc/lvm/lvm.conf  
    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.  
[root@neuromancer ~]#
```

```
root@finn:~  
File Edit View Search Terminal Help  
[root@finn ~]# grep locking_type /etc/lvm/lvm.conf  
    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.  
[root@finn ~]#
```

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Create Cluster Filesystem

- From a node:
 - fdisk shared storage
 - pvcreate
 - vgcreate
 - vgscan on all nodes
 - vgdisplay to get extents
 - lvcreate
 - lvscan on all nodes
 - mkfs.gfs2
 - make mount persistent (optional)



Create Cluster Filesystem

- Mount point clustered vs. persistent

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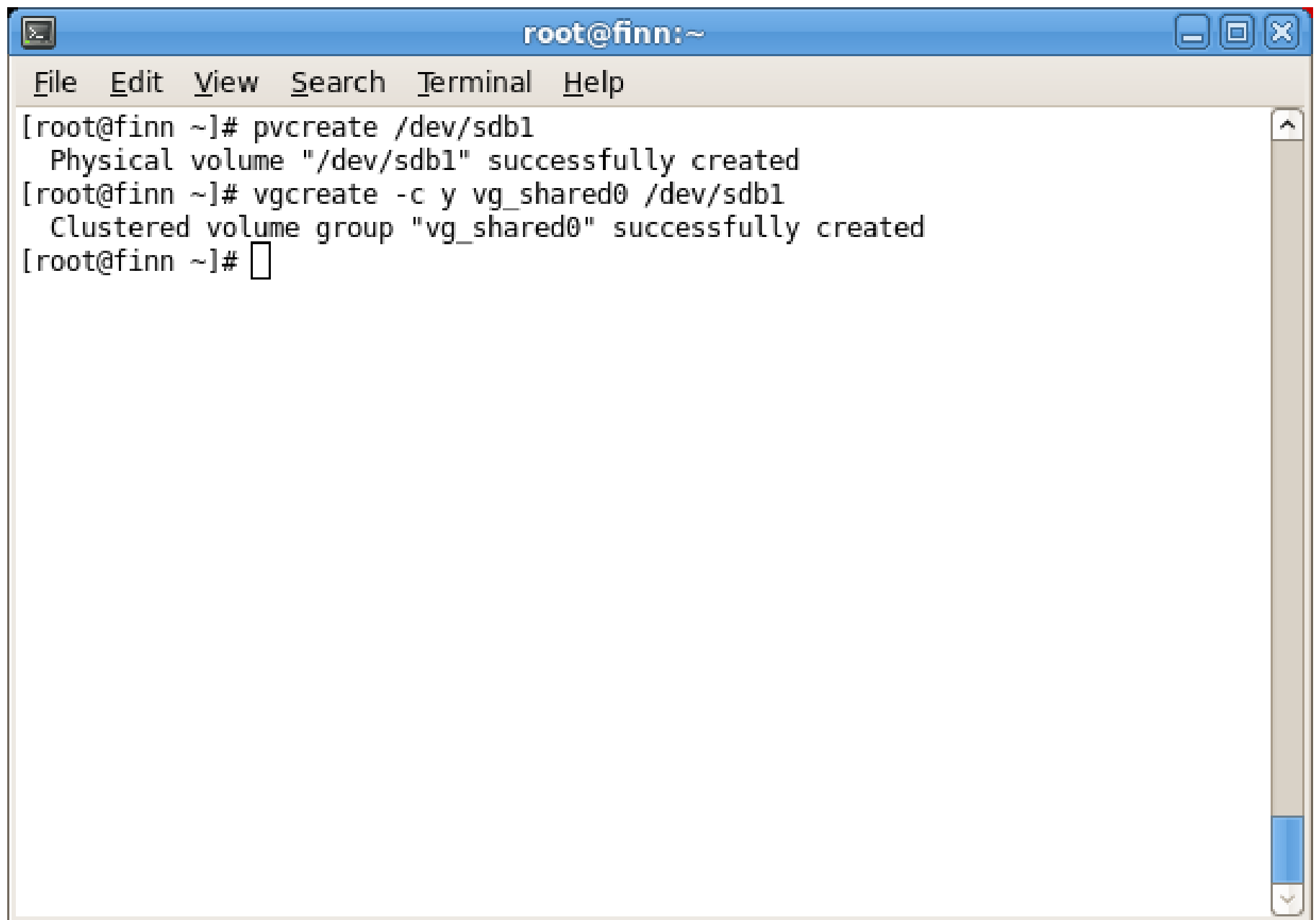
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```
root@finn:~  
File Edit View Search Terminal Help  
Warning: invalid flag 0x0000 of partition table 4 will be corrected by w(rite)  
  
WARNING: DOS-compatible mode is deprecated. It's strongly recommended to  
switch off the mode (command 'c') and change display units to  
sectors (command 'u').  
  
Command (m for help): n  
Command action  
  e   extended  
  p   primary partition (1-4)  
p  
Partition number (1-4): 1  
First cylinder (1-10443, default 1):  
Using default value 1  
Last cylinder, +cylinders or +size{K,M,G} (1-10443, default 10443):  
Using default value 10443  
  
Command (m for help): w  
The partition table has been altered!  
  
Calling ioctl() to re-read partition table.  
Syncing disks.  
[root@finn ~]#
```

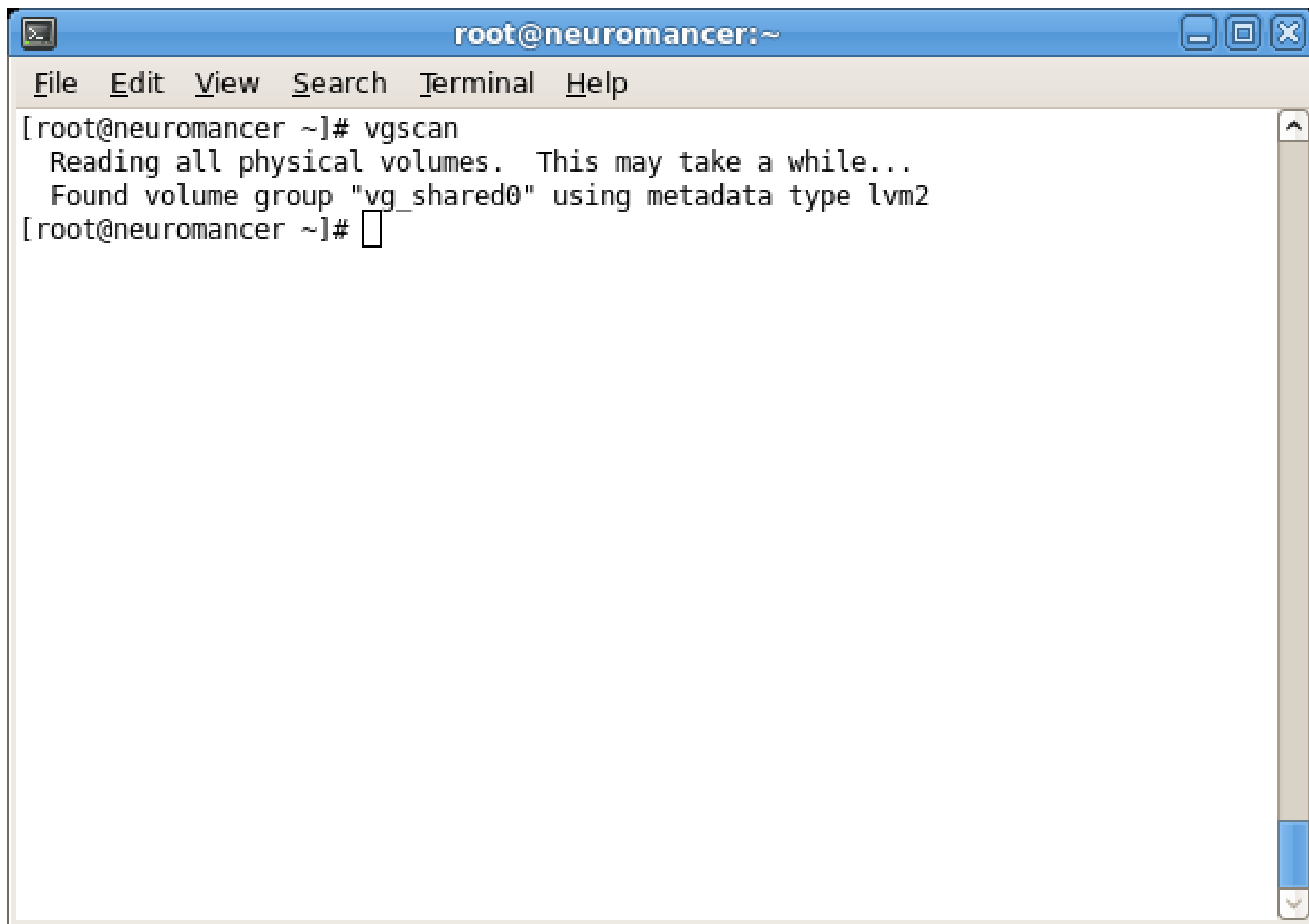




A terminal window titled "root@finn:~" with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows the following commands and output:

```
[root@finn ~]# pvcreate /dev/sdb1
Physical volume "/dev/sdb1" successfully created
[root@finn ~]# vgcreate -c y vg_shared0 /dev/sdb1
Clustered volume group "vg_shared0" successfully created
[root@finn ~]#
```



A terminal window titled 'root@neuromancer:~' with a menu bar containing 'File', 'Edit', 'View', 'Search', 'Terminal', and 'Help'. The terminal content shows the command 'vgscan' being executed, followed by the output: 'Reading all physical volumes. This may take a while...' and 'Found volume group "vg_shared0" using metadata type lvm2'. The prompt '[root@neuromancer ~]#' is followed by a cursor.

```
root@neuromancer:~  
File Edit View Search Terminal Help  
[root@neuromancer ~]# vgscan  
  Reading all physical volumes.  This may take a while...  
  Found volume group "vg_shared0" using metadata type lvm2  
[root@neuromancer ~]#
```

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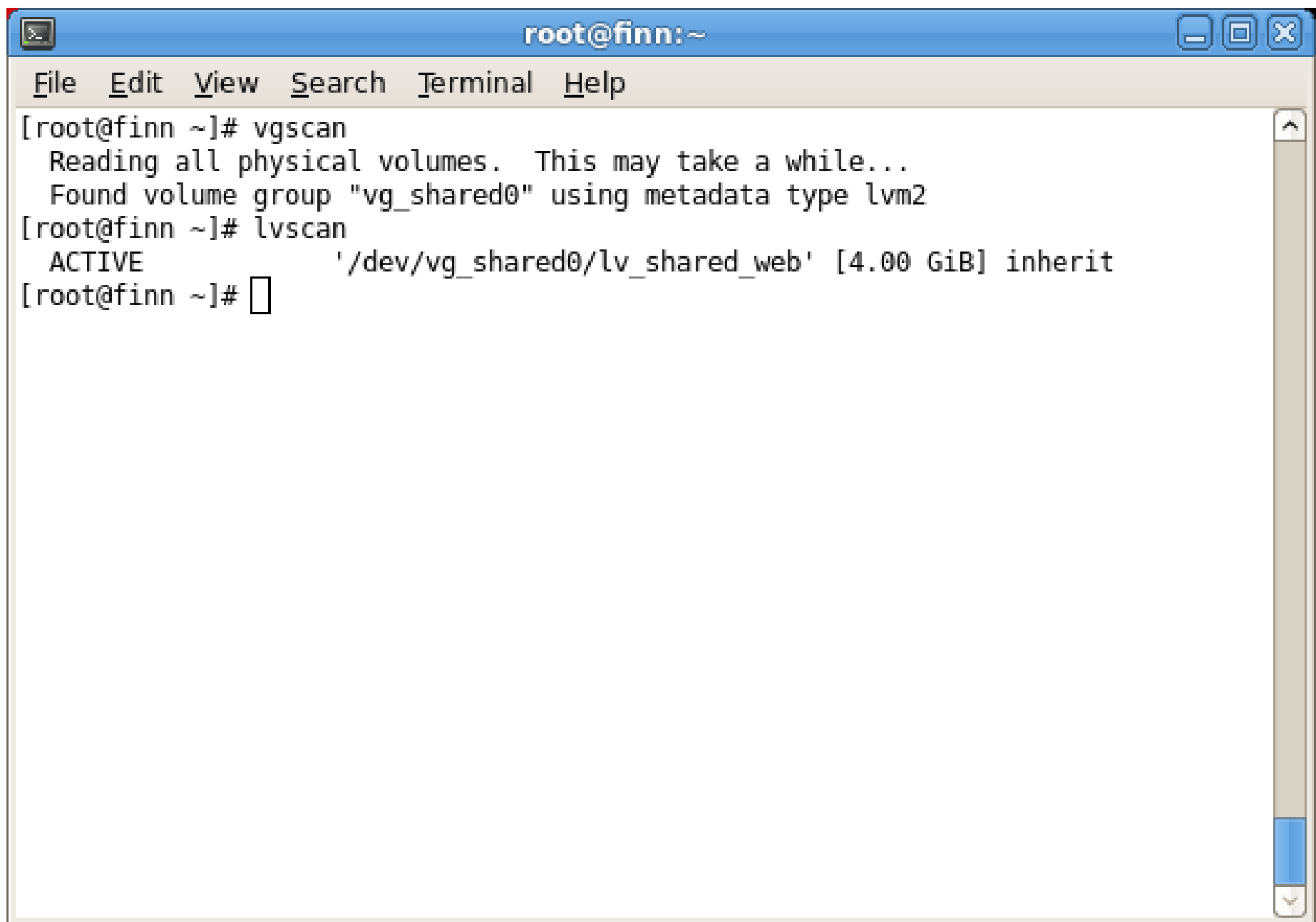
```
root@neuromancer:~  
File Edit View Search Terminal Help  
System ID  
Format lvm2  
Metadata Areas 1  
Metadata Sequence No 1  
VG Access read/write  
VG Status resizable  
Clustered yes  
Shared no  
MAX LV 0  
Cur LV 0  
Open LV 0  
Max PV 0  
Cur PV 1  
Act PV 1  
VG Size 127.32 GiB  
PE Size 4.00 MiB  
Total PE 32594  
Alloc PE / Size 0 / 0  
Free PE / Size 32594 / 127.32 GiB  
VG UUID etBNLn-e046-5RyT-T7Yz-z05n-K1a5-qhTET7  
  
[root@neuromancer ~]# lvcreate -L 4G -n lv_shared_web vg_shared0  
Logical volume "lv_shared_web" created  
[root@neuromancer ~]#
```

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A terminal window titled "root@finn:~" with a menu bar containing "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal shows the following commands and output:

```
[root@finn ~]# vgscan
  Reading all physical volumes.  This may take a while...
  Found volume group "vg_shared0" using metadata type lvm2
[root@finn ~]# lvscan
  ACTIVE                '/dev/vg_shared0/lv_shared_web' [4.00 GiB] inherit
[root@finn ~]#
```

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```
root@neuromancer:~  
File Edit View Search Terminal Help  
Alloc PE / Size      0 / 0  
Free  PE / Size     32594 / 127.32 GiB  
VG UUID              etBNLn-e046-5RyT-T7Yz-z05n-K1a5-qhTET7  
  
[root@neuromancer ~]# lvcreate -L 4G -n lv_shared_web vg_shared0  
Logical volume "lv_shared_web" created  
[root@neuromancer ~]# mkfs.gfs2 -j 3 -p lock_dlm -t aus-cluster:shared-web /dev/  
mapper/vg_shared0-lv_shared_web  
This will destroy any data on /dev/mapper/vg_shared0-lv_shared_web.  
It appears to contain: symbolic link to `../dm-0`  
  
Are you sure you want to proceed? [y/n] y  
  
Device:                /dev/mapper/vg_shared0-lv_shared_web  
Blocksize:             4096  
Device Size            4.00 GB (1048576 blocks)  
Filesystem Size:       4.00 GB (1048575 blocks)  
Journals:              3  
Resource Groups:       16  
Locking Protocol:      "lock_dlm"  
Lock Table:            "aus-cluster:shared-web"  
UUID:                  DBD18A58-A05B-04D4-8000-74095D417AEC  
  
[root@neuromancer ~]#
```

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```
root@finn:~  
File Edit View Search Terminal Help  
[root@finn ~]# vgscan  
  Reading all physical volumes.  This may take a while...  
  Found volume group "vg_shared0" using metadata type lvm2  
[root@finn ~]# lvscan  
  ACTIVE                '/dev/vg_shared0/lv_shared_web' [4.00 GiB] inherit  
[root@finn ~]# clustat  
Cluster Status for aus-cluster @ Mon Apr 18 19:59:11 2011  
Member Status: Quorate  
  
Member Name                                ID    Status  
-----  
neuromancer.tc.redhat.com                  1 Online  
finn.tc.redhat.com                         2 Online, Local  
  
[root@finn ~]# mount /dev/mapper/vg_shared0-lv_shared_web /var/www/html/  
[root@finn ~]#
```

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```
root@neuromancer:~  
File Edit View Search Terminal Help  
#  
# /etc/fstab  
# Created by anaconda on Mon Apr 18 17:55:30 2011  
#  
# Accessible filesystems, by reference, are maintained under '/dev/disk'  
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info  
#  
UUID=dcc5ebaf-c6f8-40bb-a367-de1fffbfa92a / ext4 default  
ts 1 1  
UUID=2a836d30-4905-4cff-b3f0-f4c8cd940b29 /boot ext4 default  
ts 1 2  
UUID=bf0792af-c5ab-4b54-b526-fb7755a085eb swap swap default  
ts 0 0  
tmpfs /dev/shm tmpfs defaults 0 0  
devpts /dev/pts devpts gid=5,mode=620 0 0  
sysfs /sys sysfs defaults 0 0  
proc /proc proc defaults 0 0  
/dev/mapper/vg_shared0-lv_shared_web /var/www/html/ gfs2 noatime 0 0  
~  
~  
~  
-- INSERT --
```

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```
root@neuromancer:~  
File Edit View Search Terminal Help  
[root@neuromancer ~]# mount  
/dev/sda3 on / type ext4 (rw)  
proc on /proc type proc (rw)  
sysfs on /sys type sysfs (rw)  
devpts on /dev/pts type devpts (rw,gid=5,mode=620)  
tmpfs on /dev/shm type tmpfs (rw)  
/dev/sda1 on /boot type ext4 (rw)  
none on /proc/sys/fs/binfmt_misc type binfmt_misc (rw)  
sunrpc on /var/lib/nfs/rpc_pipefs type rpc_pipefs (rw)  
none on /sys/kernel/config type configfs (rw)  
/dev/mapper/vg_shared0-lv_shared_web on /var/www/html type gfs2 (rw,relatime,hos  
tdata=jid=1)  
[root@neuromancer ~]# df -h  
Filesystem      Size  Used Avail Use% Mounted on  
/dev/sda3       21G   1.4G   18G    7% /  
tmpfs           7.7G   32M   7.7G    1% /dev/shm  
/dev/sda1       194M   31M   154M   17% /boot  
/dev/mapper/vg_shared0-lv_shared_web  
4.0G   388M   3.7G   10% /var/www/html  
[root@neuromancer ~]#
```

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Define the fence device

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Define the fence device

- In this case, a WTI IPS-800 remote power switch

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High Availability Management

High Availability management About Logout

Homebase Clusters aus-cluster

Homebase Manage Clusters

aus-cluster

Nodes Fence Devices Failover Domains Resources Service Groups Configure

+ Add x Delete

Name	Fence Type	Nodes Using	Hostname
No item to display			

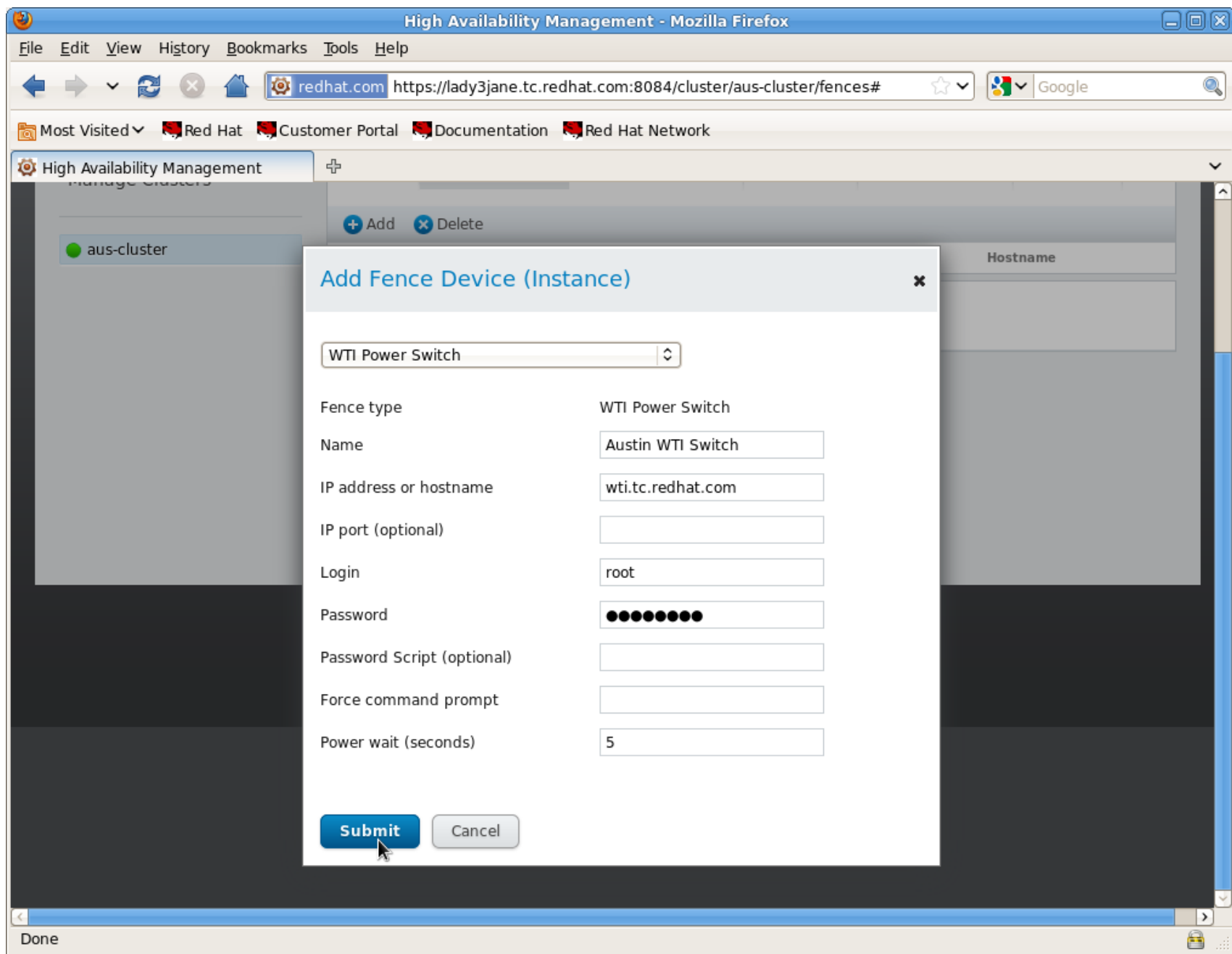
https://lady3jane.tc.redhat.com:8084/cluster/aus-cluster/fences#

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⚙️ High Availability Management + ▾

High Availability
management

About Logout

Homebase > Clusters > aus-cluster

Homebase
Manage Clusters

● aus-cluster

Nodes Fence Devices Failover Domains Resources Service Groups Configure

+ Add × Delete

	Name	Fence Type	Nodes Using	Hostname
☐	Austin_WTI_Switch	WTI Power Device	0	wti.tc.redhat.com

Select an item to view details

Done

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Assign hosts to fence device ports

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Assign hosts to fence device ports

- Define the power port for each server

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High Availability Management

High Availability management About Preferences Logout

Homebase Clusters aus-cluster

Homebase Manage Clusters

aus-cluster

Nodes Fence Devices Failover Domains Resources Service Groups Configure

+ Add Reboot Join Cluster Leave Cluster Delete

!	Node Name	Node ID	Votes	Status	Uptime	Hostname
☐	neuromancer.tc.redhat.com	1	1	Cluster Member	00:01:40:43	neuromancer.tc.redhat.com
☐	finn.tc.redhat.com	2	1	Cluster Member	00:01:40:43	finn.tc.redhat.com

Select an item to view details

https://lady3jane.tc.redhat.com:8084/cluster/aus-cluster/neuromancer.tc.redhat.com

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redhat.com https://lady3jane.tc.redhat.com:8084/cluster/aus-cluster/neuromancer.t Google

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High Availability Management

ricci host neuromancer.tc.redhat.com

ricci port 11111

Services

clustered-web-service

Failover Domains

	Priority
prefer_neuromancer	1
prefer_finn	10

Fence Devices

Method

Add Fence Method

Cluster Daemons

	Status
cman	Running
rgmanager	Running
ricci	Running
modclusterd	Running
clvmd	Running

Done

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High Availability Management

ricci host neuromancer.tc.redhat.com

ricci port 11111

Services

clustered-web-service

Failover Domains Priority

Add Fence Method To Node

Method Name: WTI

Submit Cancel

Cluster Daemons Status

cman	Running
rgmanager	Running
ricci	Running
modclusterd	Running
clvmd	Running

Done

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High Availability Management

Services

clustered-web-service

Failover Domains

	Priority
prefer_neuromancer	1
prefer_finn	10

Fence Devices

Method

WTI [Remove](#)

Name	Type/Values
Add Fence Instance	

[Add Fence Method](#)

Cluster Daemons

	Status
cman	Running
rgmanager	Running
ricci	Running
modclusterd	Running
clvmd	Running

Done

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High Availability Management

Services

clustered-web-service

Failover Domains

	Priority
prefer_neuromancer	1
prefer_finn	10

Fence Devices

Add Fence Device (Instance) ×

-- Select a fence device --

-- Select a fence device --

Existing fence devices

Austin_WTI_Switch (WTI Power Device)

Remove

Cluster Daemons

	Status
cman	Running
rgmanager	Running
ricci	Running
modclusterd	Running
clvmd	Running

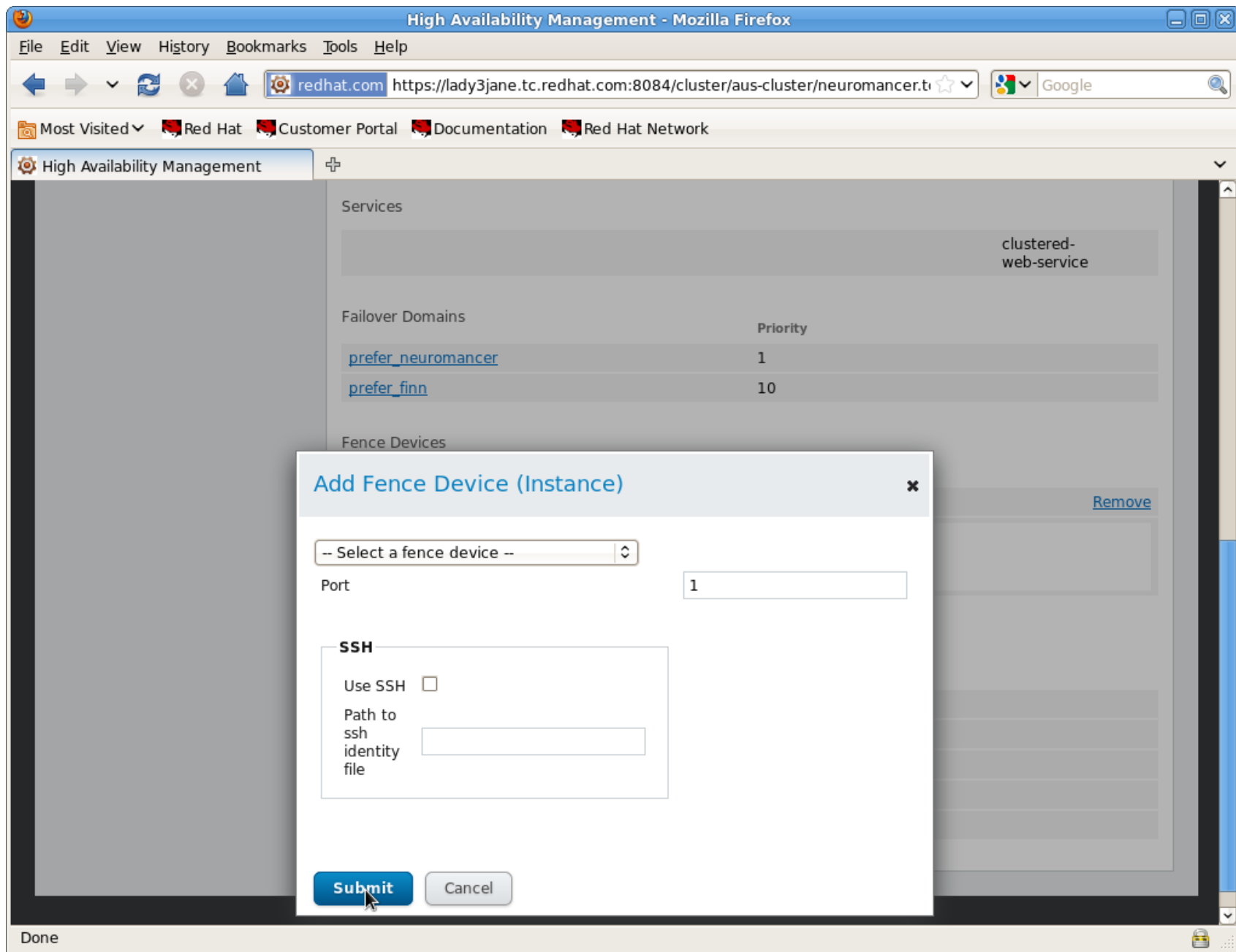
Done

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Define Failover Domains

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Define Failover Domains

- prefer_neuromancer
- prefer_finn

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High Availability Management

High Availability management About Logout

Homebase Clusters aus-cluster

Homebase Manage Clusters

aus-cluster

Add Failover Domain To Cluster

Name

☒ Prioritized Order the nodes to which services failover.

☒ Restricted Service can run only on nodes specified.

☐ No Failback Do not send service back to 1st priority node when it becomes available again.

	Member	Priority
neuromancer.tc.redhat.com	☒	1
finn.tc.redhat.com	☒	10

Create Cancel

Done

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High Availability Management

High Availability management About Logout

Homebase Clusters aus-cluster

Creating failover domain "prefer neuromancer"

Homebase Manage Clusters

aus-cluster

Groups Configure

Restricted

Add Failover Domain To Cluster

Name prefer_finn

☒ Prioritized Order the nodes to which services failover.

☒ Restricted Service can run only on nodes specified.

☐ No Failback Do not send service back to 1st priority node when it becomes available again.

	Member	Priority
neuromancer.tc.redhat.com	☒	10
finn.tc.redhat.com	☒	1

Create Cancel

Done

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High Availability Management

About Logout

Homebase Clusters aus-cluster

✓ Creating failover domain "prefer_finn"

Homebase
Manage Clusters

aus-cluster

Nodes Fence Devices Failover Domains Resources Service Groups Configure

+ Add - Delete

	Name	Prioritized	Restricted
☐	prefer_neuromancer	✓	✓
☐	prefer_finn	✓	✓

Select an item to view details

Done

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Define Resources For Clustered Web Service

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Define Resources For Clustered Web Service

- Shared Storage (if not in fstab)
- IP address
- Apache Resource

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High Availability Management

High Availability management About Logout

Homebase Clusters aus-cluster

Homebase
Manage Clusters

aus-cluster

Nodes Fence Devices Failover Domains Resources Service Groups Configure

+ Add x Delete

Name/IP	Type	In Use
No item to display		

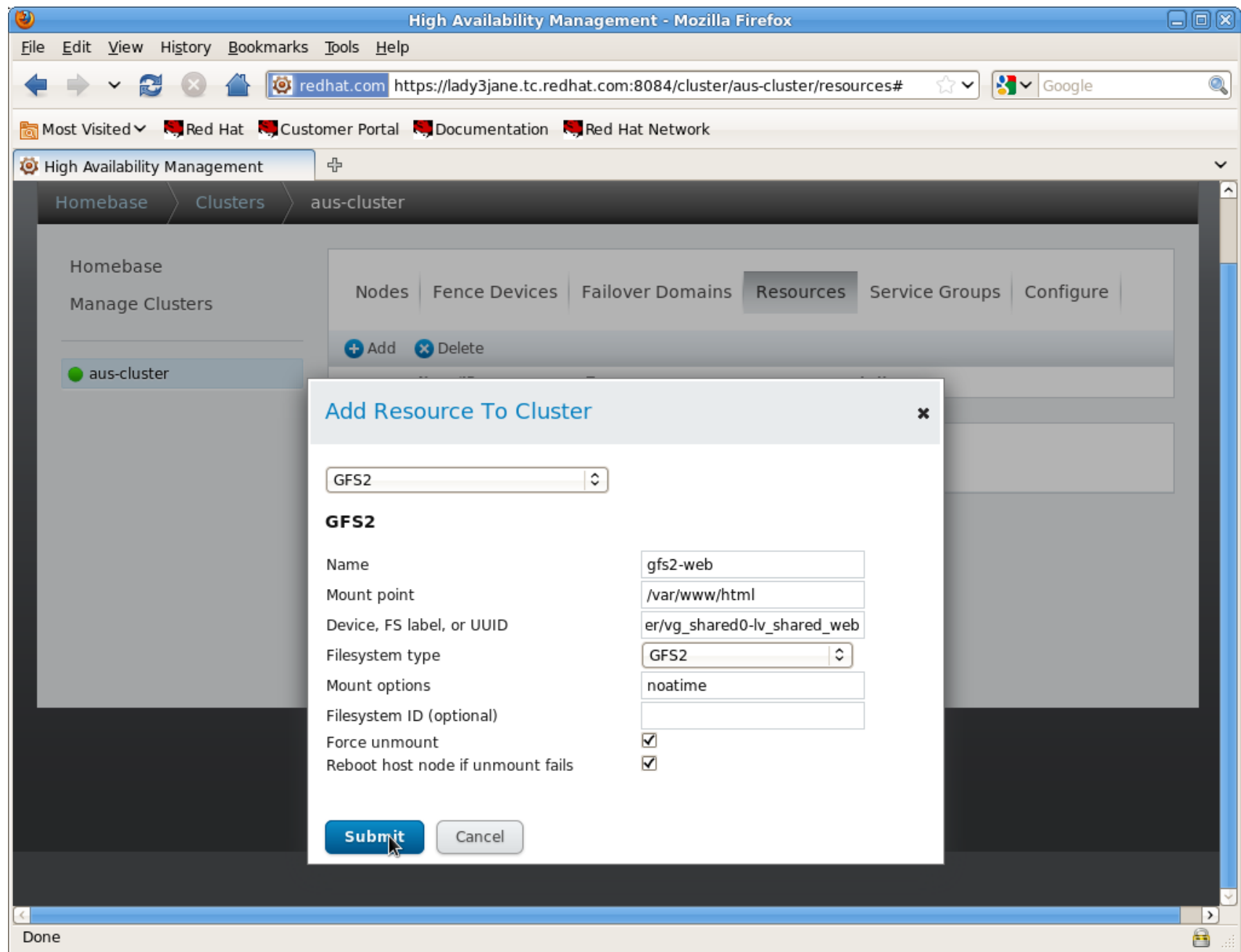
https://lady3jane.tc.redhat.com:8084/cluster/aus-cluster/resources#

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 **High Availability**
management About Logout

Homebase Clusters **aus-cluster**

Homebase
Manage Clusters

● aus-cluster

Nodes Fence Devices Failover Domains **Resources** Service Groups Configure

+ Add × Delete

	Name/IP	Type	In Use
☐	gfs2-web	GFS2	No

Select an item to view details

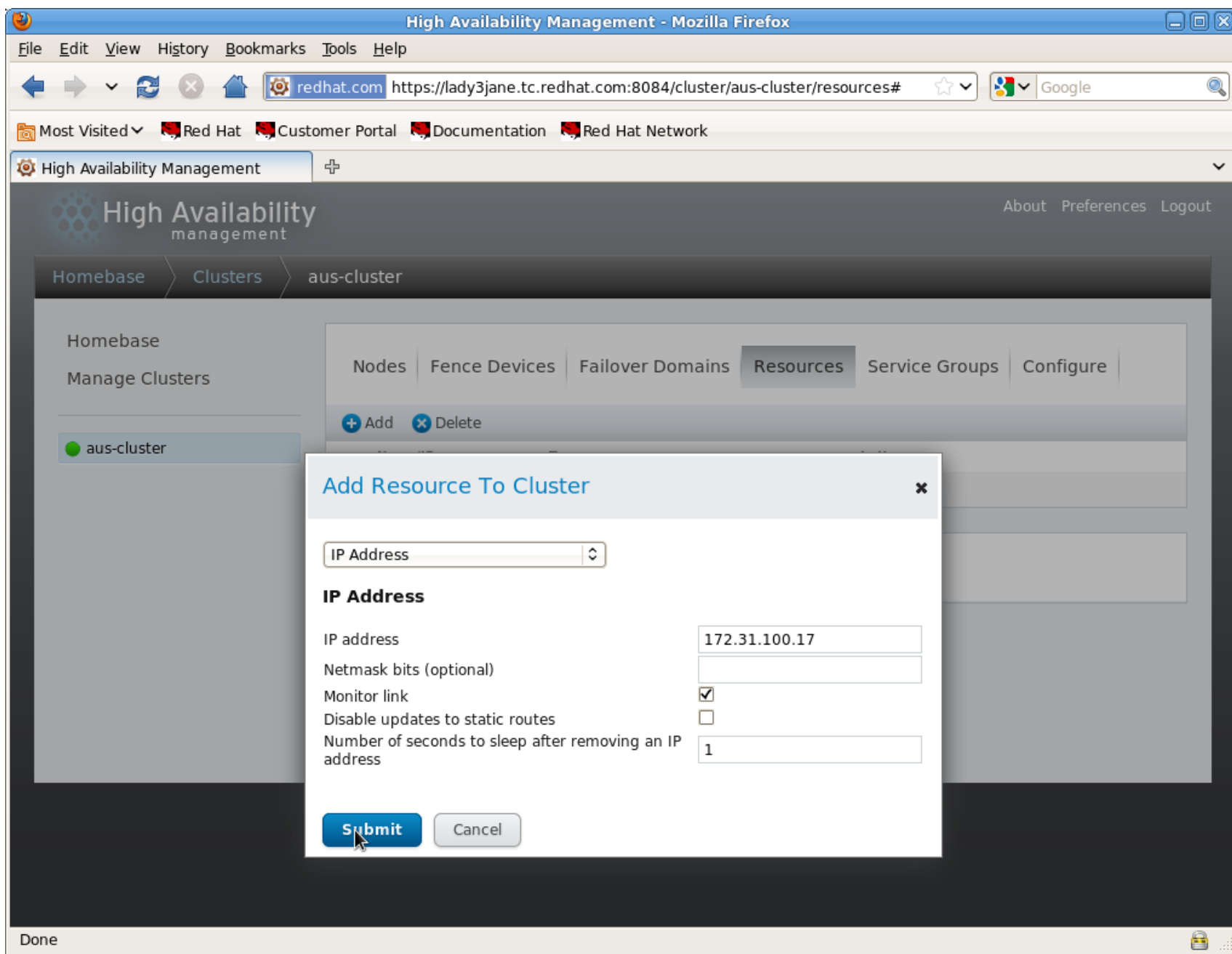
https://lady3jane.tc.redhat.com:8084/cluster/aus-cluster/resources#

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High Availability Management

About Logout

Homebase Clusters aus-cluster

Homebase
Manage Clusters

aus-cluster

Nodes Fence Devices Failover Domains Resources Service Groups Configure

+ Add x Delete

	Name/IP	Type	In Use
☐	gfs2-web	GFS2	No
☐	172.31.100.17	IP Address	No

Select an item to view details

https://lady3jane.tc.redhat.com:8084/cluster/aus-cluster/resources#

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High Availability Management

High Availability management About Preferences Logout

Homebase Clusters aus-cluster

✓ Edited global resource "172.31.100.17"

Homebase Manage Clusters

aus-cluster

Add Resource To Cluster

Script

Script

Name web-server-script

Full path to script file /etc/rc.d/init.d/httpd

Submit Cancel

IP address 172.31.100.17

Netmask bits (optional)

Monitor link ☒

Disable updates to static routes ☐

Number of seconds to sleep after removing an IP address 1

Done

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High Availability Management

About Preferences Logout

Homebase Clusters aus-cluster

Homebase
Manage Clusters

aus-cluster

Nodes Fence Devices Failover Domains Resources Service Groups Configure

+ Add - Delete

	Name/IP	Type	In Use
☐	gfs2-web	GFS2	No
☐	172.31.100.17	IP Address	No
☐	web-server-script	Script	No

Select an item to view details

Done

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Define Clustered Web Service

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Define Clustered Web Service

- Define service
- Add storage resource (if not in fstab)
- Add ip address resource
- add script resource



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High Availability Management

High Availability management About Logout

Homebase Clusters aus-cluster

Homebase
Manage Clusters

aus-cluster

Nodes Fence Devices Failover Domains Resources Service Groups Configure

+ Add Start Restart Disable Delete

! Name	Status	Autostart	Failover Domain
No item to display			

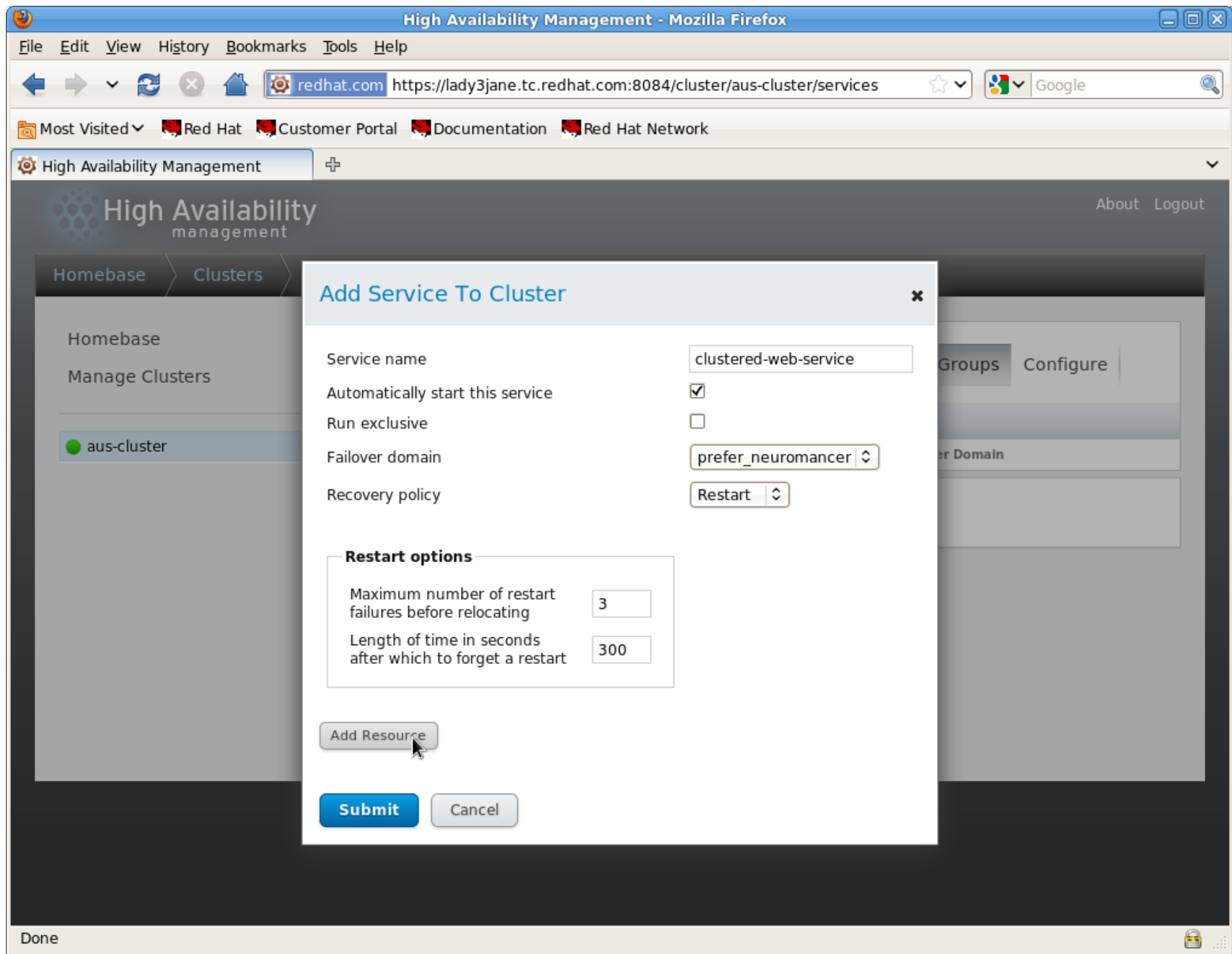
https://lady3jane.tc.redhat.com:8084/cluster/aus-cluster/services#

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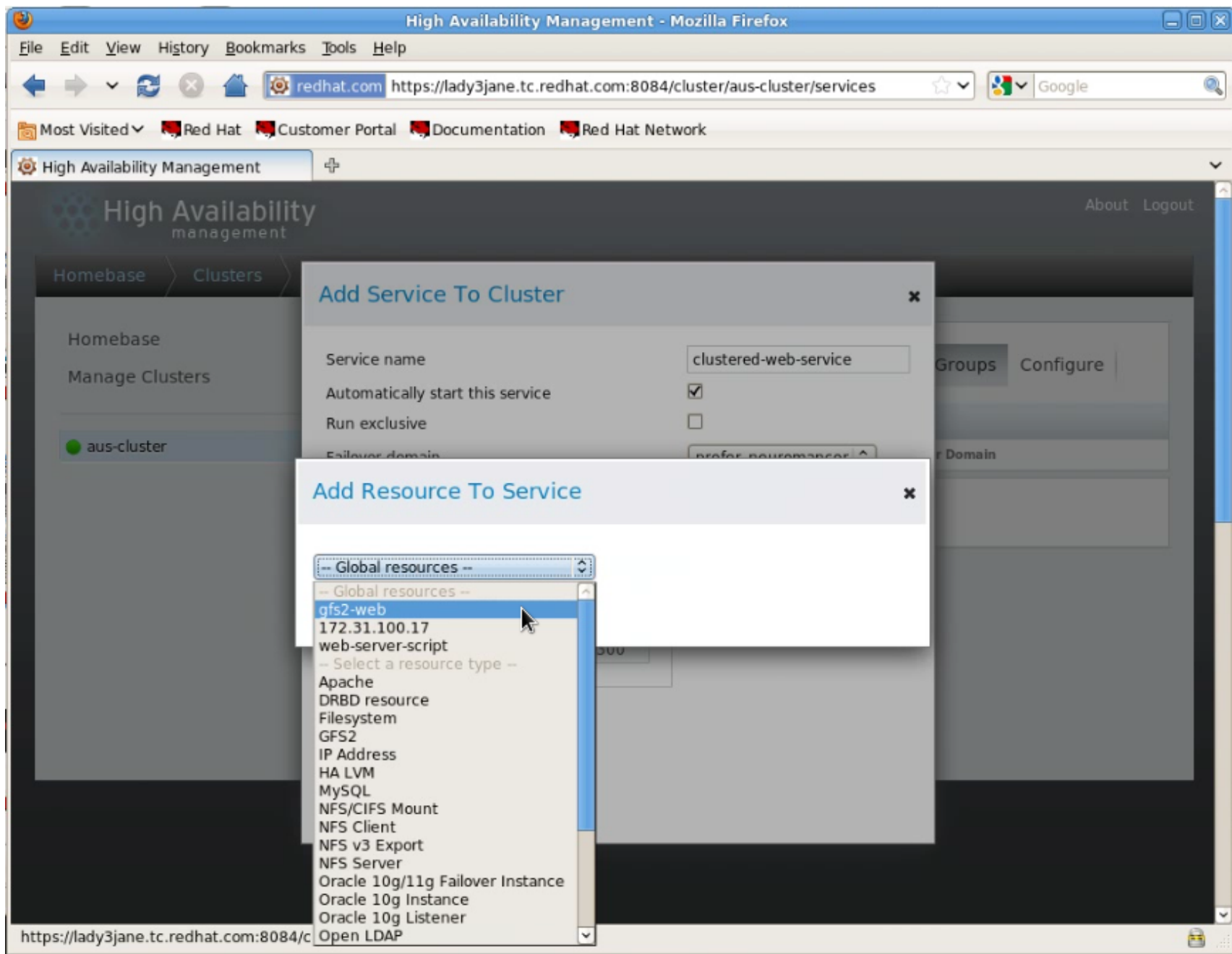


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High Availability Management

High Availability management

About Logout

Homebase Clusters

Homebase

Manage Clusters

aus-cluster

Add Service To Cluster

Service name clustered-web-service

Automatically start this service ☒

Run exclusive ☐

Failover domain prefer_neuromancer

Recovery policy Restart

Restart options

Maximum number of restart failures before relocating 3

Length of time in seconds after which to forget a restart 300

GFS2

Name gfs2-web

Mount point /var/www/html

Device, FS label, or UUID /dev/mapper/vg_shared0-lv

Done

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High Availability Management

Force unmount ☐

Reboot host node if unmount fails ☐

Independent subtree ☐

Non-critical resource ☐

Independent subtree/non-critical options

Maximum number of failures

Failure expire time (seconds)

Maximum number of restarts

Restart expire time (seconds)

Add a child resource

Add Resource

Submit Cancel

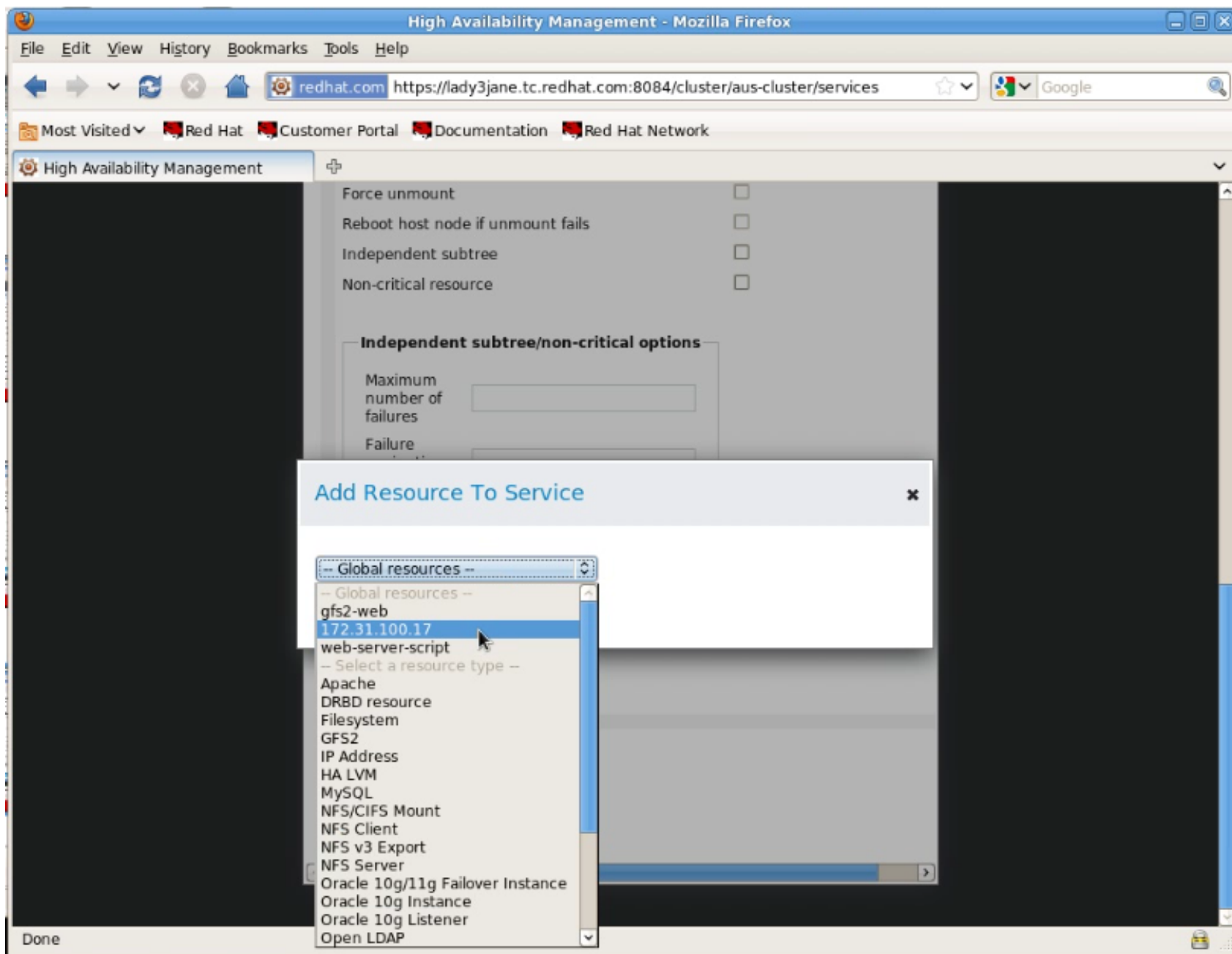
Done

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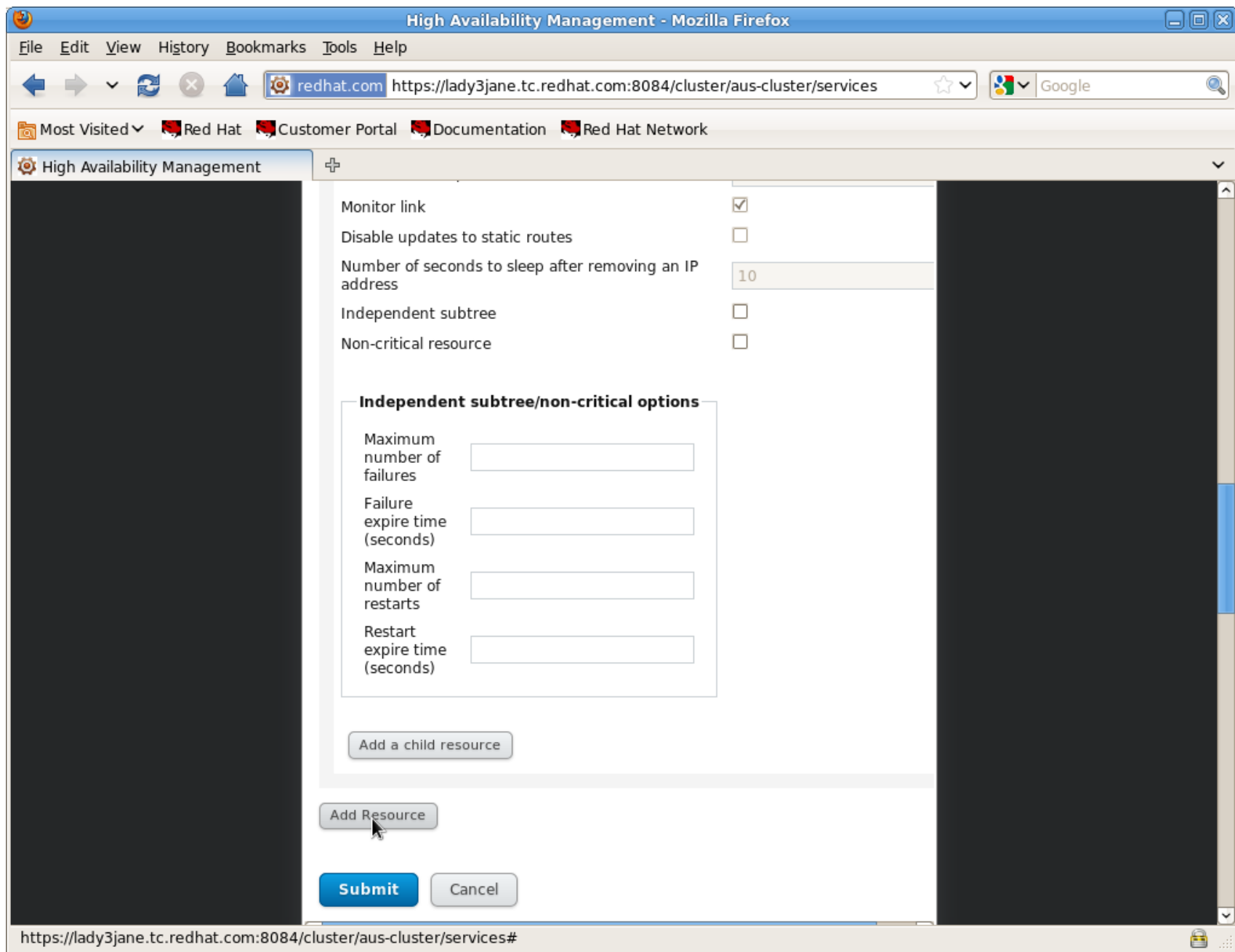


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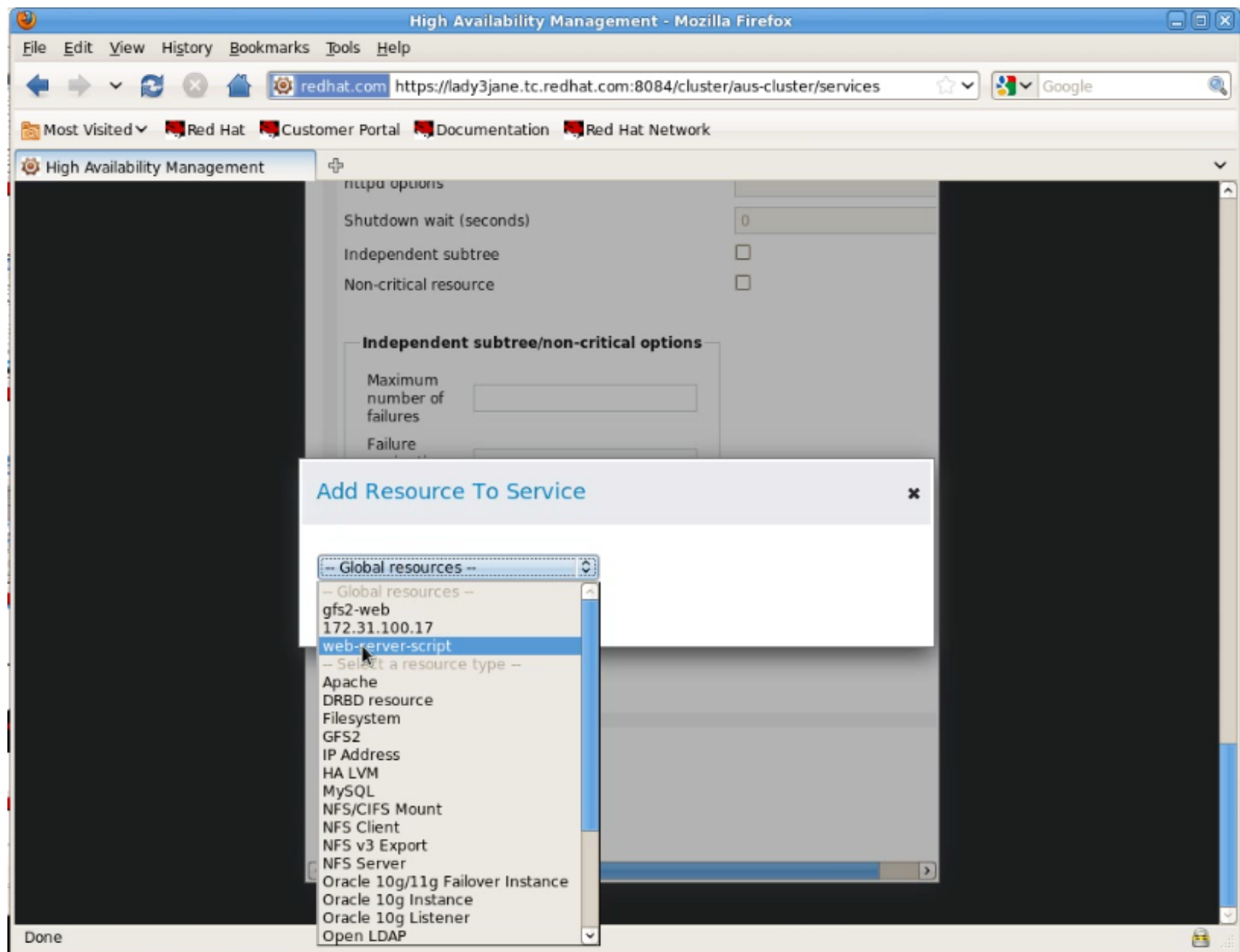


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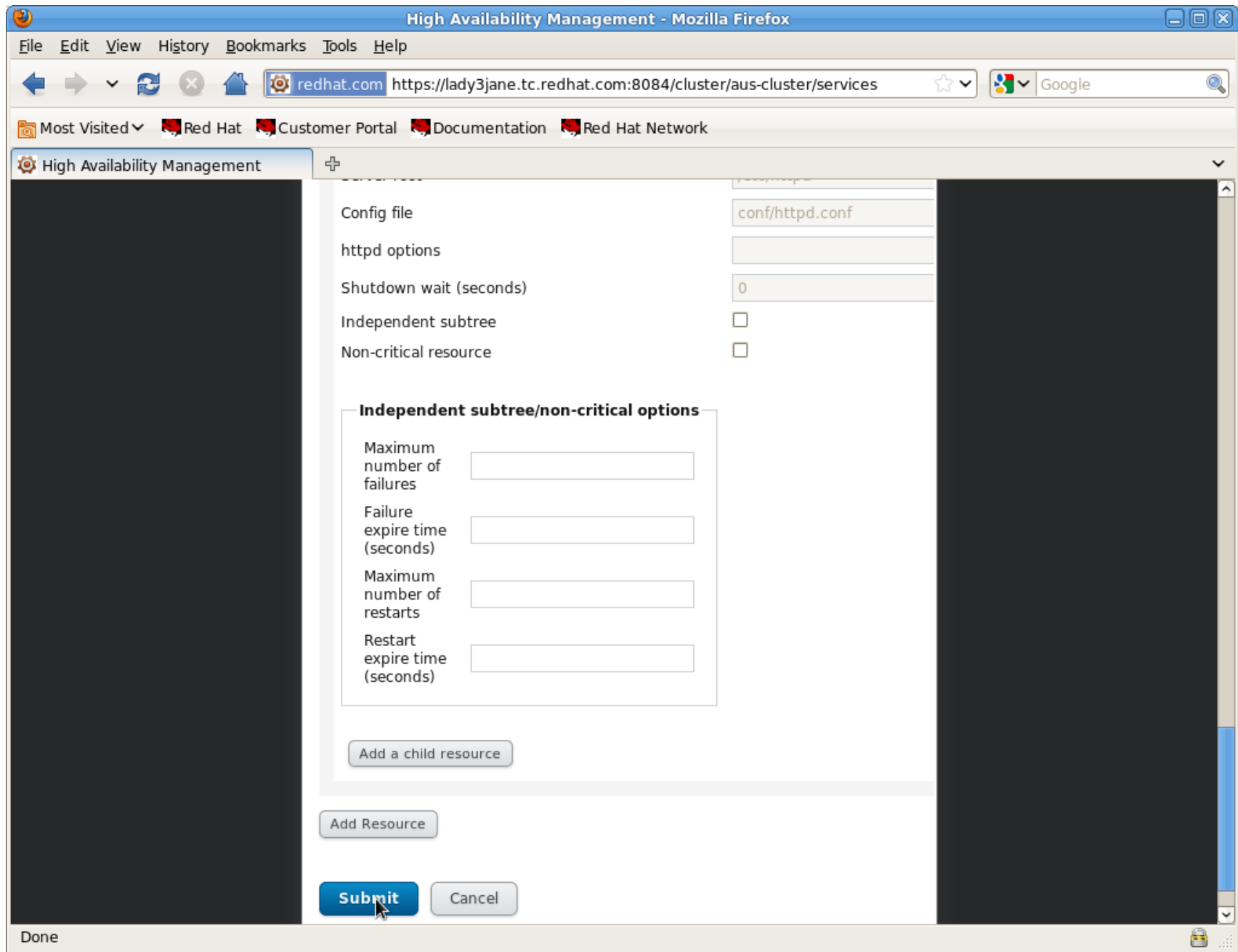


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High Availability Management

High Availability management About Preferences Logout

Homebase Clusters aus-cluster

Homebase
Manage Clusters

aus-cluster

Nodes Fence Devices Failover Domains Resources Service Groups Configure

+ Add ▶ Start ↺ Restart ■ Disable ✕ Delete

!	Name	Status	Autostart	Fallover Domain
☐	clustered-web-service	Running on neuromancer.tc.redhat.com	☒	prefer_neuromancer

Select an item to view details

Done

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```
root@neuromancer:~  
File Edit View Search Terminal Help  
[root@neuromancer ~]# clustat  
Cluster Status for aus-cluster @ Mon Apr 18 20:25:50 2011  
Member Status: Quorate  
  
Member Name                                ID    Status  
-----  
neuromancer.tc.redhat.com                  1 Online, Local, rgmanager  
finn.tc.redhat.com                         2 Online, rgmanager  
  
Service Name                                Owner (Last)                                State  
-----  
service:clustered-web-service neuromancer.tc.redhat.com started  
[root@neuromancer ~]#
```



```
root@neuromancer:~  
File Edit View Search Terminal Help  
[root@neuromancer ~]# ip addr show  
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 16436 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  
    inet6 ::1/128 scope host  
        valid_lft forever preferred_lft forever  
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP ql  
en 1000  
    link/ether bc:ae:c5:8d:7e:d3 brd ff:ff:ff:ff:ff:ff  
    inet 172.31.100.14/24 brd 172.31.100.255 scope global eth0  
    inet 172.31.100.17/24 scope global secondary eth0  
    inet6 fe80::beae:c5ff:fe8d:7ed3/64 scope link  
        valid_lft forever preferred_lft forever  
3: eth1: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN qlen 1000  
    link/ether 00:21:2f:31:11:35 brd ff:ff:ff:ff:ff:ff  
[root@neuromancer ~]#
```

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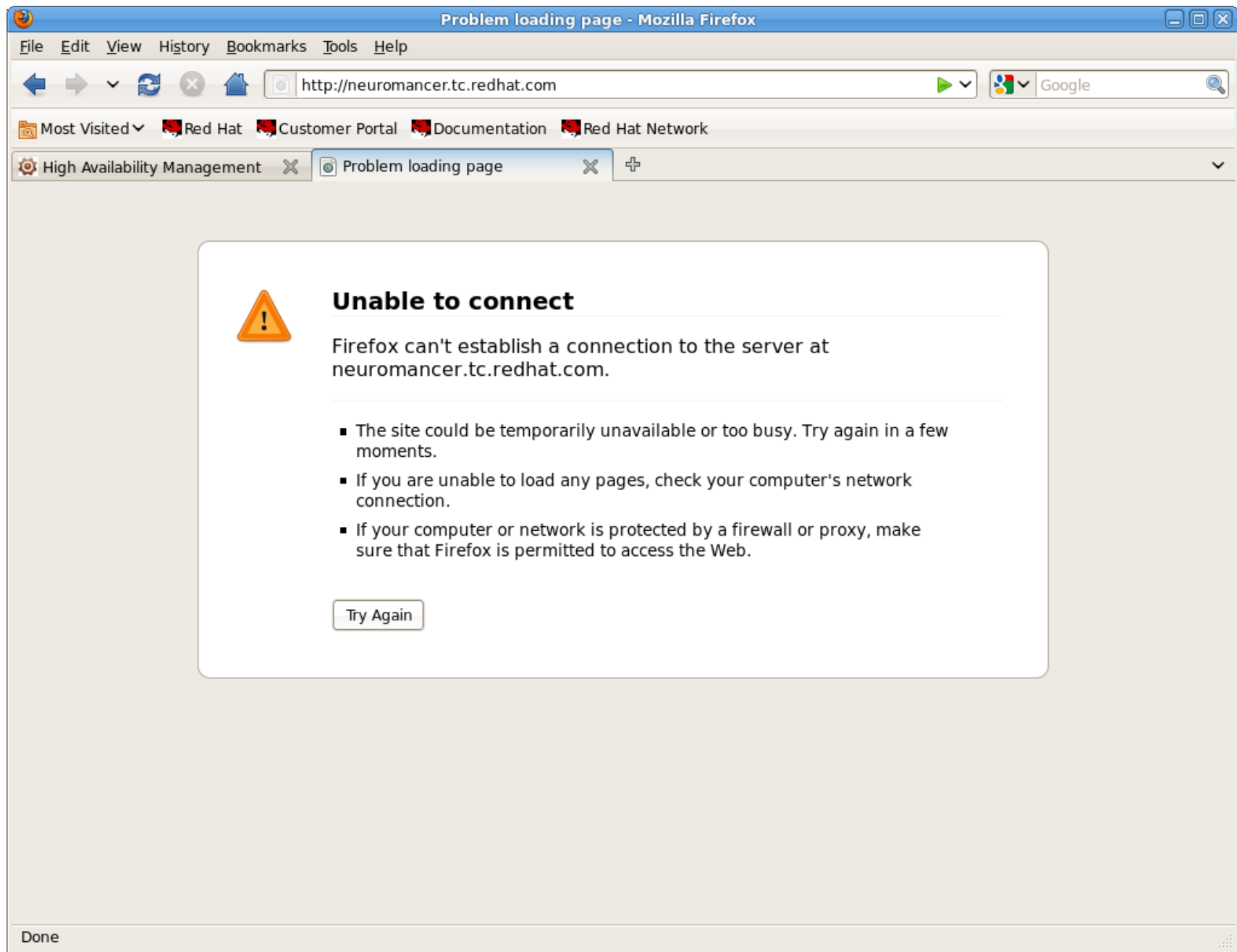
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```
root@neuromancer:~  
File Edit View Search Terminal Help  
[root@neuromancer ~]# mount  
/dev/sda3 on / type ext4 (rw)  
proc on /proc type proc (rw)  
sysfs on /sys type sysfs (rw)  
devpts on /dev/pts type devpts (rw,gid=5,mode=620)  
tmpfs on /dev/shm type tmpfs (rw)  
/dev/sda1 on /boot type ext4 (rw)  
none on /proc/sys/fs/binfmt_misc type binfmt_misc (rw)  
sunrpc on /var/lib/nfs/rpc_pipefs type rpc_pipefs (rw)  
none on /sys/kernel/config type configfs (rw)  
/dev/mapper/vg_shared0-lv_shared_web on /var/www/html type gfs2 (rw,noatime,host  
data=jid=0)  
[root@neuromancer ~]#
```



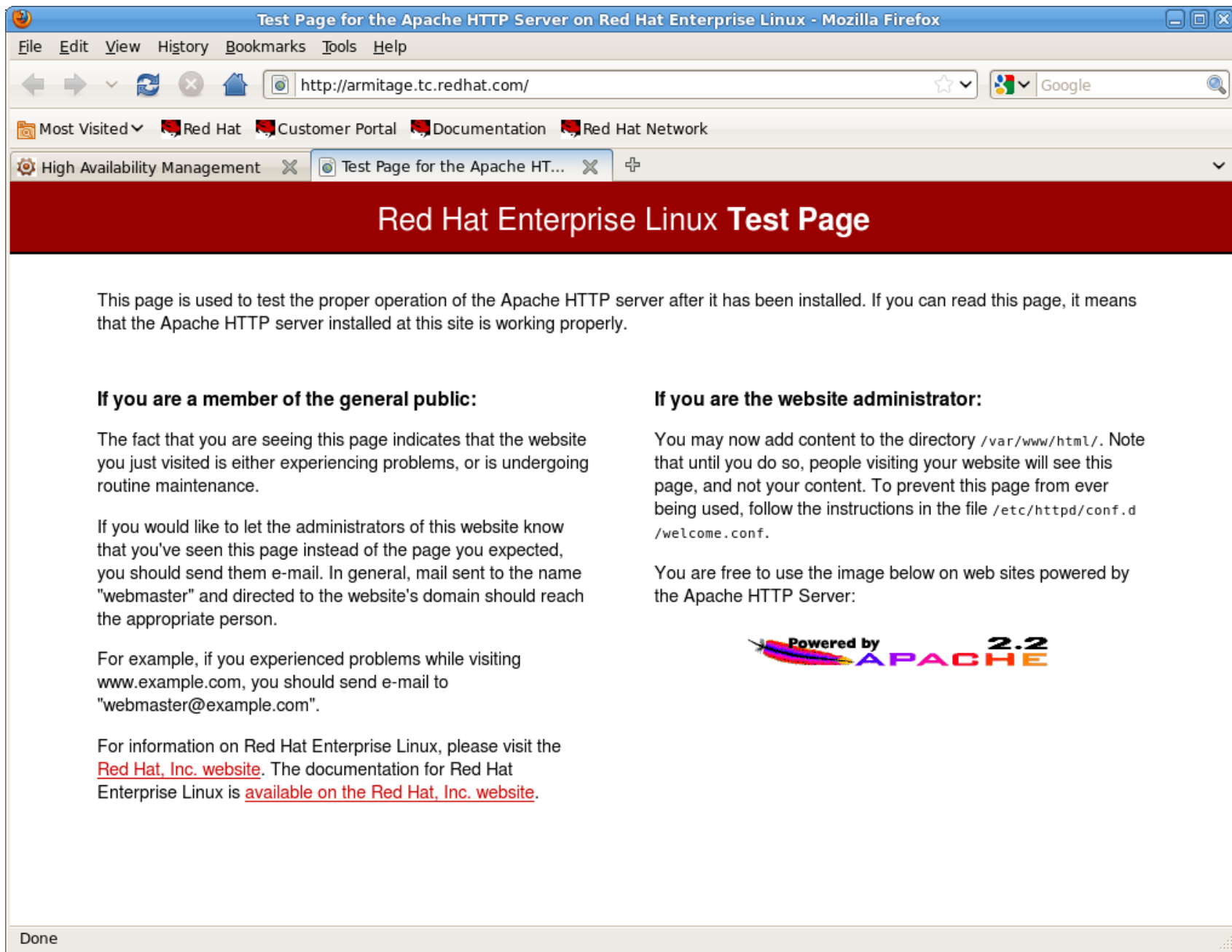


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Test Clustered Web Service

- From the web UI
- From the command line

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High Availability Management

About Preferences Logout

Homebase Clusters aus-cluster

Homebase
Manage Clusters

aus-cluster

Nodes Fence Devices Failover Domains Resources Service Groups Configure

+ Add ▶ Start ↺ Restart ■ Disable ✕ Delete

!	Name	Status	Autostart	Failover Domain
☐	clustered-web-service	Running on neuromancer.tc.redhat.com	☒	prefer_neuromancer

clustered-web-service

Status Running on neuromancer.tc.redhat.com finn.tc.redhat.com

Edit service

Service name clustered-web-service

Automatically start this service ☒

Run exclusive ☒

Failover domain prefer_neuromancer

Recovery policy Restart

Restart options

Maximum number of restart failures before relocating 3

https://lady3jane.tc.redhat.com:8084/cluster/aus-cluster/services_cmd?command=Start&name=clustered-web-service

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High Availability Management Problem loading page

High Availability management

Homebase Clusters aus-cluster

i Starting services clustered-web-service

Homebase
Manage Clusters

aus-cluster

Nodes Fence Devices Failover Domains Resources **Service Groups** Configure

+ Add ▶ Start ↺ Restart ■ Disable ✕ Delete

!	Name	Status	Autostart	Failover Domain
☐	clustered-web-service	Running on finn.tc.redhat.com	☒	prefer_neuromancer

clustered-web-service

Status Running on finn.tc.redhat.com Start on node...

Edit service

Service name clustered-web-service

Automatically start this service ☒

Run exclusive ☒

Failover domain prefer_neuromancer

Recovery policy Restart

Starting cluster "aus-cluster" service "clustered-web-service" from node "neuromancer.tc.redhat.com" completed successfully

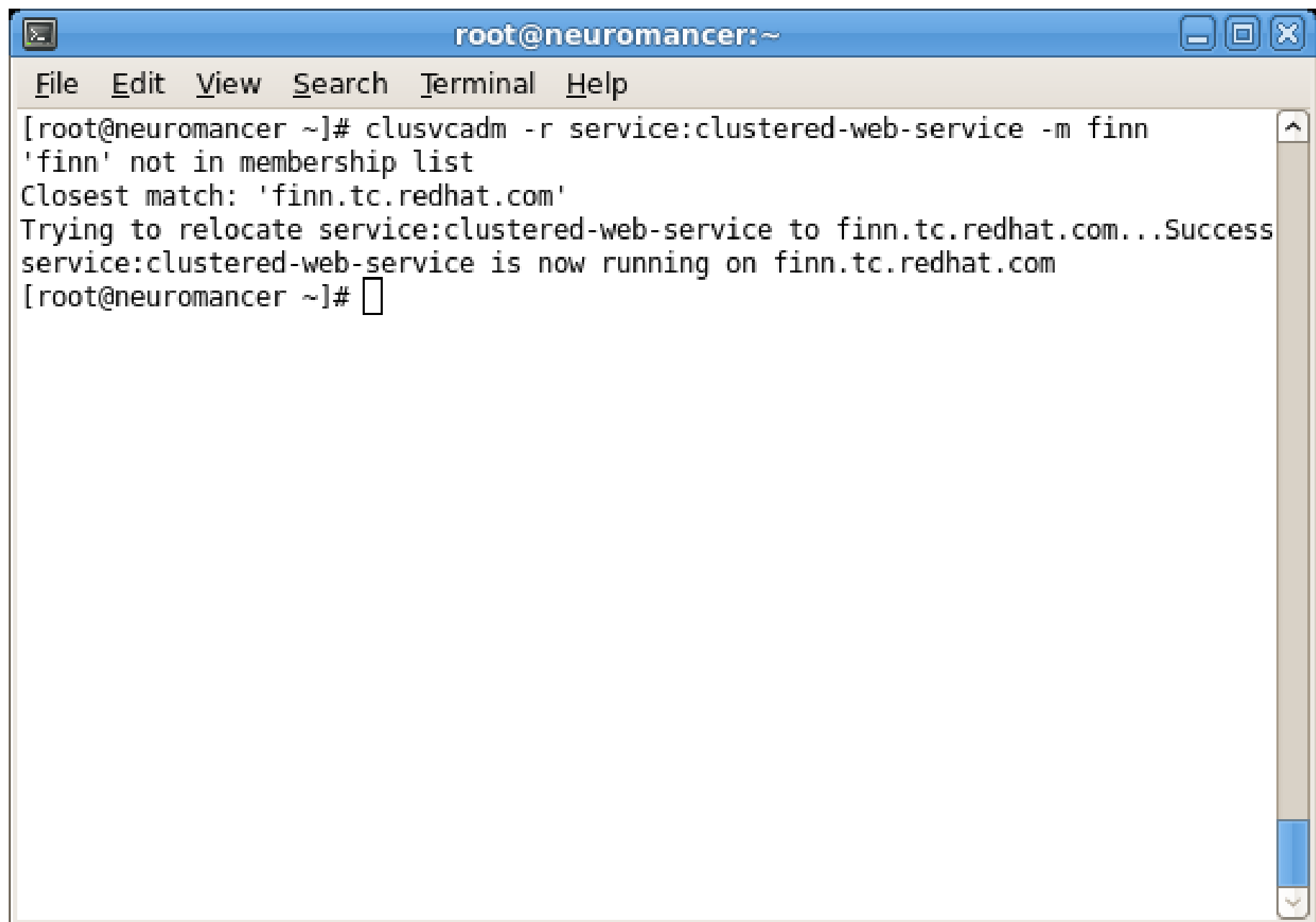
Done

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A terminal window titled "root@neuromancer:~" with a menu bar containing "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal output shows a command to relocate a service, followed by a message that the target host is not in the membership list, a suggestion for the closest match, and a successful relocation message.

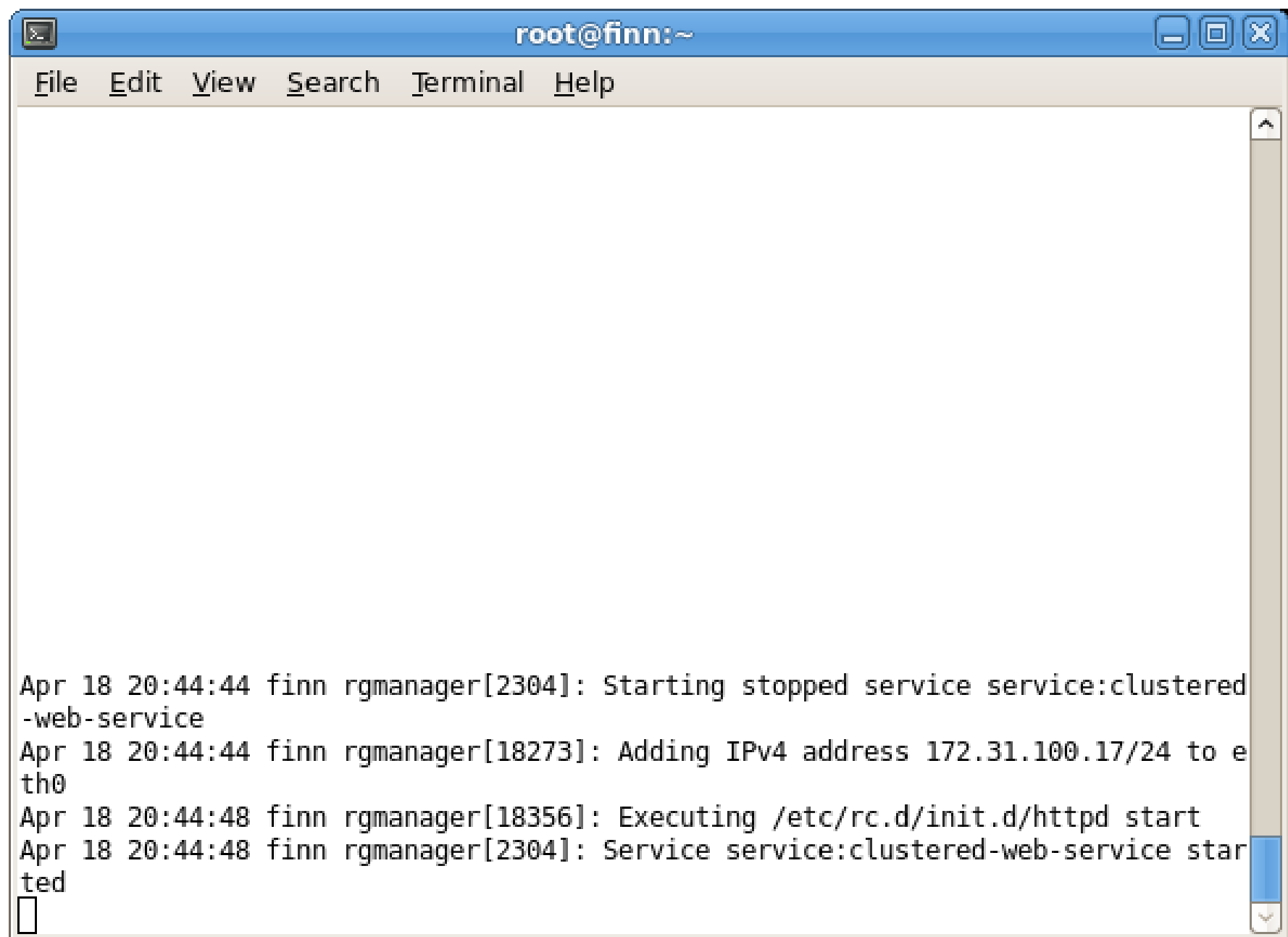
```
root@neuromancer:~  
File Edit View Search Terminal Help  
[root@neuromancer ~]# clusvcadm -r service:clustered-web-service -m finn  
'finn' not in membership list  
Closest match: 'finn.tc.redhat.com'  
Trying to relocate service:clustered-web-service to finn.tc.redhat.com...Success  
service:clustered-web-service is now running on finn.tc.redhat.com  
[root@neuromancer ~]#
```

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A terminal window titled "root@finn:~" with a menu bar containing "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal displays four log messages from "finn rgmanager" and a cursor at the bottom.

```
Apr 18 20:44:44 finn rgmanager[2304]: Starting stopped service service:clustered-web-service
Apr 18 20:44:44 finn rgmanager[18273]: Adding IPv4 address 172.31.100.17/24 to eth0
Apr 18 20:44:48 finn rgmanager[18356]: Executing /etc/rc.d/init.d/httpd start
Apr 18 20:44:48 finn rgmanager[2304]: Service service:clustered-web-service started
█
```

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Test Failover

- Crash the app several times
- Crash the server

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```
root@neuromancer:~  
File Edit View Search Terminal Help  
[root@neuromancer ~]# ps ax | grep http  
26167 ?        S<s      0:00 /usr/sbin/httpd  
26170 ?        S<       0:00 /usr/sbin/httpd  
26171 ?        S<       0:00 /usr/sbin/httpd  
26172 ?        S<       0:00 /usr/sbin/httpd  
26173 ?        S<       0:00 /usr/sbin/httpd  
26174 ?        S<       0:00 /usr/sbin/httpd  
26175 ?        S<       0:00 /usr/sbin/httpd  
26176 ?        S<       0:00 /usr/sbin/httpd  
26177 ?        S<       0:00 /usr/sbin/httpd  
26190 pts/0    S+       0:00 grep http  
[root@neuromancer ~]# pkill httpd  
[root@neuromancer ~]# ps ax | grep http  
26213 pts/0    S+       0:00 grep http  
[root@neuromancer ~]#
```

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```
root@neuromancer:~  
File Edit View Search Terminal Help  
  
Apr 18 21:03:06 neuromancer rgmanager[27403]: Executing /etc/rc.d/init.d/httpd s  
tatus  
Apr 18 21:03:06 neuromancer rgmanager[27428]: script:web-server-script: status o  
f /etc/rc.d/init.d/httpd failed (returned 2)  
Apr 18 21:03:06 neuromancer rgmanager[2223]: status on script "web-server-script  
" returned 1 (generic error)  
Apr 18 21:03:06 neuromancer rgmanager[2223]: Stopping service service:clustered-  
web-service  
Apr 18 21:03:06 neuromancer rgmanager[27459]: Executing /etc/rc.d/init.d/httpd s  
top  
Apr 18 21:03:07 neuromancer rgmanager[27516]: Removing IPv4 address 172.31.100.1  
7/24 from eth0  
Apr 18 21:03:08 neuromancer rgmanager[2223]: Service service:clustered-web-servi  
ce is recovering  
Apr 18 21:03:08 neuromancer rgmanager[2223]: Recovering failed service service:c  
lustered-web-service  
Apr 18 21:03:09 neuromancer rgmanager[27705]: Adding IPv4 address 172.31.100.17/  
24 to eth0  
Apr 18 21:03:12 neuromancer rgmanager[27797]: Executing /etc/rc.d/init.d/httpd s  
tart  
Apr 18 21:03:12 neuromancer rgmanager[2223]: Service service:clustered-web-servi  
ce started
```

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```
root@neuromancer:~  
File Edit View Search Terminal Help  
[root@neuromancer ~]# ps ax | grep httpd  
5531 ?        S<s      0:00 /usr/sbin/httpd  
5535 ?        S<       0:00 /usr/sbin/httpd  
5536 ?        S<       0:00 /usr/sbin/httpd  
5537 ?        S<       0:00 /usr/sbin/httpd  
5538 ?        S<       0:00 /usr/sbin/httpd  
5539 ?        S<       0:00 /usr/sbin/httpd  
5540 ?        S<       0:00 /usr/sbin/httpd  
5541 ?        S<       0:00 /usr/sbin/httpd  
5542 ?        S<       0:00 /usr/sbin/httpd  
5544 pts/0    S+       0:00 grep httpd  
[root@neuromancer ~]# pkill httpd  
[root@neuromancer ~]# pkill httpd  
[root@neuromancer ~]# pkill httpd  
[root@neuromancer ~]# pkill httpd  
[root@neuromancer ~]#
```

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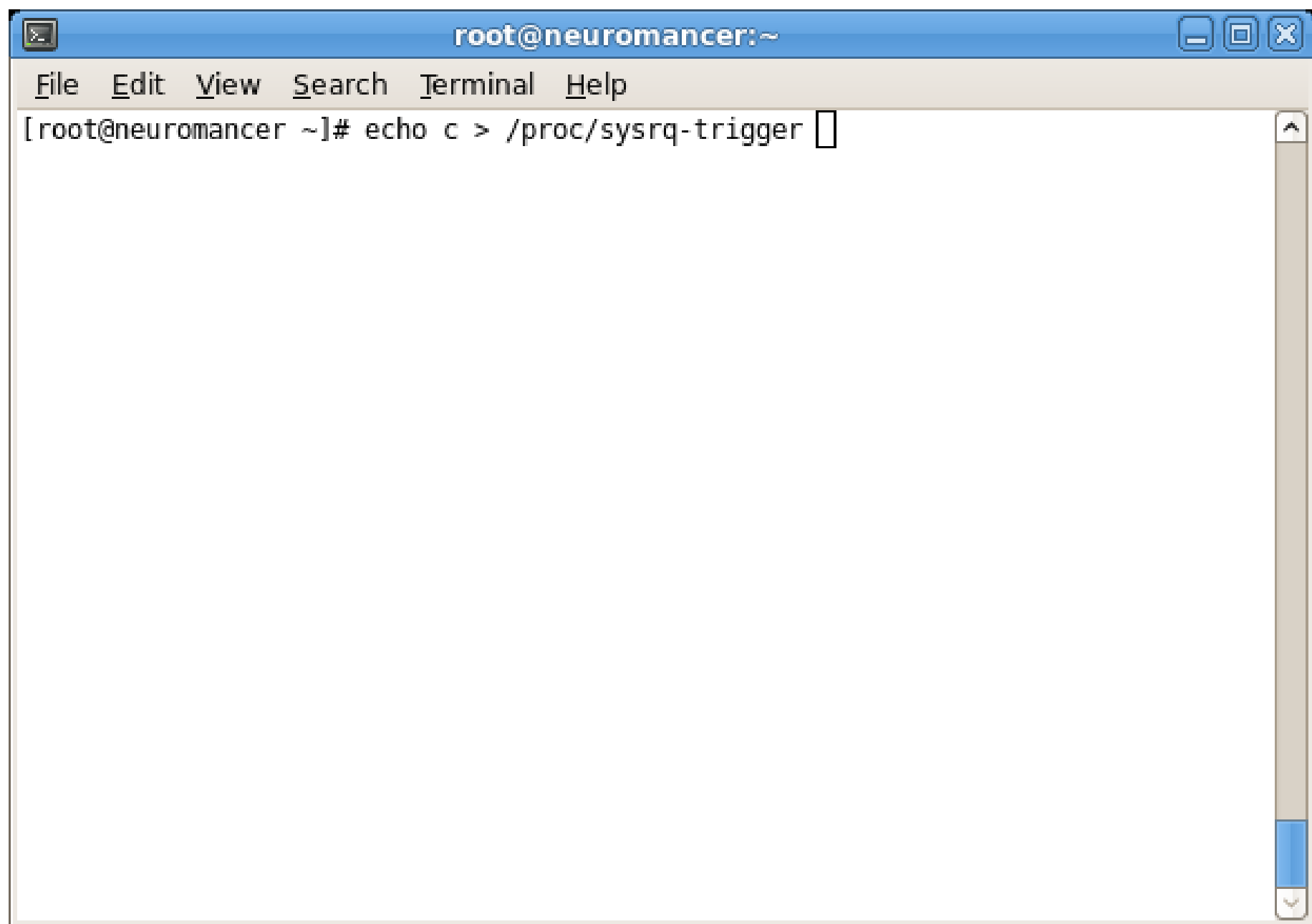
```
root@neuromancer:~  
File Edit View Search Terminal Help  
4 to eth0  
Apr 18 21:51:32 neuromancer rgmanager[6617]: Executing /etc/rc.d/init.d/httpd st  
art  
Apr 18 21:51:32 neuromancer rgmanager[2127]: Service service:clustered-web-servi  
ce started  
Apr 18 21:52:06 neuromancer rgmanager[6785]: Executing /etc/rc.d/init.d/httpd st  
atus  
Apr 18 21:52:06 neuromancer rgmanager[6810]: script:web-server-script: status of  
/etc/rc.d/init.d/httpd failed (returned 2)  
Apr 18 21:52:06 neuromancer rgmanager[2127]: status on script "web-server-script  
" returned 1 (generic error)  
Apr 18 21:52:06 neuromancer rgmanager[2127]: Stopping service service:clustered-  
web-service  
Apr 18 21:52:06 neuromancer rgmanager[6841]: Executing /etc/rc.d/init.d/httpd st  
op  
Apr 18 21:52:06 neuromancer rgmanager[6898]: Removing IPv4 address 172.31.100.17  
/24 from eth0  
Apr 18 21:52:08 neuromancer rgmanager[2127]: Service service:clustered-web-servi  
ce is recovering  
Apr 18 21:52:08 neuromancer rgmanager[2127]: Restart threshold for service:clust  
ered-web-service exceeded; attempting to relocate  
Apr 18 21:52:12 neuromancer rgmanager[2127]: Service service:clustered-web-servi  
ce is now running on member 2  
□
```

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A terminal window titled "root@neuromancer:~" with a menu bar containing "File", "Edit", "View", "Search", "Terminal", and "Help". The command prompt shows "[root@neuromancer ~]# echo c > /proc/sysrq-trigger" with a cursor at the end. A vertical scrollbar is on the right side of the terminal area.

```
root@neuromancer:~  
File Edit View Search Terminal Help  
[root@neuromancer ~]# echo c > /proc/sysrq-trigger
```

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```
root@finn:~
File Edit View Search Terminal Help

Apr 18 21:44:10 finn corosync[2048]: [TOTEM ] A processor failed, forming new
configuration.
Apr 18 21:44:12 finn corosync[2048]: [QUORUM] Members[1]: 2
Apr 18 21:44:12 finn corosync[2048]: [TOTEM ] A processor joined or left the m
embership and a new membership was formed.
Apr 18 21:44:12 finn kernel: dlm: closing connection to node 1
Apr 18 21:44:12 finn rgmanager[2304]: State change: neuromancer.tc.redhat.com DO
WN
Apr 18 21:44:12 finn corosync[2048]: [CPG ] downlist received left_list: 1
Apr 18 21:44:12 finn corosync[2048]: [CPG ] chosen downlist from node r(0) i
p(172.31.100.13)
Apr 18 21:44:12 finn corosync[2048]: [MAIN ] Completed service synchronizatio
n, ready to provide service.
Apr 18 21:44:12 finn fenced[2106]: fencing node neuromancer.tc.redhat.com
```



```
root@finn:~  
File Edit View Search Terminal Help  
Apr 18 21:44:12 finn fenced[2106]: fencing node neuromancer.tc.redhat.com  
Apr 18 21:44:12 finn kernel: GFS2: fsid=aus-cluster:shared-web.1: jid=0: Trying  
to acquire journal lock...  
Apr 18 21:44:25 finn fenced[2106]: fence neuromancer.tc.redhat.com success  
Apr 18 21:44:25 finn kernel: GFS2: fsid=aus-cluster:shared-web.1: jid=0: Looking  
at journal...  
Apr 18 21:44:26 finn kernel: GFS2: fsid=aus-cluster:shared-web.1: jid=0: Done  
Apr 18 21:44:26 finn rgmanager[2304]: Taking over service service:clustered-web-  
service from down member neuromancer.tc.redhat.com  
Apr 18 21:44:26 finn rgmanager[4724]: Adding IPv4 address 172.31.100.17/24 to et  
h0  
Apr 18 21:44:30 finn rgmanager[4816]: Executing /etc/rc.d/init.d/httpd start  
Apr 18 21:44:30 finn rgmanager[2304]: Service service:clustered-web-service star  
ted  
Apr 18 21:45:02 finn rgmanager[5037]: Executing /etc/rc.d/init.d/httpd status  
Apr 18 21:45:16 finn corosync[2048]: [TOTEM ] A processor joined or left the m  
embership and a new membership was formed.  
Apr 18 21:45:16 finn corosync[2048]: [QUORUM] Members[2]: 1 2  
Apr 18 21:45:16 finn corosync[2048]: [QUORUM] Members[2]: 1 2  
Apr 18 21:45:16 finn corosync[2048]: [CPG ] downlist received left_list: 0  
Apr 18 21:45:16 finn corosync[2048]: [CPG ] downlist received left_list: 0  
Apr 18 21:45:16 finn corosync[2048]: [CPG ] chosen downlist from node r(0) i  
p(172.31.100.14)  
Apr 18 21:45:16 finn corosync[2048]: [MAIN ] Completed service synchronizatio
```

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```
root@finn:~  
File Edit View Search Terminal Help  
Apr 18 21:45:02 finn rgmanager[5037]: Executing /etc/rc.d/init.d/httpd status  
Apr 18 21:45:16 finn corosync[2048]: [TOTEM ] A processor joined or left the membership and a new membership was formed.  
Apr 18 21:45:16 finn corosync[2048]: [QUORUM] Members[2]: 1 2  
Apr 18 21:45:16 finn corosync[2048]: [QUORUM] Members[2]: 1 2  
Apr 18 21:45:16 finn corosync[2048]: [CPG ] downlist received left_list: 0  
Apr 18 21:45:16 finn corosync[2048]: [CPG ] downlist received left_list: 0  
Apr 18 21:45:16 finn corosync[2048]: [CPG ] chosen downlist from node r(0) i p(172.31.100.14)  
Apr 18 21:45:16 finn corosync[2048]: [MAIN ] Completed service synchronization, ready to provide service.  
Apr 18 21:45:23 finn kernel: dlm: got connection from 1  
Apr 18 21:45:33 finn rgmanager[5428]: Executing /etc/rc.d/init.d/httpd status  
Apr 18 21:45:33 finn rgmanager[2304]: State change: neuromancer.tc.redhat.com UP  
Apr 18 21:45:33 finn rgmanager[2304]: Relocating service:clustered-web-service to better node neuromancer.tc.redhat.com  
Apr 18 21:45:33 finn rgmanager[2304]: Stopping service service:clustered-web-service  
Apr 18 21:45:34 finn rgmanager[5464]: Executing /etc/rc.d/init.d/httpd stop  
Apr 18 21:45:35 finn rgmanager[5531]: Removing IPv4 address 172.31.100.17/24 from eth0  
Apr 18 21:45:36 finn rgmanager[2304]: Service service:clustered-web-service is stopped  
□
```



Questions?



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Thank You!

- If you liked today's presentation, please let us know!
- Lon's contact info:
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 - thomas@redhat.com
 - choirboy on #rhel on Freenode
 - thomasdcameron on Twitter
 - <http://people.redhat.com/tcameron>

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Additional Resources

- RHEL 6.1 Beta Clustering Guide
 - <http://bit.ly/eePh7U>
- RH436: Red Hat Enterprise Clustering and Storage Management
 - <http://bit.ly/9KEDhZ>
- Red Hat Cluster Wiki
 - <http://sources.redhat.com/cluster/wiki/>
- Red Hat Mailing Lists
 - <http://listman.redhat.com/mailman/listinfo/linux-cluster>

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