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Clustering Virtual Machines and Applications with Red Hat Enterprise Linux

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September 2, 2009

presented by

This Presentation

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Agenda

- Red Hat and Virtualization
- Architecture
- Configure Raw Storage and iSCSI
  - On the Target
  - On the Client
- Define dom0 Cluster
  - Conga
- Configure Shared Storage for dom0 Machines
  - Conga
- Install domU machines

Agenda

Set up cluster of domU machines

Set up Application Cluster on domU machines

Questions

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Red Hat and Virtualization

Red Hat leads the way in Open Source virtualization

- Highly successful entry into virtualization with Xen at the release of RHEL 5.0
- Acquired Qumranet, the company which developed KVM September 2008
- KVM included in RHEL 5.4 – more choice, more flexibility!
- Announcing Red Hat Enterprise Virtualization (RHEV), a KVM based hypervisor and enterprise virtualization management system at Summit this year.

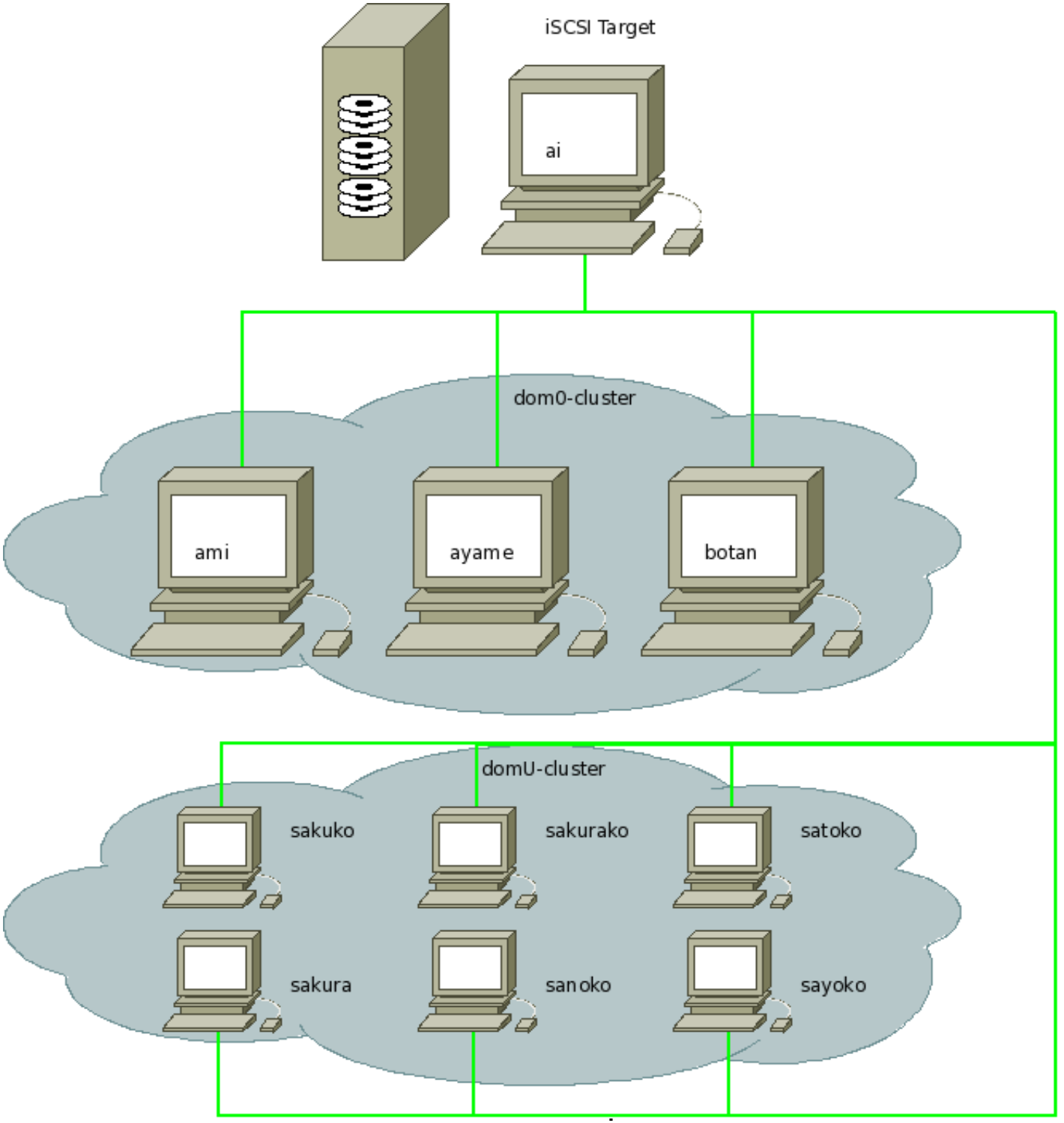
Architecture

ai - iSCSI target and Conga server. Not part of the cluster, just storage and management. Kickstarted with cluster-storage and clustering groups and scsi-target-utils package

ami, ayame and botan - iSCSI initiators, dom0 cluster members. Kickstarted with virtualization, cluster-storage and clustering groups and iscsi-initiator-utils package

sakuko, sakura, sakurako, sanako, satoko and sayoko - domU machines. Kickstarted with cluster-storage and clustering groups. Running an Apache cluster.

All systems are on a gigabit ethernet network



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Configure storage and iSCSI on ai

Create the physical volume, volume group and logical volume. In this case, /dev/sdb1 is a newly created, blank partition of 1TiB:

```
pvcreate /dev/sdb1
vgcreate VolGroup01 /dev/sdb1
lvcreate -n VMStorage -L 100GB VolGroup01
```

Configure storage and iSCSI on ai

Make sure that the iSCSI target software is installed

yum -y groupinstall clustering cluster-storage

yum -y install scsi-target-utils

chkconfig tgtd on

Configure storage and iSCSI on ai

Configure the target

Configure the /etc/tgtd/target.conf to look something like this:

```
<target iqn.2009-06.com.redhat.dfw.salab:disk1>
        backing-store /dev/mapper/VolGroup01-VMStorage
        initiator-address 10.15.183.6
        initiator-address 10.15.183.7
        initiator-address 10.15.183.8
</target>
```

Configure storage and iSCSI on ai

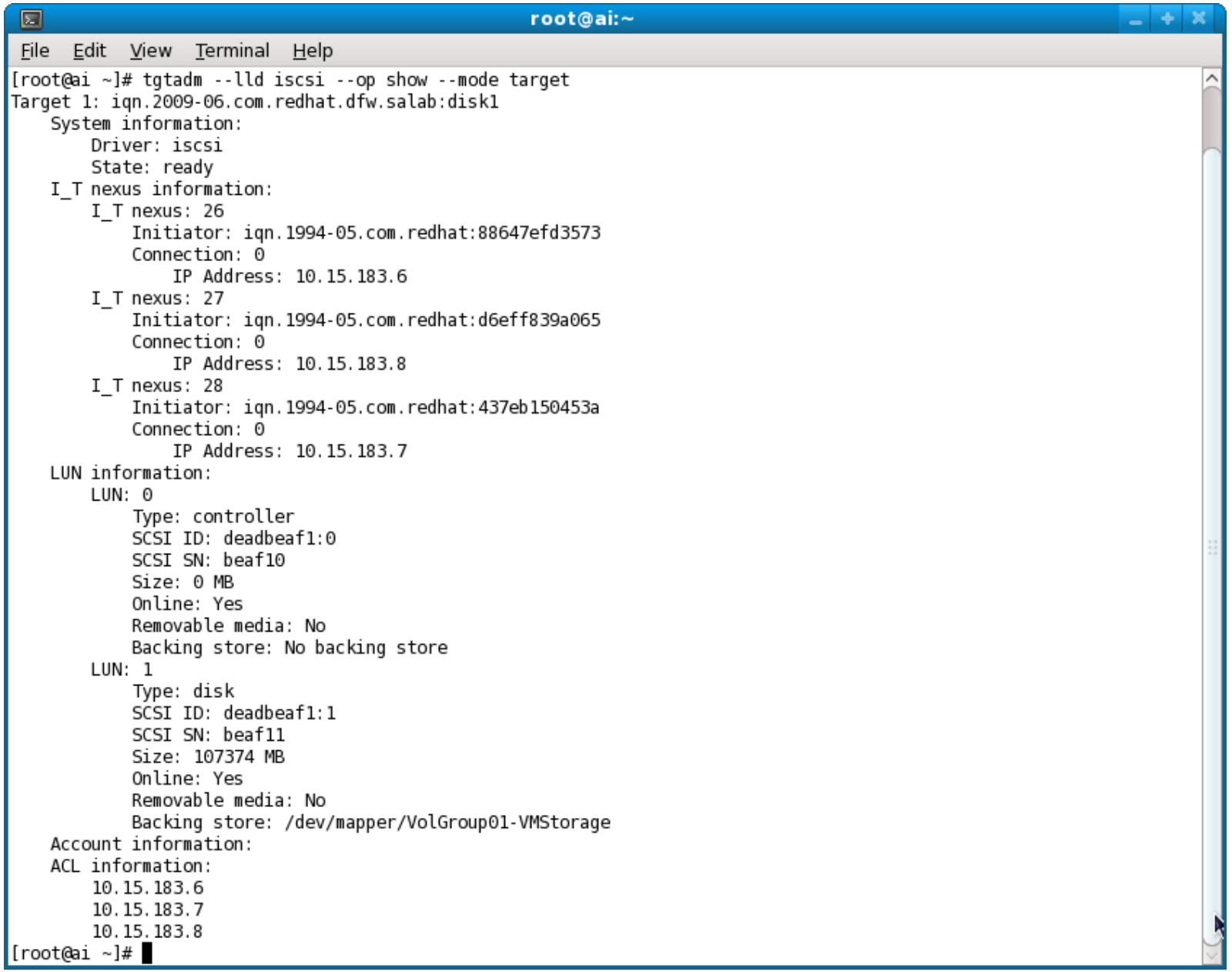
Stop and start the tgtd service on the iSCSI target

```
service tgtd stop
sleep 5
service tgtd start
```

Configure storage and iSCSI on ai

Check that your target is available

```
tgtadm --lld iscsi --op show --mode target
```


root@ai:~
File Edit View Terminal Help
[root@ai ~]# tgtadm --lld iscsi --op show --mode target
Target 1: iqn.2009-06.com.redhat.dfw.salab:disk1
System information:
Driver: iscsi
State: ready
I_T nexus information:
I_T nexus: 26
Initiator: iqn.1994-05.com.redhat:88647efd3573
Connection: 0
IP Address: 10.15.183.6
I_T nexus: 27
Initiator: iqn.1994-05.com.redhat:d6eff839a065
Connection: 0
IP Address: 10.15.183.8
I_T nexus: 28
Initiator: iqn.1994-05.com.redhat:437eb150453a
Connection: 0
IP Address: 10.15.183.7
LUN information:
LUN: 0
Type: controller
SCSI ID: deadbeaf1:0
SCSI SN: beaf10
Size: 0 MB
Online: Yes
Removable media: No
Backing store: No backing store
LUN: 1
Type: disk
SCSI ID: deadbeaf1:1
SCSI SN: beaf11
Size: 107374 MB
Online: Yes
Removable media: No
Backing store: /dev/mapper/VolGroup01-VMStorage
Account information:
ACL information:
10.15.183.6
10.15.183.7
10.15.183.8
[root@ai ~]#

Configure storage and iSCSI on initiators

On each of the dom0 servers (ami, ayame and botan)

yum -y groupinstall clustering cluster-storage

yum -y install iscsi-initiator-utils

chkconfig iscsi on

chkconfig iscsid on

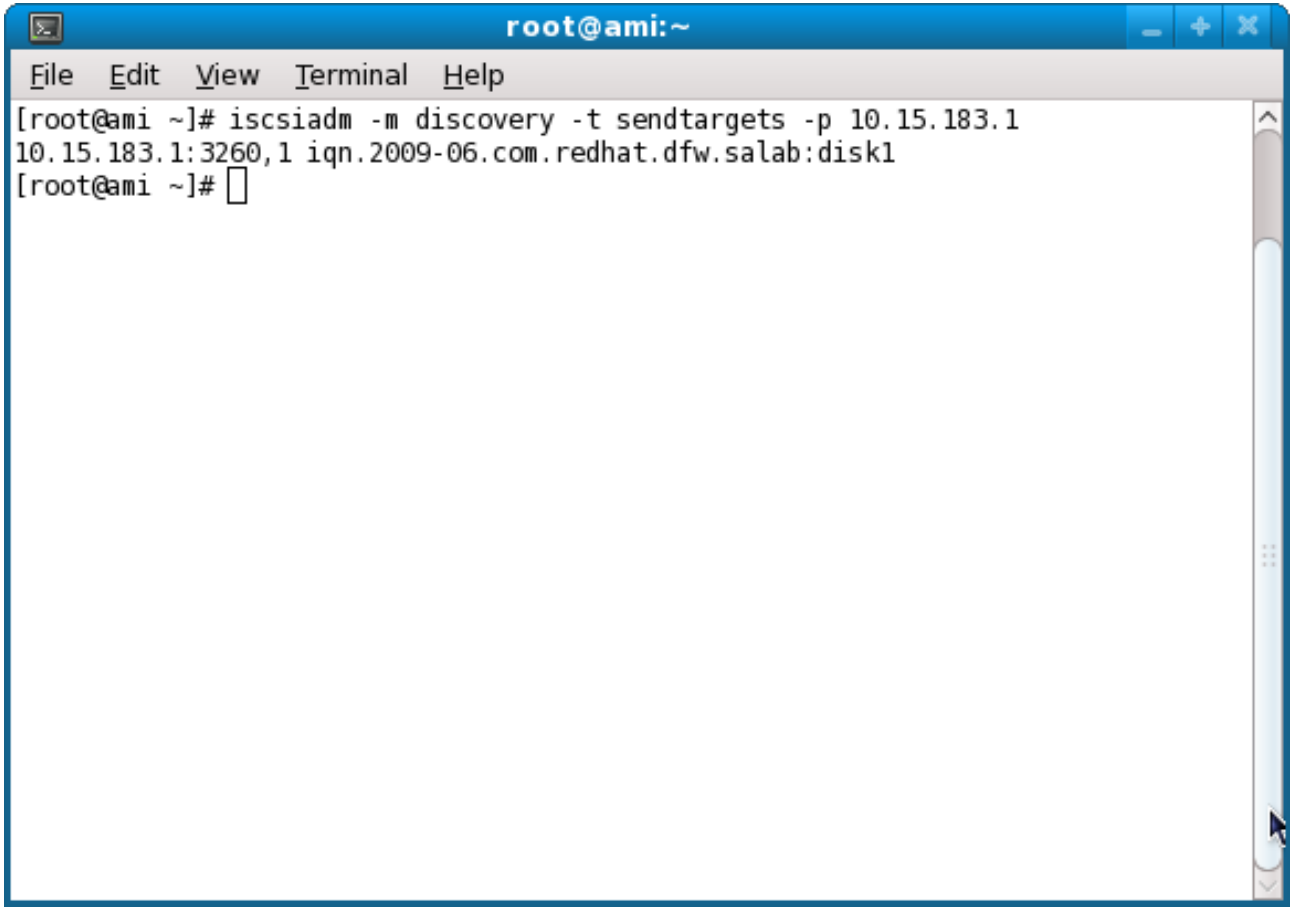
service iscsid restart

service iscsi restart

Configure storage and iSCSI on initiators

Discover the iSCSI target

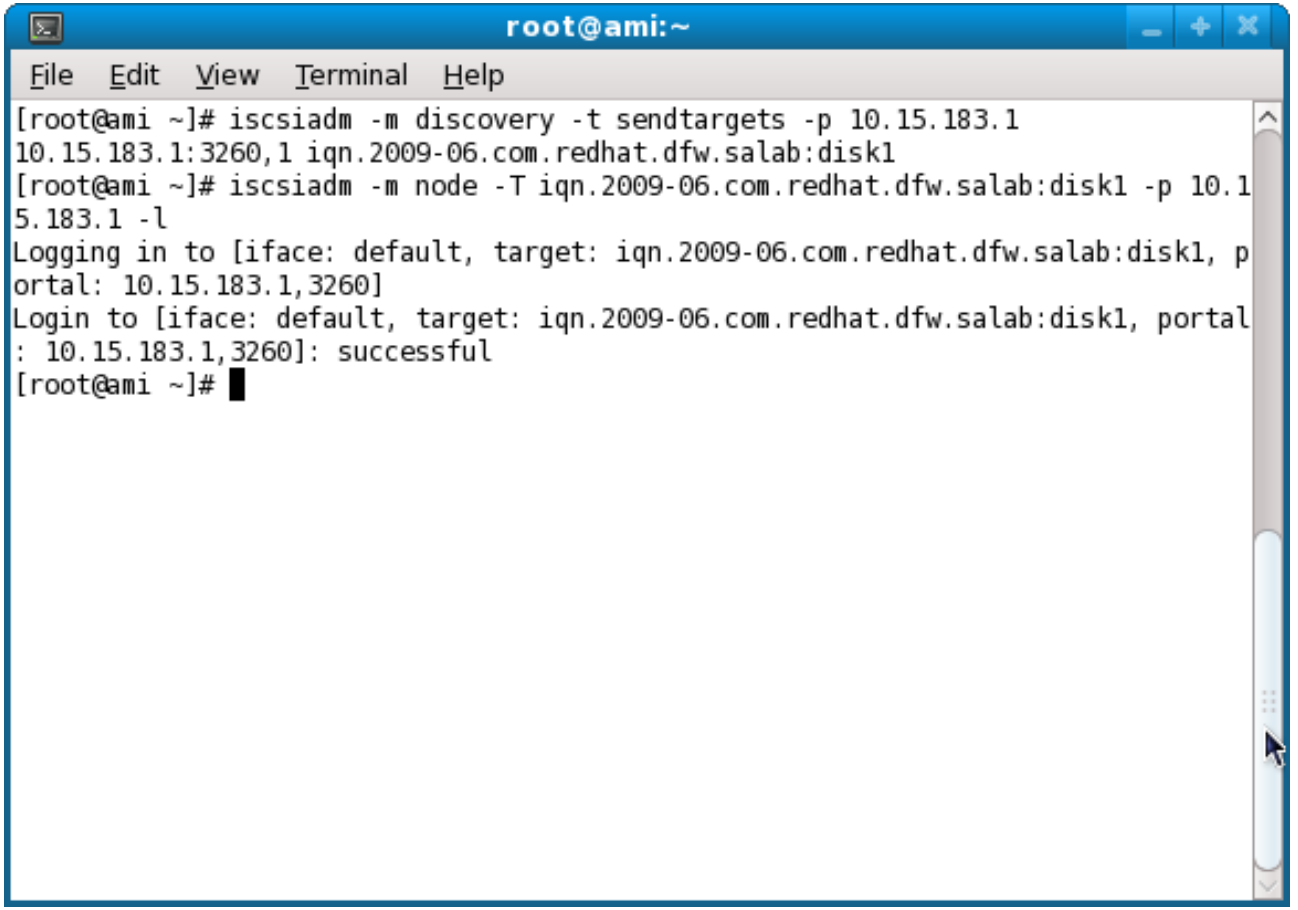
```
iscsiadm -m discovery -t sendtargets -p 10.15.183.1
```


root@ami:~
File Edit View Terminal Help
[root@ami ~]# iscsiadm -m discovery -t sendtargets -p 10.15.183.1
10.15.183.1:3260,1 iqn.2009-06.com.redhat.dfw.salab:disk1
[root@ami ~]#

Configure storage and iSCSI on initiators

Log in to the target (command below is actually all one command, it is on multiple lines for ease of visibility)

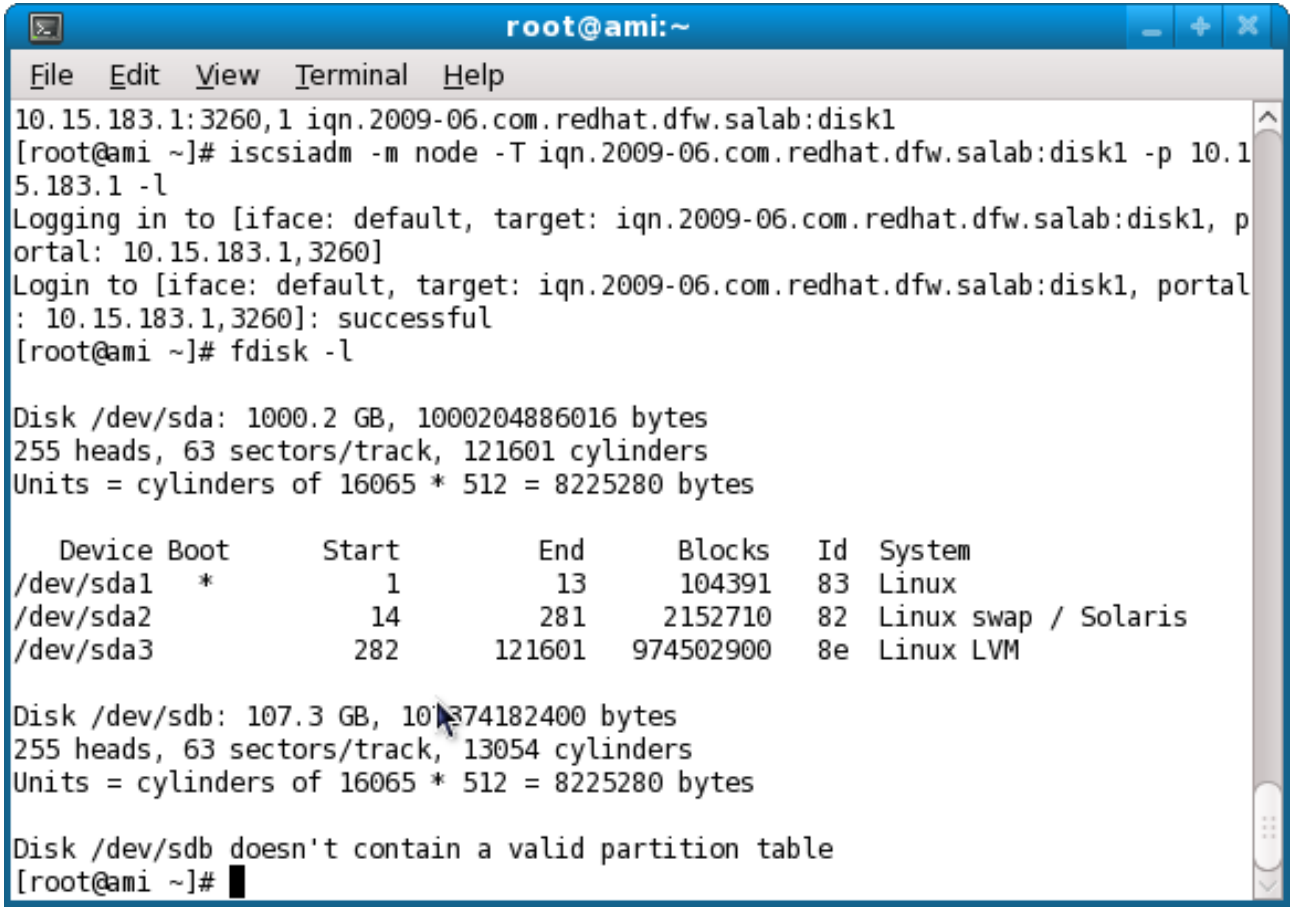
```
iscsiadm -m node \
    -T iqn.2009-06.com.redhat.dfw.salab:disk1 \
    -p 10.15.183.1 -l
```


root@ami:~
File Edit View Terminal Help
[root@ami ~]# iscsiadm -m discovery -t sendtargets -p 10.15.183.1
10.15.183.1:3260,1 iqn.2009-06.com.redhat.dfw.salab:disk1
[root@ami ~]# iscsiadm -m node -T iqn.2009-06.com.redhat.dfw.salab:disk1 -p 10.1
5.183.1 -l
Logging in to [iface: default, target: iqn.2009-06.com.redhat.dfw.salab:disk1, p
ortal: 10.15.183.1,3260]
Login to [iface: default, target: iqn.2009-06.com.redhat.dfw.salab:disk1, portal
: 10.15.183.1,3260]: successful
[root@ami ~]#

Configure storage and iSCSI on initiators

Run “fdisk -l” or “cat /proc/partitions” to verify that your system “sees” the new disk

- There should be no partition table on e.g. /dev/sdb

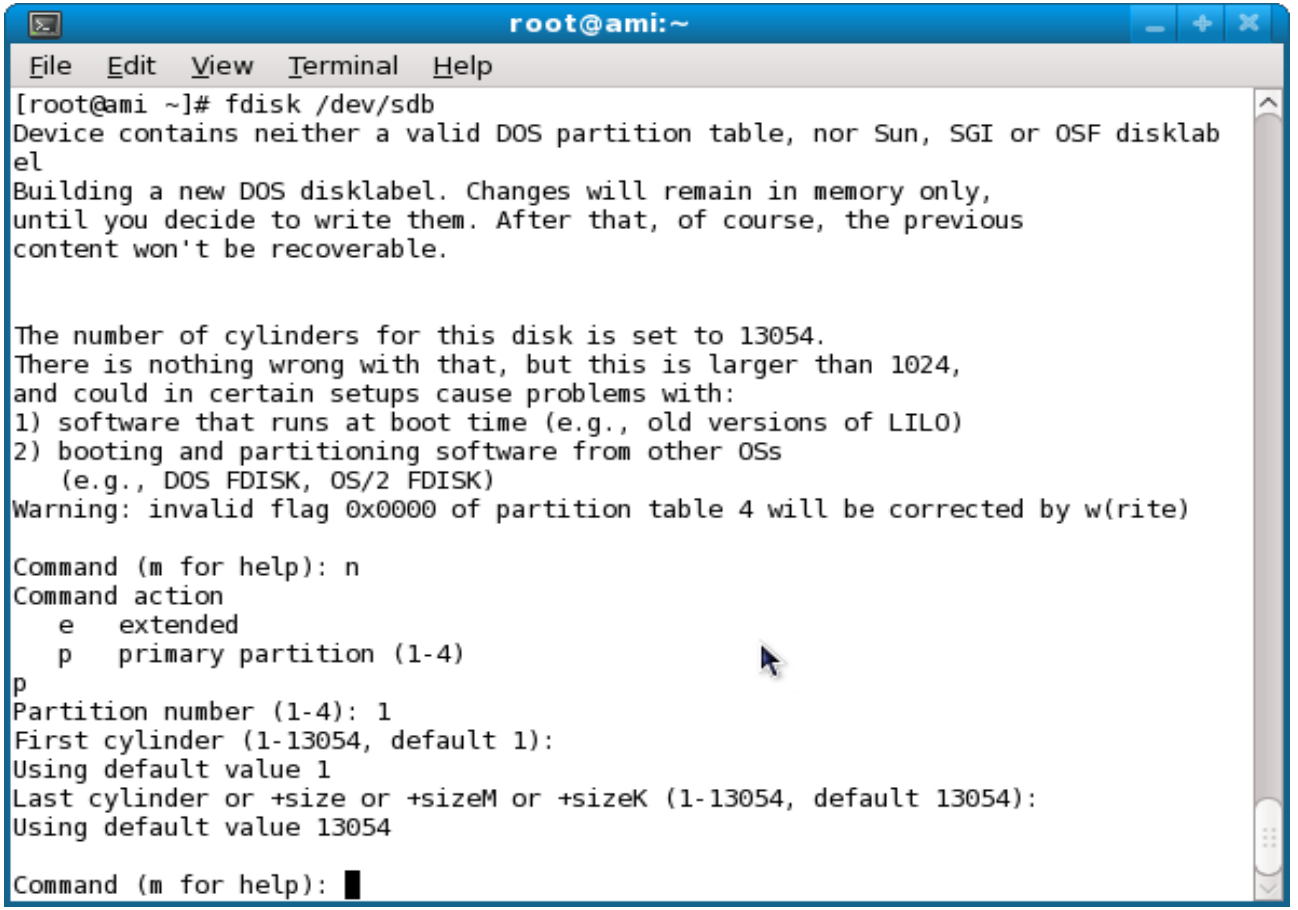

root@ami:~
File Edit View Terminal Help
10.15.183.1:3260,1 iqn.2009-06.com.redhat.dfw.salab:disk1
[root@ami ~]# iscsiadm -m node -T iqn.2009-06.com.redhat.dfw.salab:disk1 -p 10.1
5.183.1 -l
Logging in to [iface: default, target: iqn.2009-06.com.redhat.dfw.salab:disk1, p
ortal: 10.15.183.1,3260]
Login to [iface: default, target: iqn.2009-06.com.redhat.dfw.salab:disk1, portal
: 10.15.183.1,3260]: successful
[root@ami ~]# fdisk -l
Disk /dev/sda: 1000.2 GB, 1000204886016 bytes
255 heads, 63 sectors/track, 121601 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Device Boot Start End Blocks Id System
/dev/sda1 * 1 13 104391 83 Linux
/dev/sda2 14 281 2152710 82 Linux swap / Solaris
/dev/sda3 282 121601 974502900 8e Linux LVM
Disk /dev/sdb: 107.3 GB, 107374182400 bytes
255 heads, 63 sectors/track, 13054 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Disk /dev/sdb doesn't contain a valid partition table
[root@ami ~]#

Configure storage and iSCSI on initiators

Create a partition on the LUN using fdisk

- fdisk /dev/sdb
- Choose n for new
- Choose p for primary
- Choose 1 for first partition
- Hit [enter] to start at the first cylinder
- Hit [enter] to end at the last cylinder
- Hit w to write changes to disk

As root, run “partprobe” and “fdisk -l” on the other nodes and verify that the new partition shows up.


root@ami:~
File Edit View Terminal Help
[root@ami ~]# fdisk /dev/sdb
Device contains neither a valid DOS partition table, nor Sun, SGI or OSF disklab
el
Building a new DOS disklabel. Changes will remain in memory only,
until you decide to write them. After that, of course, the previous
content won't be recoverable.
The number of cylinders for this disk is set to 13054.
There is nothing wrong with that, but this is larger than 1024,
and could in certain setups cause problems with:
1) software that runs at boot time (e.g., old versions of LILO)
2) booting and partitioning software from other OSs
(e.g., DOS FDISK, OS/2 FDISK)
Warning: invalid flag 0x0000 of partition table 4 will be corrected by w(rite)
Command (m for help): n
Command action
e extended
p primary partition (1-4)
p
Partition number (1-4): 1
First cylinder (1-13054, default 1):
Using default value 1
Last cylinder or +size or +sizeM or +sizeK (1-13054, default 13054):
Using default value 13054
Command (m for help):

Configure storage and iSCSI on initiators

Make sure that the ricci service is installed and running on all the dom0 nodes.

service ricci status

Configure the Cluster Using Conga

On the management station (ai), make sure that the luci package is installed

yum -y install luci

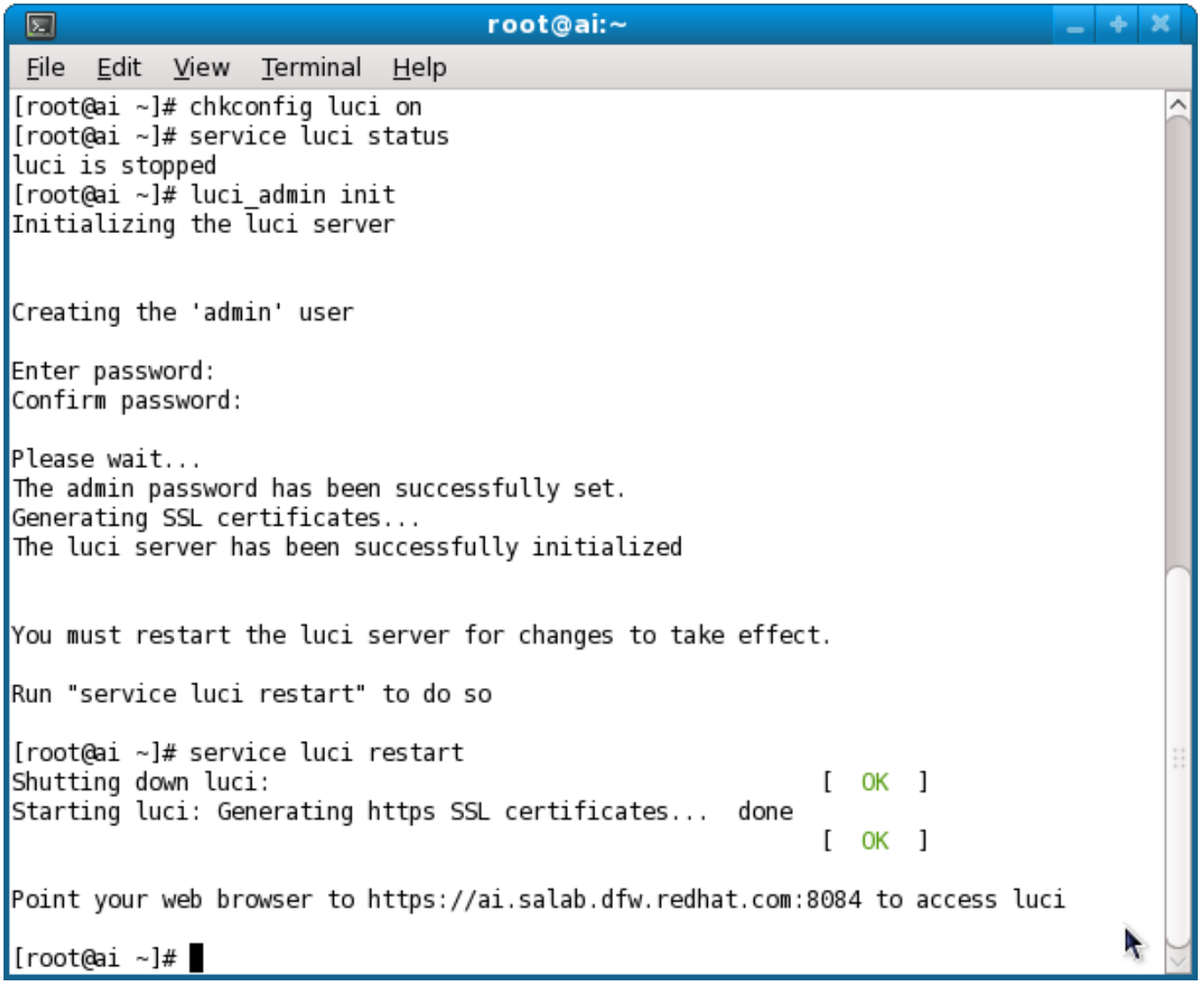
chkconfig luci on

Don't start the luci service yet!

Add an administrator password

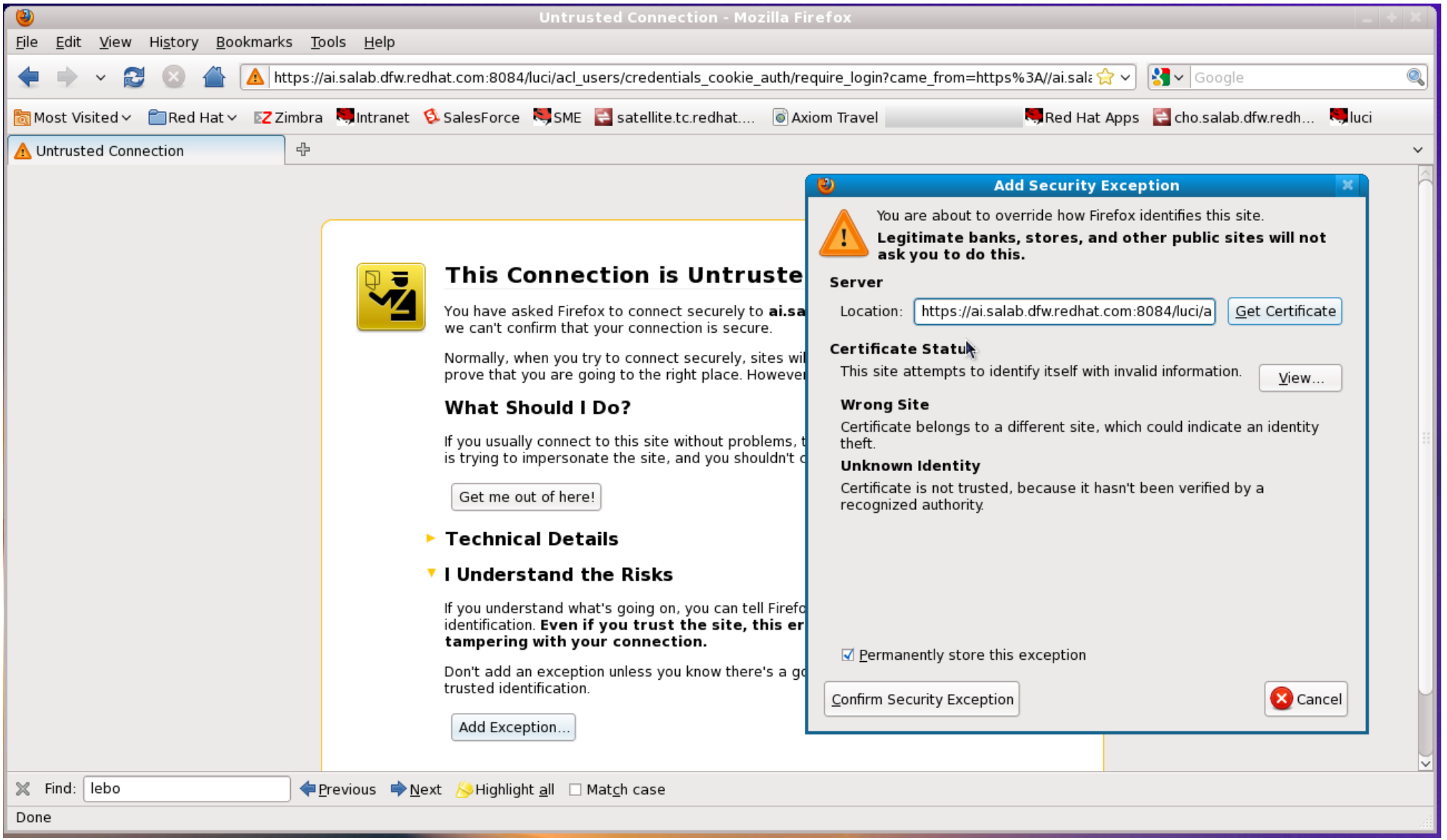
luci_admin init

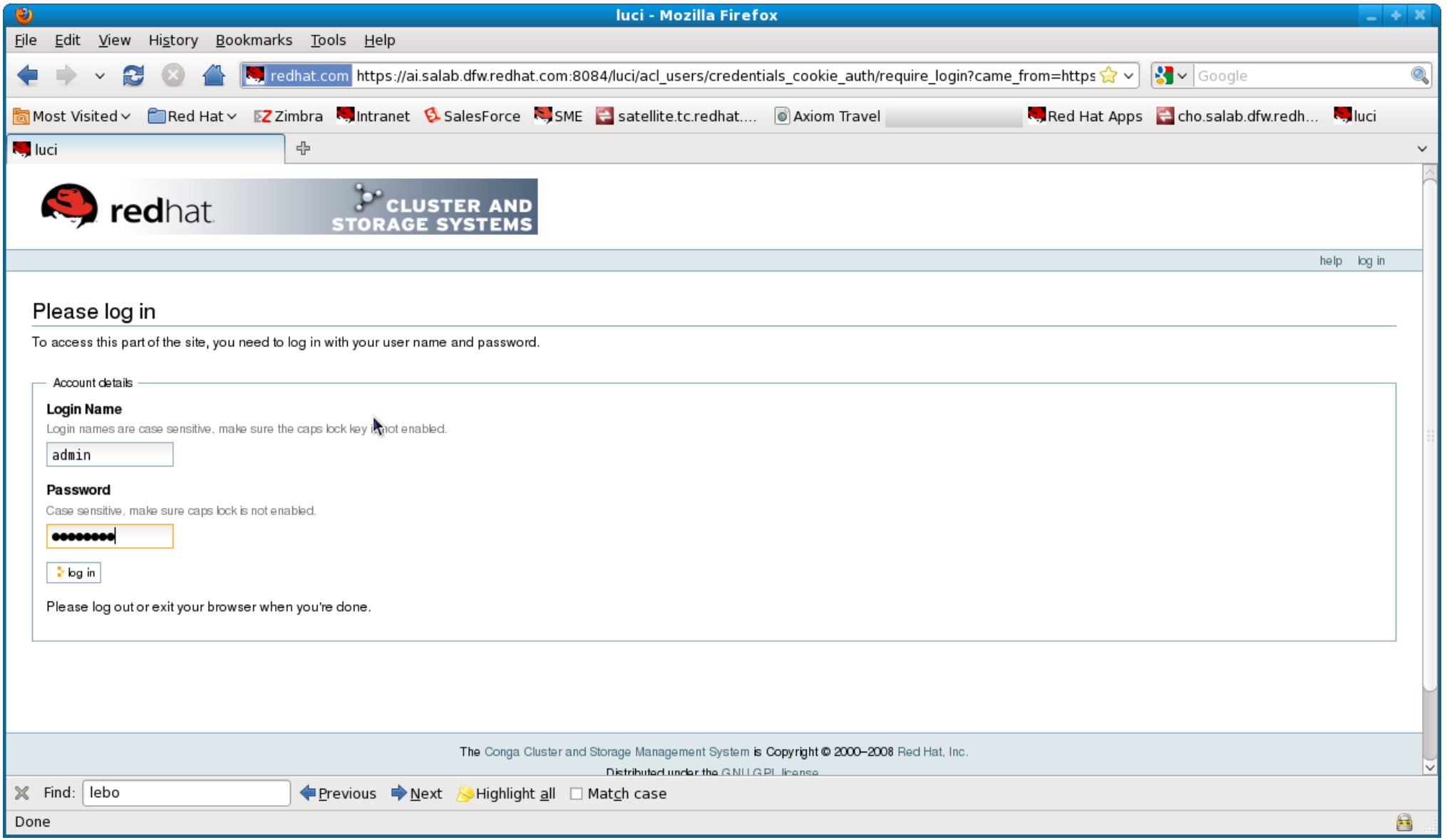
service luci start

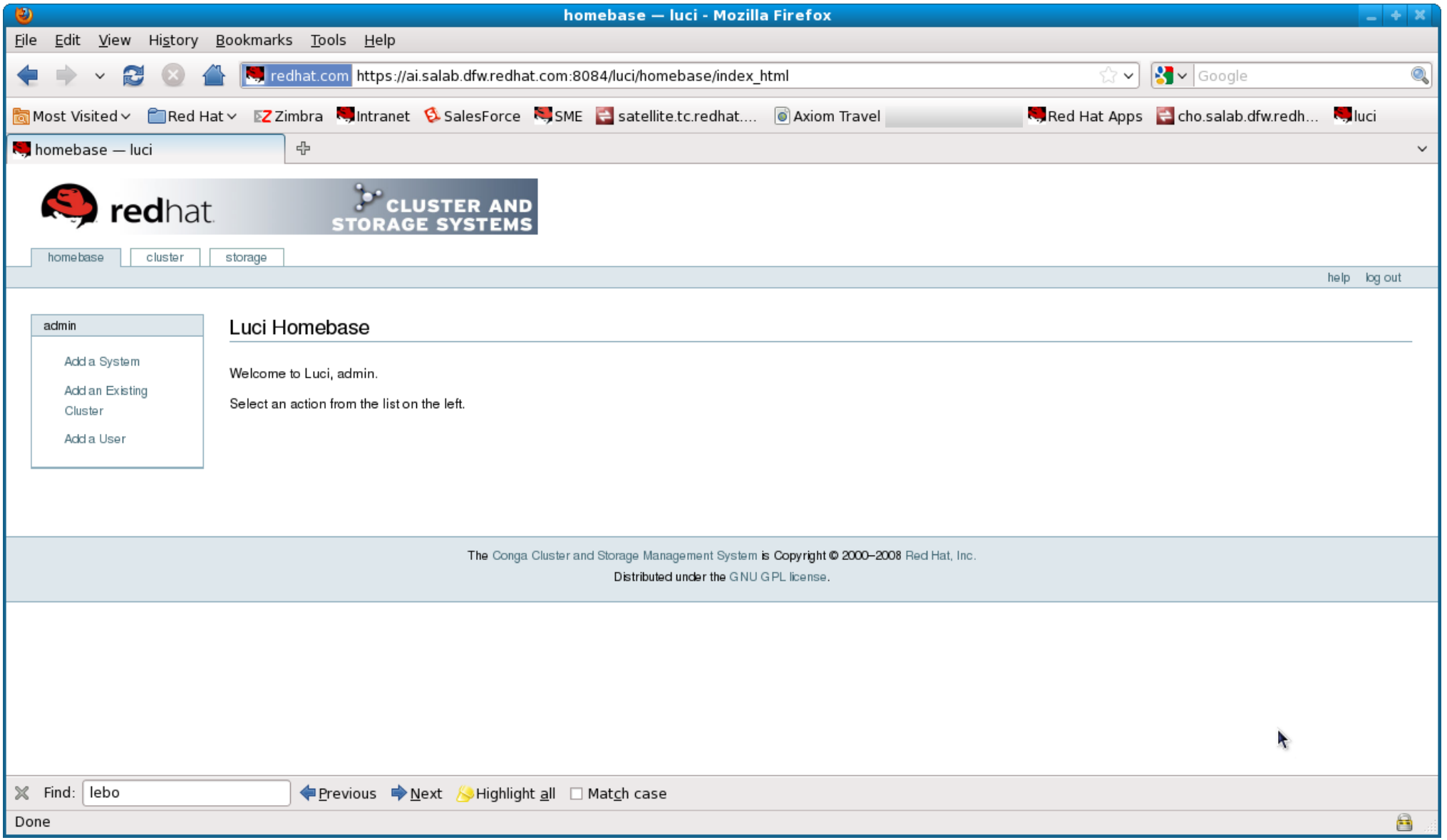

root@ai:~
File Edit View Terminal Help
[root@ai ~]# chkconfig luci on
[root@ai ~]# service luci status
luci is stopped
[root@ai ~]# luci_admin init
Initializing the luci server
Creating the 'admin' user
Enter password:
Confirm password:
Please wait...
The admin password has been successfully set.
Generating SSL certificates...
The luci server has been successfully initialized
You must restart the luci server for changes to take effect.
Run "service luci restart" to do so
[root@ai ~]# service luci restart
Shutting down luci: [OK]
Starting luci: Generating https SSL certificates... done
[OK]
Point your web browser to https://ai.salab.dfw.redhat.com:8084 to access luci
[root@ai ~]#

Configure the Cluster Using Conga

- Open the URL listed by the “service luci start” command in your web browser
  - You will be warned about the self-signed certificate, it's fine to accept it assuming you trust your network


Untrusted Connection - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/acl_users/credentials_cookie_auth/require_login?came_from=https%3A//ai.sala
Google
Most Visited
Red Hat
Zimbra
Intranet
SalesForce
SME
satellite.tc.redhat....
Axiom Travel
Red Hat Apps
cho.salab.dfw.redh...
luci
Untrusted Connection
This Connection is Untruste
You have asked Firefox to connect securely to ai.sa
we can't confirm that your connection is secure.
Normally, when you try to connect securely, sites wi
prove that you are going to the right place. However
What Should I Do?
If you usually connect to this site without problems, t
is trying to impersonate the site, and you shouldn't c
Get me out of here!
Technical Details
I Understand the Risks
If you understand what's going on, you can tell Firefo
identification. Even if you trust the site, this er
tampering with your connection.
Don't add an exception unless you know there's a go
trusted identification.
Add Exception...
Add Security Exception
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://ai.salab.dfw.redhat.com:8084/luci/a
Get Certificate
Certificate Statu
This site attempts to identify itself with invalid information.
View...
Wrong Site
Certificate belongs to a different site, which could indicate an identity theft.
Unknown Identity
Certificate is not trusted, because it hasn't been verified by a recognized authority.
Permanently store this exception
Confirm Security Exception
Cancel
Find: lebo
Previous
Next
Highlight all
Match case
Done


luci - Mozilla Firefox
File Edit View History Bookmarks Tools Help
redhat.com https://ai.salab.dfw.redhat.com:8084/luci/acl_users/credentials_cookie_auth/require_login?came_from=https
Google
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
luci
redhat
CLUSTER AND STORAGE SYSTEMS
help log in
Please log in
To access this part of the site, you need to log in with your user name and password.
Account details
Login Name
Login names are case sensitive, make sure the caps lock key is not enabled.
admin
Password
Case sensitive, make sure caps lock is not enabled.
log in
Please log out or exit your browser when you're done.
The Conga Cluster and Storage Management System is Copyright © 2000–2008 Red Hat, Inc.
Distributed under the GNU GPL license
Find: lebo
Previous
Next
Highlight all
Match case
Done



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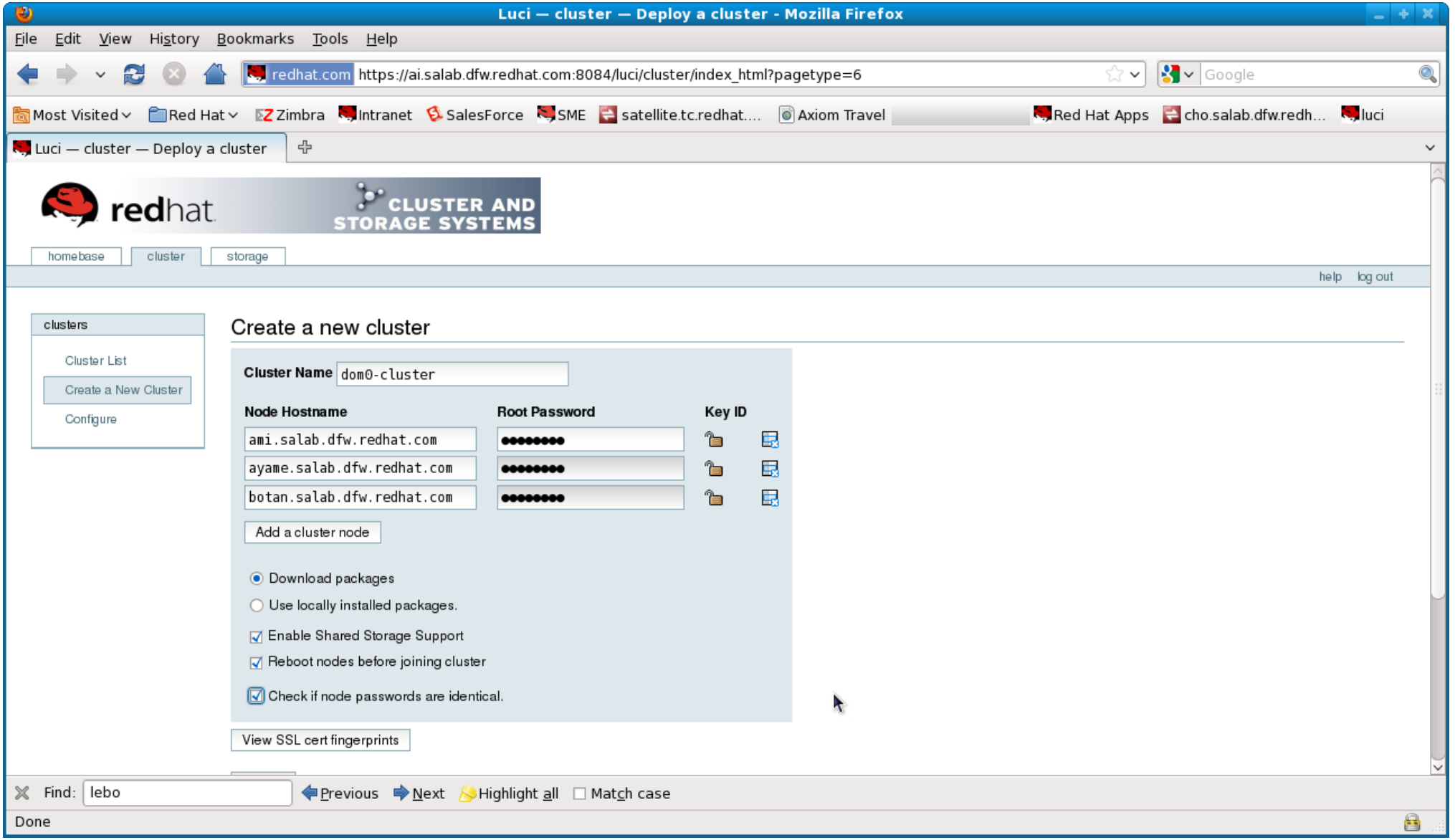
Configure the Cluster Using Conga

Choose the “Cluster” tab and create a new cluster

- Cluster name
- Node names and passwords
- Download or use locally installed
- Enable shared storage since we'll be using GFS
- Reboot nodes
- Check the box if the passwords are all the same



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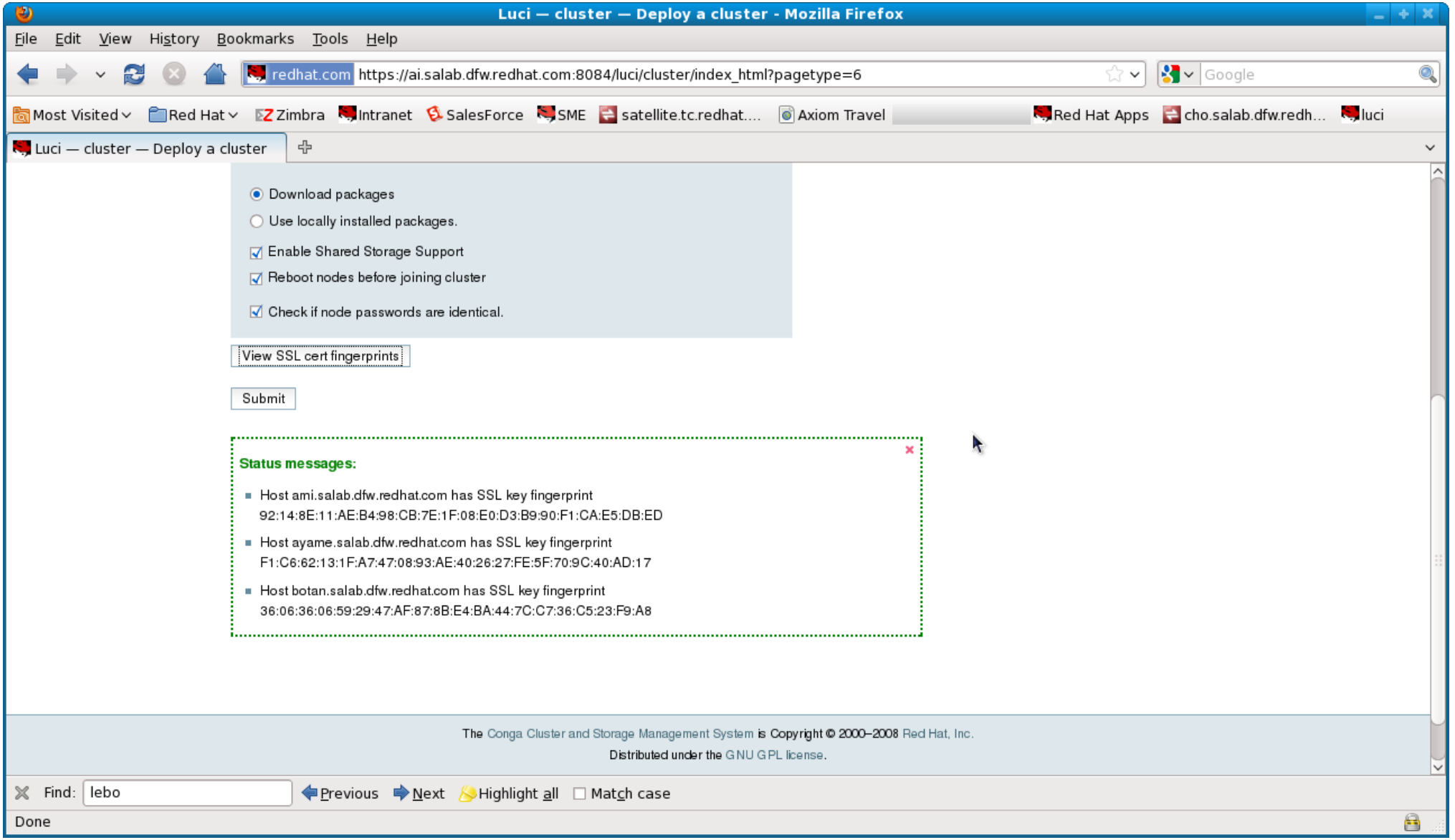
Configure the Cluster Using Conga

- Check to see if the luci server can talk to the ricci services on all nodes
  - Click “View SSL fIngerprints” button
  - If that checks out, click on “Submit”



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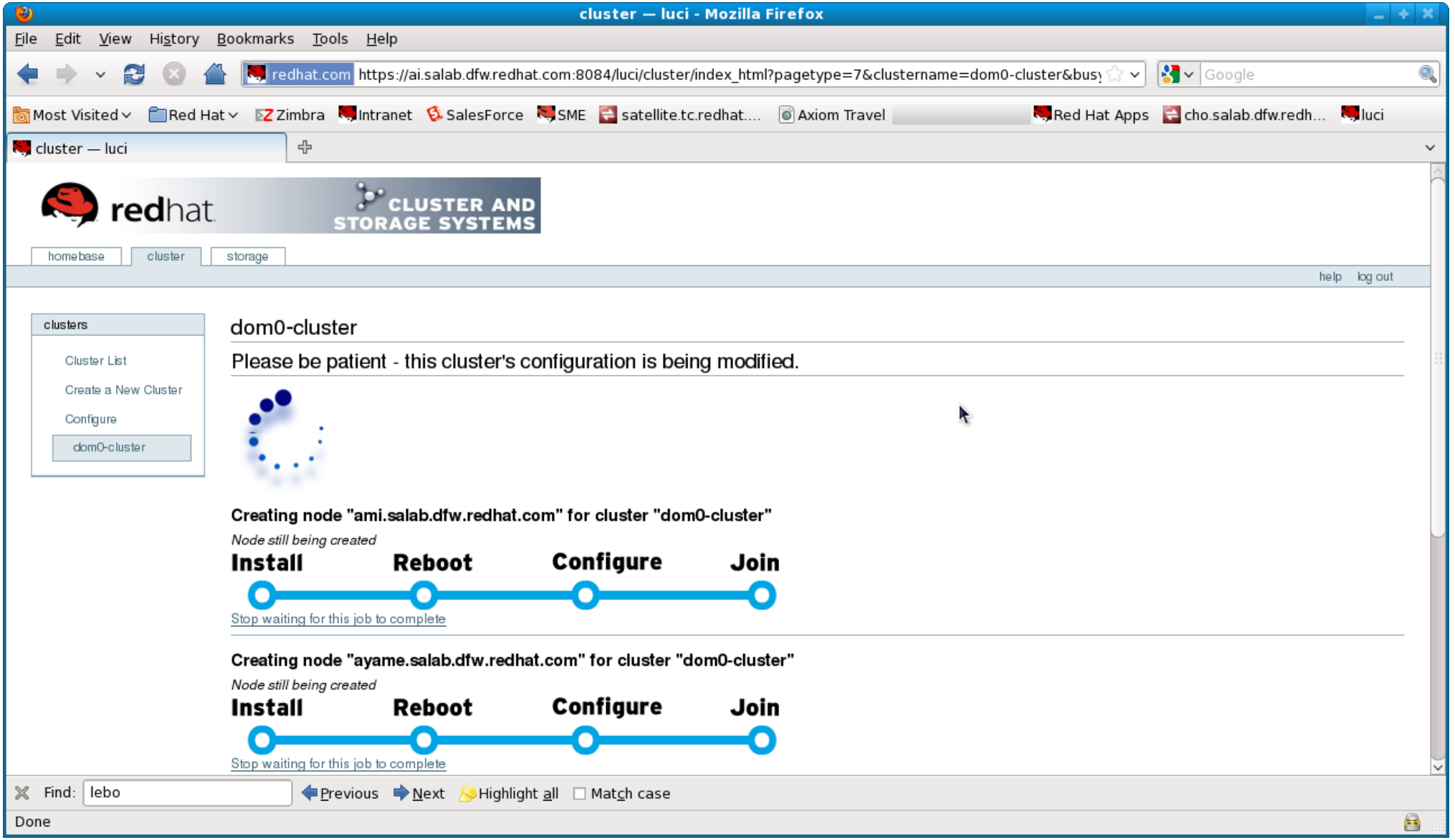

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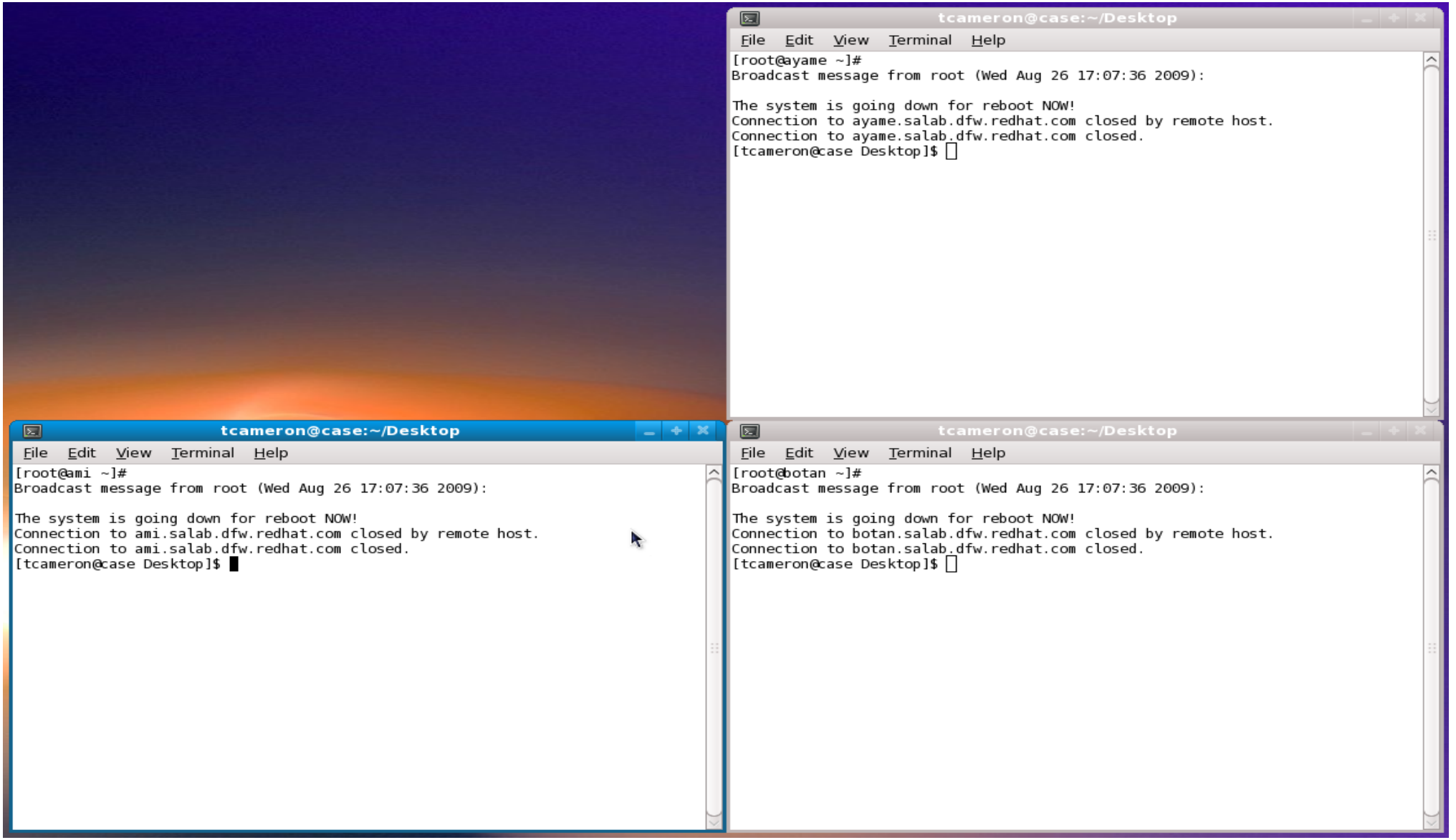

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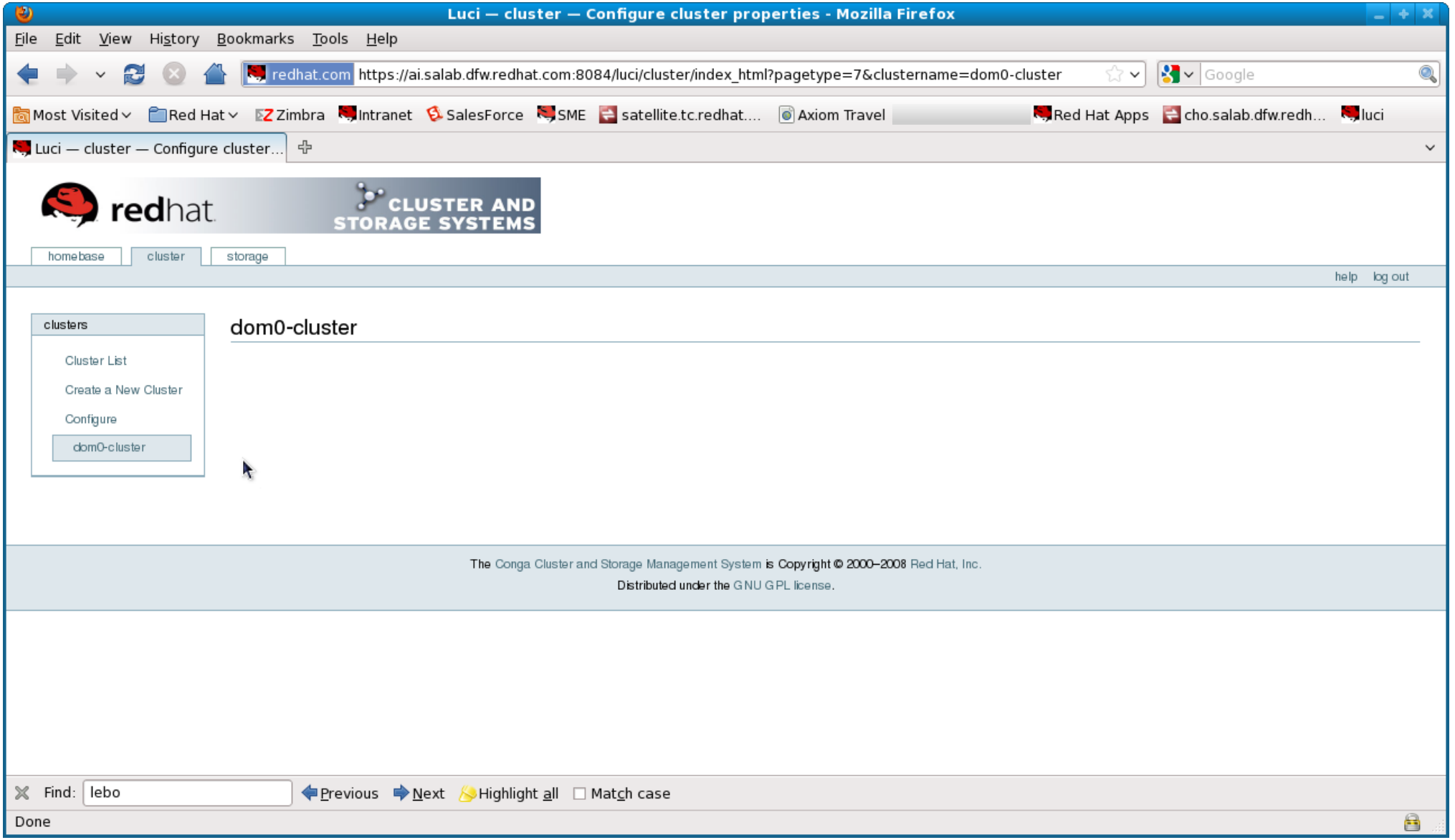

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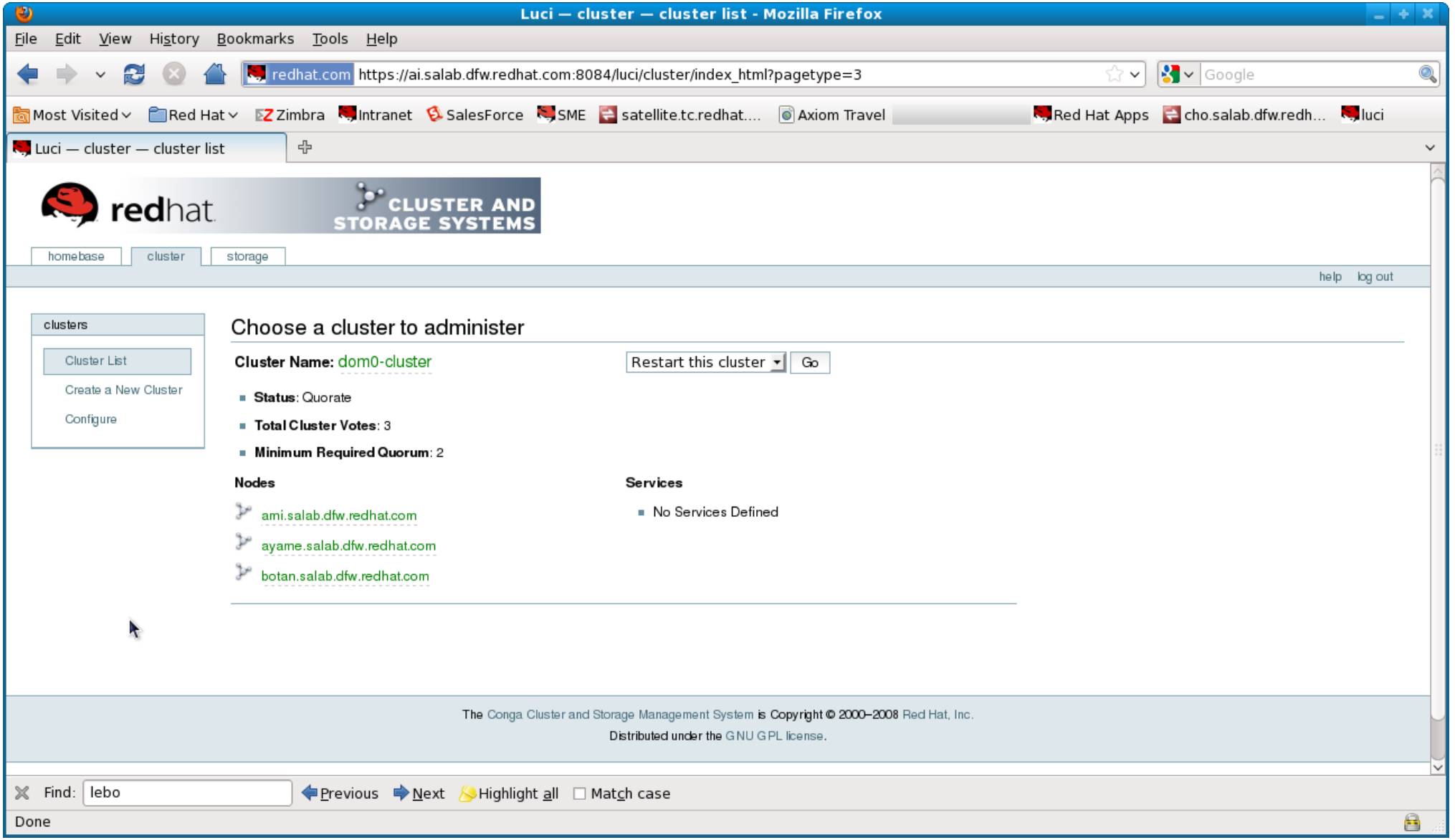
Configure the Cluster Using Conga

- After the nodes all reboot, click on “Cluster List” to see if everything came up
  - If the cluster name and the node names are green, you're good.



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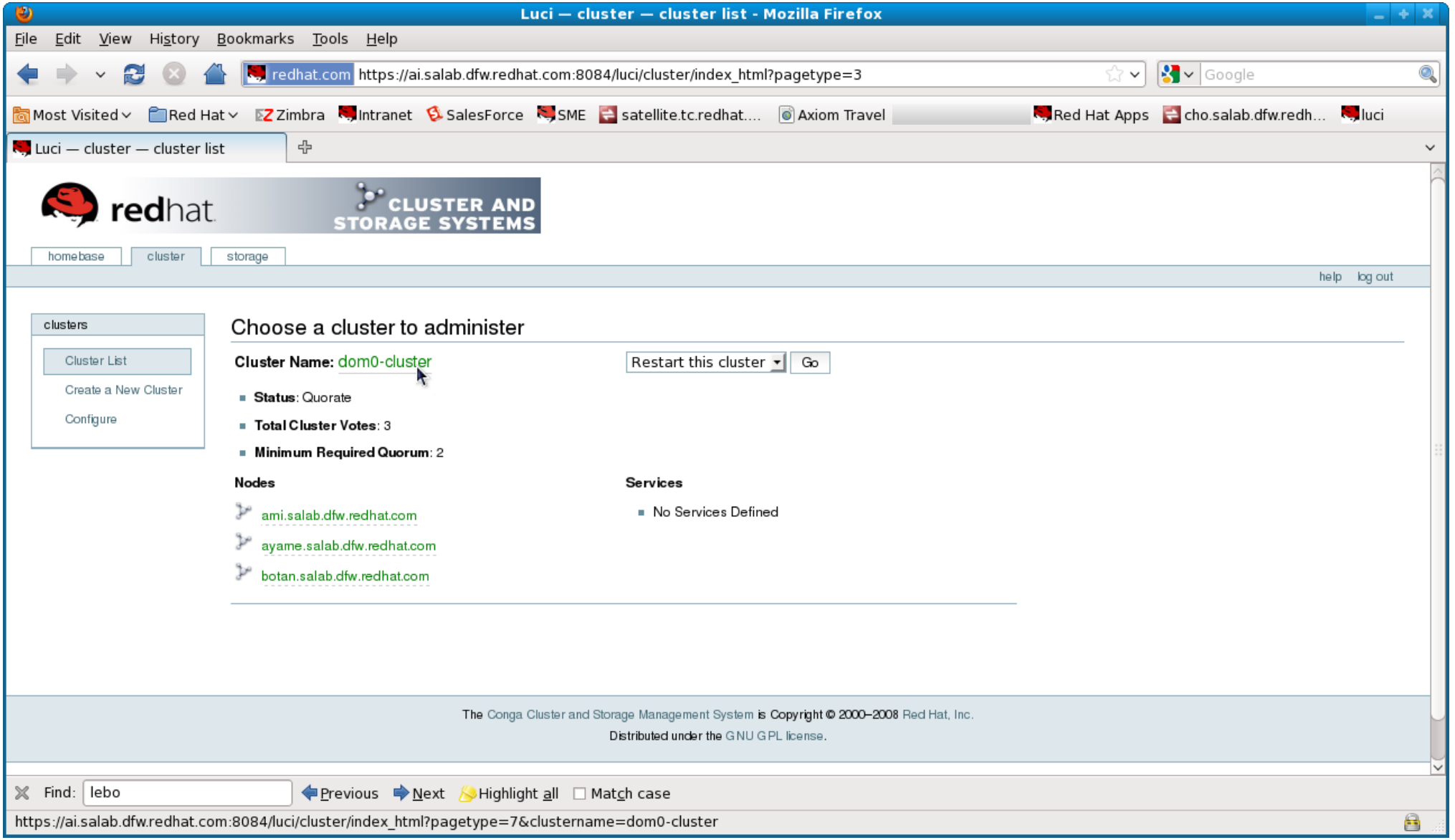
Configure the Cluster Using Conga

Set up a shared fence device

- Cluster tab
- Cluster name
- Shared Fence Devices
- Add a shareable fence device
- Fill out details
- Submit and accept



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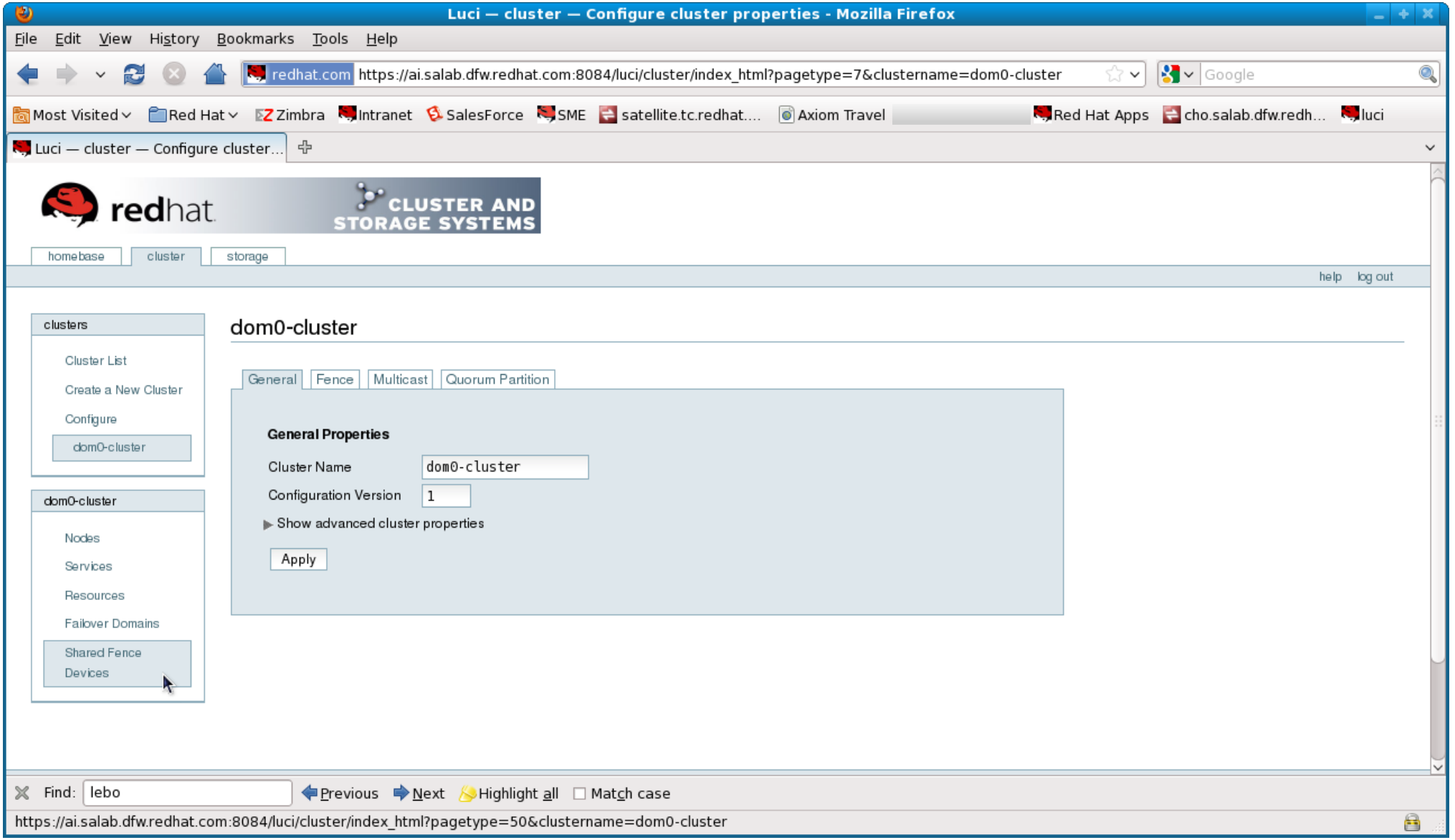

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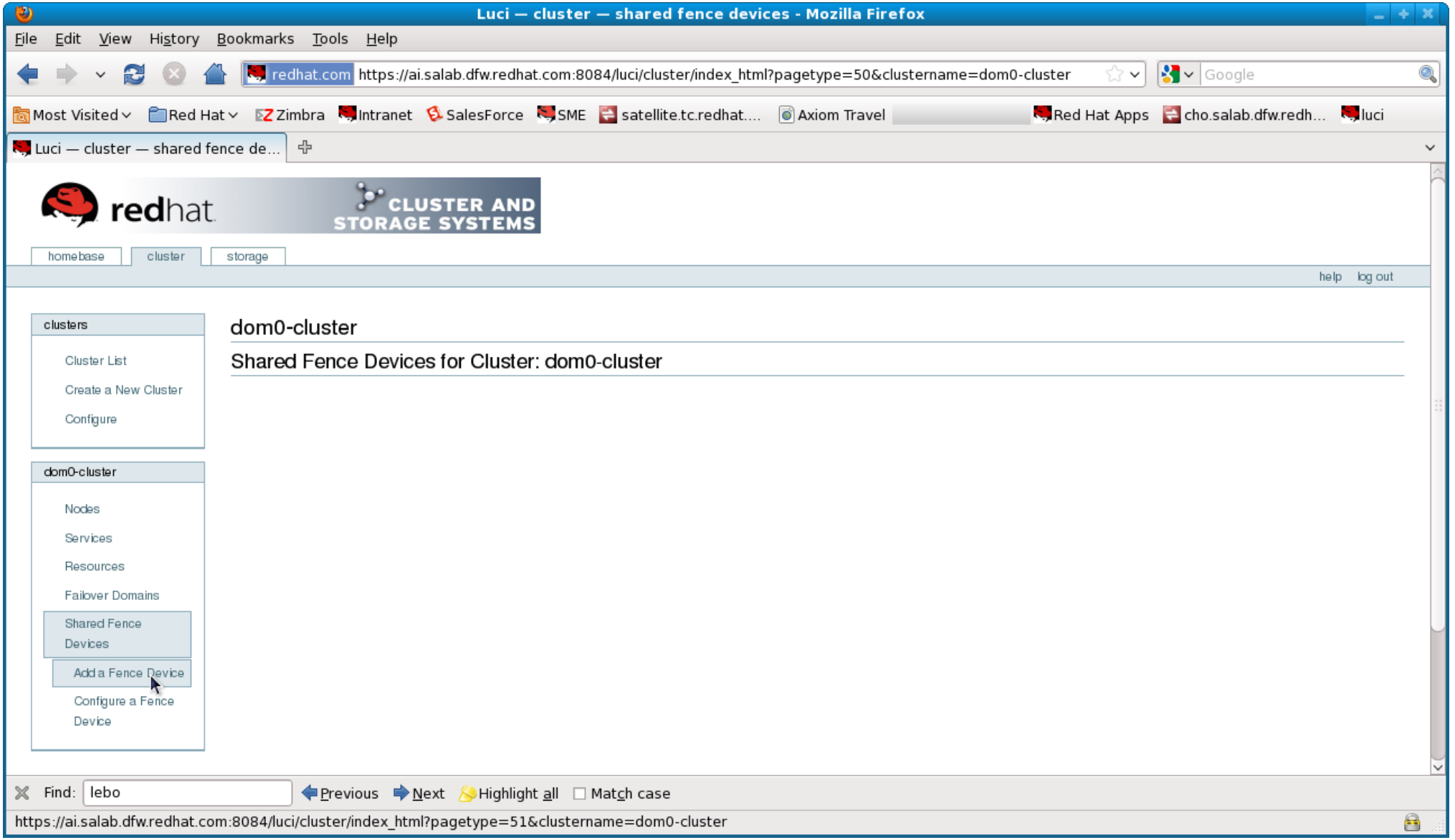
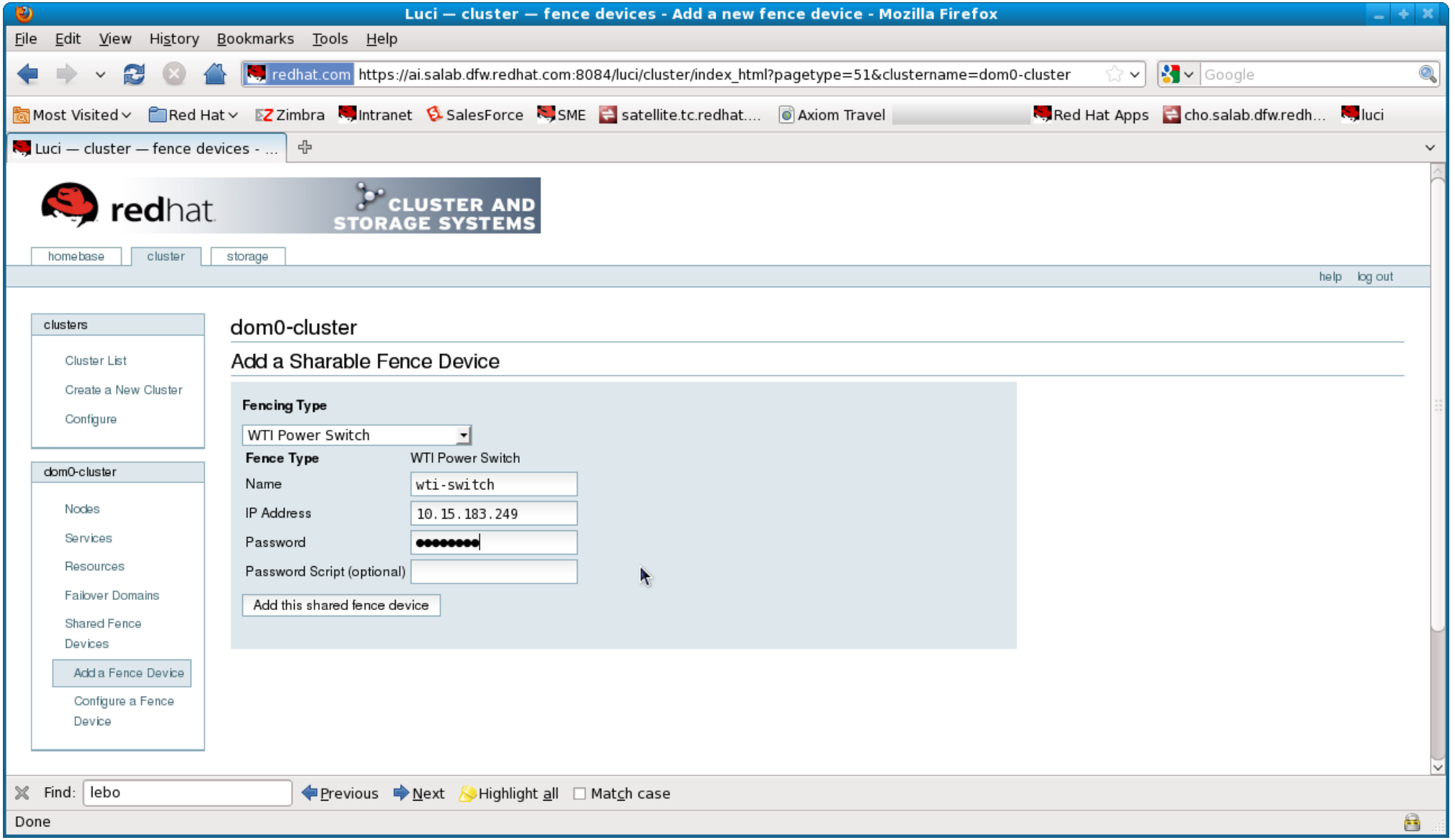

Luci — cluster — shared fence devices - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=50&clustername=dom0-cluster
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — shared fence de...
redhat
CLUSTER AND STORAGE SYSTEMS
homebase cluster storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
dom0-cluster
Nodes
Services
Resources
Failover Domains
Shared Fence Devices
Add a Fence Device
Configure a Fence Device
dom0-cluster
Shared Fence Devices for Cluster: dom0-cluster
Find: lebo
Previous Next Highlight all Match case
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=51&clustername=dom0-cluster



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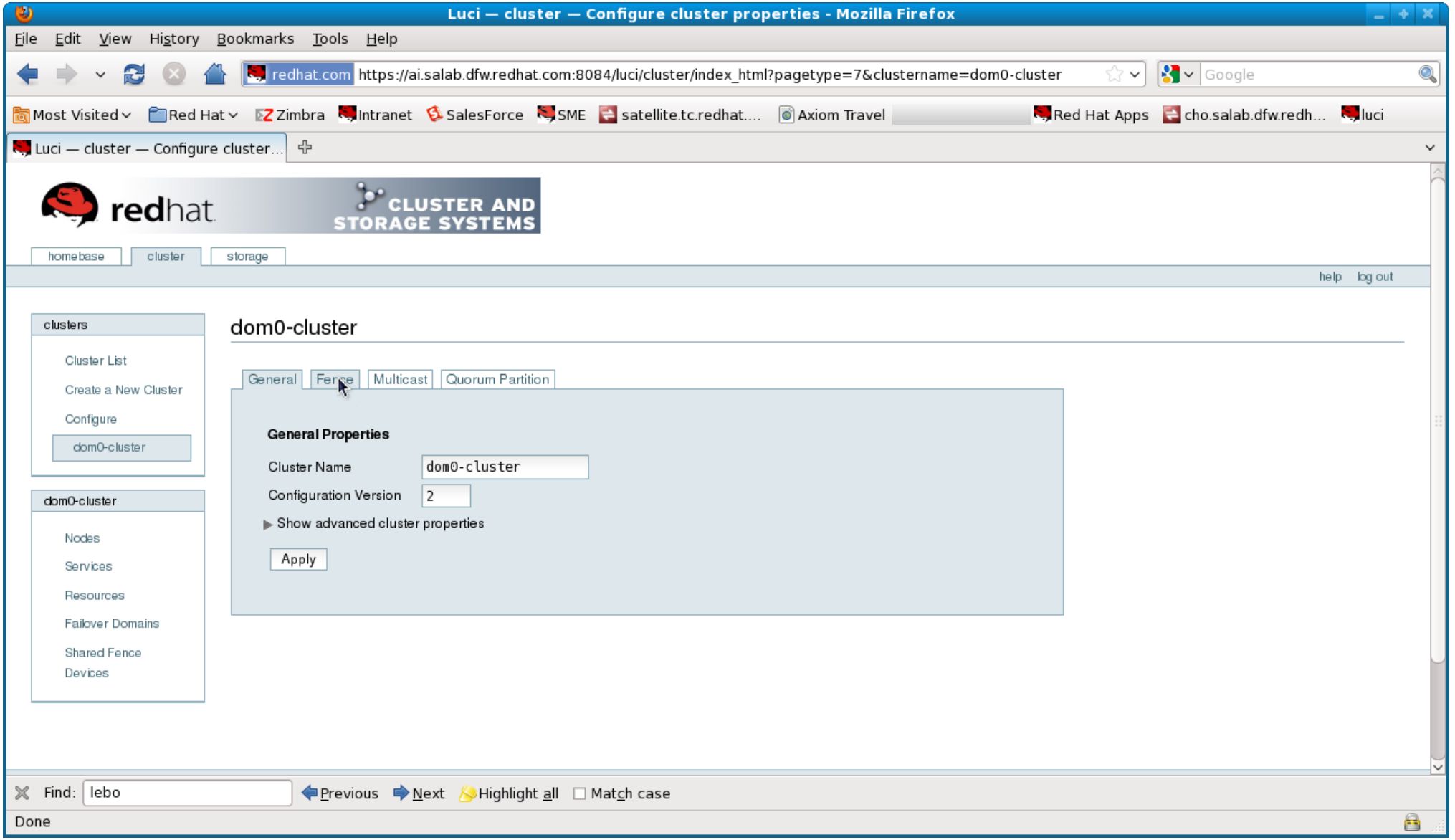
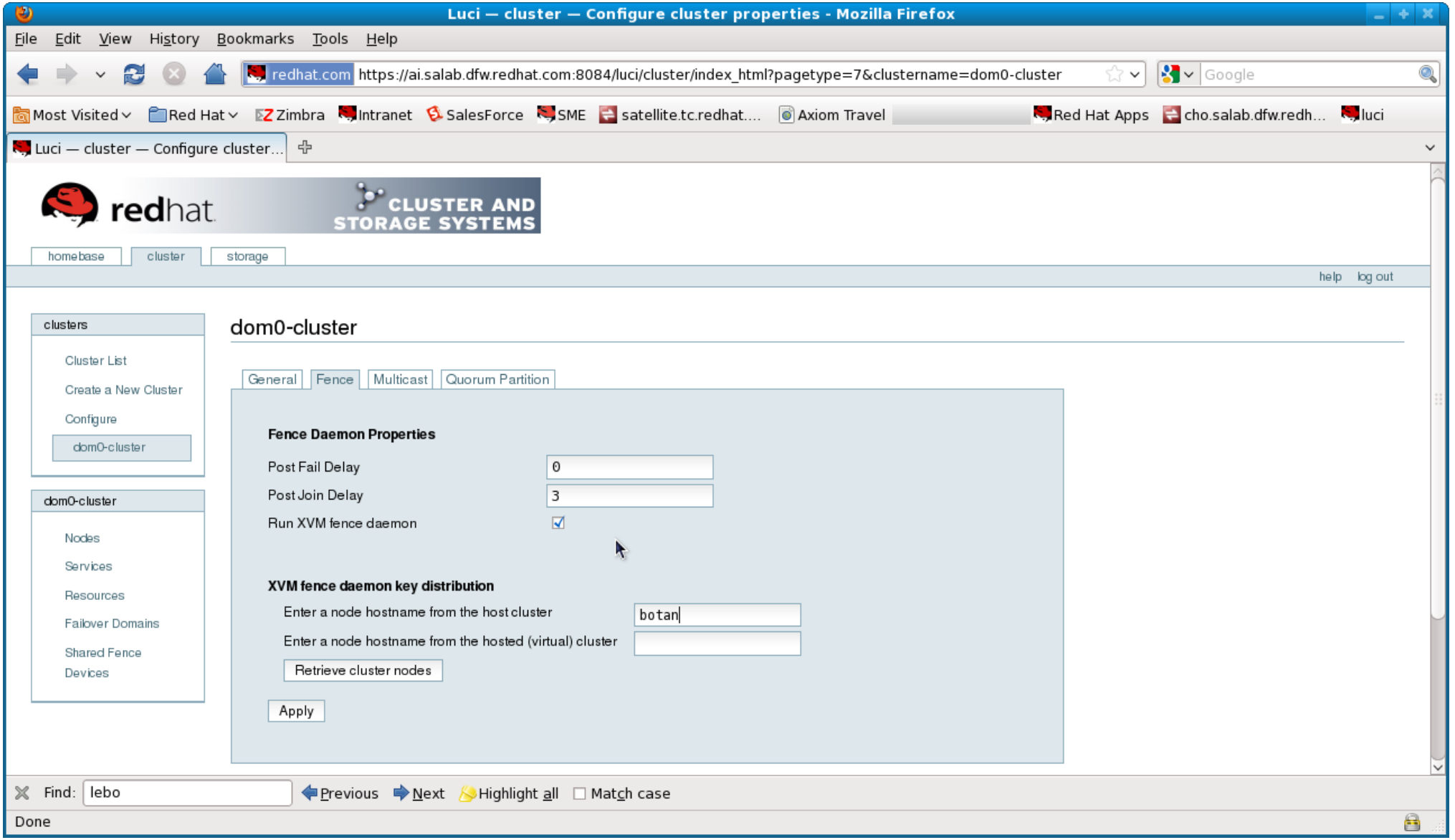
Configure the Cluster Using Conga

- Define virtual machine fencing
- Cluster tab
- Click on cluster
- Choose Fence tab
- Check the box for XVM fence daemon
- Enter a hostname from dom0 cluster
  - Retrieve cluster nodes
  - Create and distribute keys
- Apply and confirm


Luci — cluster — Configure cluster properties - Mozilla Firefox
File Edit View History Bookmarks Tools Help
redhat.com https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=7&clustername=dom0-cluster
Google
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — Configure cluster...
redhat
CLUSTER AND STORAGE SYSTEMS
homebase cluster storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
dom0-cluster
dom0-cluster
Nodes
Services
Resources
Failover Domains
Shared Fence Devices
dom0-cluster
General Fence Multicast Quorum Partition
General Properties
Cluster Name dom0-cluster
Configuration Version 2
Show advanced cluster properties
Apply
Find: lebo
Previous Next Highlight all Match case
Done



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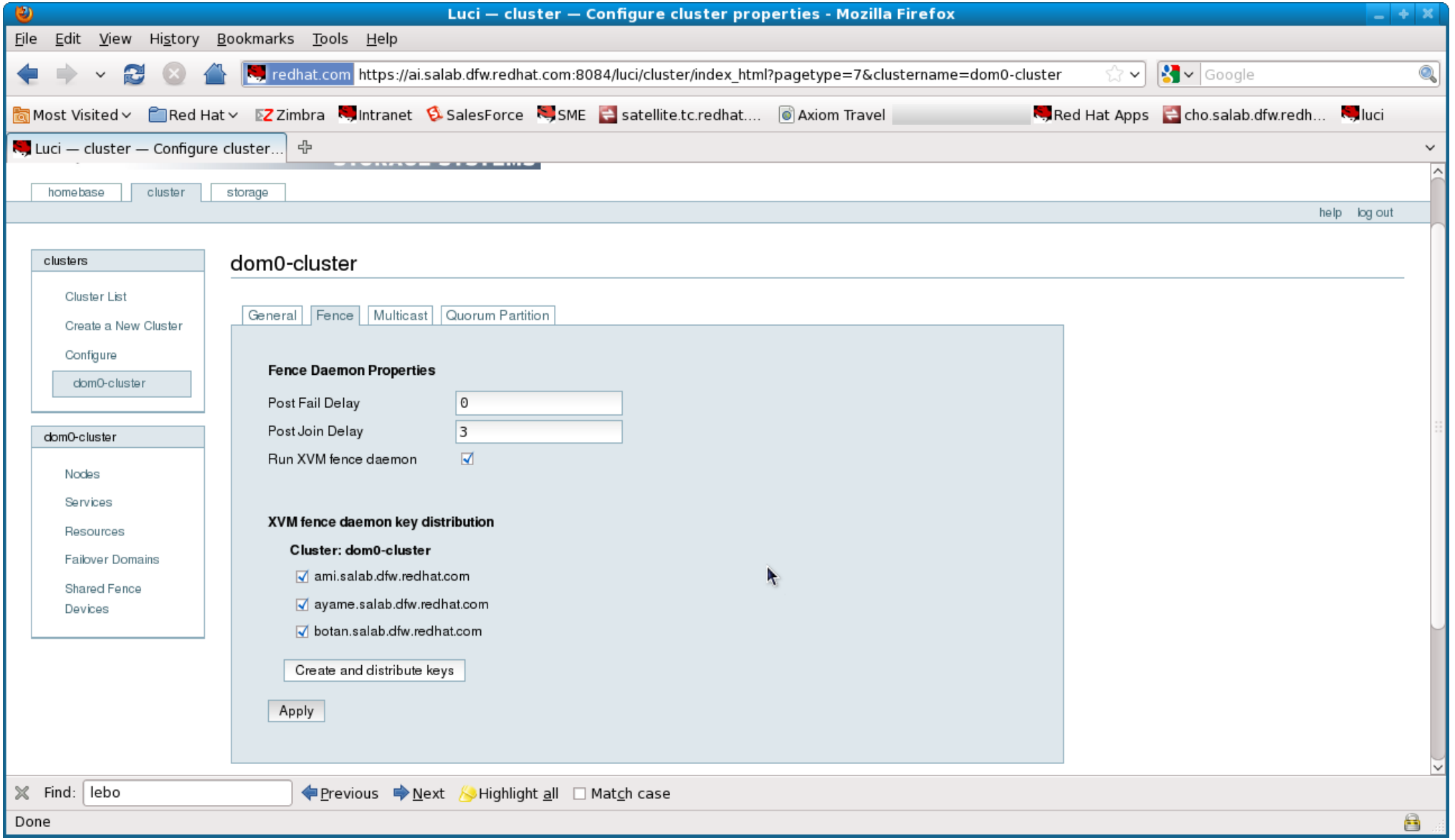

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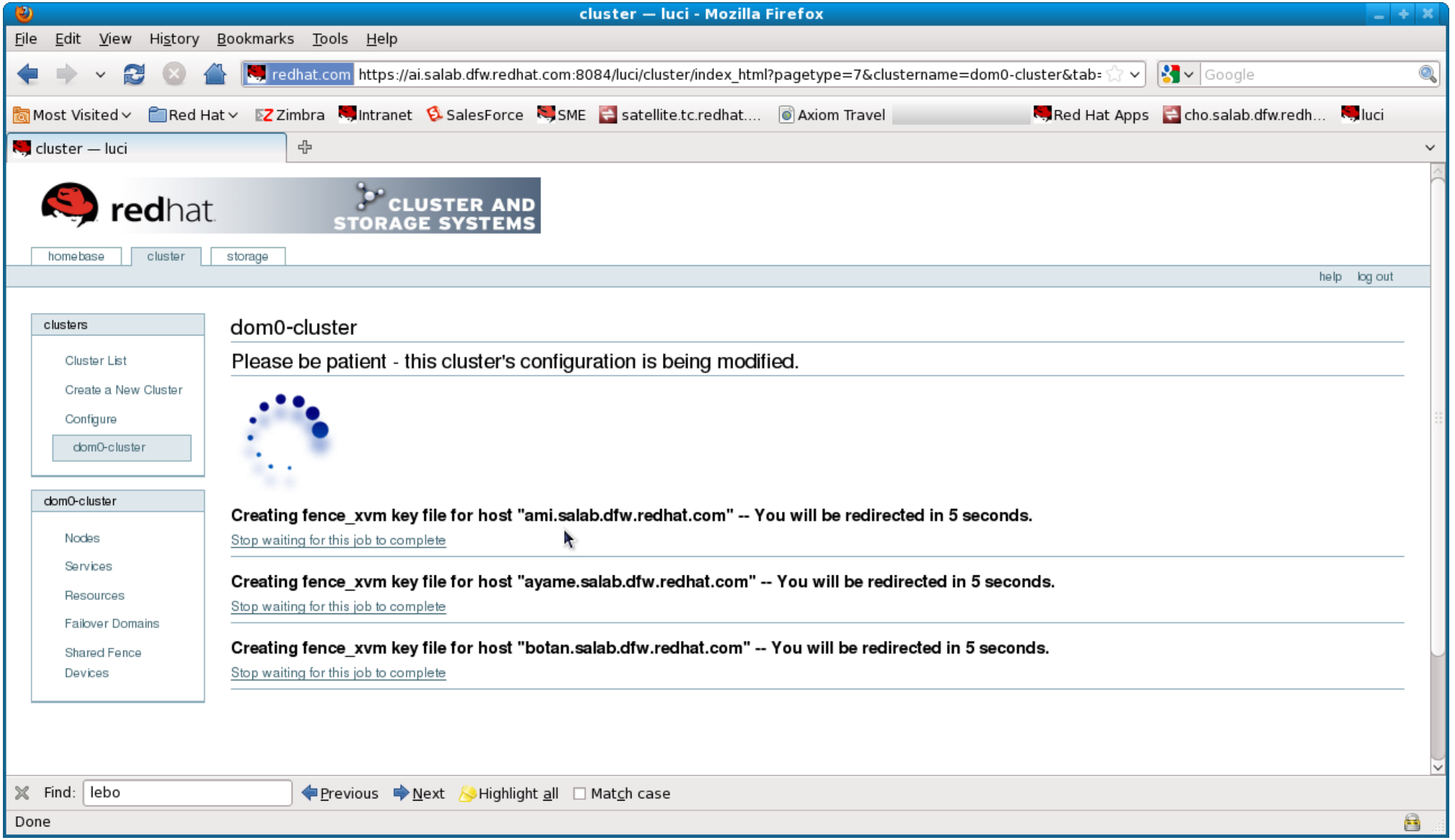
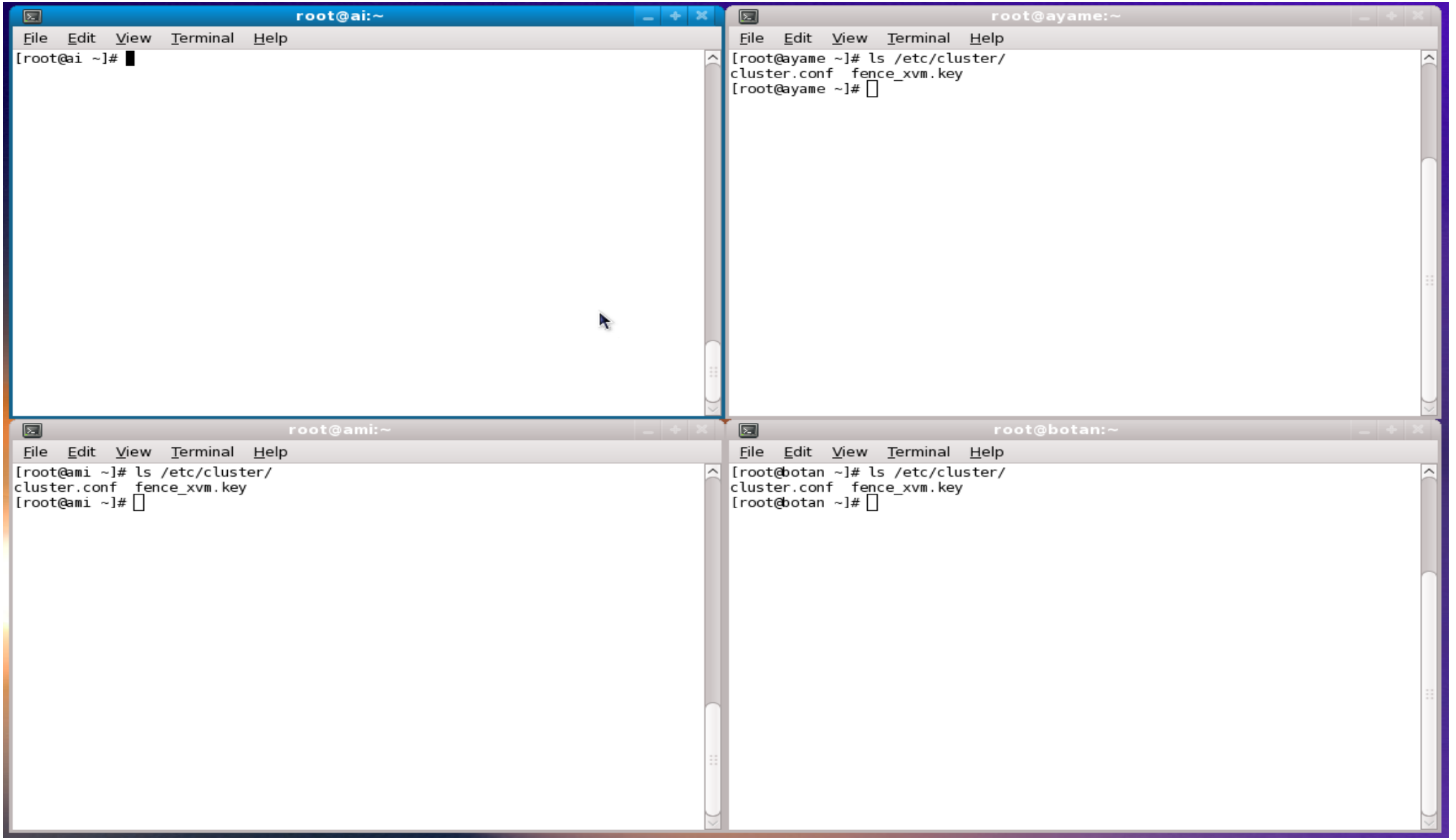

cluster — luci - Mozilla Firefox
File Edit View History Bookmarks Tools Help
redhat.com https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=7&clustername=dom0-cluster&tab=
Google
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
cluster — luci
redhat
CLUSTER AND STORAGE SYSTEMS
homebase cluster storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
dom0-cluster
dom0-cluster
Nodes
Services
Resources
Failover Domains
Shared Fence Devices
dom0-cluster
Please be patient - this cluster's configuration is being modified.
Creating fence_xvm key file for host "ami.salab.dfw.redhat.com" -- You will be redirected in 5 seconds.
Stop waiting for this job to complete
Creating fence_xvm key file for host "ayame.salab.dfw.redhat.com" -- You will be redirected in 5 seconds.
Stop waiting for this job to complete
Creating fence_xvm key file for host "botan.salab.dfw.redhat.com" -- You will be redirected in 5 seconds.
Stop waiting for this job to complete
Find: lebo
Previous Next Highlight all Match case
Done

Configure the Cluster Using Conga

Check that /etc/fence_xvm.key was created on each of the dom0 cluster node members.



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Configure Per-Node Fencing

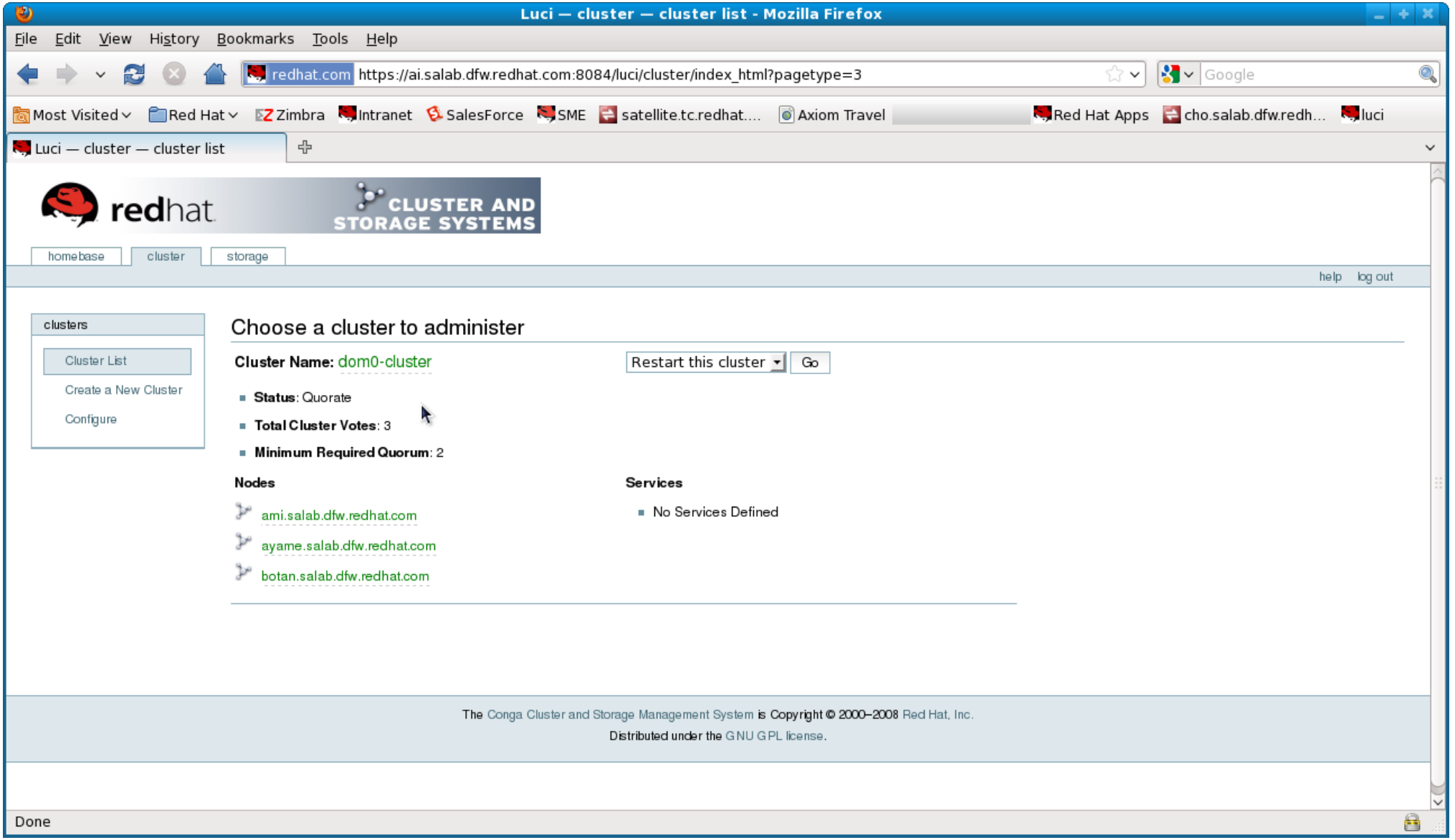
Cluster tab

Cluster Name

Node Name

Main Fencing Method

Add a fence device to this level



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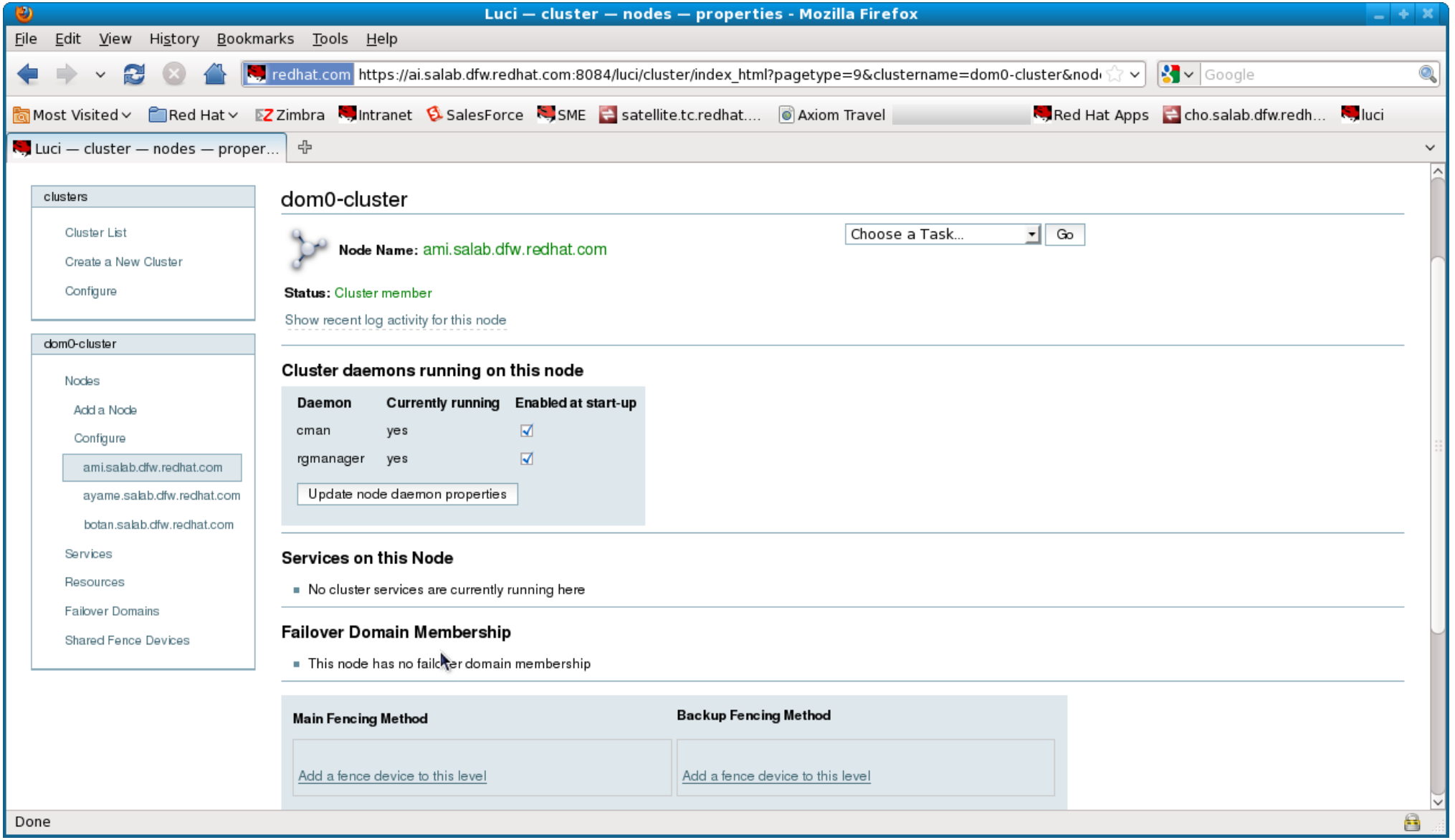
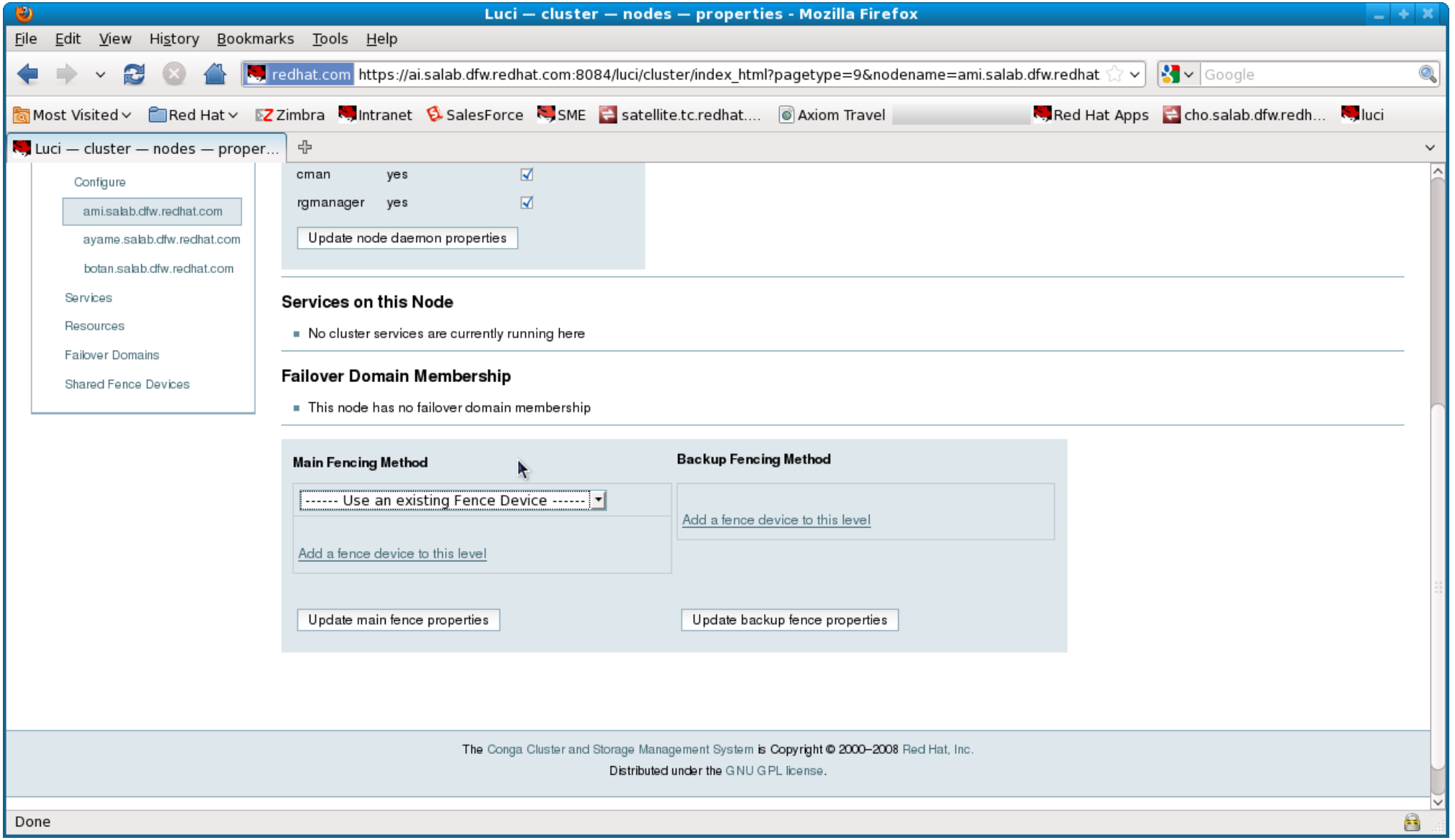

Luci — cluster — nodes — properties - Mozilla Firefox
File Edit View History Bookmarks Tools Help
redhat.com https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=9&clustername=dom0-cluster&nod
Google
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — nodes — proper...
clusters
Cluster List
Create a New Cluster
Configure
dom0-cluster
Nodes
Add a Node
Configure
ami.salab.dfw.redhat.com
ayame.salab.dfw.redhat.com
botan.salab.dfw.redhat.com
Services
Resources
Failover Domains
Shared Fence Devices
dom0-cluster
Choose a Task...
Go
Node Name: ami.salab.dfw.redhat.com
Status: Cluster member
Show recent log activity for this node
Cluster daemons running on this node
Daemon
Currently running
Enabled at start-up
cman
yes
rgmanager
yes
Update node daemon properties
Services on this Node
No cluster services are currently running here
Failover Domain Membership
This node has no failover domain membership
Main Fencing Method
Backup Fencing Method
Add a fence device to this level
Add a fence device to this level
Done



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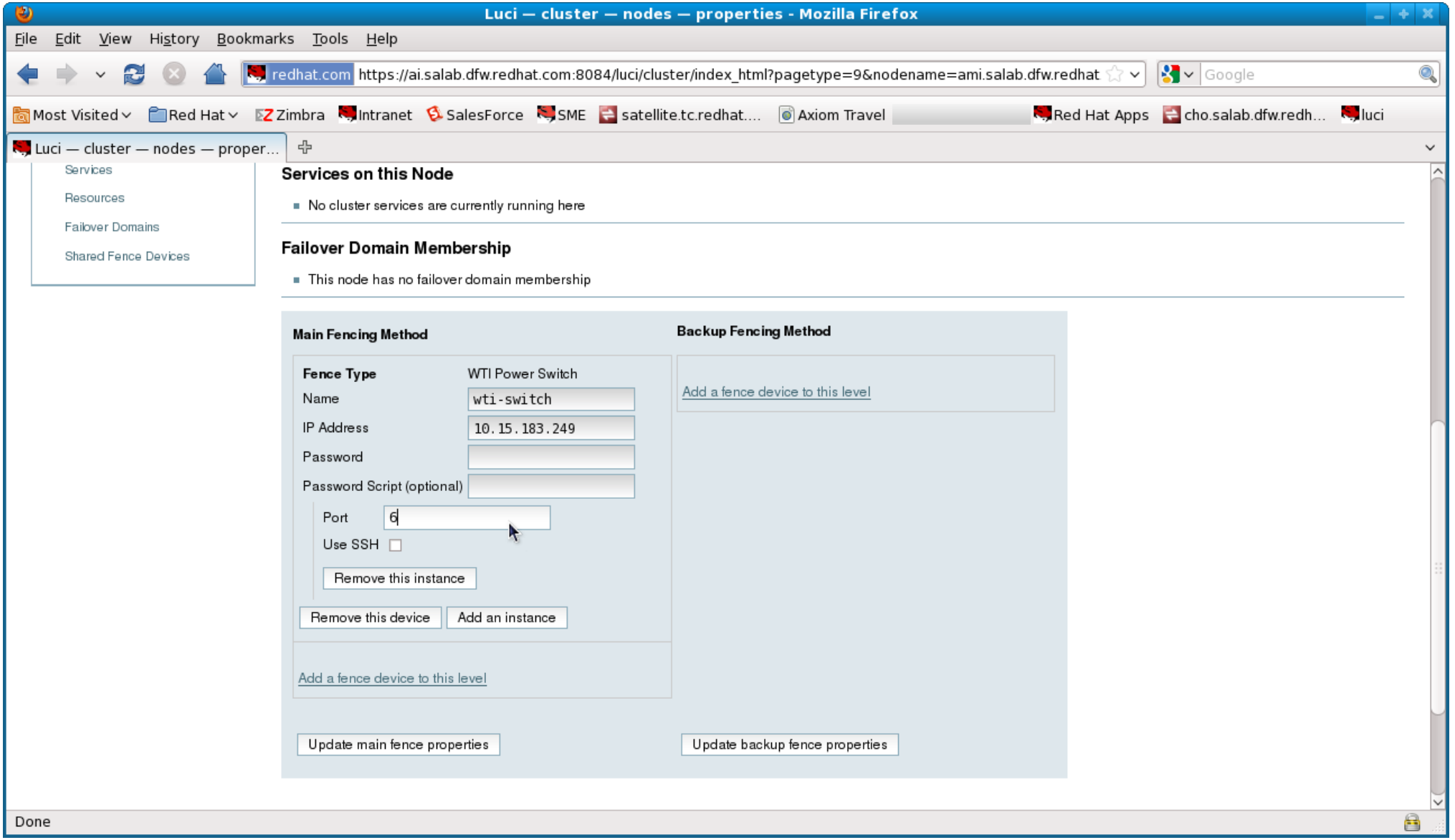

Luci — cluster — nodes — properties - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=9&nodename=ami.salab.dfw.redhat
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — nodes — proper...
Services
Resources
Failover Domains
Shared Fence Devices
Services on this Node
No cluster services are currently running here
Failover Domain Membership
This node has no failover domain membership
Main Fencing Method
Backup Fencing Method
Fence Type
WTI Power Switch
Name
wti-switch
IP Address
10.15.183.249
Password
Password Script (optional)
Port
6
Use SSH
Remove this instance
Remove this device
Add an instance
Add a fence device to this level
Add a fence device to this level
Update main fence properties
Update backup fence properties
Done

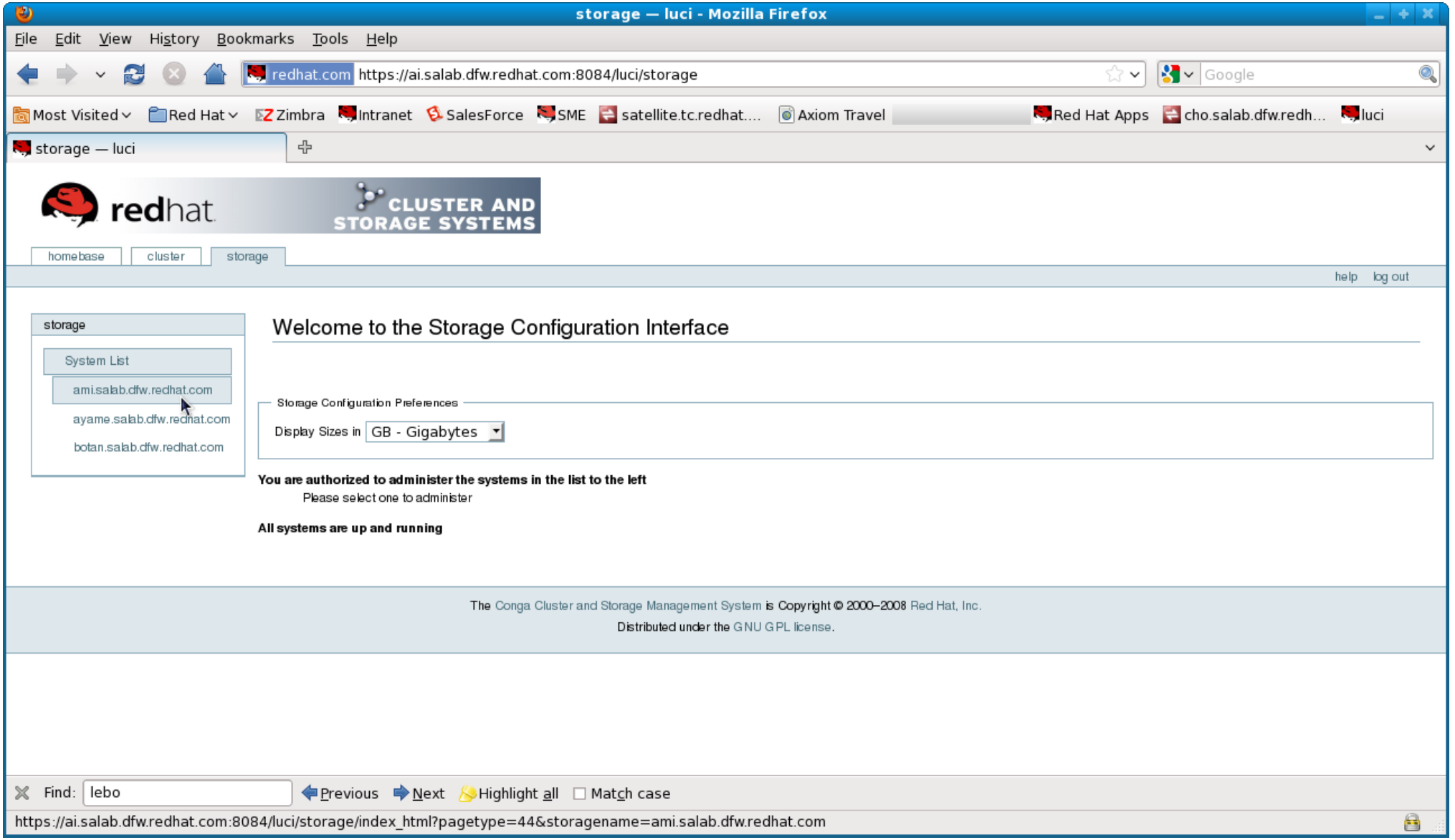
Configure Per-Node Fencing

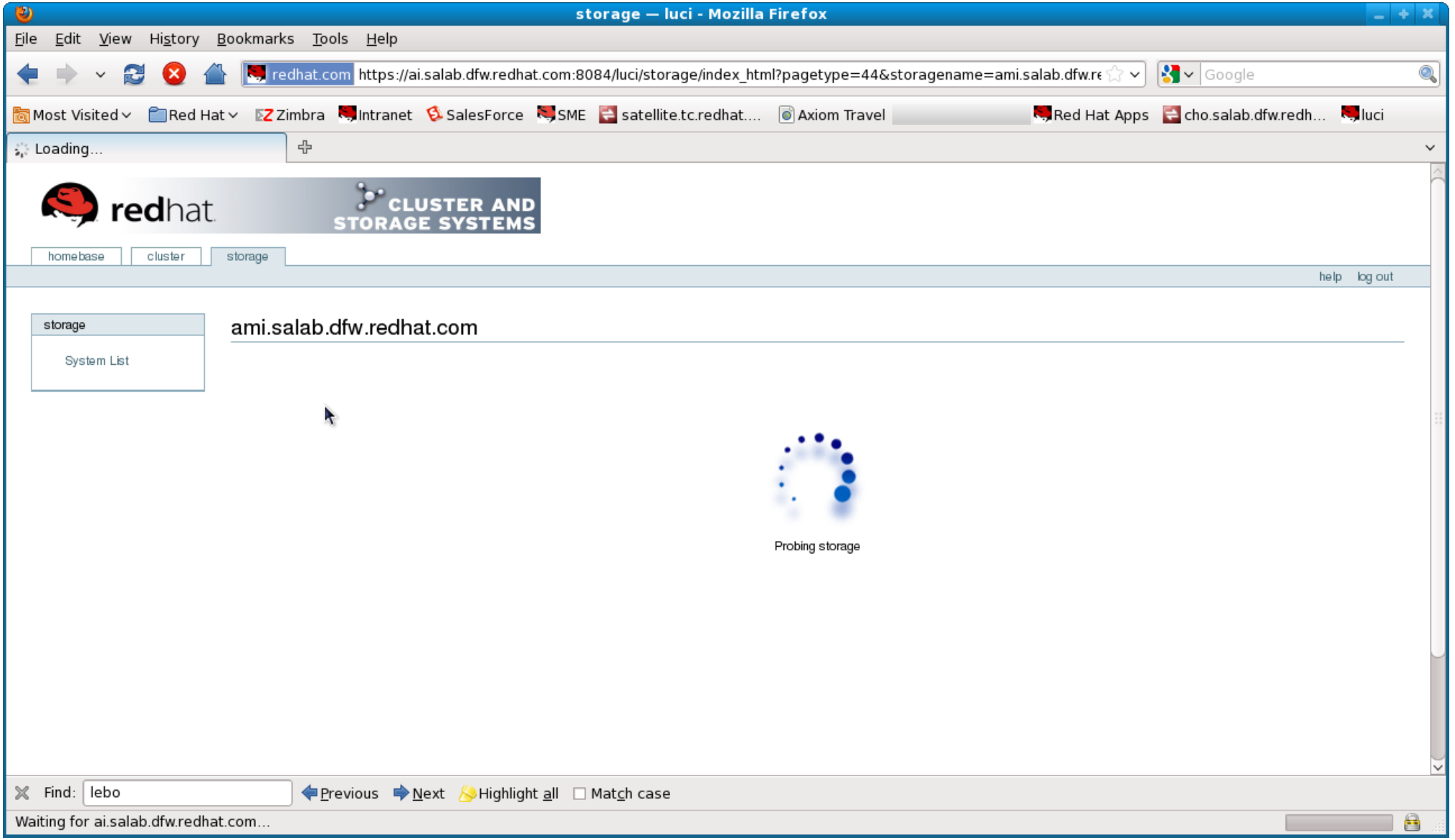
Lather, rinse, repeat for each node.

Configure Storage Using Conga

Set up the volume group which will be used to house the virtual machine

- Storage tab
- Choose a server
- Choose Volume Groups
- Choose New Volume Group
- Name new VG and assign to a block device


storage — luci - Mozilla Firefox
File Edit View History Bookmarks Tools Help
redhat.com https://ai.salab.dfw.redhat.com:8084/luci/storage
Google
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
storage — luci
redhat
CLUSTER AND STORAGE SYSTEMS
homebase cluster storage
help log out
storage
System List
ami.salab.dfw.redhat.com
ayame.salab.dfw.redhat.com
botan.salab.dfw.redhat.com
Welcome to the Storage Configuration Interface
Storage Configuration Preferences
Display Sizes in GB - Gigabytes
You are authorized to administer the systems in the list to the left
Please select one to administer
All systems are up and running
The Conga Cluster and Storage Management System is Copyright © 2000–2008 Red Hat, Inc.
Distributed under the GNU GPL license.
Find: lebo Previous Next Highlight all Match case
https://ai.salab.dfw.redhat.com:8084/luci/storage/index_html?pagetype=44&storagename=ami.salab.dfw.redhat.com



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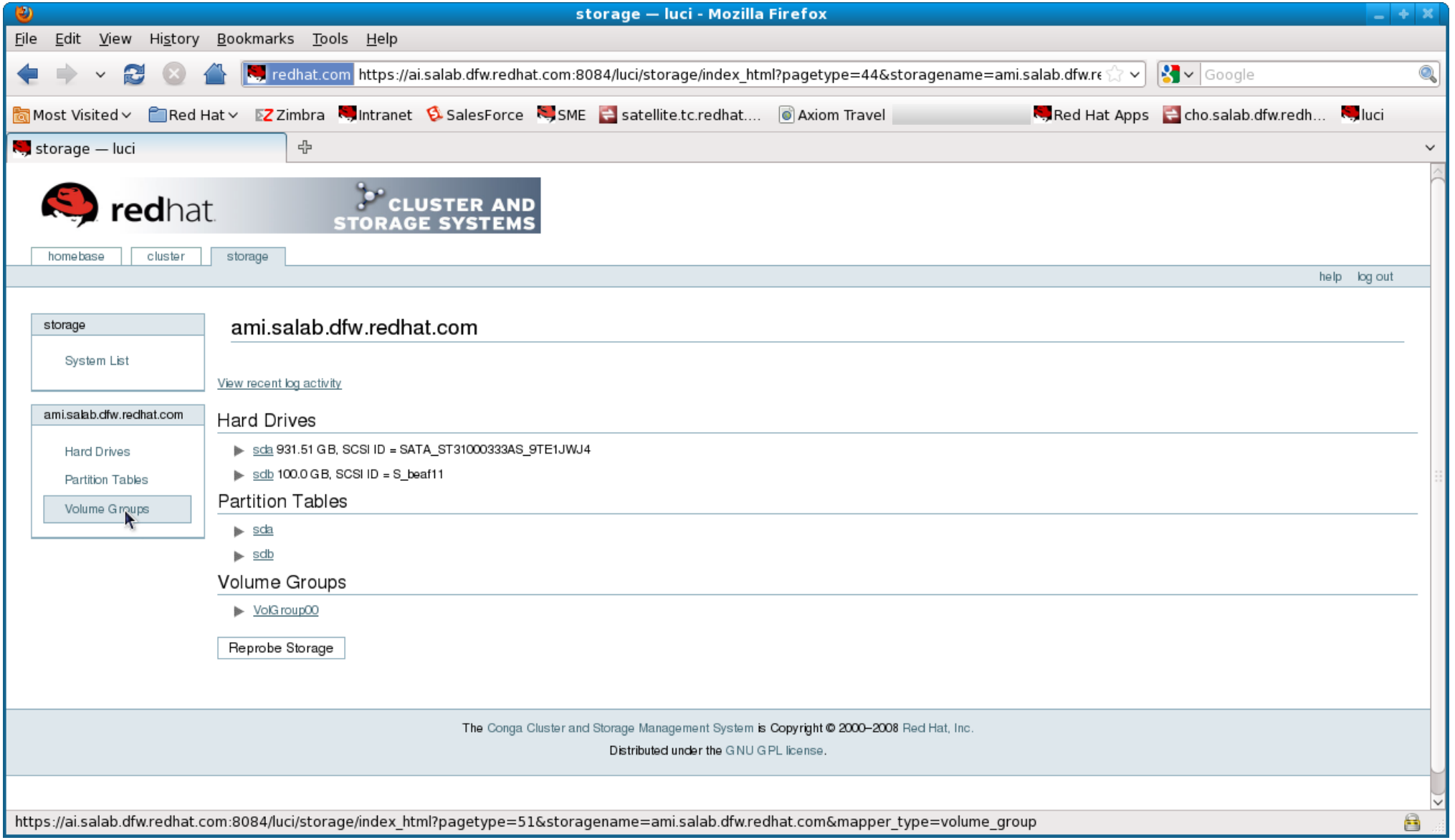

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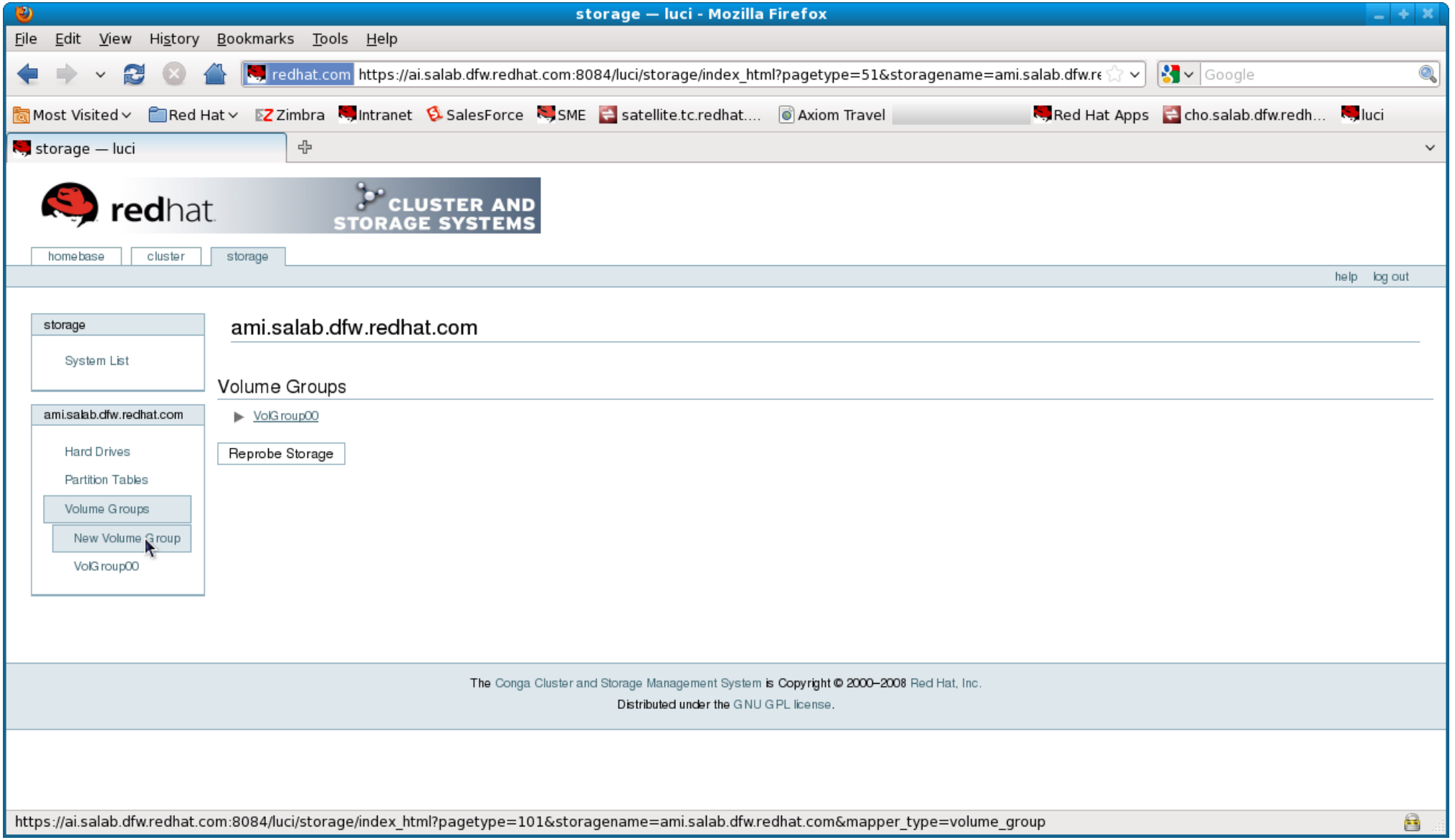

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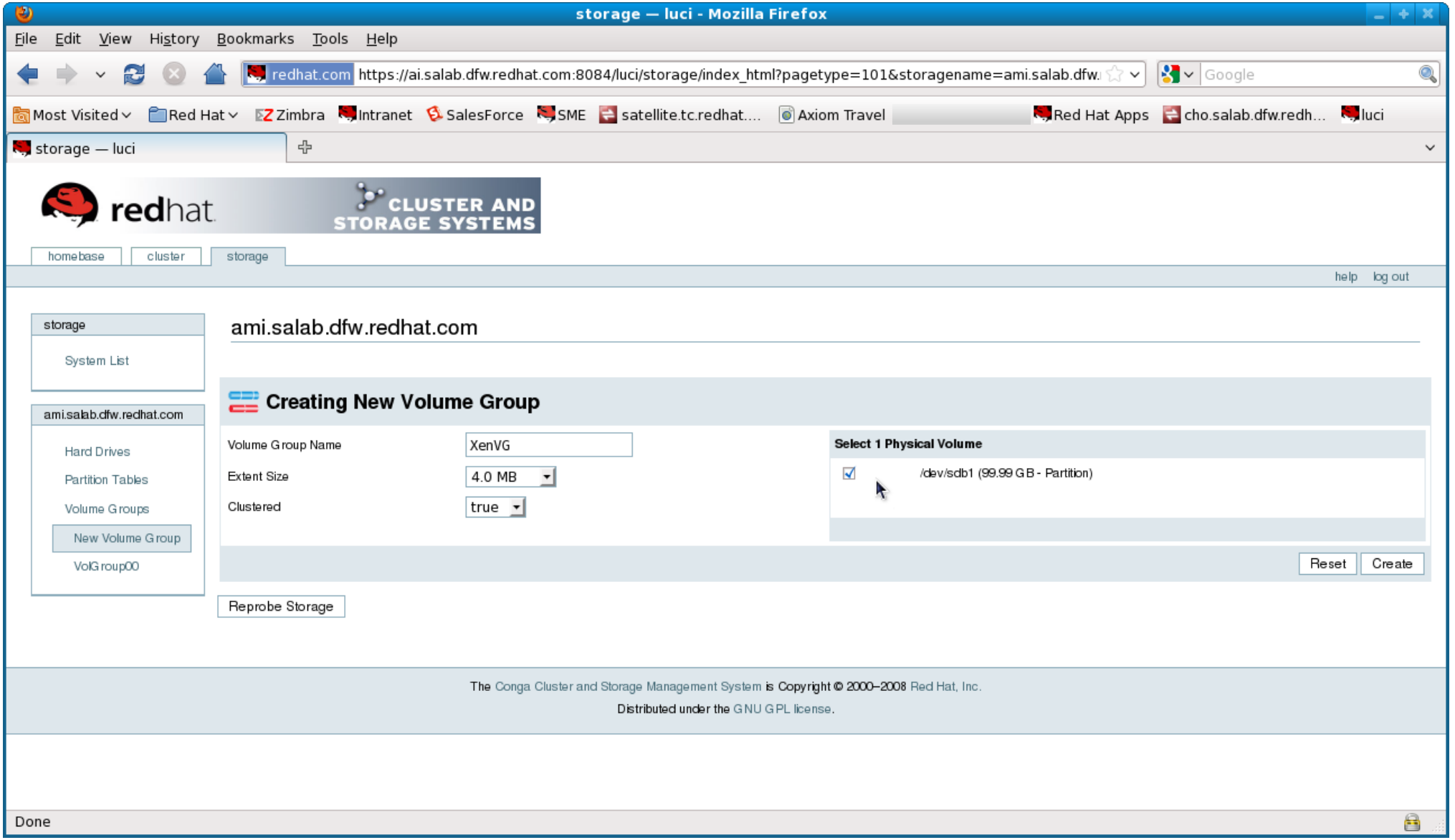

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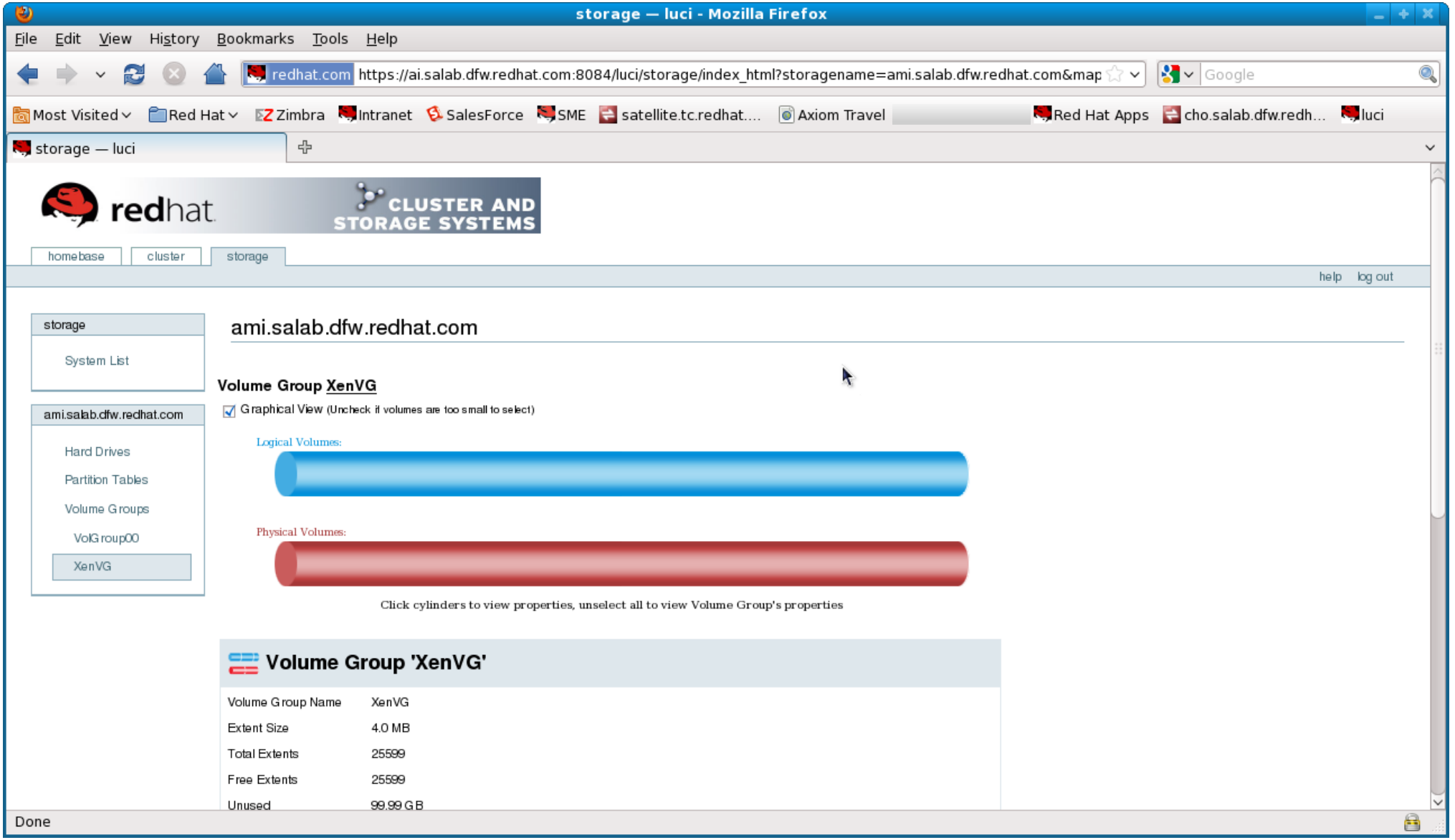

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Configure Storage Using Conga

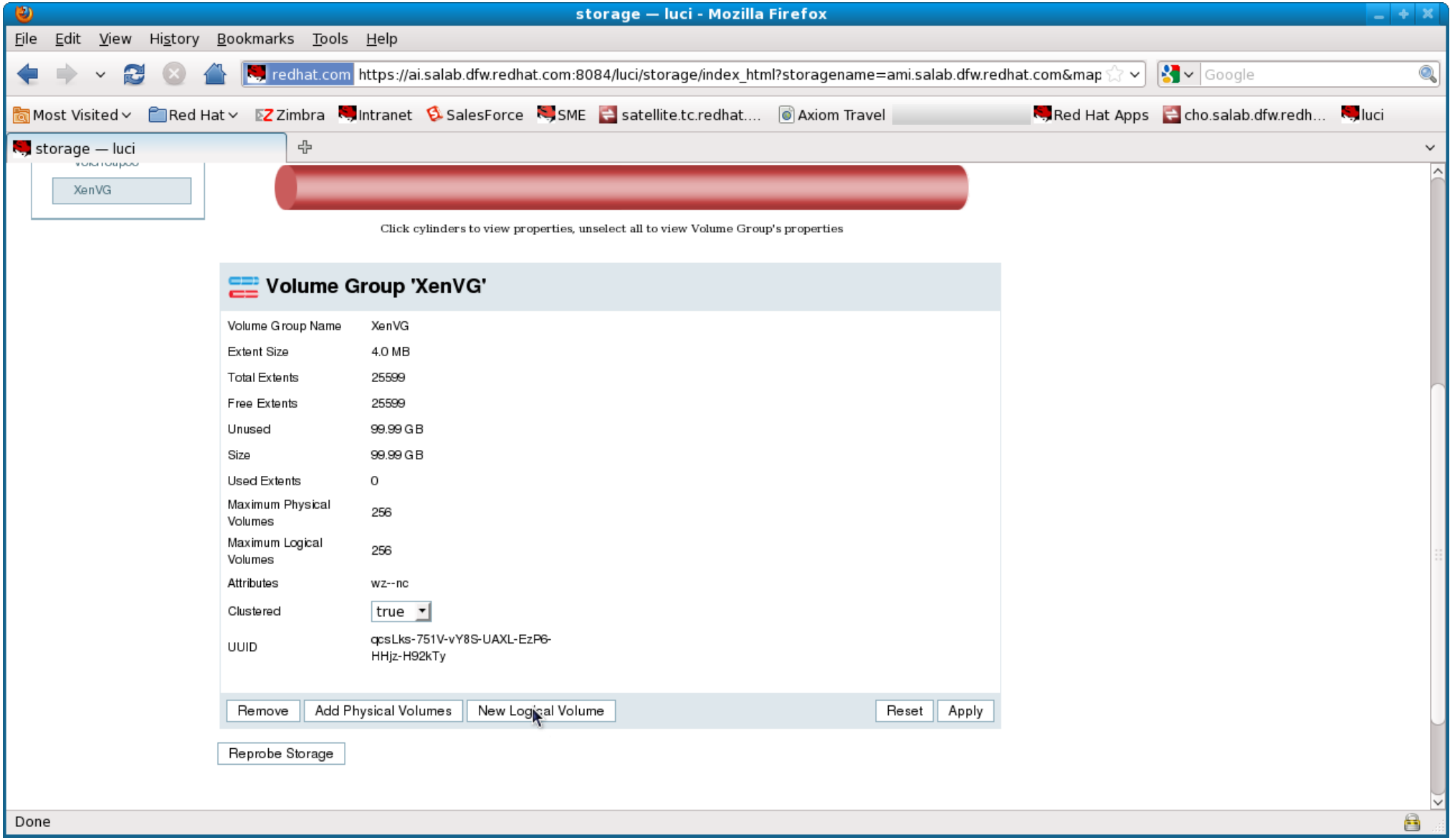
Set up the logical volume which will be used to house the virtual machines

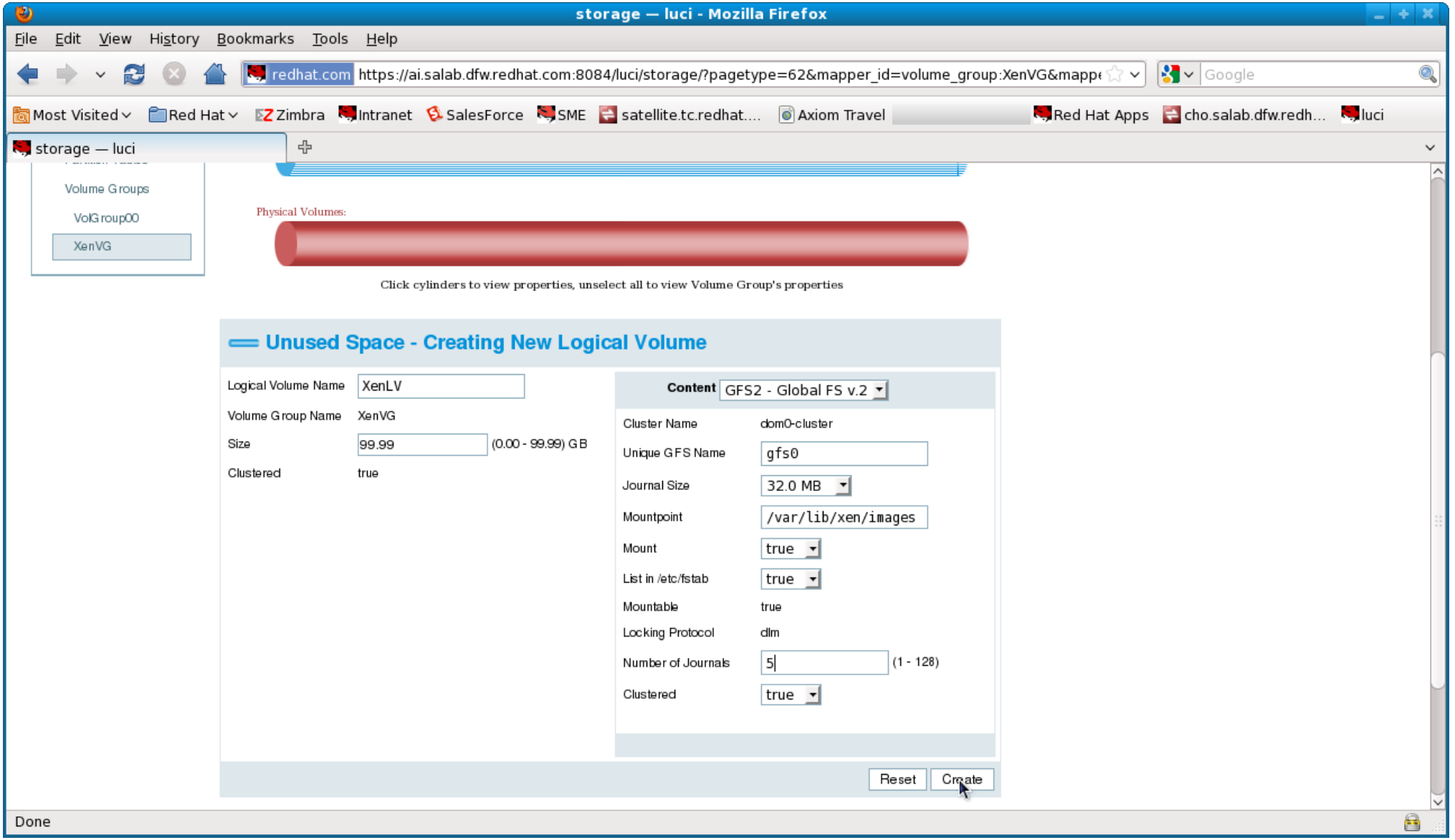
- Scroll down
- New Logical Volume
- Define LV Name
- Define LV Size
- Define Content (GFS2 recommended)
- Define Unique GFS Name (gfs0)
- Define mount point (/var/lib/xen/images)

Configure Storage Using Conga

Set up the logical volume which will be used to house the virtual machines

- Set Mount to true
- Set List in /etc/fstab to true
- Set number of journals
- Verify Clustered is set to true


storage — luci - Mozilla Firefox
File Edit View History Bookmarks Tools Help
redhat.com https://ai.salab.dfw.redhat.com:8084/luci/storage/index_html?storagename=ami.salab.dfw.redhat.com&map
Google
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
storage — luci
XenVG
Click cylinders to view properties, unselect all to view Volume Group's properties
Volume Group 'XenVG'
Volume Group Name XenVG
Extent Size 4.0 MB
Total Extents 25599
Free Extents 25599
Unused 99.99 GB
Size 99.99 GB
Used Extents 0
Maximum Physical Volumes 256
Maximum Logical Volumes 256
Attributes wz--nc
Clustered true
UUID qcsLks-751V-vY8S-UAXL-EzP6-HHjz-H92kTy
Remove
Add Physical Volumes
New Logical Volume
Reset
Apply
Reprobe Storage
Done



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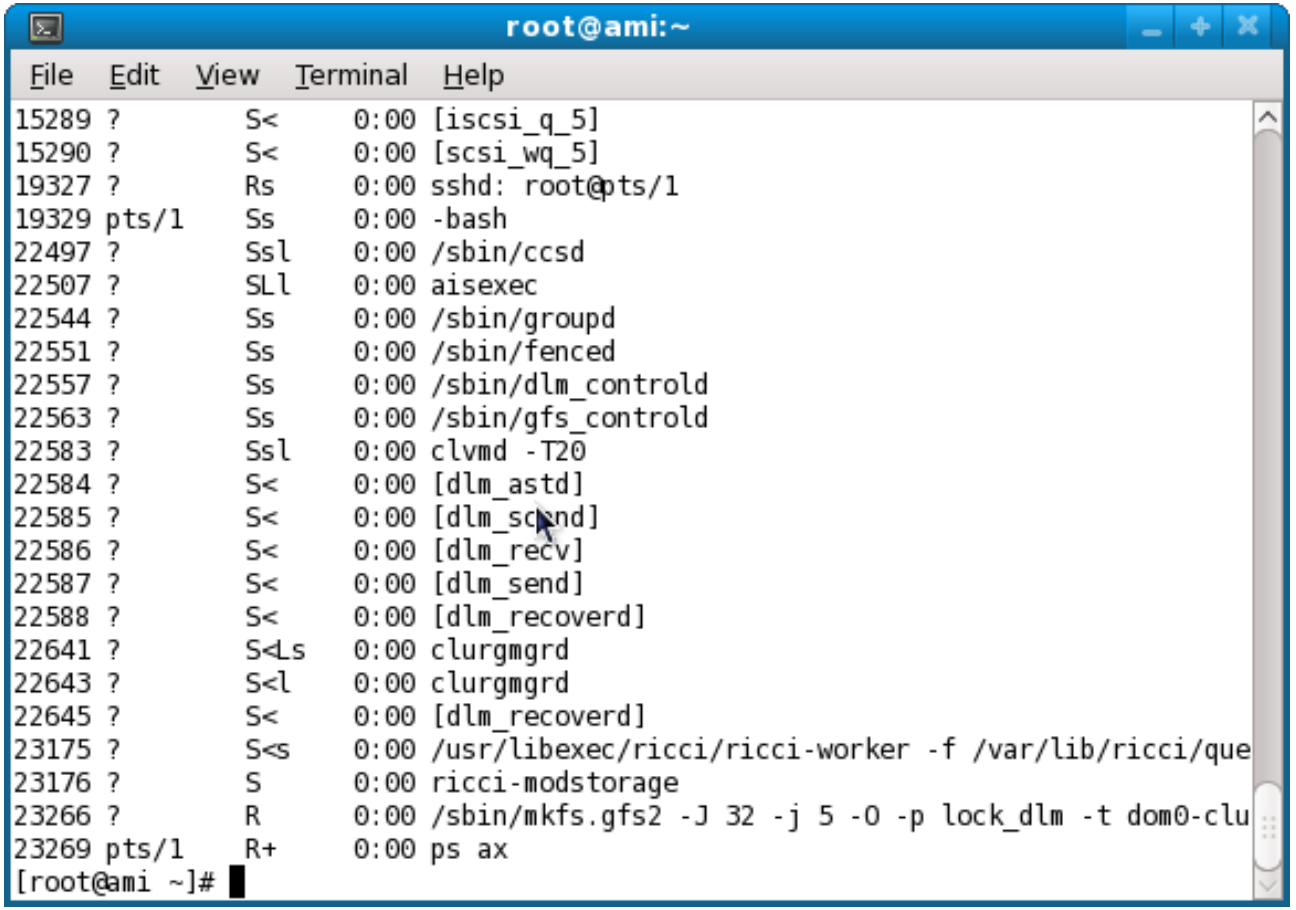

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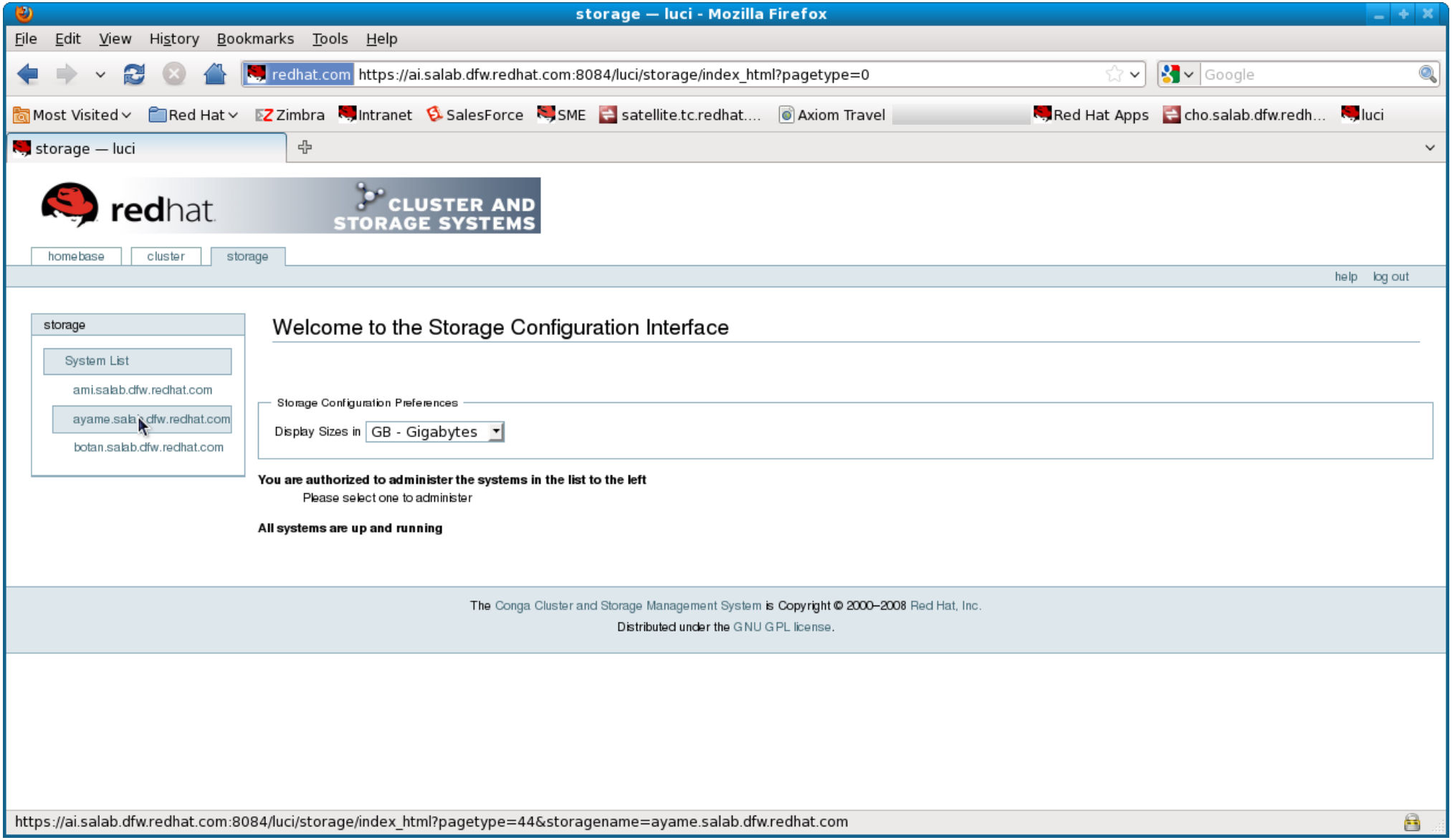
Configure Storage Using Conga

Add the mount point to the other hosts in the cluster

- Storage
- System List
- System name
- Expand VG
- Expand LV
- Fill in Mountpoint
- Fill in /etc/fstab Mountpoint



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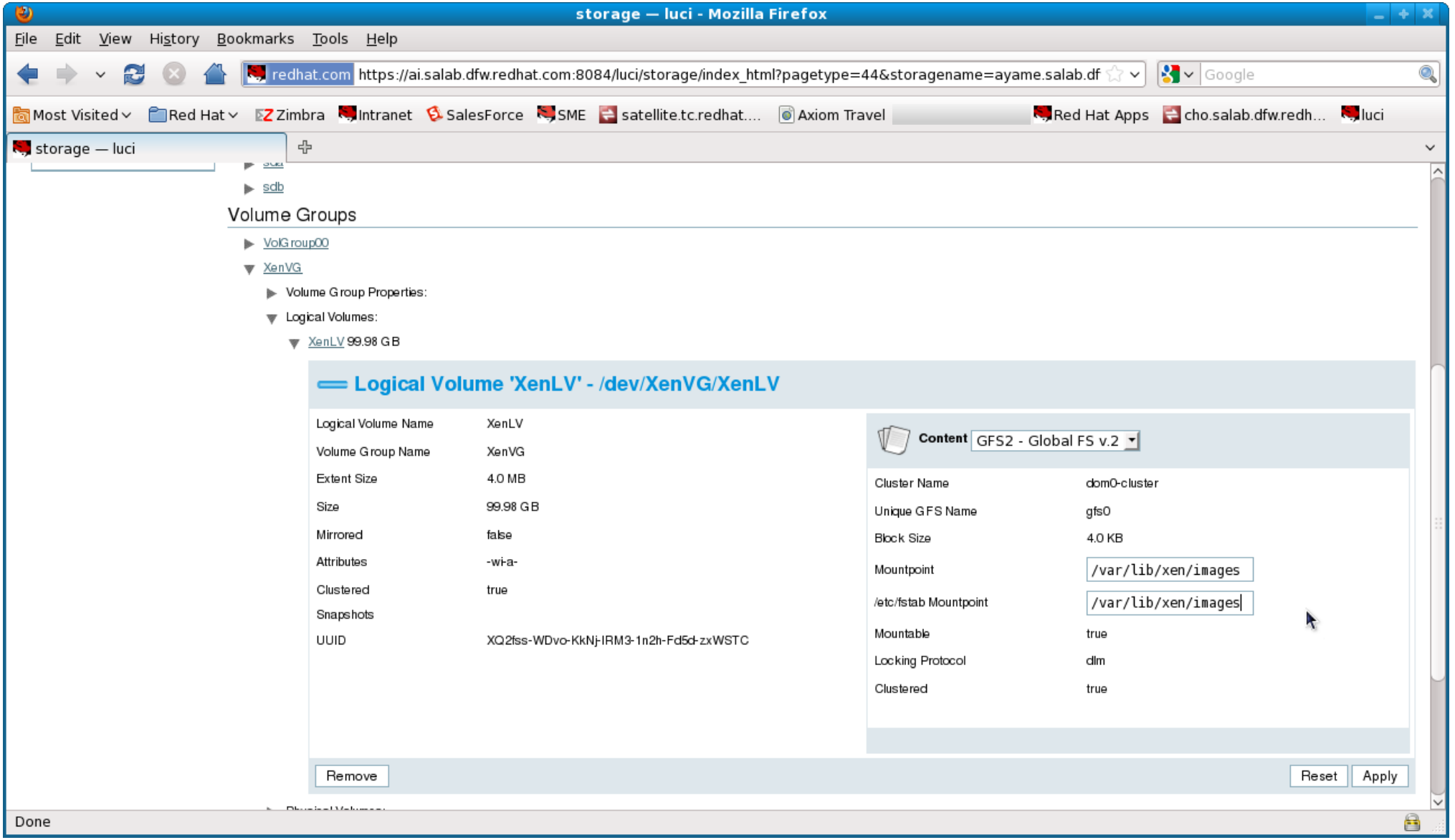

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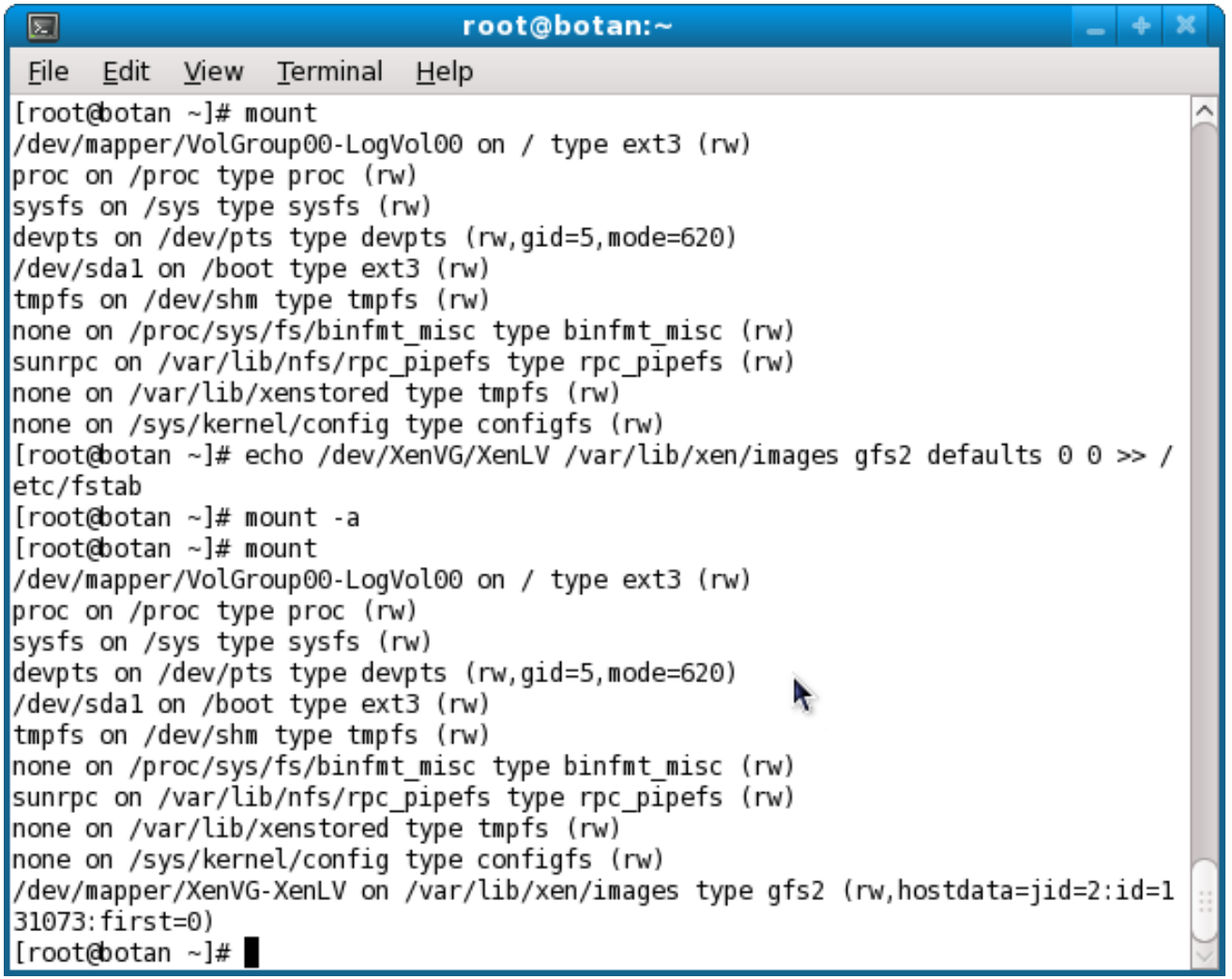
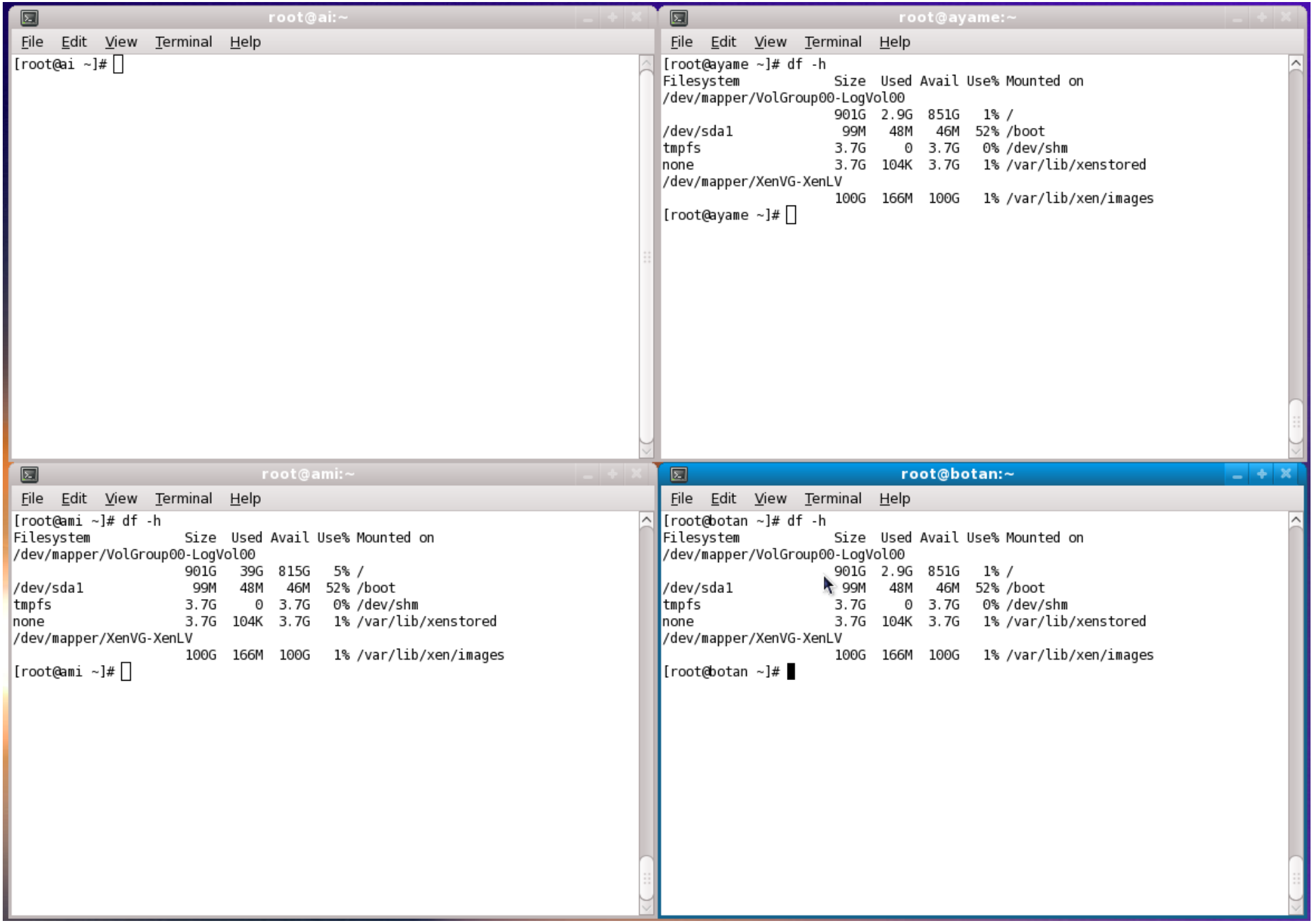
Configure Storage (alternative method)

Copy and paste the last line of /etc/fstab to the other nodes and then mount -a


root@botan:~
File Edit View Terminal Help
[root@botan ~]# mount
/dev/mapper/VolGroup00-LogVol00 on / type ext3 (rw)
proc on /proc type proc (rw)
sysfs on /sys type sysfs (rw)
devpts on /dev/pts type devpts (rw,gid=5,mode=620)
/dev/sda1 on /boot type ext3 (rw)
tmpfs on /dev/shm type tmpfs (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 /var/lib/xenstored type tmpfs (rw)
none on /sys/kernel/config type configfs (rw)
[root@botan ~]# echo /dev/XenVG/XenLV /var/lib/xen/images gfs2 defaults 0 0 >> /
etc/fstab
[root@botan ~]# mount -a
[root@botan ~]# mount
/dev/mapper/VolGroup00-LogVol00 on / type ext3 (rw)
proc on /proc type proc (rw)
sysfs on /sys type sysfs (rw)
devpts on /dev/pts type devpts (rw,gid=5,mode=620)
/dev/sda1 on /boot type ext3 (rw)
tmpfs on /dev/shm type tmpfs (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 /var/lib/xenstored type tmpfs (rw)
none on /sys/kernel/config type configfs (rw)
/dev/mapper/XenVG-XenLV on /var/lib/xen/images type gfs2 (rw,hostdata=jid=2:id=1
31073:first=0)
[root@botan ~]#

Verify Storage Availability

Something simple like a df -h on all nodes is fine.



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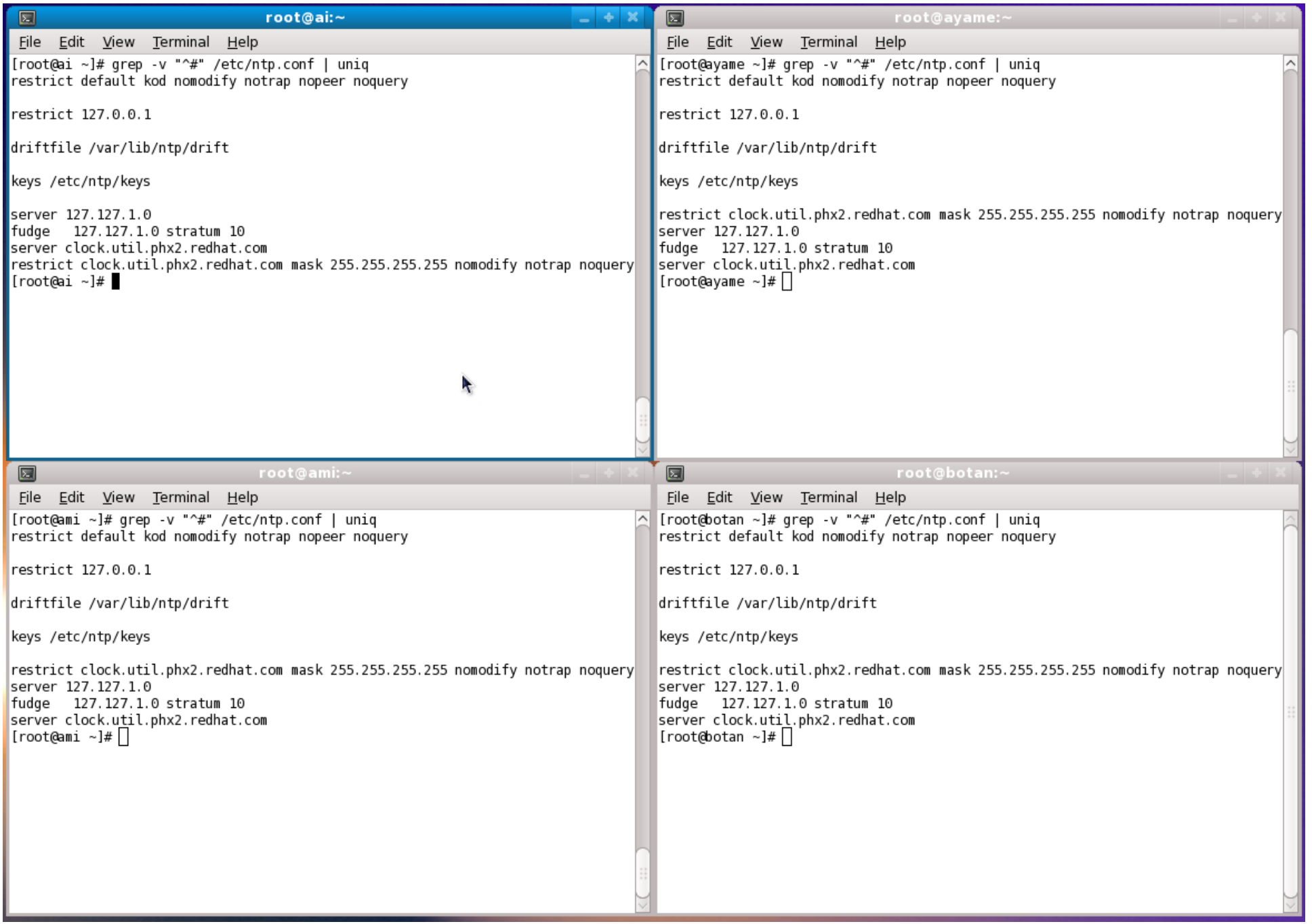
Prepare dom0 machines for live migration

Make sure that time is synced across all of the dom0 machines.

You **must** use something like NTP. Even if you just set up the management server as an NTP server, the dom0 times **must** be synced for live migration to work right!



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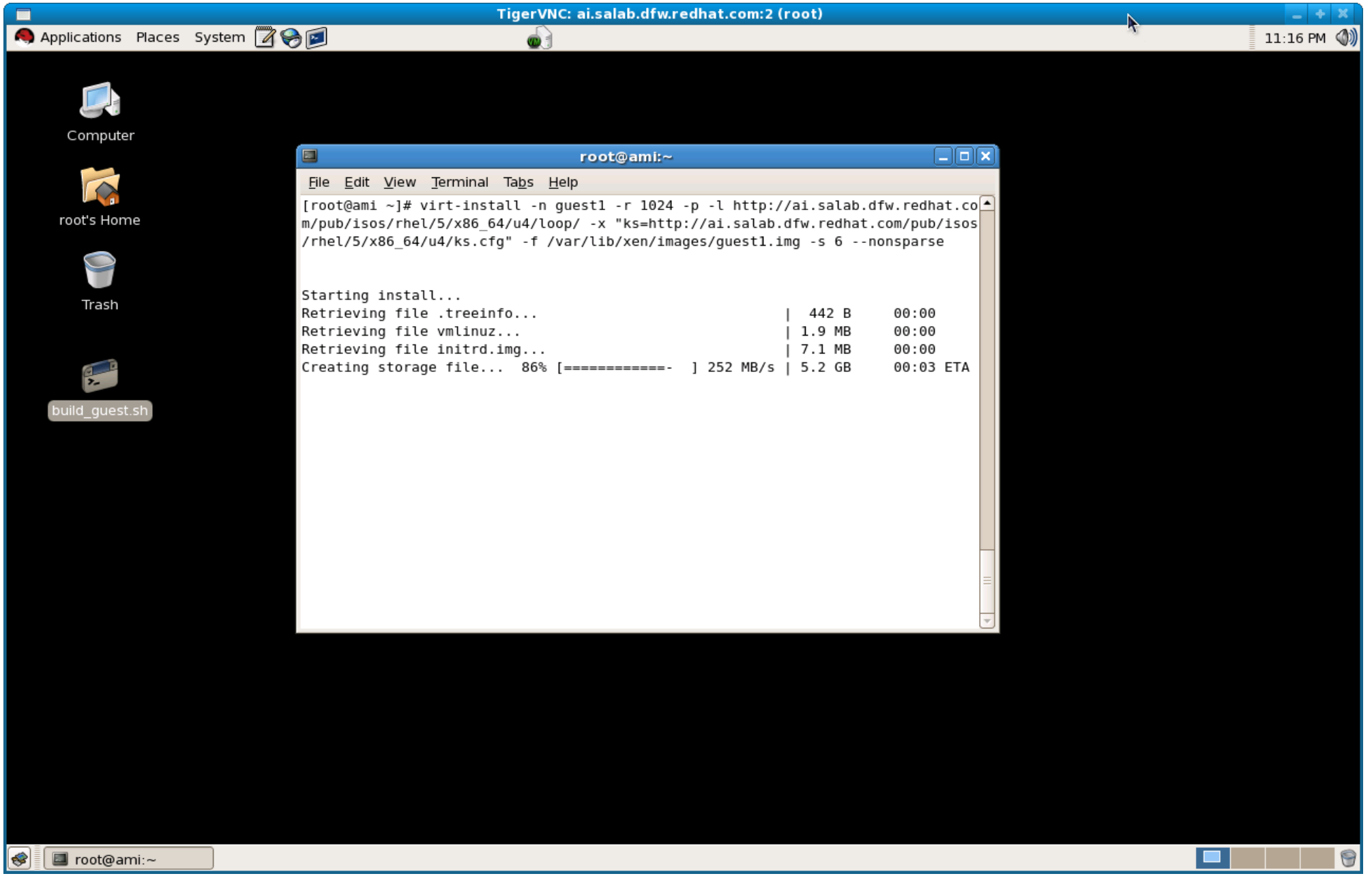
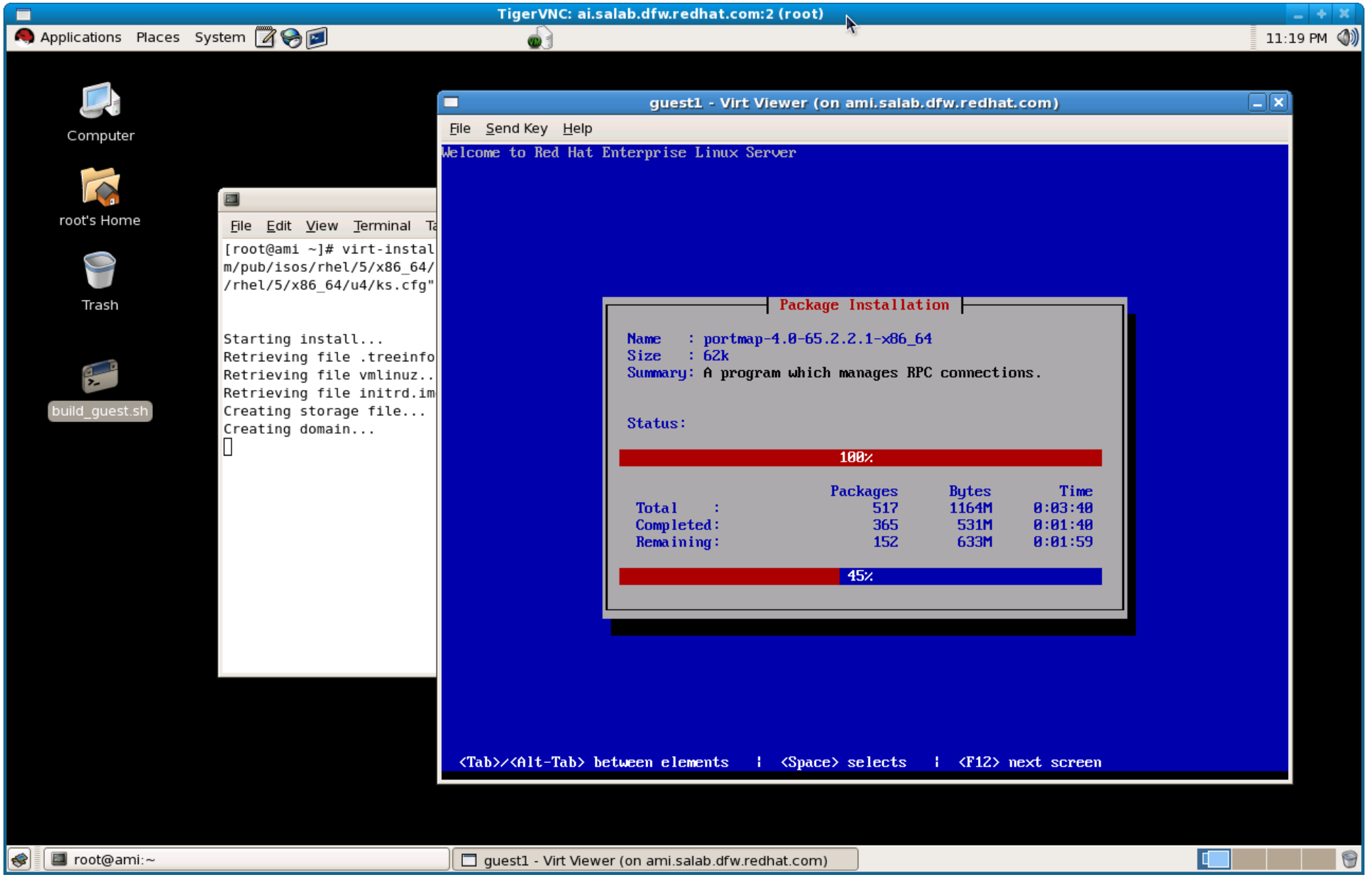
Install Virtual Machines

Use virt-manager or virt-install

The following is a single command, separated here for easier viewing:

```
virt-install -n guest1 -r 1024 -p \
 -l http://ai.salab.dfw.redhat.com/pub/isos/rhel/5/x86_64/u4/loop/ \
 -x "ks=http://ai.salab.dfw.redhat.com/pub/isos/rhel/5/x86_64/u4/ks.cfg" \
 -f /var/lib/xen/images/guest1.img -s 6 --nonsparse
                                        ^^^^^^^^^^
```


TigerVNC: ai.salab.dfw.redhat.com:2 (root)
Applications
Places
System
11:16 PM
Computer
root's Home
Trash
build_guest.sh
root@ami:~
File Edit View Terminal Tabs Help
[root@ami ~]# virt-install -n guest1 -r 1024 -p -l http://ai.salab.dfw.redhat.com/pub/isos/rhel/5/x86_64/u4/loop/ -x "ks=http://ai.salab.dfw.redhat.com/pub/isos/rhel/5/x86_64/u4/ks.cfg" -f /var/lib/xen/images/guest1.img -s 6 --nonsparse
Starting install...
Retrieving file .treeinfo... | 442 B 00:00
Retrieving file vmlinuz... | 1.9 MB 00:00
Retrieving file initrd.img... | 7.1 MB 00:00
Creating storage file... 86% [==========-] 252 MB/s | 5.2 GB 00:03 ETA
root@ami:~


TigerVNC: ai.salab.dfw.redhat.com:2 (root)
Applications Places System
11:19 PM
Computer
root's Home
Trash
build_guest.sh
File Edit View Terminal Ta
[root@ami ~]# virt-instal
m/pub/isos/rhel/5/x86_64/
/rhel/5/x86_64/u4/ks.cfg"
Starting install...
Retrieving file .treeinfo
Retrieving file vmlinuz..
Retrieving file initrd.im
Creating storage file...
Creating domain...
guest1 - Virt Viewer (on ami.salab.dfw.redhat.com)
File Send Key Help
Welcome to Red Hat Enterprise Linux Server
Package Installation
Name : portmap-4.0-65.2.2.1-x86_64
Size : 62k
Summary: A program which manages RPC connections.
Status:
100%
Packages Bytes Time
Total : 517 1164M 0:03:40
Completed: 365 531M 0:01:40
Remaining: 152 633M 0:01:59
45%
<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen
root@ami:~
guest1 - Virt Viewer (on ami.salab.dfw.redhat.com)

Prepare all dom0 machines for live migration

In the /etc/xend-config.sxp file set the following:

(xend-relocation-server yes)

(xend-relocation-port 8002)

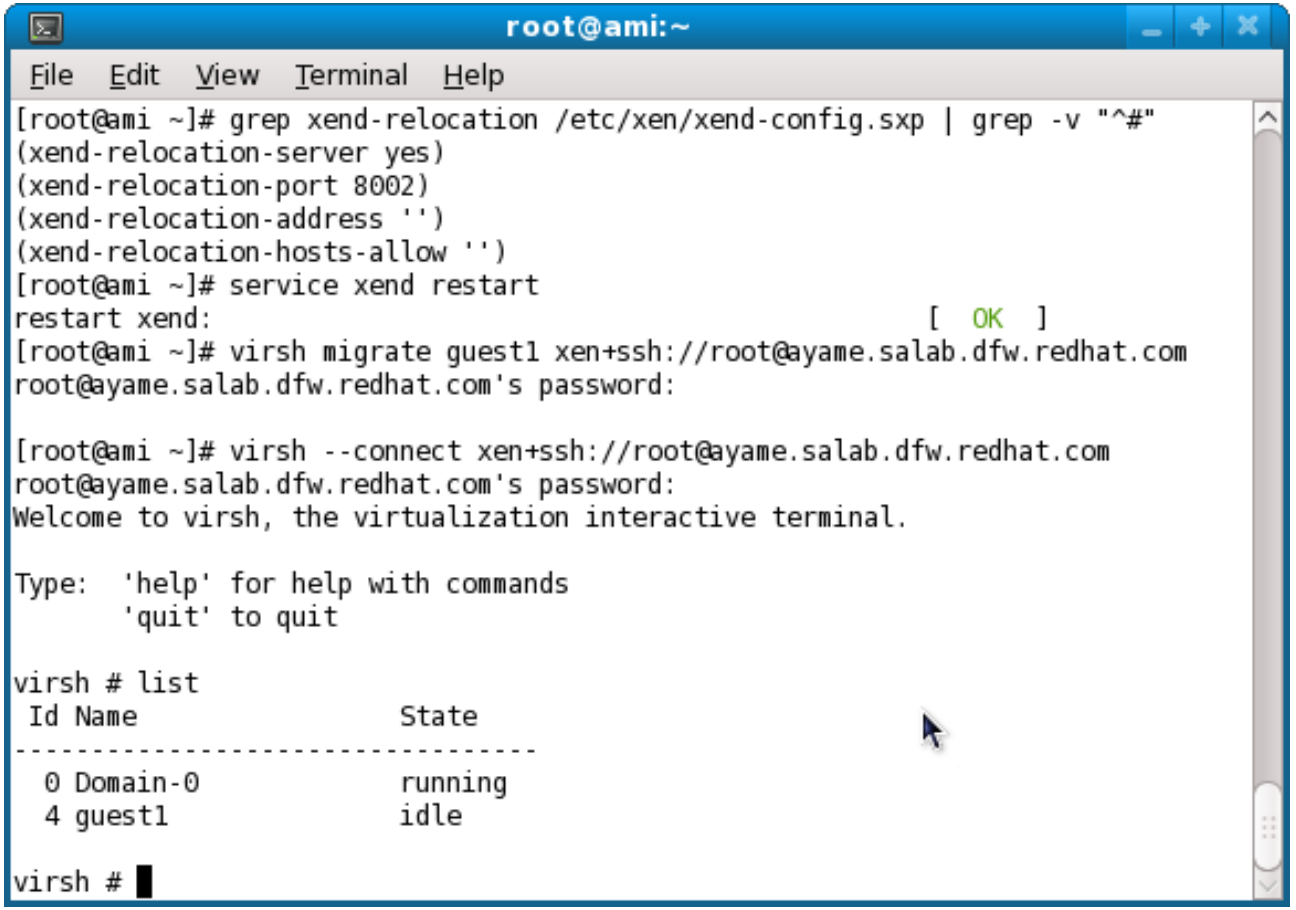
(xend-relocation-address '')

(xend-relocation-hosts-allow '')

Restart the xend service

Test live migration

```
virsh migrate guest1 \ xen
  +ssh://root@ayame.salab.dfw.redhat.com
```

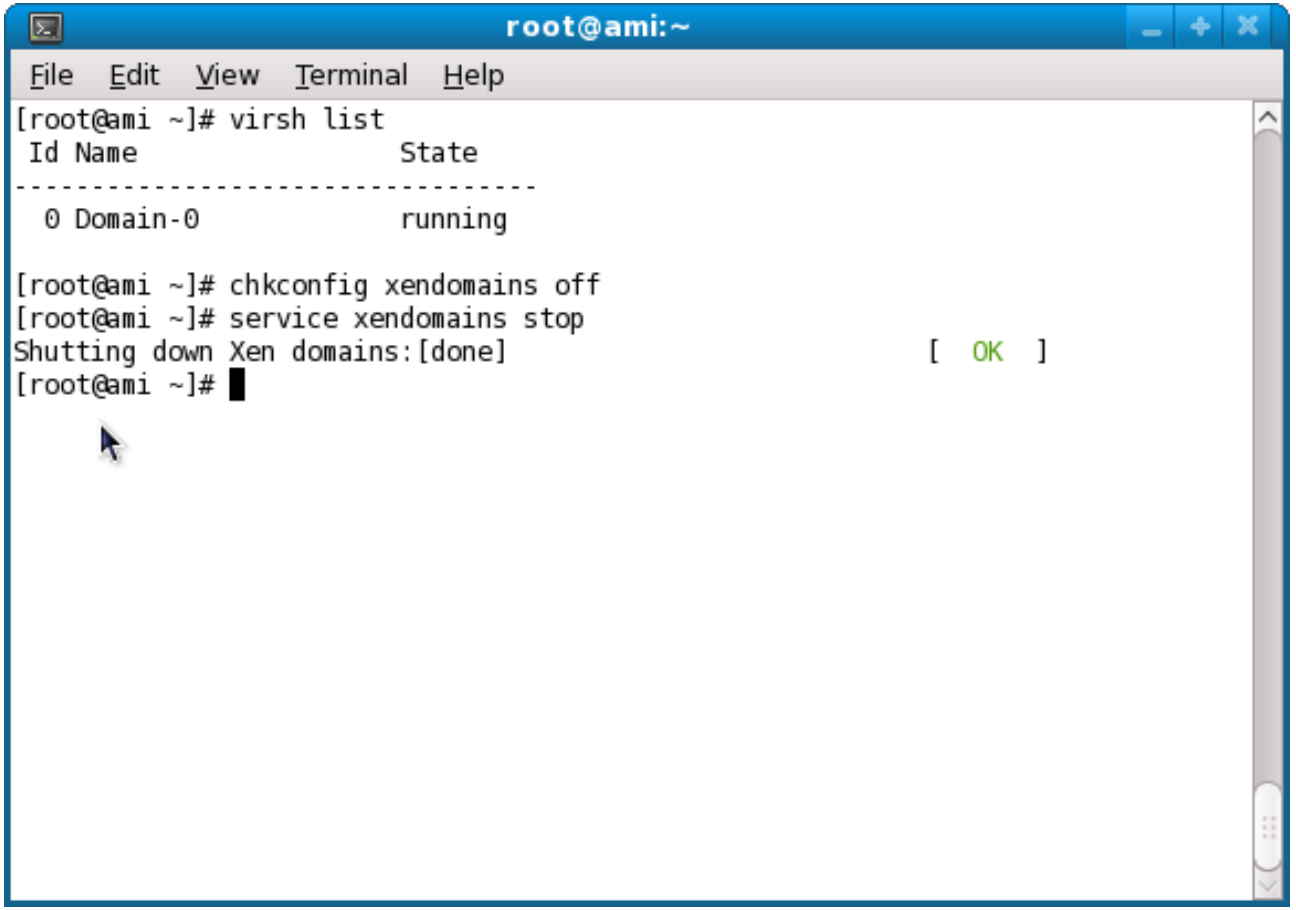

root@ami:~
File Edit View Terminal Help
[root@ami ~]# grep xend-relocation /etc/xen/xend-config.sxp | grep -v "^#"
(xend-relocation-server yes)
(xend-relocation-port 8002)
(xend-relocation-address '')
(xend-relocation-hosts-allow '')
[root@ami ~]# service xend restart
restart xend: [OK]
[root@ami ~]# virsh migrate guest1 xen+ssh://root@ayame.salab.dfw.redhat.com
root@ayame.salab.dfw.redhat.com's password:
[root@ami ~]# virsh --connect xen+ssh://root@ayame.salab.dfw.redhat.com
root@ayame.salab.dfw.redhat.com's password:
Welcome to virsh, the virtualization interactive terminal.
Type: 'help' for help with commands
'quit' to quit
virsh # list
Id Name State
0 Domain-0 running
4 guest1 idle
virsh #

Prepare dom0 machines for live migration

Stop all the guests

chkconfig xendomains off

service xendomains stop


root@ami:~
File Edit View Terminal Help
[root@ami ~]# virsh list
Id Name State
0 Domain-0 running
[root@ami ~]# chkconfig xendomains off
[root@ami ~]# service xendomains stop
Shutting down Xen domains:[done] [OK]
[root@ami ~]#

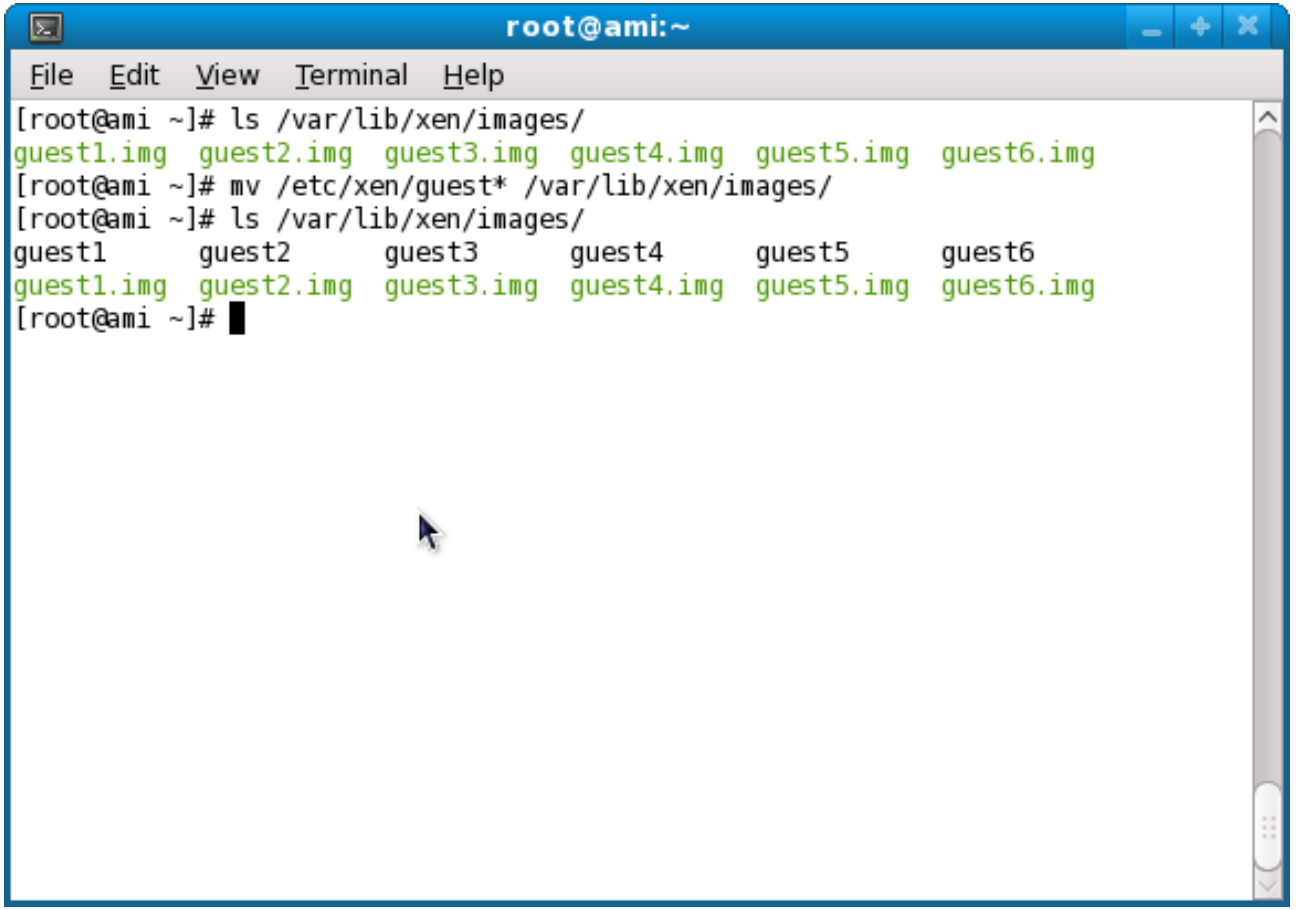
Prepare dom0 machines for live migration

Normally you would move the config files etc /etc/xen to shared storage (/var/lib/xen/images on each dom0), but there is a bug in the beta version of RHEL 5.4, BZ 519786.

Either:

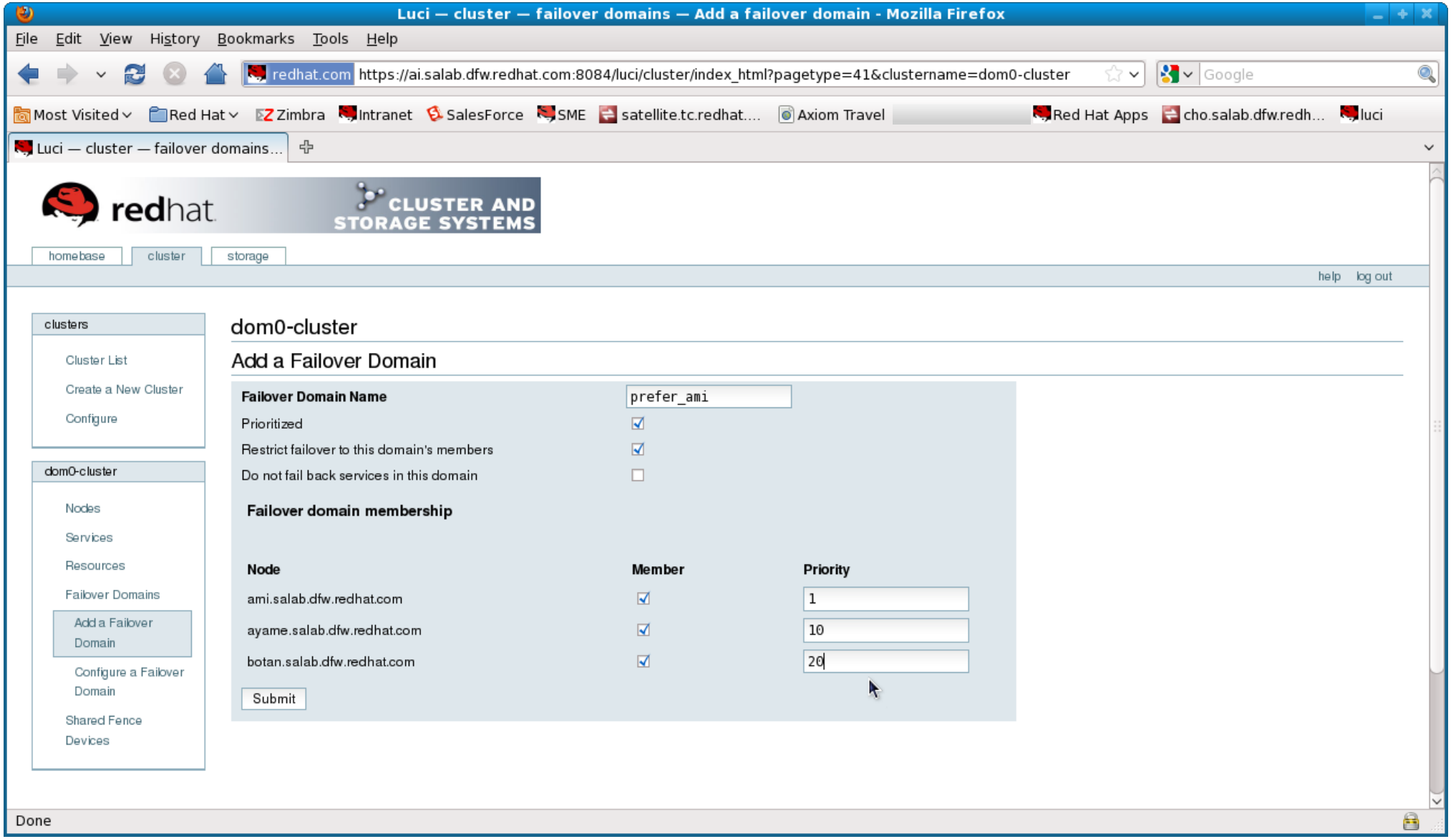
- use the vm.sh from the BZ
- copy all of the domU config files to /etc/xen on all of the nodes
- symlink the configs from /etc/xen/[guest] to /var/lib/xen/images/[guest] on all the nodes.

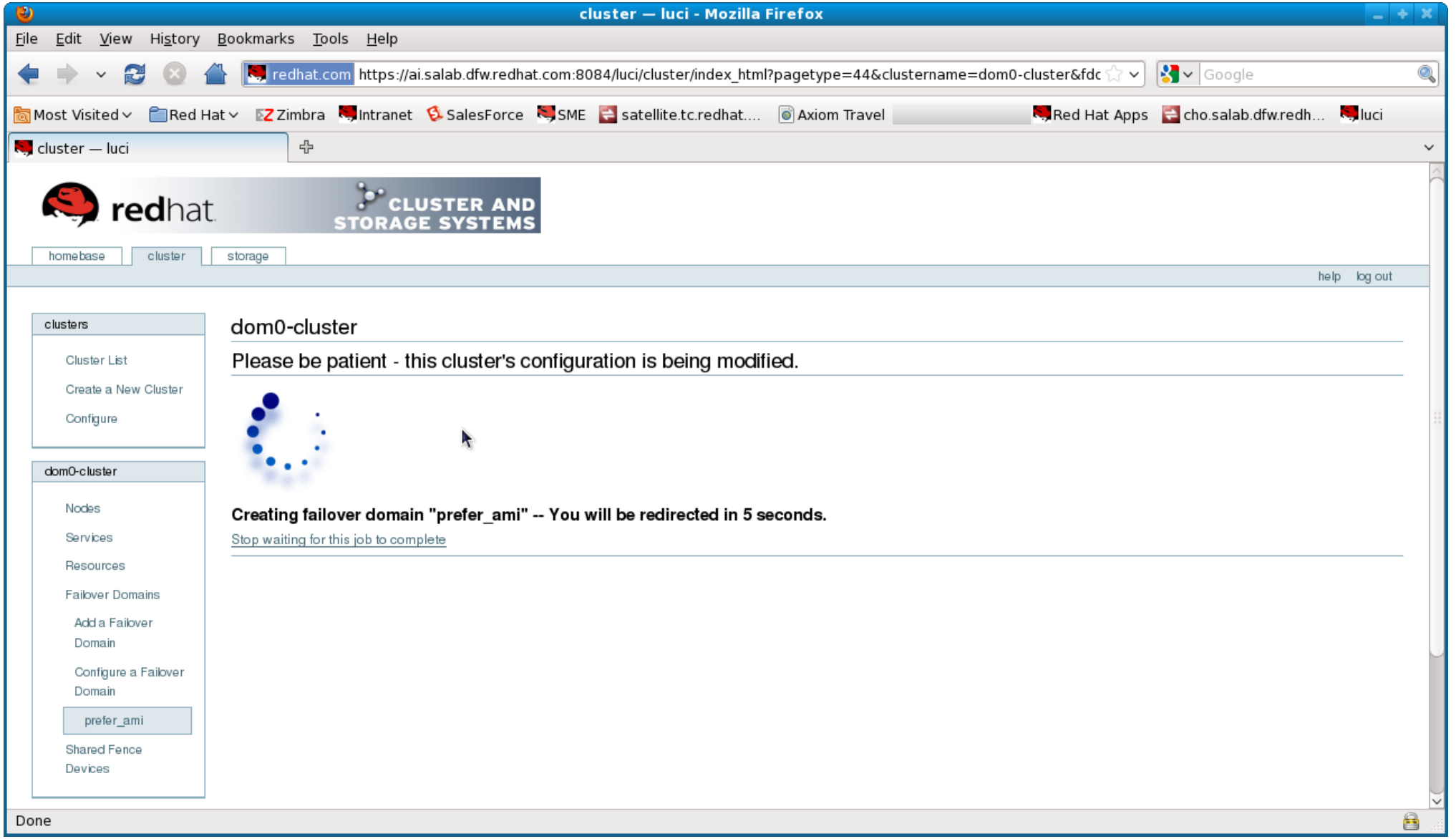
For this presentation, I used the vm.sh from the BZ and moved all the configs to shared storage


root@ami:~
File Edit View Terminal Help
[root@ami ~]# ls /var/lib/xen/images/
guest1.img guest2.img guest3.img guest4.img guest5.img guest6.img
[root@ami ~]# mv /etc/xen/guest* /var/lib/xen/images/
[root@ami ~]# ls /var/lib/xen/images/
guest1 guest2 guest3 guest4 guest5 guest6
guest1.img guest2.img guest3.img guest4.img guest5.img guest6.img
[root@ami ~]#

Configure Failover Domains

- Cluster tab
- Cluster Name
- Failover Domains
- Add Failover Domain
  - FD Name
  - Check “Prioritized“
  - Check “Restrict failover to this domain's members”
  - Do not check “Do not fail back services...”
  - Assign members and priorities
  - Submit


Luci — cluster — failover domains — Add a failover domain - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=41&clustername=dom0-cluster
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — failover domains...
redhat
CLUSTER AND STORAGE SYSTEMS
homebase cluster storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
dom0-cluster
Nodes
Services
Resources
Failover Domains
Add a Failover Domain
Configure a Failover Domain
Shared Fence Devices
dom0-cluster
Add a Failover Domain
Failover Domain Name
prefer_ami
Prioritized
Restrict failover to this domain's members
Do not fail back services in this domain
Failover domain membership
Node
Member
Priority
ami.salab.dfw.redhat.com
1
ayame.salab.dfw.redhat.com
10
botan.salab.dfw.redhat.com
20
Submit
Done



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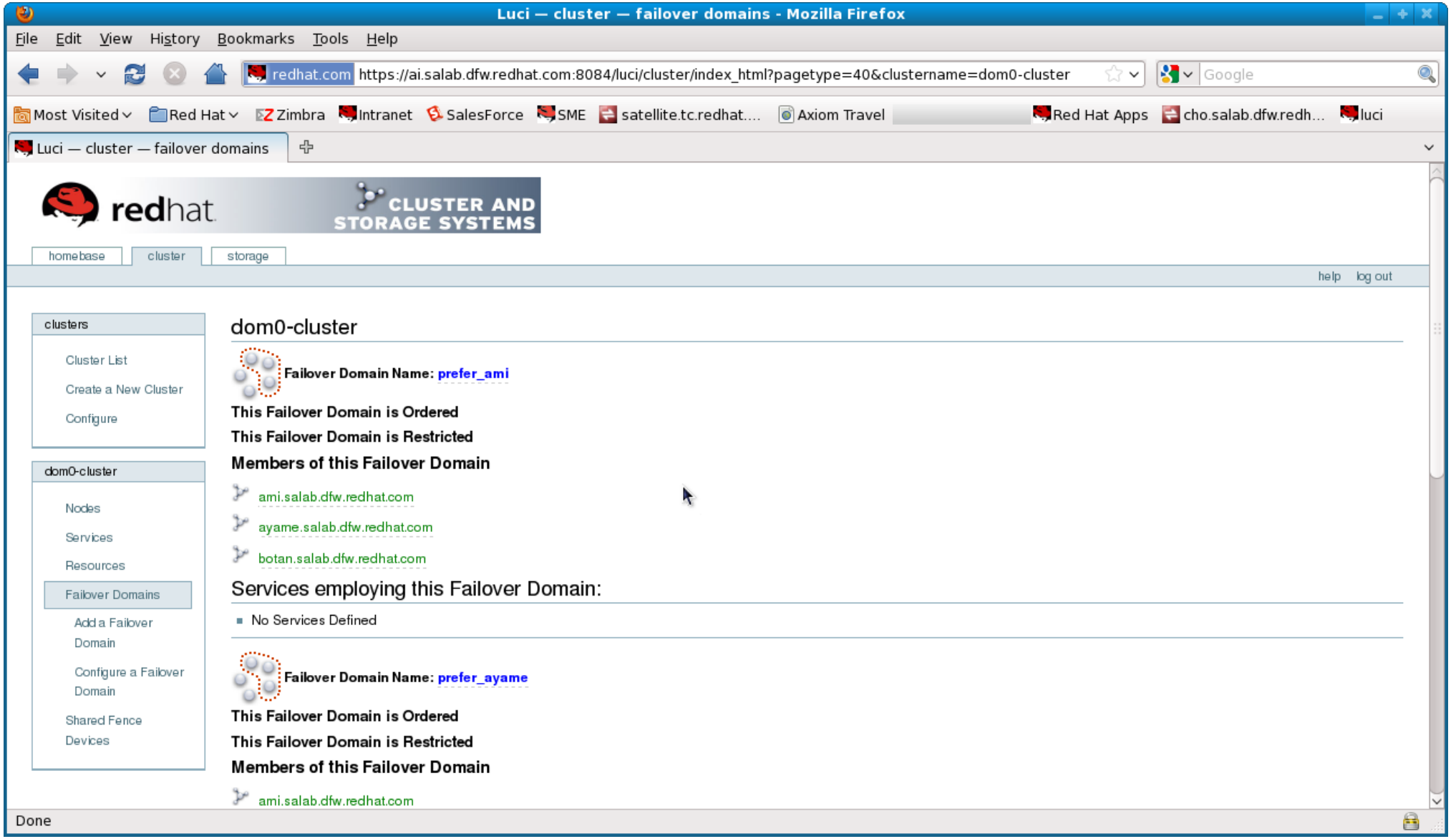
Configure Failover Domains

Create a domain for each dom0.

- prefer_ami
  - ami 1, ayame 10, botan 20
- prefer_ayame
  - ayame 1, botan 10, ami 20
- prefer_botan
  - botan 1, ami 10, ayame 20


Luci — cluster — failover domains - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=40&clustername=dom0-cluster
Luci — cluster — failover domains
redhat
CLUSTER AND STORAGE SYSTEMS
homebase
cluster
storage
help
log out
clusters
Cluster List
Create a New Cluster
Configure
dom0-cluster
Nodes
Services
Resources
Failover Domains
Add a Failover Domain
Configure a Failover Domain
Shared Fence Devices
dom0-cluster
Failover Domain Name: prefer_ami
This Failover Domain is Ordered
This Failover Domain is Restricted
Members of this Failover Domain
ami.salab.dfw.redhat.com
ayame.salab.dfw.redhat.com
botan.salab.dfw.redhat.com
Services employing this Failover Domain:
No Services Defined
Failover Domain Name: prefer_ayame
This Failover Domain is Ordered
This Failover Domain is Restricted
Members of this Failover Domain
ami.salab.dfw.redhat.com
Done

Define Virtual Machine Services

Cluster Tab

Cluster Name

Services

Add Virtual Machine Service

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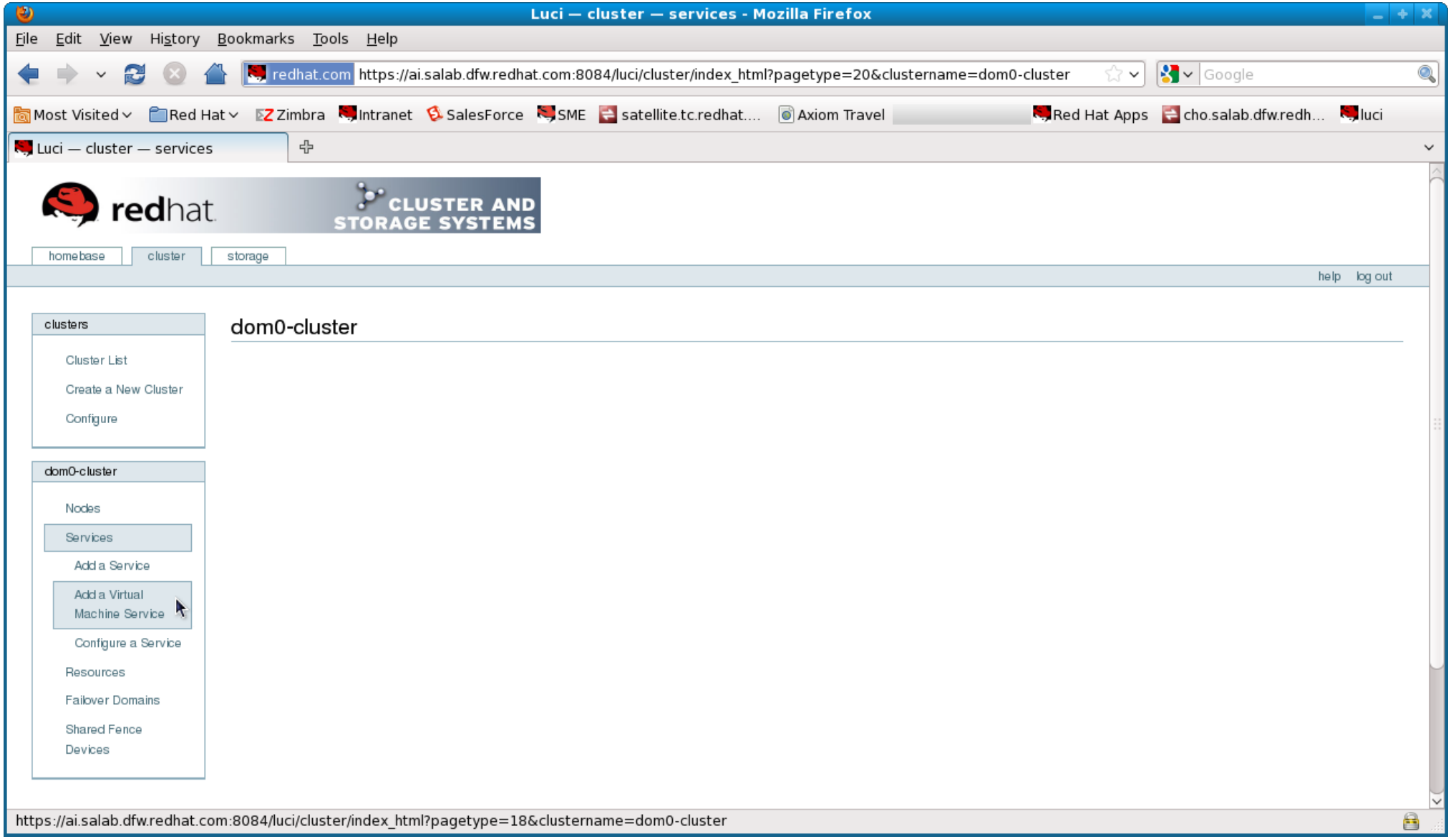
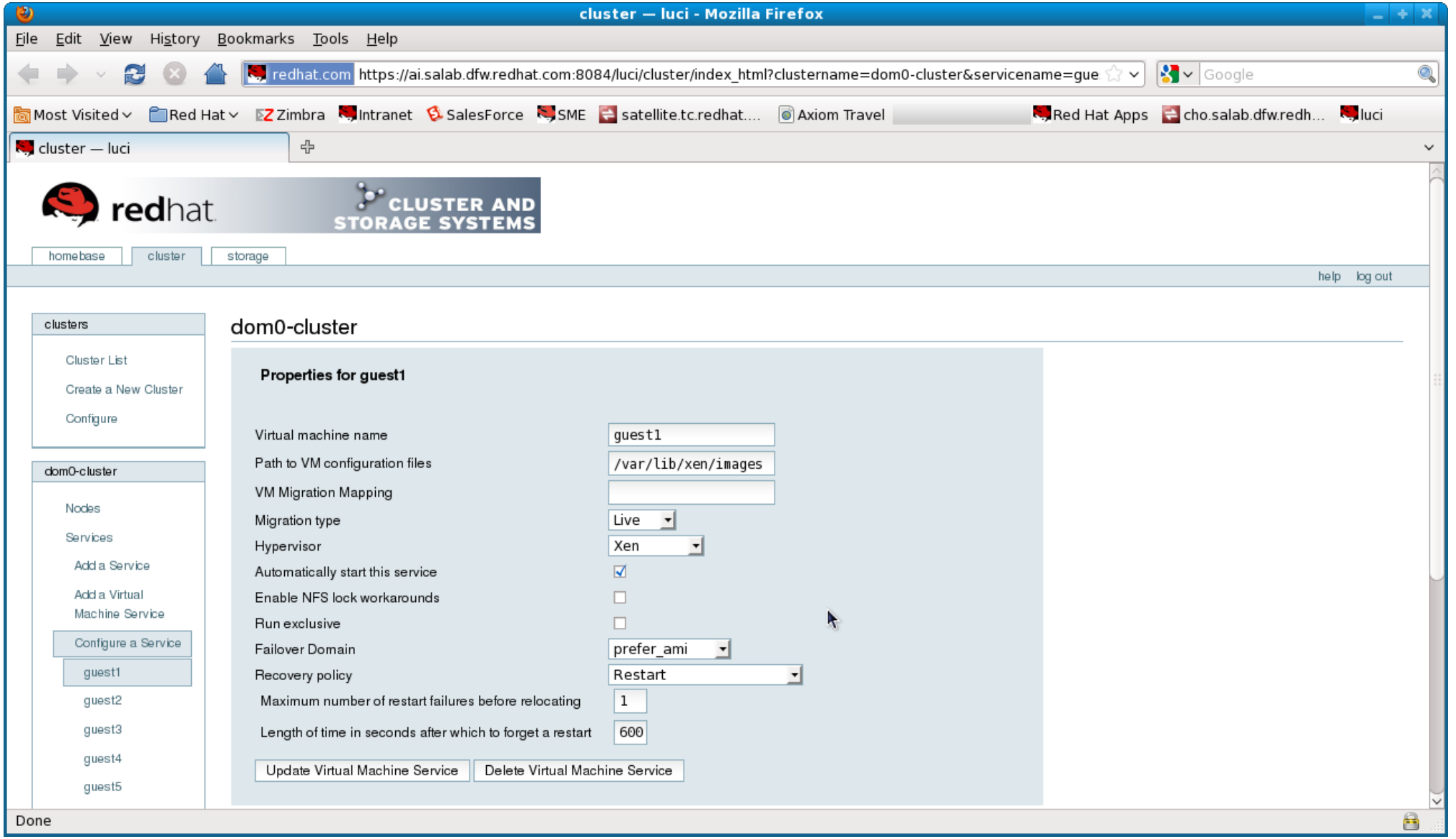
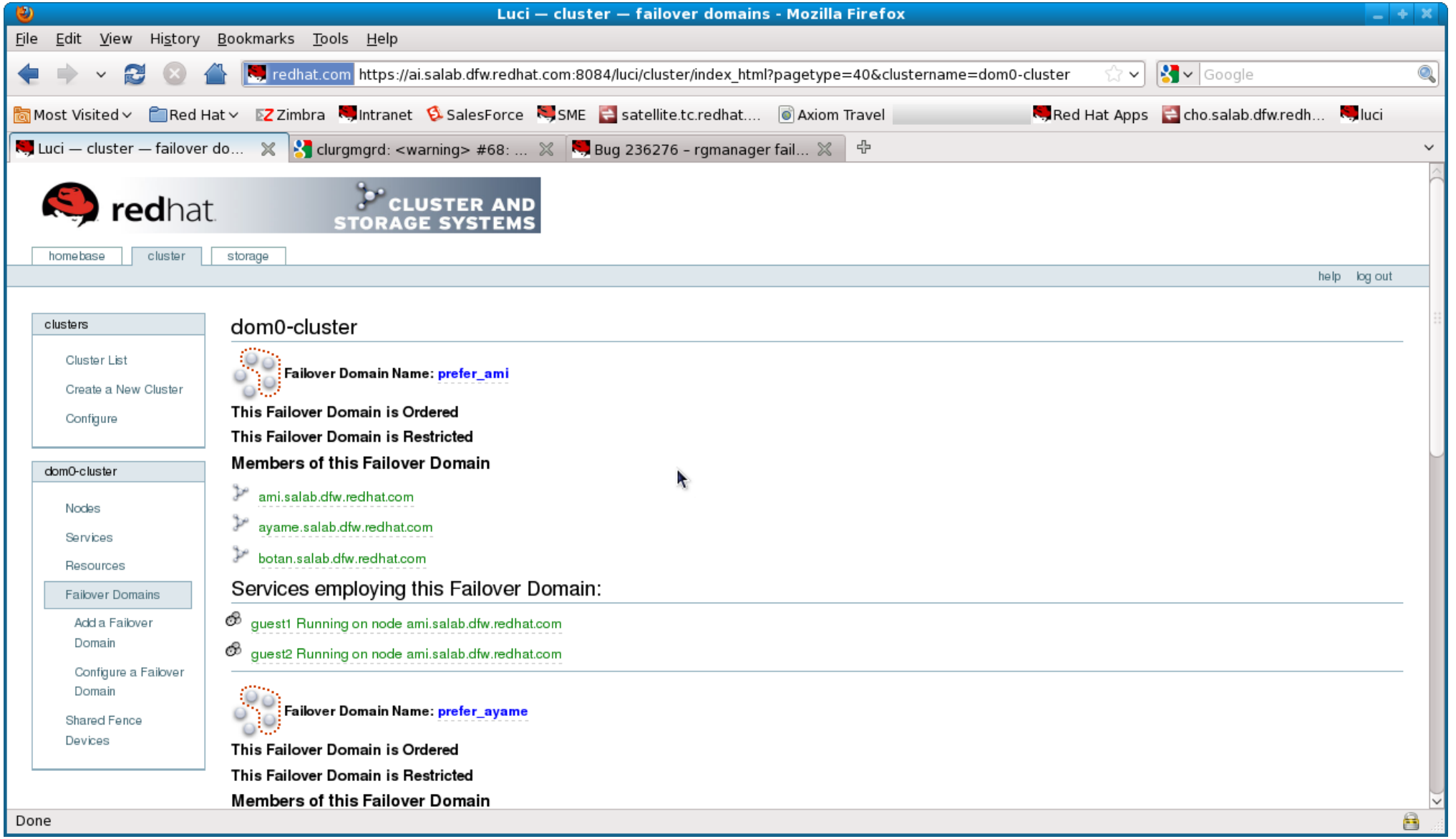

Luci — cluster — services - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=20&clustername=dom0-cluster
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — services
redhat
CLUSTER AND STORAGE SYSTEMS
homebase cluster storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
dom0-cluster
Nodes
Services
Add a Service
Add a Virtual Machine Service
Configure a Service
Resources
Failover Domains
Shared Fence Devices
dom0-cluster
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=18&clustername=dom0-cluster


cluster — luci - Mozilla Firefox
File Edit View History Bookmarks Tools Help
redhat.com https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?clustername=dom0-cluster&servicename=gue
Google
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
cluster — luci
redhat
CLUSTER AND STORAGE SYSTEMS
homebase cluster storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
dom0-cluster
Nodes
Services
Add a Service
Add a Virtual Machine Service
Configure a Service
guest1
guest2
guest3
guest4
guest5
dom0-cluster
Properties for guest1
Virtual machine name guest1
Path to VM configuration files /var/lib/xen/images
VM Migration Mapping
Migration type Live
Hypervisor Xen
Automatically start this service
Enable NFS lock workarounds
Run exclusive
Failover Domain prefer_ami
Recovery policy Restart
Maximum number of restart failures before relocating 1
Length of time in seconds after which to forget a restart 600
Update Virtual Machine Service
Delete Virtual Machine Service
Done

Define Virtual Machine Services

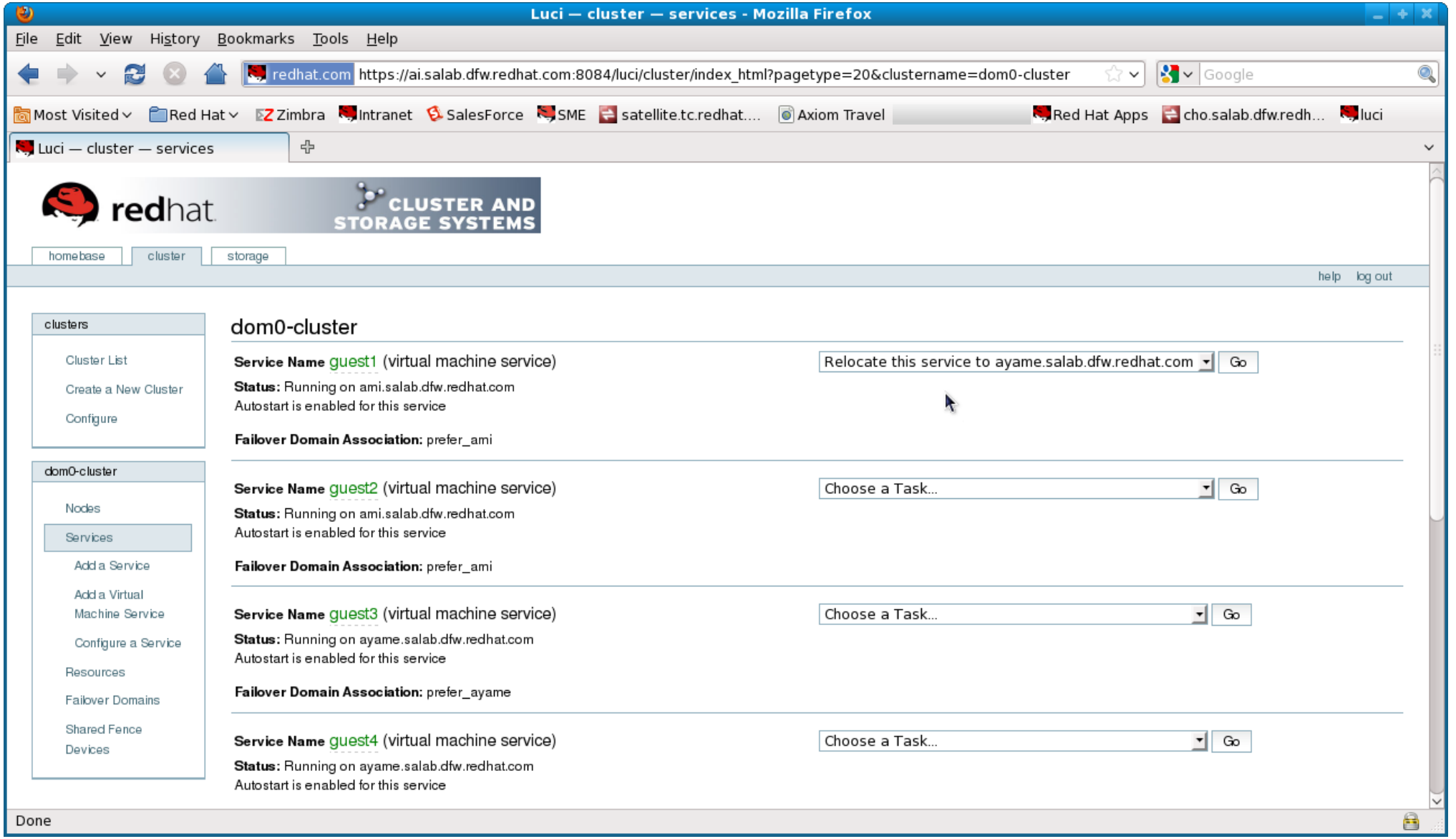
Repeat for each VM Service

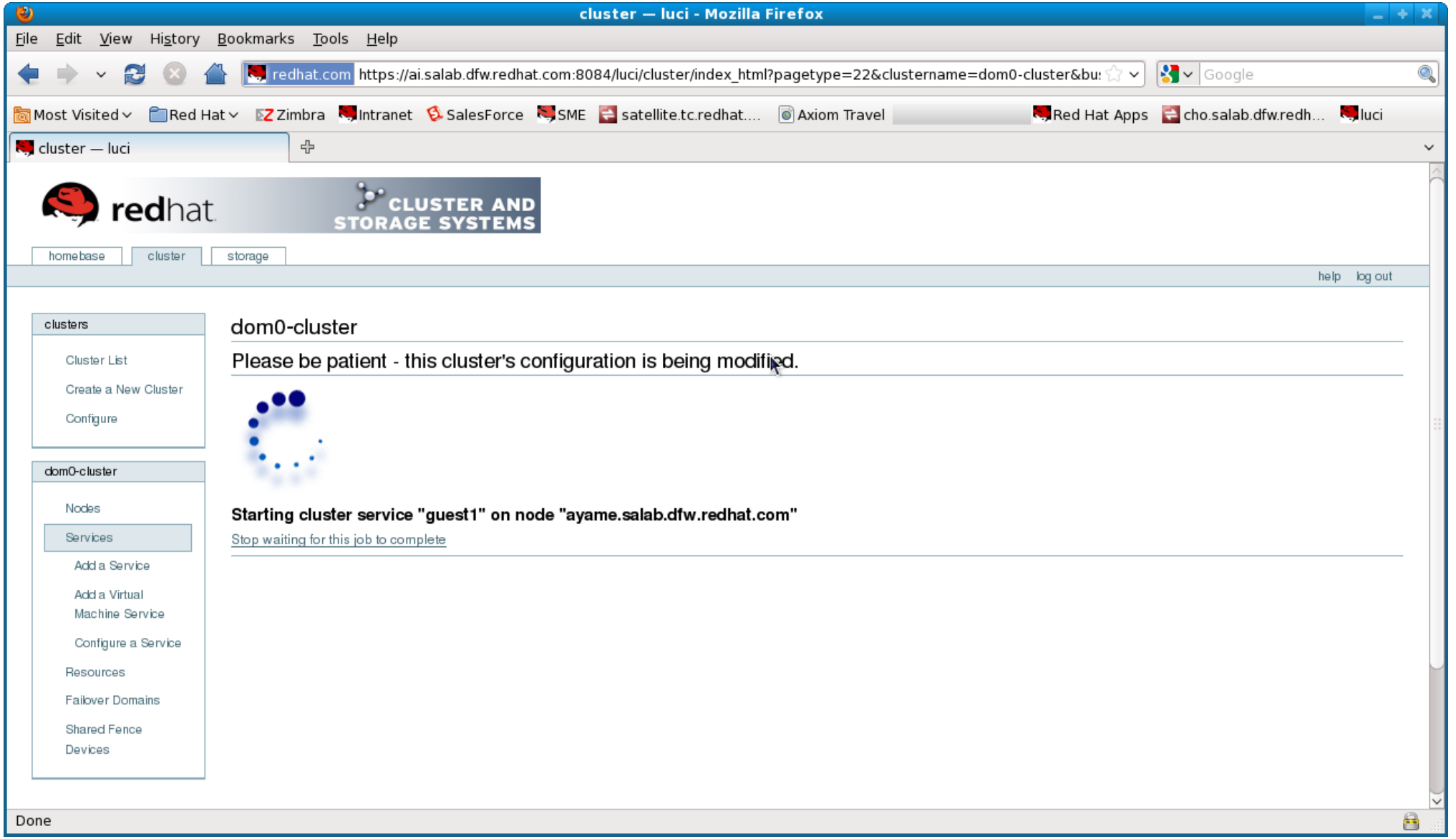
In this example, two VM Services are assigned to each failover domain - this equates to two machines starting on ai, two on ayame and two on botan


Luci — cluster — failover domains - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=40&clustername=dom0-cluster
Luci — cluster — failover do...
clurgmgrd: <warning> #68: ...
Bug 236276 – rgmanager fail...
redhat
CLUSTER AND STORAGE SYSTEMS
homebase
cluster
storage
help
log out
clusters
Cluster List
Create a New Cluster
Configure
dom0-cluster
Nodes
Services
Resources
Failover Domains
Add a Failover Domain
Configure a Failover Domain
Shared Fence Devices
dom0-cluster
Failover Domain Name: prefer_ami
This Failover Domain is Ordered
This Failover Domain is Restricted
Members of this Failover Domain
ami.salab.dfw.redhat.com
ayame.salab.dfw.redhat.com
botan.salab.dfw.redhat.com
Services employing this Failover Domain:
guest1 Running on node ami.salab.dfw.redhat.com
guest2 Running on node ami.salab.dfw.redhat.com
Failover Domain Name: prefer_ayame
This Failover Domain is Ordered
This Failover Domain is Restricted
Members of this Failover Domain
Done

Test virtual machine management services

- Cluster Tab
- Cluster Name
- Services
- Choose an action for one of the machines from the drop down menu
- Go and confirm


Luci — cluster — services - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=20&clustername=dom0-cluster
Luci — cluster — services
redhat
CLUSTER AND STORAGE SYSTEMS
homebase cluster storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
dom0-cluster
Nodes
Services
Add a Service
Add a Virtual Machine Service
Configure a Service
Resources
Failover Domains
Shared Fence Devices
dom0-cluster
Service Name guest1 (virtual machine service)
Status: Running on ami.salab.dfw.redhat.com
Autostart is enabled for this service
Failover Domain Association: prefer_ami
Relocate this service to ayame.salab.dfw.redhat.com
Go
Service Name guest2 (virtual machine service)
Status: Running on ami.salab.dfw.redhat.com
Autostart is enabled for this service
Failover Domain Association: prefer_ami
Choose a Task...
Go
Service Name guest3 (virtual machine service)
Status: Running on ayame.salab.dfw.redhat.com
Autostart is enabled for this service
Failover Domain Association: prefer_ayame
Choose a Task...
Go
Service Name guest4 (virtual machine service)
Status: Running on ayame.salab.dfw.redhat.com
Autostart is enabled for this service
Choose a Task...
Go
Done



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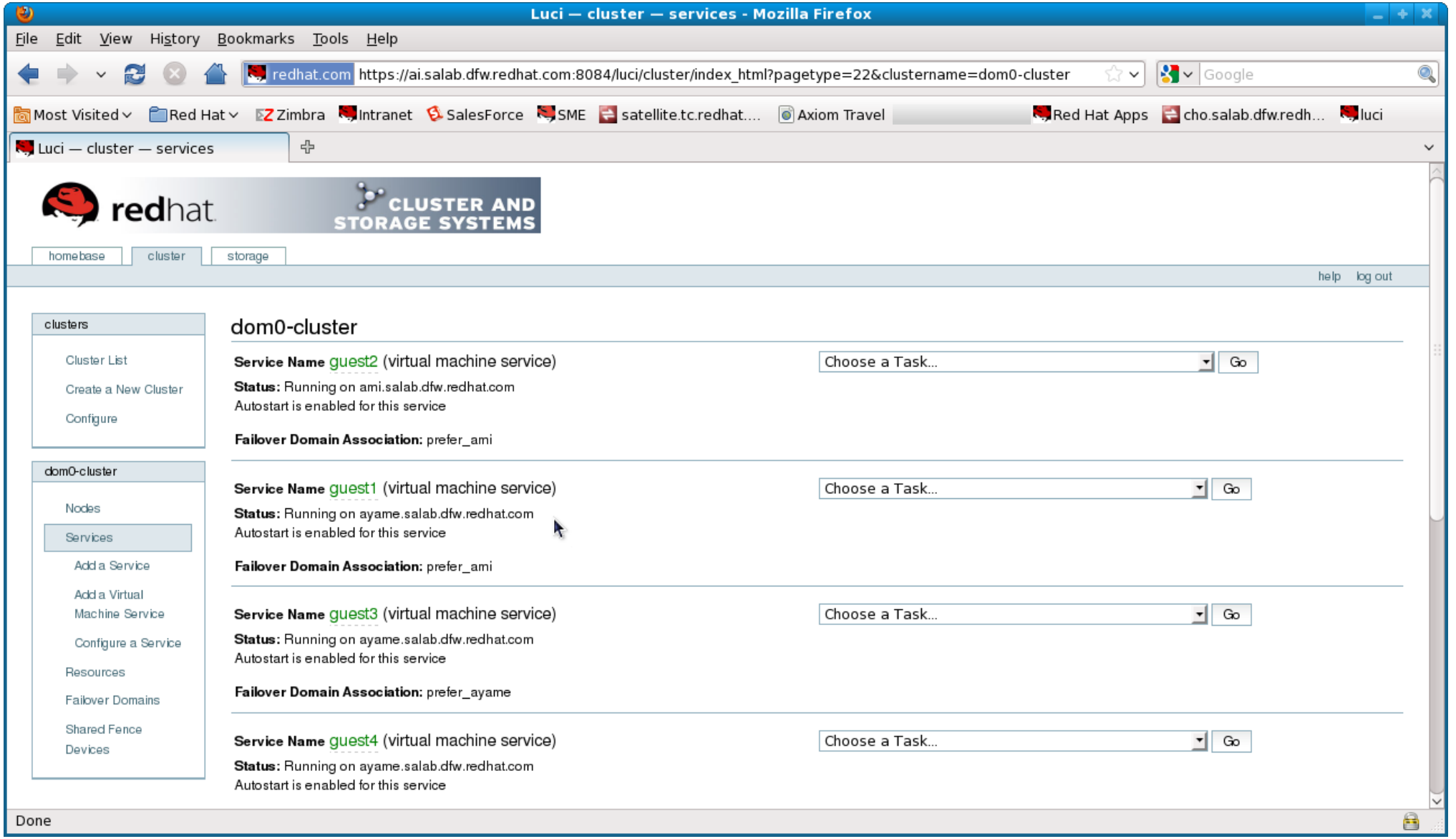

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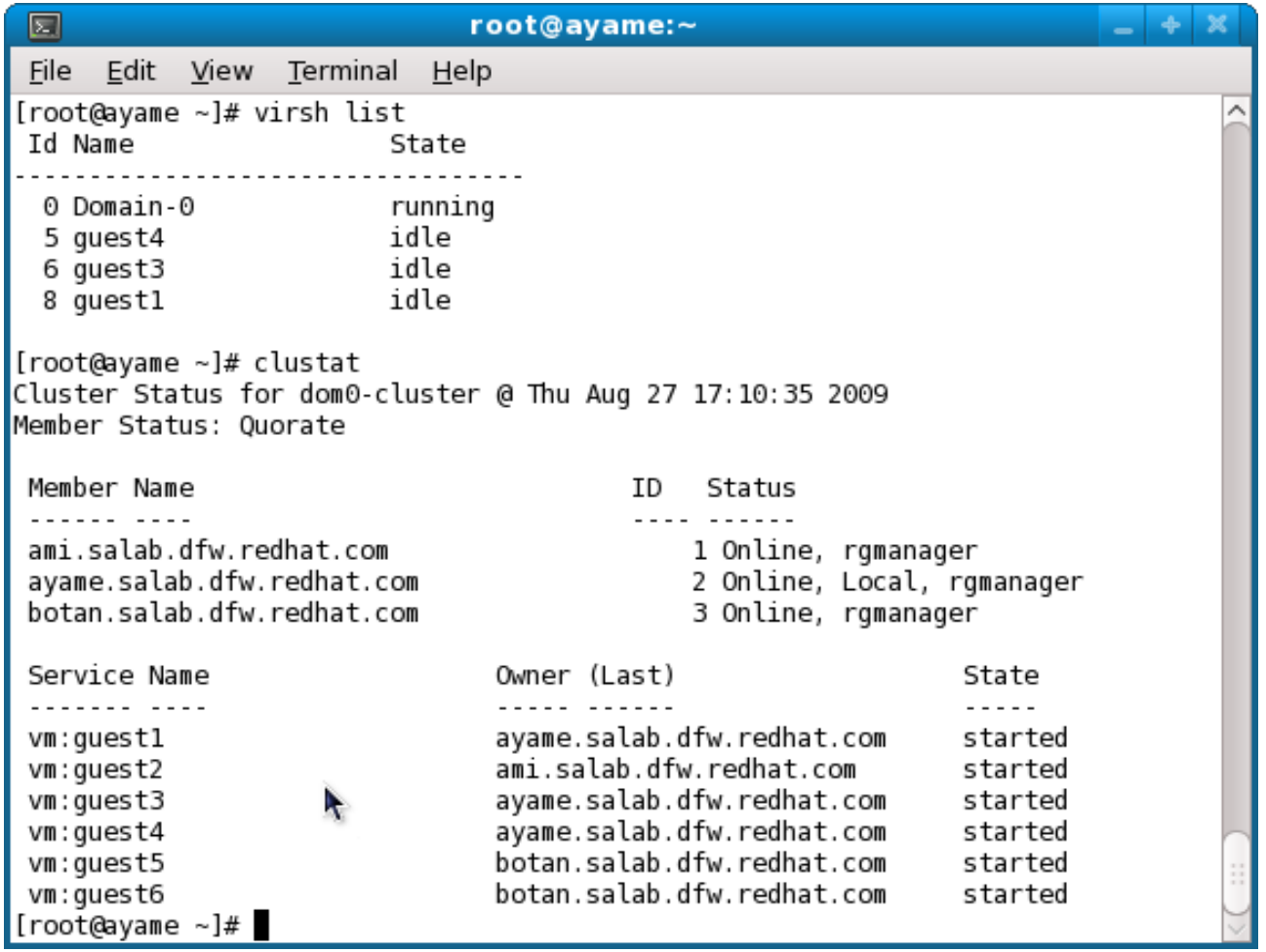

root@ayame:~
File Edit View Terminal Help
[root@ayame ~]# virsh list
 Id Name   State
----
  0 Domain-0   running
  5 guest4   idle
  6 guest3   idle
  8 guest1   idle
[root@ayame ~]# clustat
Cluster Status for dom0-cluster @ Thu Aug 27 17:10:35 2009
Member Status: Quorate
 Member Name   ID   Status
 ------ ----   ---- ------
 ami.salab.dfw.redhat.com   1 Online, rgmanager
 ayame.salab.dfw.redhat.com   2 Online, Local, rgmanager
 botan.salab.dfw.redhat.com   3 Online, rgmanager
 Service Name   Owner (Last)   State
 ------- ----   ----- ------   -----
 vm:guest1   ayame.salab.dfw.redhat.com   started
 vm:guest2   ami.salab.dfw.redhat.com   started
 vm:guest3   ayame.salab.dfw.redhat.com   started
 vm:guest4   ayame.salab.dfw.redhat.com   started
 vm:guest5   botan.salab.dfw.redhat.com   started
 vm:guest6   botan.salab.dfw.redhat.com   started
[root@ayame ~]#

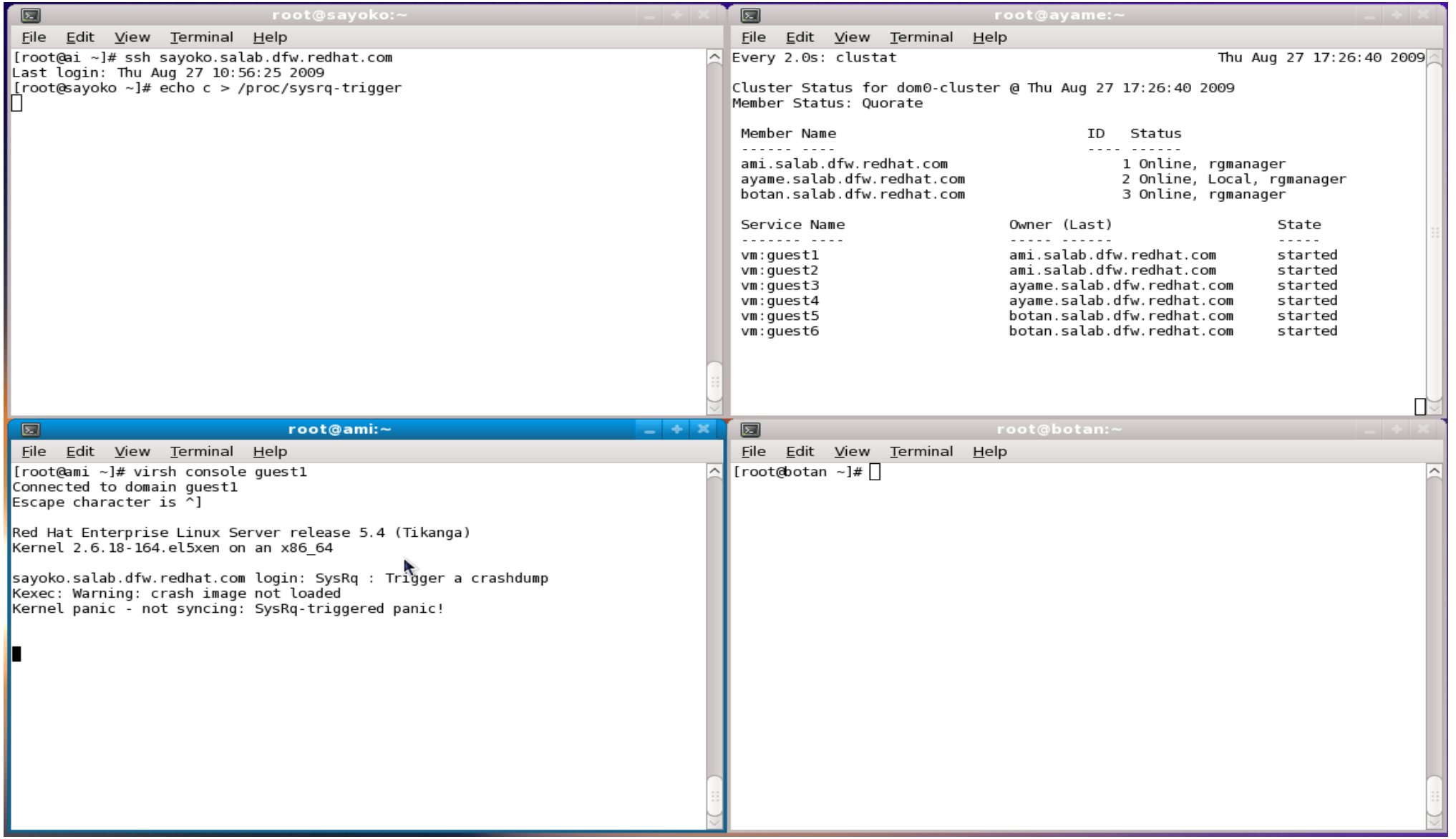
Test virtual machine failover services

Log into a domU machine and crash it

```
echo c > /proc/sysrq-trigger
```

Watch clustat on one of the dom0 machines

In the following slides, the domU system is crashed and the cluster restarts it on ami.



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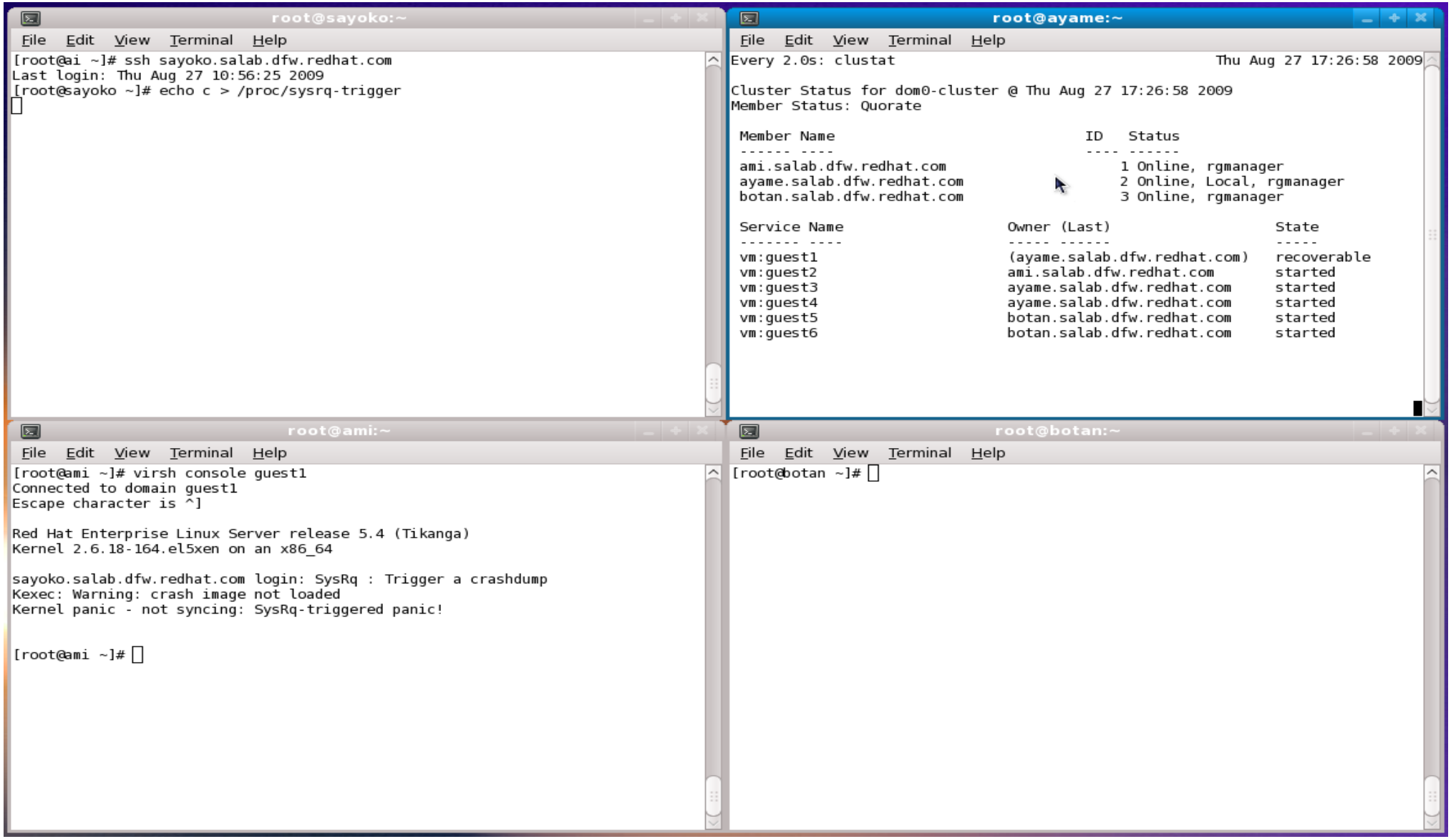

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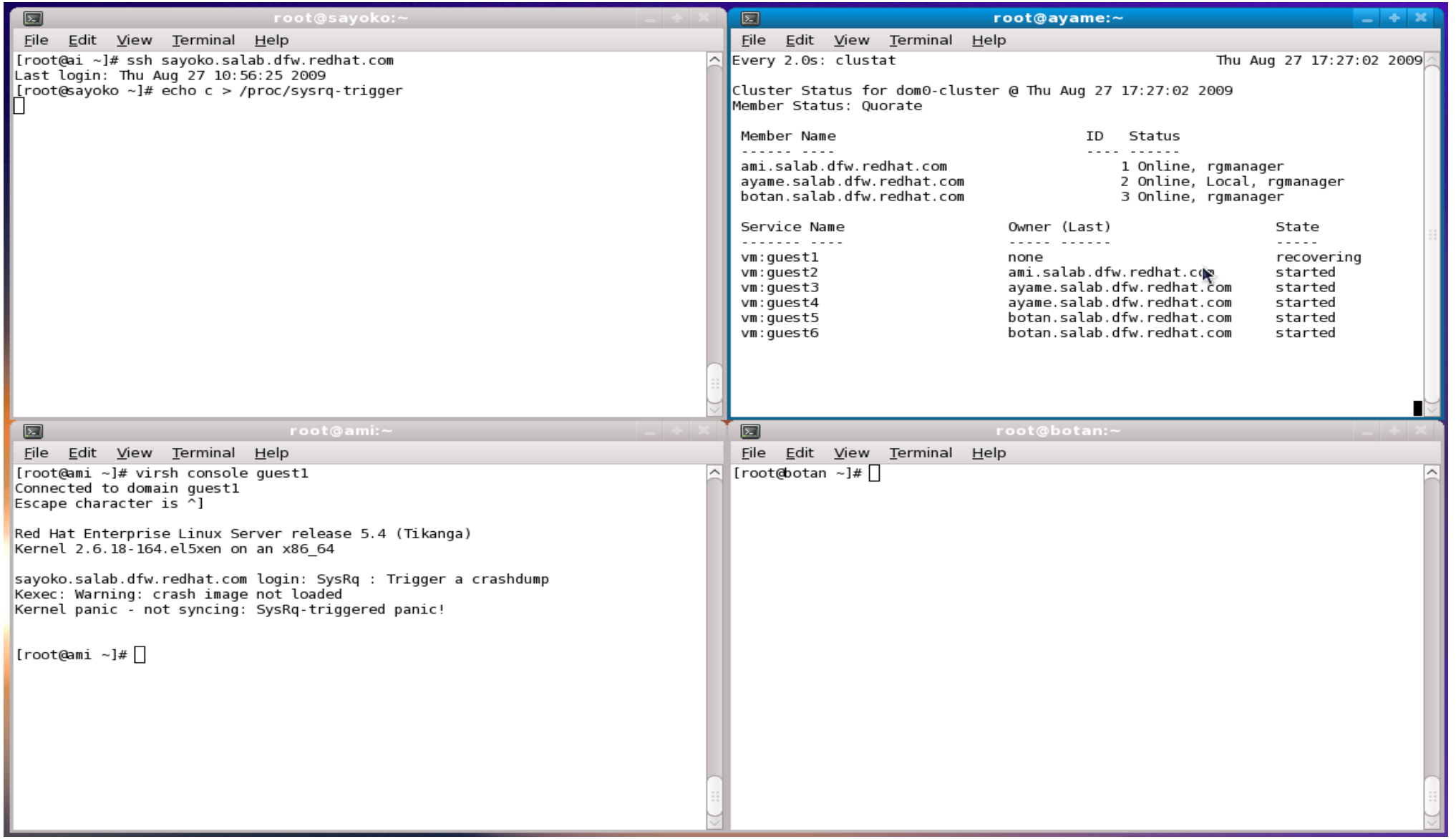

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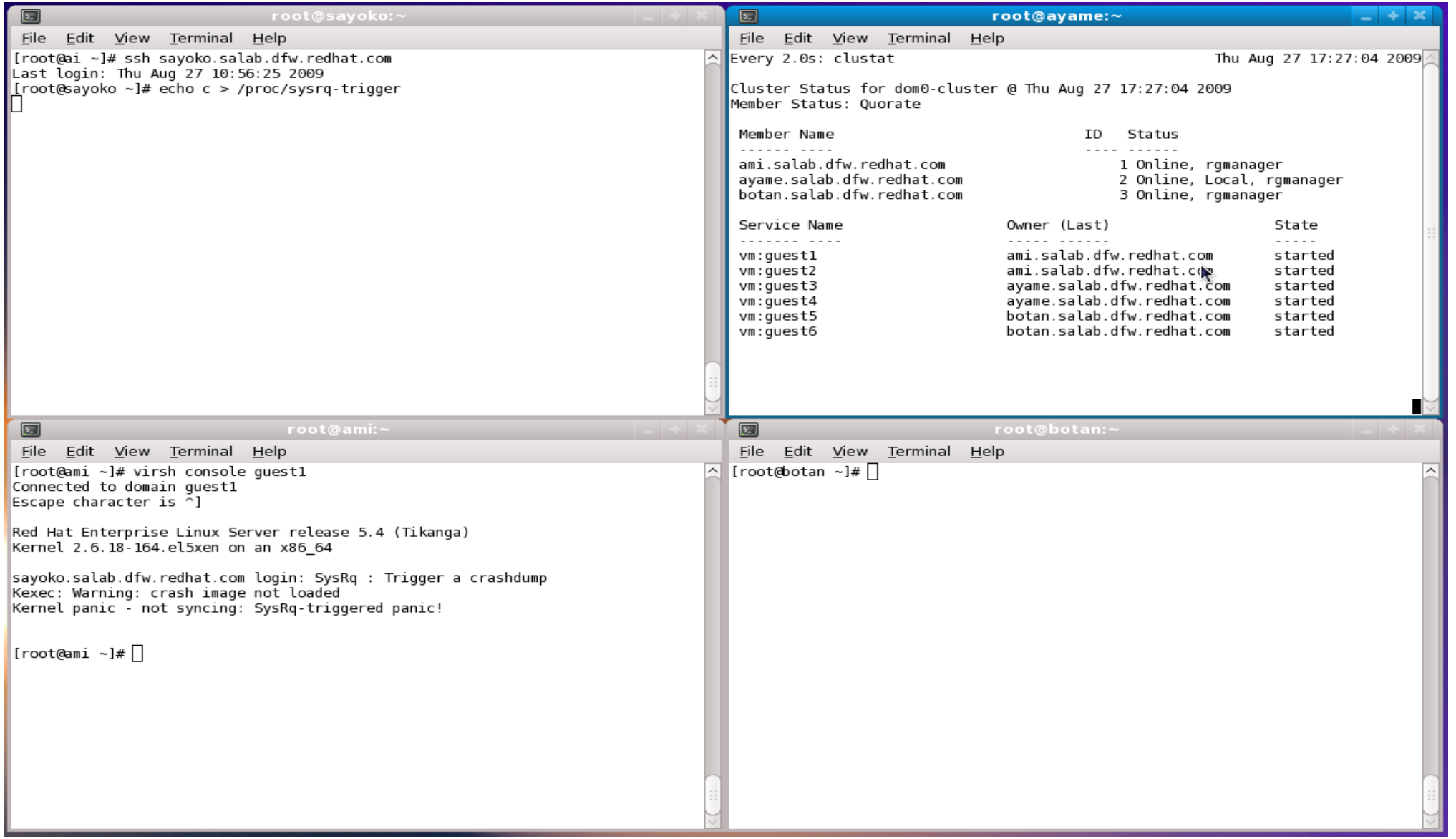

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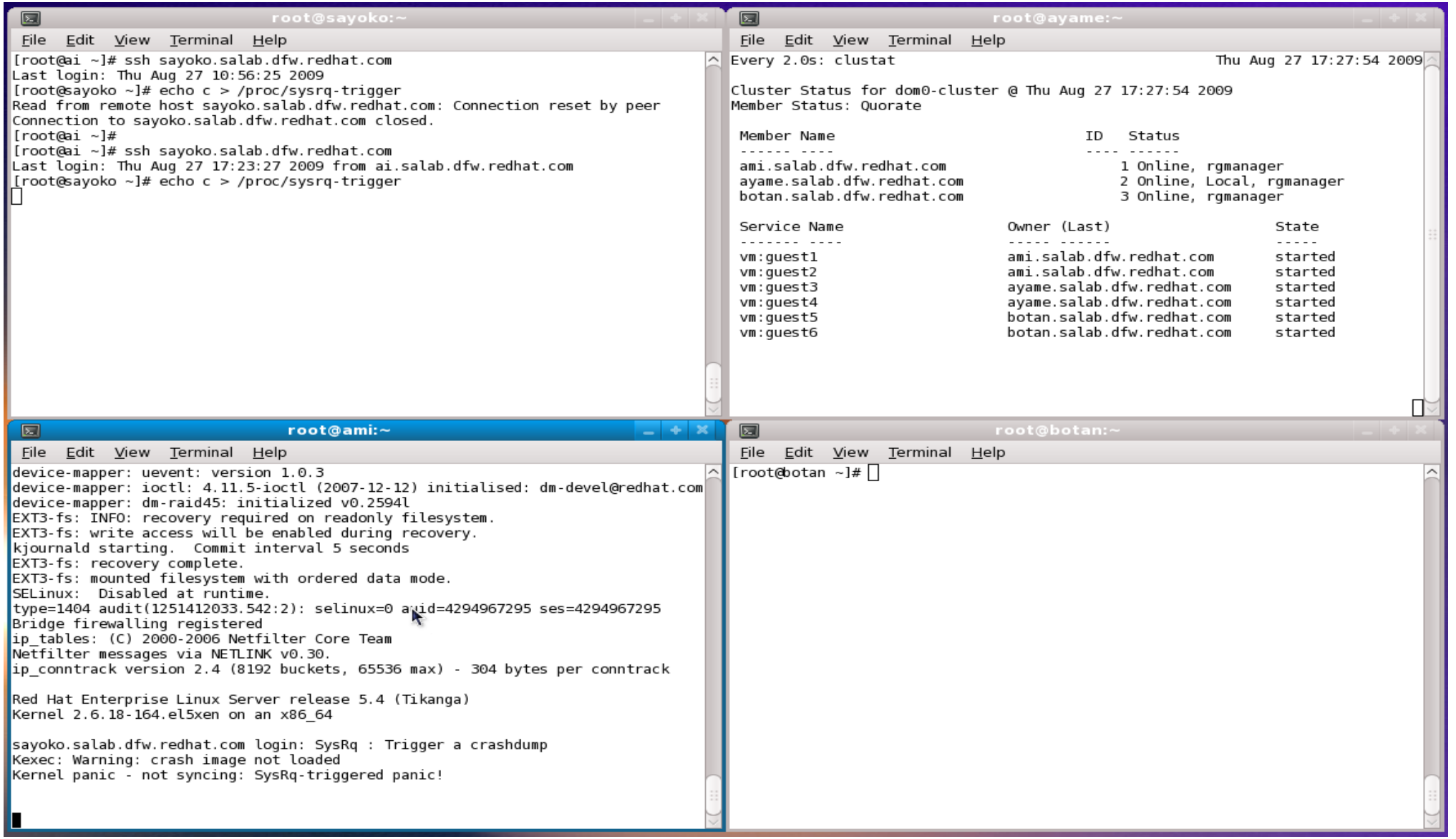
Test virtual machine failover services

The same guest is crashed a second time and the cluster migrates it to ayami based on the failover domain rules we set up earlier.



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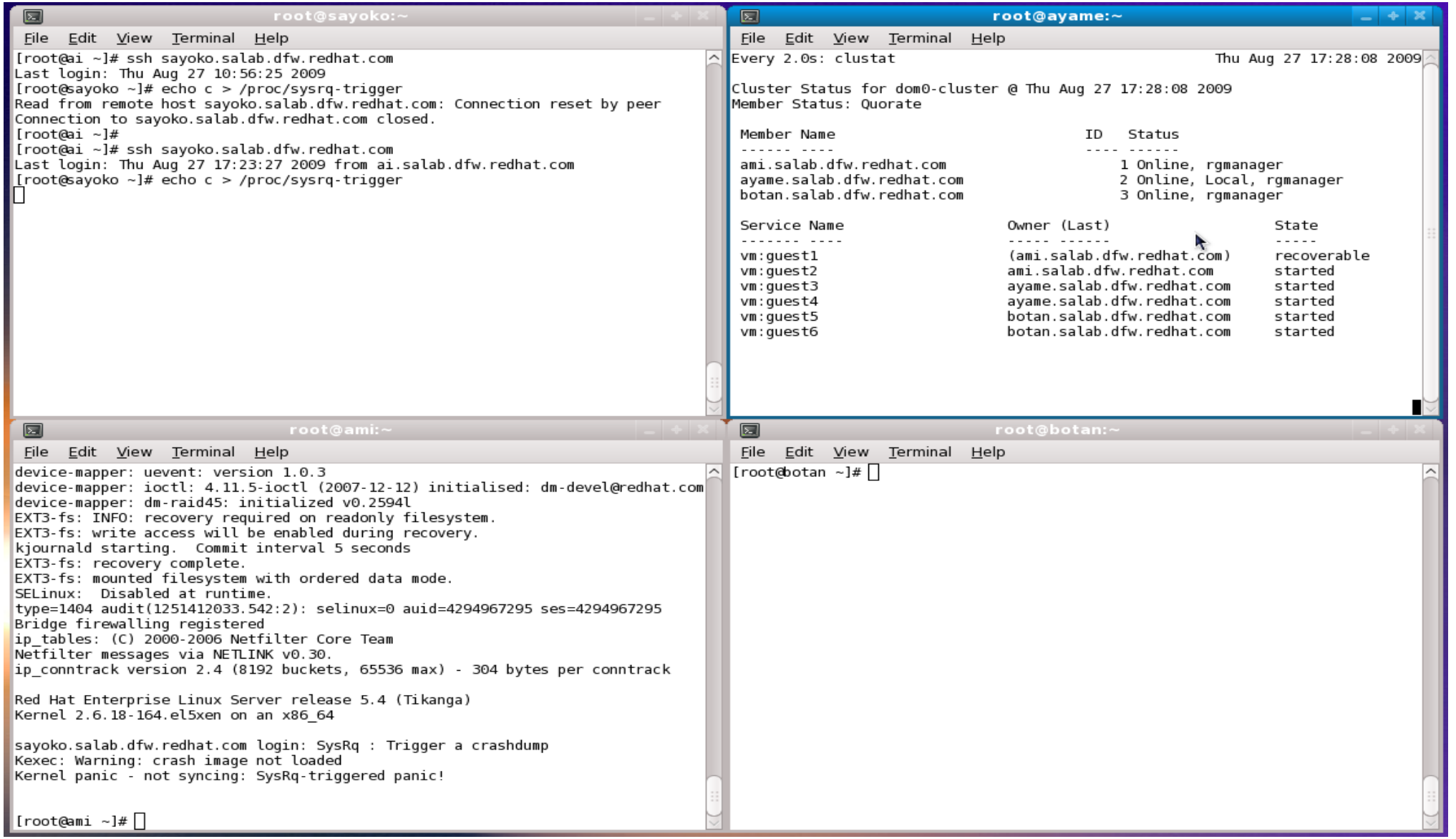

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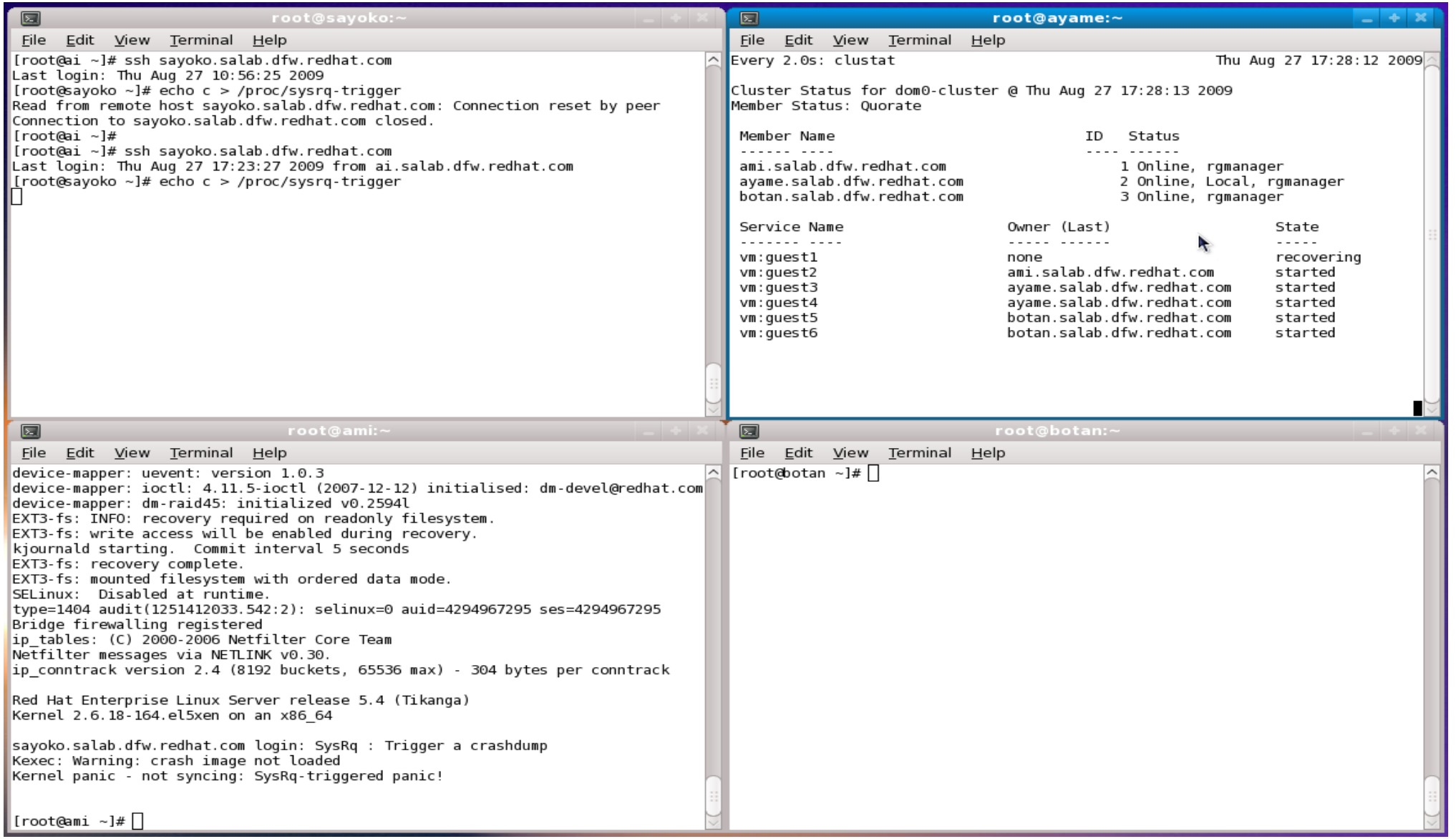

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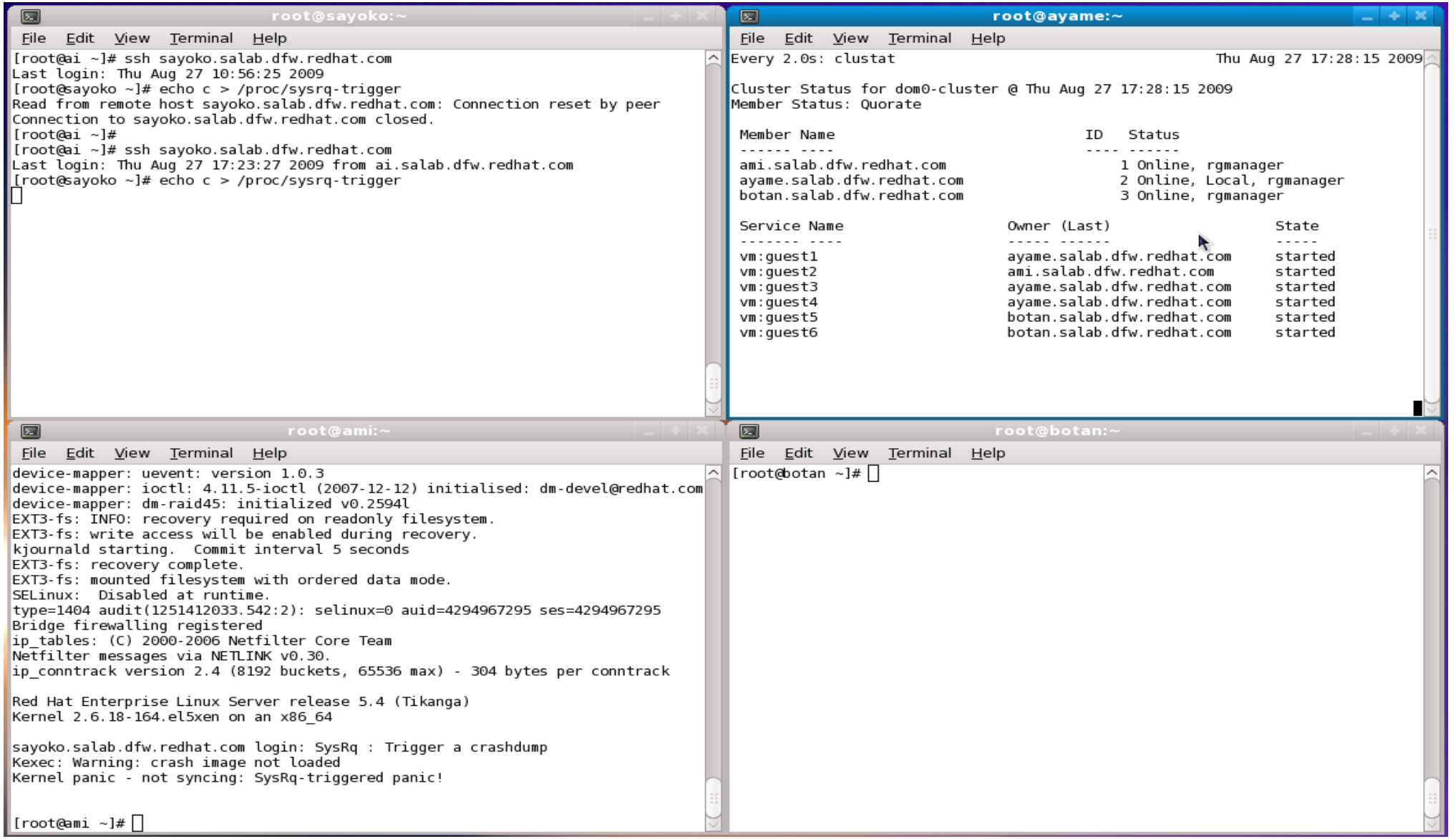

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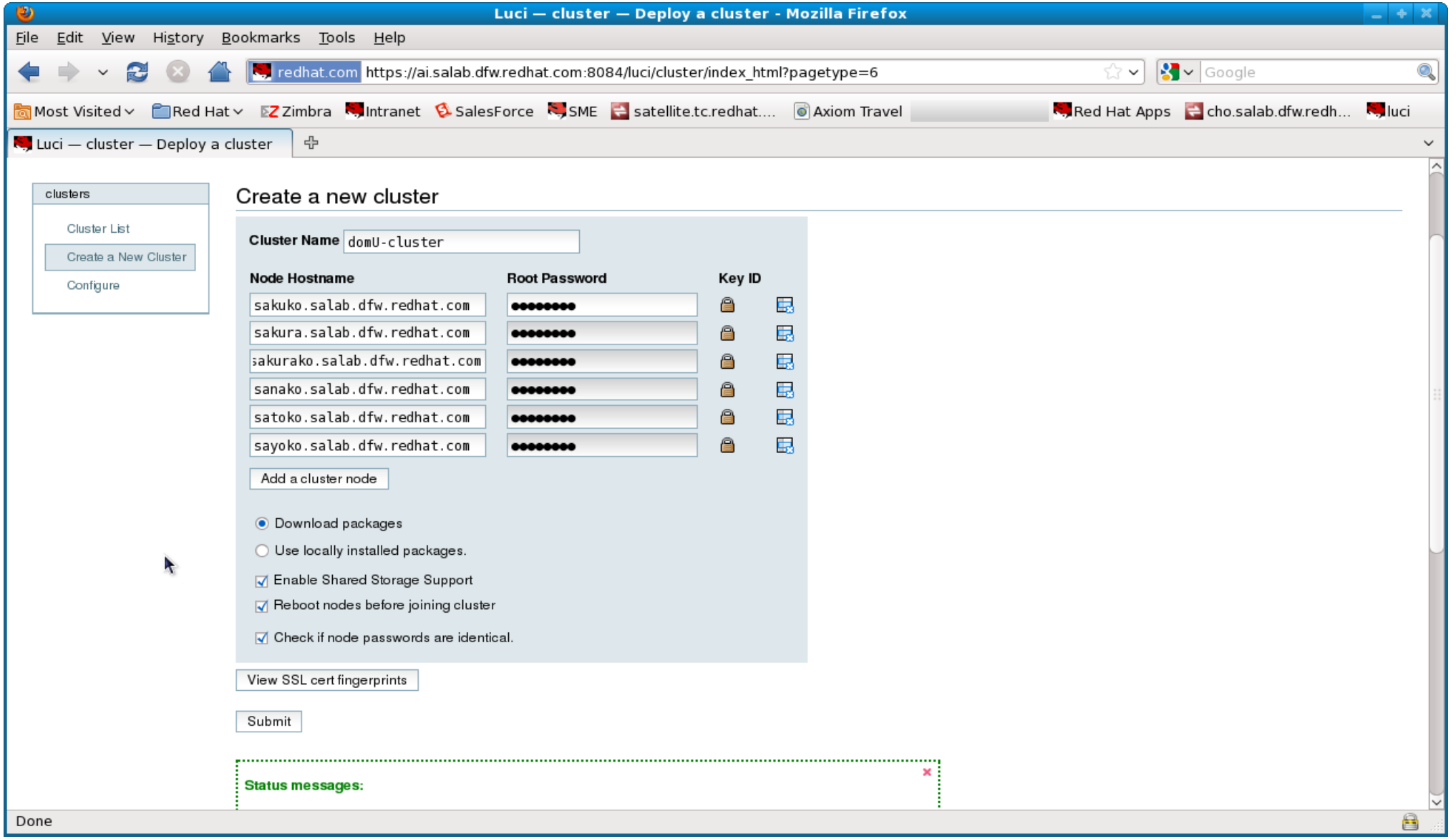
Set up the clustered app on the domU cluster

Define a new cluster - domU-cluster

- Cluster tab
- Create new cluster
- Cluster name
- Node Hostnames/passwords
- Enable share storage
- Reboot nodes
- Check if passwords identical
- View SSL fingerprints



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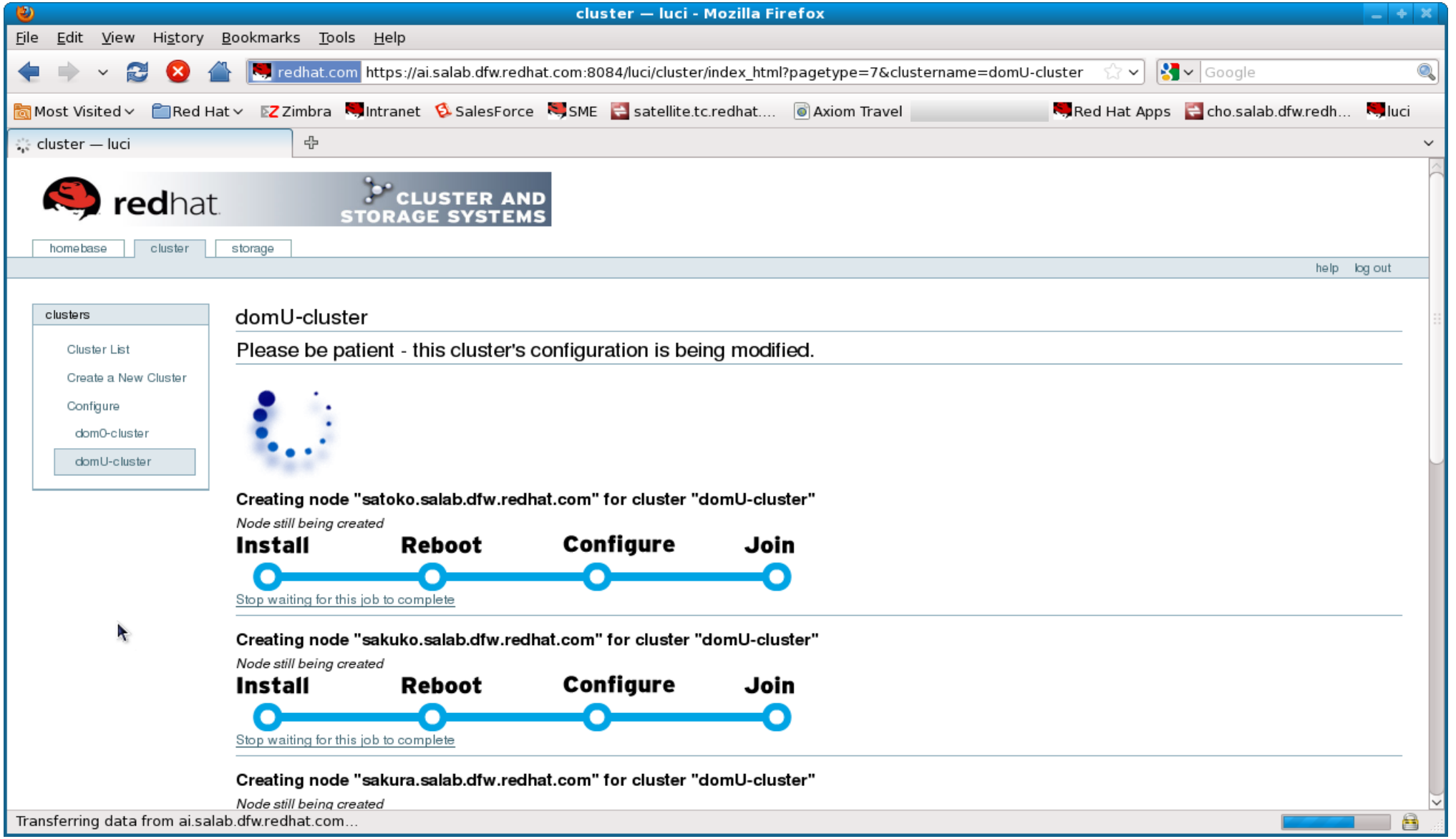

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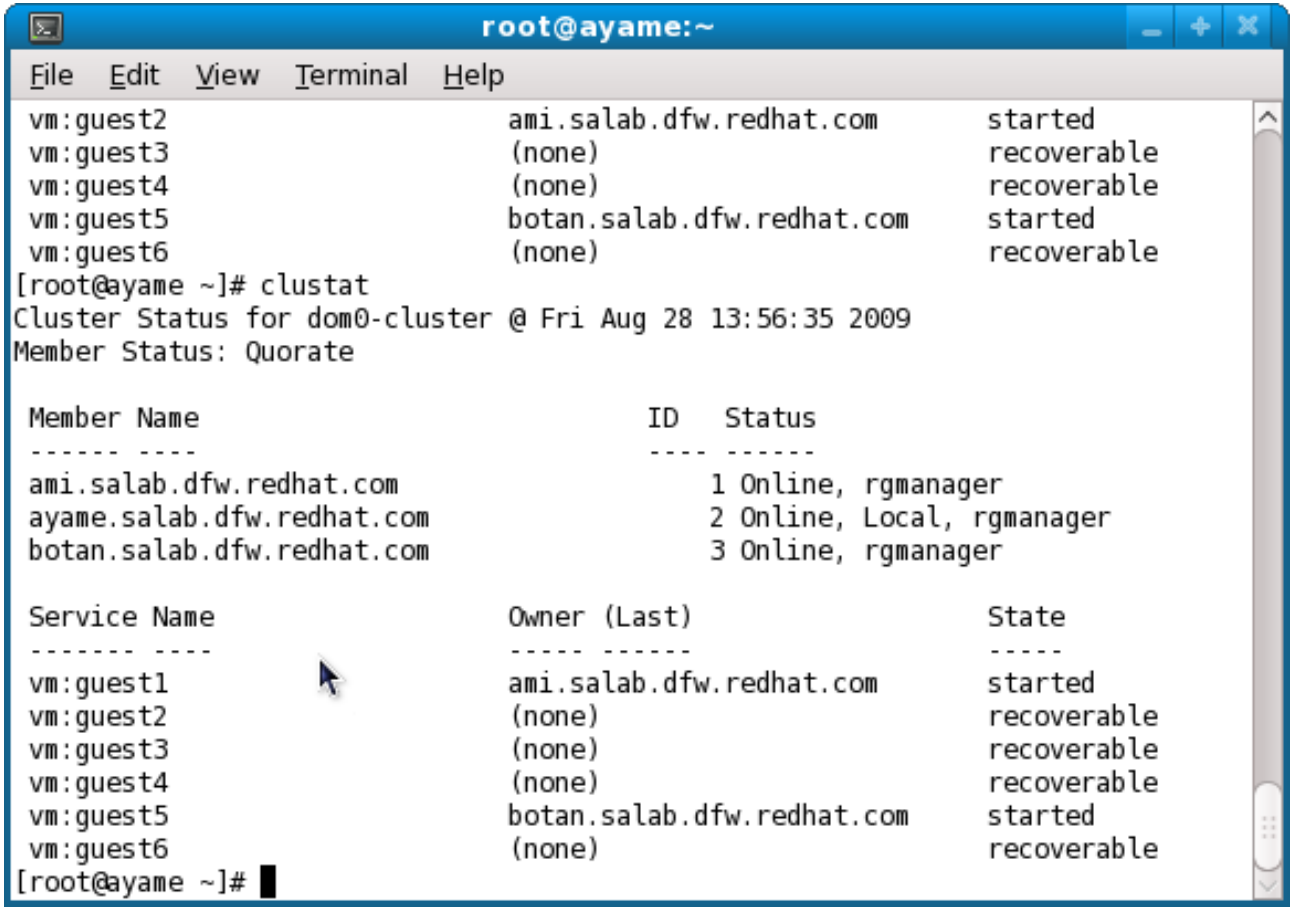
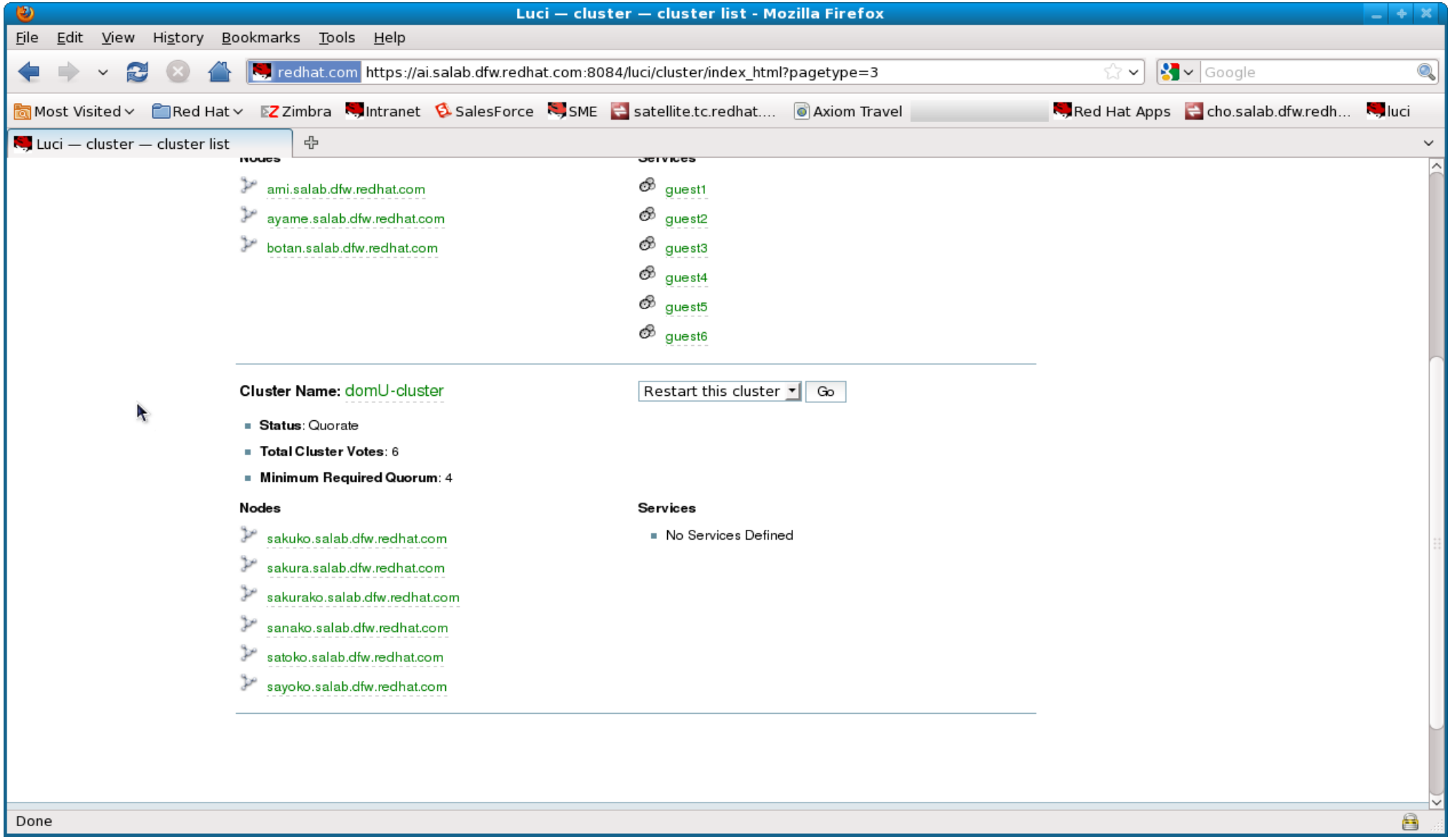

root@ayame:~
File Edit View Terminal Help
vm:guest2 ami.salab.dfw.redhat.com started
vm:guest3 (none) recoverable
vm:guest4 (none) recoverable
vm:guest5 botan.salab.dfw.redhat.com started
vm:guest6 (none) recoverable
[root@ayame ~]# clustat
Cluster Status for dom0-cluster @ Fri Aug 28 13:56:35 2009
Member Status: Quorate
Member Name ID Status
ami.salab.dfw.redhat.com 1 Online, rgmanager
ayame.salab.dfw.redhat.com 2 Online, Local, rgmanager
botan.salab.dfw.redhat.com 3 Online, rgmanager
Service Name Owner (Last) State
vm:guest1 ami.salab.dfw.redhat.com started
vm:guest2 (none) recoverable
vm:guest3 (none) recoverable
vm:guest4 (none) recoverable
vm:guest5 botan.salab.dfw.redhat.com started
vm:guest6 (none) recoverable
[root@ayame ~]#


Luci — cluster — cluster list - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=3
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — cluster list
ami.salab.dfw.redhat.com
ayame.salab.dfw.redhat.com
botan.salab.dfw.redhat.com
guest1
guest2
guest3
guest4
guest5
guest6
Cluster Name: domU-cluster
Restart this cluster
Go
Status: Quorate
Total Cluster Votes: 6
Minimum Required Quorum: 4
Nodes
sakuko.salab.dfw.redhat.com
sakura.salab.dfw.redhat.com
sakurako.salab.dfw.redhat.com
sanako.salab.dfw.redhat.com
satoko.salab.dfw.redhat.com
sayoko.salab.dfw.redhat.com
Services
No Services Defined
Done

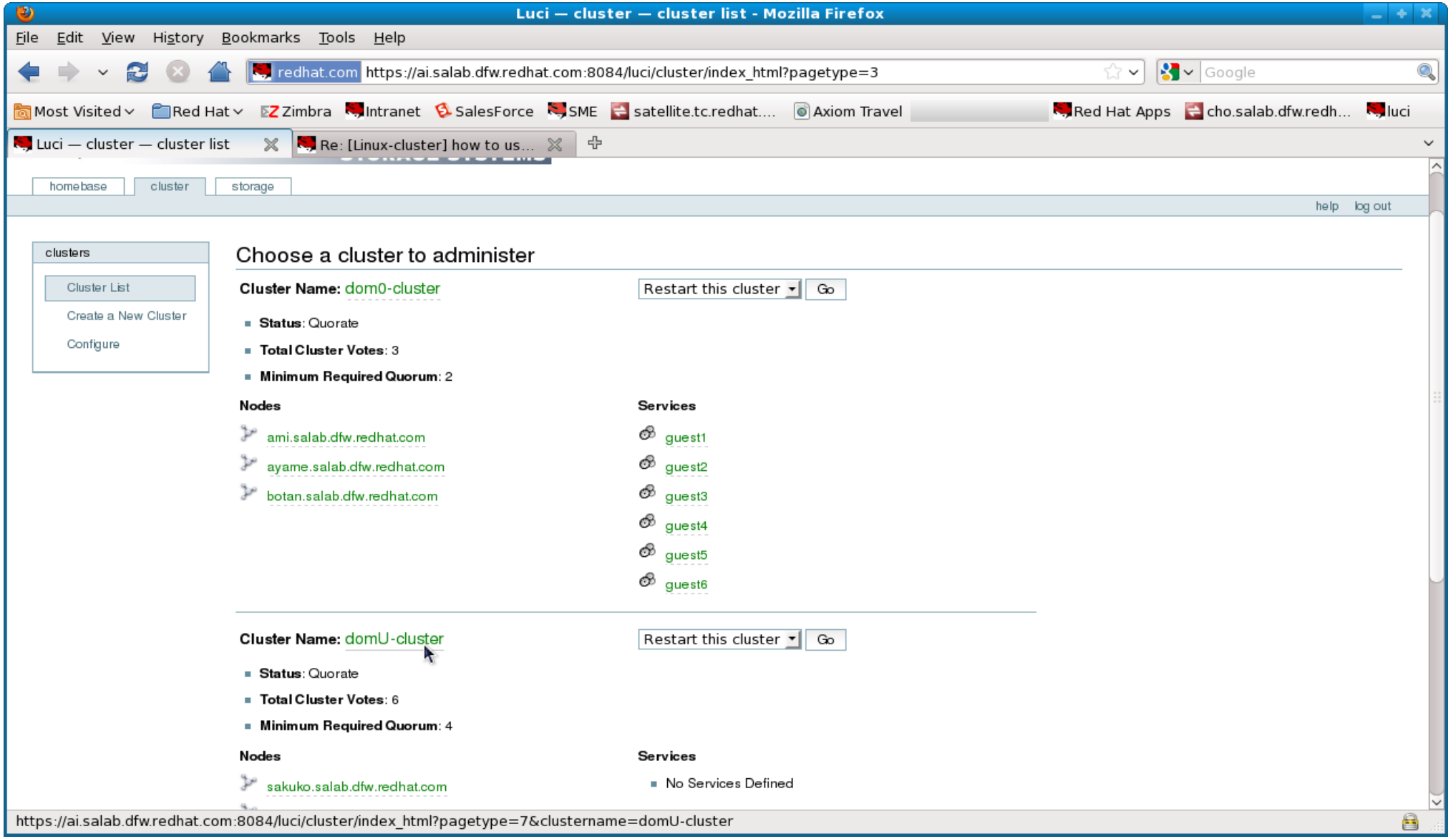
Set up the clustered app on the domU cluster

Copy the fence_xvm.key to the domU cluster members

- Either scp or use the web UI

Set up the clustered app on the domU cluster

- Set up a shared fence device
  - Cluster Tab
  - Cluster Name
  - Shared Fence Devices
  - Add a Fence Device
    - Type
    - Name
  - Submit and confirm



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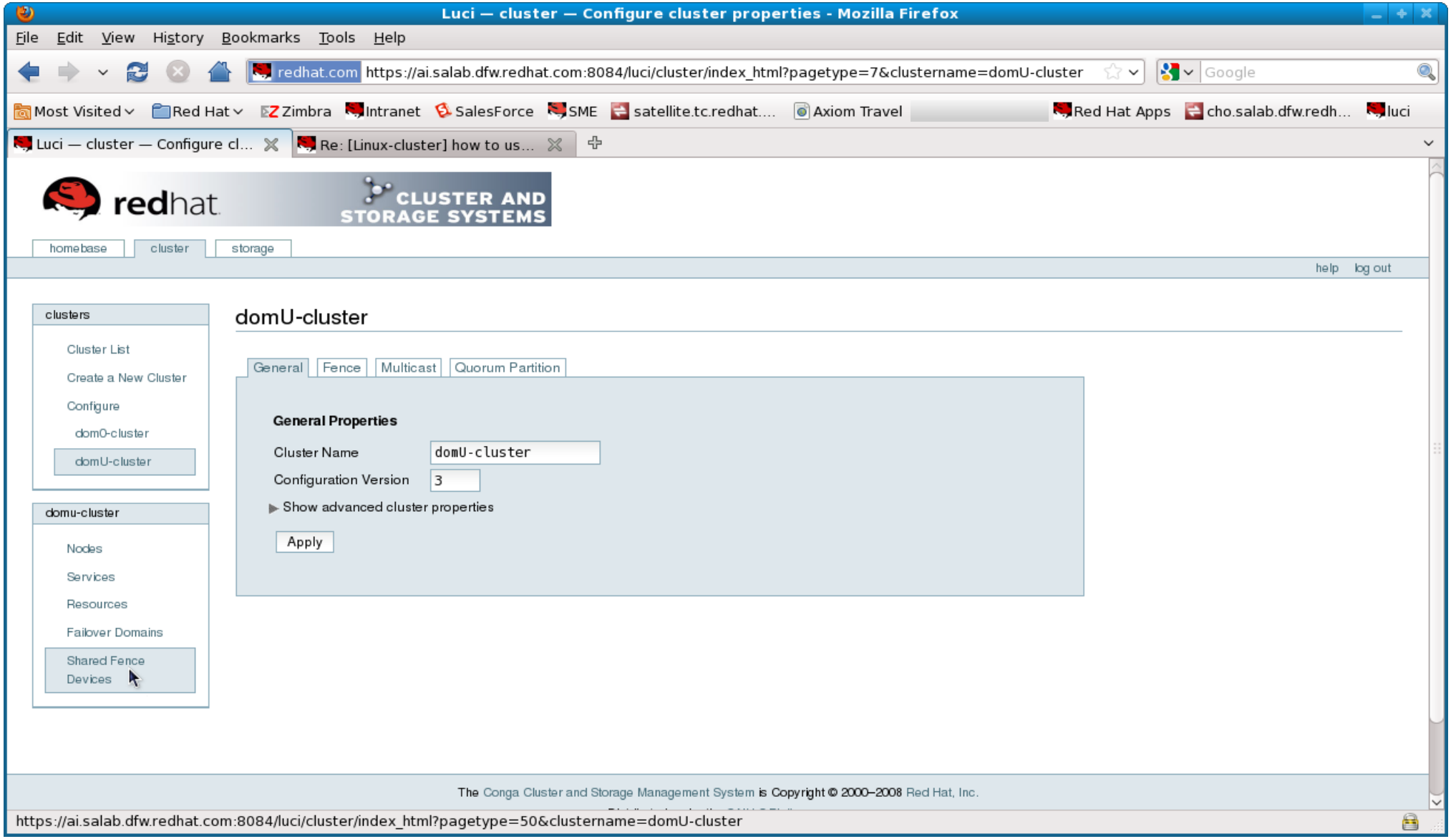
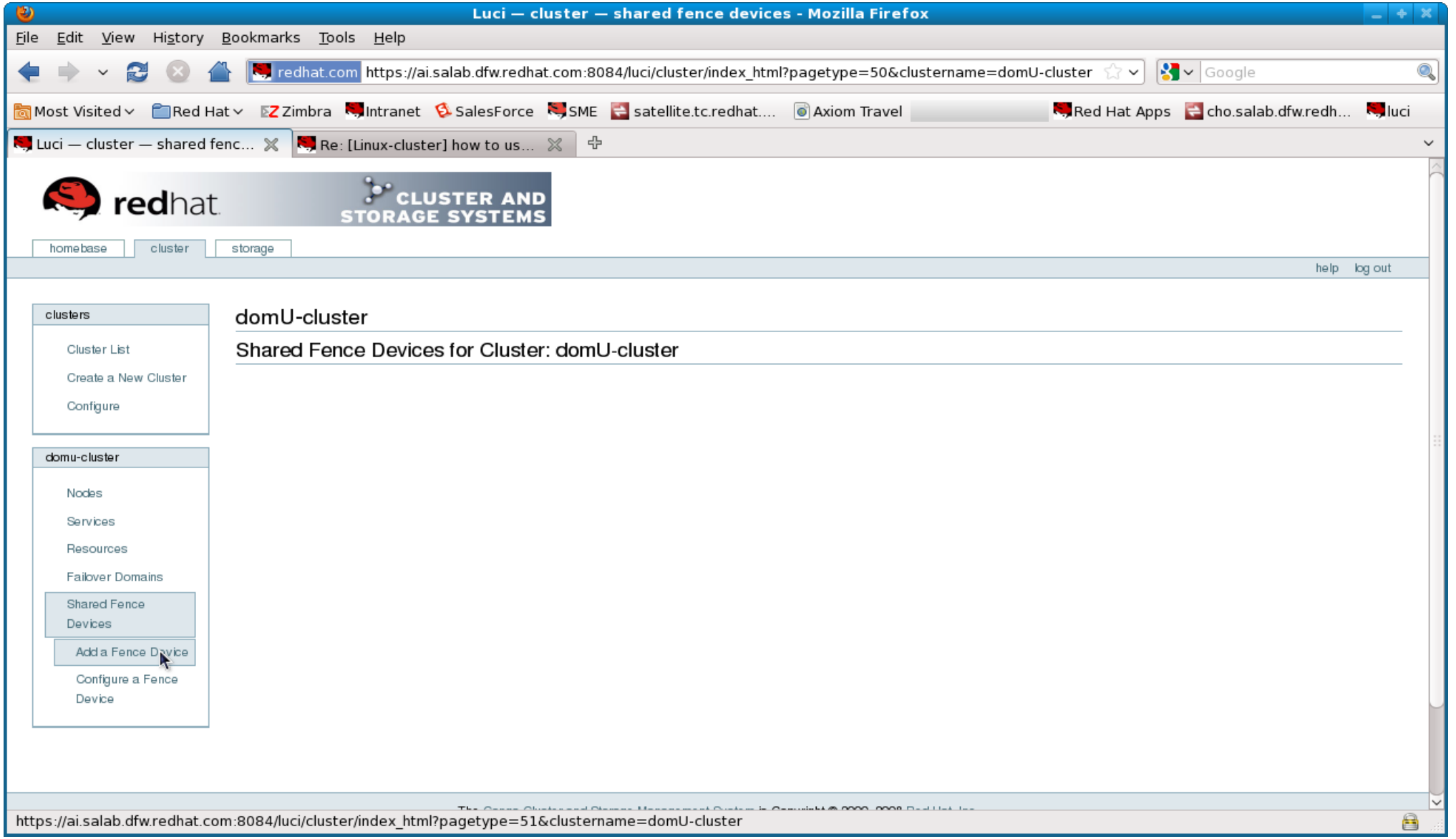
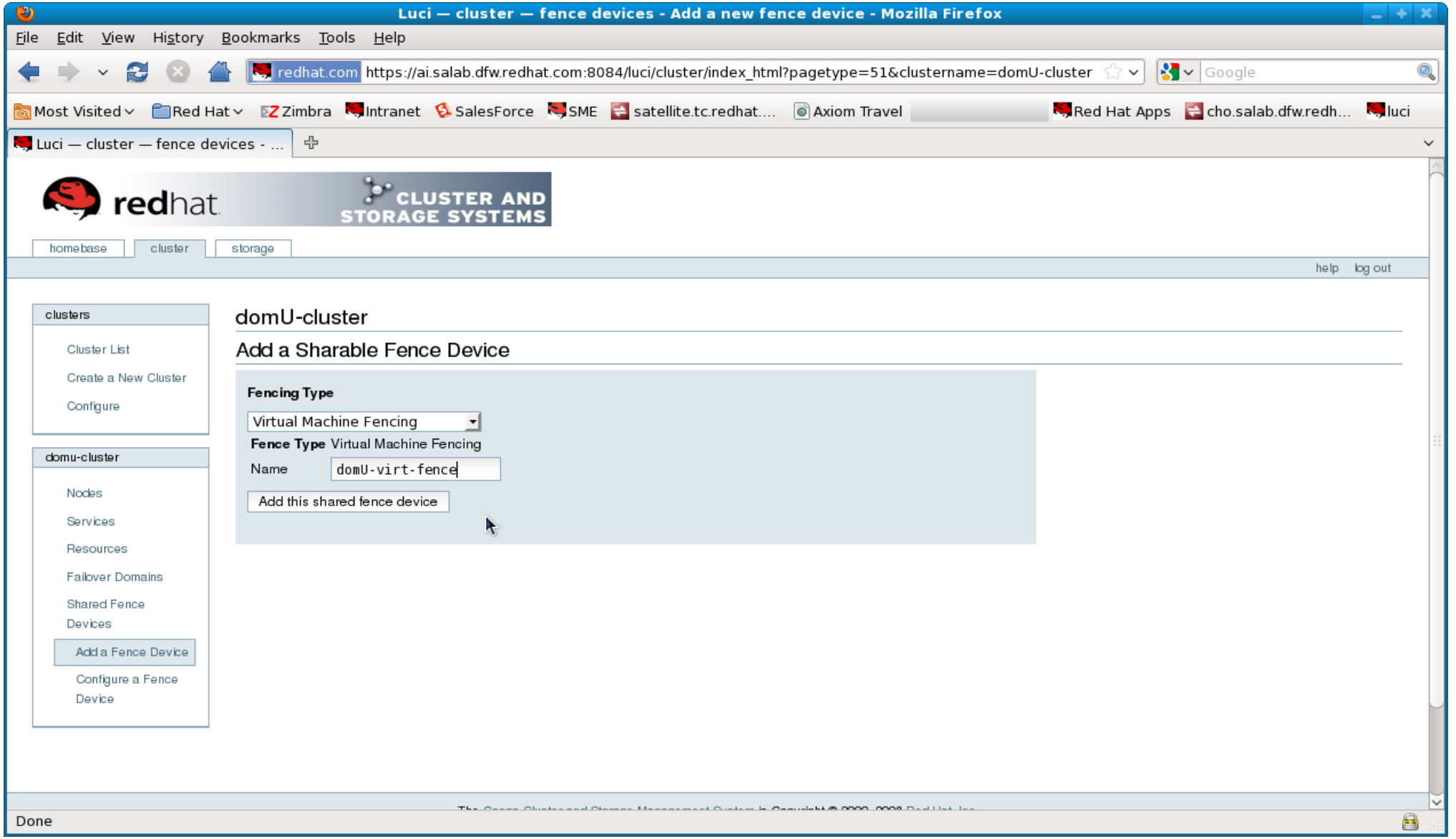


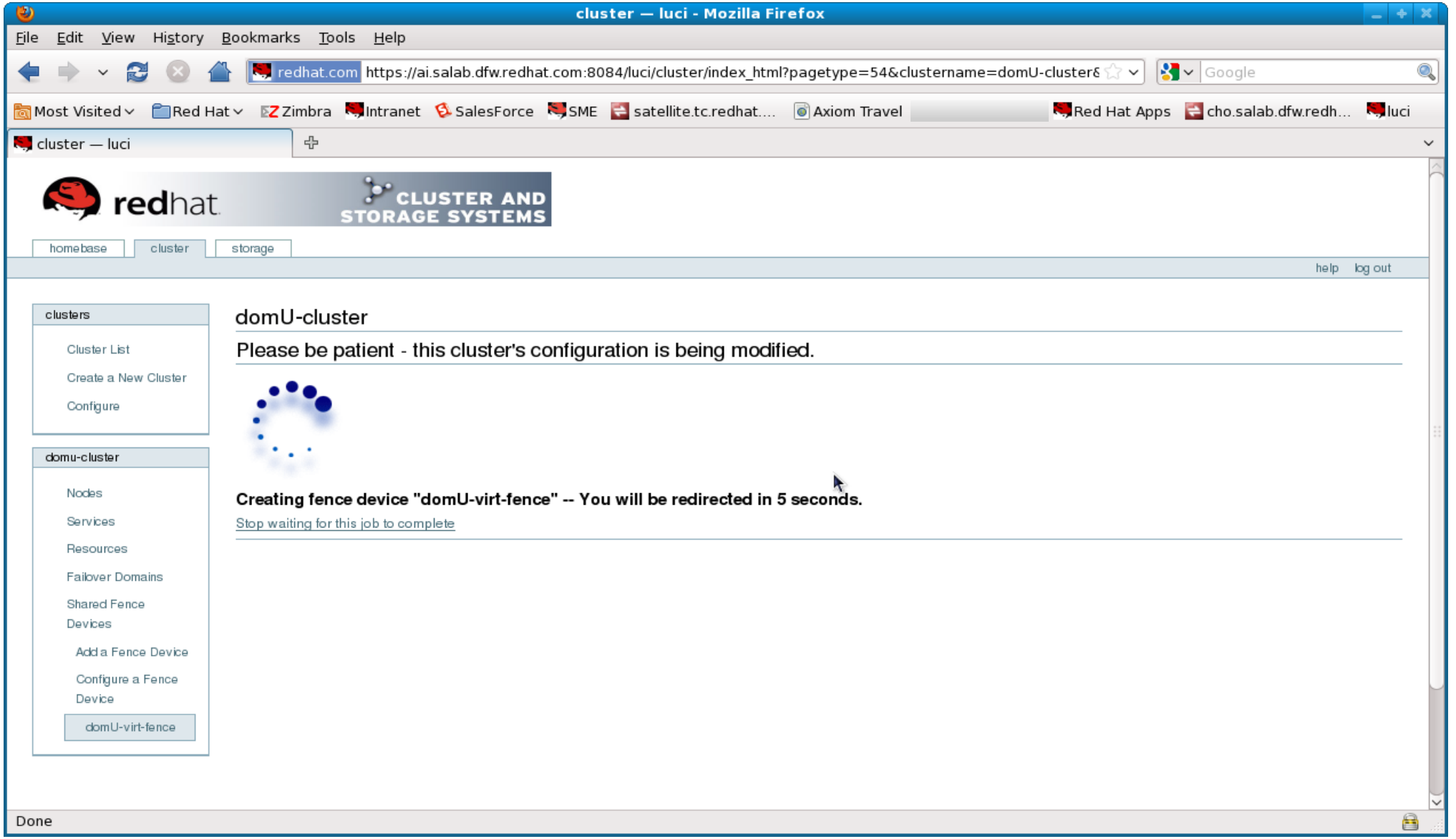
RED HAT :: CHICAGO :: 2009 SUMMIT



RED HAT :: CHICAGO :: 2009 SUMMIT



RED HAT :: CHICAGO :: 2009 SUMMIT



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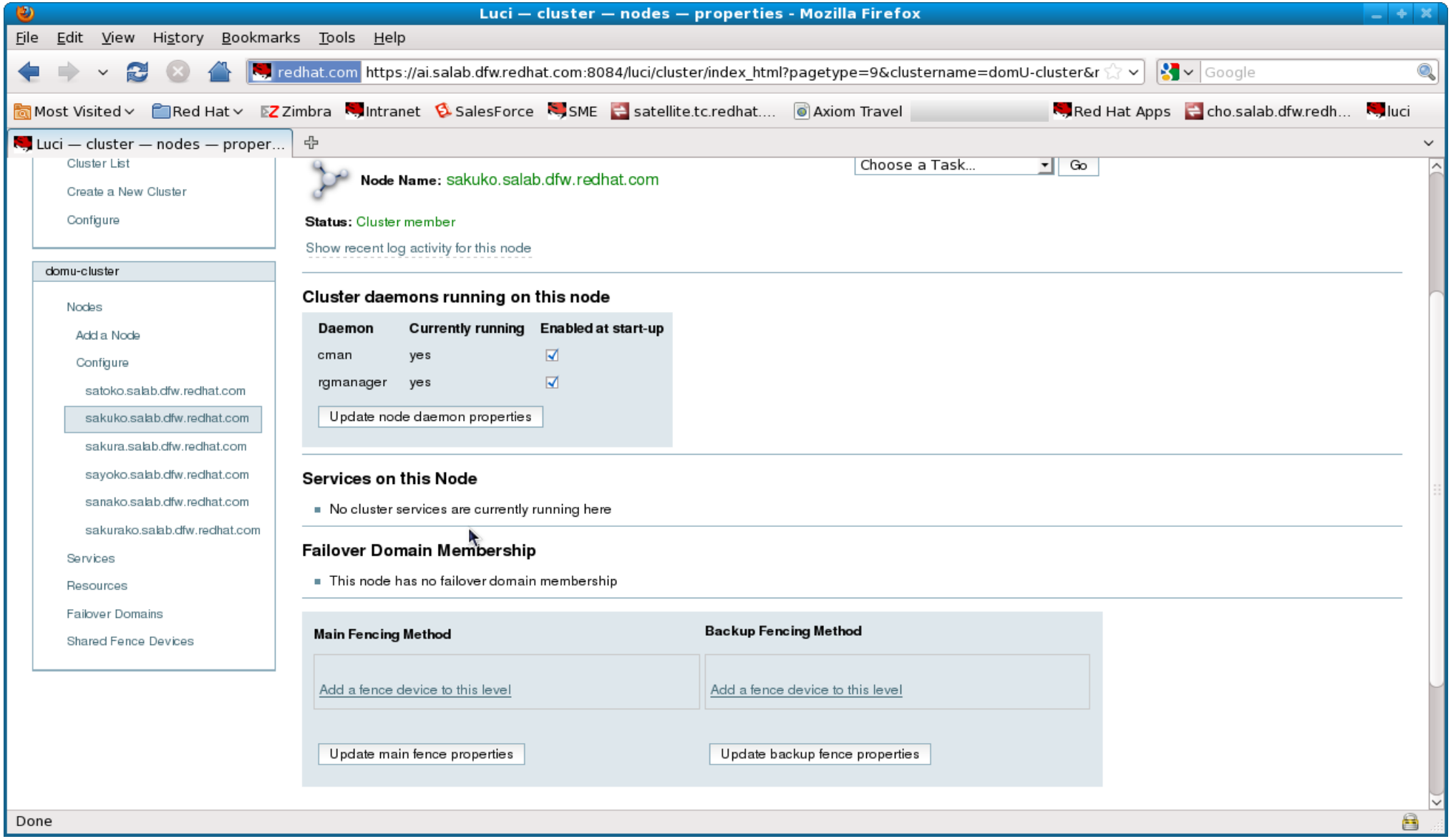
Set up the clustered app on the domU cluster

- Assign Fence Devices to Each domU
  - Cluster Node
  - Main Fencing Method
  - Add Fence Device To This Level
    - Pre-defined device
    - Domain name
    - Update and confirm
  - Repeat for each domU machine



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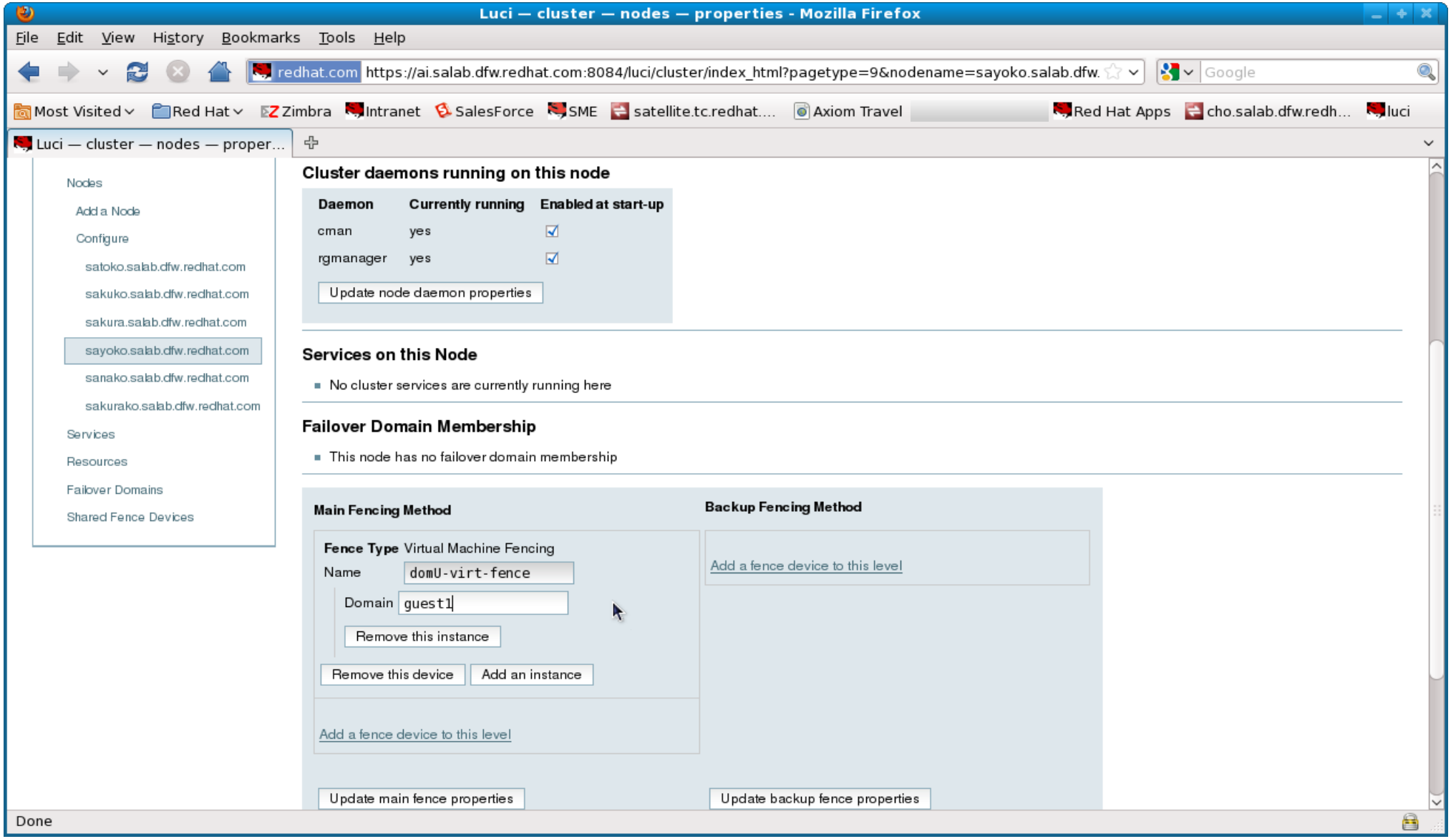
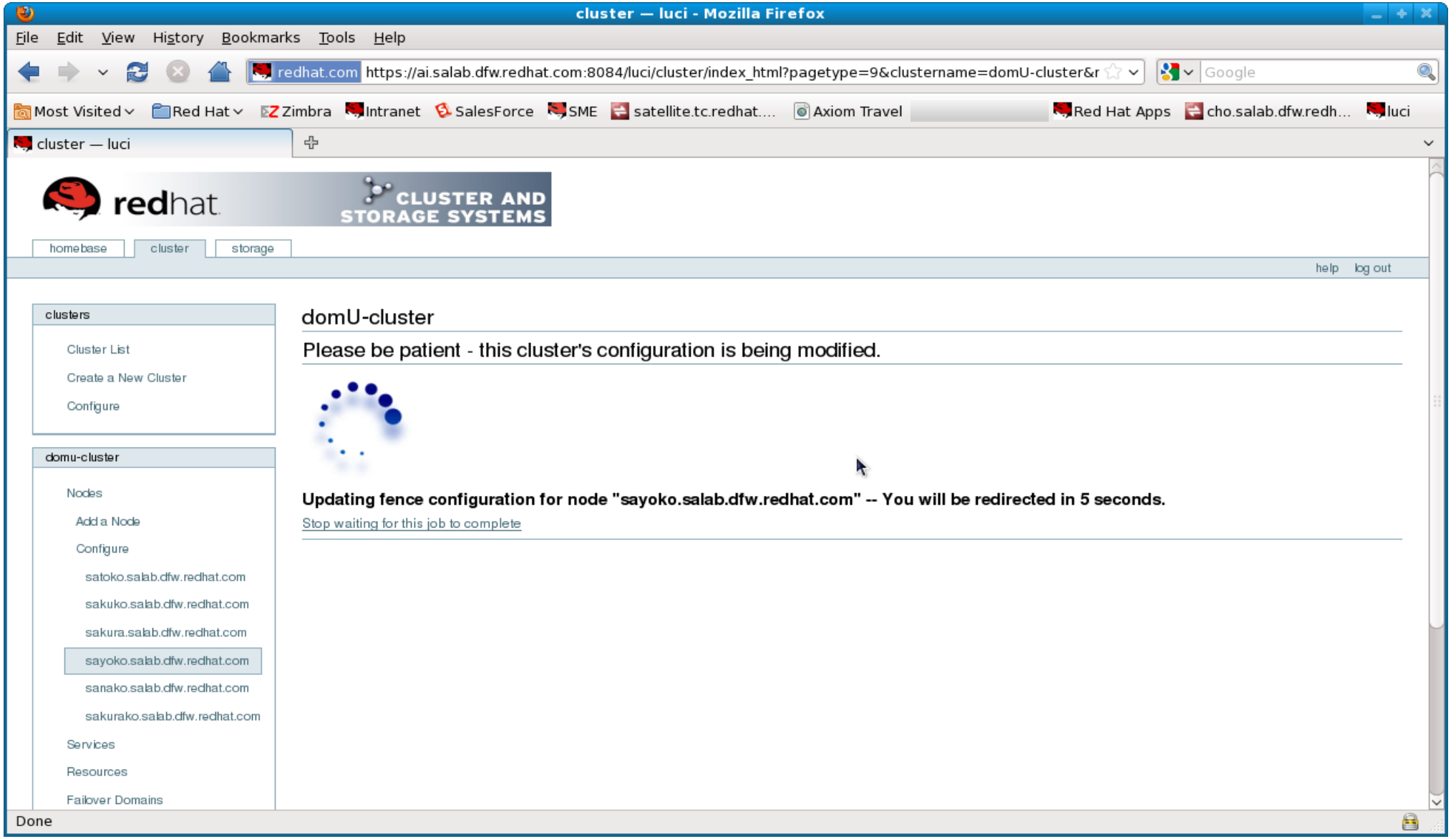

Luci — cluster — nodes — properties - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=9&nodename=sayoko.salab.dfw.
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — nodes — proper...
Nodes
Add a Node
Configure
satoko.salab.dfw.redhat.com
sakuko.salab.dfw.redhat.com
sakura.salab.dfw.redhat.com
sayoko.salab.dfw.redhat.com
sanako.salab.dfw.redhat.com
sakurako.salab.dfw.redhat.com
Services
Resources
Failover Domains
Shared Fence Devices
Cluster daemons running on this node
Daemon
Currently running
Enabled at start-up
cman
yes
rgmanager
yes
Update node daemon properties
Services on this Node
No cluster services are currently running here
Failover Domain Membership
This node has no failover domain membership
Main Fencing Method
Backup Fencing Method
Fence Type Virtual Machine Fencing
Name domU-virt-fence
Domain guest1
Remove this instance
Remove this device
Add an instance
Add a fence device to this level
Add a fence device to this level
Update main fence properties
Update backup fence properties
Done



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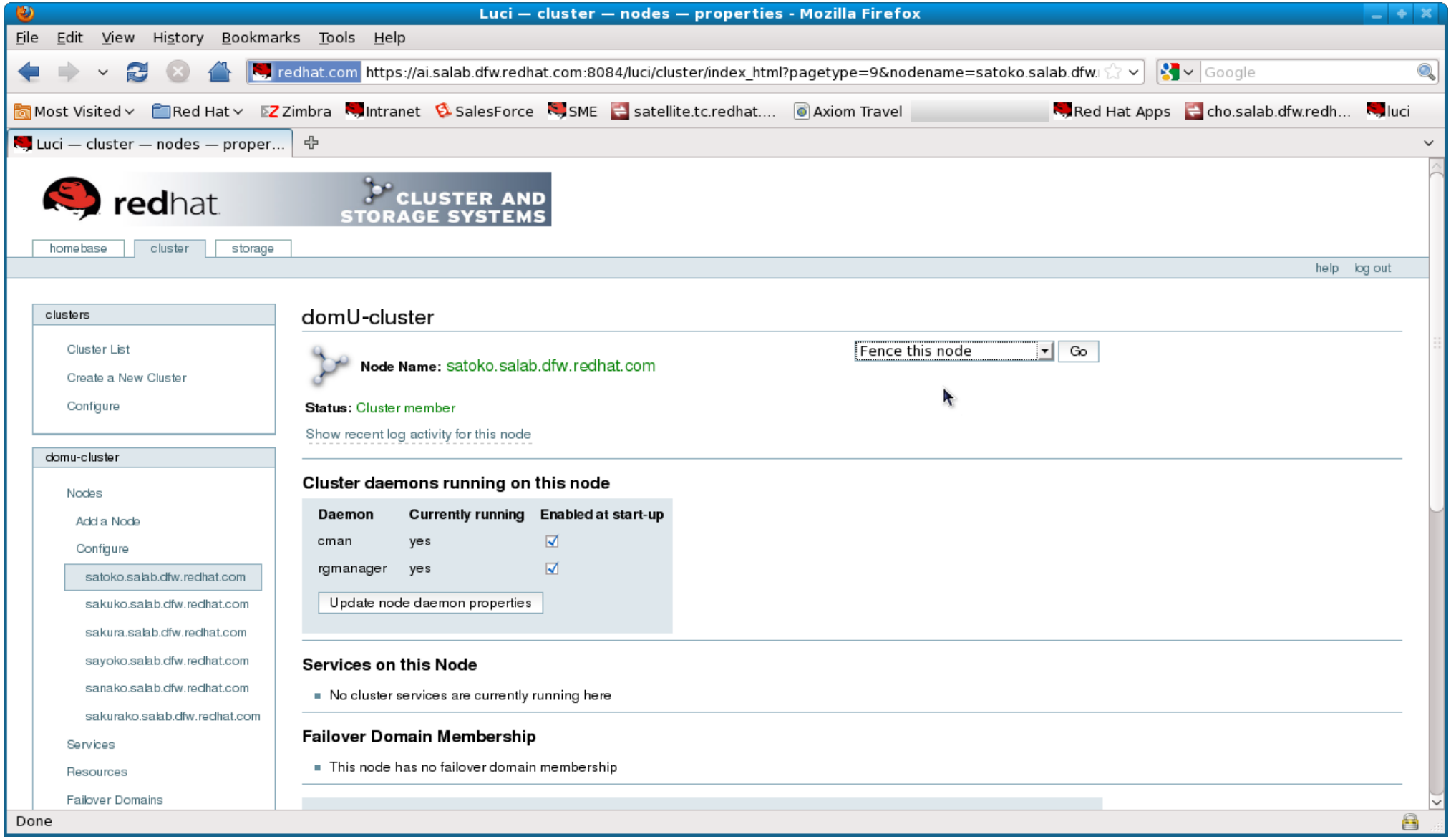
Set up the clustered app on the domU cluster

Test by fencing a domU



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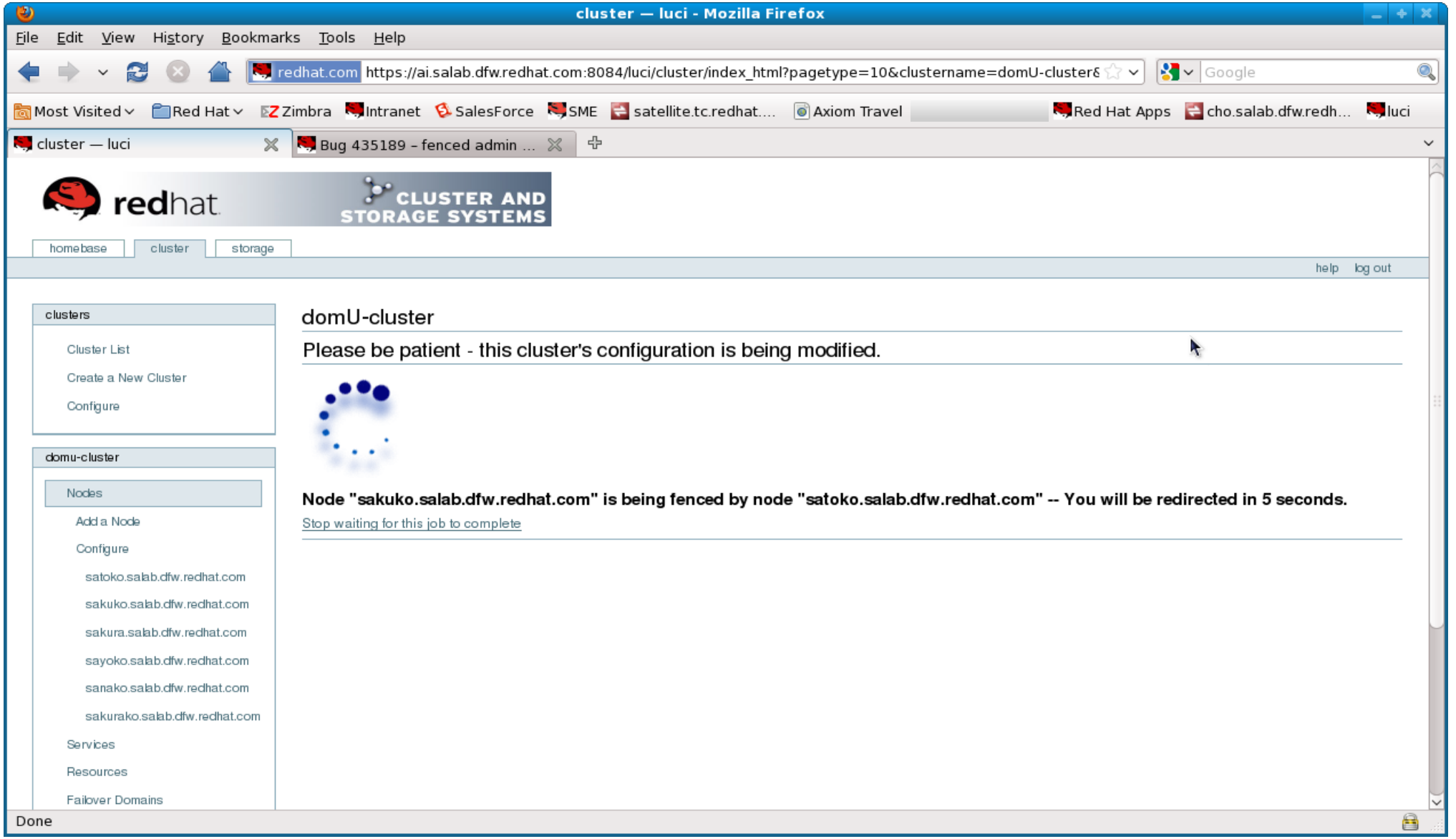

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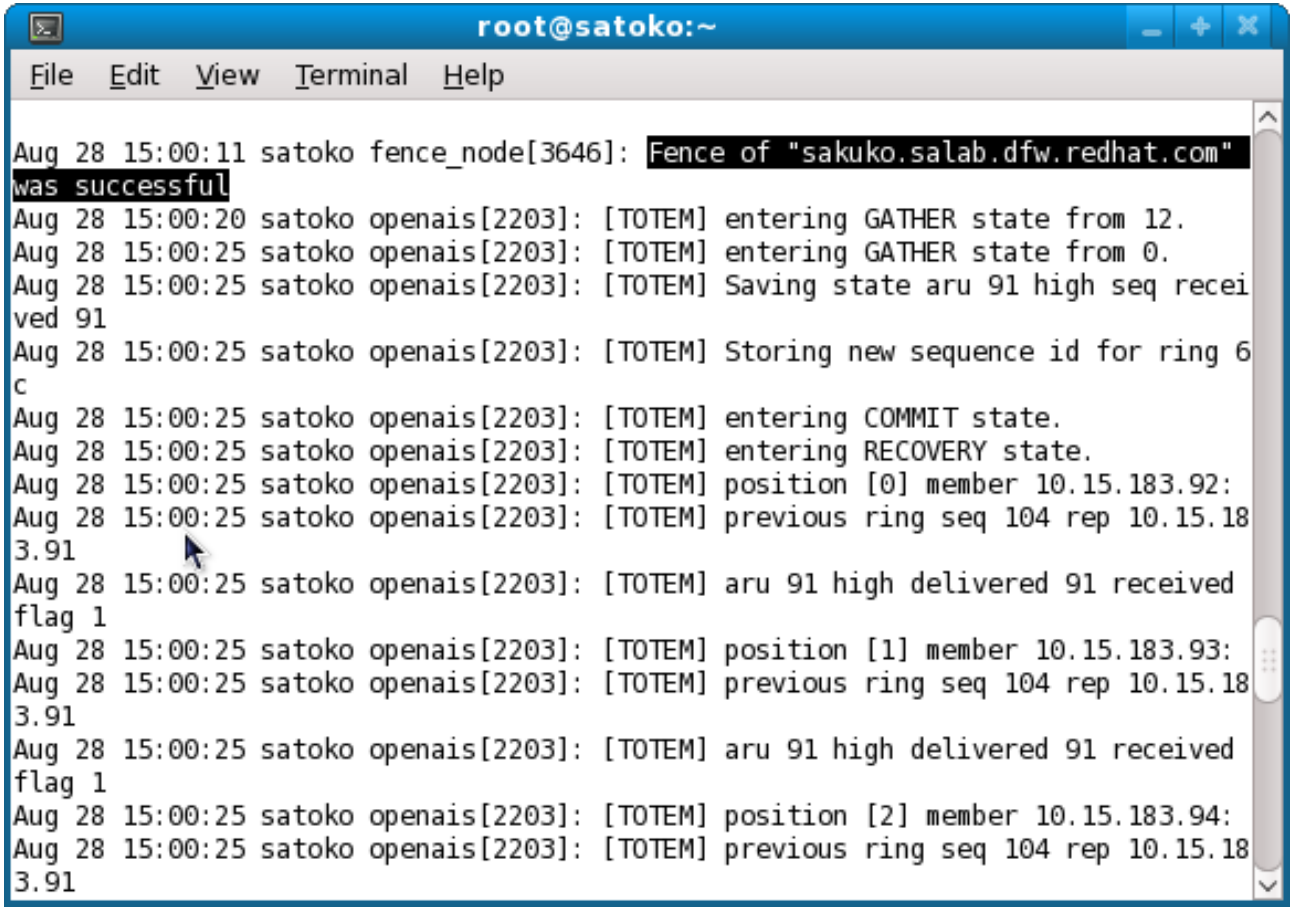

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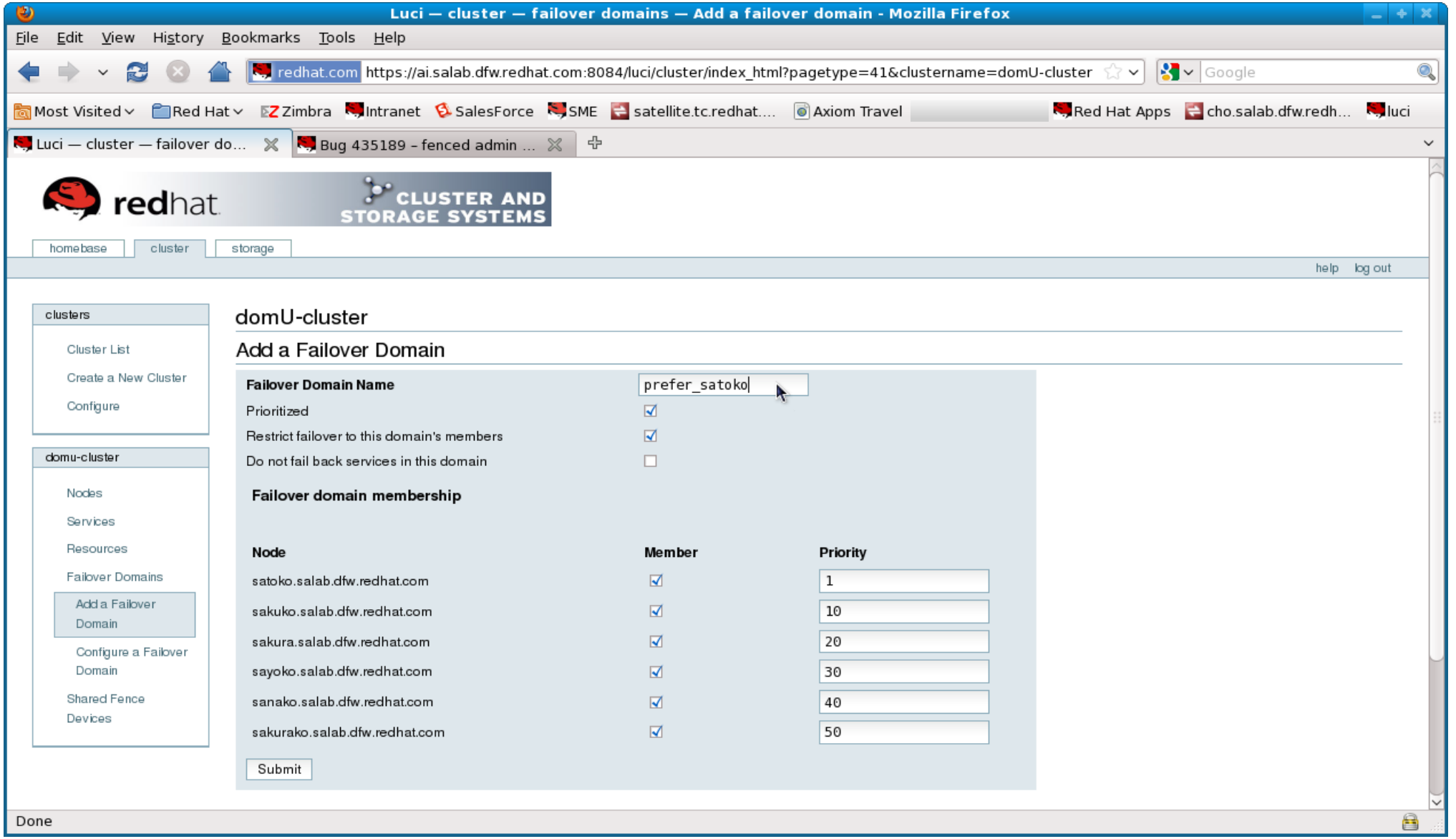
Set up the clustered app on the domU cluster

- Define failover domain(s) for the app you want to run on this domU cluster
  - In this case, a simple Apache web server with an NFS mounted /var/www/html and a floating IP address
  - Here I've defined a FD prefer_satoko



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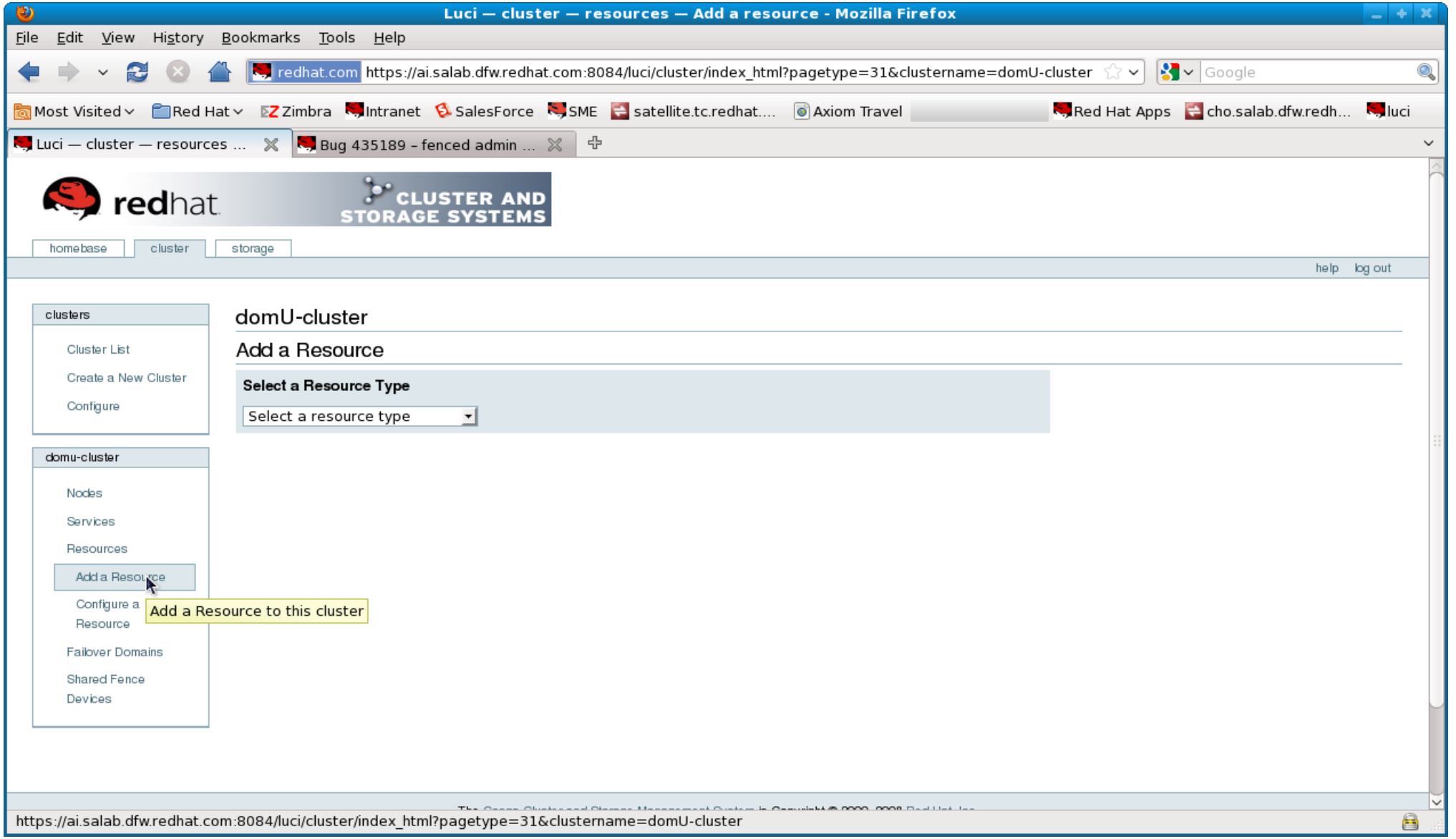
Set up the clustered app on the domU cluster

- Define resources for the service
  - Cluster Tab
  - Cluster Name
  - Resources
  - Add a Resource
    - IP address
    - NFS mount
    - Script



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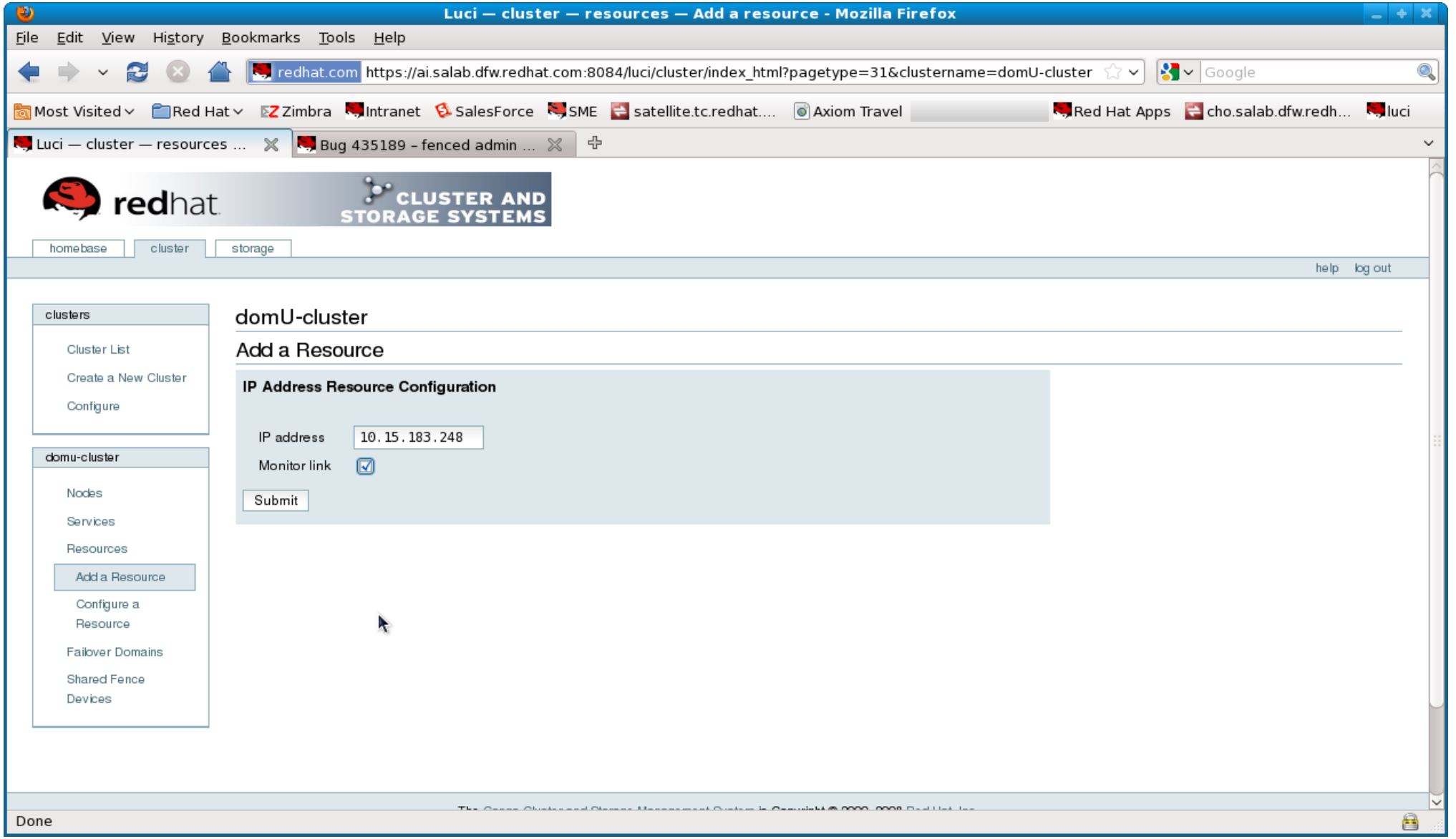
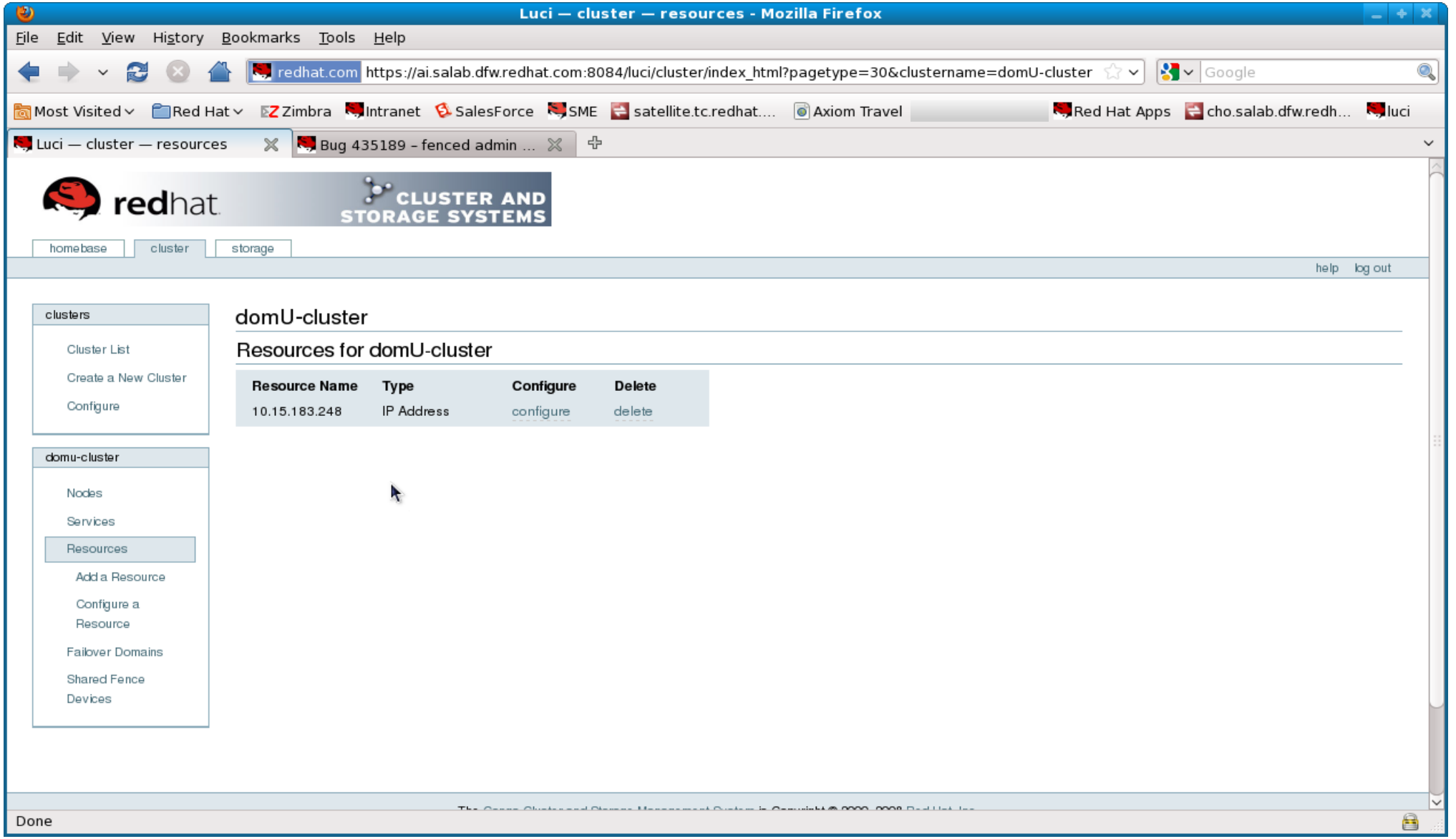

Luci — cluster — resources — Add a resource - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=31&clustername=domU-cluster
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — resources ...
Bug 435189 – fenced admin ...
redhat
CLUSTER AND STORAGE SYSTEMS
homebase
cluster
storage
help
log out
clusters
Cluster List
Create a New Cluster
Configure
domu-cluster
Nodes
Services
Resources
Add a Resource
Configure a Resource
Failover Domains
Shared Fence Devices
domU-cluster
Add a Resource
IP Address Resource Configuration
IP address
10.15.183.248
Monitor link
Submit
Done



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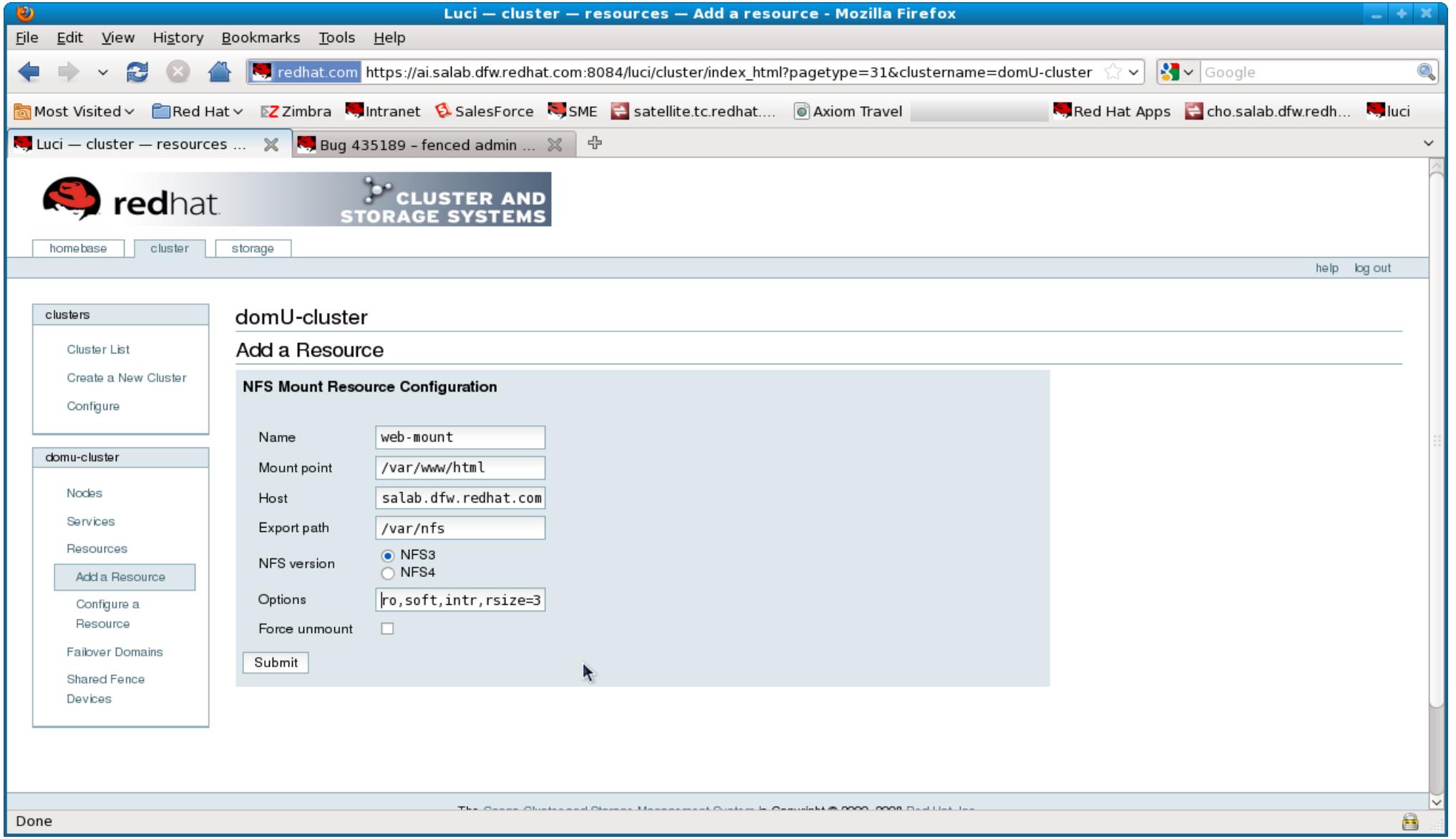

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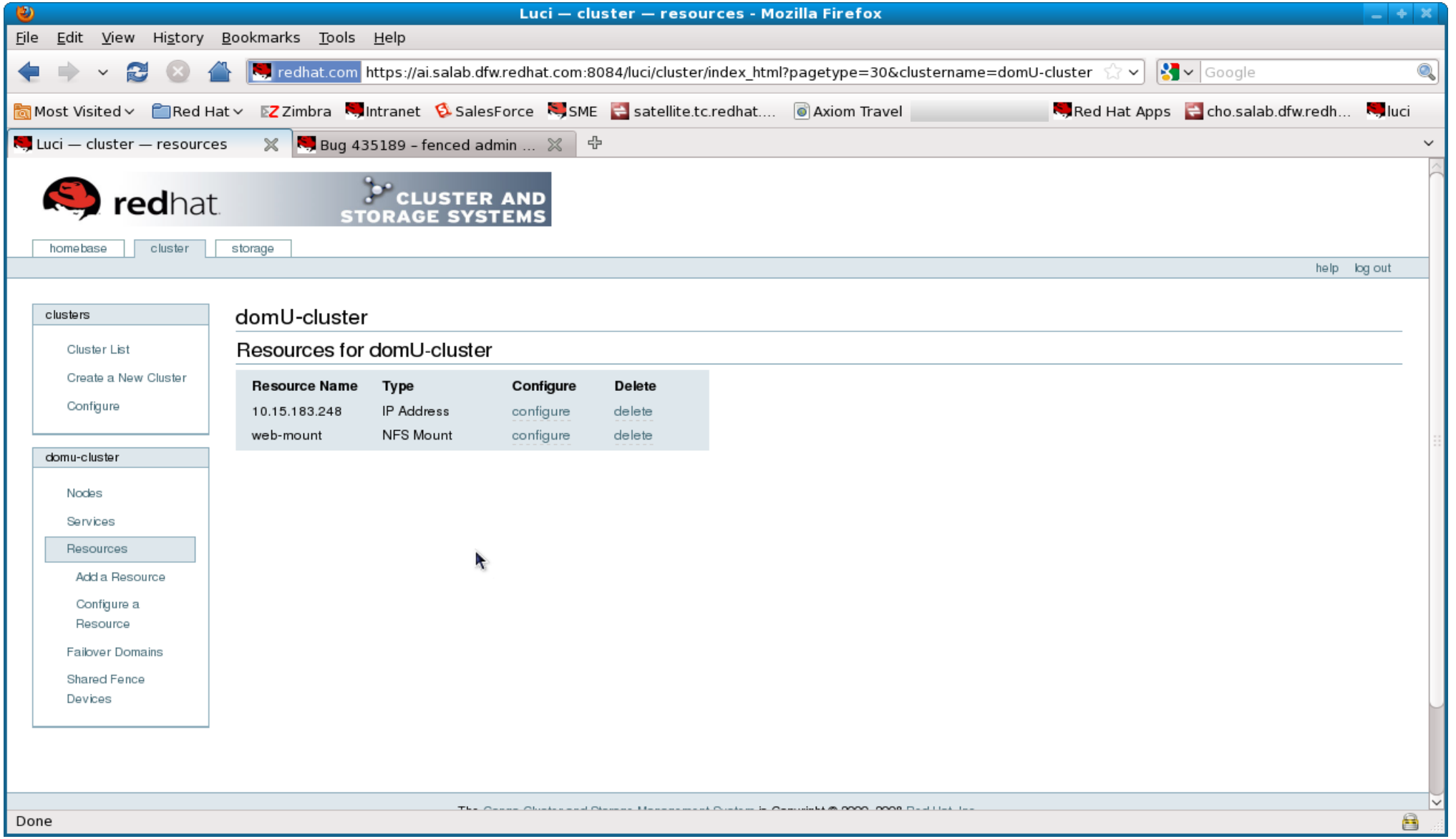

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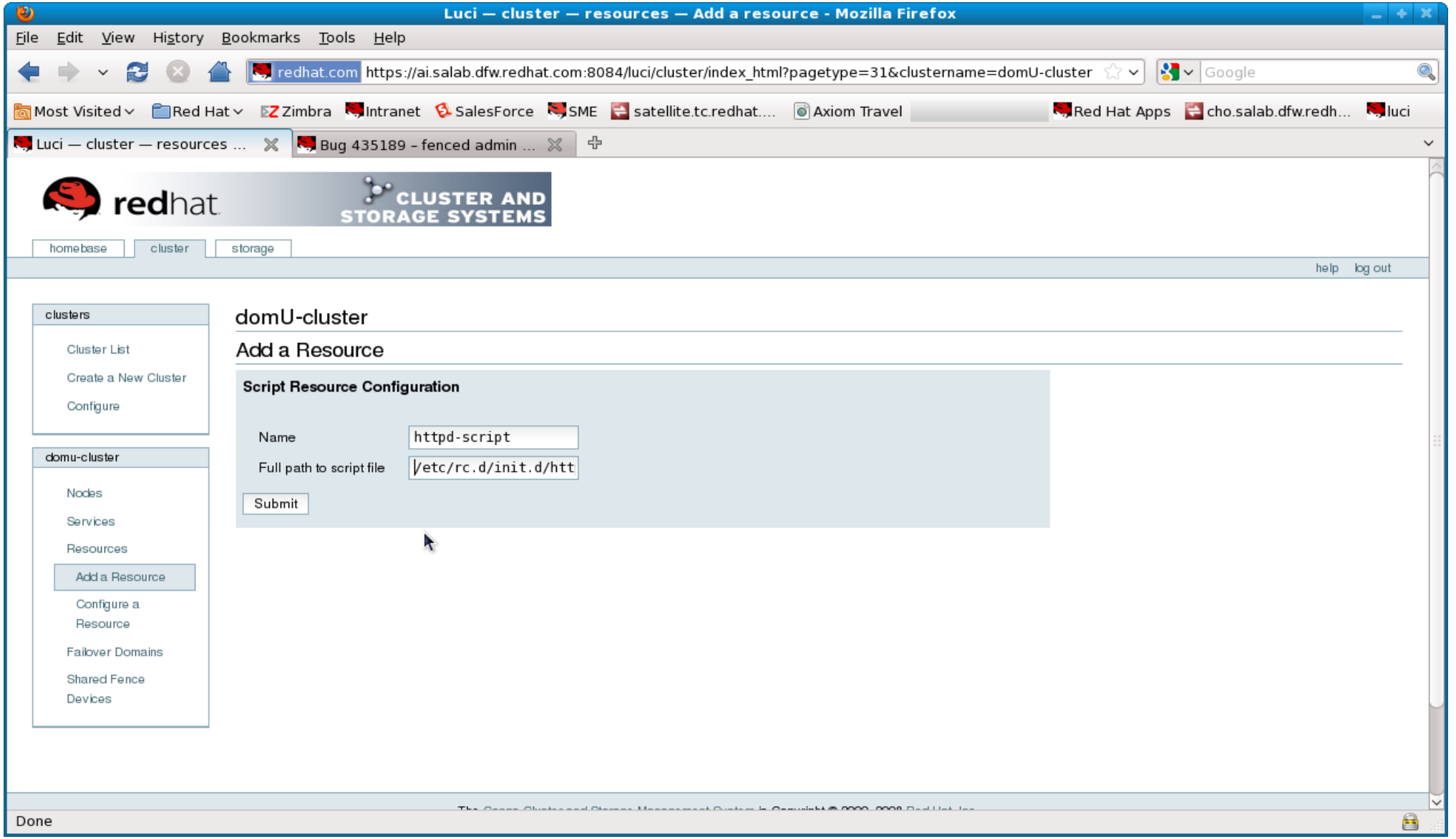

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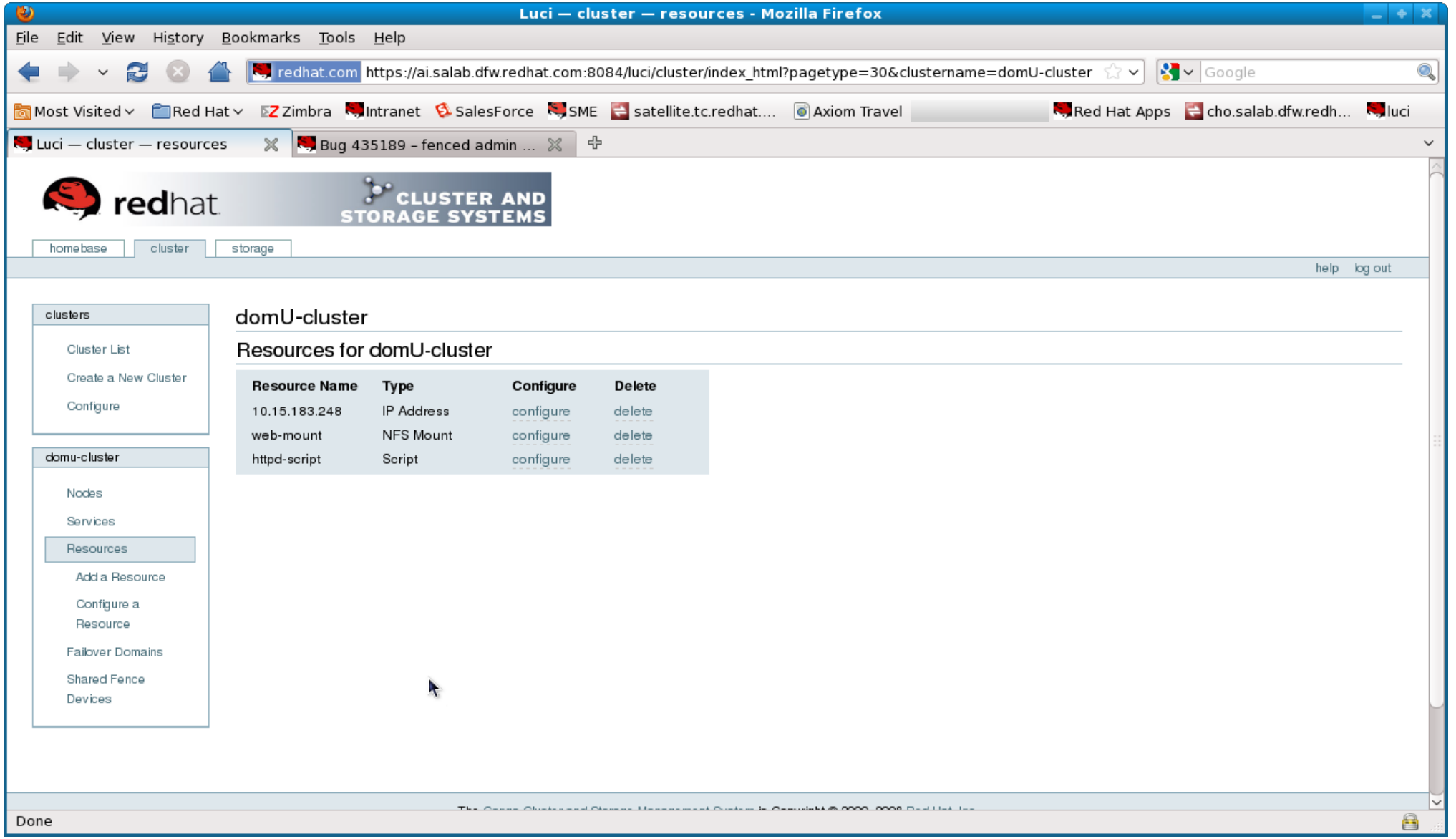

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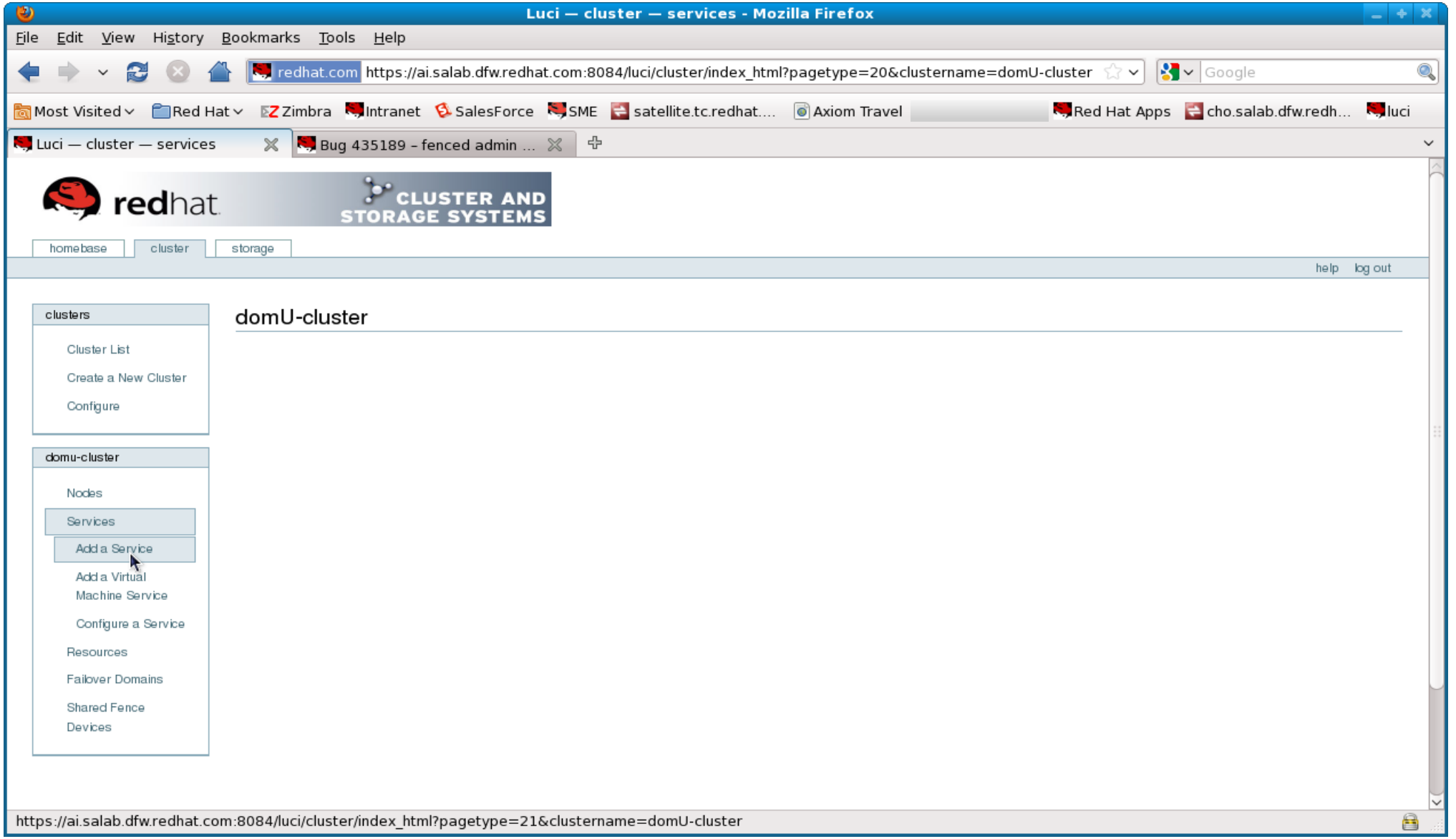
Set up the clustered app on the domU cluster

Define a service which uses all of those resources

- Cluster Tab
- Cluster Name
- Services

Set up the clustered app on the domU cluster

- Define a service which uses all of those resources
  - Add a Service
    - Name
    - Auto-start?
    - Enable NFS lock workarounds
    - Run exclusive
    - FD
    - Recovery Policy
    - Maximum number of restart failures before relocating
    - Length of time in seconds after which to forget a restart



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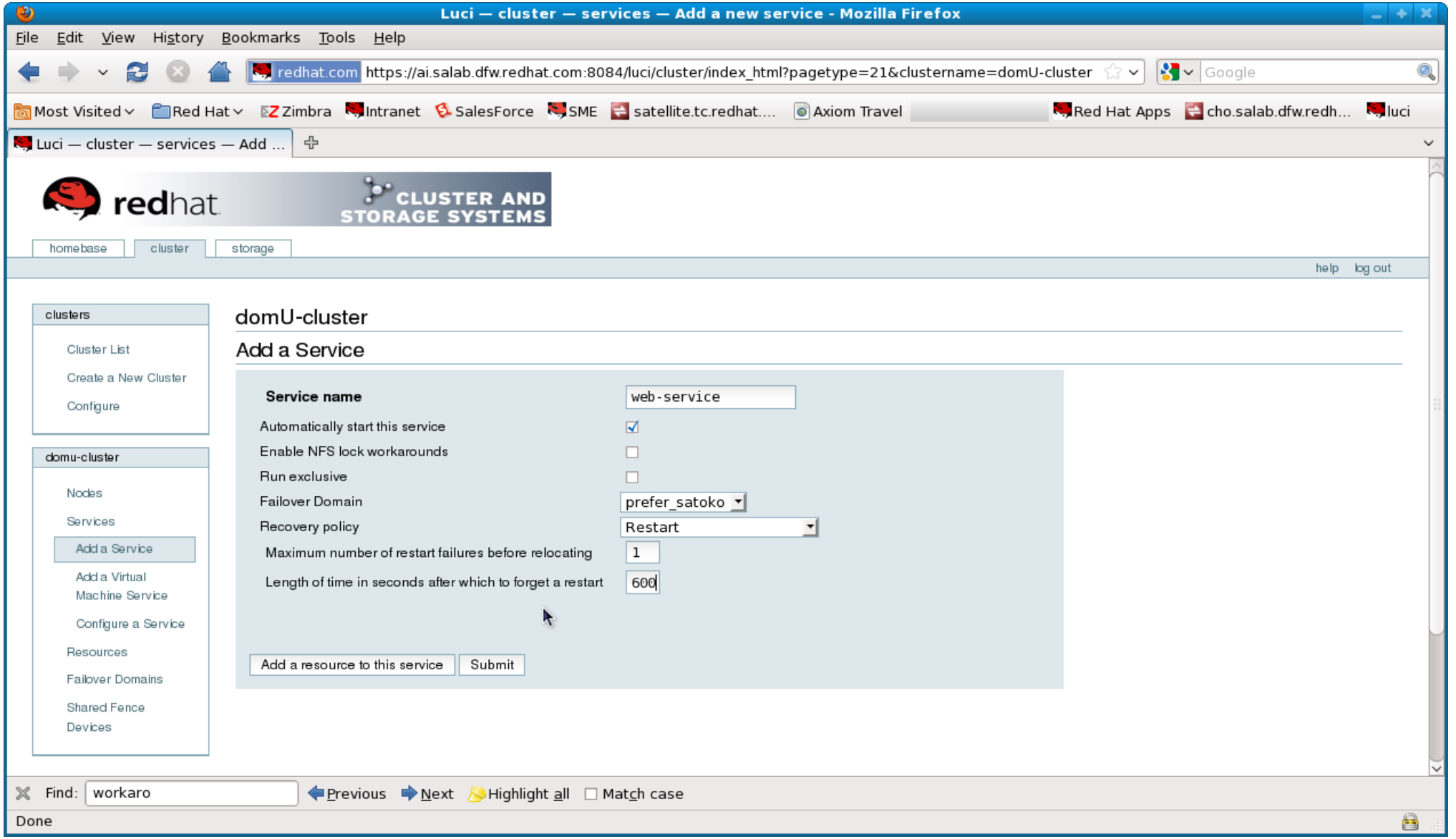

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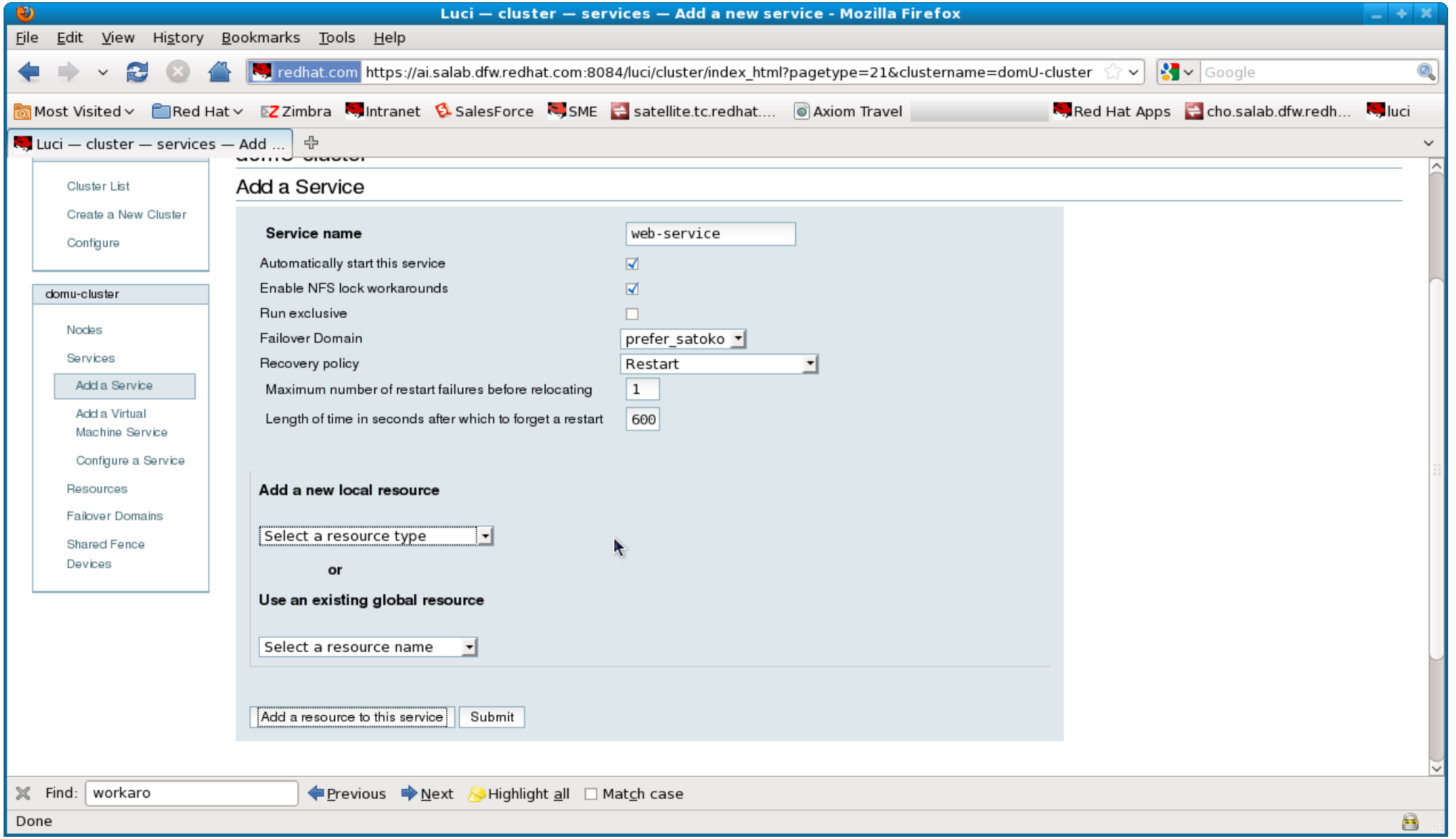
Set up the clustered app on the domU cluster

- Define a service which uses all of those resources
  - Add Global Resources to the service
    - IP address
    - NFS Mount
    - Script



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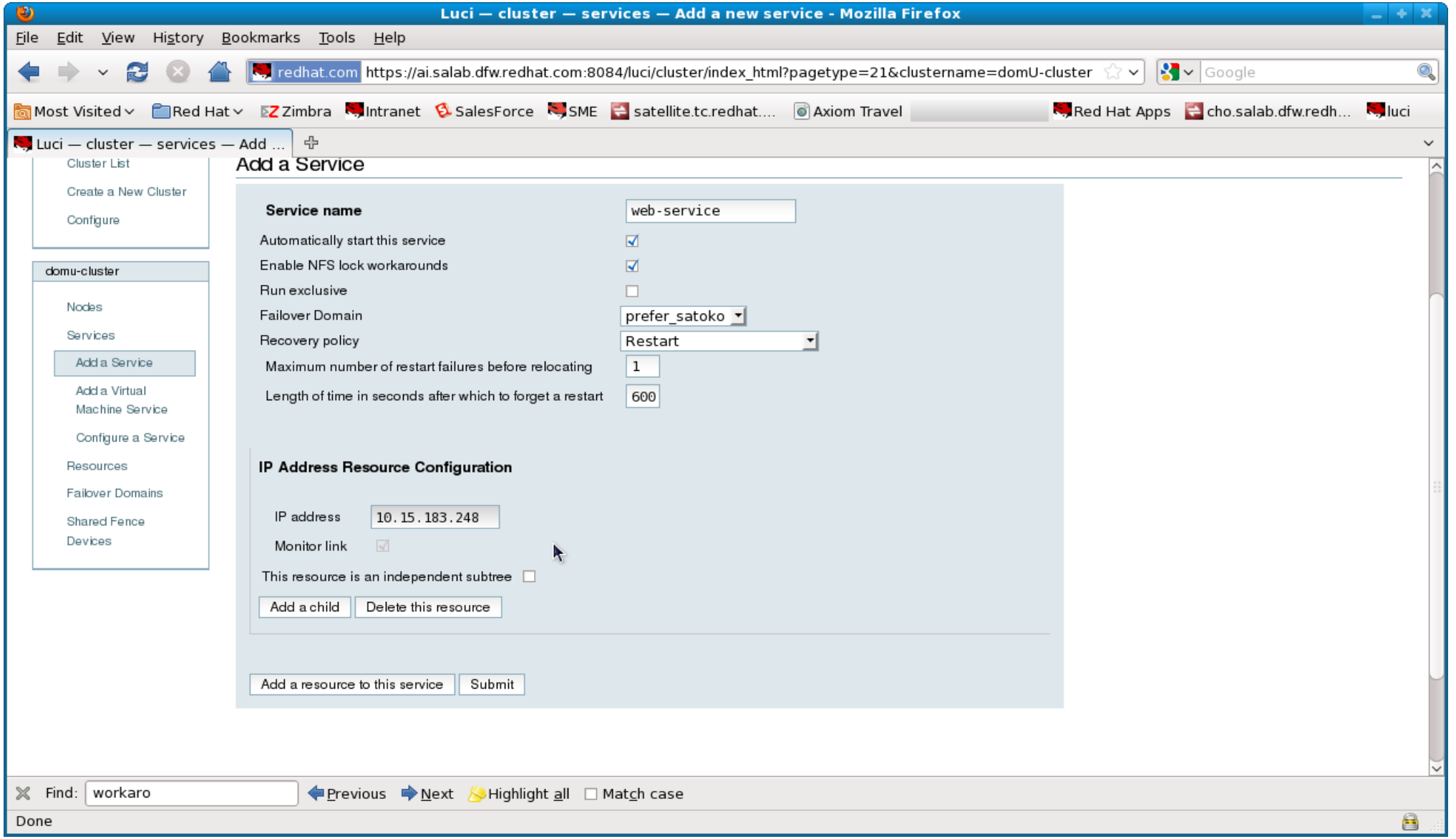

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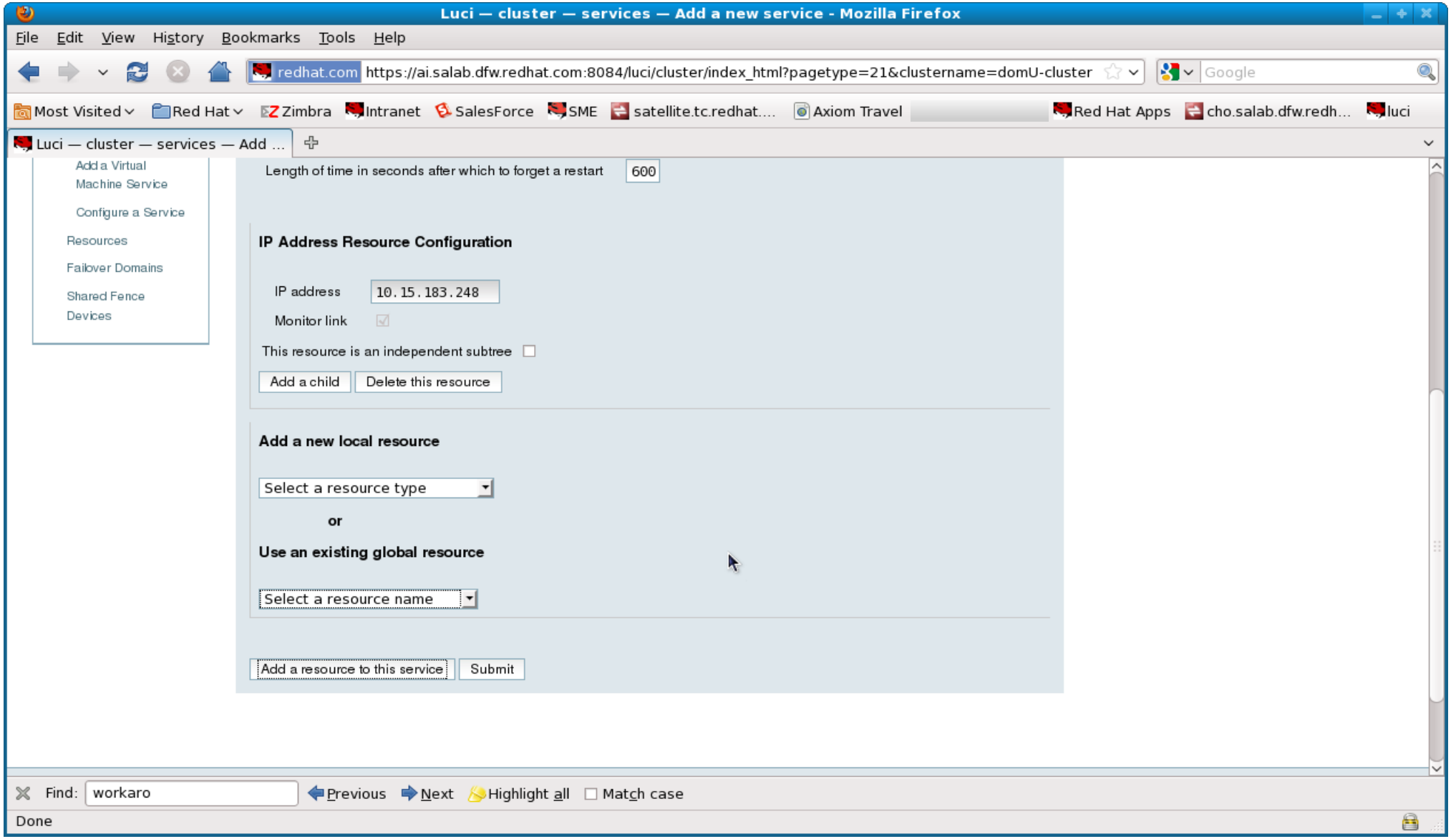

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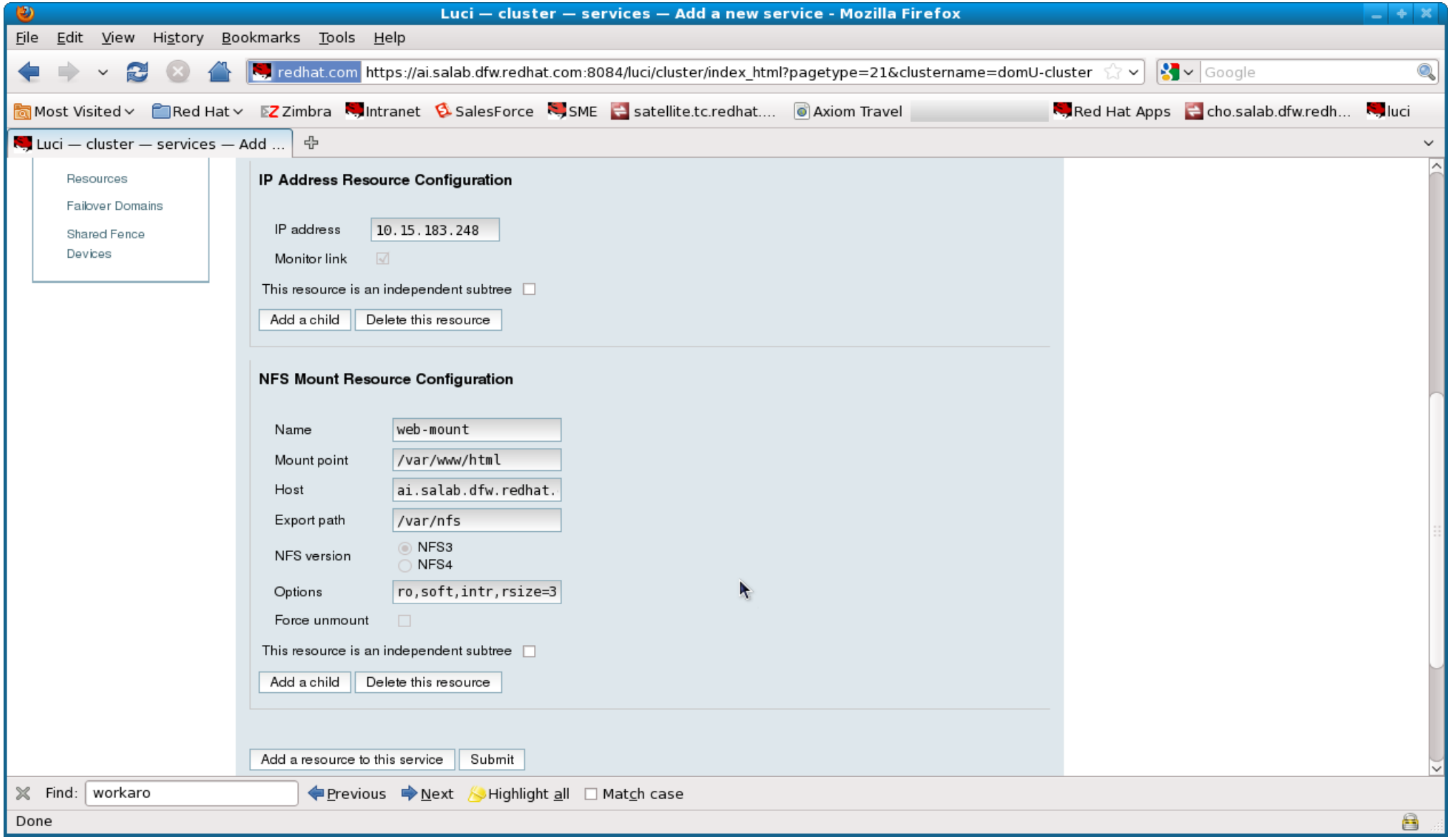

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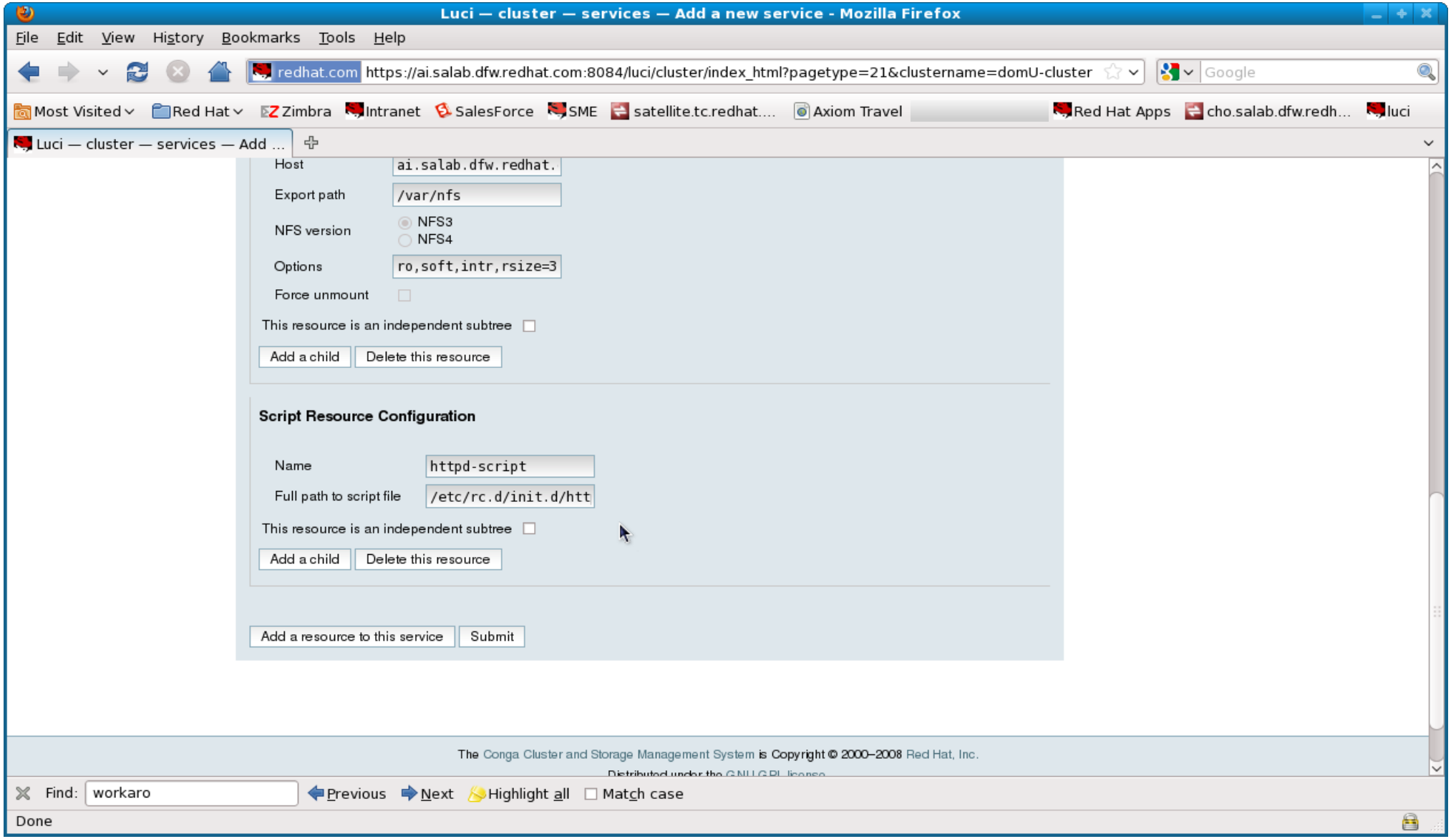

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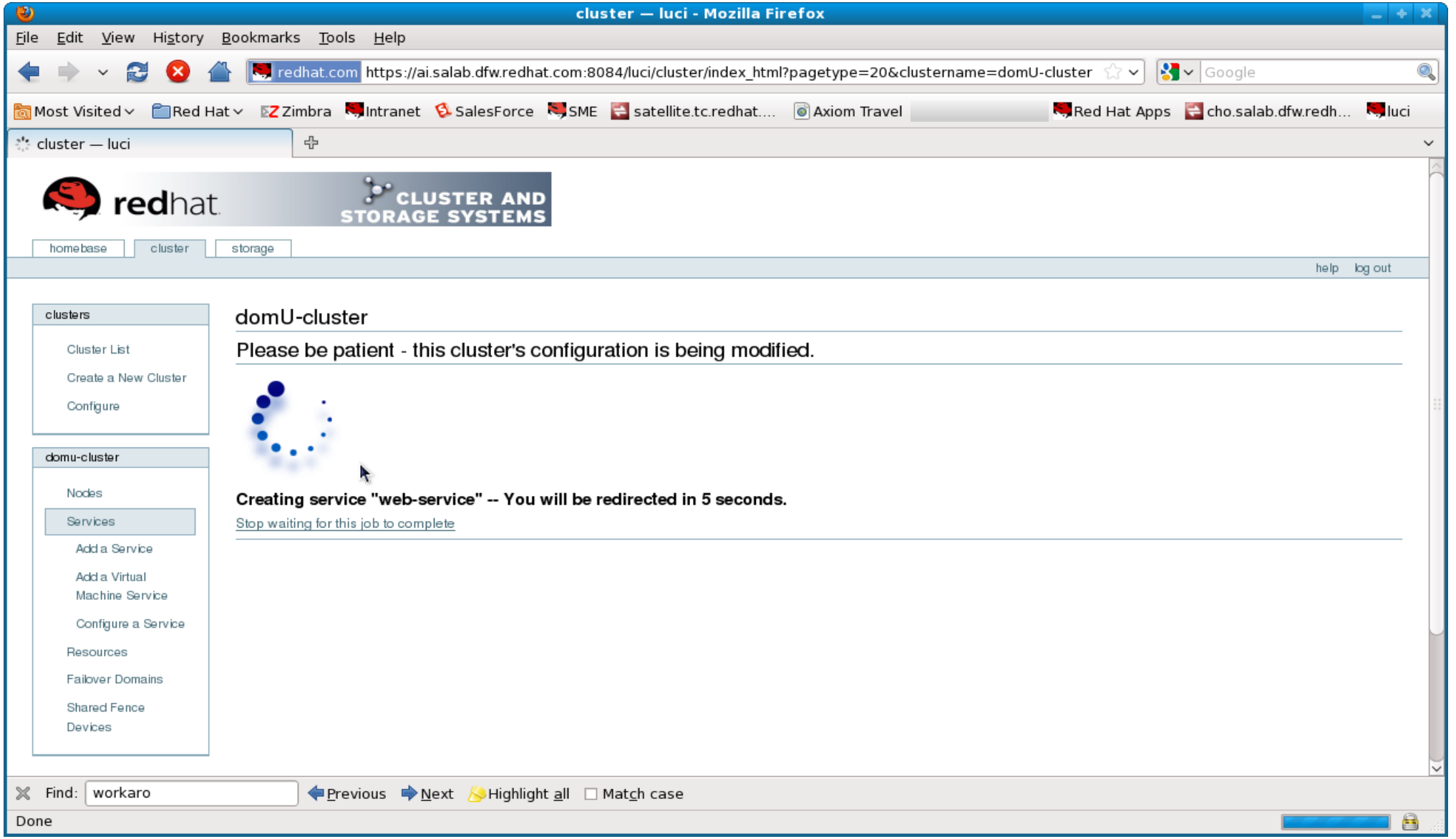
Set up the clustered app on the domU cluster

Submit and confirm

Open the IP address defined in the resource definition in your web browser



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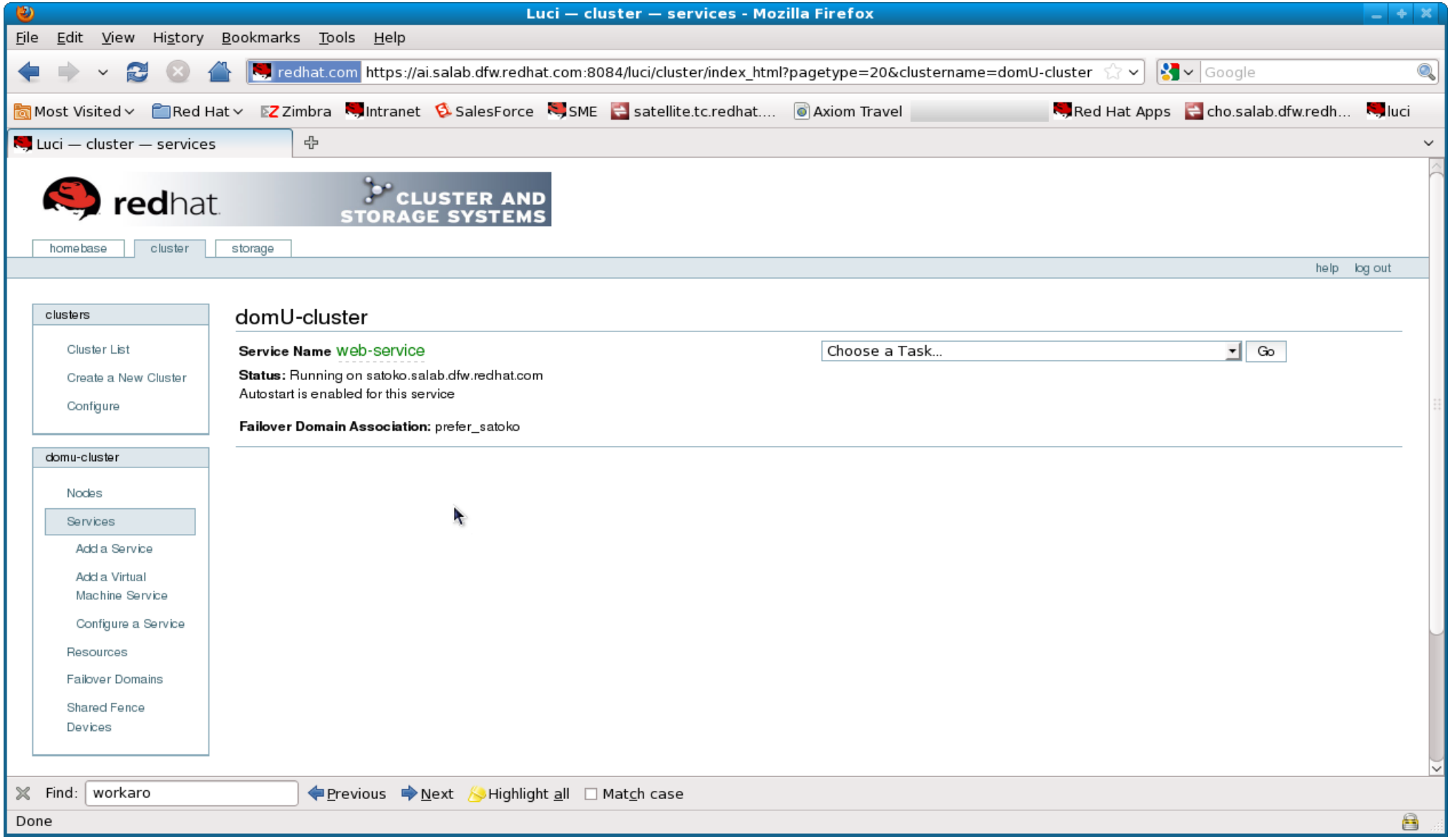

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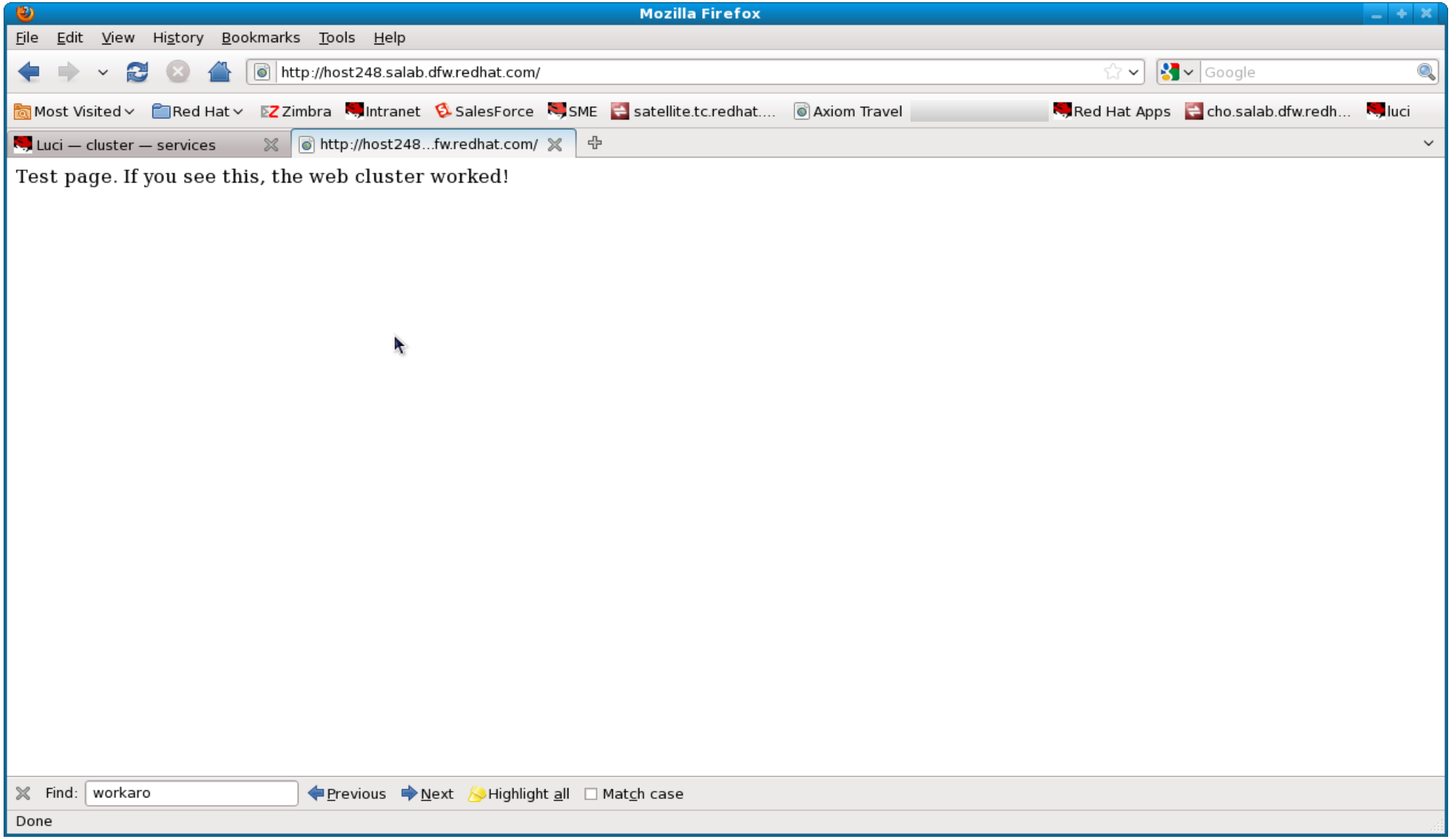

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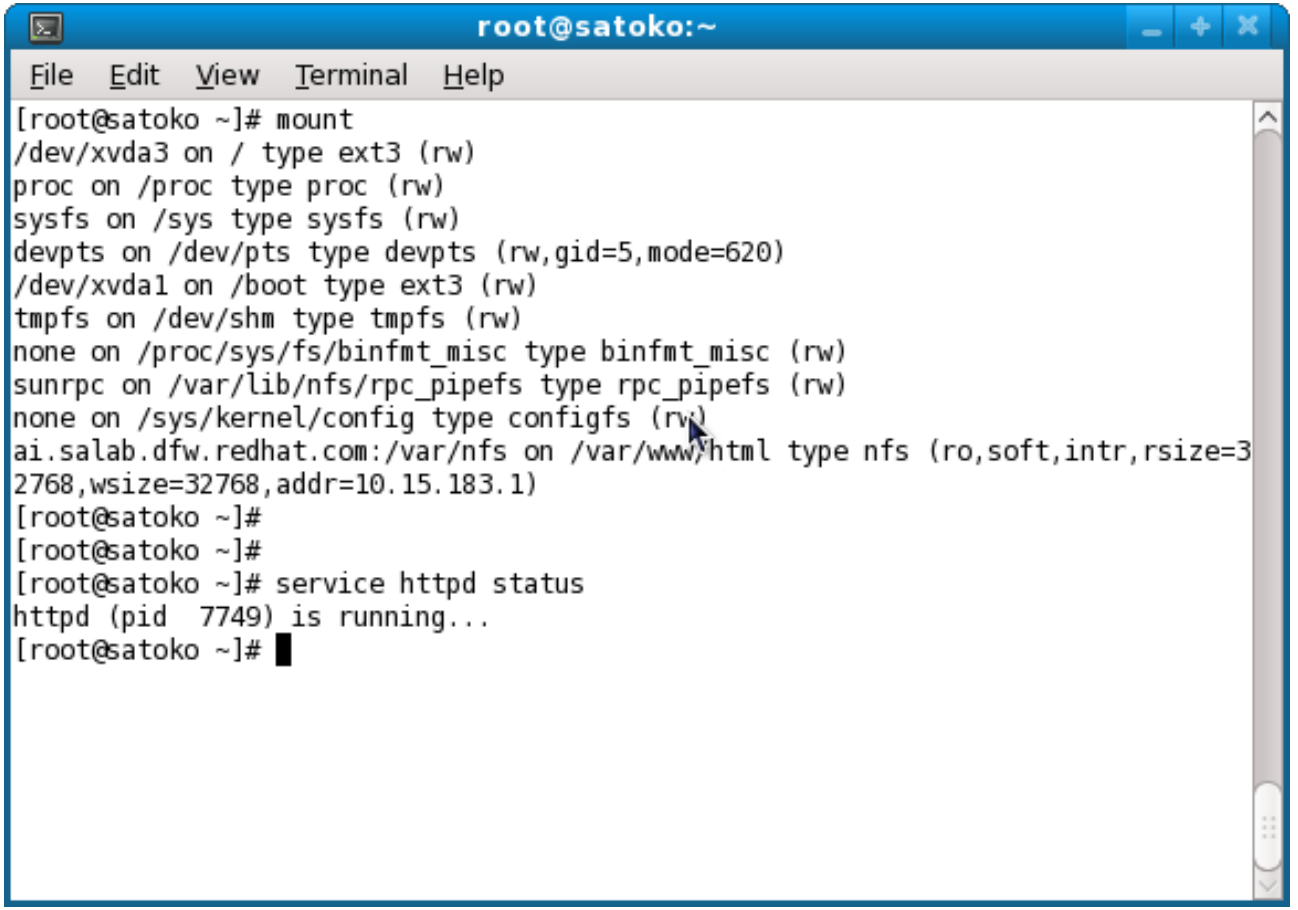
root@satoko:~
File Edit View Terminal Help
[root@satoko ~]# mount
/dev/xvda3 on / type ext3 (rw)
proc on /proc type proc (rw)
sysfs on /sys type sysfs (rw)
devpts on /dev/pts type devpts (rw,gid=5,mode=620)
/dev/xvda1 on /boot type ext3 (rw)
tmpfs on /dev/shm type tmpfs (rw)
none on /proc/sys/fs/binfmt_misc type binfmt_misc (rw)
sunrpc on /var/lib/nfs/rpc_pipefs type rpc_pipefs (rw)
none on /sys/kernel/config type configfs (rw)
ai.salab.dfw.redhat.com:/var/nfs on /var/www/html type nfs (ro,soft,intr,rsize=3
2768,wsize=32768,addr=10.15.183.1)
[root@satoko ~]#
[root@satoko ~]#
[root@satoko ~]# service httpd status
httpd (pid 7749) is running...
[root@satoko ~]#

Set up the clustered app on the domU cluster

Test migration and failover

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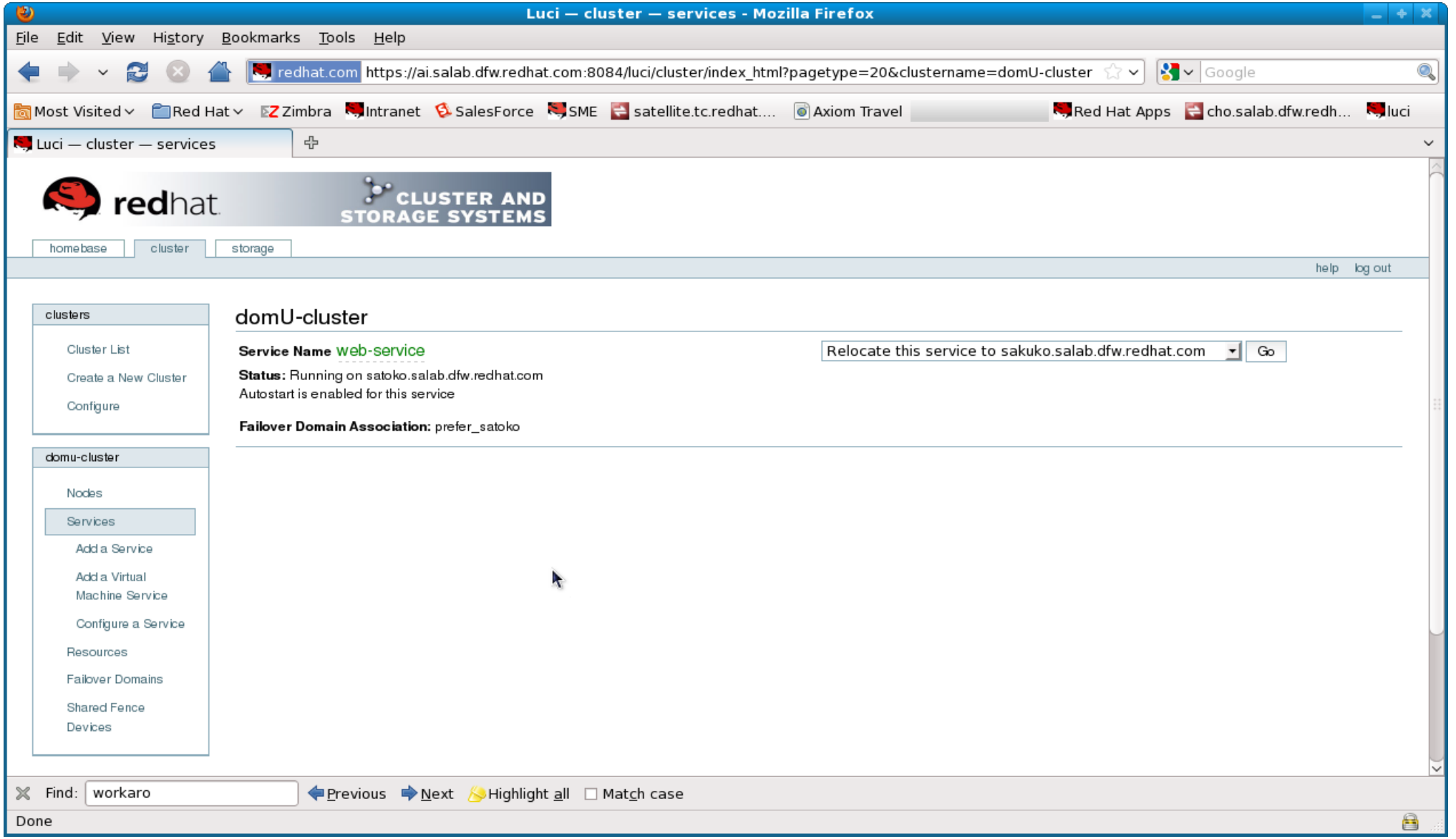

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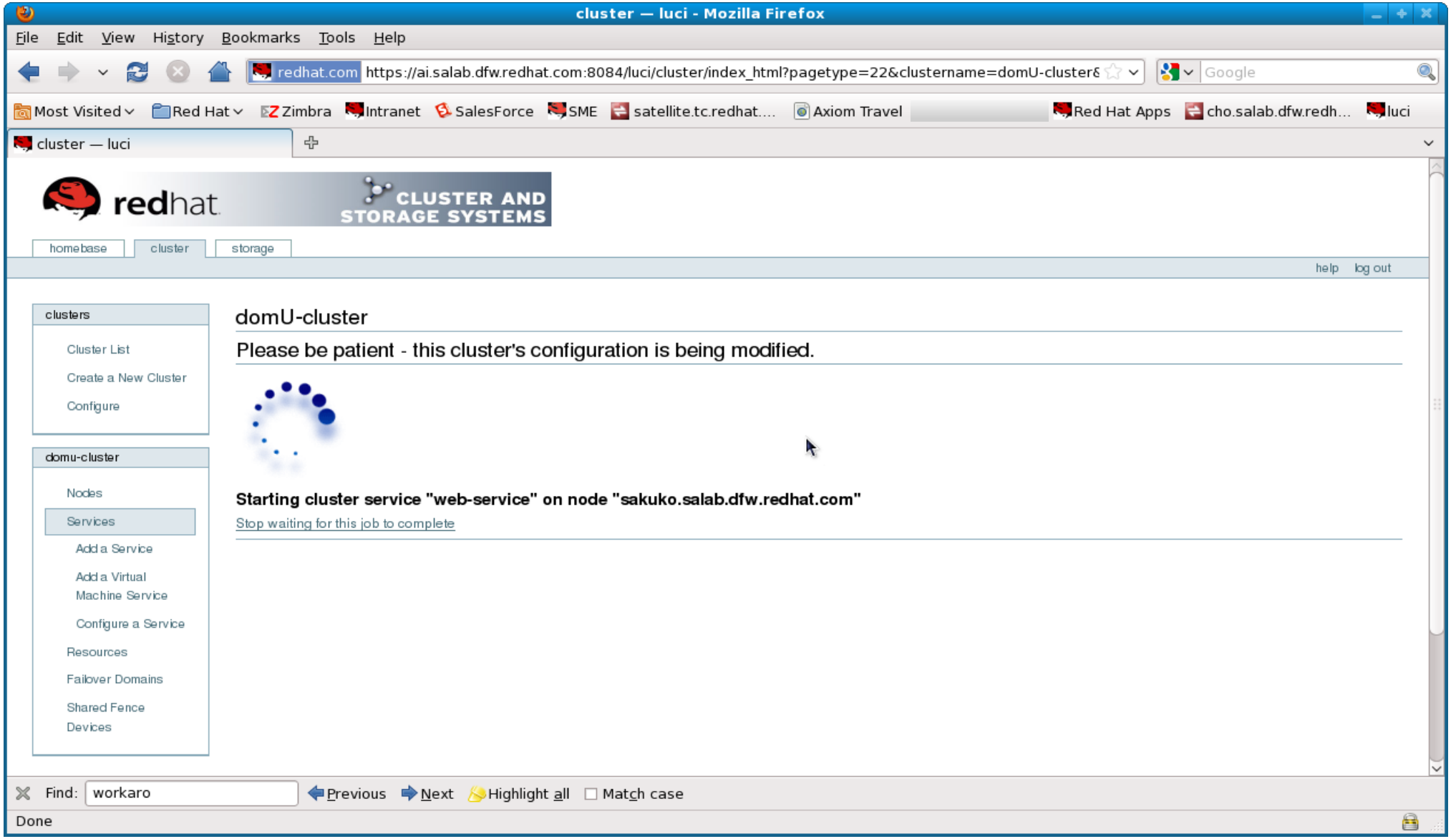

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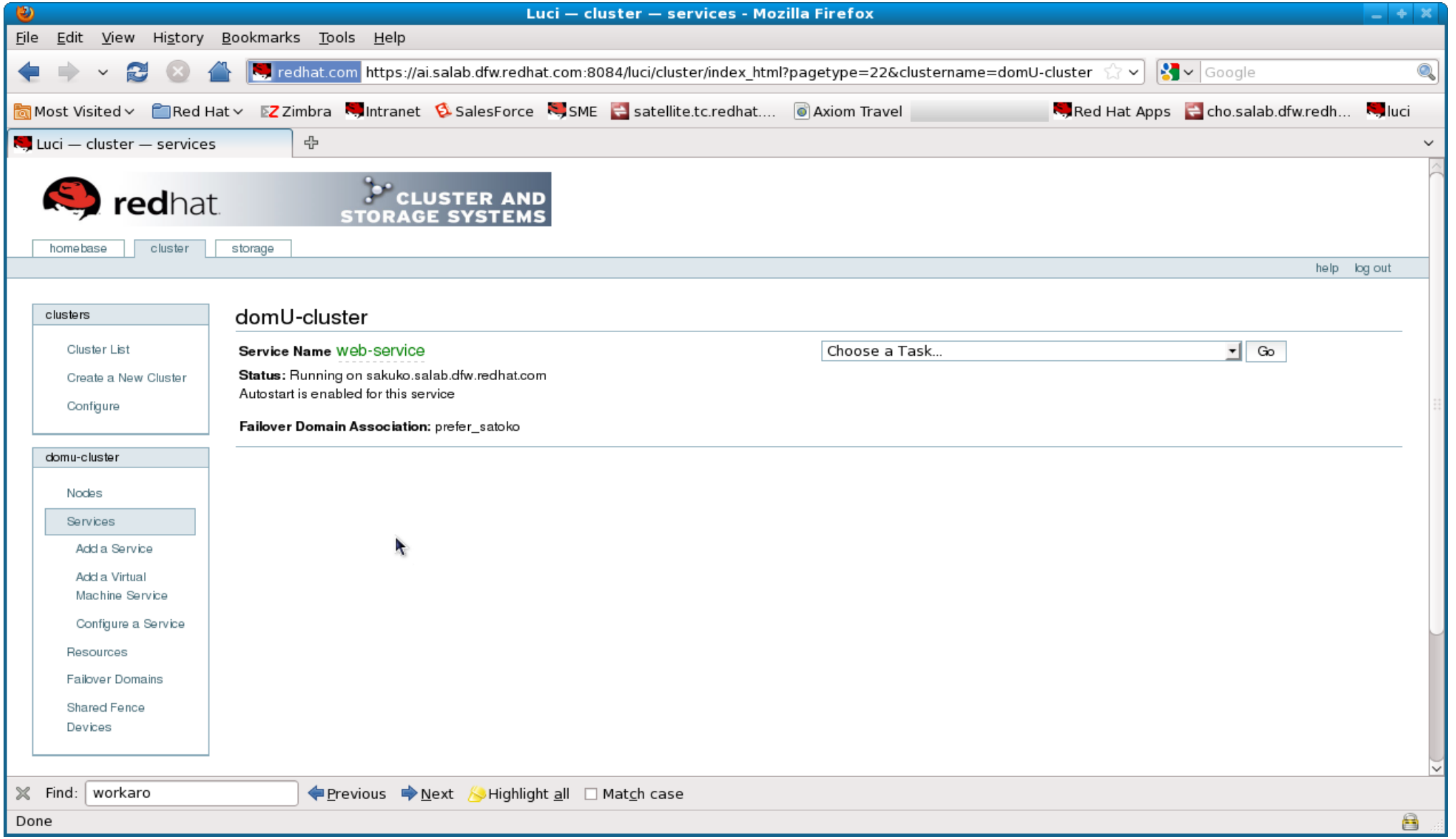

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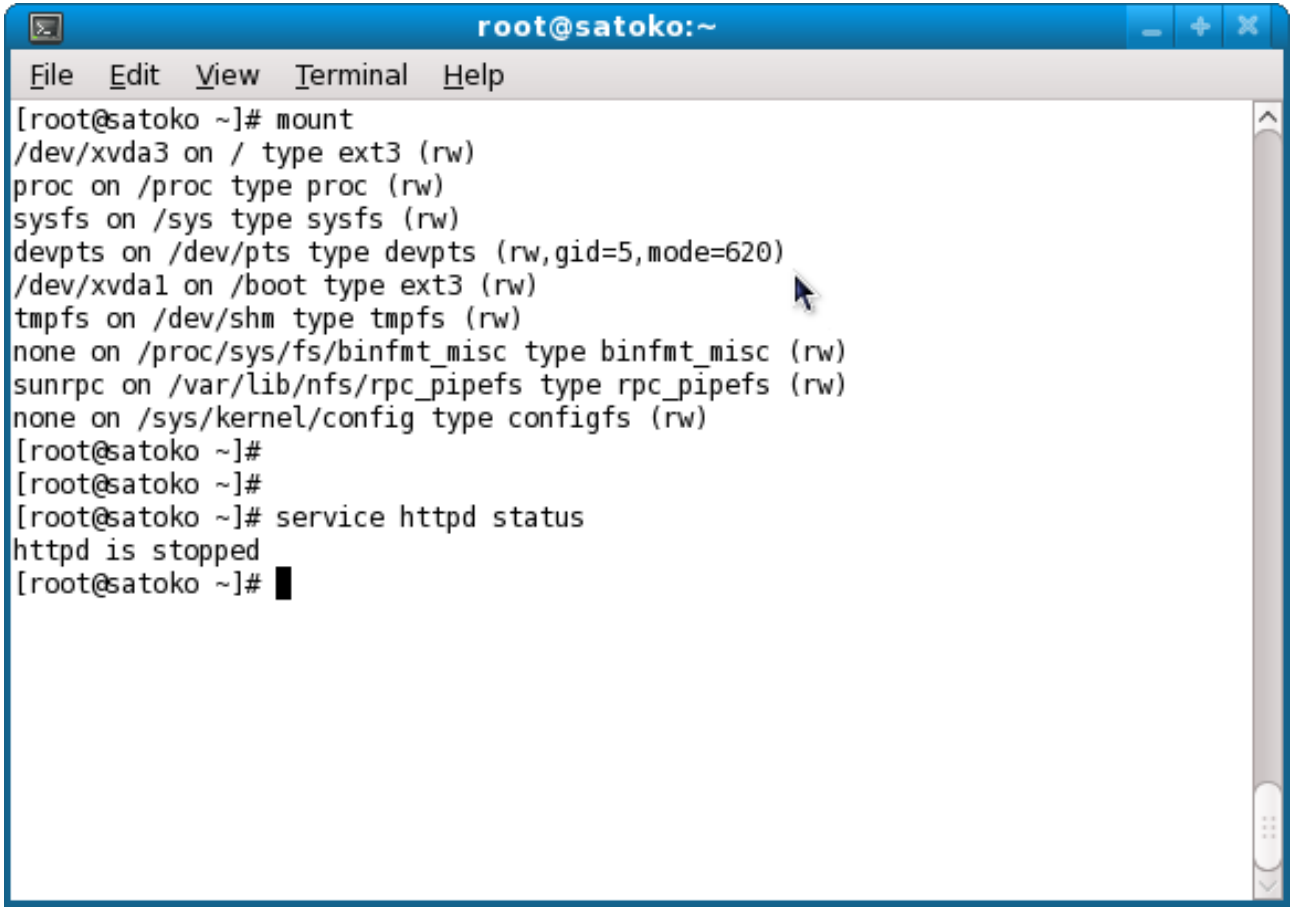

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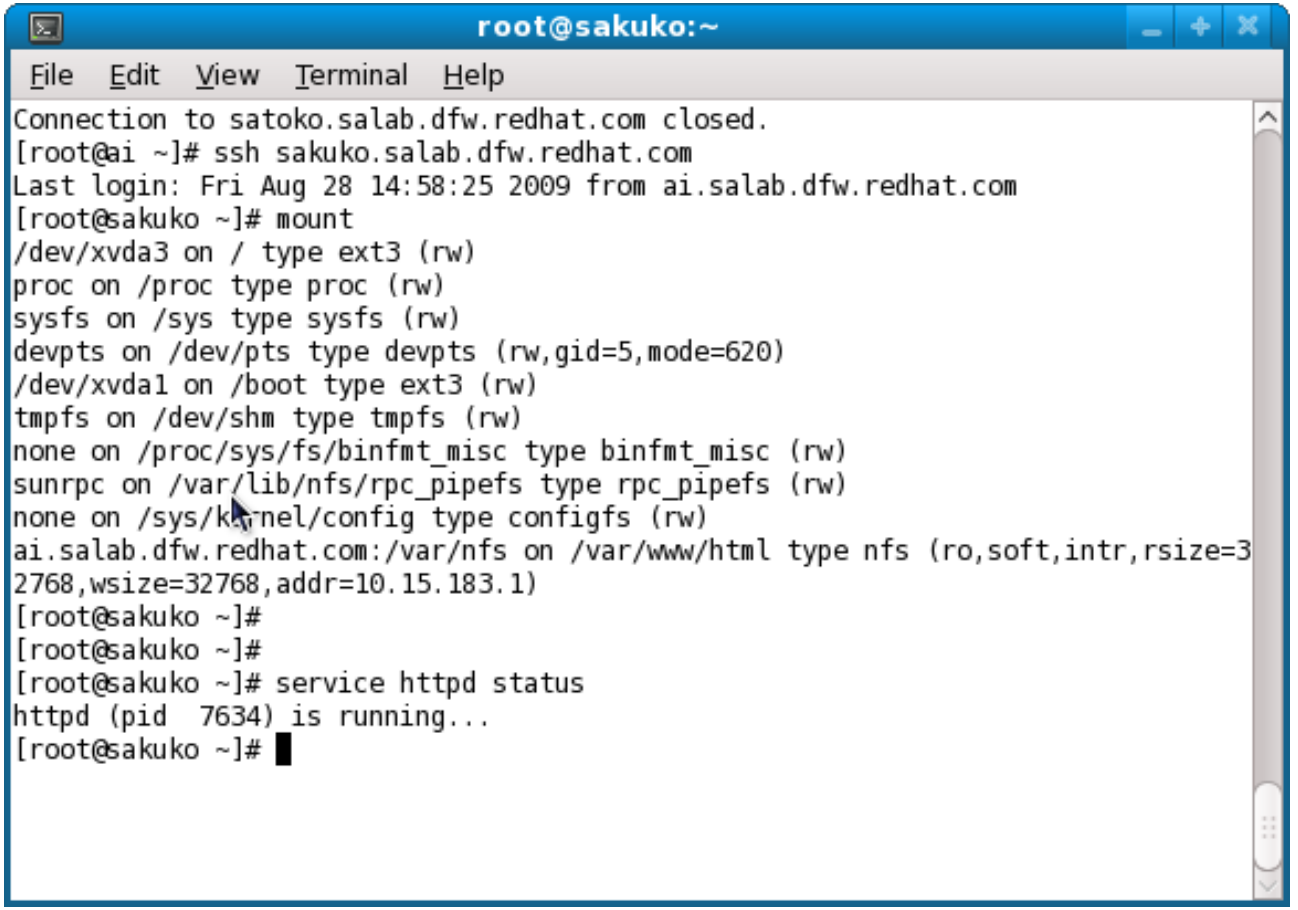
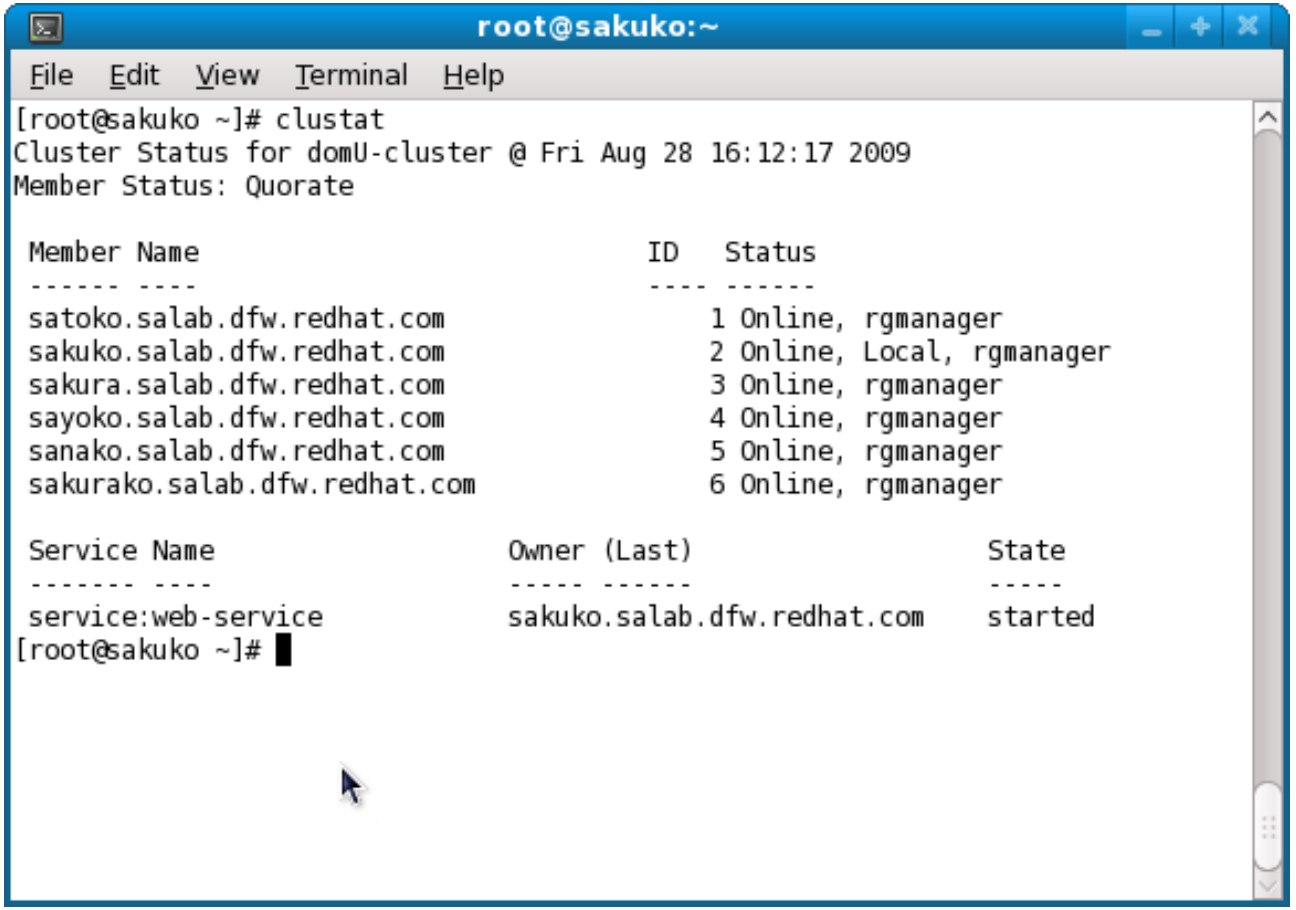

root@sakuko:~
File Edit View Terminal Help
Connection to satoko.salab.dfw.redhat.com closed.
[root@ai ~]# ssh sakuko.salab.dfw.redhat.com
Last login: Fri Aug 28 14:58:25 2009 from ai.salab.dfw.redhat.com
[root@sakuko ~]# mount
/dev/xvda3 on / type ext3 (rw)
proc on /proc type proc (rw)
sysfs on /sys type sysfs (rw)
devpts on /dev/pts type devpts (rw,gid=5,mode=620)
/dev/xvda1 on /boot type ext3 (rw)
tmpfs on /dev/shm type tmpfs (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)
ai.salab.dfw.redhat.com:/var/nfs on /var/www/html type nfs (ro,soft,intr,rsize=32768,wsize=32768,addr=10.15.183.1)
[root@sakuko ~]#
[root@sakuko ~]#
[root@sakuko ~]# service httpd status
httpd (pid 7634) is running...
[root@sakuko ~]#


root@sakuko:~
File Edit View Terminal Help
[root@sakuko ~]# clustat
Cluster Status for domU-cluster @ Fri Aug 28 16:12:17 2009
Member Status: Quorate
Member Name ID Status
satoko.salab.dfw.redhat.com 1 Online, rgmanager
sakuko.salab.dfw.redhat.com 2 Online, Local, rgmanager
sakura.salab.dfw.redhat.com 3 Online, rgmanager
sayoko.salab.dfw.redhat.com 4 Online, rgmanager
sanako.salab.dfw.redhat.com 5 Online, rgmanager
sakurako.salab.dfw.redhat.com 6 Online, rgmanager
Service Name Owner (Last) State
service:web-service sakuko.salab.dfw.redhat.com started
[root@sakuko ~]#

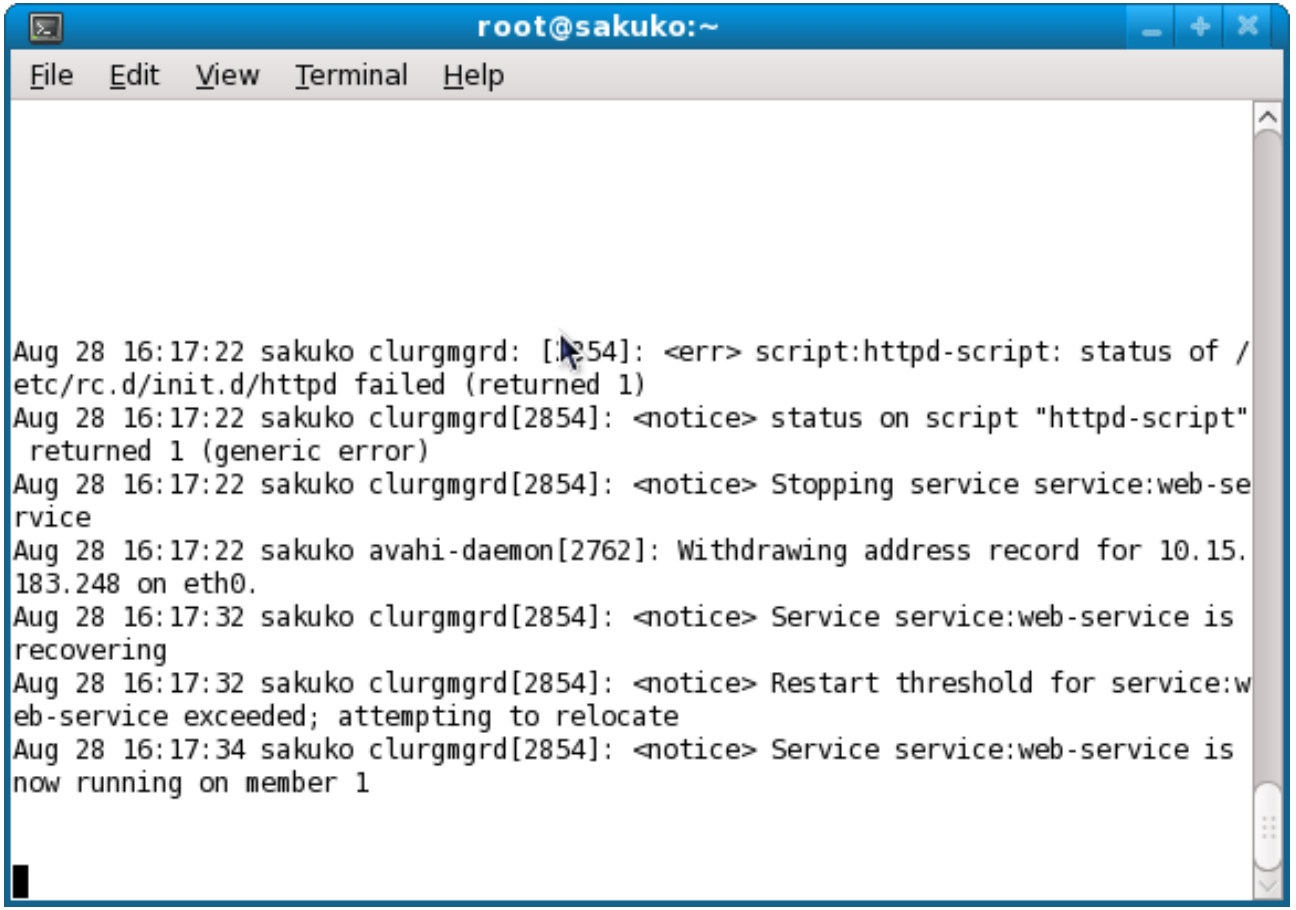
Set up the clustered app on the domU cluster

Test, test, test

Kill the app

Crash the domU

Crash the dom0


root@sakuko:~
File Edit View Terminal Help
Aug 28 16:17:22 sakuko clurgmgrd: [2854]: <err> script:httpd-script: status of /etc/rc.d/init.d/httpd failed (returned 1)
Aug 28 16:17:22 sakuko clurgmgrd[2854]: <notice> status on script "httpd-script" returned 1 (generic error)
Aug 28 16:17:22 sakuko clurgmgrd[2854]: <notice> Stopping service service:web-service
Aug 28 16:17:22 sakuko avahi-daemon[2762]: Withdrawing address record for 10.15.183.248 on eth0.
Aug 28 16:17:32 sakuko clurgmgrd[2854]: <notice> Service service:web-service is recovering
Aug 28 16:17:32 sakuko clurgmgrd[2854]: <notice> Restart threshold for service:web-service exceeded; attempting to relocate
Aug 28 16:17:34 sakuko clurgmgrd[2854]: <notice> Service service:web-service is now running on member 1

WOW! You made it this far!

This should give you a good start - it is not, and can not be, comprehensive.

To learn a lot more about virtualization, take RH401:

http://tinyurl.com/5gnj2f

To learn a lot more about clustering, look at RH436:

http://tinyurl.com/o89lnr

If you need help getting this all set up, contact Red Hat Consulting:

http://www.redhat.com/consulting/

Thank you very much!

Feel free to reach out to me at thomas@redhat.com, or Lon at lhh@redhat.com

Updated slides at

http://people.redhat.com/tcameron

http://www.redhat.com/promo/summit

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http://www.redhat.com/summit-survey

QUESTIONS?

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Clustering Virtual Machines and Applications with Red Hat Enterprise Linux

Thomas Cameron, RHCE, RHCX, CNE, MCSE, MCT
Solutions Architect Team Lead, Red Hat
Lon Hohberger
Senior Cluster Software Engineer, Red Hat

September 2, 2009

presented by

This Presentation

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Agenda

Red Hat and Virtualization

Architecture

Configure Raw Storage and iSCSI

- On the Target
- On the Client

Define dom0 Cluster

- Conga

Configure Shared Storage for dom0 Machines

- Conga

Install domU machines

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Agenda

Set up cluster of domU machines

Set up Application Cluster on domU machines

Questions

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Red Hat and Virtualization

Red Hat leads the way in Open Source virtualization

- Highly successful entry into virtualization with Xen at the release of RHEL 5.0
- Acquired Qumranet, the company which developed KVM September 2008
- KVM included in RHEL 5.4 – more choice, more flexibility!
- Announcing Red Hat Enterprise Virtualization (RHEV), a KVM based hypervisor and enterprise virtualization management system at Summit this year.

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Architecture

ai - iSCSI target and Conga server. Not part of the cluster, just storage and management. Kickstarted with cluster-storage and clustering groups and scsi-target-utils package

ami, ayame and botan - iSCSI initiators, dom0 cluster members. Kickstarted with virtualization, cluster-storage and clustering groups and iscsi-initiator-utils package

sakuko, sakura, sakurako, sanako, satoko and sayoko - domU machines. Kickstarted with cluster-storage and clustering groups. Running an Apache cluster.

All systems are on a gigabit ethernet network

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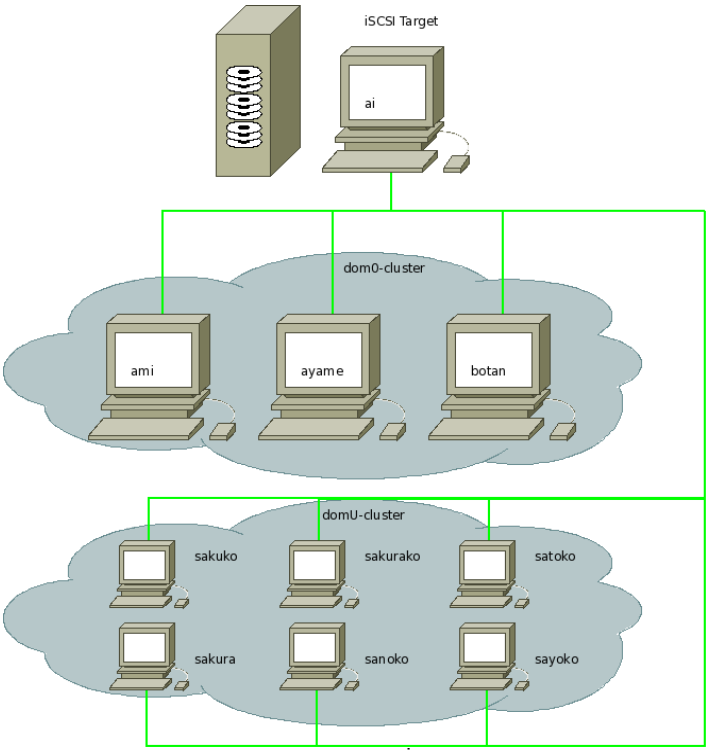
```
install
text
network --bootproto dhcp
url --url http://cho.salab.dfw.redhat.com/ty/xZSxYSae
lang en_US
langsupport --default en_US en_US
keyboard us
mouse none
zerombr yes
clearpart --all
part /boot --fstype=ext3 --size=100
part pv.01 --size=1000 --grow
part swap --size=2100
volgroup VolGroup00 pv.01
logvol / --vgname=VolGroup00 --name=LogVol00 --size=1 --grow
bootloader --location mbr
timezone --utc America/Chicago
auth --enablemd5 --enableshadow
rootpw --iscrypted $1$NSMQB/$4hPK9.OkxSs/bx3aI.l72/
selinux --disabled
reboot
firewall --disabled
skipx
repo --name=Cluster --baseurl=http://cho.salab.dfw.redhat.com/kickstart/dist/ks-rhel-x86_64-server-5-u3/Cluster
repo --name=ClusterStorage --baseurl=http://cho.salab.dfw.redhat.com/kickstart/dist/ks-rhel-x86_64-server-5-u3/ClusterStorage
repo --name=VT --baseurl=http://cho.salab.dfw.redhat.com/kickstart/dist/ks-rhel-x86_64-server-5-u3/VT
repo --name=Workstation --baseurl=http://cho.salab.dfw.redhat.com/kickstart/dist/ks-rhel-x86_64-server-5-u3/Workstation
key --skip

%packages --resolvedeps

@virtualization
kernel-xen
@clustering
@cluster-storage
@base
xen
scsi-target-utils
```



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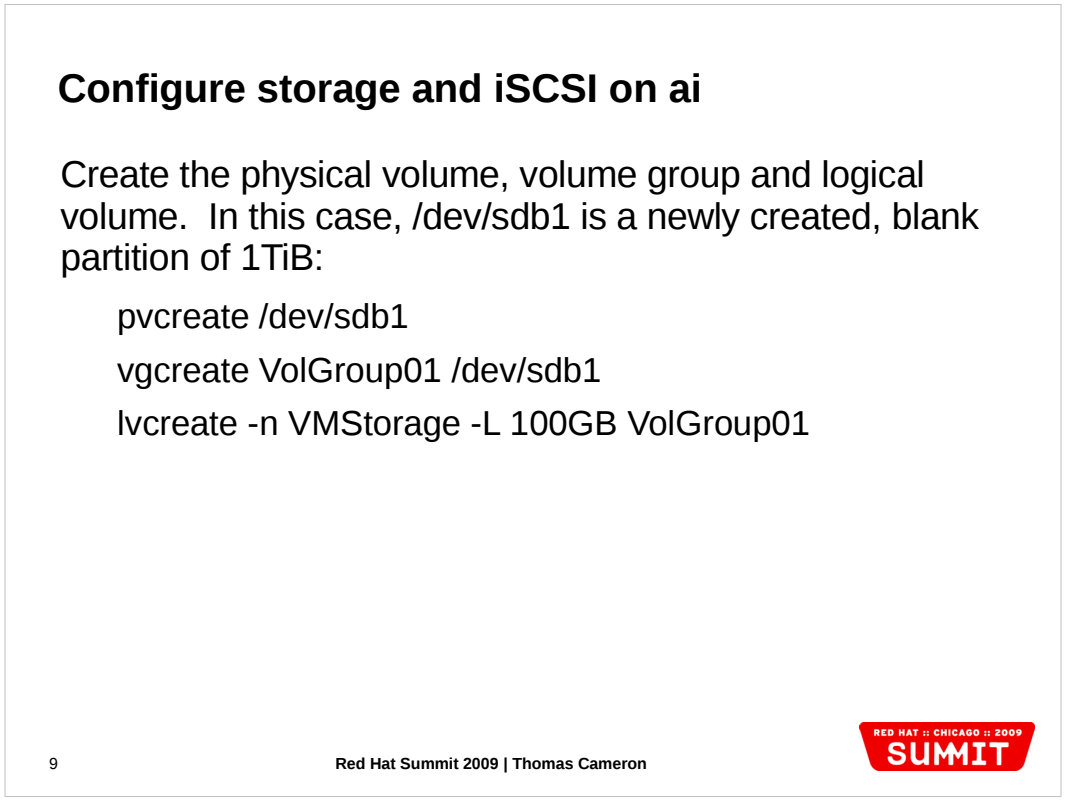

/dev/sdb1 is the whole disk.

We create one large physical volume with the pvcreate command.

We use the whole physical volume (and therefore the whole disk) for the volume group with the vgcreate command.

Then we create a small, 100GiB logical volume called VMStorage with the lvcreate command.

Configure storage and iSCSI on ai

Make sure that the iSCSI target software is installed

- yum -y groupinstall clustering cluster-storage
- yum -y install scsi-target-utils
- chkconfig tgtd on

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Could easily get away with only installing the luci RPM instead of all of the clustering and cluster-storage groups.

scsi-target-utils will install perl-Config-General as a dependency

Only chkconfig tgtd on, don't start it yet.

Configure storage and iSCSI on ai

Configure the target

Configure the /etc/tgtd/target.conf to look something like this:

```
<target iqn.2009-06.com.redhat.dfw.salab:disk1>
        backing-store /dev/mapper/VolGroup01-VMStorage
        initiator-address 10.15.183.6
        initiator-address 10.15.183.7
        initiator-address 10.15.183.8
</target>
```


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The iSCSI Qualified Name (iqn) is the string “iqn.[the date].[the domain name in reverse]:[disk]”

The backing store can be any block device or logical volume.

The initiator address lines are there for security - only allow those servers to connect which are authorized to do so

Configure storage and iSCSI on ai

Stop and start the tgtd service on the iSCSI target

```
service tgtd stop
sleep 5
service tgtd start
```


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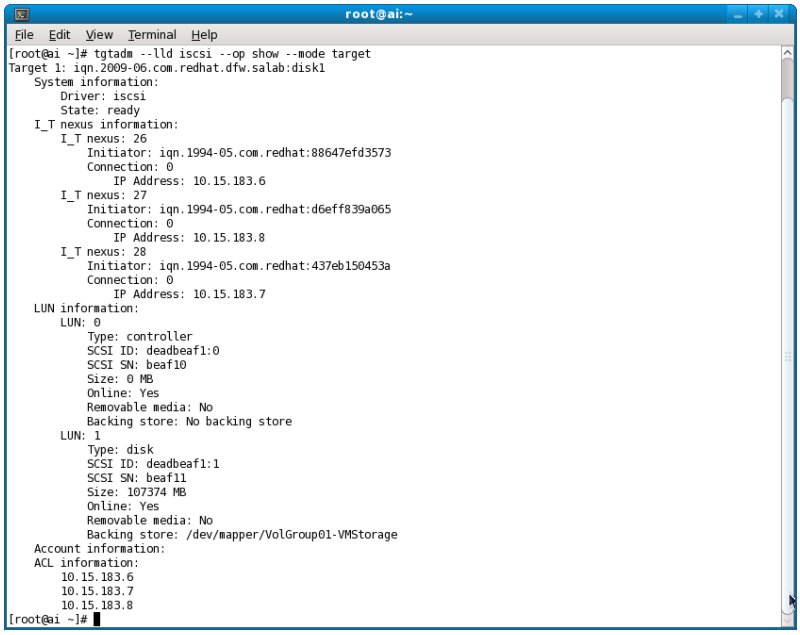
I usually do a 5 second sleep between stopping and starting, otherwise there is a potential for the target to not log out cleanly and then fail to start

Configure storage and iSCSI on ai

Check that your target is available

tgtadm --lld iscsi --op show --mode target

Will give you a verbose readout of the targets available



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Configure storage and iSCSI on initiators

On each of the dom0 servers (ami, ayame and botan)

yum -y groupinstall clustering cluster-storage

yum -y install iscsi-initiator-utils

chkconfig iscsi on

chkconfig iscsid on

service iscsid restart

service iscsi restart

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In my lab, I kickstarted ami, ayame and botan with the @ clustering and @ cluster-storage groups and iscsi-initiator-utils, so the first two steps are actually redundant

Make sure you (re)start iscsid before iscsi. iscsid inserts several necessary kernel modules and checks network setting sanity. The iscsi service only handles logins.

Configure storage and iSCSI on initiators

Discover the iSCSI target

```
iscsiadm -m discovery -t sendtargets -p 10.15.183.1
```


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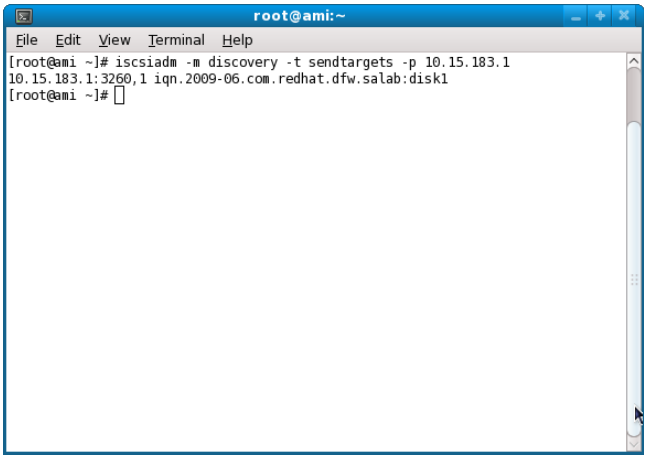
-m discovery sets the iscsi command mode to discover

-t sendtargets asks the target to send iSCSI target info to the initiator

-p 10.15.183.1 is the address of the portal. Optionally you can add a port number with the syntax “-p 10.15.183.1:3260” 3260 is the default port.


root@ami:~
File Edit View Terminal Help
[root@ami ~]# iscsiadm -m discovery -t sendtargets -p 10.15.183.1
10.15.183.1:3260,1 iqn.2009-06.com.redhat.dfw.salab:disk1
[root@ami ~]#

Configure storage and iSCSI on initiators

Log in to the target (command below is actually all one command, it is on multiple lines for ease of visibility)

```
iscsiadm -m node \
  -T iqn.2009-06.com.redhat.dfw.salab:disk1 \
  -p 10.15.183.1 -l
```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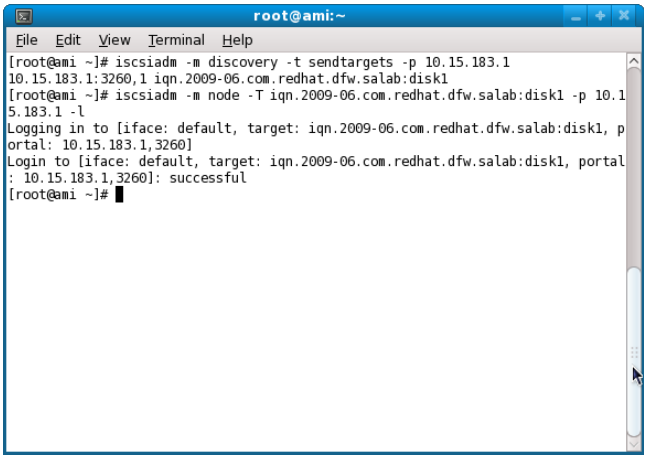
-m node sets the mode to that of a node on the cluster

-T [iqn] specifies the target we got from the previous command

-p [address] is the address and, optionally, the port number of the portal (target)

-l logs on to the target



In this slide we took the output of the previous discovery and used it to do a login

-m node sets the mode of the action to be that of a node on the storage cluster

-T [iqn] is the iqn of the LUN we want to attach to

-p [address] is the address of the target

You should see the “Login to iface...” statement end in “successful”

Configure storage and iSCSI on initiators

Run “fdisk -l” or “cat /proc/partitions” to verify that your system “sees” the new disk

- There should be no partition table on e.g. /dev/sdb

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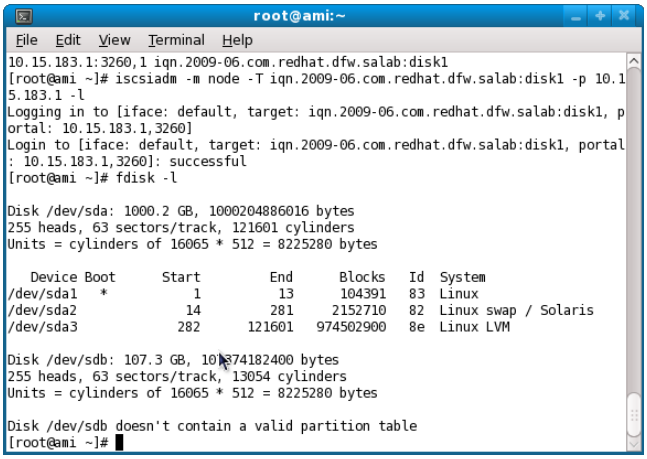
root@ami:~
File Edit View Terminal Help
10.15.183.1:3260,1 iqn.2009-06.com.redhat.dfw.salab:disk1
[root@ami ~]# iscsiadm -m node -T iqn.2009-06.com.redhat.dfw.salab:disk1 -p 10.15.183.1 -l
Logging in to [iface: default, target: iqn.2009-06.com.redhat.dfw.salab:disk1, portal: 10.15.183.1,3260]
Login to [iface: default, target: iqn.2009-06.com.redhat.dfw.salab:disk1, portal: 10.15.183.1,3260]: successful
[root@ami ~]# fdisk -l
Disk /dev/sda: 1000.2 GB, 1000204886016 bytes
255 heads, 63 sectors/track, 121601 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Device Boot Start End Blocks Id System
/dev/sda1 * 1 13 104391 83 Linux
/dev/sda2 14 281 2152710 82 Linux swap / Solaris
/dev/sda3 282 121601 974502900 8e Linux LVM
Disk /dev/sdb: 107.3 GB, 107374182400 bytes
255 heads, 63 sectors/track, 13054 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Disk /dev/sdb doesn't contain a valid partition table
[root@ami ~]#

Configure storage and iSCSI on initiators

Create a partition on the LUN using fdisk

- fdisk /dev/sdb
- Choose n for new
- Choose p for primary
- Choose 1 for first partition
- Hit [enter] to start at the first cylinder
- Hit [enter] to end at the last cylinder
- Hit w to write changes to disk

As root, run “partprobe” and “fdisk -l” on the other nodes and verify that the new partition shows up.

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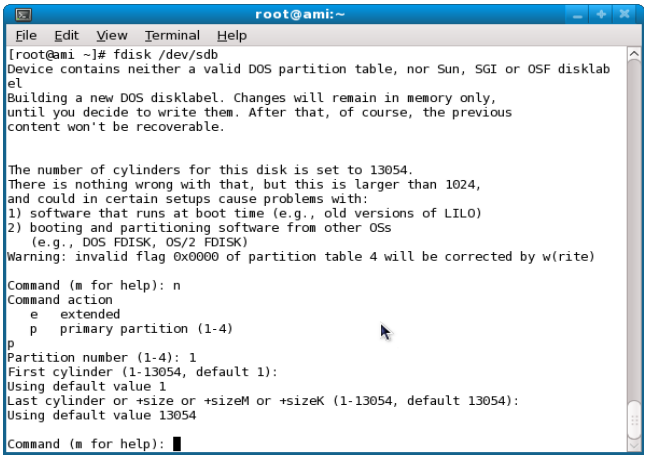
This example assumes use of the whole LUN.


root@ami:~
File Edit View Terminal Help
[root@ami ~]# fdisk /dev/sdb
Device contains neither a valid DOS partition table, nor Sun, SGI or OSF disklab
el
Building a new DOS disklabel. Changes will remain in memory only,
until you decide to write them. After that, of course, the previous
content won't be recoverable.
The number of cylinders for this disk is set to 13054.
There is nothing wrong with that, but this is larger than 1024,
and could in certain setups cause problems with:
1) software that runs at boot time (e.g., old versions of LILO)
2) booting and partitioning software from other OSs
(e.g., DOS FDISK, OS/2 FDISK)
Warning: invalid flag 0x0000 of partition table 4 will be corrected by w(rite)
Command (m for help): n
Command action
e extended
p primary partition (1-4)
p
Partition number (1-4): 1
First cylinder (1-13054, default 1):
Using default value 1
Last cylinder or +size or +sizeM or +sizeK (1-13054, default 13054):
Using default value 13054
Command (m for help):

Configure storage and iSCSI on initiators

Make sure that the ricci service is installed and running on all the dom0 nodes.

service ricci status

Again, on my lab systesm, since they were built with the clustering and cluster-storage groups, ricci was running at boot time.

Configure the Cluster Using Conga

On the management station (ai), make sure that the luci package is installed

- yum -y install luci
- chkconfig luci on
- Don't start the luci service yet!

Add an administrator password

- luci_admin init
- service luci start

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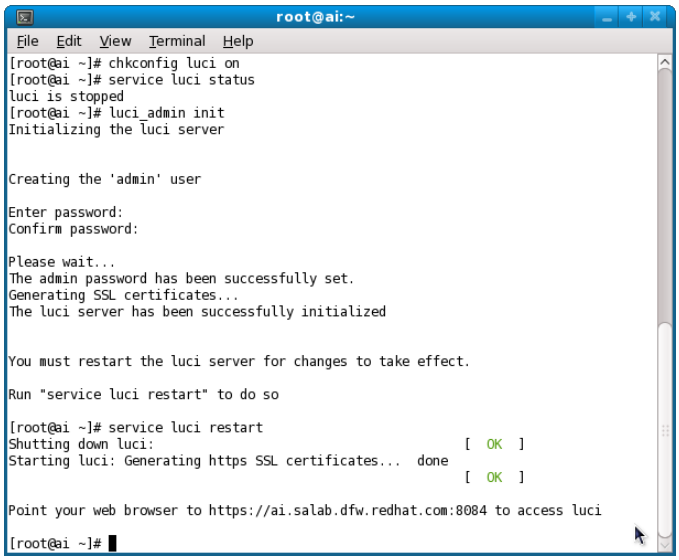
Since my systems were kickstarted with the clustering and cluster-storage package groups installed, luci was already there.

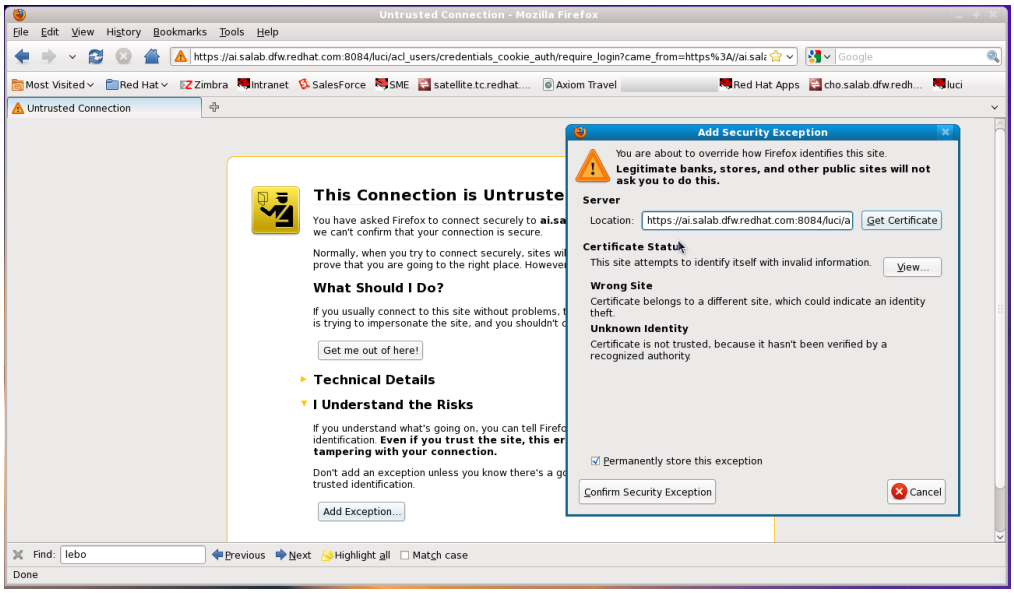
Make sure that luci is not started when running “luci_admin init”

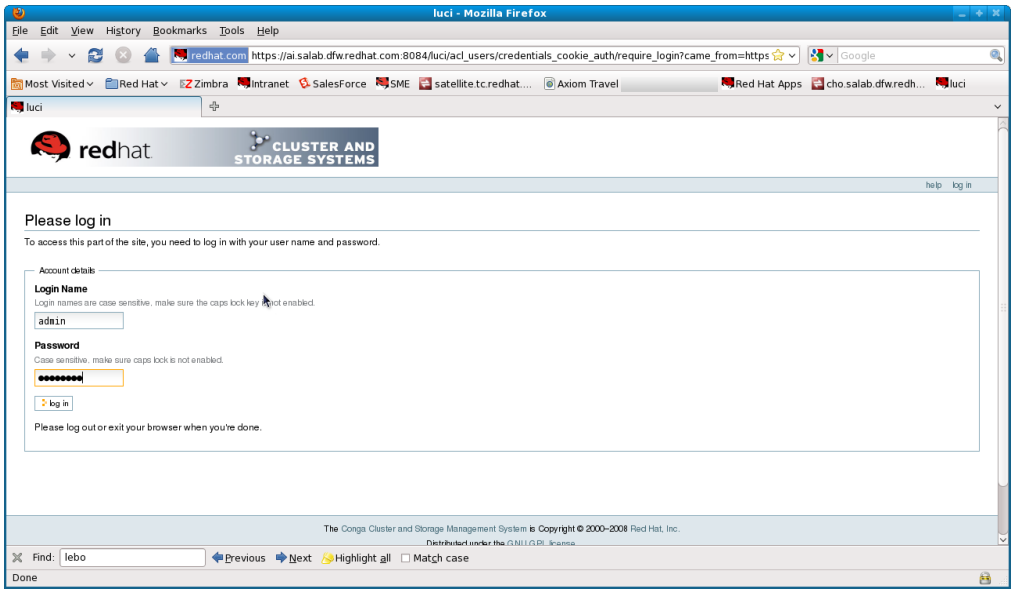
Go to the URL listed by the restart to access Conga


root@ai:~
File Edit View Terminal Help
[root@ai ~]# chkconfig luci on
[root@ai ~]# service luci status
luci is stopped
[root@ai ~]# luci_admin init
Initializing the luci server
Creating the 'admin' user
Enter password:
Confirm password:
Please wait...
The admin password has been successfully set.
Generating SSL certificates...
The luci server has been successfully initialized
You must restart the luci server for changes to take effect.
Run "service luci restart" to do so
[root@ai ~]# service luci restart
Shutting down luci: [OK]
Starting luci: Generating https SSL certificates... done
[OK]
Point your web browser to https://ai.salab.dfw.redhat.com:8084 to access luci
[root@ai ~]#

Configure the Cluster Using Conga

- Open the URL listed by the “service luci start” command in your web browser
  - You will be warned about the self-signed certificate, it's fine to accept it assuming you trust your network


Untrusted Connection - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Untrusted Connection
This Connection is Untruste
What Should I Do?
Get me out of here!
Technical Details
I Understand the Risks
Add Exception...
Add Security Exception
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:
Get Certificate
Certificate Status
This site attempts to identify itself with invalid information.
View...
Wrong Site
Certificate belongs to a different site, which could indicate an identity theft.
Unknown Identity
Certificate is not trusted, because it hasn't been verified by a recognized authority.
Permanently store this exception
Confirm Security Exception
Cancel
Find: lebo
Previous
Next
Highlight all
Match case
Done



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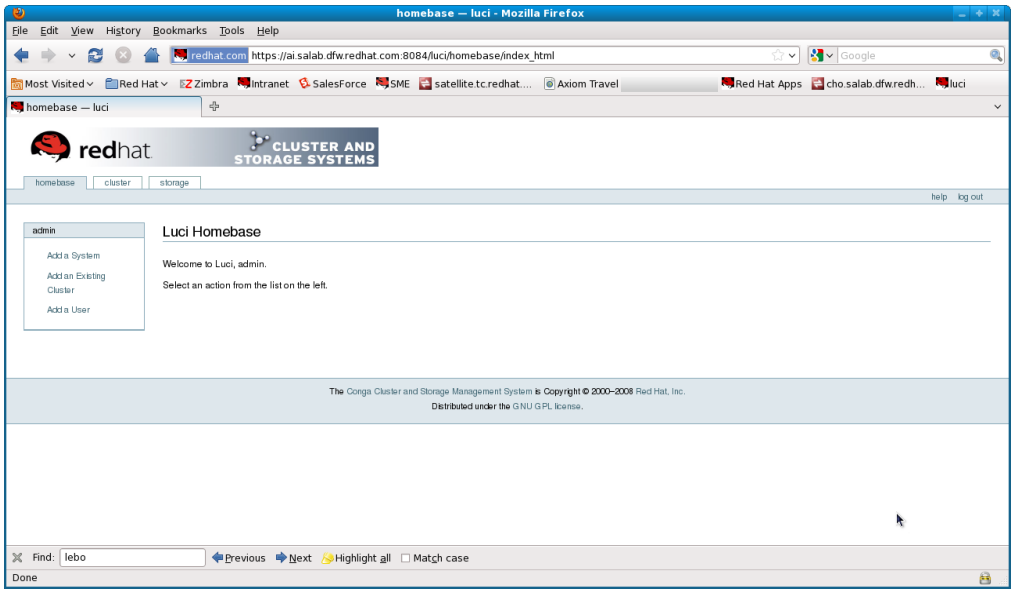

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Configure the Cluster Using Conga

Choose the “Cluster” tab and create a new cluster

- Cluster name
- Node names and passwords
- Download or use locally installed
- Enable shared storage since we'll be using GFS
- Reboot nodes
- Check the box if the passwords are all the same

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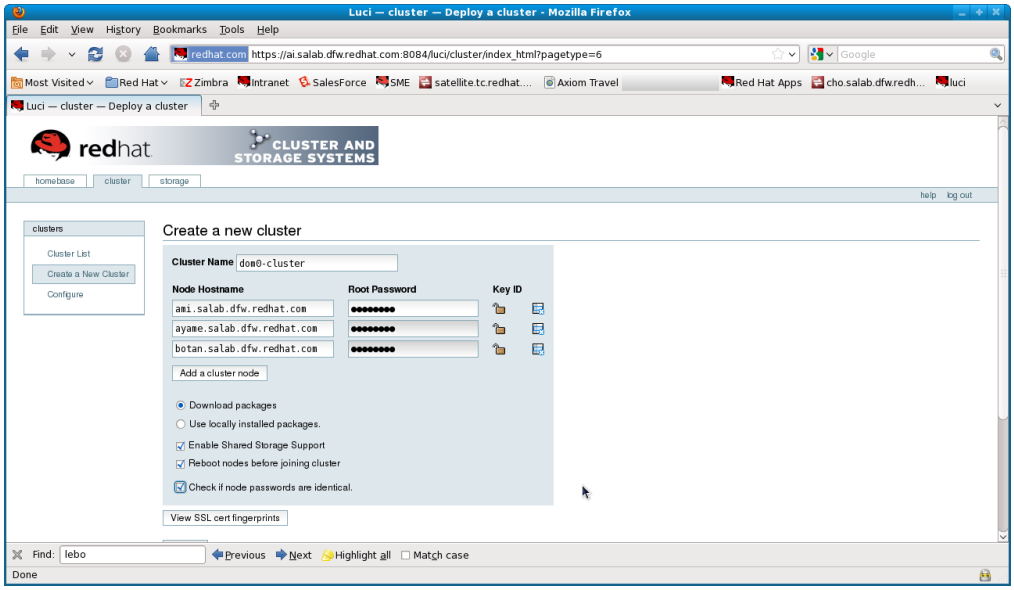
I always choose “download packages” just on the off chance there is a newer version on RHN

I always choose to reboot the nodes just to make sure the cluster comes up correctly



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Configure the Cluster Using Conga

Check to see if the luci server can talk to the ricci services on all nodes

- Click “View SSL fIngerprints” button
- If that checks out, click on “Submit”

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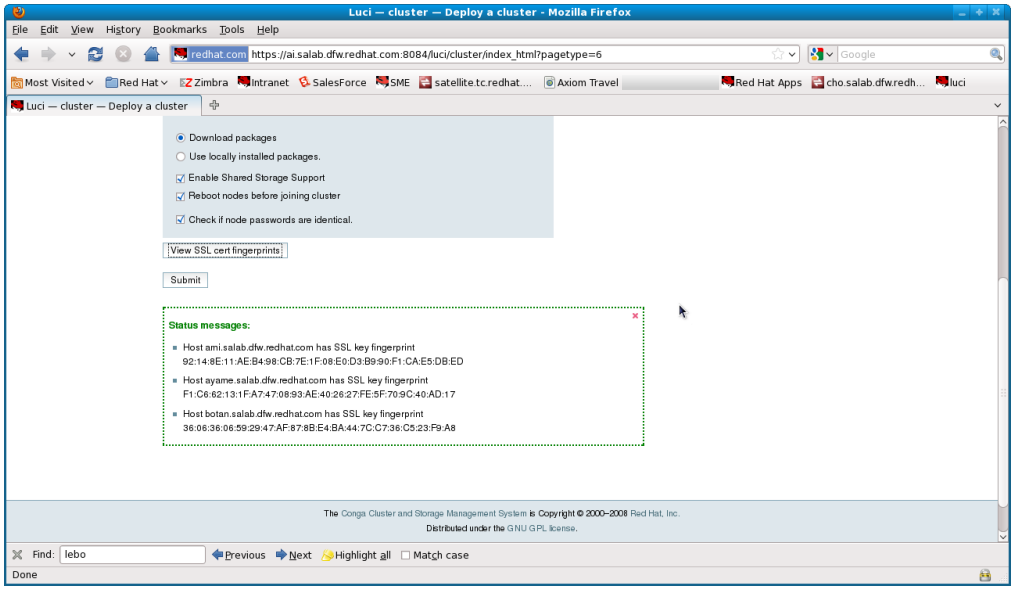

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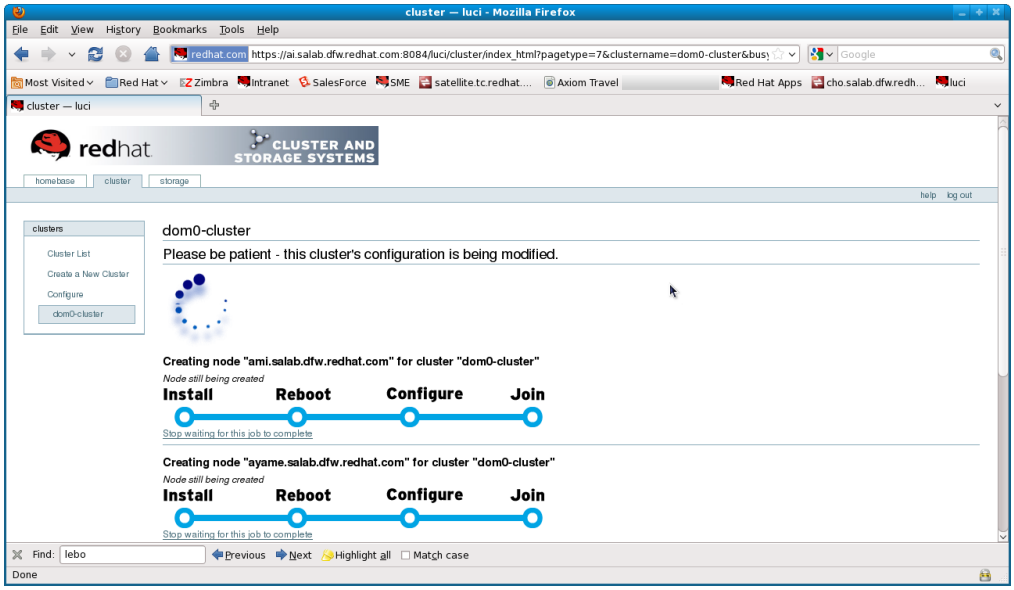
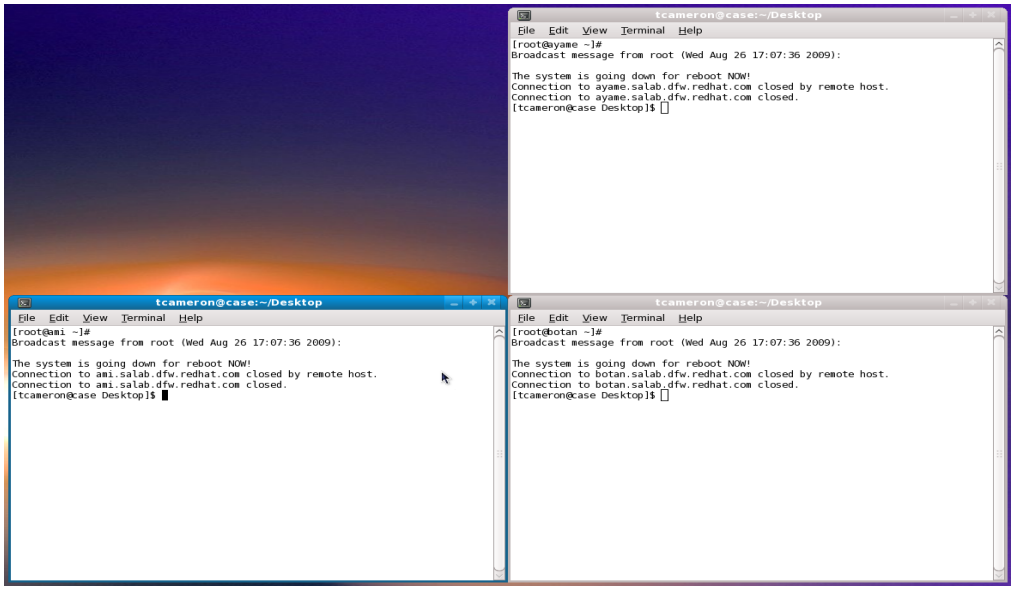

cluster — luci - Mozilla Firefox
File Edit View History Bookmarks Tools Help
redhat.com https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=7&clustername=dom0-cluster&bus
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
cluster — luci
redhat
CLUSTER AND STORAGE SYSTEMS
homebase cluster storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
dom0-cluster
dom0-cluster
Please be patient - this cluster's configuration is being modified.
Creating node "ami.salab.dfw.redhat.com" for cluster "dom0-cluster"
Node still being created
Install Reboot Configure Join
Stop waiting for this job to complete
Creating node "ayame.salab.dfw.redhat.com" for cluster "dom0-cluster"
Node still being created
Install Reboot Configure Join
Stop waiting for this job to complete
Find: lebo Previous Next Highlight all Match case
Done



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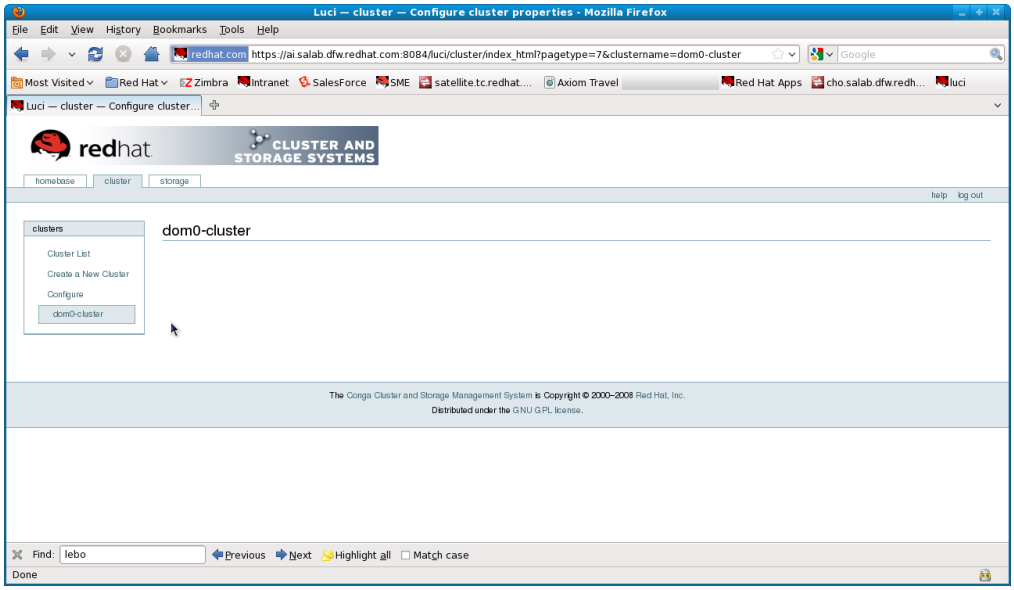
The three dom0 machines reboot.



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Configure the Cluster Using Conga

After the nodes all reboot, click on “Cluster List” to see if everything came up

If the cluster name and the node names are green, you're good.

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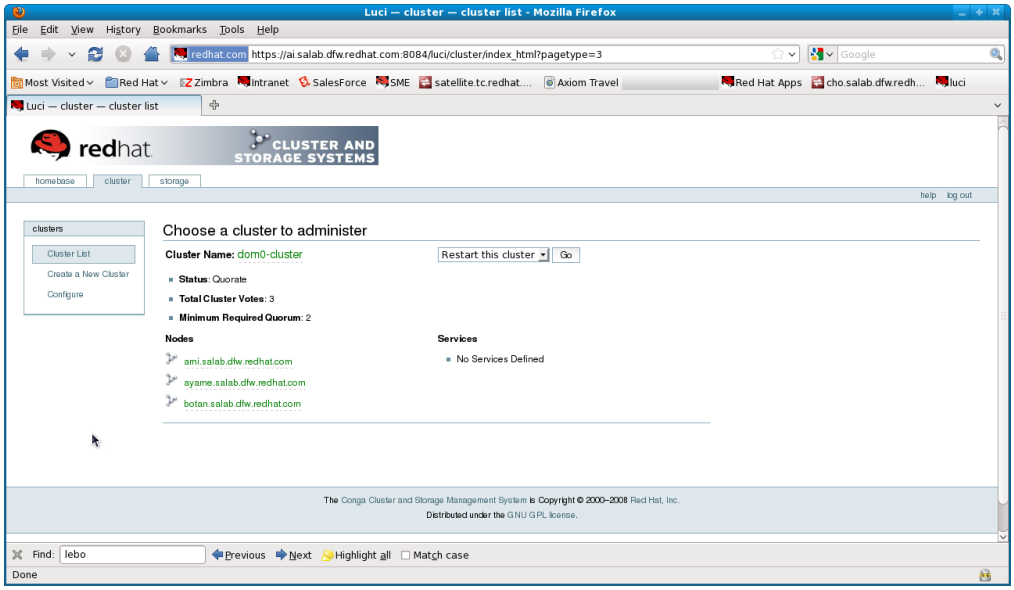
Note that it is not unusual for the web UI to throw an error until the nodes reboot, since luci can't reach ricci on the nodes.



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Configure the Cluster Using Conga

Set up a shared fence device

- Cluster tab
- Cluster name
- Shared Fence Devices
- Add a shareable fence device
- Fill out details
- Submit and accept

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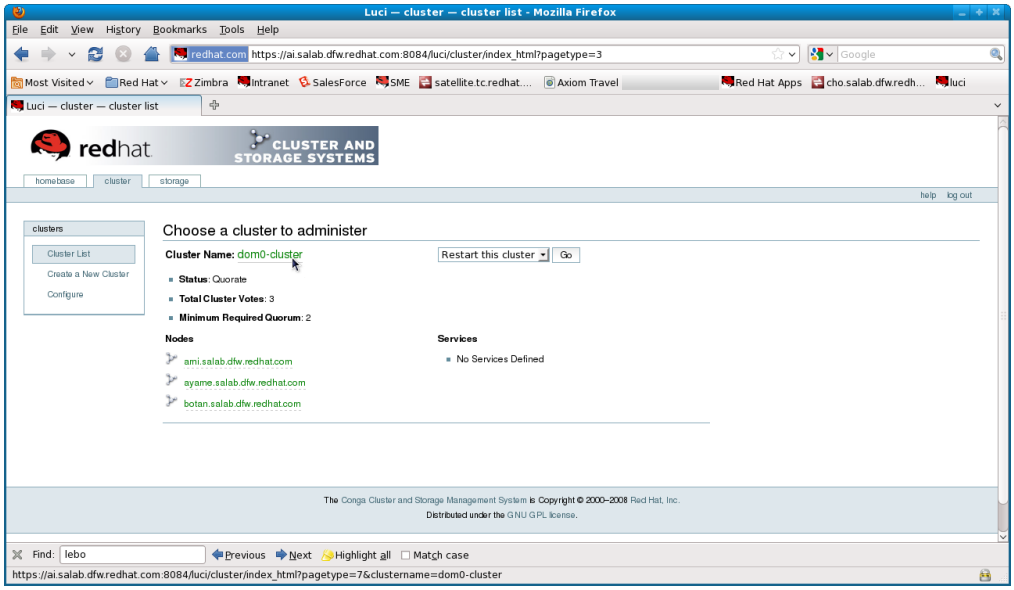
There are numerous fence devices supported, including fiber switch, remote power switch, iLO, DRAC, etc.



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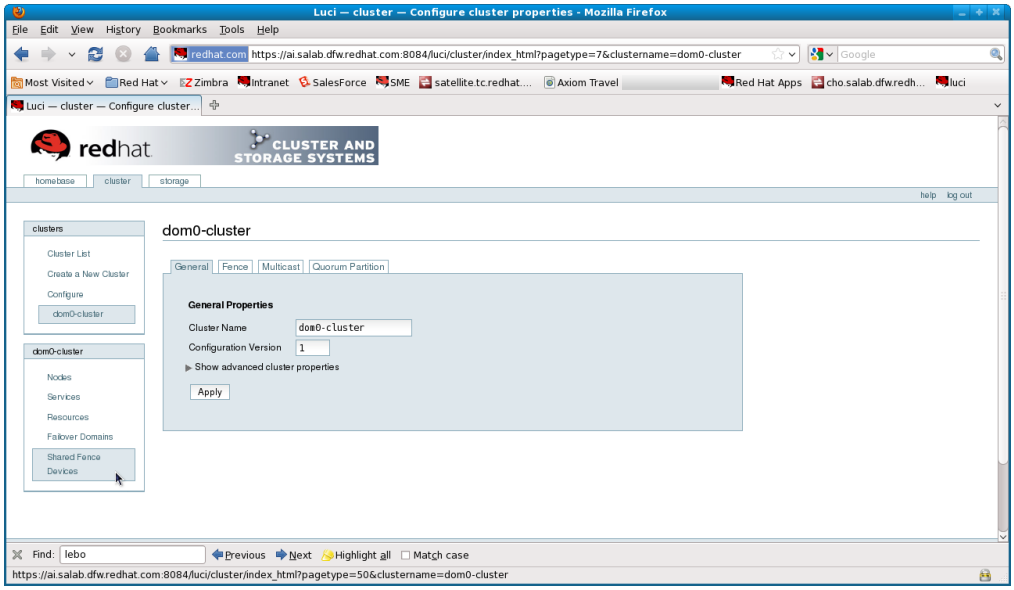

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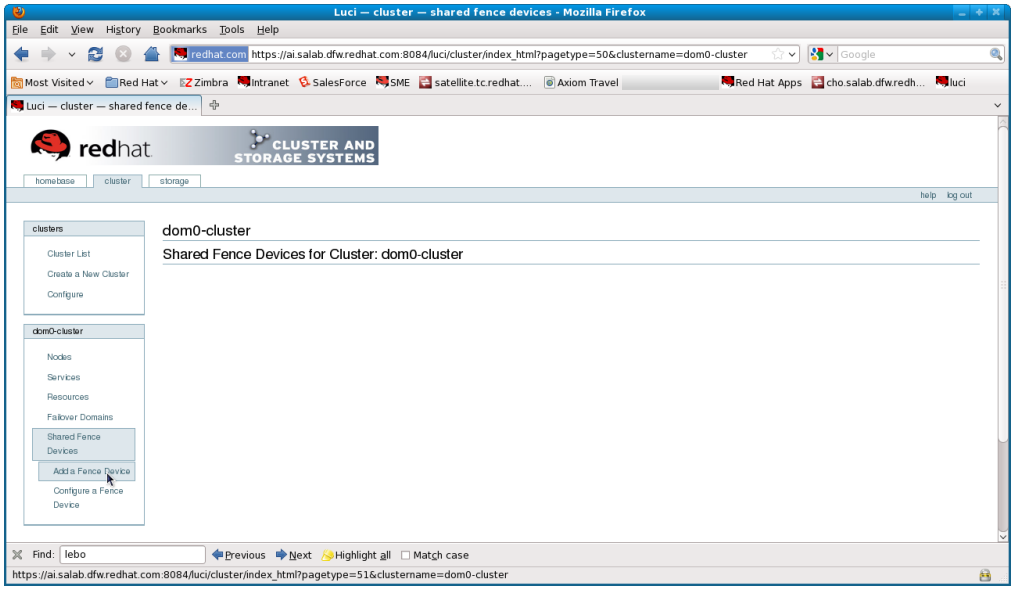

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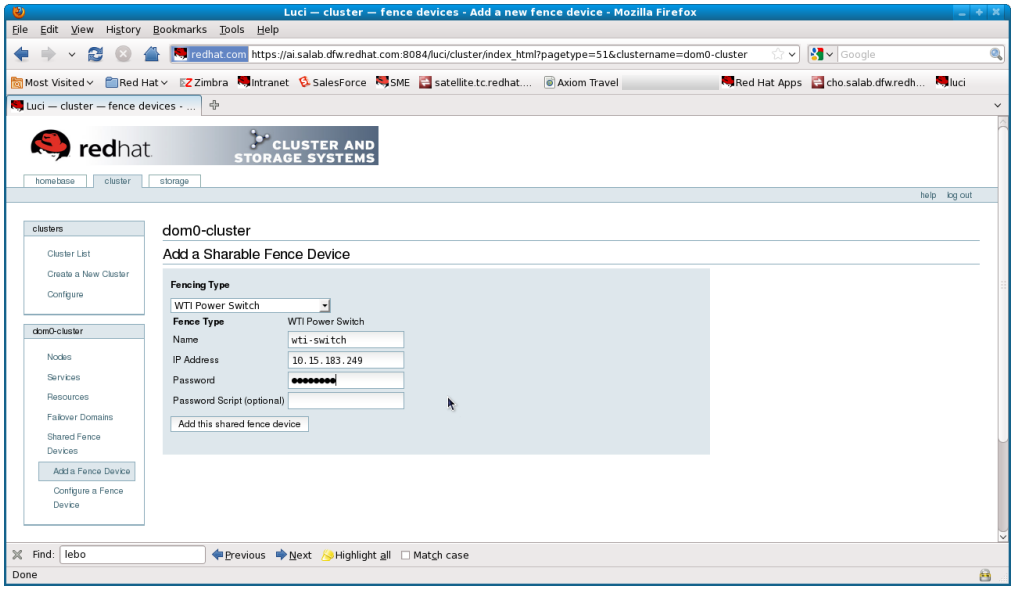

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Configure the Cluster Using Conga

- Define virtual machine fencing
- Cluster tab
- Click on cluster
- Choose Fence tab
- Check the box for XVM fence daemon
- Enter a hostname from dom0 cluster
  - Retrieve cluster nodes
  - Create and distribute keys
- Apply and confirm

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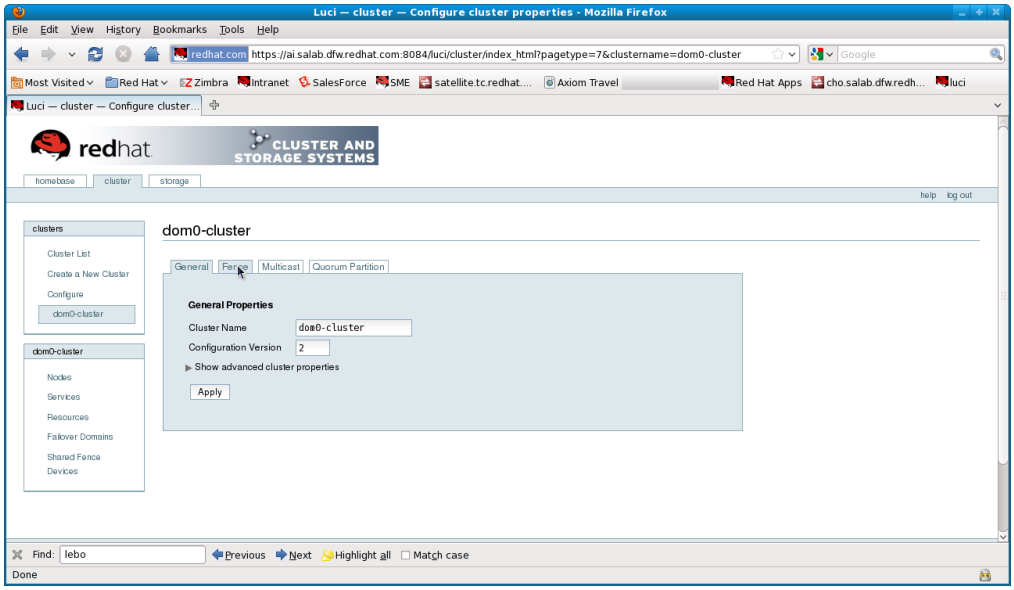

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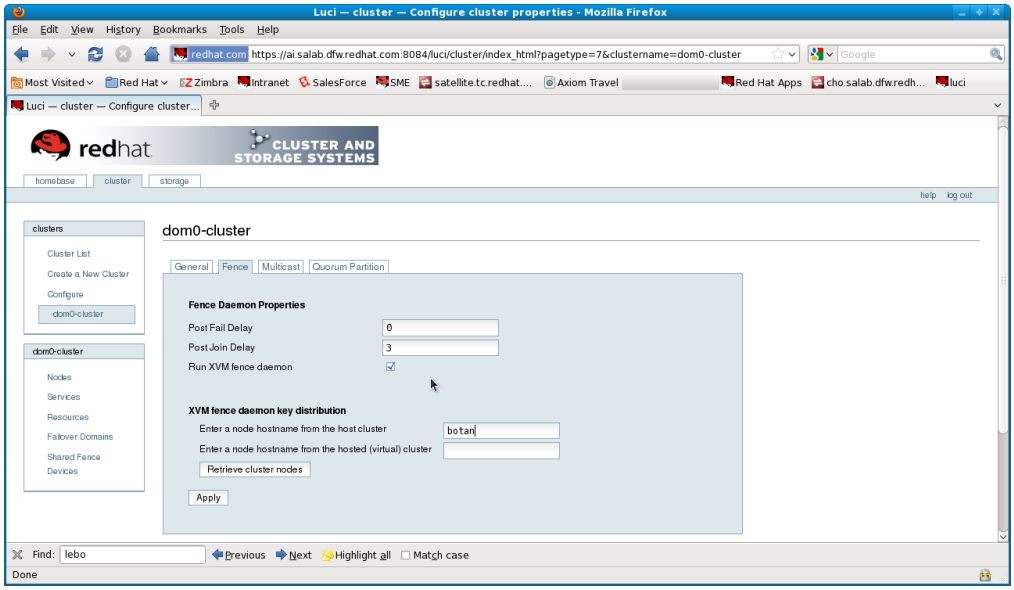
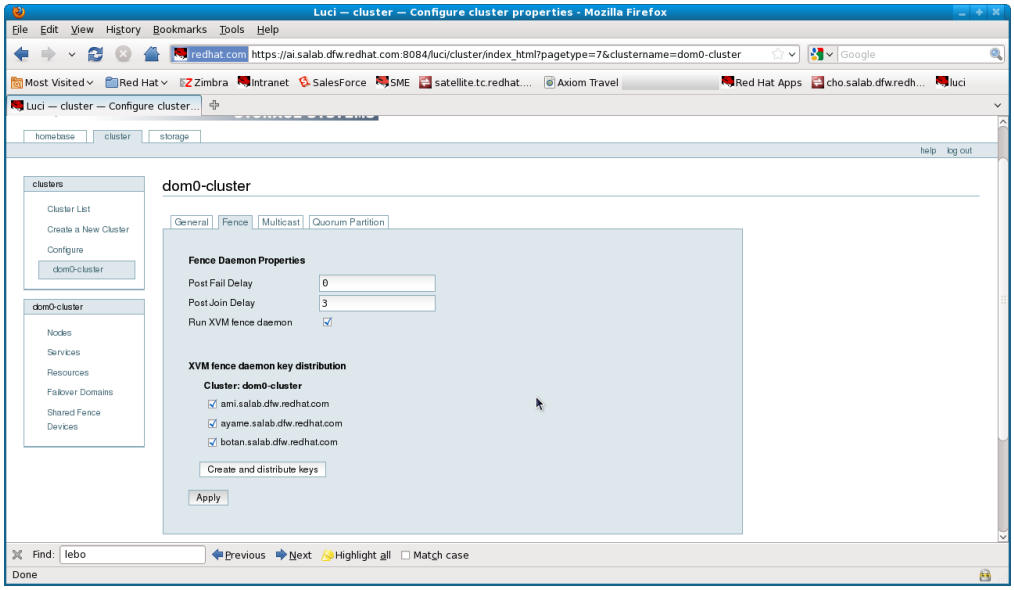

Luci — cluster — Configure cluster properties - Mozilla Firefox
File Edit View History Bookmarks Tools Help
redhat.com https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=7&clustername=dom0-cluster
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — Configure cluster...
redhat
CLUSTER AND STORAGE SYSTEMS
homebase cluster storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
dom0-cluster
dom0-cluster
Nodes
Services
Resources
Failover Domains
Shared Fence Devices
dom0-cluster
General Fence Multicast Quorum Partition
Fence Daemon Properties
Post Fail Delay 0
Post Join Delay 3
Run XVM fence daemon
XVM fence daemon key distribution
Enter a node hostname from the host cluster botan
Enter a node hostname from the hosted (virtual) cluster
Retrieve cluster nodes
Apply
Find: lebo Previous Next Highlight all Match case
Done



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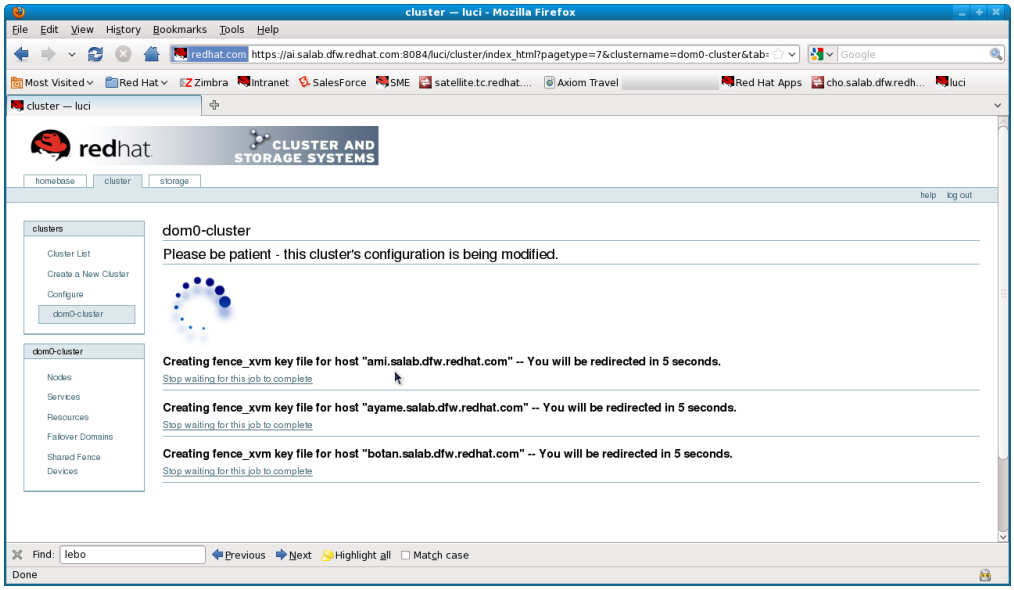
cluster — luci - Mozilla Firefox
File Edit View History Bookmarks Tools Help
redhat.com https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=7&clustername=dom0-cluster&tab=
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
cluster — luci
redhat
CLUSTER AND STORAGE SYSTEMS
homebase cluster storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
dom0-cluster
dom0-cluster
Nodes
Services
Resources
Failover Domains
Shared Fence Devices
dom0-cluster
Please be patient - this cluster's configuration is being modified.
Creating fence_xvm key file for host "ami.salab.dfw.redhat.com" -- You will be redirected in 5 seconds.
Stop waiting for this job to complete
Creating fence_xvm key file for host "ayame.salab.dfw.redhat.com" -- You will be redirected in 5 seconds.
Stop waiting for this job to complete
Creating fence_xvm key file for host "botan.salab.dfw.redhat.com" -- You will be redirected in 5 seconds.
Stop waiting for this job to complete
Find: lebo Previous Next Highlight all Match case
Done

Configure the Cluster Using Conga

Check that /etc/fence_xvm.key was created on each of the dom0 cluster node members.

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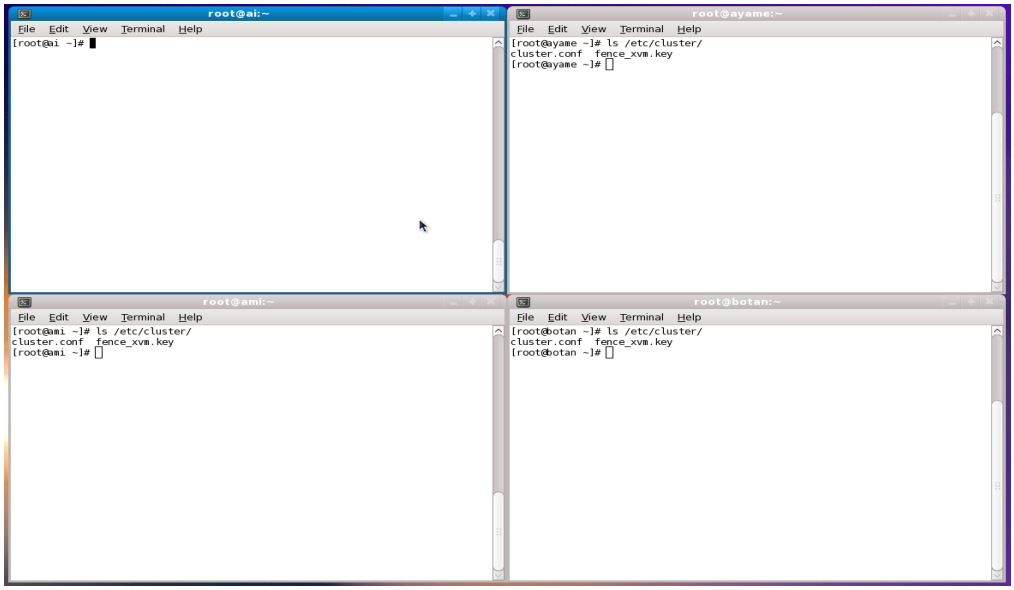

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Configure Per-Node Fencing

Cluster tab

Cluster Name

Node Name

Main Fencing Method

Add a fence device to this level

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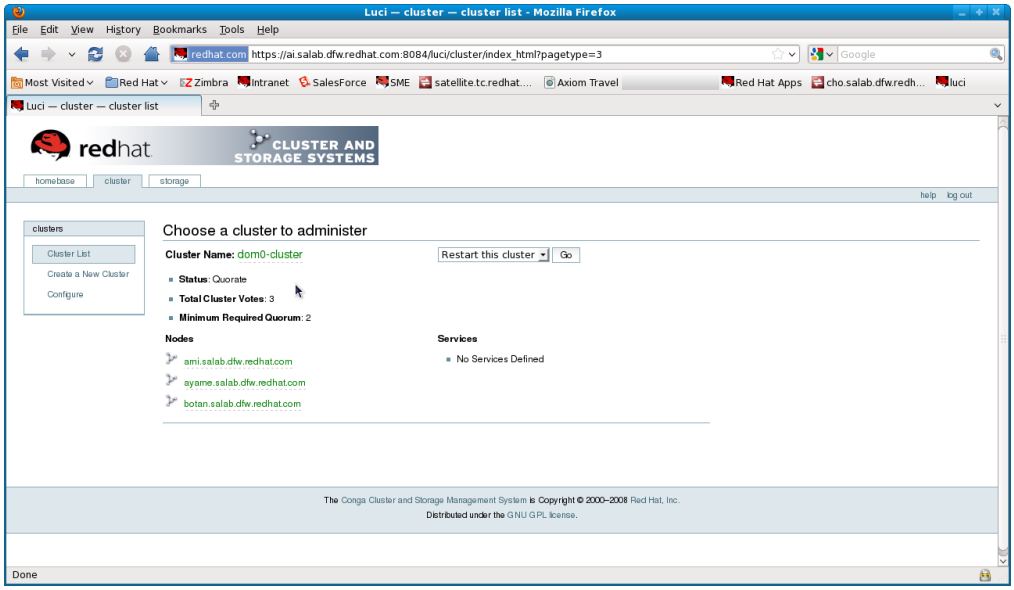
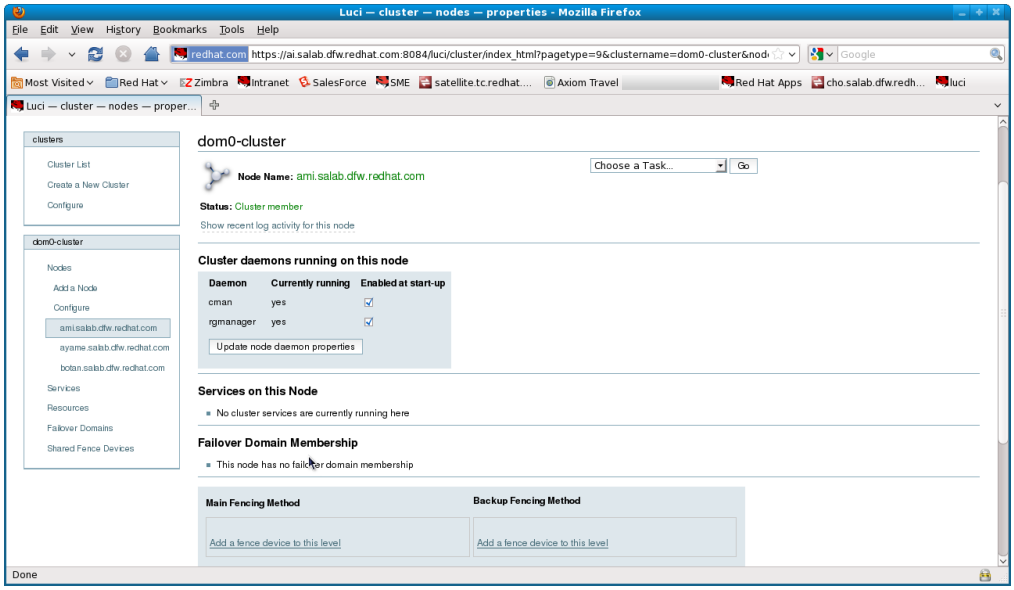

Luci — cluster — cluster list - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=3
Luci — cluster — cluster list
redhat
CLUSTER AND STORAGE SYSTEMS
homebase cluster storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
Choose a cluster to administer
Cluster Name: dom0-cluster
Restart this cluster
Go
Status: Quorate
Total Cluster Votes: 3
Minimum Required Quorum: 2
Nodes
ami.salab.dfw.redhat.com
ayame.salab.dfw.redhat.com
botan.salab.dfw.redhat.com
Services
No Services Defined
The Conga Cluster and Storage Management System is Copyright © 2000–2008 Red Hat, Inc.
Distributed under the GNU GPL license.
Done



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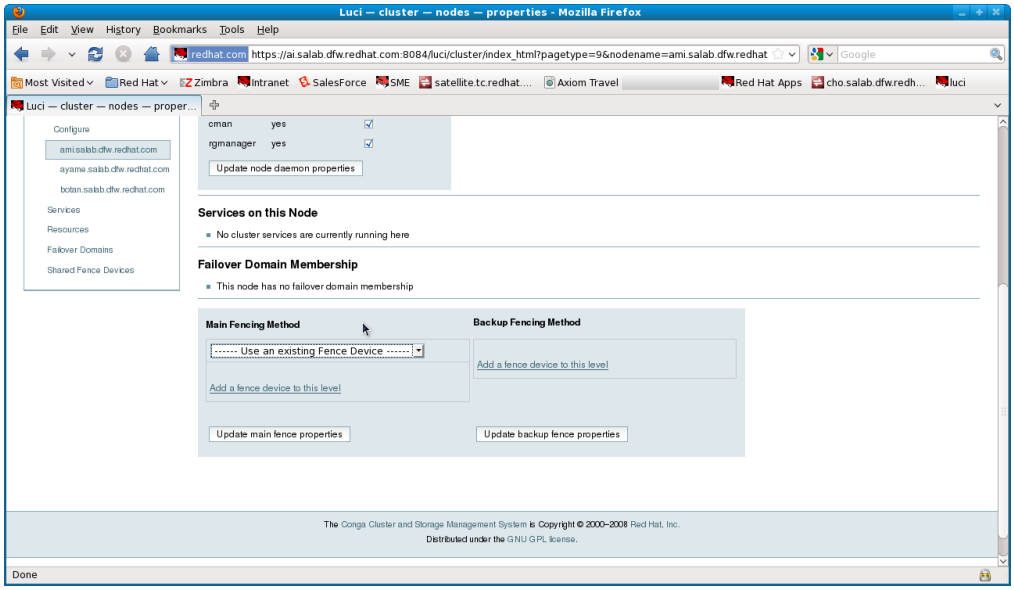
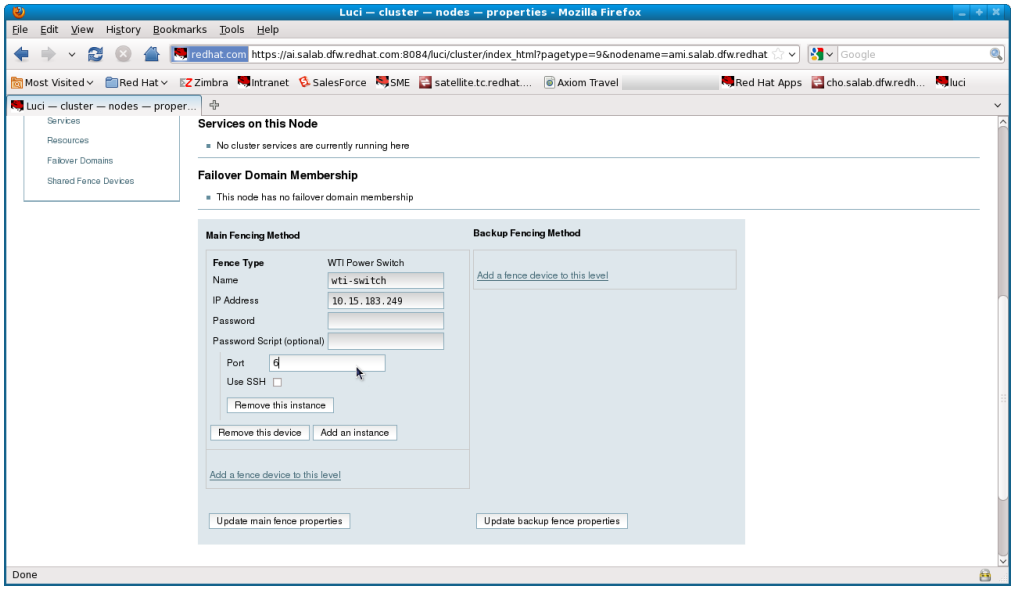


When you click the drop-down, choose the existing fencing device. In this case, a WTI power switch.



If you've already specified the password for the power switch, and there are no per-port passwords, you do not need to set the password again. Just the power port.

Configure Per-Node Fencing

Lather, rinse, repeat for each node.

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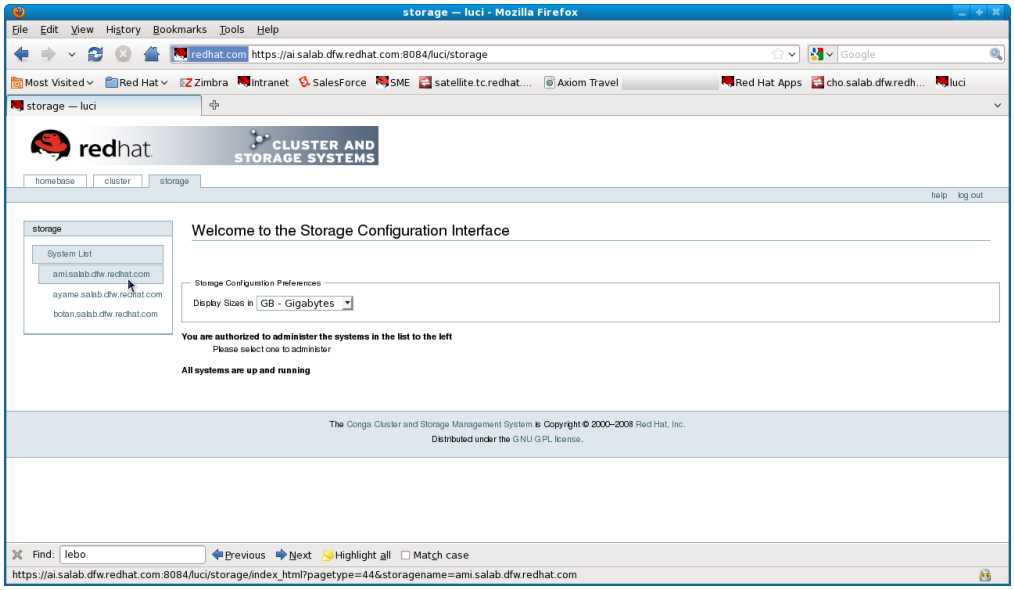
Make sure that you put the right power port number in for each node.

Configure Storage Using Conga

- Set up the volume group which will be used to house the virtual machine
  - Storage tab
  - Choose a server
  - Choose Volume Groups
  - Choose New Volume Group
  - Name new VG and assign to a block device



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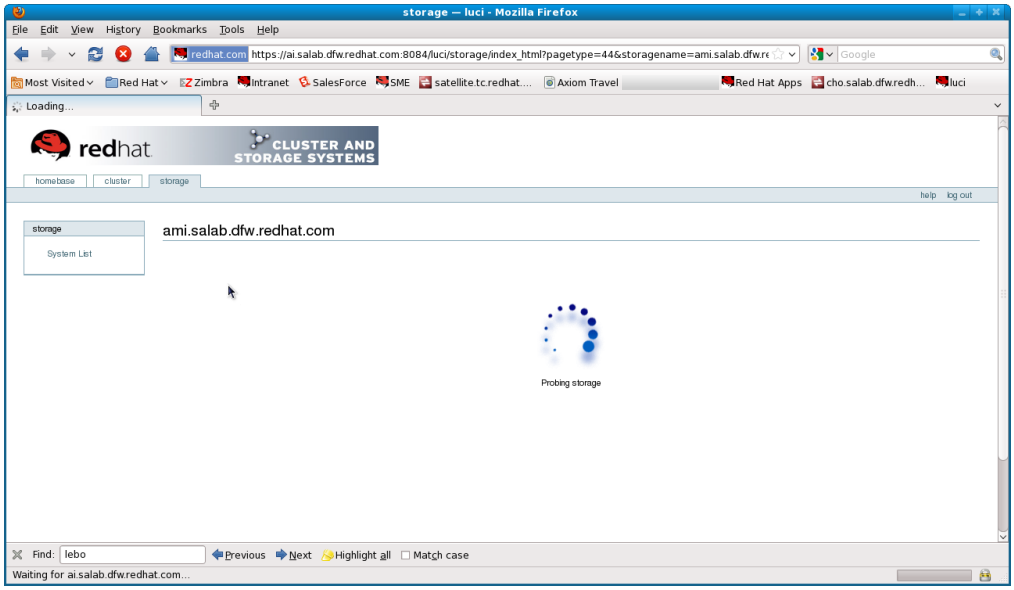

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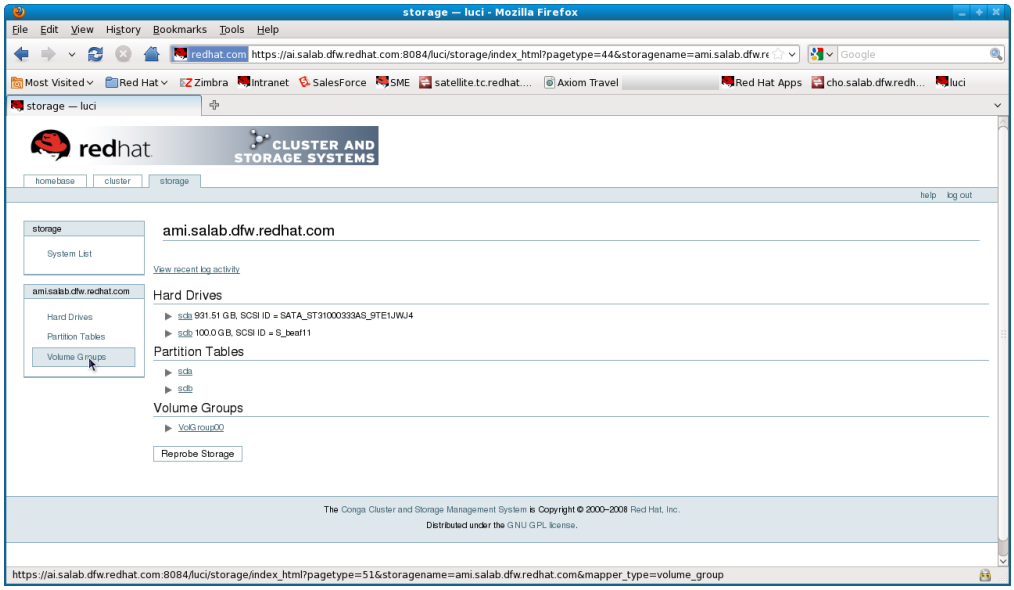

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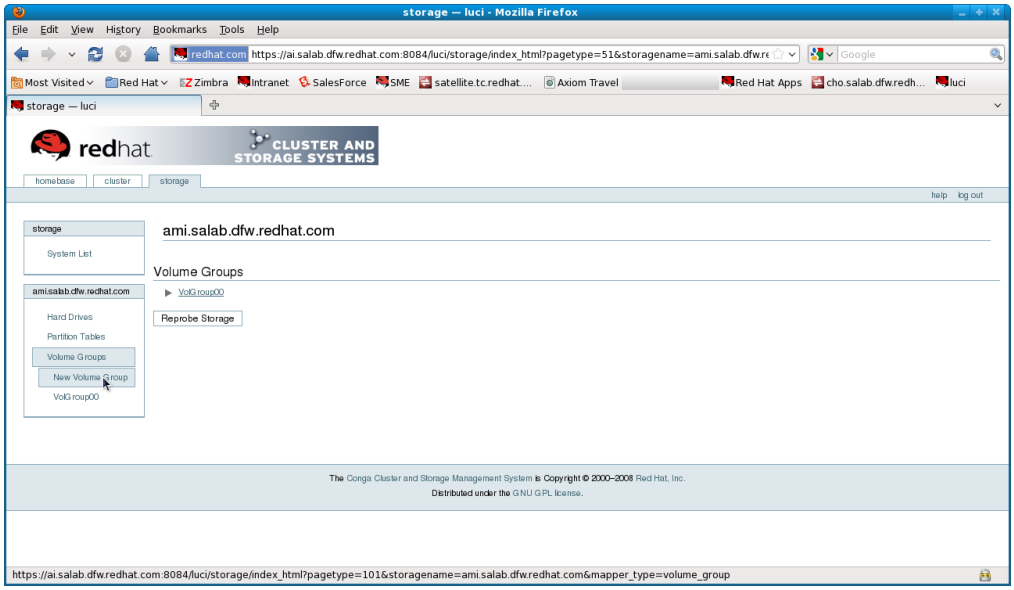

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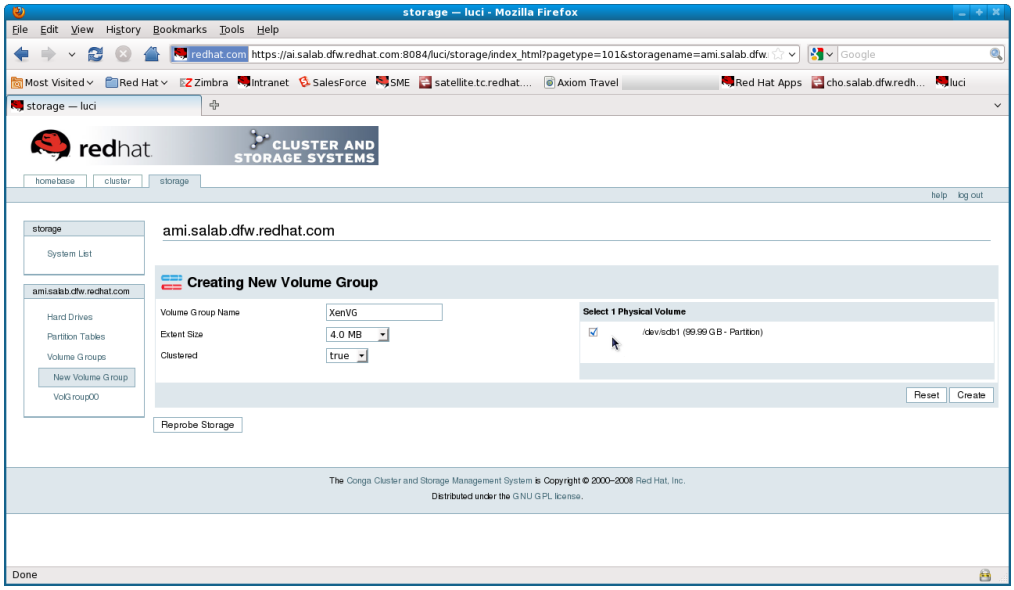
storage — luci - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/storage/index_html?pagetype=101&storagename=ami.salab.dfw.
storage — luci
redhat
CLUSTER AND STORAGE SYSTEMS
homebase cluster storage
help log out
storage
System List
ami.salab.dfw.redhat.com
Hard Drives
Partition Tables
Volume Groups
New Volume Group
VolGroup00
ami.salab.dfw.redhat.com
Creating New Volume Group
Volume Group Name
XenVG
Extent Size
4.0 MB
Clustered
true
Select 1 Physical Volume
/dev/sdb1 (99.99 GB - Partition)
Reset
Create
Reprobe Storage
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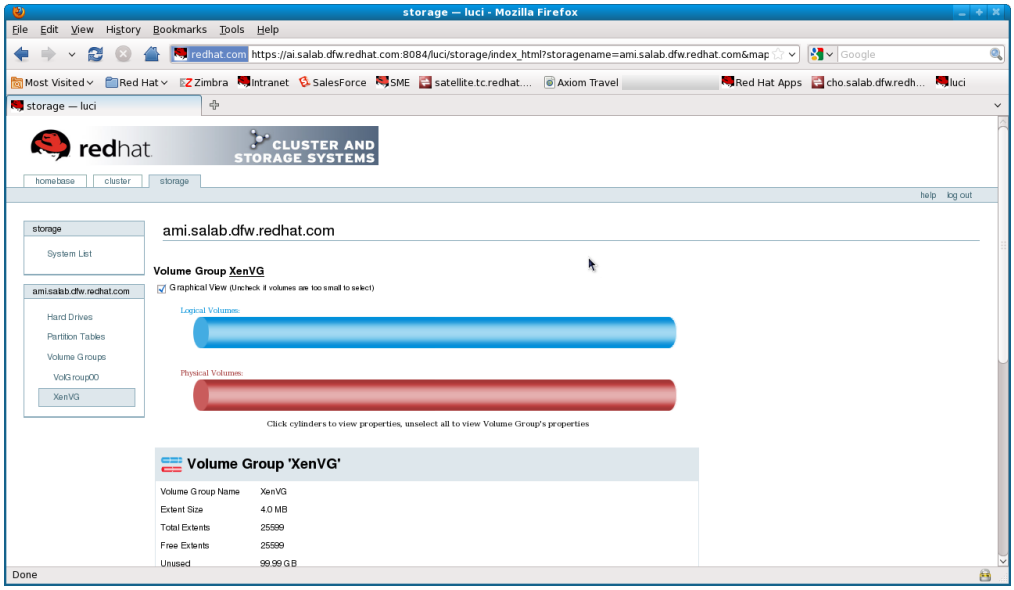
Distributed under the GNU GPL license.
Done



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Configure Storage Using Conga

Set up the logical volume which will be used to house the virtual machines

- Scroll down
- New Logical Volume
- Define LV Name
- Define LV Size
- Define Content (GFS2 recommended)
- Define Unique GFS Name (gfs0)
- Define mount point (/var/lib/xen/images)

Configure Storage Using Conga

Set up the logical volume which will be used to house the virtual machines

- Set Mount to true
- Set List in /etc/fstab to true
- Set number of journals
- Verify Clustered is set to true

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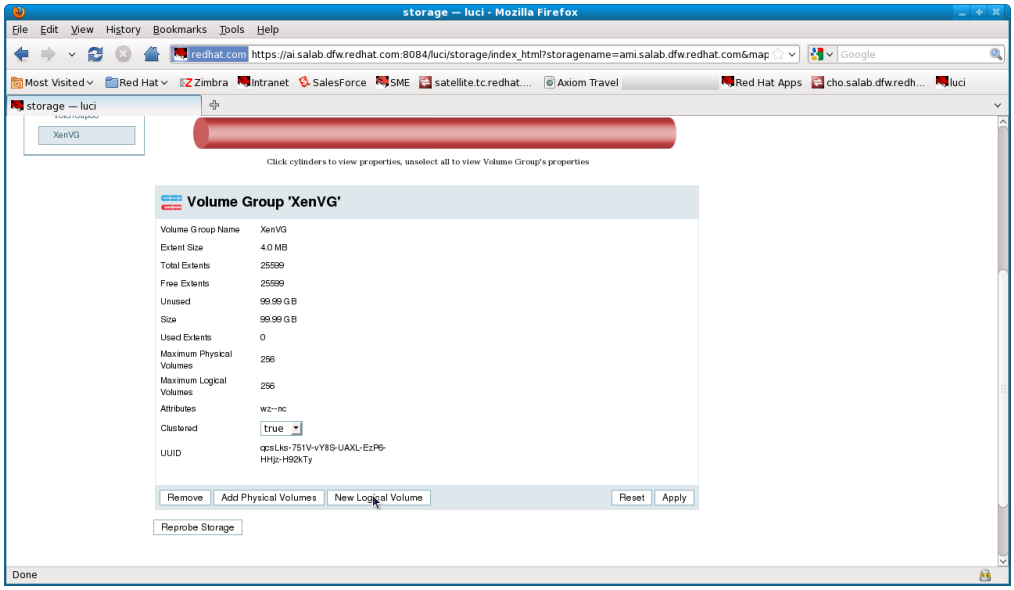
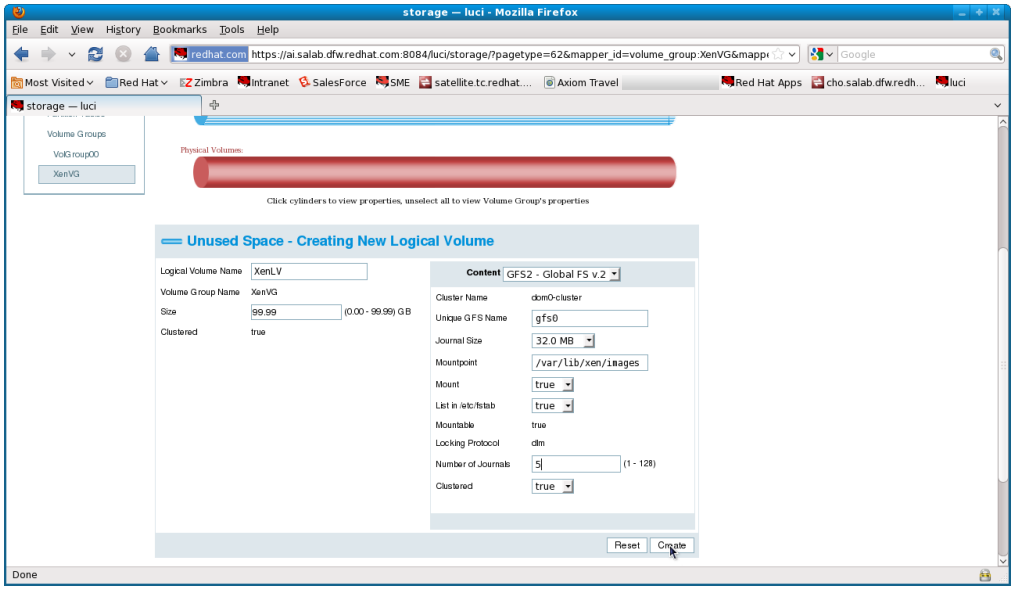
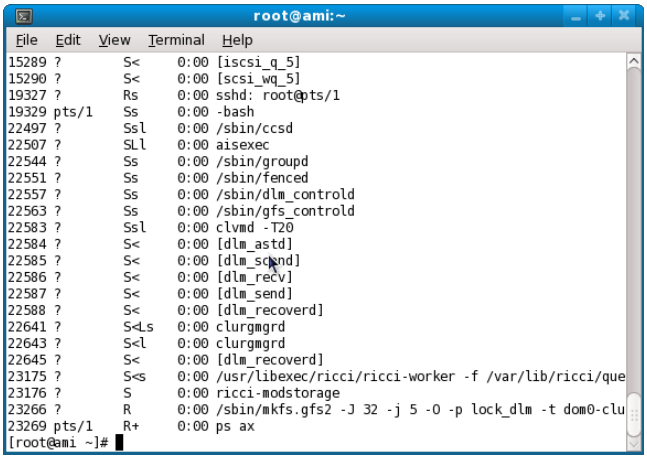
I usually add a couple of spare journals so that if I want to add nodes later there are journals for them. Not nearly as big a deal on GFS2 as on GFS1.


storage — luci - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/storage/index_html?storagename=ami.salab.dfw.redhat.com&map
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
storage — luci
XenVG
Click cylinders to view properties, unselect all to view Volume Group's properties
Volume Group 'XenVG'
Volume Group Name XenVG
Extent Size 4.0 MB
Total Extents 25599
Free Extents 25599
Unused 99.99 GB
Size 99.99 GB
Used Extents 0
Maximum Physical Volumes 256
Maximum Logical Volumes 256
Attributes wz--nc
Clustered true
UUID qcsLks-751V-vY8S-UAXL-EzP6-HHjz-H92kTy
Remove Add Physical Volumes New Logical Volume Reset Apply
Reprobe Storage
Done



In some rare cases, once you've created the volume group on one host, you might need to restart the clvmd service on the other nodes so they register the new volume group. Alternatively, just re-probe storage through the Conga web UI.



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After submitting the job, you can watch the mkfs.gfs2 process running on the target machine.

Configure Storage Using Conga

Add the mount point to the other hosts in the cluster

- Storage
- System List
- System name
- Expand VG
- Expand LV
- Fill in Mountpoint
- Fill in /etc/fstab Mountpoint

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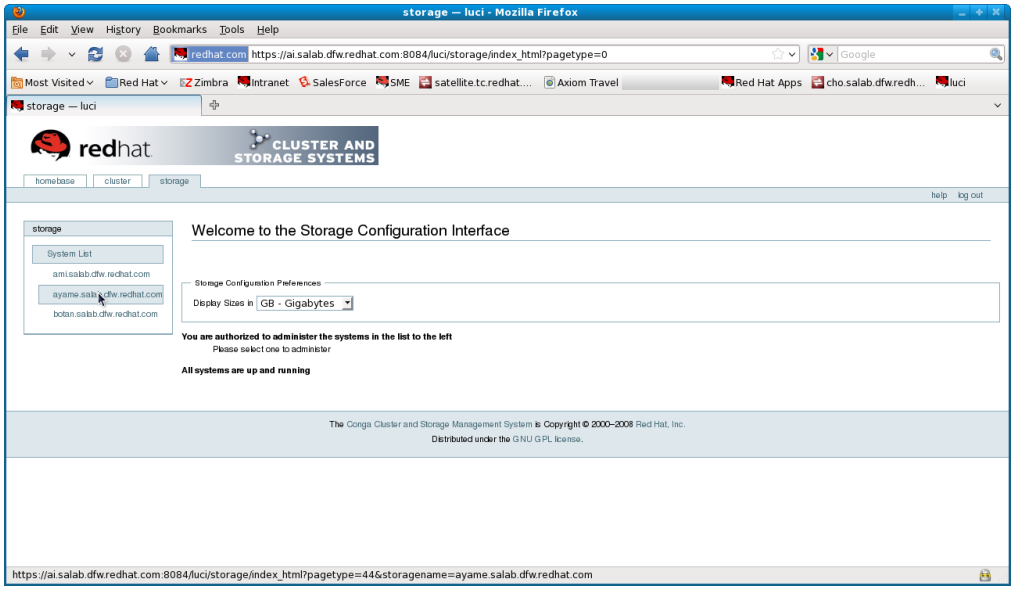
In some cases, you might need to reprobe storage so that the host “sees” the new LV


storage — luci - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/storage/index_html?pagetype=0
storage — luci
redhat
CLUSTER AND STORAGE SYSTEMS
homebase cluster storage
help log out
storage
System List
ami.salab.dfw.redhat.com
ayame.salab.dfw.redhat.com
botan.salab.dfw.redhat.com
Welcome to the Storage Configuration Interface
Storage Configuration Preferences
Display Sizes in GB - Gigabytes
You are authorized to administer the systems in the list to the left
Please select one to administer
All systems are up and running
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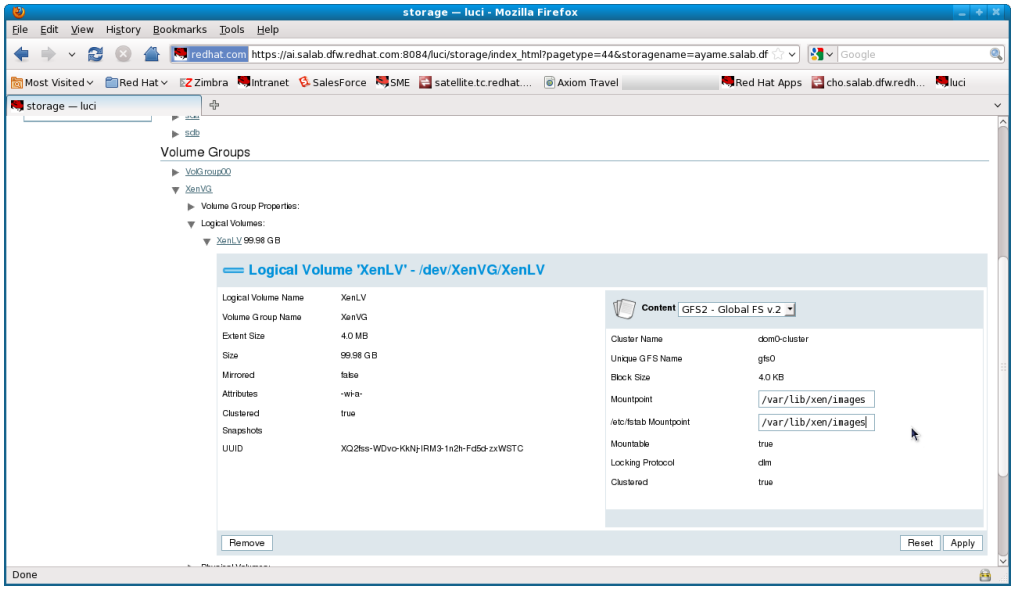
Distributed under the GNU GPL license.
https://ai.salab.dfw.redhat.com:8084/luci/storage/index_html?pagetype=44&storagename=ayame.salab.dfw.redhat.com


storage — luci - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/storage/index_html?pagetype=44&storagename=ayame.salab.df
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
storage — luci
Volume Groups
VolGroup00
XenVG
Volume Group Properties:
Logical Volumes:
XenLV 99.98 GB
Logical Volume 'XenLV' - /dev/XenVG/XenLV
Logical Volume Name XenLV
Volume Group Name XenVG
Extent Size 4.0 MB
Size 99.98 GB
Mirrored false
Attributes -wi-a-
Clustered true
Snapshots
UUID XQ2fss-WDvo-KkNj-IRM3-1n2h-Fd5d-zxWSTC
Content GFS2 - Global FS v.2
Cluster Name dom0-cluster
Unique GFS Name gfs0
Block Size 4.0 KB
Mountpoint /var/lib/xen/images
/etc/fstab Mountpoint /var/lib/xen/images
Mountable true
Locking Protocol dlm
Clustered true
Remove
Reset Apply
Done

Configure Storage (alternative method)

Copy and paste the last line of /etc/fstab to the other nodes and then mount -a

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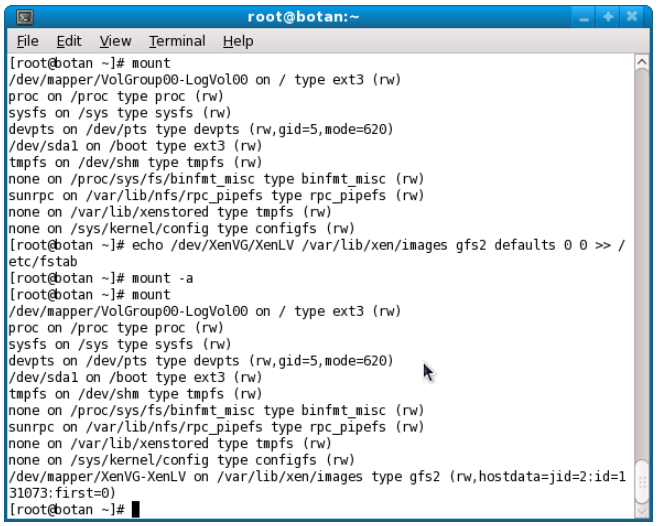
root@botan:~
File Edit View Terminal Help
[root@botan ~]# mount
/dev/mapper/VolGroup00-LogVol00 on / type ext3 (rw)
proc on /proc type proc (rw)
sysfs on /sys type sysfs (rw)
devpts on /dev/pts type devpts (rw,gid=5,mode=620)
/dev/sda1 on /boot type ext3 (rw)
tmpfs on /dev/shm type tmpfs (rw)
none on /proc/sys/fs/binfmt_misc type binfmt_misc (rw)
sunrpc on /var/lib/nfs/rpc_pipefs type rpc_pipefs (rw)
none on /var/lib/xenstored type tmpfs (rw)
none on /sys/kernel/config type configfs (rw)
[root@botan ~]# echo /dev/XenVG/XenLV /var/lib/xen/images gfs2 defaults 0 0 >> /
etc/fstab
[root@botan ~]# mount -a
[root@botan ~]# mount
/dev/mapper/VolGroup00-LogVol00 on / type ext3 (rw)
proc on /proc type proc (rw)
sysfs on /sys type sysfs (rw)
devpts on /dev/pts type devpts (rw,gid=5,mode=620)
/dev/sda1 on /boot type ext3 (rw)
tmpfs on /dev/shm type tmpfs (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 /var/lib/xenstored type tmpfs (rw)
none on /sys/kernel/config type configfs (rw)
/dev/mapper/XenVG-XenLV on /var/lib/xen/images type gfs2 (rw,hostdata=jid=2:id=1
31073:first=0)
[root@botan ~]#

Verify Storage Availability

Something simple like a df -h on all nodes is fine.

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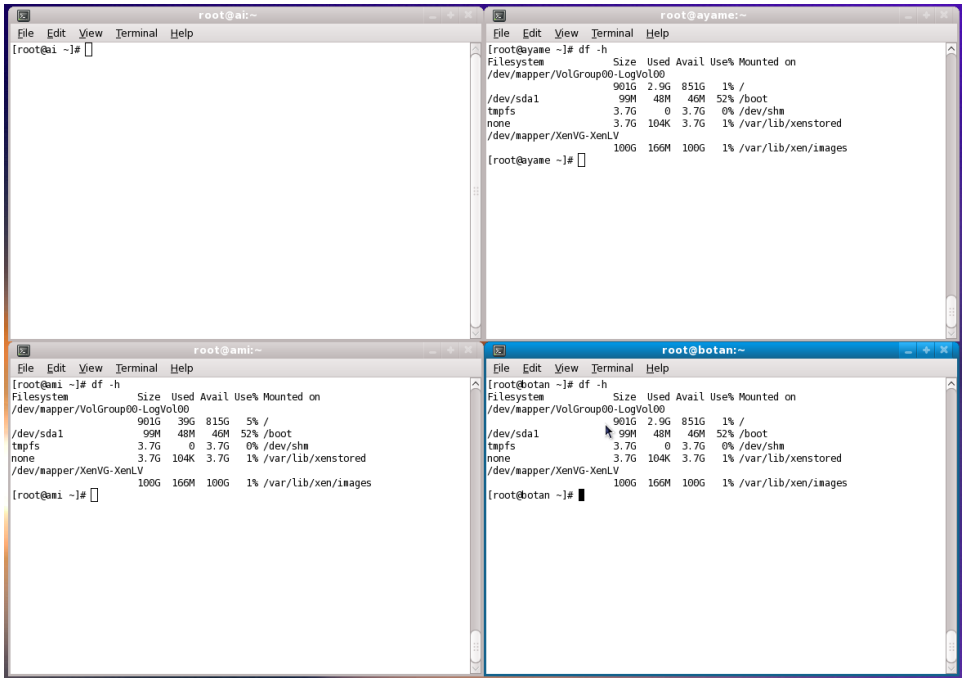

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Prepare dom0 machines for live migration

Make sure that time is synced across all of the dom0 machines.

You **must** use something like NTP. Even if you just set up the management server as an NTP server, the dom0 times **must** be synced for live migration to work right!

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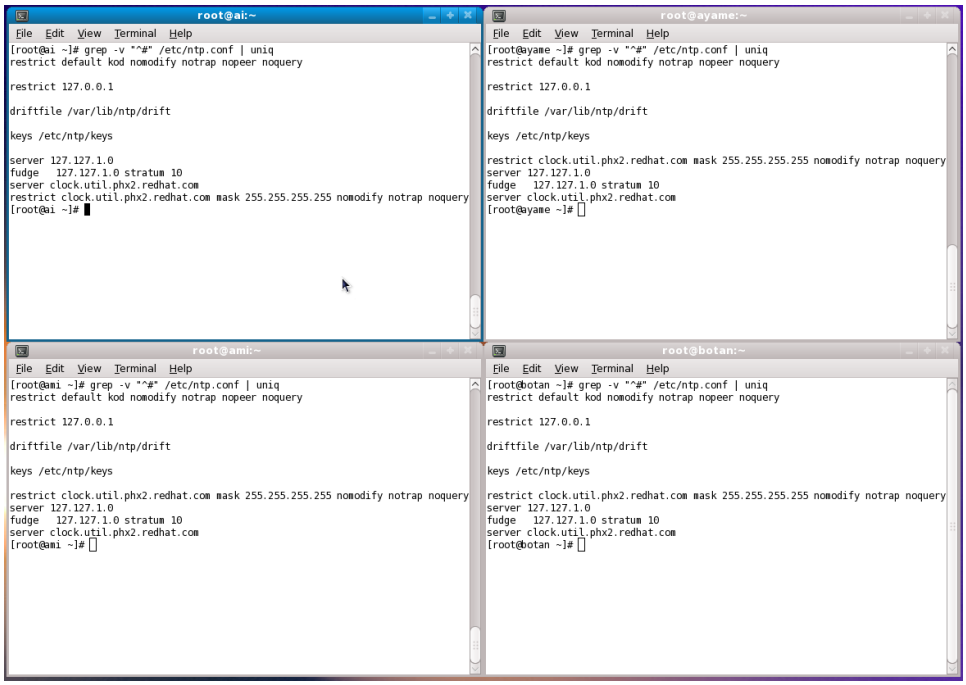

In the lab, all of the servers are syncing against our internal time source. All of the servers time is synced.

Install Virtual Machines

Use virt-manager or virt-install

The following is a single command, separated here for easier viewing:

```
virt-install -n guest1 -r 1024 -p \
 -l http://ai.salab.dfw.redhat.com/pub/isos/rhel/5/x86_64/u4/loop/ \
 -x "ks=http://ai.salab.dfw.redhat.com/pub/isos/rhel/5/x86_64/u4/ks.cfg" \
 -f /var/lib/xen/images/guest1.img -s 6 --nonsparse
                                        ^^^^^^^^^^
```


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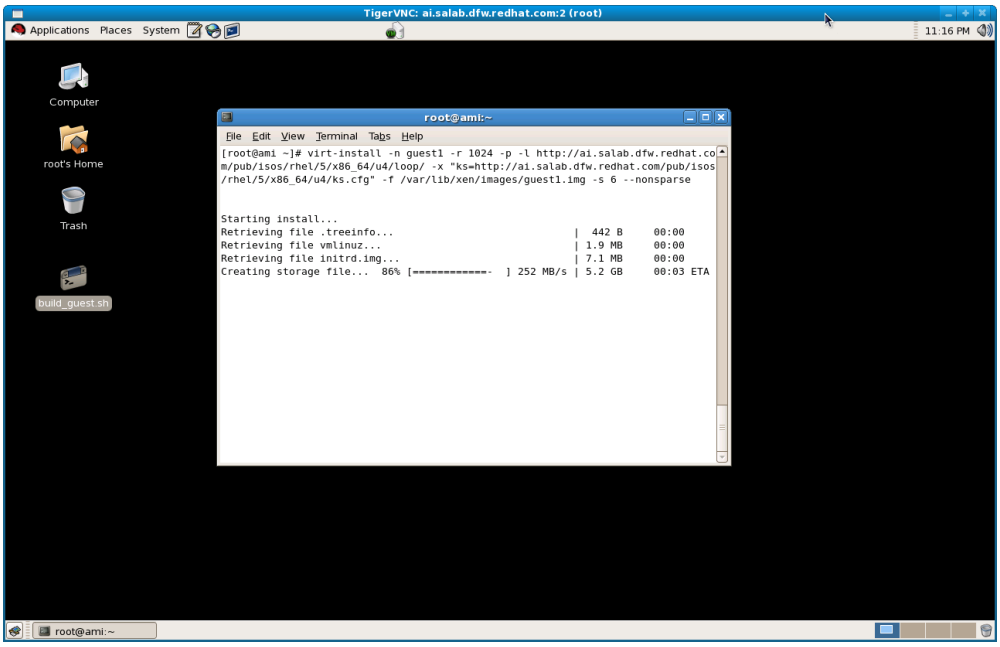
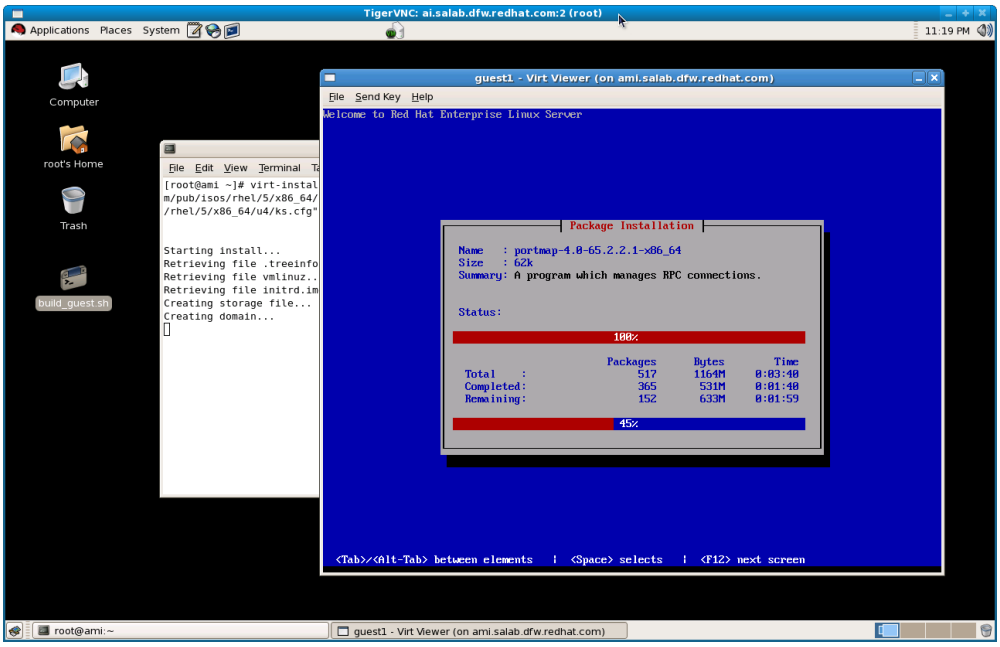
In my lab, I created two domU guests on each dom0 host.

--non-sparse is very important for performance!

For mass provisioning via virt-install we also added an option to not wait in the foreground for the install to complete '--wait'


TigerVNC: ai.salab.dfw.redhat.com:2 (root)
Applications Places System
11:16 PM
Computer
root's Home
Trash
build_guest.sh
root@ami:~
File Edit View Terminal Tabs Help
[root@ami ~]# virt-install -n guest1 -r 1024 -p -l http://ai.salab.dfw.redhat.co
m/pub/isos/rhel/5/x86_64/u4/loop/ -x "ks=http://ai.salab.dfw.redhat.com/pub/isos
/rhel/5/x86_64/u4/ks.cfg" -f /var/lib/xen/images/guest1.img -s 6 --nonsparse
Starting install...
Retrieving file .treeinfo... | 442 B 00:00
Retrieving file vmlinuz... | 1.9 MB 00:00
Retrieving file initrd.img... | 7.1 MB 00:00
Creating storage file... 86% [==========-] 252 MB/s | 5.2 GB 00:03 ETA
root@ami:~



Since I am using a single gigabit NIC for each dom0, I only installed one guest at a time per dom0. The iSCSI target, ai, was pretty loaded with three concurrent installations going but it ran pretty well. For a production system I would definitely do bonded ethernet on the dom0 and the iSCSI target.

Prepare all dom0 machines for live migration

In the /etc/xend-config.sxp file set the following:

(xend-relocation-server yes)

(xend-relocation-port 8002)

(xend-relocation-address '')

(xend-relocation-hosts-allow '')

Restart the xend service

Test live migration

```
virsh migrate guest1 \ xen
  +ssh://root@ayame.salab.dfw.redhat.com
```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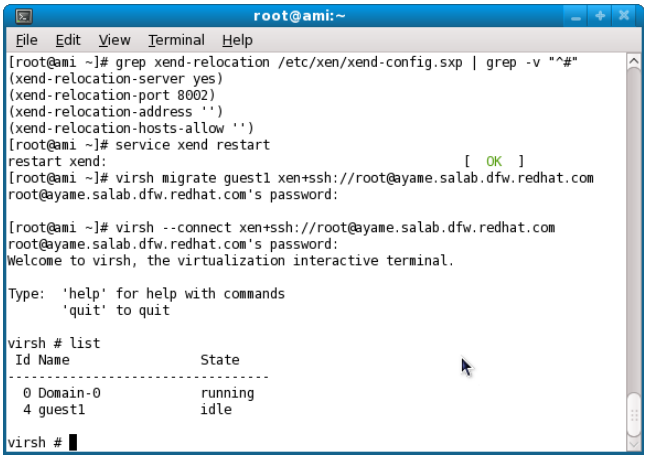
Note that these are two single quotes ('') not a single double-quote

For testing migration, since virsh uses ssh, you might want to create ssh keys. See the man page for ssh-keygen(1)

Note that this is only an example and done in a secure lab. Consider security implications of opening up your server this wide!


root@ami:~
File Edit View Terminal Help
[root@ami ~]# grep xend-relocation /etc/xen/xend-config.sxp | grep -v "^#"
(xend-relocation-server yes)
(xend-relocation-port 8002)
(xend-relocation-address '')
(xend-relocation-hosts-allow '')
[root@ami ~]# service xend restart
restart xend: [OK]
[root@ami ~]# virsh migrate guest1 xen+ssh://root@ayame.salab.dfw.redhat.com
root@ayame.salab.dfw.redhat.com's password:
[root@ami ~]# virsh --connect xen+ssh://root@ayame.salab.dfw.redhat.com
root@ayame.salab.dfw.redhat.com's password:
Welcome to virsh, the virtualization interactive terminal.
Type: 'help' for help with commands
'quit' to quit
virsh # list
Id Name State
0 Domain-0 running
4 guest1 idle
virsh #

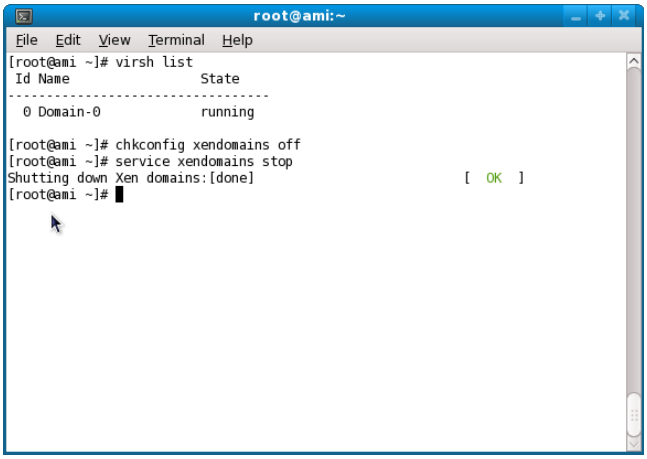
Prepare dom0 machines for live migration

Stop all the guests

chkconfig xendomains off

service xendomains stop

We don't want the xendomains service to try to start a guest at the same time that the clustering services are trying to start them, so we'll turn all start/stop abilities over the clustering


root@ami:~
File Edit View Terminal Help
[root@ami ~]# virsh list
Id Name State
0 Domain-0 running
[root@ami ~]# chkconfig xendomains off
[root@ami ~]# service xendomains stop
Shutting down Xen domains:[done] [OK]
[root@ami ~]#

Prepare dom0 machines for live migration

Normally you would move the config files etc /etc/xen to shared storage (/var/lib/xen/images on each dom0), but there is a bug in the beta version of RHEL 5.4, BZ 519786.

Either:

- use the vm.sh from the BZ
- copy all of the domU config files to /etc/xen on all of the nodes
- symlink the configs from /etc/xen/[guest] to /var/lib/xen/images/[guest] on all the nodes.

For this presentation, I used the vm.sh from the BZ and moved all the configs to shared storage

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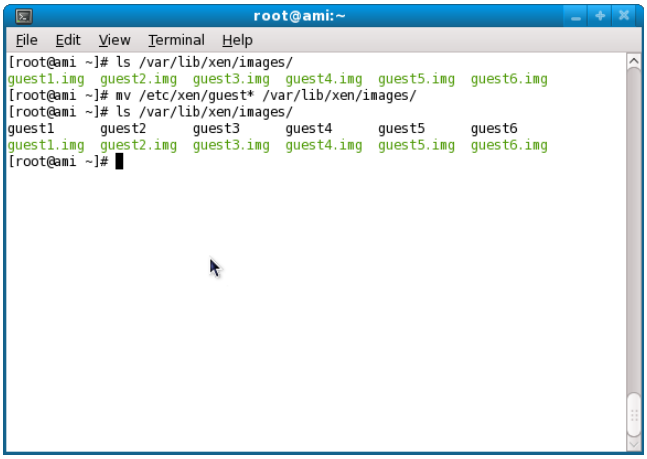
Since the cluster service needs to have access to the config files, they need to be on shared storage. Since /var/lib/xen/images is already shared, just move them there.



This shows the results of having moved the config files on all three dom0 machines at the same time.

Configure Failover Domains

- Cluster tab
- Cluster Name
- Failover Domains
- Add Failover Domain
  - FD Name
  - Check “Prioritized“
  - Check “Restrict failover to this domain's members”
  - Do not check “Do not fail back services...”
  - Assign members and priorities
  - Submit

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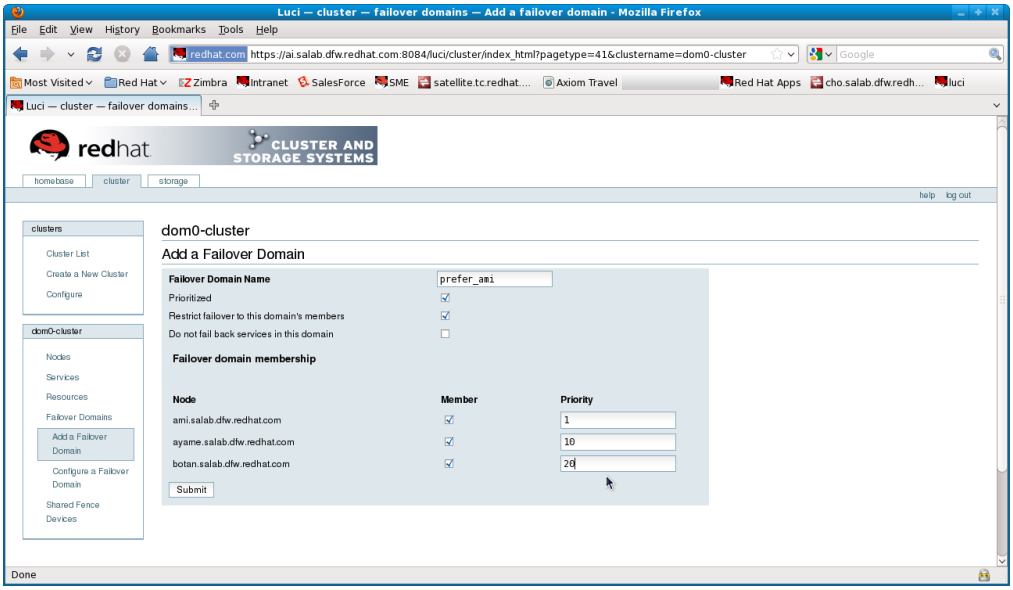
Prioritized sets services assigned to the FD to run on the lowest priority first

Set up FD for each server in the dom0 cluster.



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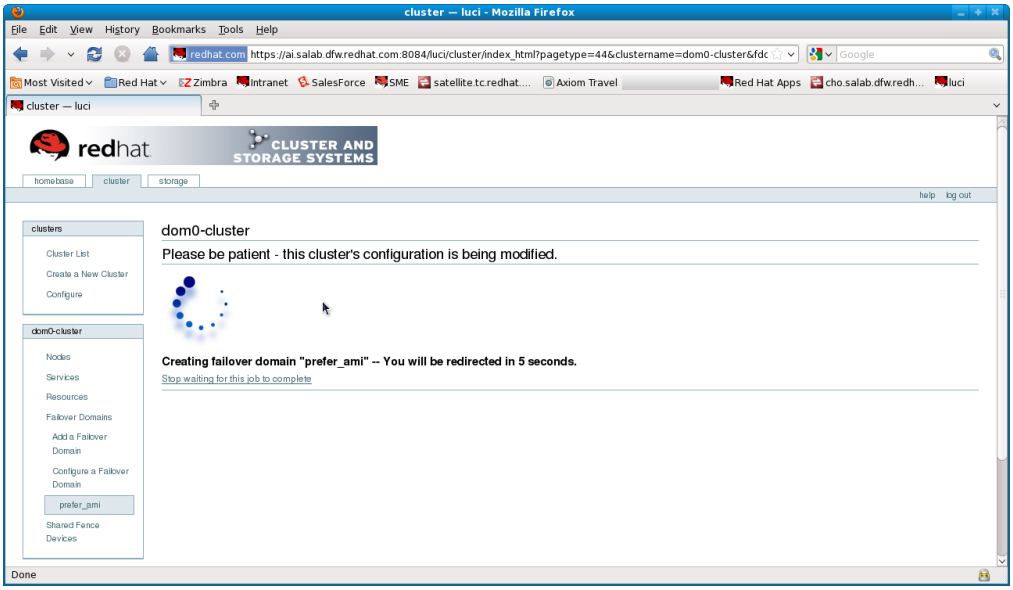

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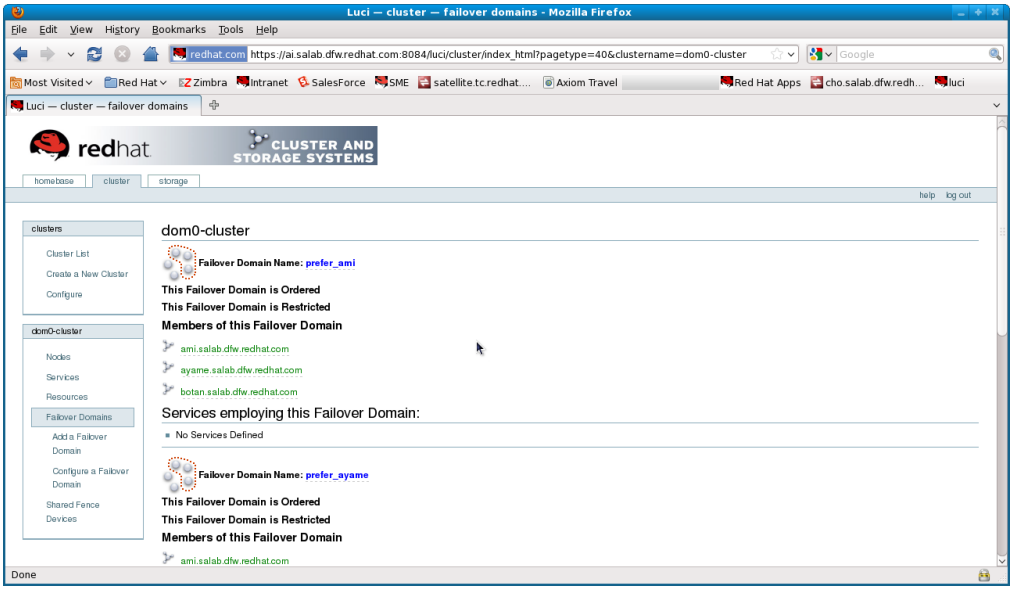
Configure Failover Domains

Create a domain for each dom0.

- prefer_ami
  - ami 1, ayame 10, botan 20
- prefer_ayame
  - ayame 1, botan 10, ami 20
- prefer_botan
  - botan 1, ami 10, ayame 20



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Define Virtual Machine Services

Cluster Tab

Cluster Name

Services

Add Virtual Machine Service

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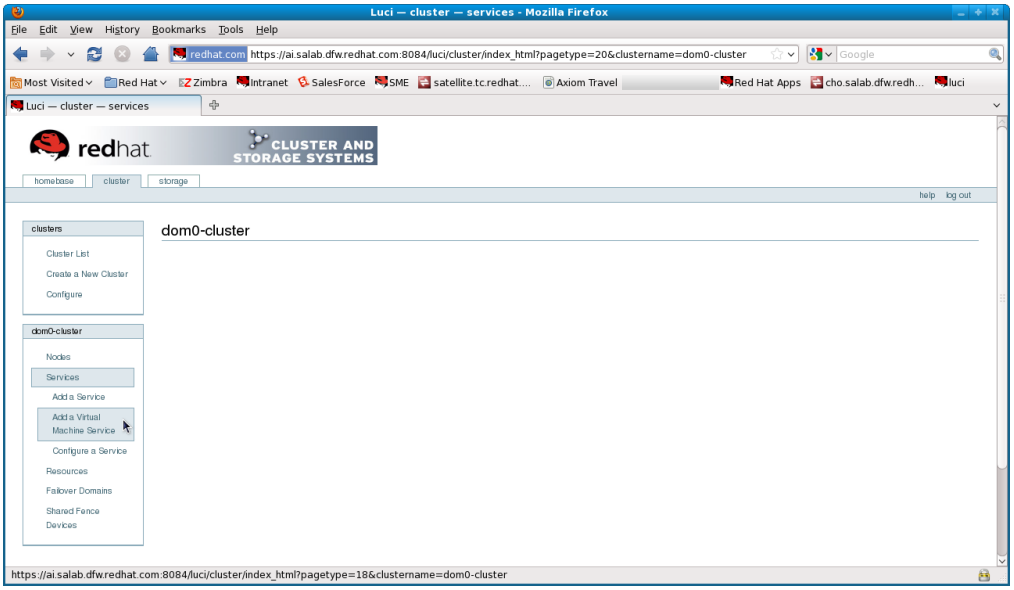


Note BZ 519252 - Conga does not show the option to add a virtual machine service. Workaround is to edit /var/lib/luci/Extensions/ricci_communicator.py and change
these lines:

self.__dom0 = hello.firstChild.getAttribute('xen_host') == 'true'

to:

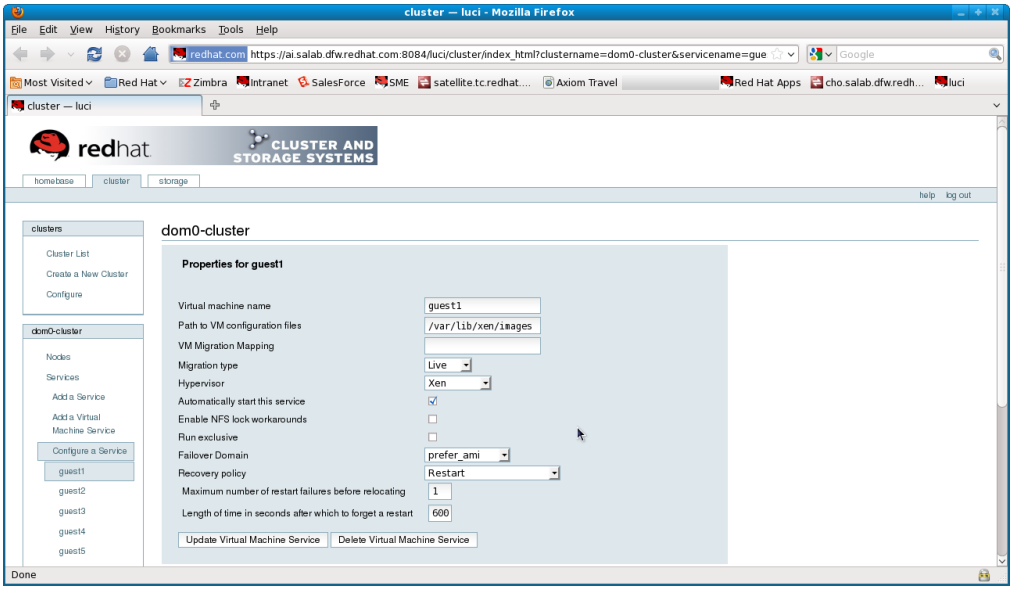
self.__dom0 = True

self.__dom0 = resp.firstChild.getAttribute('xen_host') == 'true'

to:

self.__dom0 = True

Also, FD will not show up correctly in luci-0.12.2-6.el5. Update to luci-0.12.2-6.el5 from RHEL 5.4 to fix it.



VM name must be the same as the config file name

VM Migration Mapping is for multi-homed machines, if you want to specify a management network interface

HV should be set to Xen

No NFS so skip it

Run exclusive allows no other services on this cluster, skip it

Example recovery policy sets restart unless it fails more than once in 10 minutes, then relo

If you have problems getting the VMs to come up in the cluster, manually start them and then activate them in the Conga interface.

Define Virtual Machine Services

Repeat for each VM Service

In this example, two VM Services are assigned to each failover domain - this equates to two machines starting on ai, two on ayame and two on botan

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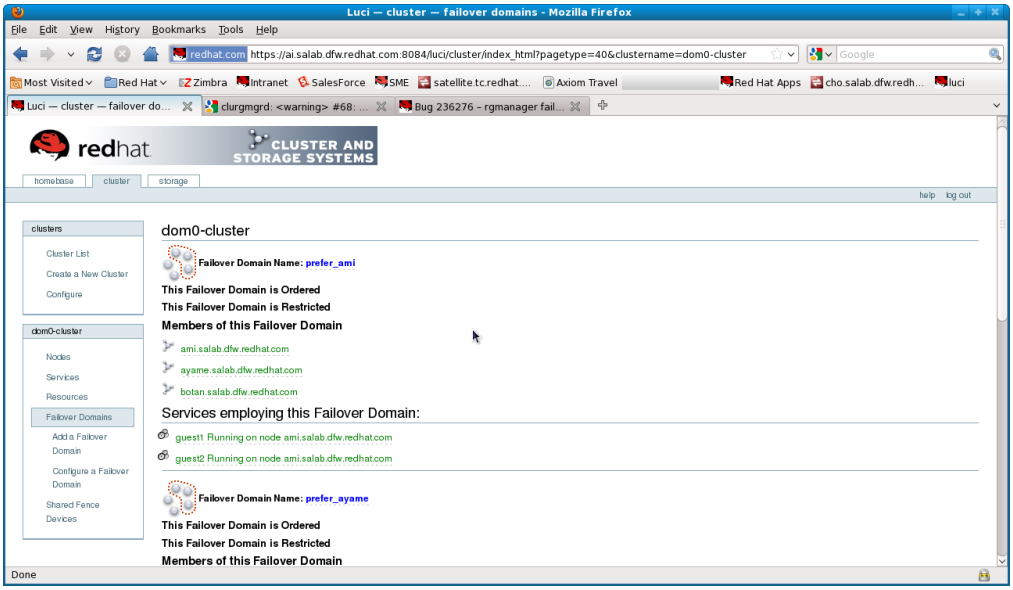

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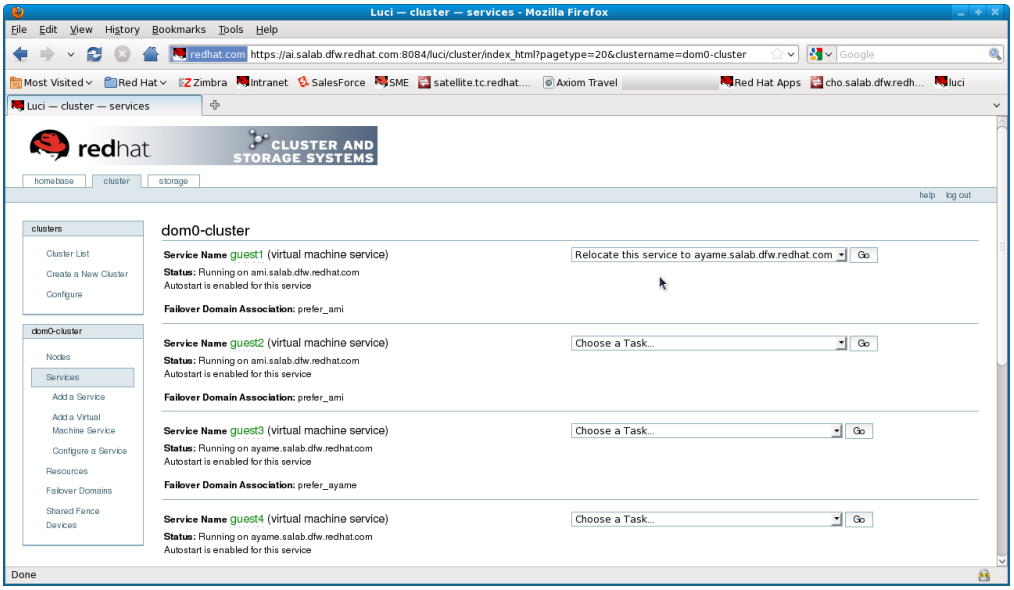
Test virtual machine management services

- Cluster Tab
- Cluster Name
- Services
- Choose an action for one of the machines from the drop down menu
- Go and confirm



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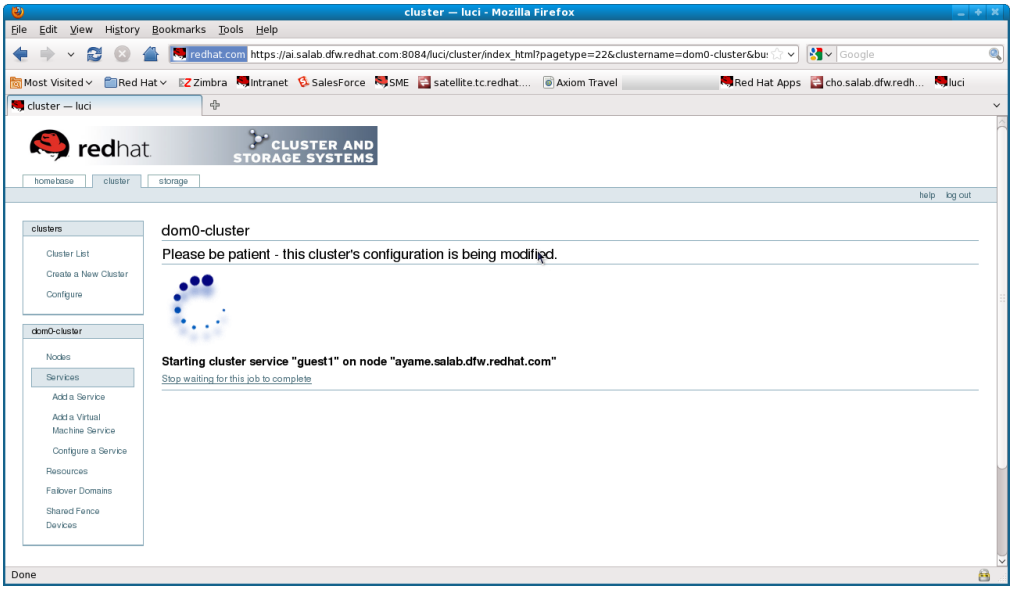
You can also do this from the command line:

```
[root@ayame ~]# clusvcadm -M vm:guest1 -m ayame
'ayame' not in membership list
Closest match: 'ayame.salab.dfw.redhat.com'
Trying to migrate vm:guest1 to
ayame.salab.dfw.redhat.com...Success
[root@ayame ~]#
```



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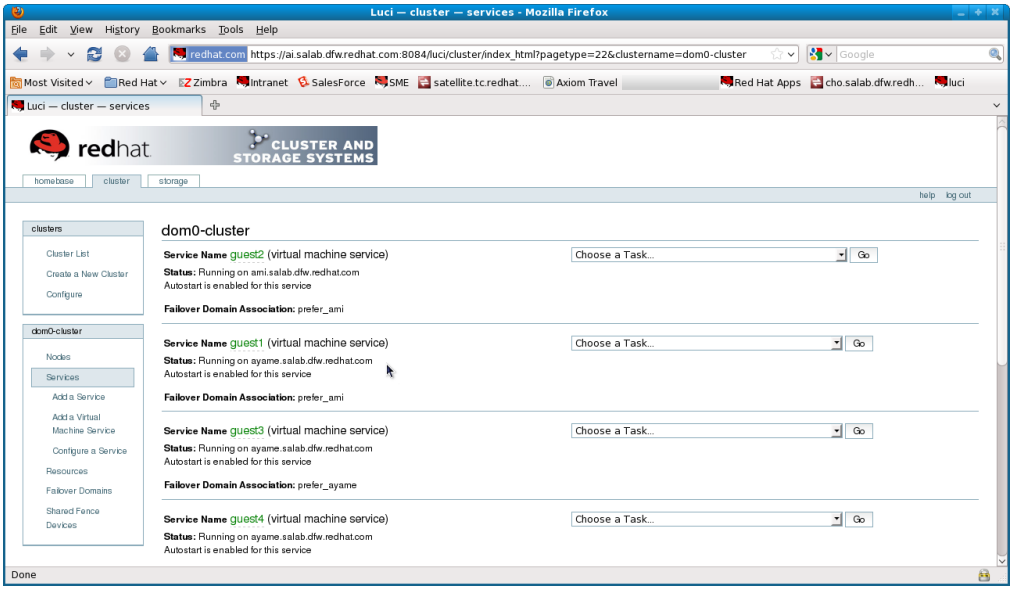

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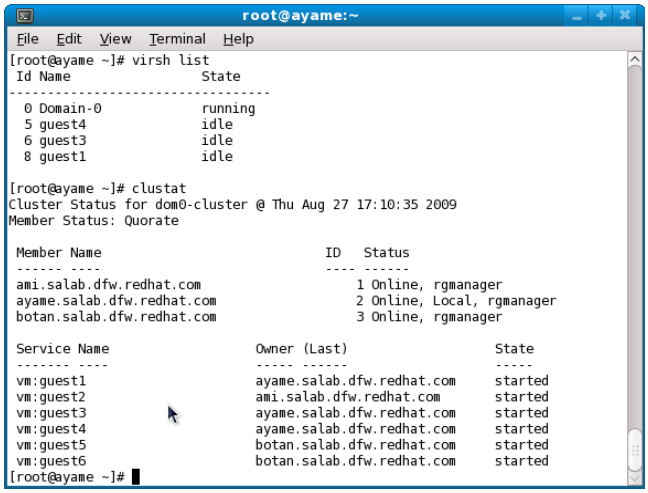
root@ayame:~
File Edit View Terminal Help
[root@ayame ~]# virsh list
 Id Name   State
----
  0 Domain-0   running
  5 guest4   idle
  6 guest3   idle
  8 guest1   idle
[root@ayame ~]# clustat
Cluster Status for dom0-cluster @ Thu Aug 27 17:10:35 2009
Member Status: Quorate
 Member Name   ID   Status
 ------ ----   ---- ------
 ami.salab.dfw.redhat.com   1 Online, rgmanager
 ayame.salab.dfw.redhat.com   2 Online, Local, rgmanager
 botan.salab.dfw.redhat.com   3 Online, rgmanager
 Service Name   Owner (Last)   State
 ------- ----   ----- ------   -----
 vm:guest1   ayame.salab.dfw.redhat.com   started
 vm:guest2   ami.salab.dfw.redhat.com   started
 vm:guest3   ayame.salab.dfw.redhat.com   started
 vm:guest4   ayame.salab.dfw.redhat.com   started
 vm:guest5   botan.salab.dfw.redhat.com   started
 vm:guest6   botan.salab.dfw.redhat.com   started
[root@ayame ~]#

Test virtual machine failover services

Log into a domU machine and crash it

```
echo c > /proc/sysrq-trigger
```

Watch clustat on one of the dom0 machines

In the following slides, the domU system is crashed and the cluster restarts it on ami.

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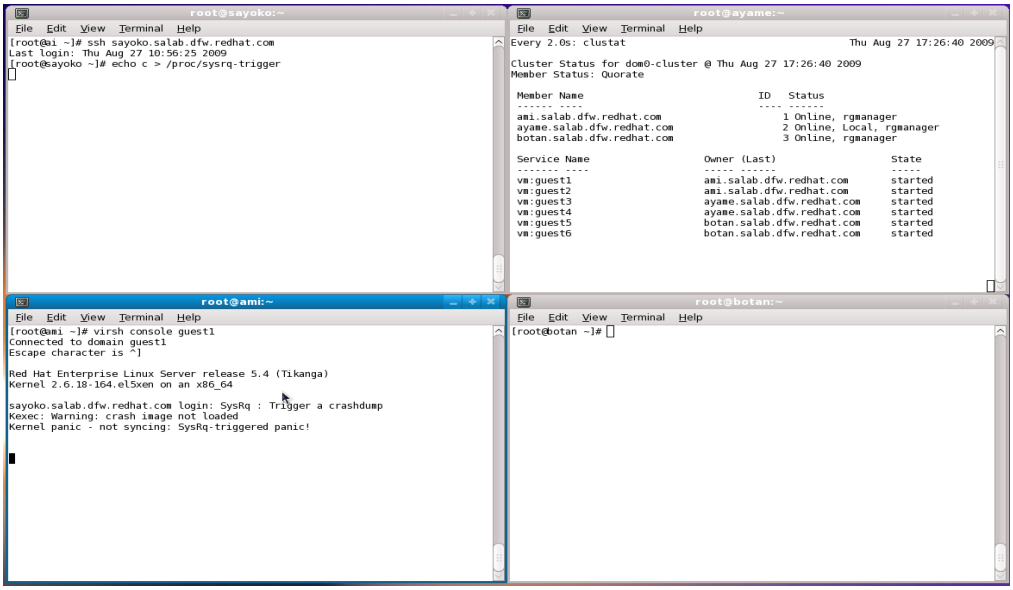

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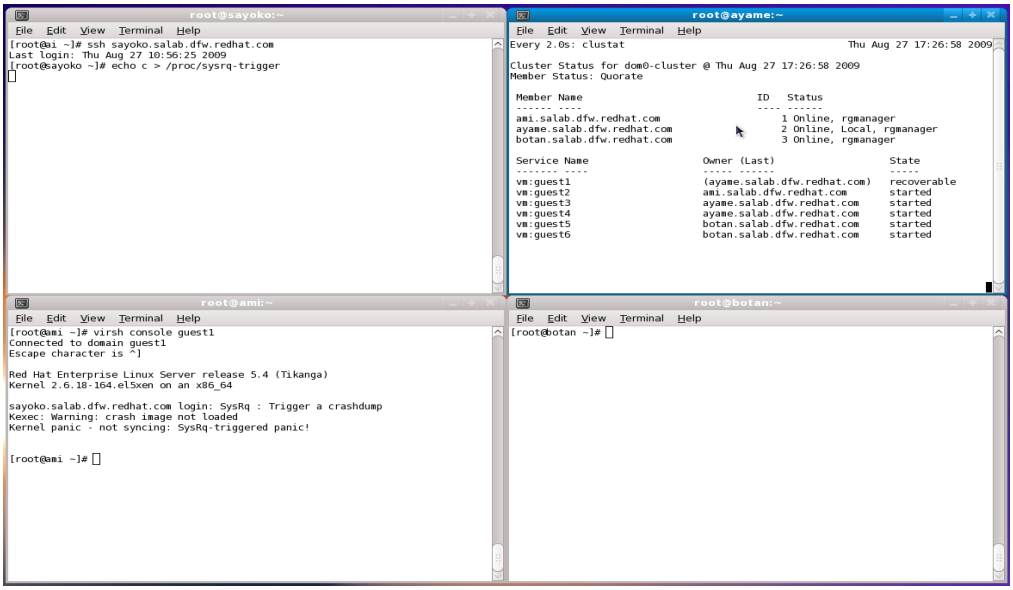

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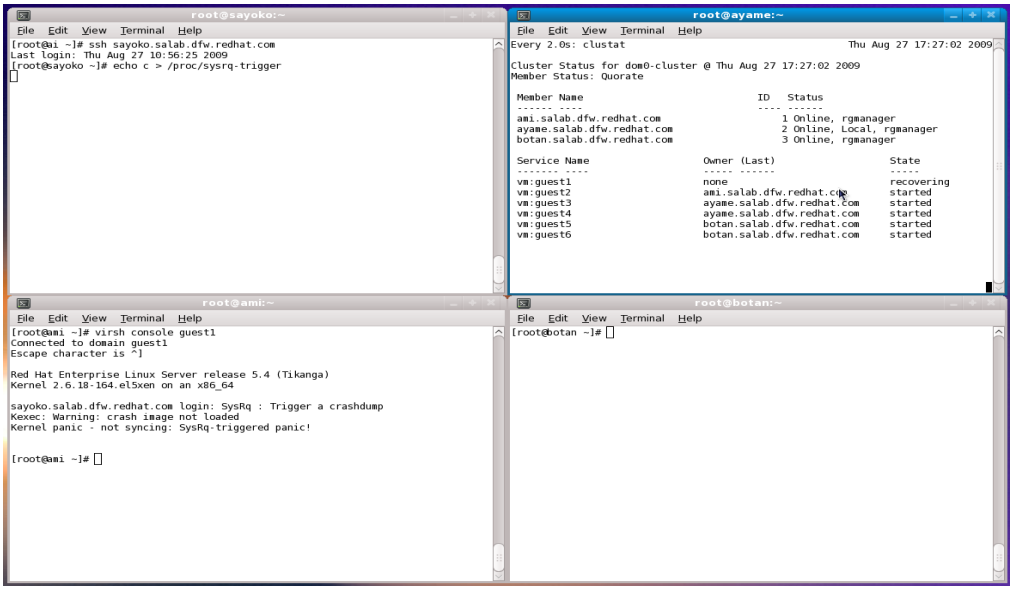
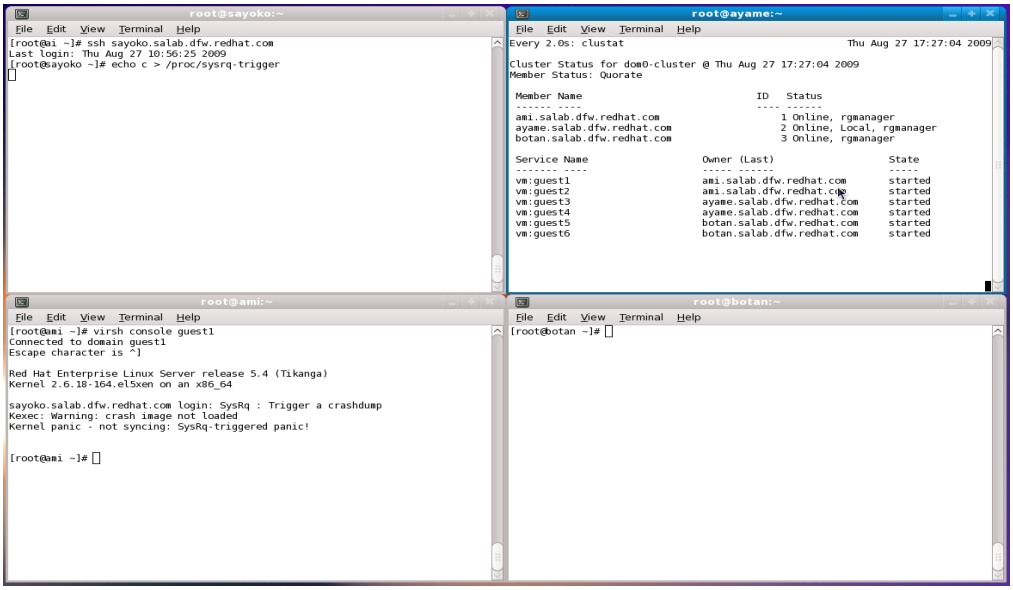

root@sayoko:~
File Edit View Terminal Help
[root@ai ~]# ssh sayoko.salab.dfw.redhat.com
Last login: Thu Aug 27 10:56:25 2009
[root@sayoko ~]# echo c > /proc/sysrq-trigger
root@ayame:~
File Edit View Terminal Help
Every 2.0s: clustat Thu Aug 27 17:27:02 2009
Cluster Status for dom0-cluster @ Thu Aug 27 17:27:02 2009
Member Status: Quorate
Member Name ID Status
ami.salab.dfw.redhat.com 1 Online, rgmanager
ayame.salab.dfw.redhat.com 2 Online, Local, rgmanager
botan.salab.dfw.redhat.com 3 Online, rgmanager
Service Name Owner (Last) State
vm:guest1 none recovering
vm:guest2 ami.salab.dfw.redhat.com started
vm:guest3 ayame.salab.dfw.redhat.com started
vm:guest4 ayame.salab.dfw.redhat.com started
vm:guest5 botan.salab.dfw.redhat.com started
vm:guest6 botan.salab.dfw.redhat.com started
root@ami:~
File Edit View Terminal Help
[root@ami ~]# virsh console guest1
Connected to domain guest1
Escape character is ^]
Red Hat Enterprise Linux Server release 5.4 (Tikanga)
Kernel 2.6.18-164.el5xen on an x86_64
sayoko.salab.dfw.redhat.com login: SysRq : Trigger a crashdump
Kexec: Warning: crash image not loaded
Kernel panic - not syncing: SysRq-triggered panic!
[root@ami ~]#
root@botan:~
File Edit View Terminal Help
[root@botan ~]#


root@sayoko:~
File Edit View Terminal Help
[root@ai ~]# ssh sayoko.salab.dfw.redhat.com
Last login: Thu Aug 27 10:56:25 2009
[root@sayoko ~]# echo c > /proc/sysrq-trigger
root@ayame:~
File Edit View Terminal Help
Every 2.0s: clustat Thu Aug 27 17:27:04 2009
Cluster Status for dom0-cluster @ Thu Aug 27 17:27:04 2009
Member Status: Quorate
Member Name ID Status
ami.salab.dfw.redhat.com 1 Online, rgmanager
ayame.salab.dfw.redhat.com 2 Online, Local, rgmanager
botan.salab.dfw.redhat.com 3 Online, rgmanager
Service Name Owner (Last) State
vm:guest1 ami.salab.dfw.redhat.com started
vm:guest2 ami.salab.dfw.redhat.com started
vm:guest3 ayame.salab.dfw.redhat.com started
vm:guest4 ayame.salab.dfw.redhat.com started
vm:guest5 botan.salab.dfw.redhat.com started
vm:guest6 botan.salab.dfw.redhat.com started
root@ami:~
File Edit View Terminal Help
[root@ami ~]# virsh console guest1
Connected to domain guest1
Escape character is ^]
Red Hat Enterprise Linux Server release 5.4 (Tikanga)
Kernel 2.6.18-164.el5xen on an x86_64
sayoko.salab.dfw.redhat.com login: SysRq : Trigger a crashdump
Kexec: Warning: crash image not loaded
Kernel panic - not syncing: SysRq-triggered panic!
[root@ami ~]#
root@botan:~
File Edit View Terminal Help
[root@botan ~]#

Test virtual machine failover services

The same guest is crashed a second time and the cluster migrates it to ayami based on the failover domain rules we set up earlier.

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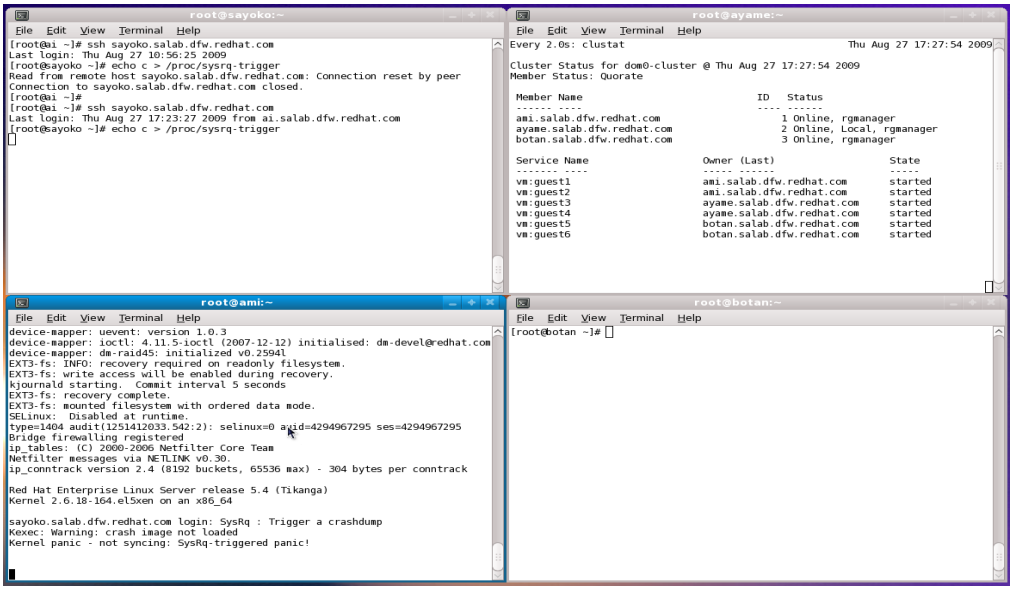

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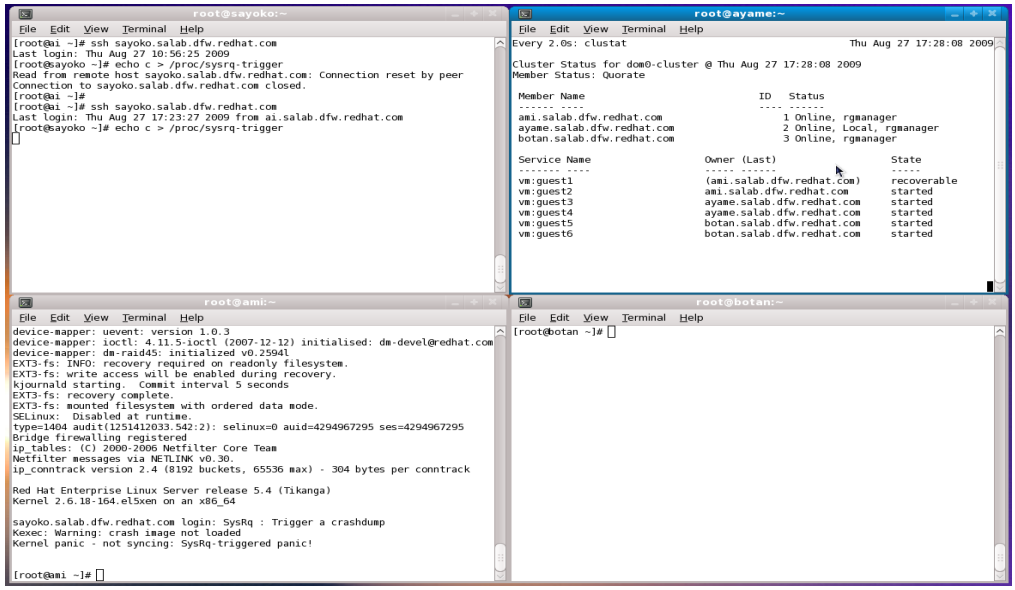

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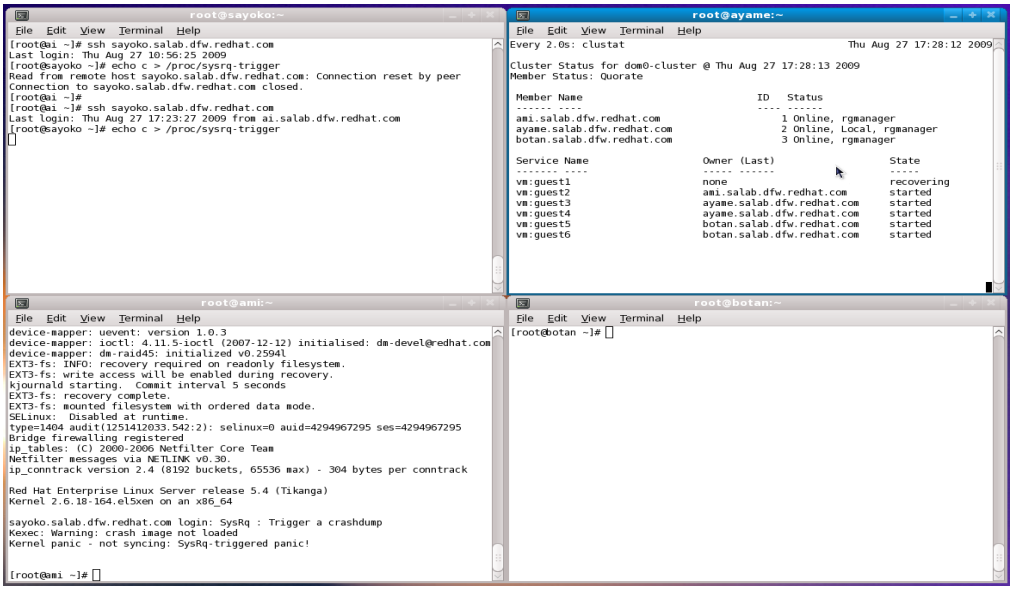

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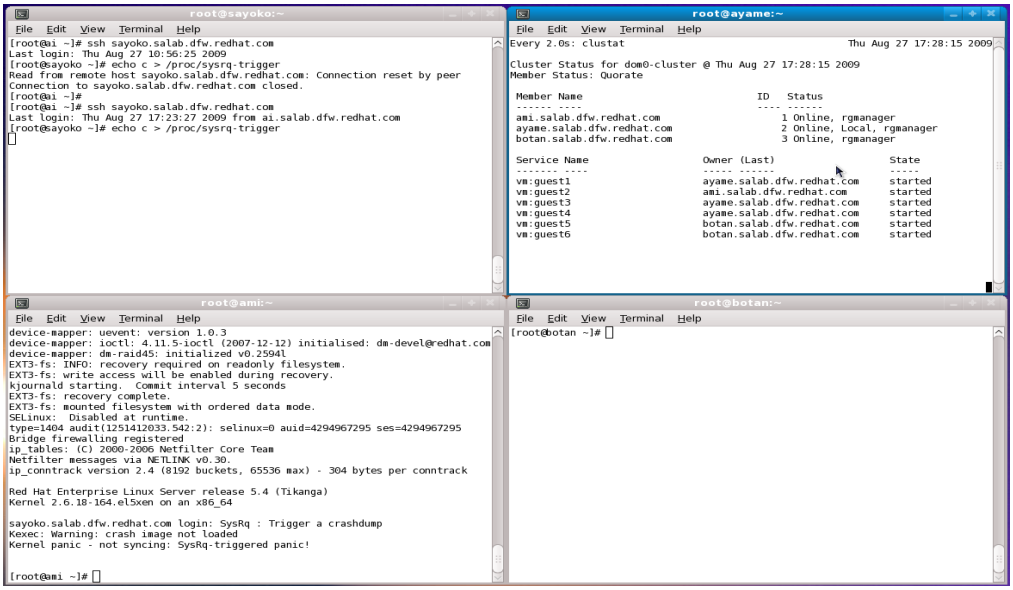

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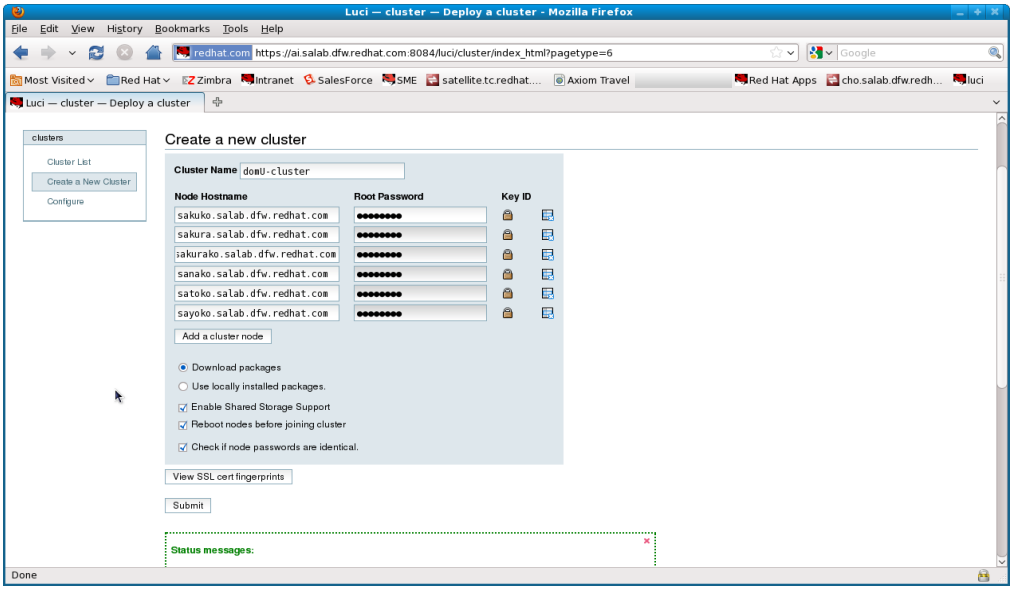
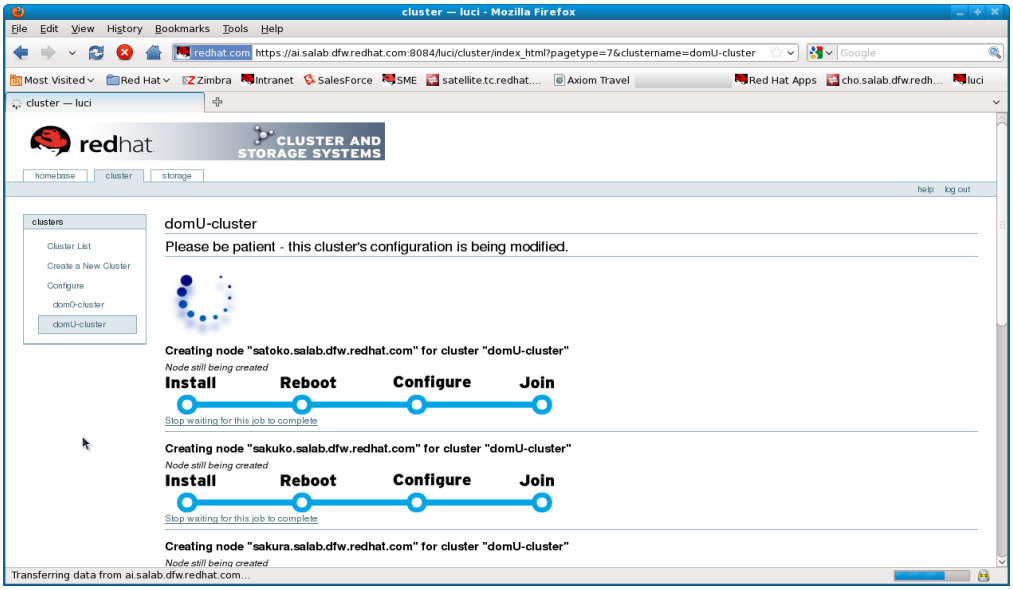
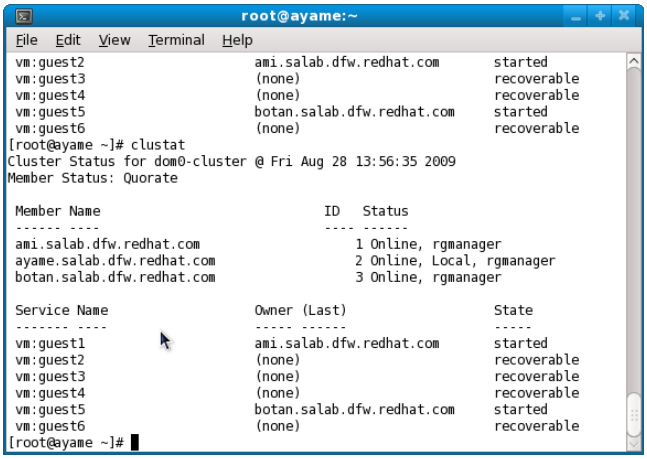
Set up the clustered app on the domU cluster

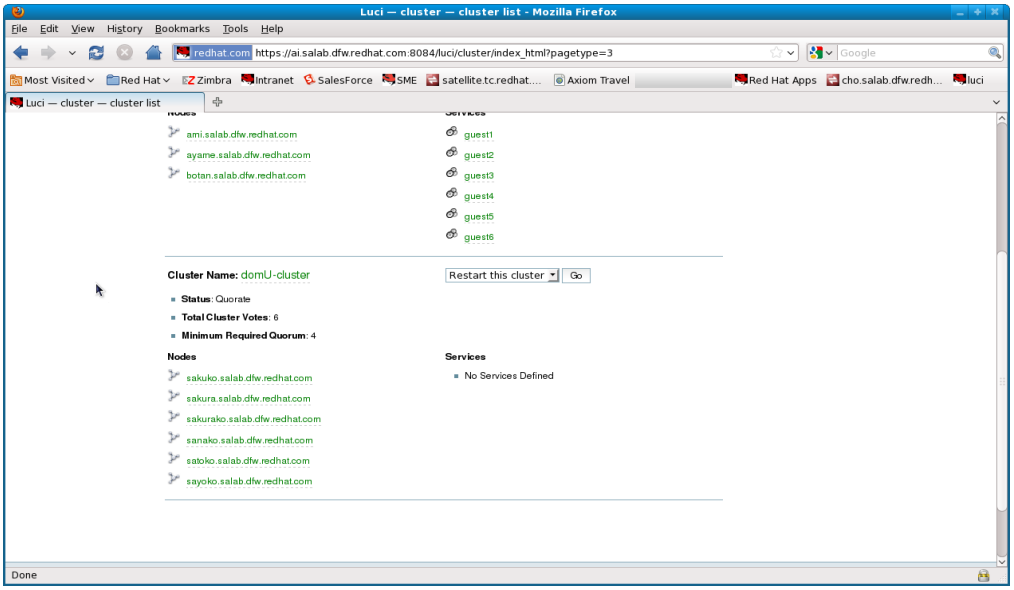
Define a new cluster - domU-cluster

- Cluster tab
- Create new cluster
- Cluster name
- Node Hostnames/passwords
- Enable share storage
- Reboot nodes
- Check if passwords identical
- View SSL fingerprints


Luci — cluster — Deploy a cluster - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=6
Luci — cluster — Deploy a cluster
clusters
Cluster List
Create a New Cluster
Configure
Create a new cluster
Cluster Name domU-cluster
Node Hostname
Root Password
Key ID
sakuko.salab.dfw.redhat.com
sakura.salab.dfw.redhat.com
iakurako.salab.dfw.redhat.com
sanako.salab.dfw.redhat.com
satoko.salab.dfw.redhat.com
sayoko.salab.dfw.redhat.com
Add a cluster node
Download packages
Use locally installed packages.
Enable Shared Storage Support
Reboot nodes before joining cluster
Check if node passwords are identical.
View SSL cert fingerprints
Submit
Status messages:
Done


cluster — luci - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=7&clustername=domU-cluster
cluster — luci
redhat
CLUSTER AND STORAGE SYSTEMS
homebase
cluster
storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
dom0-cluster
domU-cluster
domU-cluster
Please be patient - this cluster's configuration is being modified.
Creating node "satoko.salab.dfw.redhat.com" for cluster "domU-cluster"
Node still being created
Install Reboot Configure Join
Stop waiting for this job to complete
Creating node "sakuko.salab.dfw.redhat.com" for cluster "domU-cluster"
Node still being created
Install Reboot Configure Join
Stop waiting for this job to complete
Creating node "sakura.salab.dfw.redhat.com" for cluster "domU-cluster"
Node still being created
Transferring data from ai.salab.dfw.redhat.com...


root@ayame:~
File Edit View Terminal Help
vm:guest2 ami.salab.dfw.redhat.com started
vm:guest3 (none) recoverable
vm:guest4 (none) recoverable
vm:guest5 botan.salab.dfw.redhat.com started
vm:guest6 (none) recoverable
[root@ayame ~]# clustat
Cluster Status for dom0-cluster @ Fri Aug 28 13:56:35 2009
Member Status: Quorate
Member Name ID Status
ami.salab.dfw.redhat.com 1 Online, rgmanager
ayame.salab.dfw.redhat.com 2 Online, Local, rgmanager
botan.salab.dfw.redhat.com 3 Online, rgmanager
Service Name Owner (Last) State
vm:guest1 ami.salab.dfw.redhat.com started
vm:guest2 (none) recoverable
vm:guest3 (none) recoverable
vm:guest4 (none) recoverable
vm:guest5 botan.salab.dfw.redhat.com started
vm:guest6 (none) recoverable
[root@ayame ~]#


Luci — cluster — cluster list - Mozilla Firefox
File Edit View History Bookmarks Tools Help
redhat.com https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=3
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — cluster list
ami.salab.dfw.redhat.com
ayame.salab.dfw.redhat.com
botan.salab.dfw.redhat.com
guest1
guest2
guest3
guest4
guest5
guest6
Cluster Name: domU-cluster
Restart this cluster
Go
Status: Quorate
Total Cluster Votes: 6
Minimum Required Quorum: 4
Nodes
sakuko.salab.dfw.redhat.com
sakura.salab.dfw.redhat.com
sakurako.salab.dfw.redhat.com
sanako.salab.dfw.redhat.com
satoko.salab.dfw.redhat.com
sayoko.salab.dfw.redhat.com
Services
No Services Defined
Done

Set up the clustered app on the domU cluster

Copy the fence_xvm.key to the domU cluster members

Either scp or use the web UI

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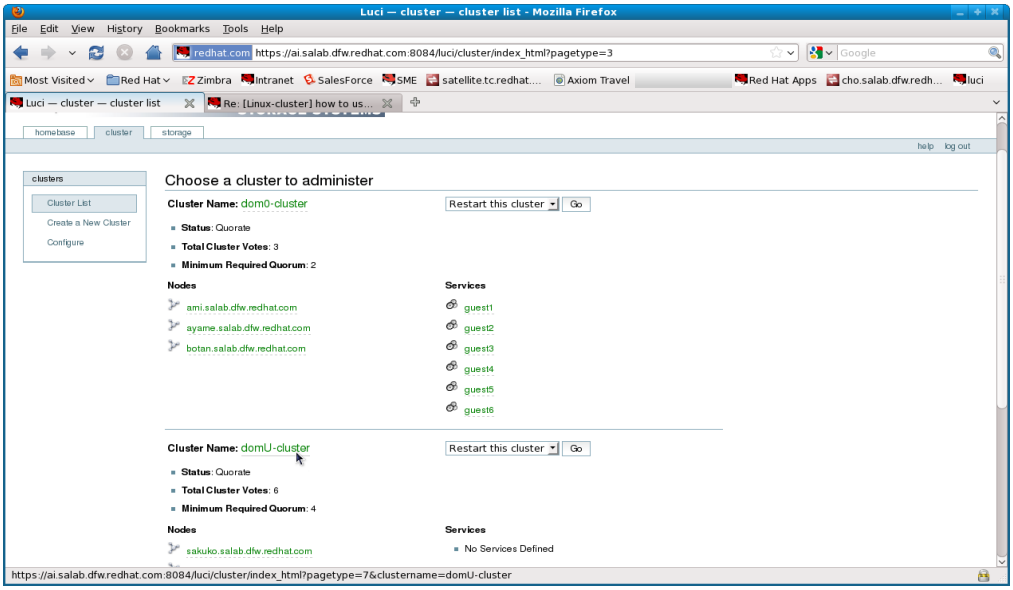
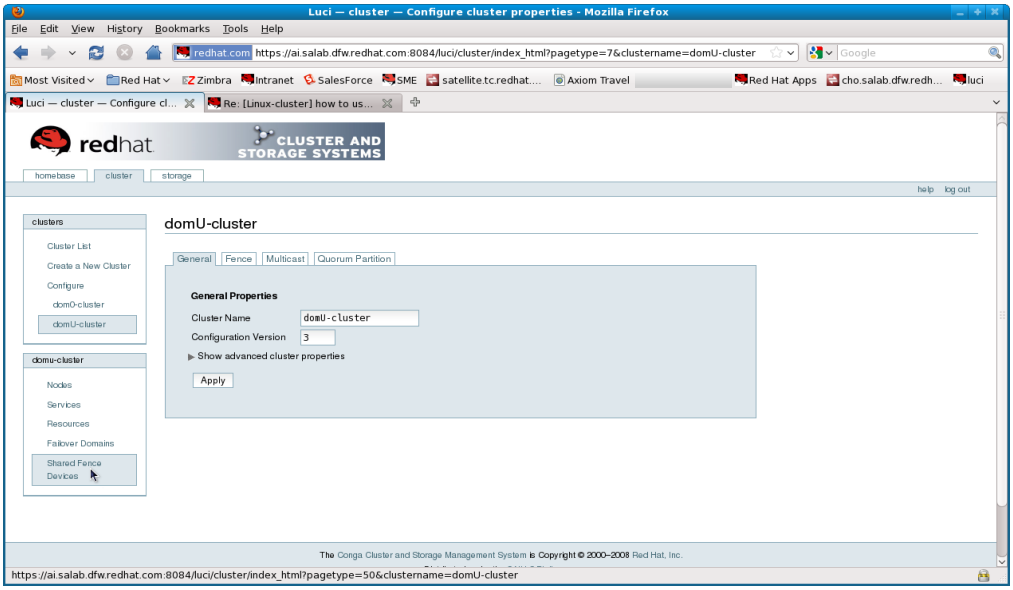
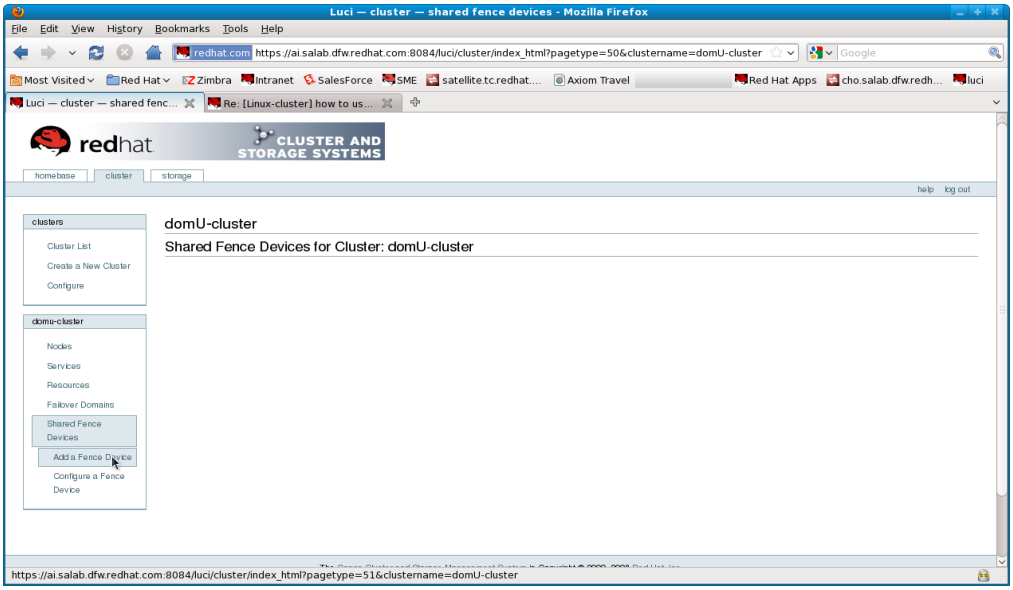
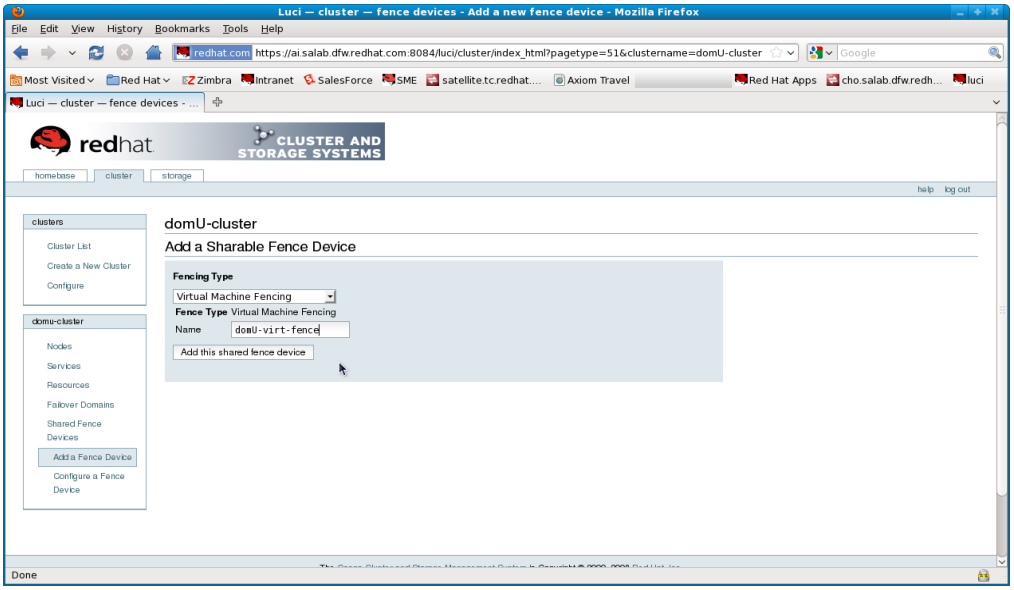
Set up the clustered app on the domU cluster

- Set up a shared fence device
  - Cluster Tab
  - Cluster Name
  - Shared Fence Devices
  - Add a Fence Device
    - Type
    - Name
  - Submit and confirm


Luci — cluster — cluster list - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=3
Luci — cluster — cluster list
homebase
cluster
storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
Choose a cluster to administer
Cluster Name: dom0-cluster
Restart this cluster
Go
Status: Quorate
Total Cluster Votes: 3
Minimum Required Quorum: 2
Nodes
ami.salab.dfw.redhat.com
ayame.salab.dfw.redhat.com
botan.salab.dfw.redhat.com
Services
guest1
guest2
guest3
guest4
guest5
guest6
Cluster Name: domU-cluster
Restart this cluster
Go
Status: Quorate
Total Cluster Votes: 6
Minimum Required Quorum: 4
Nodes
sakuko.salab.dfw.redhat.com
Services
No Services Defined
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=7&clustername=domU-cluster


Luci — cluster — Configure cluster properties - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=7&clustername=domU-cluster
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — Configure cl...
Re: [Linux-cluster] how to us...
redhat
CLUSTER AND STORAGE SYSTEMS
homebase
cluster
storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
dom0-cluster
domU-cluster
domu-cluster
Nodes
Services
Resources
Failover Domains
Shared Fence Devices
domU-cluster
General
Fence
Multicast
Quorum Partition
General Properties
Cluster Name
domU-cluster
Configuration Version
3
Show advanced cluster properties
Apply
The Conga Cluster and Storage Management System is Copyright © 2000–2008 Red Hat, Inc.
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=50&clustername=domU-cluster


Luci — cluster — shared fence devices - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=50&clustername=domU-cluster
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — shared fenc...
Re: [Linux-cluster] how to us...
redhat
CLUSTER AND STORAGE SYSTEMS
homebase
cluster
storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
domu-cluster
Nodes
Services
Resources
Failover Domains
Shared Fence Devices
Add a Fence Device
Configure a Fence Device
domU-cluster
Shared Fence Devices for Cluster: domU-cluster
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=51&clustername=domU-cluster



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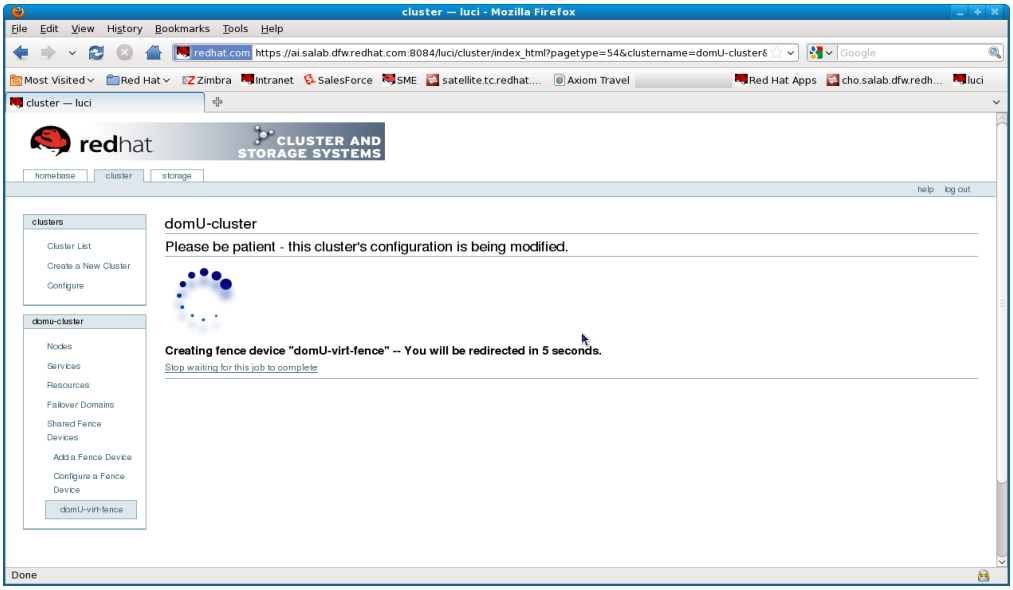

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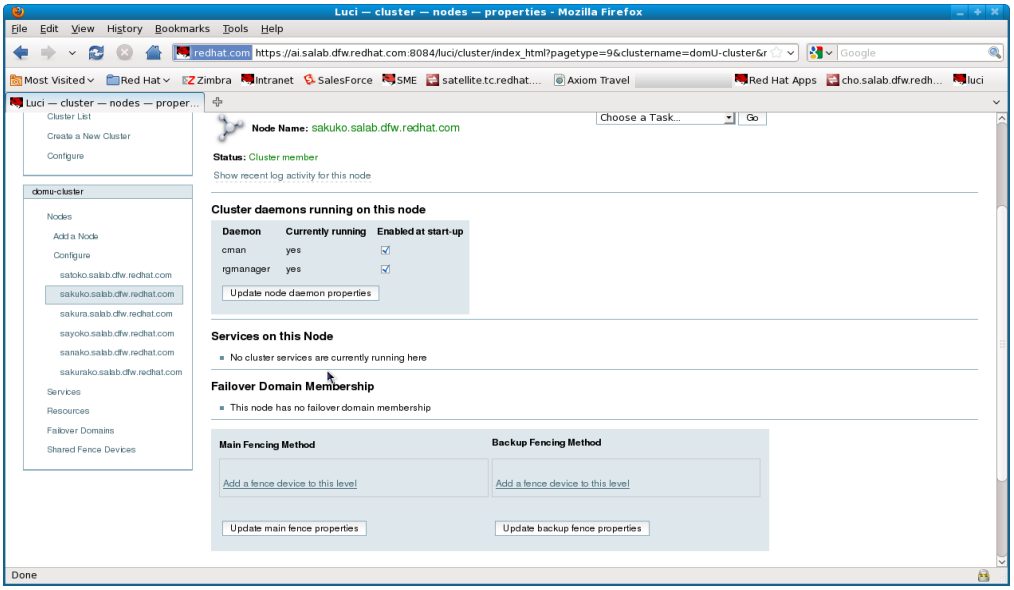
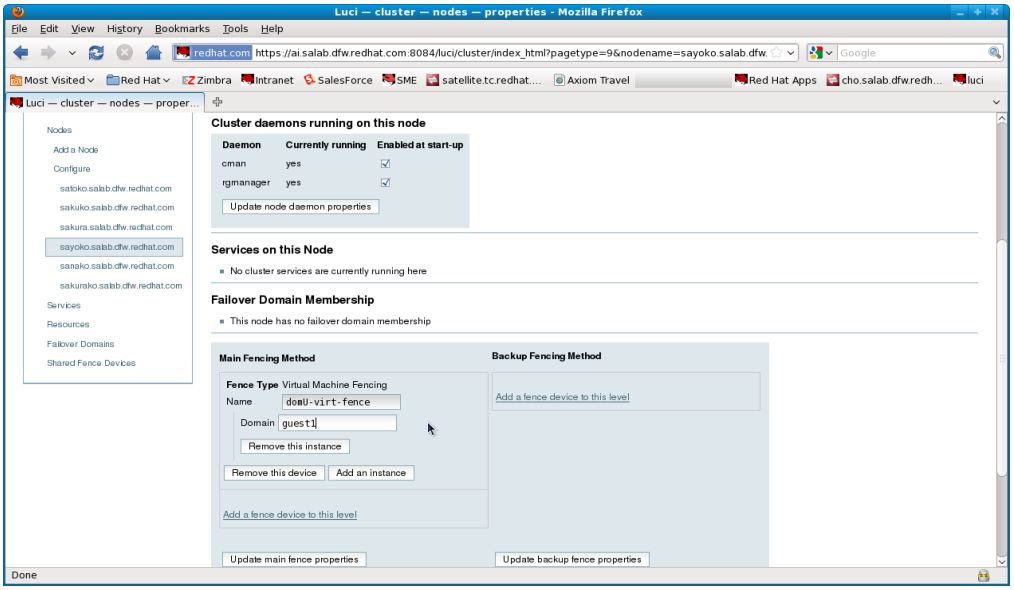
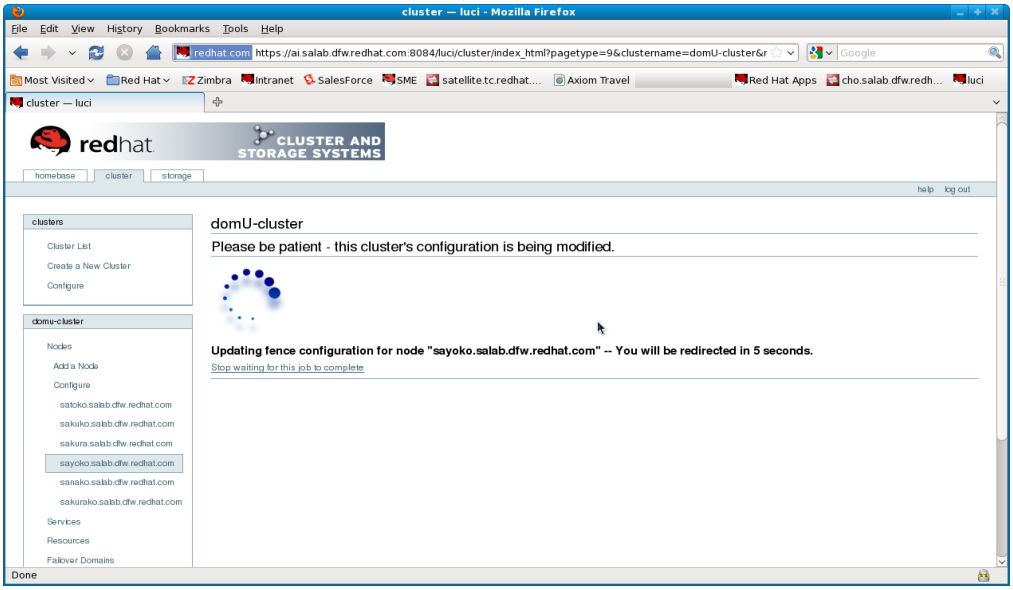
Set up the clustered app on the domU cluster

- Assign Fence Devices to Each domU
  - Cluster Node
  - Main Fencing Method
  - Add Fence Device To This Level
    - Pre-defined device
    - Domain name
    - Update and confirm
  - Repeat for each domU machine


Luci — cluster — nodes — properties - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=9&clustername=domU-cluster&r
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — nodes — proper...
Cluster List
Create a New Cluster
Configure
domu-cluster
Nodes
Add a Node
Configure
satoko.salab.dfw.redhat.com
sakuko.salab.dfw.redhat.com
sakura.salab.dfw.redhat.com
sayoko.salab.dfw.redhat.com
sanako.salab.dfw.redhat.com
sakurako.salab.dfw.redhat.com
Services
Resources
Failover Domains
Shared Fence Devices
Choose a Task...
Go
Node Name: sakuko.salab.dfw.redhat.com
Status: Cluster member
Show recent log activity for this node
Cluster daemons running on this node
Daemon
Currently running
Enabled at start-up
cman
yes
rgmanager
yes
Update node daemon properties
Services on this Node
No cluster services are currently running here
Failover Domain Membership
This node has no failover domain membership
Main Fencing Method
Backup Fencing Method
Add a fence device to this level
Add a fence device to this level
Update main fence properties
Update backup fence properties
Done



The “Domain” name is the name of the virtual machine, in this case sayoko is running as guest1


cluster — luci - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=9&clustername=domU-cluster&r
cluster — luci
redhat
CLUSTER AND STORAGE SYSTEMS
homebase
cluster
storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
domu-cluster
Nodes
Add a Node
Configure
satoko.salab.dfw.redhat.com
sakuko.salab.dfw.redhat.com
sakura.salab.dfw.redhat.com
sayoko.salab.dfw.redhat.com
sanako.salab.dfw.redhat.com
sakurako.salab.dfw.redhat.com
Services
Resources
Failover Domains
domU-cluster
Please be patient - this cluster's configuration is being modified.
Updating fence configuration for node "sayoko.salab.dfw.redhat.com" -- You will be redirected in 5 seconds.
Stop waiting for this job to complete
Done

Set up the clustered app on the domU cluster

Test by fencing a domU

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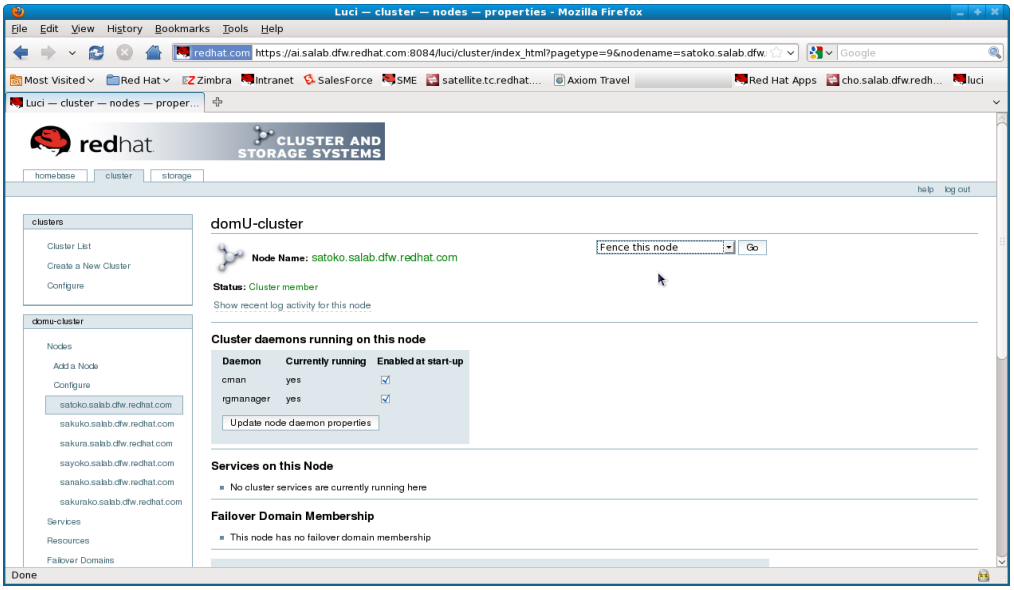

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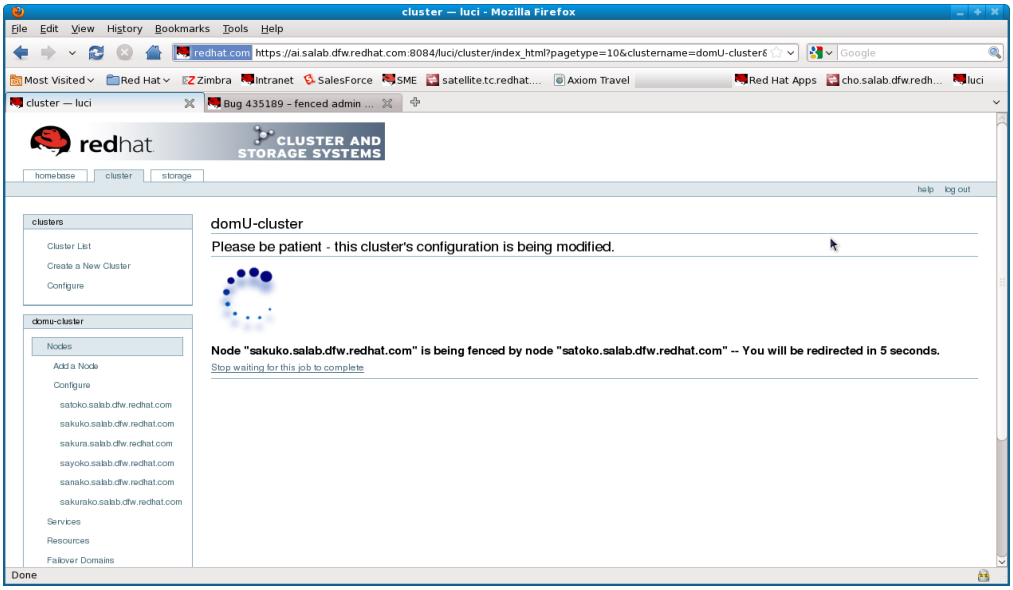
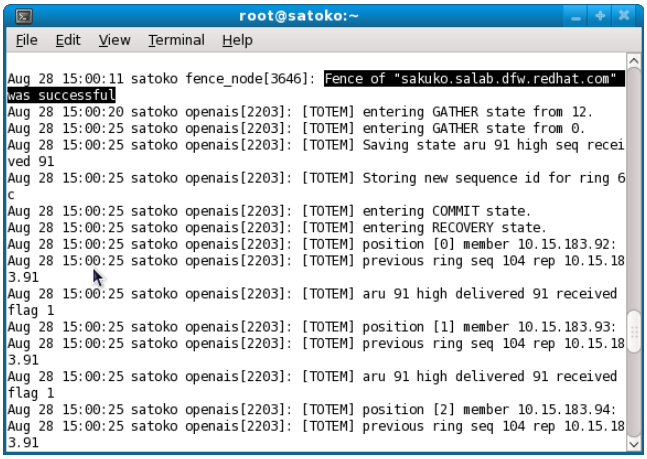

cluster — luci - Mozilla Firefox
File Edit View History Bookmarks Tools Help
redhat.com https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=10&clustername=domU-cluster&
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
cluster — luci
Bug 435189 - fenced admin ...
redhat
CLUSTER AND STORAGE SYSTEMS
homebase
cluster
storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
domu-cluster
Nodes
Add a Node
Configure
satoko.salab.dfw.redhat.com
sakuko.salab.dfw.redhat.com
sakura.salab.dfw.redhat.com
sayoko.salab.dfw.redhat.com
sanako.salab.dfw.redhat.com
sakurako.salab.dfw.redhat.com
Services
Resources
Failover Domains
domU-cluster
Please be patient - this cluster's configuration is being modified.
Node "sakuko.salab.dfw.redhat.com" is being fenced by node "satoko.salab.dfw.redhat.com" -- You will be redirected in 5 seconds.
Stop waiting for this job to complete
Done


root@satoko:~
File Edit View Terminal Help
Aug 28 15:00:11 satoko fence_node[3646]: Fence of "sakuko.salab.dfw.redhat.com" was successful
Aug 28 15:00:20 satoko openais[2203]: [TOTEM] entering GATHER state from 12.
Aug 28 15:00:25 satoko openais[2203]: [TOTEM] entering GATHER state from 0.
Aug 28 15:00:25 satoko openais[2203]: [TOTEM] Saving state aru 91 high seq received 91
Aug 28 15:00:25 satoko openais[2203]: [TOTEM] Storing new sequence id for ring 6c
Aug 28 15:00:25 satoko openais[2203]: [TOTEM] entering COMMIT state.
Aug 28 15:00:25 satoko openais[2203]: [TOTEM] entering RECOVERY state.
Aug 28 15:00:25 satoko openais[2203]: [TOTEM] position [0] member 10.15.183.92:
Aug 28 15:00:25 satoko openais[2203]: [TOTEM] previous ring seq 104 rep 10.15.183.91
Aug 28 15:00:25 satoko openais[2203]: [TOTEM] aru 91 high delivered 91 received flag 1
Aug 28 15:00:25 satoko openais[2203]: [TOTEM] position [1] member 10.15.183.93:
Aug 28 15:00:25 satoko openais[2203]: [TOTEM] previous ring seq 104 rep 10.15.183.91
Aug 28 15:00:25 satoko openais[2203]: [TOTEM] aru 91 high delivered 91 received flag 1
Aug 28 15:00:25 satoko openais[2203]: [TOTEM] position [2] member 10.15.183.94:
Aug 28 15:00:25 satoko openais[2203]: [TOTEM] previous ring seq 104 rep 10.15.183.91

Set up the clustered app on the domU cluster

- Define failover domain(s) for the app you want to run on this domU cluster
  - In this case, a simple Apache web server with an NFS mounted /var/www/html and a floating IP address
  - Here I've defined a FD prefer_satoko

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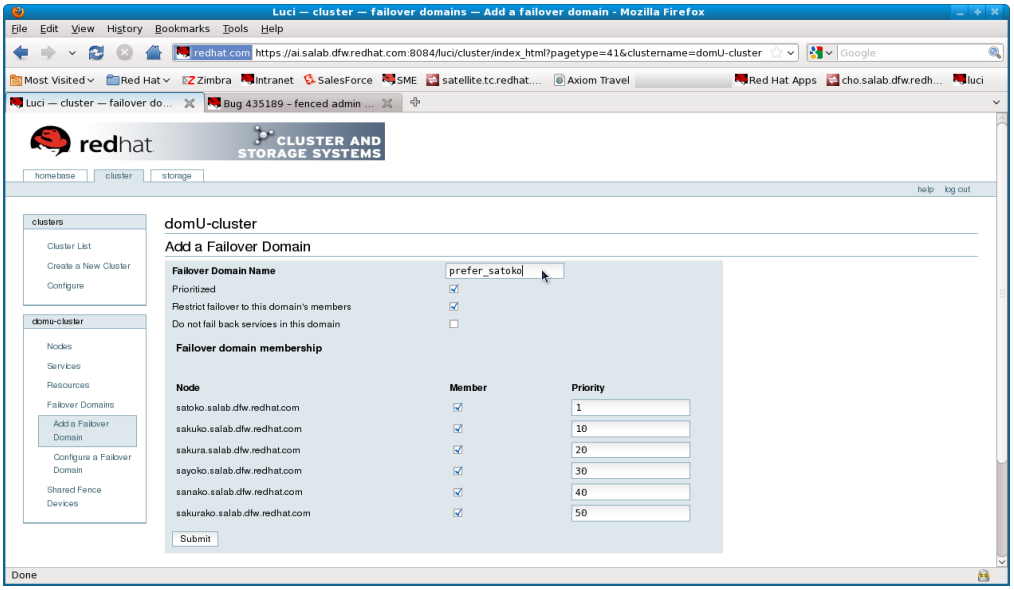
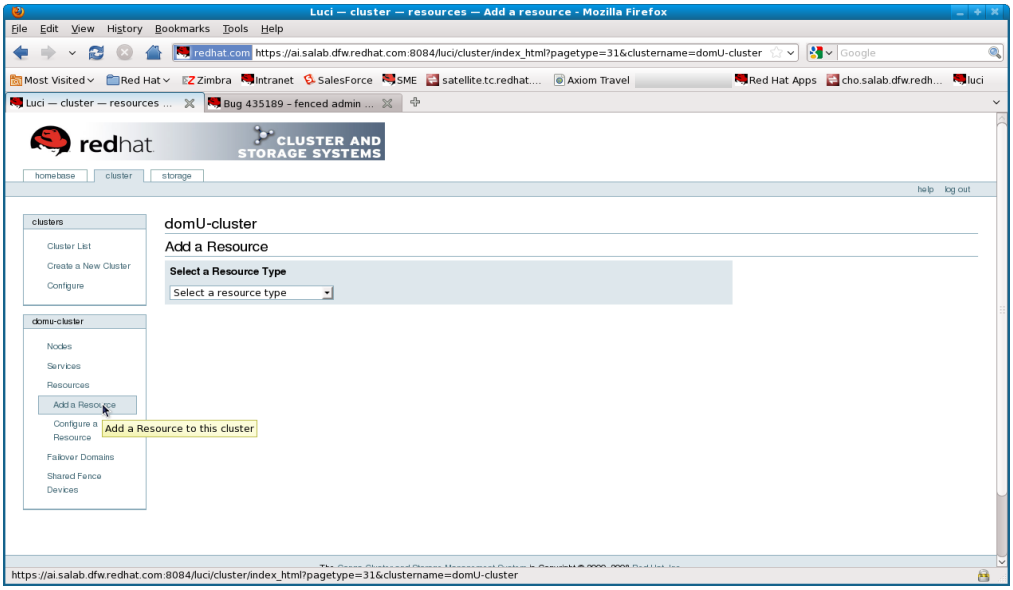
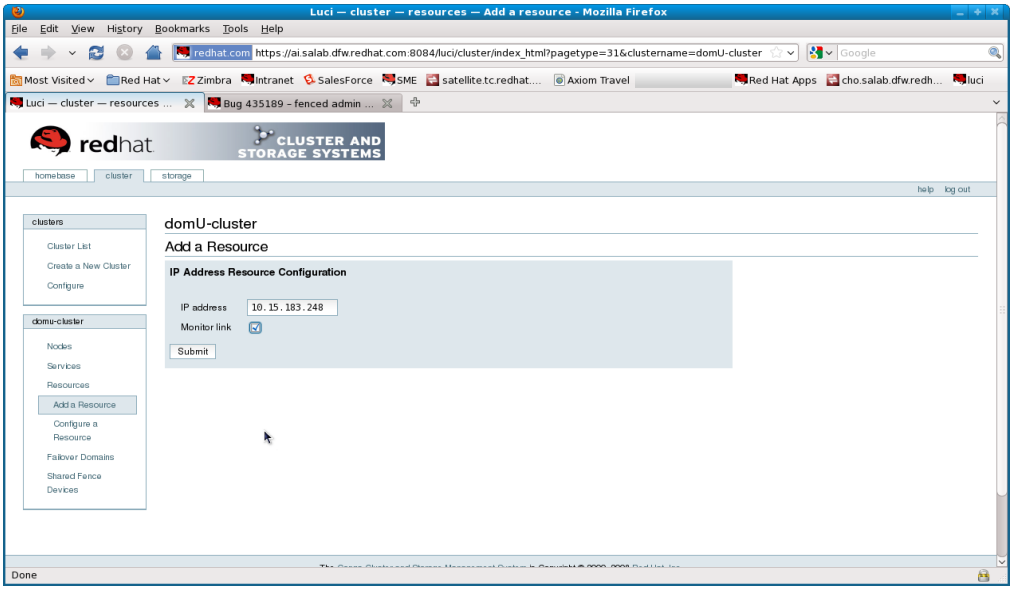

Luci — cluster — failover domains — Add a failover domain - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=41&clustername=domU-cluster
Luci — cluster — failover do...
Bug 435189 - fenced admin ...
redhat
CLUSTER AND STORAGE SYSTEMS
homebase
cluster
storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
domu-cluster
Nodes
Services
Resources
Failover Domains
Add a Failover Domain
Configure a Failover Domain
Shared Fence Devices
domU-cluster
Add a Failover Domain
Failover Domain Name
prefer_satoko
Prioritized
Restrict failover to this domain's members
Do not fail back services in this domain
Failover domain membership
Node
Member
Priority
satoko.salab.dfw.redhat.com
1
sakuko.salab.dfw.redhat.com
10
sakura.salab.dfw.redhat.com
20
sayoko.salab.dfw.redhat.com
30
sanako.salab.dfw.redhat.com
40
sakurako.salab.dfw.redhat.com
50
Submit
Done

Set up the clustered app on the domU cluster

- Define resources for the service
  - Cluster Tab
  - Cluster Name
  - Resources
  - Add a Resource
    - IP address
    - NFS mount
    - Script


Luci — cluster — resources — Add a resource - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=31&clustername=domU-cluster
Luci — cluster — resources ...
Bug 435189 - fenced admin ...
redhat
CLUSTER AND STORAGE SYSTEMS
homebase
cluster
storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
domu-cluster
Nodes
Services
Resources
Add a Resource
Configure a Resource
Failover Domains
Shared Fence Devices
domU-cluster
Add a Resource
Select a Resource Type
Select a resource type
Add a Resource to this cluster
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=31&clustername=domU-cluster



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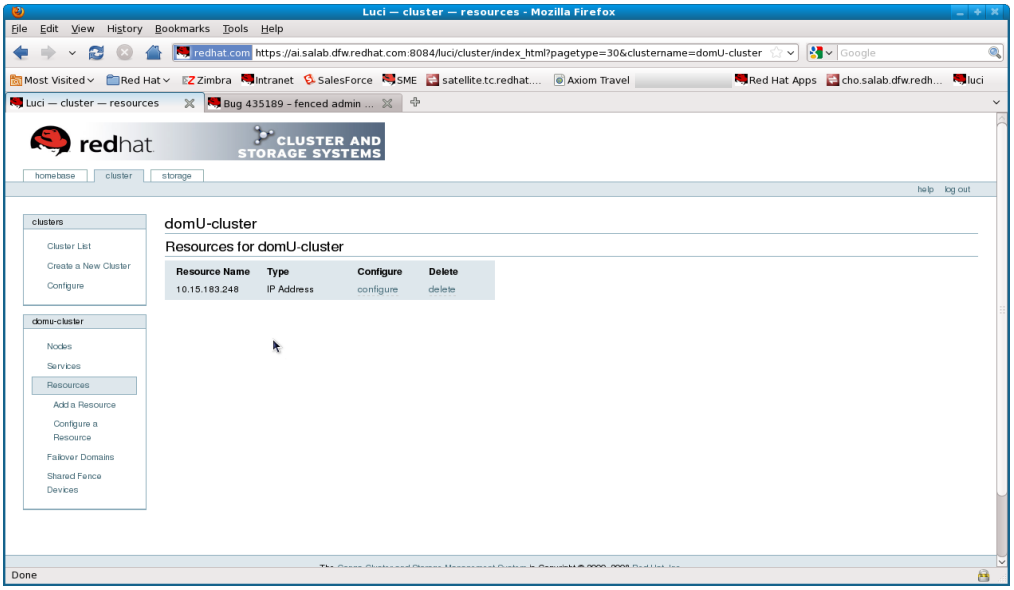

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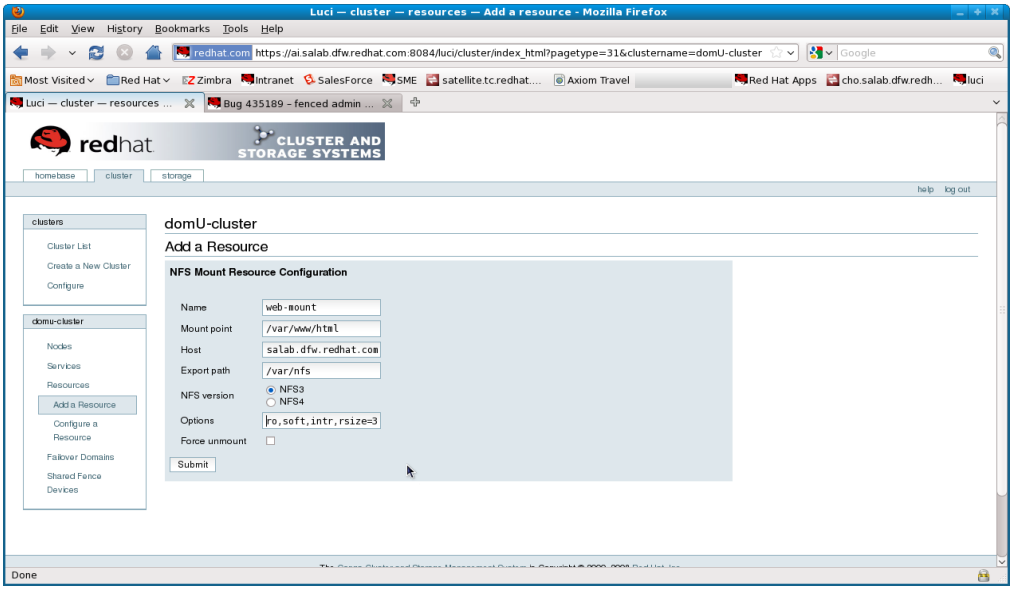
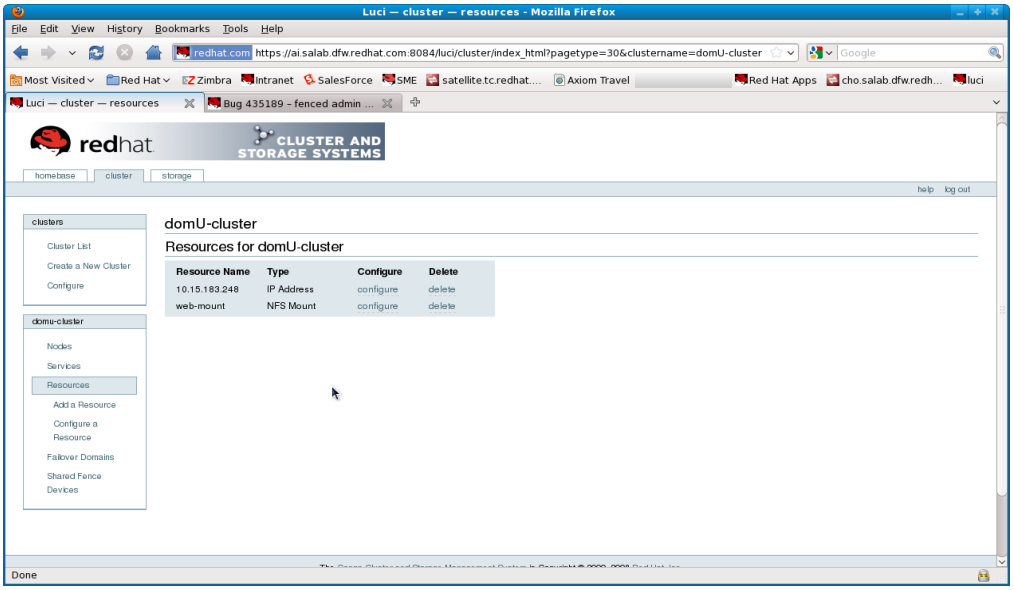
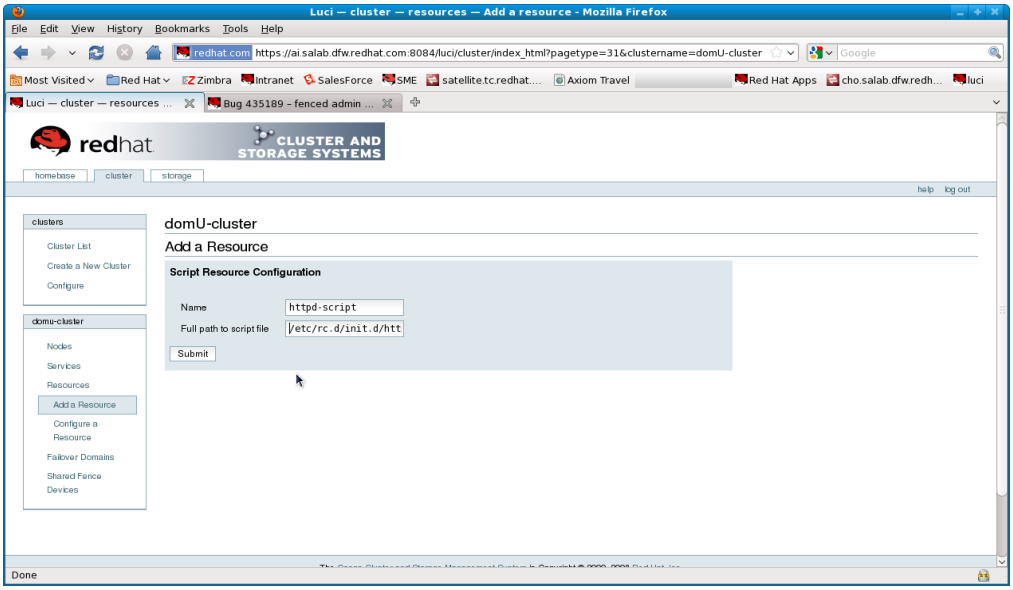

Luci — cluster — resources — Add a resource - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=31&clustername=domU-cluster
Luci — cluster — resources ...
Bug 435189 - fenced admin ...
redhat
CLUSTER AND STORAGE SYSTEMS
homebase
cluster
storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
domu-cluster
Nodes
Services
Resources
Add a Resource
Configure a Resource
Failover Domains
Shared Fence Devices
domU-cluster
Add a Resource
NFS Mount Resource Configuration
Name web-mount
Mount point /var/www/html
Host salab.dfw.redhat.com
Export path /var/nfs
NFS version NFS3 NFS4
Options ro,soft,intr,rsize=3
Force unmount
Submit
Done


Luci — cluster — resources - Mozilla Firefox
File Edit View History Bookmarks Tools Help
redhat.com https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=30&clustername=domU-cluster
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — resources
Bug 435189 - fenced admin ...
redhat
CLUSTER AND STORAGE SYSTEMS
homebase cluster storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
domu-cluster
Nodes
Services
Resources
Add a Resource
Configure a Resource
Failover Domains
Shared Fence Devices
domU-cluster
Resources for domU-cluster
Resource Name Type Configure Delete
10.15.183.248 IP Address configure delete
web-mount NFS Mount configure delete
Done



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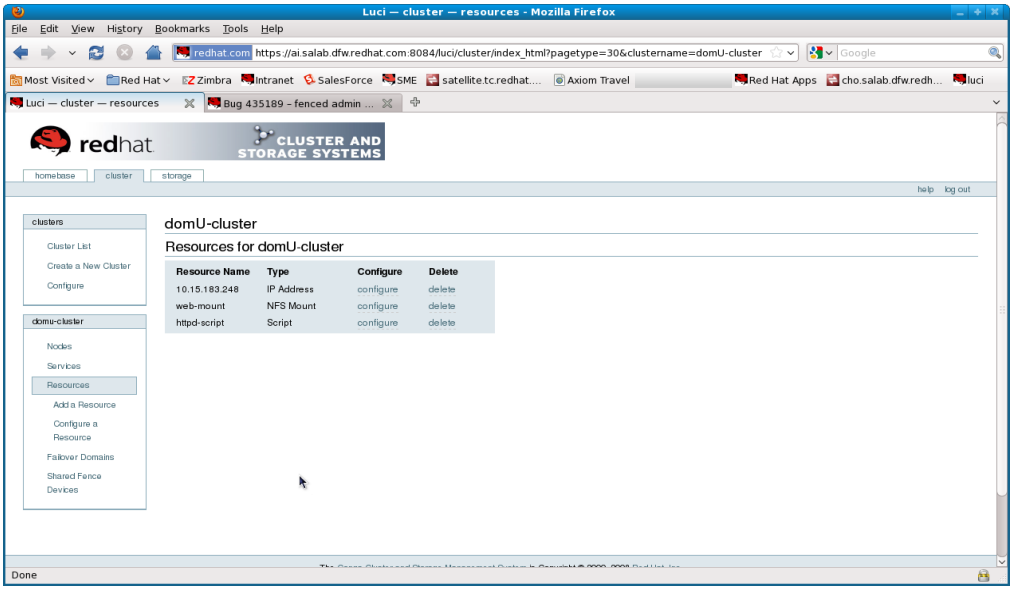

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Set up the clustered app on the domU cluster

Define a service which uses all of those resources

- Cluster Tab
- Cluster Name
- Services

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Set up the clustered app on the domU cluster

- Define a service which uses all of those resources
  - Add a Service
    - Name
    - Auto-start?
    - Enable NFS lock workarounds
    - Run exclusive
    - FD
    - Recovery Policy
    - Maximum number of restart failures before relocating
    - Length of time in seconds after which to forget a restart

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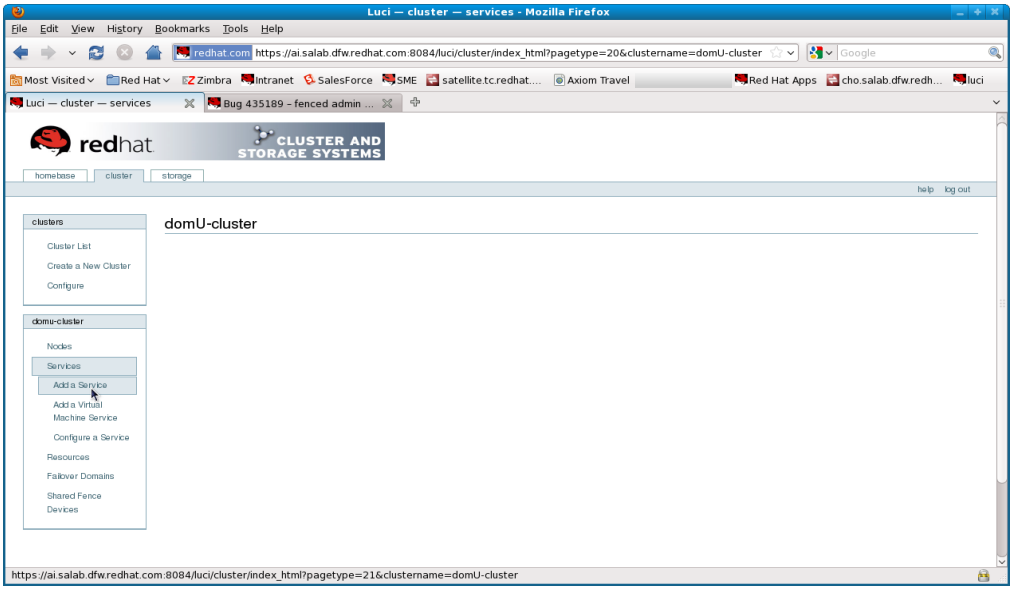
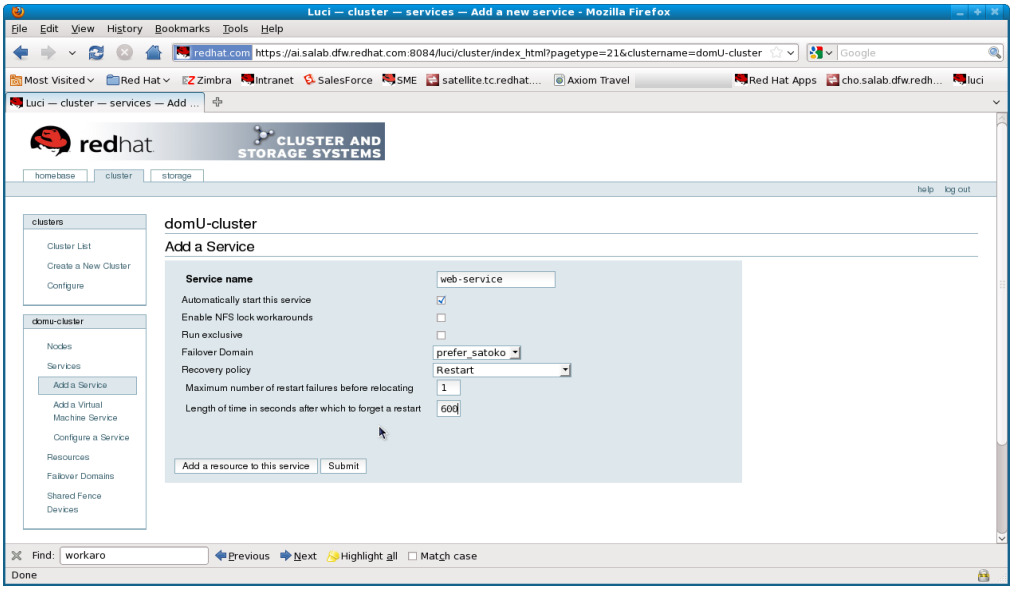


RED HAT :: CHICAGO :: 2009 SUMMIT



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Since this is not an HA callout like clunfslock (just failing over from one domU to another), there is no need to check the “Enable NFS lock workarounds” box.

Set up the clustered app on the domU cluster

- Define a service which uses all of those resources
  - Add Global Resources to the service
    - IP address
    - NFS Mount
    - Script

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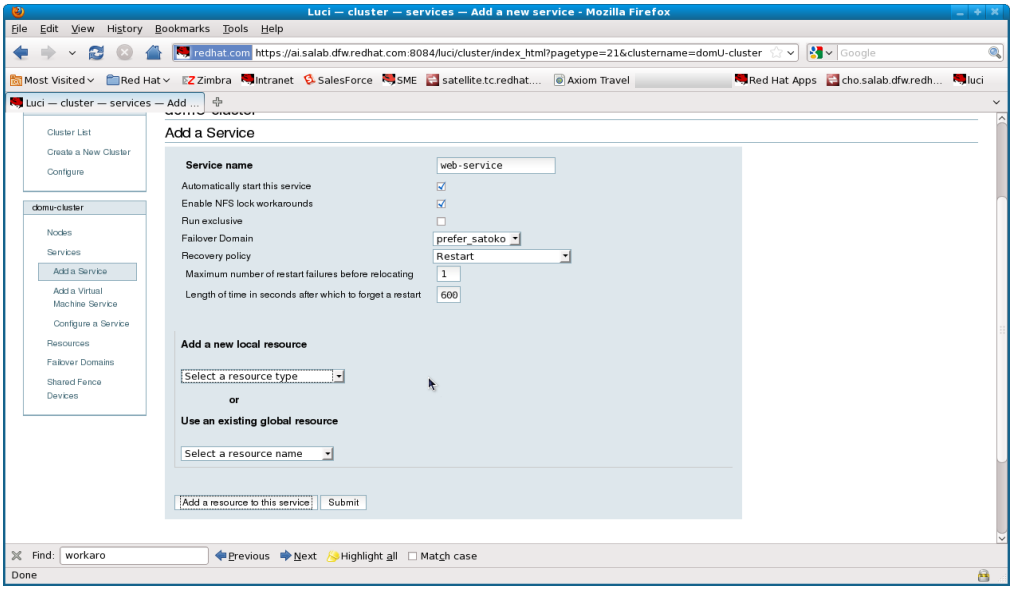
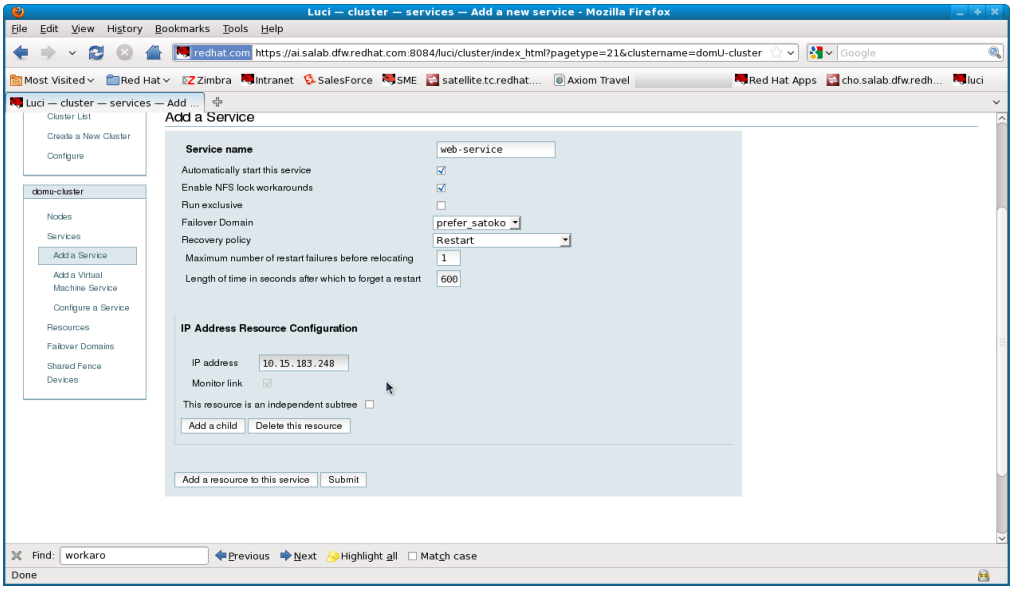
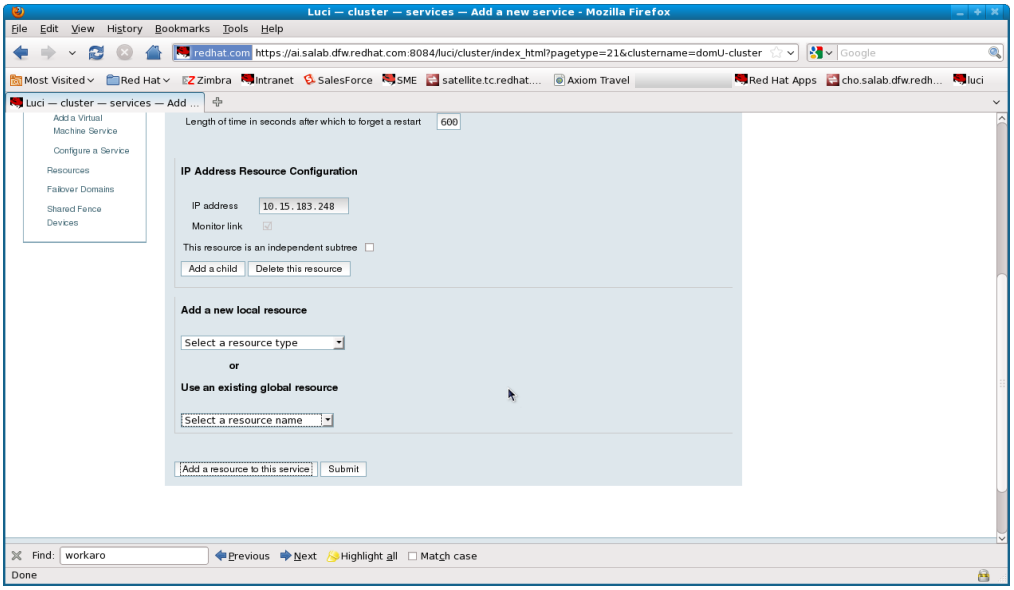
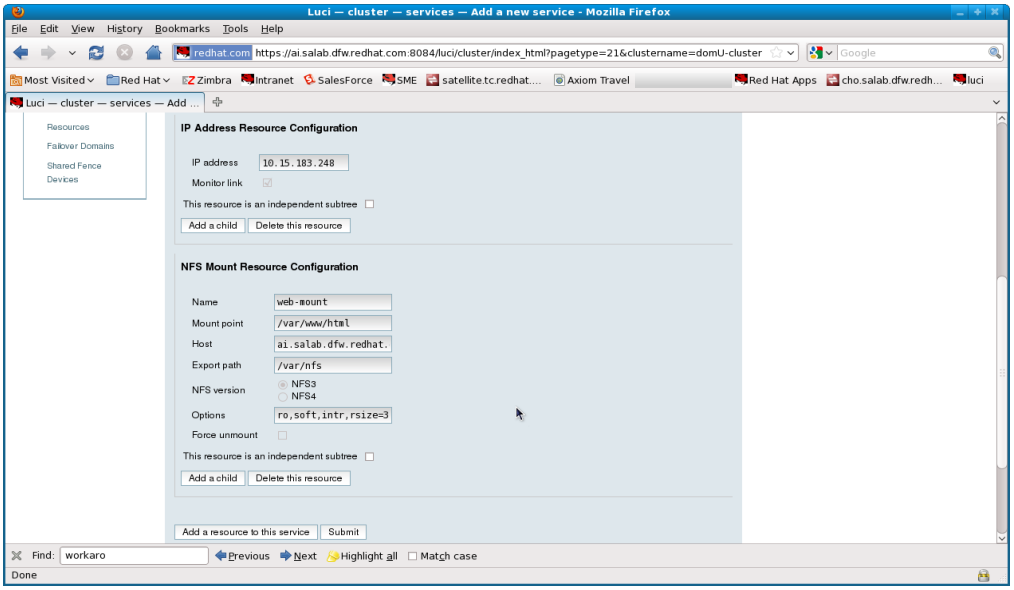
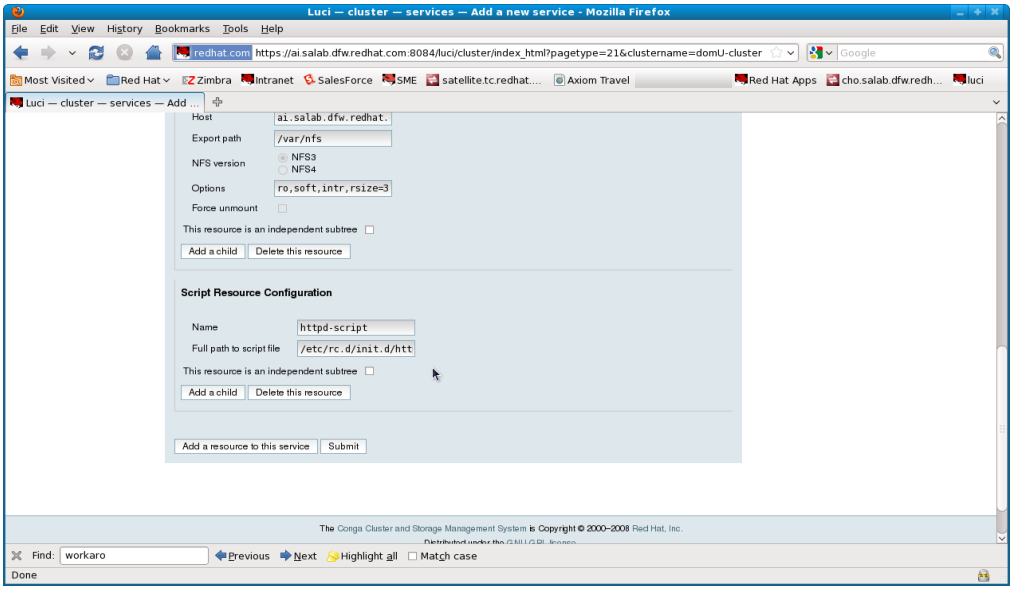

Luci — cluster — services — Add a new service - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=21&clustername=domU-cluster
Cluster List
Create a New Cluster
Configure
domu-cluster
Nodes
Services
Add a Service
Add a Virtual Machine Service
Configure a Service
Resources
Failover Domains
Shared Fence Devices
Add a Service
Service name
web-service
Automatically start this service
Enable NFS lock workarounds
Run exclusive
Failover Domain
prefer_satoko
Recovery policy
Restart
Maximum number of restart failures before relocating
1
Length of time in seconds after which to forget a restart
600
Add a new local resource
Select a resource type
or
Use an existing global resource
Select a resource name
Add a resource to this service
Submit
Find: workaro
Previous
Next
Highlight all
Match case
Done


Luci — cluster — services — Add a new service - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=21&clustername=domU-cluster
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — services — Add ...
Cluster List
Create a New Cluster
Configure
domu-cluster
Nodes
Services
Add a Service
Add a Virtual Machine Service
Configure a Service
Resources
Failover Domains
Shared Fence Devices
Add a Service
Service name
web-service
Automatically start this service
Enable NFS lock workarounds
Run exclusive
Failover Domain
prefer_satoko
Recovery policy
Restart
Maximum number of restart failures before relocating
1
Length of time in seconds after which to forget a restart
600
IP Address Resource Configuration
IP address
10.15.183.248
Monitor link
This resource is an independent subtree
Add a child
Delete this resource
Add a resource to this service
Submit
Find: workaro
Previous
Next
Highlight all
Match case
Done


Luci — cluster — services — Add a new service - Mozilla Firefox
File Edit View History Bookmarks Tools Help
redhat.com https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=21&clustername=domU-cluster
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — services — Add ...
Add a Virtual Machine Service
Configure a Service
Resources
Failover Domains
Shared Fence Devices
Length of time in seconds after which to forget a restart 600
IP Address Resource Configuration
IP address 10.15.183.248
Monitor link
This resource is an independent subtree
Add a child Delete this resource
Add a new local resource
Select a resource type
or
Use an existing global resource
Select a resource name
Add a resource to this service Submit
Find: workaro Previous Next Highlight all Match case
Done


Luci — cluster — services — Add a new service - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=21&clustername=domU-cluster
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — services — Add ...
Resources
Failover Domains
Shared Fence Devices
IP Address Resource Configuration
IP address 10.15.183.248
Monitor link
This resource is an independent subtree
Add a child Delete this resource
NFS Mount Resource Configuration
Name web-mount
Mount point /var/www/html
Host ai.salab.dfw.redhat.
Export path /var/nfs
NFS version NFS3 NFS4
Options ro,soft,intr,rsize=3
Force unmount
This resource is an independent subtree
Add a child Delete this resource
Add a resource to this service Submit
Find: workaro Previous Next Highlight all Match case
Done


Luci — cluster — services — Add a new service - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=21&clustername=domU-cluster
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — services — Add ...
Host ai.salab.dfw.redhat.
Export path /var/nfs
NFS version NFS3 NFS4
Options ro,soft,intr,rsize=3
Force unmount
This resource is an independent subtree
Add a child Delete this resource
Script Resource Configuration
Name httpd-script
Full path to script file /etc/rc.d/init.d/htt
This resource is an independent subtree
Add a child Delete this resource
Add a resource to this service Submit
The Conga Cluster and Storage Management System is Copyright © 2000–2008 Red Hat, Inc.
Find: workaro Previous Next Highlight all Match case
Done

Set up the clustered app on the domU cluster

Submit and confirm

Open the IP address defined in the resource definition in your web browser

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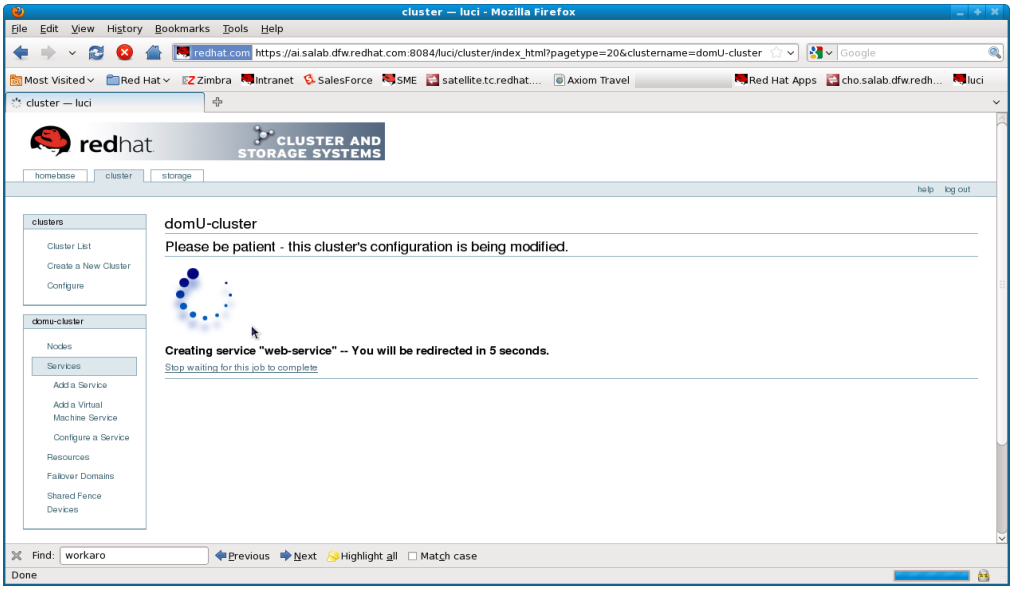
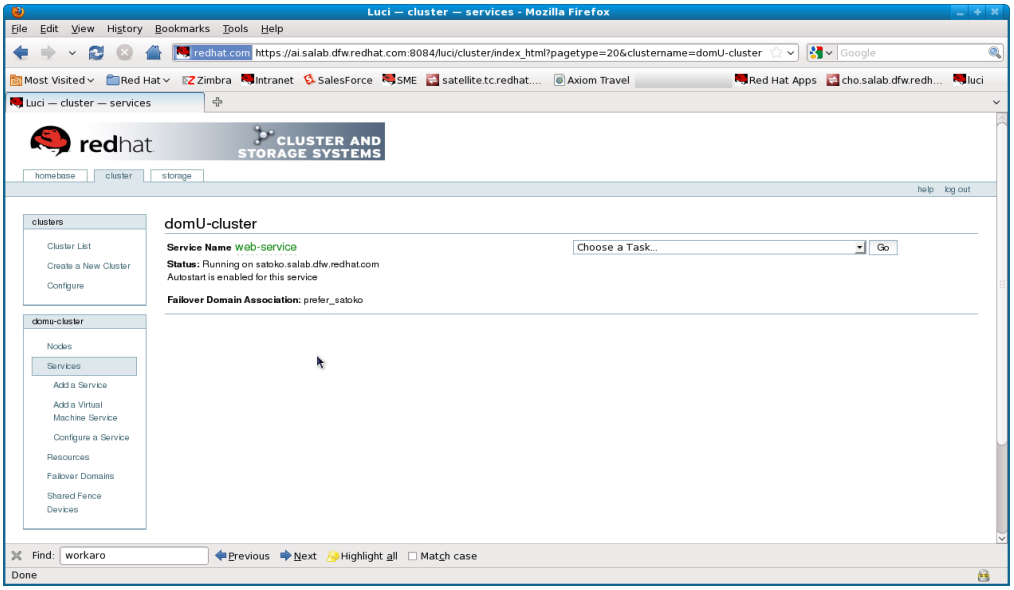
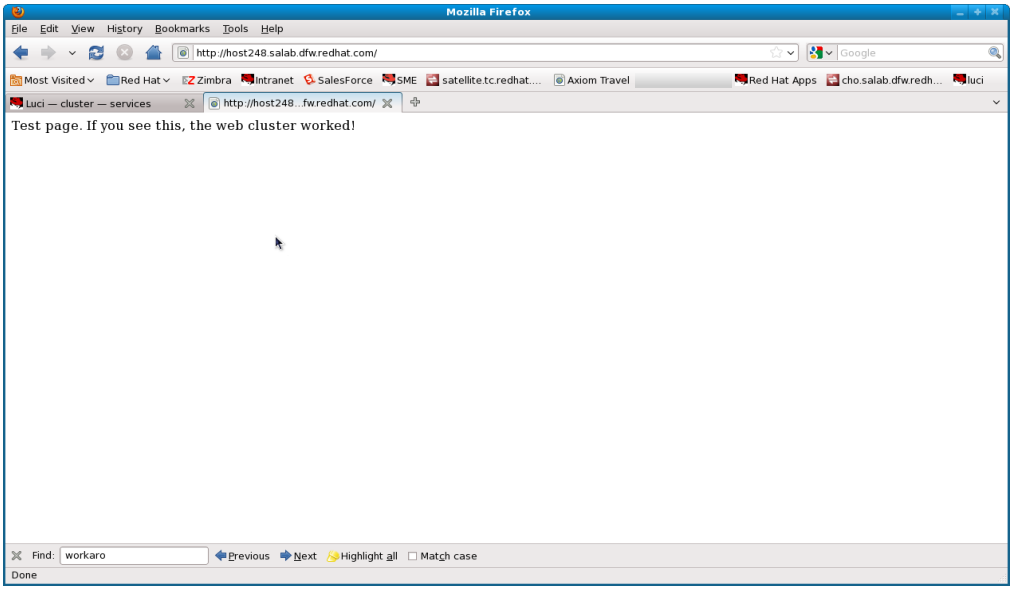
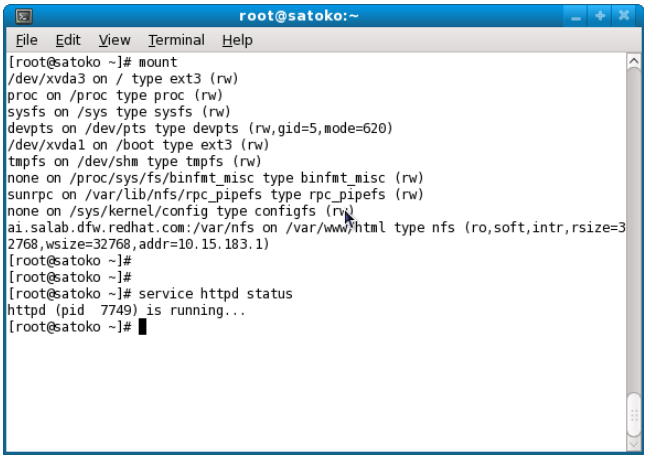

cluster — luci - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=20&clustername=domU-cluster
cluster — luci
redhat
CLUSTER AND STORAGE SYSTEMS
homebase
cluster
storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
domu-cluster
Nodes
Services
Add a Service
Add a Virtual Machine Service
Configure a Service
Resources
Failover Domains
Shared Fence Devices
domU-cluster
Please be patient - this cluster's configuration is being modified.
Creating service "web-service" -- You will be redirected in 5 seconds.
Stop waiting for this job to complete
Find: workaro
Previous
Next
Highlight all
Match case
Done



Remember that it may take a few seconds for the service to go green. If it comes up red, just refresh the screen a few times.


Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://host248.salab.dfw.redhat.com/
Google
Most Visited Red Hat Zimbra Intranet SalesForce SME satellite.tc.redhat.... Axiom Travel Red Hat Apps cho.salab.dfw.redh... luci
Luci — cluster — services
http://host248...fw.redhat.com/
Test page. If you see this, the web cluster worked!
Find: workaro
Previous
Next
Highlight all
Match case
Done


root@satoko:~
File Edit View Terminal Help
[root@satoko ~]# mount
/dev/xvda3 on / type ext3 (rw)
proc on /proc type proc (rw)
sysfs on /sys type sysfs (rw)
devpts on /dev/pts type devpts (rw,gid=5,mode=620)
/dev/xvda1 on /boot type ext3 (rw)
tmpfs on /dev/shm type tmpfs (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)
ai.salab.dfw.redhat.com:/var/nfs on /var/www/html type nfs (ro,soft,intr,rsize=3
2768,wsize=32768,addr=10.15.183.1)
[root@satoko ~]#
[root@satoko ~]#
[root@satoko ~]# service httpd status
httpd (pid 7749) is running...
[root@satoko ~]#

Set up the clustered app on the domU cluster

Test migration and failover

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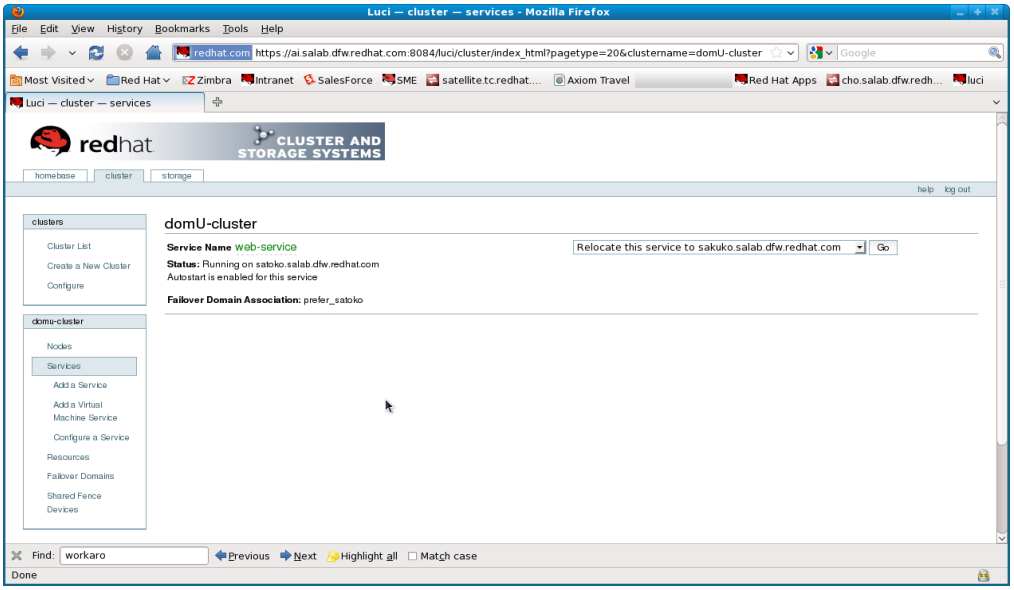
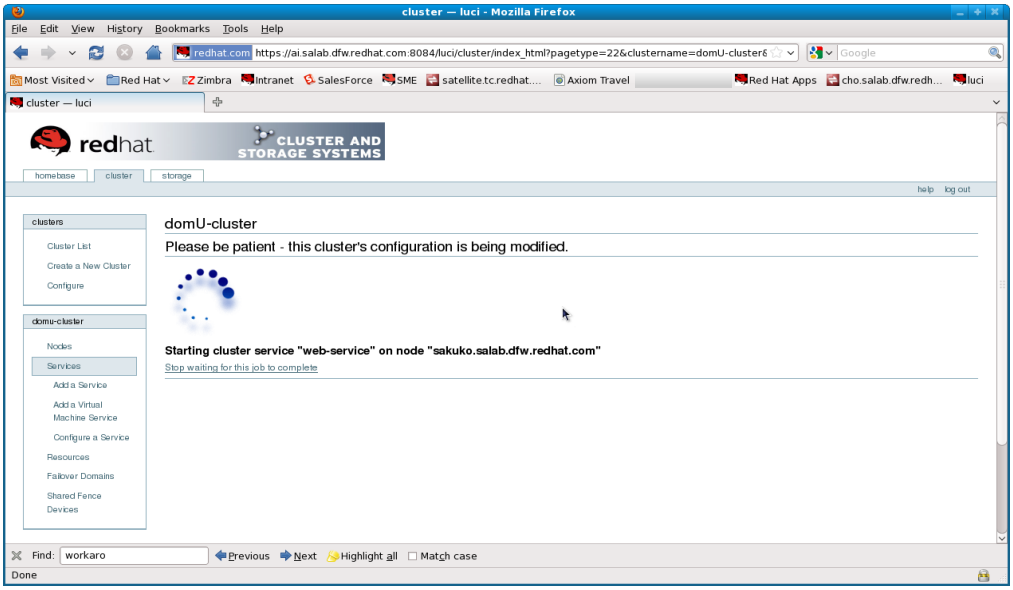

Luci — cluster — services - Mozilla Firefox
File Edit View History Bookmarks Tools Help
https://ai.salab.dfw.redhat.com:8084/luci/cluster/index_html?pagetype=20&clustername=domU-cluster
Luci — cluster — services
redhat
CLUSTER AND STORAGE SYSTEMS
homebase cluster storage
help log out
clusters
Cluster List
Create a New Cluster
Configure
domu-cluster
Nodes
Services
Add a Service
Add a Virtual Machine Service
Configure a Service
Resources
Failover Domains
Shared Fence Devices
domU-cluster
Service Name web-service
Status: Running on satoko.salab.dfw.redhat.com
Autostart is enabled for this service
Failover Domain Association: prefer_satoko
Relocate this service to sakuko.salab.dfw.redhat.com
Go
Find: workaro
Previous Next Highlight all Match case
Done



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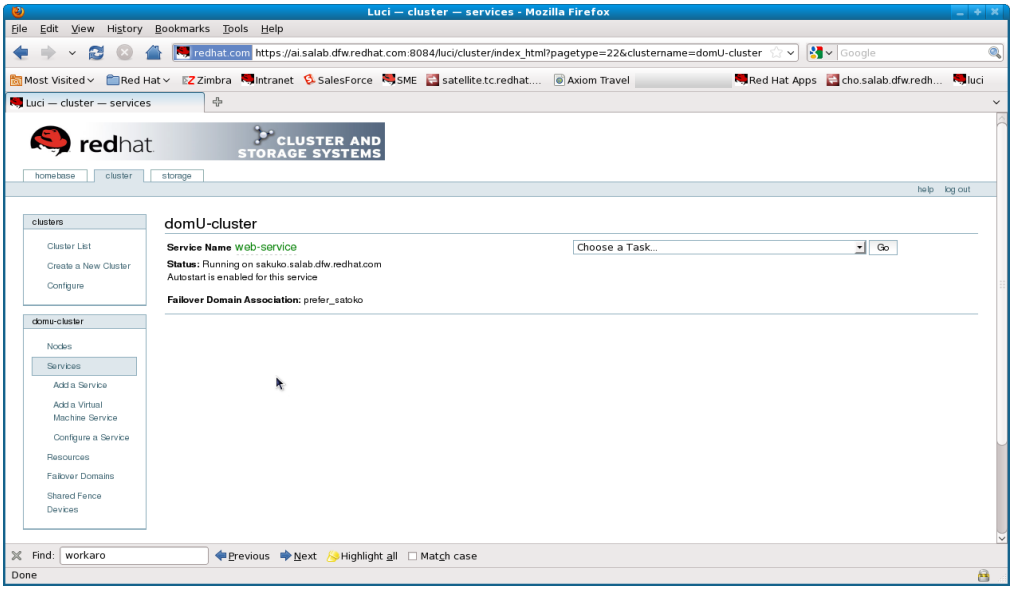

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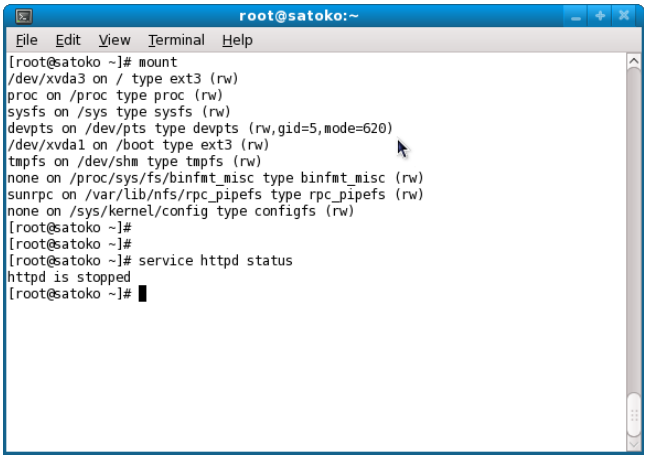

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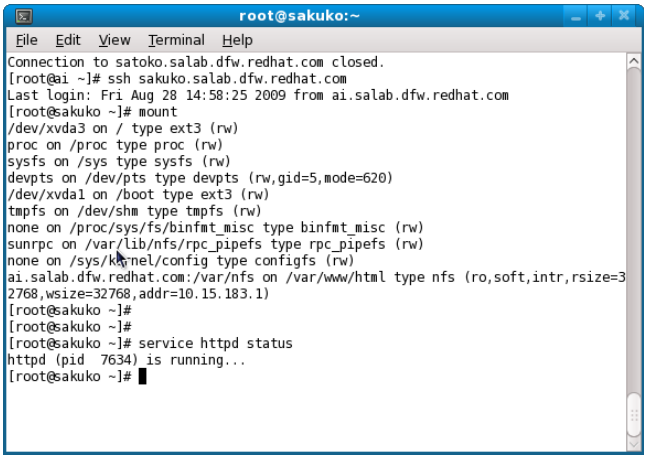

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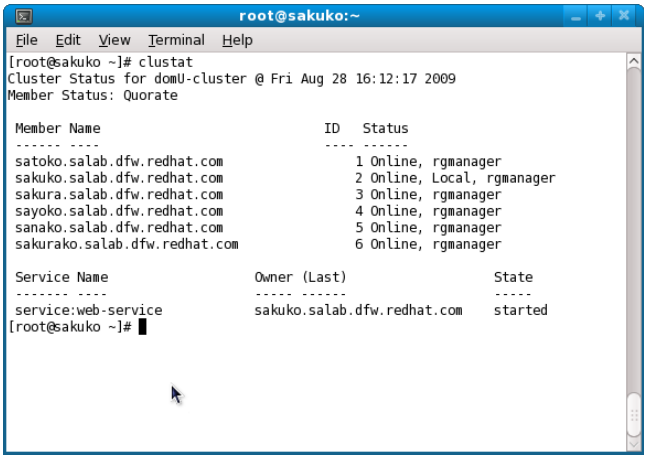
root@sakuko:~
File Edit View Terminal Help
[root@sakuko ~]# clustat
Cluster Status for domU-cluster @ Fri Aug 28 16:12:17 2009
Member Status: Quorate
Member Name ID Status
satoko.salab.dfw.redhat.com 1 Online, rgmanager
sakuko.salab.dfw.redhat.com 2 Online, Local, rgmanager
sakura.salab.dfw.redhat.com 3 Online, rgmanager
sayoko.salab.dfw.redhat.com 4 Online, rgmanager
sanako.salab.dfw.redhat.com 5 Online, rgmanager
sakurako.salab.dfw.redhat.com 6 Online, rgmanager
Service Name Owner (Last) State
service:web-service sakuko.salab.dfw.redhat.com started
[root@sakuko ~]#

Set up the clustered app on the domU cluster

Test, test, test

Kill the app

Crash the domU

Crash the dom0

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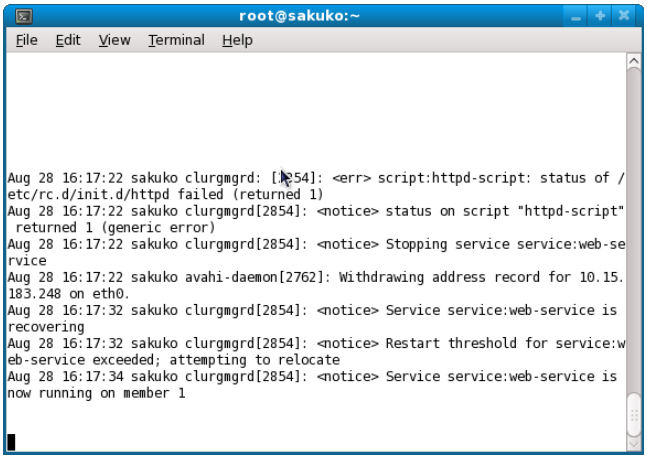

In this slide I've issued “pkill -9 httpd” twice. This demonstrates that the cluster has restarted the service once, then relocated per our FD thresholds.

WOW! You made it this far!

This should give you a good start - it is not, and can not be, comprehensive.

To learn a lot more about virtualization, take RH401:

http://tinyurl.com/5gnj2f

To learn a lot more about clustering, look at RH436:

http://tinyurl.com/o89lnr

If you need help getting this all set up, contact Red Hat Consulting:

http://www.redhat.com/consulting/

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Thank you very much!

Feel free to reach out to me at thomas@redhat.com, or Lon at lhh@redhat.com

Updated slides at

http://people.redhat.com/tcameron

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QUESTIONS?

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