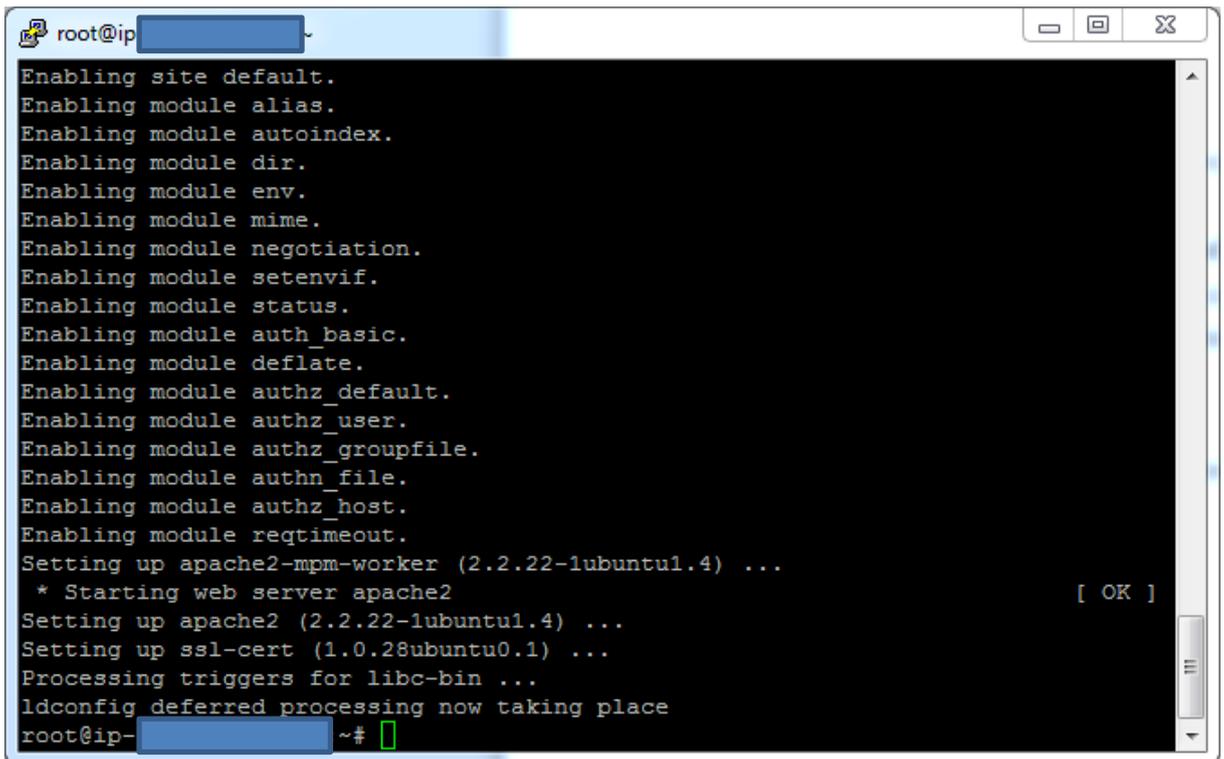


Exercise 1: Create a simple Web Server

1. Create an Instance (like in Exercise 4)
2. Connect via Putty
3. Change to root using command: `sudo -s`
4. Install package `apache2` using command: `apt-get install apache2`
5. If the service is not started automatically you can start it with command: `service apache2 start`



```
root@ip-... ~#  
Enabling site default.  
Enabling module alias.  
Enabling module autoindex.  
Enabling module dir.  
Enabling module env.  
Enabling module mime.  
Enabling module negotiation.  
Enabling module setenvif.  
Enabling module status.  
Enabling module auth_basic.  
Enabling module deflate.  
Enabling module authz_default.  
Enabling module authz_user.  
Enabling module authz_groupfile.  
Enabling module authn_file.  
Enabling module authz_host.  
Enabling module reqtimeout.  
Setting up apache2-mpm-worker (2.2.22-1ubuntu1.4) ...  
* Starting web server apache2 [ OK ]  
Setting up apache2 (2.2.22-1ubuntu1.4) ...  
Setting up ssl-cert (1.0.28ubuntu0.1) ...  
Processing triggers for libc-bin ...  
ldconfig deferred processing now taking place  
root@ip-... ~#
```

6. To access the Webserver via Browser you have to add a new inbound rule to your security group protocol: `http`
7. Then you can access the Webserver by typing in the PublicDNS or PublicIP of the instance into the browser addressline and you should see something like this:



It works!

This is the default web page for this server.

The web server software is running but no content has been added, yet.

Exercise 2: Persistent Storage

1. Go to the part Elastic Block Store → Volumes
2. Click on: Create Volume
3. Following Window is opening:

Create Volume Cancel X

Volume Type: Please Select ▼

Size: GiB ▼ (Min: 1 GiB, Max: 1TiB)

IOPS: (Max: 4000 IOPS)

Availability Zone: us-west-2a ▼

The availability zone in which to create the Amazon EBS volume. Availability Zones are distinct locations within a region that are engineered to be insulated from failures in other Availability Zones.

Cancel Yes, Create

4. Choose following Options, Use the same Availability Zone as your instance e.g.:

Create Volume Cancel X

Volume Type: Standard ▼

Size: 1 GiB ▼ (Min: 1 GiB, Max: 1TiB)

IOPS: (Max: 4000 IOPS)

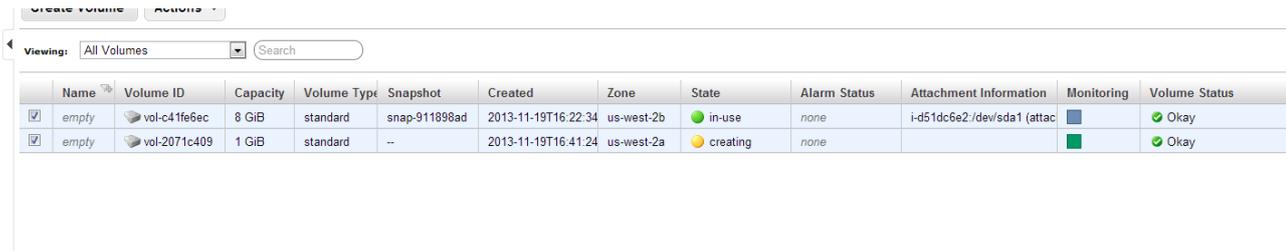
Availability Zone: us-west-2b ▼

Snapshot: --- No Snapshot --- ▼

Cancel Yes, Create

5. Click on: Yes, Create

6. Now the Volume is created. But it is still not attached to an instance

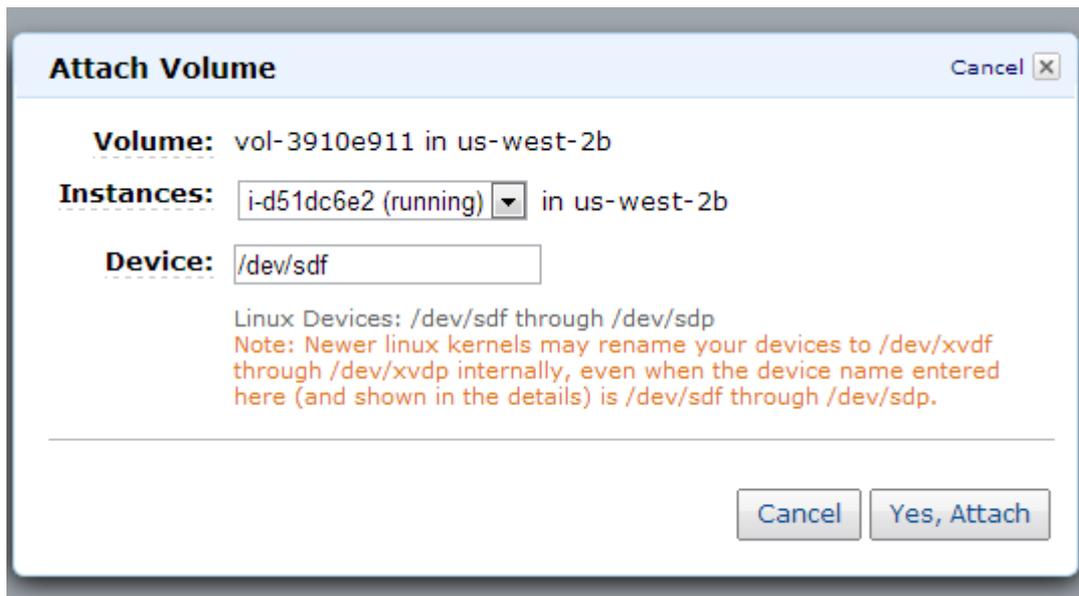


Name	Volume ID	Capacity	Volume Type	Snapshot	Created	Zone	State	Alarm Status	Attachment Information	Monitoring	Volume Status
empty	vol-c41fe6ec	8 GiB	standard	snap-911898ad	2013-11-19T16:22:34	us-west-2b	in-use	none	i-d51dc6e2 /dev/sda1 (attac		Okay
empty	vol-2071c409	1 GiB	standard	--	2013-11-19T16:41:24	us-west-2a	creating	none			Okay

7. The first volume is the standard volume, which is automatically created with the instance

8. When our new volume is in state available we can attach it to an instance

9. To attach our new volume to the instance you have to rightclick on it and click on attach volume

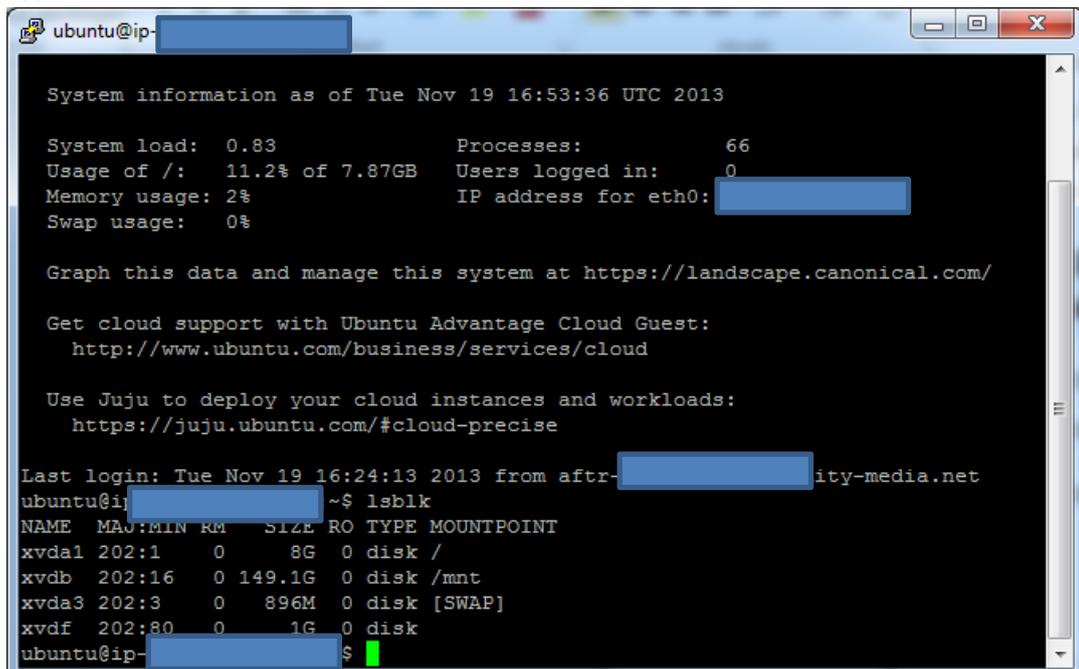


10. Now click on: Yes, Attach

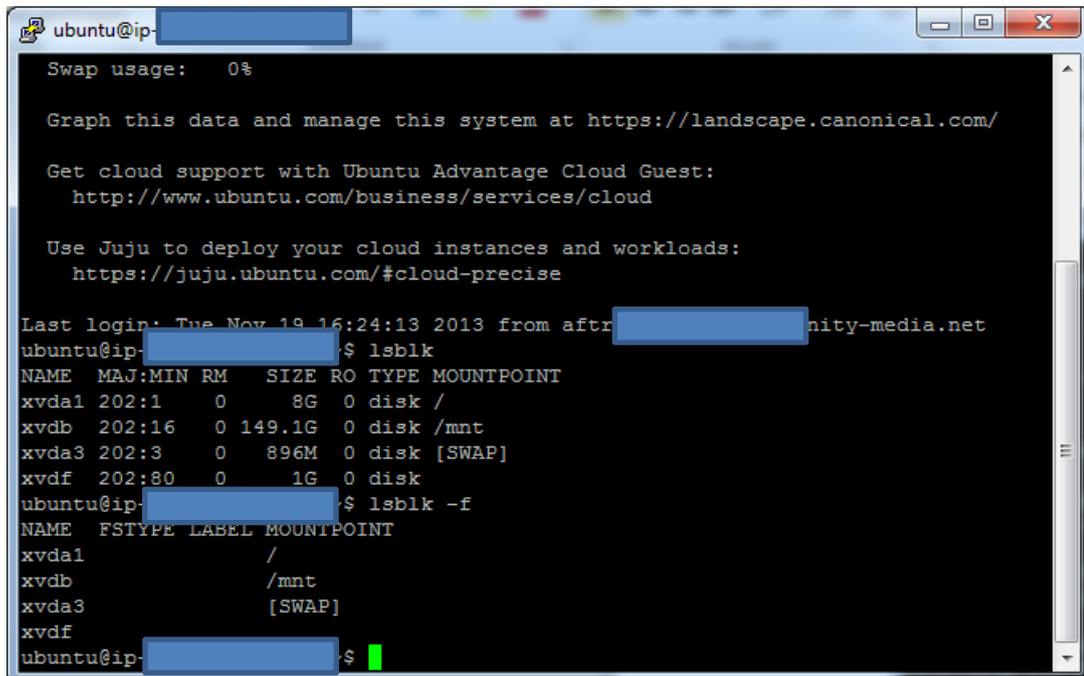
11. Now restart your instance by rightclick on reboot

12. Connect to instance via putty

13. Type command: lsblk



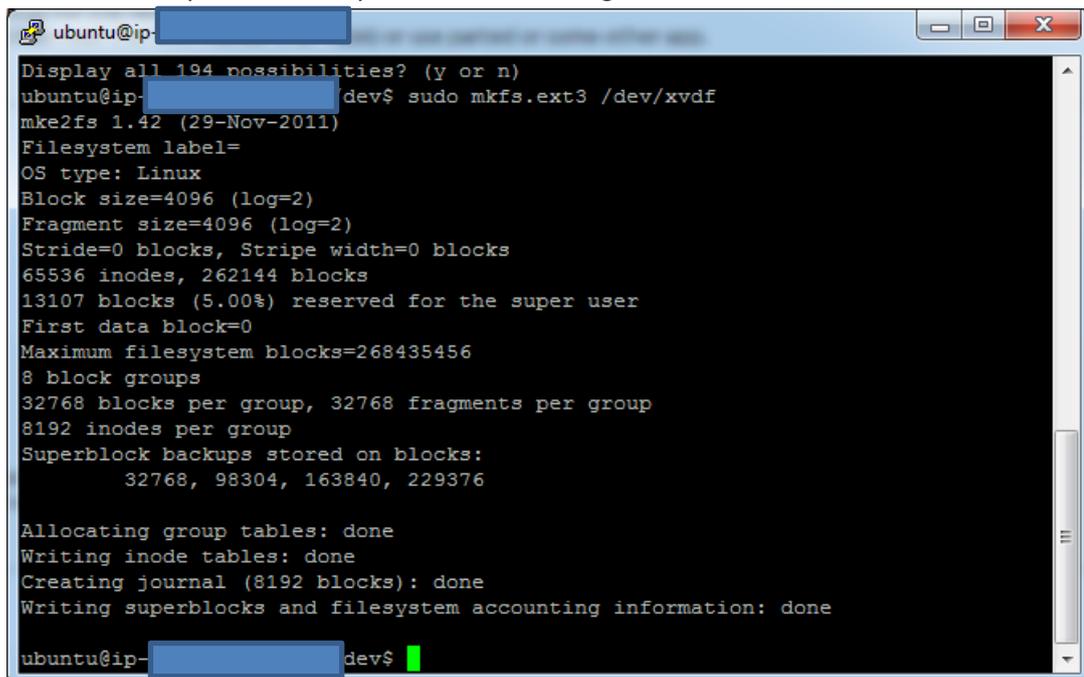
14. You will see that the block storage is not attached with sdf. It is named xvdf
15. With the command: `lsblk -f` you will see the filetype of existing block storage



```
ubuntu@ip-...$ lsblk
NAME MAJ:MIN RM   SIZE RO TYPE MOUNTPOINT
xvda1 202:1   0     8G  0 disk /
xvdb   202:16  0 149.1G  0 disk /mnt
xvda3 202:3   0   896M  0 disk [SWAP]
xvdf   202:80  0     1G  0 disk

ubuntu@ip-...$ lsblk -f
NAME FSTYPE LABEL MOUNTPOINT
xvda1 /
xvdb  /mnt
xvda3 [SWAP]
xvdf
```

16. To make a filesystem to ext3 you can use following command: `sudo mkfs.ext3 /dev/xvdf`



```
ubuntu@ip-...$ sudo mkfs.ext3 /dev/xvdf
mke2fs 1.42 (29-Nov-2011)
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
Stride=0 blocks, Stripe width=0 blocks
65536 inodes, 262144 blocks
13107 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=268435456
8 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376

Allocating group tables: done
Writing inode tables: done
Creating journal (8192 blocks): done
Writing superblocks and filesystem accounting information: done

ubuntu@ip-...$
```

17. Now you have to mount our volume correctly
18. First you have to create a new folder where you want to save your data. Use following command: `sudo mkdir /media/xvdf`
19. After this you have to mount the volume to the folder by using command: `mount /dev/xvdf /media/xvdf`
20. If you want to mount it automatically you have to make an entry into fstab using following command: `sudo nano /etc/fstab`
21. Add entry as seen in the following picture:

```

GNU nano 2.2.6 File: /etc/fstab Modified
LABEL=cloudimg-rootfs / ext4 defaults 0 0
/dev/xvdb /mnt auto defaults,nobootwait,comment=cloudconfig 0 $
/dev/xvda3 none swap sw,comment=cloudconfig 0 0
/dev/xvdf /media/xvdf ext3 defaults 0 0
  
```

22. For saving press STRG+X and type in Y for Yes and Press ENTER
23. Restart server by using command: `sudo reboot`
24. Check if it is mounted by using command: `mount`

```

Graph this data and manage this system at https://landscape.canonical.com/

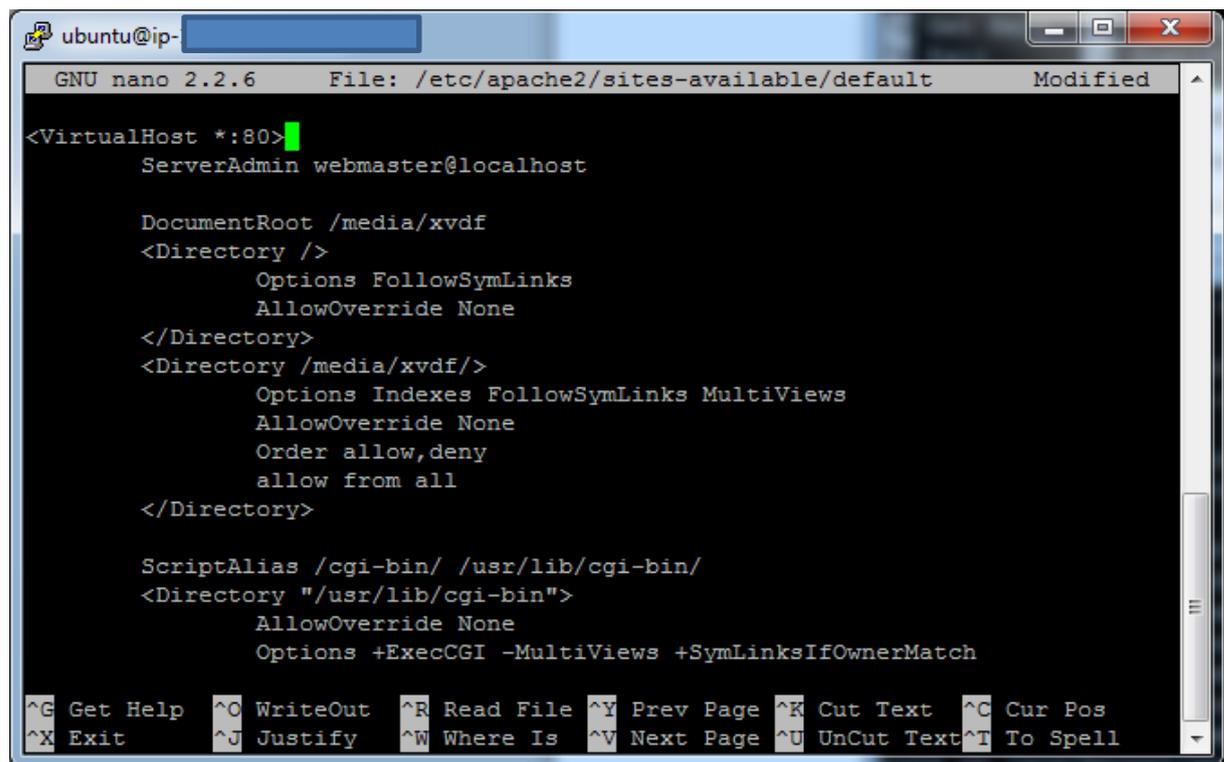
Get cloud support with Ubuntu Advantage Cloud Guest:
  http://www.ubuntu.com/business/services/cloud

Use Juju to deploy your cloud instances and workloads:
  https://juju.ubuntu.com/#cloud-precise

Last login: Tue Nov 19 16:53:38 2013 from aftr-...y-media.net
ubuntu@ip-... mount
/dev/xvda1 on / type ext4 (rw)
proc on /proc type proc (rw,noexec,nosuid,nodev)
sysfs on /sys type sysfs (rw,noexec,nosuid,nodev)
none on /sys/fs/fuse/connections type fusectl (rw)
none on /sys/kernel/debug type debugfs (rw)
none on /sys/kernel/security type securityfs (rw)
udev on /dev type devtmpfs (rw,mode=0755)
devpts on /dev/pts type devpts (rw,noexec,nosuid,gid=5,mode=0620)
tmpfs on /run type tmpfs (rw,noexec,nosuid,size=10%,mode=0755)
none on /run/lock type tmpfs (rw,noexec,nosuid,nodev,size=5242880)
none on /run/shm type tmpfs (rw,nosuid,nodev)
/dev/xvdb on /mnt type ext3 (rw)
/dev/xvdf on /media/xvdf type ext3 (rw)
ubuntu@ip-...
  
```

25. Now we want to move our webpages to the new volume
26. You have to copy first following file to `/media/xvdf` using following command: `sudo cp /var/www/index.html /media/xvdf/`
27. Change the configuration of Apache using command: `sudo nano /etc/apache2/sites-available/default`
28. Now replace `/var/www` with `/media/xvdf`

29. Now it should look like this:



```
ubuntu@ip- [redacted]
GNU nano 2.2.6 File: /etc/apache2/sites-available/default Modified
<VirtualHost *:80>
  ServerAdmin webmaster@localhost

  DocumentRoot /media/xvdf
  <Directory />
    Options FollowSymLinks
    AllowOverride None
  </Directory>
  <Directory /media/xvdf/>
    Options Indexes FollowSymLinks MultiViews
    AllowOverride None
    Order allow,deny
    allow from all
  </Directory>

  ScriptAlias /cgi-bin/ /usr/lib/cgi-bin/
  <Directory "/usr/lib/cgi-bin">
    AllowOverride None
    Options +ExecCGI -MultiViews +SymLinksIfOwnerMatch
  </Directory>

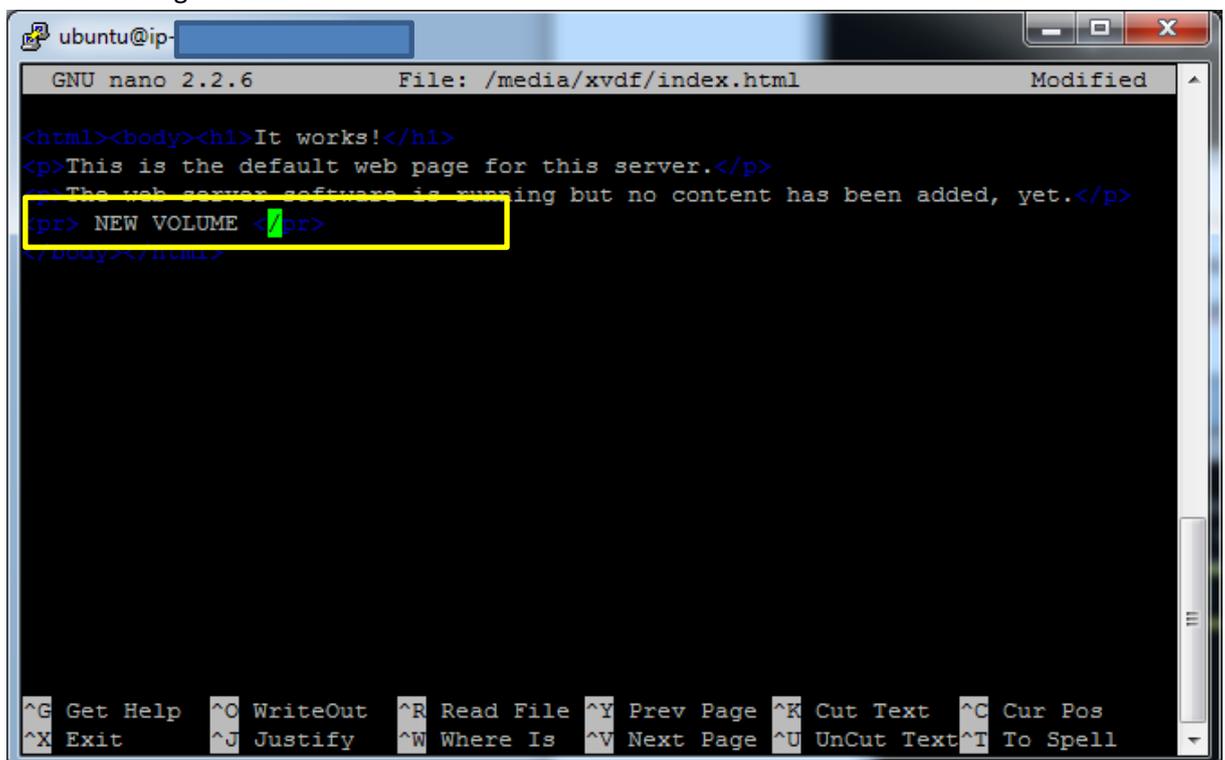
^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^U UnCut Text ^T To Spell
```

30. Save your changes and restart webservice by using command: `sudo service apache2 restart`

31. To check if the webpages now are on the new volume change the index.html file

32. Use following command: `sudo nano /media/xvdf/index.html`

33. Add something like this:



```
ubuntu@ip- [redacted]
GNU nano 2.2.6 File: /media/xvdf/index.html Modified
<html><body><h1>It works!</h1>
<p>This is the default web page for this server.</p>
<p>The web server software is running but no content has been added, yet.</p>
<pre> NEW VOLUME </pre>
</body></html>

^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^U UnCut Text ^T To Spell
```

34. Save and check via Browser if the new page is shown



It works!

This is the default web page for this server.

The web server software is running but no content has been added, yet.

NEW VOLUME