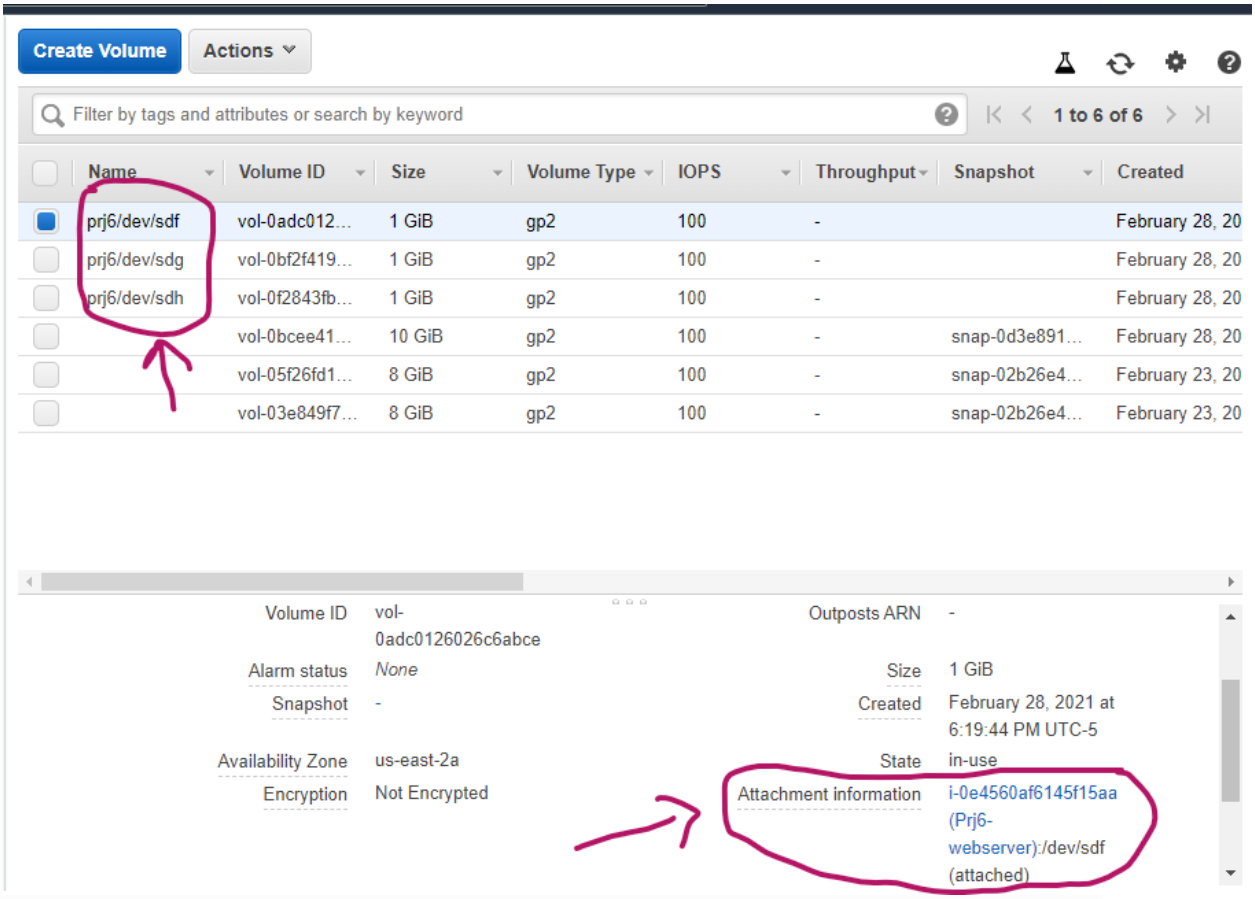
Web Solution With WordPress

Step 1 — Prepare a Web Server

1. Launch an EC2 instance that will serve as “Web Server”. Create 3 volumes in the same AZ as your Web Server EC2, each of 1 GiB.
2. Attach all three volumes one by one to your Web Server EC2 instance



3. Open up the Linux terminal to begin configuration
4. Use lsblk command to inspect what block devices are attached to the server. Notice names of your newly created devices. All devices in Linux reside in /dev/

directory. Inspect it with ls /dev/ and make sure you see all 3 newly created block devices there - their names will likely be xvdf, xvdh, xvdg.

```
[ec2-user@ip-172-31-4-140 ~]$ lsblk
NAME    MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
xvda    202:0    0  10G  0 disk
├─xvda1 202:1    0   1M  0 part
└─xvda2 202:2    0  10G  0 part /
xvdf    202:80   0   1G  0 disk
xvdg    202:96   0   1G  0 disk
xvdh    202:112  0   1G  0 disk
[ec2-user@ip-172-31-4-140 ~]$
```

5. Use df -h command to see all mounts and free space on your server

```
[ec2-user@ip-172-31-4-140 ~]$ df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        378M     0  378M   0% /dev
tmpfs           403M     0  403M   0% /dev/shm
tmpfs           403M   11M  393M   3% /run
tmpfs           403M     0  403M   0% /sys/fs/cgroup
/dev/xvda2       10G  1.2G  8.9G  12% /
tmpfs            81M     0   81M   0% /run/user/1000
[ec2-user@ip-172-31-4-140 ~]$
```

6. Use gdisk utility to create a single partition on each of the 3 disks

a. sudo gdisk /dev/xvdf

```
[ec2-user@ip-172-31-4-140 ~]$ sudo gdisk /dev/xvdf
GPT fdisk (gdisk) version 1.0.3

Partition table scan:
  MBR: not present
  BSD: not present
  APM: not present
  GPT: not present

Creating new GPT entries.

Command (? for help): ?
b       back up GPT data to a file
c       change a partition's name
d       delete a partition
i       show detailed information on a partition
l       list known partition types
n       add a new partition
o       create a new empty GUID partition table (GPT)
p       print the partition table
q       quit without saving changes
r       recovery and transformation options (experts only)
s       sort partitions
t       change a partition's type code
v       verify disk
w       write table to disk and exit
x       extra functionality (experts only)
?       print this menu

Command (? for help): n
Partition number (1-128, default 1): 1
First sector (34-2097118, default = 2048) or {+-}size{KMGTP}:
Last sector (2048-2097118, default = 2097118) or {+-}size{KMGTP}:
Current type is 'Linux filesystem'
Hex code or GUID (L to show codes, Enter = 8300): l
0700 Microsoft basic data  0c01 Microsoft reserved    2700 Windows RE
3000 ONIE boot             3001 ONIE config           3900 Plan 9
4100 PowerPC PReP boot     4200 Windows LDM data      4201 Windows LDM metadata
4202 Windows Storage Spac  7501 IBM GPFS              7f00 ChromeOS kernel
7f01 ChromeOS root         7f02 ChromeOS reserved     8200 Linux swap
8300 Linux filesystem      8301 Linux reserved        8302 Linux /home
8303 Linux x86 root (/)    8304 Linux x86-64 root (/  8305 Linux ARM64 root (/)
```

```
Current type is 'Linux filesystem'
Hex code or GUID (L to show codes, Enter = 8300): 8e00
Changed type of partition to 'Linux LVM'

Command (? for help): w

Final checks complete. About to write GPT data. THIS WILL OVERWRITE EXISTING
PARTITIONS!!

Do you want to proceed? (Y/N): y
OK; writing new GUID partition table (GPT) to /dev/xvdf.
The operation has completed successfully.
[ec2-user@ip-172-31-4-140 ~]$
```

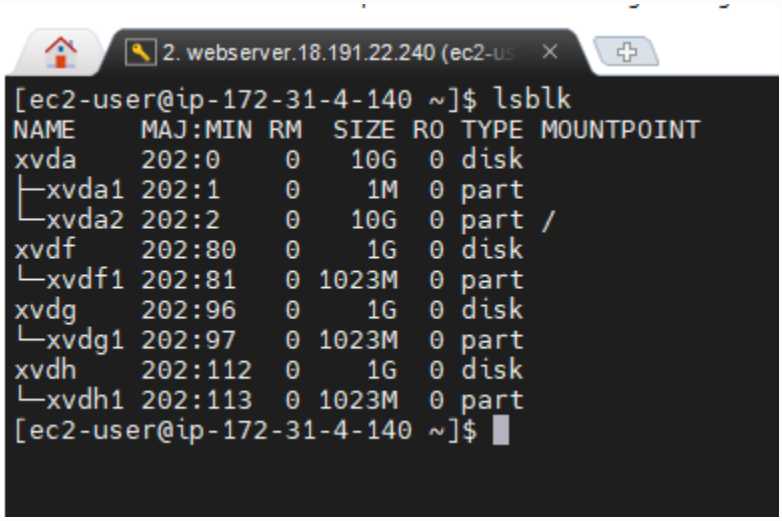
b. sudo gdisk /dev/xvdg

```
[ec2-user@ip-172-31-4-140 ~]$ sudo gdisk /dev/xvdg
GPT fdisk (gdisk) version 1.0.3

Partition table scan:
  MBR: not present
  BSD: not present
  APM: not present
  GPT: not present

Creating new GPT entries.

Command (? for help): n
Partition number (1-128, default 1): 1
First sector (34-2097118, default = 2048) or {+-}size{KMGTP}:
Last sector (2048-2097118, default = 2097118) or {+-}size{KMGTP}:
Current type is 'Linux filesystem'
Hex code or GUID (L to show codes, Enter = 8300): 8e00
Changed type of partition to 'Linux LVM'

Command (? for help): w

Final checks complete. About to write GPT data. THIS WILL OVERWRITE EXISTING
PARTITIONS!!

Do you want to proceed? (Y/N): y
OK; writing new GUID partition table (GPT) to /dev/xvdg.
The operation has completed successfully.
[ec2-user@ip-172-31-4-140 ~]$
```

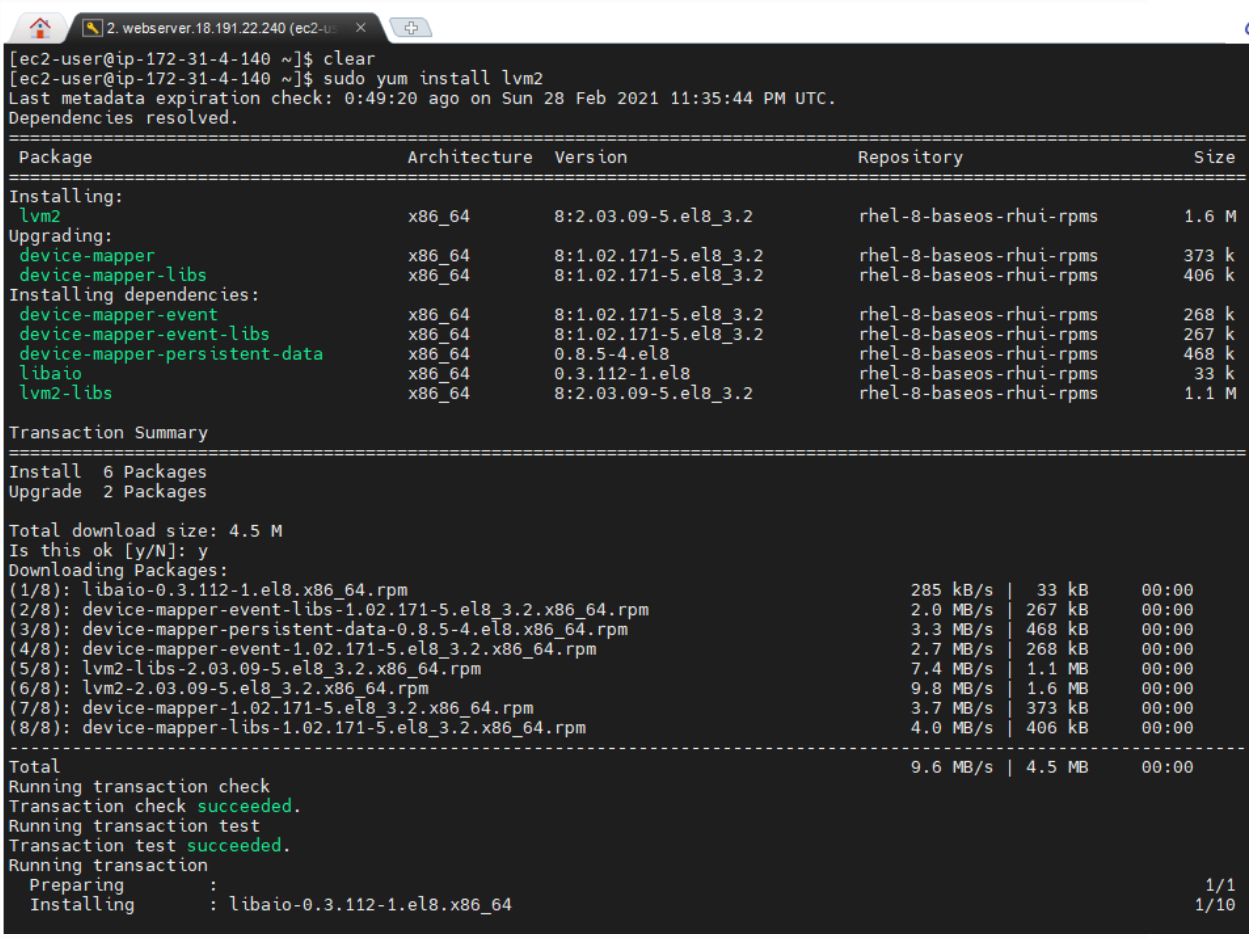
c. sudo gdisk /dev/xvdh

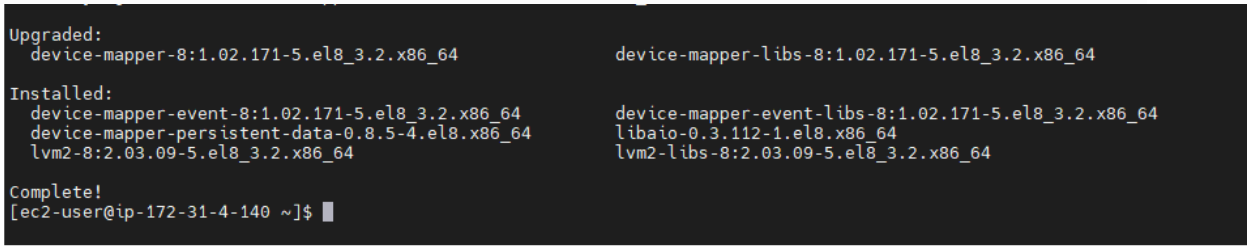
```
[ec2-user@ip-172-31-4-140 ~]$ sudo gdisk /dev/xvdh
GPT fdisk (gdisk) version 1.0.3

Partition table scan:
  MBR: not present
  BSD: not present
  APM: not present
  GPT: not present

Creating new GPT entries.

Command (? for help): n
Partition number (1-128, default 1): 1
First sector (34-2097118, default = 2048) or {+-}size{KMGTP}:
Last sector (2048-2097118, default = 2097118) or {+-}size{KMGTP}:
Current type is 'Linux filesystem'
Hex code or GUID (L to show codes, Enter = 8300): 8e00
Changed type of partition to 'Linux LVM'

Command (? for help): w

Final checks complete. About to write GPT data. THIS WILL OVERWRITE EXISTING
PARTITIONS!!

Do you want to proceed? (Y/N): y
OK; writing new GUID partition table (GPT) to /dev/xvdh.
The operation has completed successfully.
[ec2-user@ip-172-31-4-140 ~]$
```

7. Use **lsblk** utility to view the newly configured partition on each of the 3 disks**.**

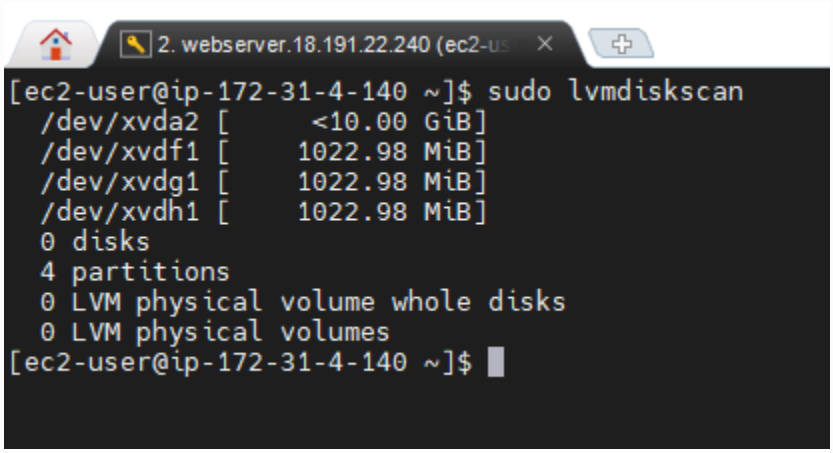


8. Install lvm2 package using sudo yum install lvm2.





9. Run sudo lvmdiskscan command to check for available partitions.



Note: In Ubuntu we used apt command to install packages, in RedHat/CentOS a different package manager is used, so we shall use yum command instead.

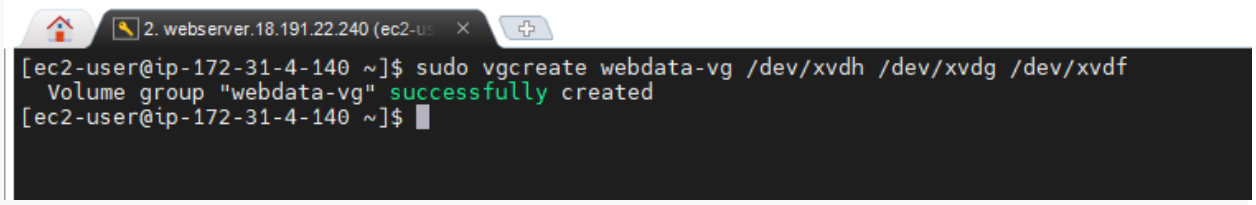
10. Use pvcreate utility to mark each of 3 disks as physical volumes (PVs) to be used by LVM

```
sudo wipefs -a /dev/xvdf && sudo pvcreate /dev/xvdf
sudo wipefs -a /dev/xvdg && sudo pvcreate /dev/xvdg
sudo wipefs -a /dev/xvdh && sudo pvcreate /dev/xvdh
```

```
[ec2-user@ip-172-31-4-140 ~]$ sudo wipefs -a /dev/xvdf && sudo pvcreate /dev/xvdf
/dev/xvdf: 8 bytes were erased at offset 0x00000200 (gpt): 45 46 49 20 50 41 52 54
/dev/xvdf: 8 bytes were erased at offset 0x3fffe00 (gpt): 45 46 49 20 50 41 52 54
/dev/xvdf: 2 bytes were erased at offset 0x000001fe (PMBR): 55 aa
/dev/xvdf: calling ioctl to re-read partition table: Success
  Physical volume "/dev/xvdf" successfully created.
[ec2-user@ip-172-31-4-140 ~]$ sudo wipefs -a /dev/xvdg && sudo pvcreate /dev/xvdg
/dev/xvdg: 8 bytes were erased at offset 0x00000200 (gpt): 45 46 49 20 50 41 52 54
/dev/xvdg: 8 bytes were erased at offset 0x3fffe00 (gpt): 45 46 49 20 50 41 52 54
/dev/xvdg: 2 bytes were erased at offset 0x000001fe (PMBR): 55 aa
/dev/xvdg: calling ioctl to re-read partition table: Success
  Physical volume "/dev/xvdg" successfully created.
[ec2-user@ip-172-31-4-140 ~]$ sudo wipefs -a /dev/xvdh && sudo pvcreate /dev/xvdh
/dev/xvdh: 8 bytes were erased at offset 0x00000200 (gpt): 45 46 49 20 50 41 52 54
/dev/xvdh: 8 bytes were erased at offset 0x3fffe00 (gpt): 45 46 49 20 50 41 52 54
/dev/xvdh: 2 bytes were erased at offset 0x000001fe (PMBR): 55 aa
/dev/xvdh: calling ioctl to re-read partition table: Success
  Physical volume "/dev/xvdh" successfully created.
[ec2-user@ip-172-31-4-140 ~]$
```

11. Use vgcreate utility to add all 3 PVs to a volume group (VG). Name the VG **webdata-vg**

sudo vgcreate webdata-vg /dev/xvdh /dev/xvdg /dev/xvdf



12. Verify that your VG has been created successfully by running sudo vgs

```
[ec2-user@ip-172-31-4-140 ~]$ sudo vgs
  VG         #PV #LV #SN Attr   VSize  VFree
  webdata-vg   3   0   0 wz--n- <2.99g <2.99g
[ec2-user@ip-172-31-4-140 ~]$
```

13. Use lvcreate utility to create 2 logical volumes. **apps-lv** (***Use half of the PV size***), and **logs-lv** ***Use the remaining space of the PV size***. **NOTE**: apps-lv will be used to store data for the Website while, logs-lv will be used to store data for logs.

sudo lvcreate -n apps-lv -L 1.44g webdata-vg

```
[ec2-user@ip-172-31-4-140 ~]$ sudo lvcreate -n apps-lv -L 1.44g webdata-vg
  Rounding up size to full physical extent 1.44 GiB
  Logical volume "apps-lv" created.
```

sudo lvcreate -n logs-lv -L 1.44g webdata-vg

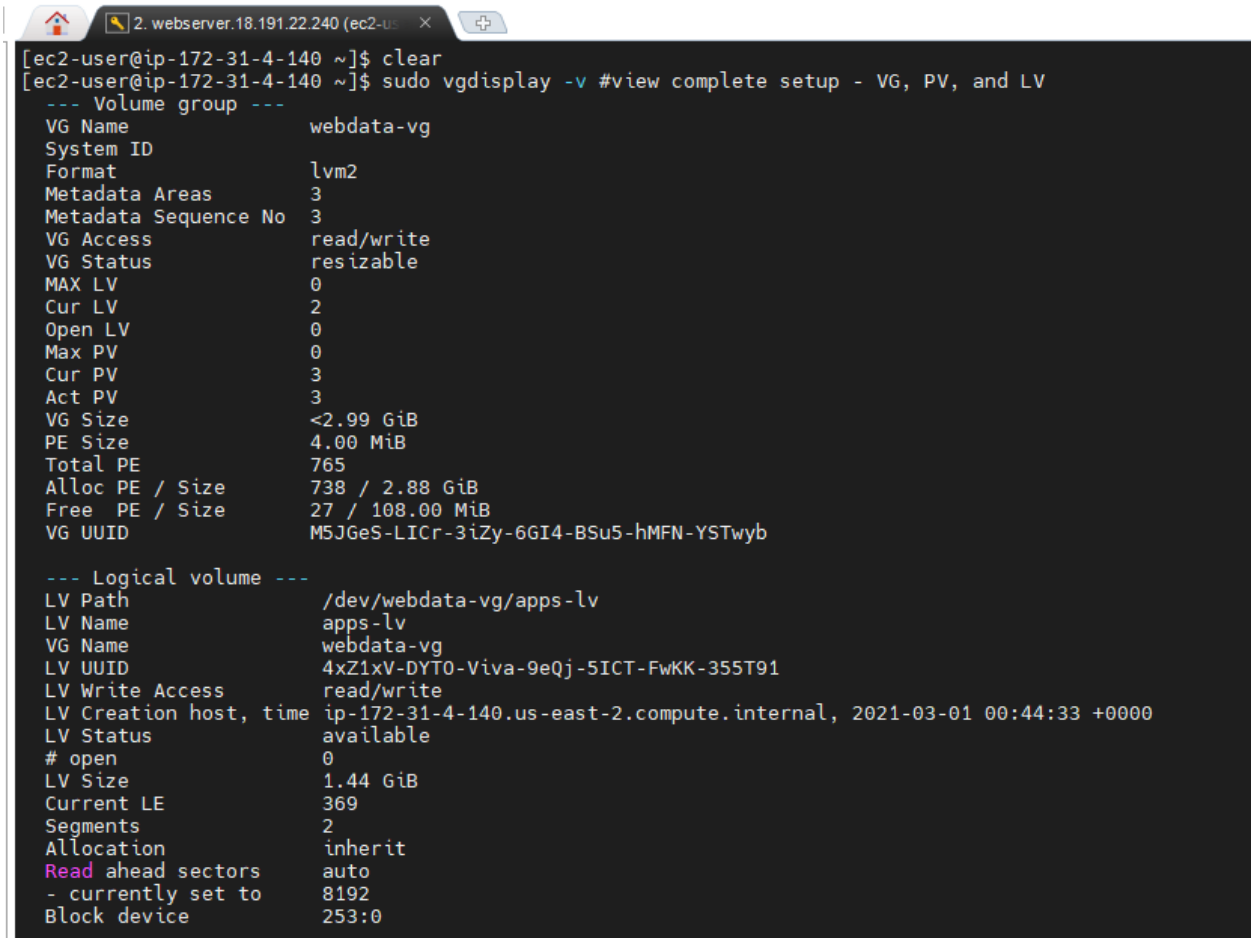
```
[ec2-user@ip-172-31-4-140 ~]$ sudo lvcreate -n logs-lv -L 1.44g webdata-vg
  Rounding up size to full physical extent 1.44 GiB
  Logical volume "logs-lv" created.
[ec2-user@ip-172-31-4-140 ~]$
```

sudo lvs

```
[ec2-user@ip-172-31-4-140 ~]$ sudo lvs
  LV      VG         Attr       LSize Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
  apps-lv webdata-vg -wi-a----- 1.44g
  logs-lv webdata-vg -wi-a----- 1.44g
[ec2-user@ip-172-31-4-140 ~]$
```

14. Verify the entire setup

sudo vgdisplay -v *#view complete setup - VG, PV, and LV*


2. webserver.18.191.22.240 (ec2-us
[ec2-user@ip-172-31-4-140 ~]$ clear
[ec2-user@ip-172-31-4-140 ~]$ sudo vgdisplay -v #view complete setup - VG, PV, and LV
--- Volume group ---
VG Name webdata-vg
System ID
Format lvm2
Metadata Areas 3
Metadata Sequence No 3
VG Access read/write
VG Status resizable
MAX LV 0
Cur LV 2
Open LV 0
Max PV 0
Cur PV 3
Act PV 3
VG Size <2.99 GiB
PE Size 4.00 MiB
Total PE 765
Alloc PE / Size 738 / 2.88 GiB
Free PE / Size 27 / 108.00 MiB
VG UUID M5JGeS-LICr-3iZy-6GI4-BSu5-hMFN-YSTwyb
--- Logical volume ---
LV Path /dev/webdata-vg/apps-lv
LV Name apps-lv
VG Name webdata-vg
LV UUID 4xZ1xV-DYTO-Viva-9eQj-5ICT-FwKK-355T91
LV Write Access read/write
LV Creation host, time ip-172-31-4-140.us-east-2.compute.internal, 2021-03-01 00:44:33 +0000
LV Status available
open 0
LV Size 1.44 GiB
Current LE 369
Segments 2
Allocation inherit
Read ahead sectors auto
- currently set to 8192
Block device 253:0

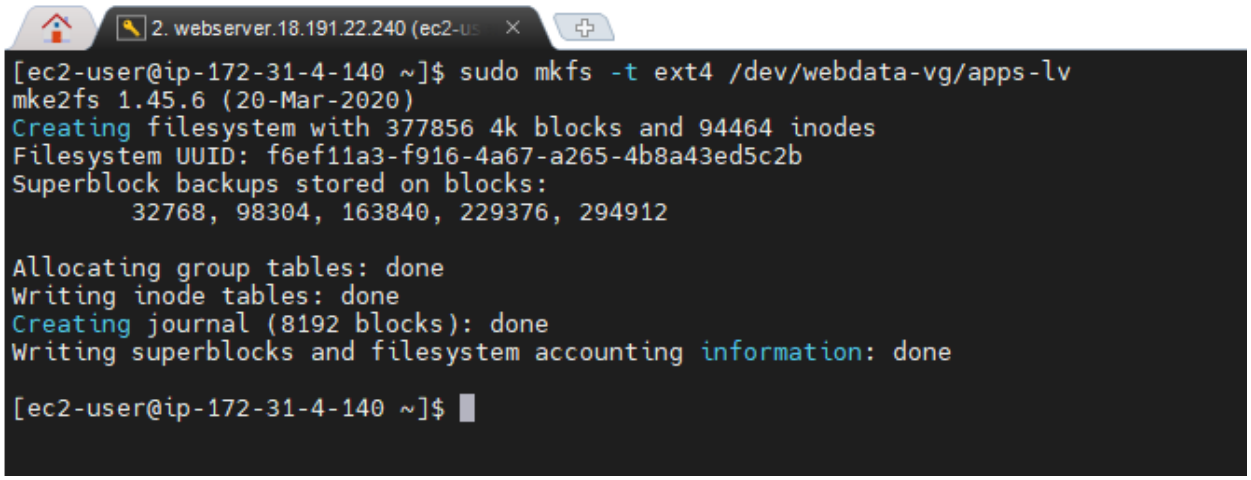
```
  --- Logical volume ---
  LV Path                /dev/webdata-vg/logs-lv
  LV Name                logs-lv
  VG Name                webdata-vg
  LV UUID                VZNWAH-6BiI-yfYx-7zgb-NY20-m9Ag-01YgIA
  LV Write Access        read/write
  LV Creation host, time ip-172-31-4-140.us-east-2.compute.internal, 2021-03-01 00:45:12 +0000
  LV Status              available
  # open                 0
  LV Size                1.44 GiB
  Current LE             369
  Segments               2
  Allocation             inherit
  Read ahead sectors     auto
  - currently set to     8192
  Block device           253:1

  --- Physical volumes ---
  PV Name               /dev/xvdh
  PV UUID               QcejvZ-WExT-5MnQ-Zj6A-UpnT-9wz0-dFW1jR
  PV Status             allocatable
  Total PE / Free PE    255 / 0

  PV Name               /dev/xvdg
  PV UUID               6o54PV-JJLj-PAjH-gcqk-DHuU-rxDa-ryjlj8
  PV Status             allocatable
  Total PE / Free PE    255 / 27

  PV Name               /dev/xvdf
  PV UUID               MTa7FM-IAEF-jZea-lj7g-nGSe-EQwH-SXsZEI
  PV Status             allocatable
  Total PE / Free PE    255 / 0

[ec2-user@ip-172-31-4-140 ~]$
```

sudo lsblk

```
2. webserver.18.191.22.240 (ec2-u
[ec2-user@ip-172-31-4-140 ~]$ sudo lsblk
NAME                    MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
xvda                    202:0    0   10G  0 disk
├─xvda1                 202:1    0    1M  0 part
└─xvda2                 202:2    0   10G  0 part /
xvdf                    202:80   0    1G  0 disk
└─webdata--vg-logs--lv 253:1    0  1.5G  0 lvm
xvdg                    202:96   0    1G  0 disk
├─webdata--vg-apps--lv 253:0    0  1.5G  0 lvm
└─webdata--vg-logs--lv 253:1    0  1.5G  0 lvm
xvdh                    202:112  0    1G  0 disk
└─webdata--vg-apps--lv 253:0    0  1.5G  0 lvm
[ec2-user@ip-172-31-4-140 ~]$
```

15. Use mkfs.ext4 to format the logical volumes with ext4 filesystem

sudo mkfs -t ext4 /dev/webdata-vg/apps-lv



sudo mkfs -t ext4 /dev/webdata-vg/logs-lv

```
[ec2-user@ip-172-31-4-140 ~]$ sudo mkfs -t ext4 /dev/webdata-vg/logs-lv
mke2fs 1.45.6 (20-Mar-2020)
Creating filesystem with 377856 4k blocks and 94464 inodes
Filesystem UUID: a2161ce2-bb44-4911-8599-9e41445c5dfe
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376, 294912

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

[ec2-user@ip-172-31-4-140 ~]$
```

16. Create **/var/www/html** directory to store website files

sudo mkdir -p /var/www/html

```
[ec2-user@ip-172-31-4-140 ~]$ sudo mkdir -p /var/www/html
[ec2-user@ip-172-31-4-140 ~]$ ls -la
total 12
drwx------. 3 ec2-user ec2-user  74 Feb 28 18:23 .
drwxr-xr-x. 3 root     root      22 Feb 28 18:23 ..
-rw-r--r--. 1 ec2-user ec2-user  18 Jun 23  2020 .bash_logout
-rw-r--r--. 1 ec2-user ec2-user 141 Jun 23  2020 .bash_profile
-rw-r--r--. 1 ec2-user ec2-user 376 Jun 23  2020 .bashrc
drwx------. 2 ec2-user ec2-user  29 Feb 28 18:23 .ssh
[ec2-user@ip-172-31-4-140 ~]$ ls var
ls: cannot access 'var': No such file or directory
[ec2-user@ip-172-31-4-140 ~]$ cd var
-bash: cd: var: No such file or directory
[ec2-user@ip-172-31-4-140 ~]$ cd /var
[ec2-user@ip-172-31-4-140 var]$ ls -la
total 16
drwxr-xr-x. 21 root root 4096 Mar  1 01:06 .
dr-xr-xr-x. 18 root root  236 Oct 31 05:09 ..
drwxr-xr-x.  2 root root    6 Apr 23  2020 adm
drwxr-xr-x.  9 root root   99 Oct 31 05:09 cache
drwxr-xr-x.  2 root root    6 Aug 19  2020 crash
drwxr-xr-x.  3 root root   18 Oct 31 05:03 db
drwxr-xr-x.  3 root root   18 Oct 31 05:03 empty
drwxr-xr-x.  2 root root    6 Apr 23  2020 ftp
drwxr-xr-x.  2 root root    6 Apr 23  2020 games
drwxr-xr-x.  2 root root    6 Apr 23  2020 gopher
drwxr-xr-x.  3 root root   18 Oct 31 05:02 kerberos
drwxr-xr-x. 29 root root 4096 Oct 31 05:03 lib
drwxr-xr-x.  2 root root    6 Apr 23  2020 local
lrwxrwxrwx.  1 root root   11 Oct 31 05:01 lock -> ../run/lock
drwxr-xr-x. 11 root root 4096 Feb 28 18:22 log
lrwxrwxrwx.  1 root root   10 Apr 23  2020 mail -> spool/mail
drwxr-xr-x.  2 root root    6 Apr 23  2020 nis
drwxr-xr-x.  2 root root    6 Apr 23  2020 opt
drwxr-xr-x.  2 root root    6 Apr 23  2020 preserve
lrwxrwxrwx.  1 root root    6 Oct 31 05:01 run -> ../run
drwxr-xr-x.  7 root root   68 Oct 31 05:03 spool
drwxrwxrwt.  4 root root  103 Mar  1 00:25 tmp
-rw-r--r--.  1 root root  208 Oct 31 05:01 .updated
drwxr-xr-x.  3 root root   18 Mar  1 01:06 www
drwxr-xr-x.  2 root root    6 Apr 23  2020 yp
[ec2-user@ip-172-31-4-140 var]$ cd www
[ec2-user@ip-172-31-4-140 www]$ ls -ltr
total 0
```

17. Create **/home/recovery/logs** to store backup of log data

sudo mkdir -p /home/recovery/logs

```
[ec2-user@ip-172-31-4-140 ~]$ sudo mkdir -p /home/recovery/logs
[ec2-user@ip-172-31-4-140 ~]$ ls -ltr
total 0
[ec2-user@ip-172-31-4-140 ~]$ ls -la
total 12
drwx------. 3 ec2-user ec2-user  74 Feb 28 18:23 .
drwxr-xr-x. 4 root     root      38 Mar  1 01:15 ..
-rw-r--r--. 1 ec2-user ec2-user  18 Jun 23  2020 .bash_logout
-rw-r--r--. 1 ec2-user ec2-user 141 Jun 23  2020 .bash_profile
-rw-r--r--. 1 ec2-user ec2-user 376 Jun 23  2020 .bashrc
drwx------. 2 ec2-user ec2-user  29 Feb 28 18:23 .ssh
[ec2-user@ip-172-31-4-140 ~]$ ls -l /home
total 0
drwx------. 3 ec2-user ec2-user 74 Feb 28 18:23 ec2-user
drwxr-xr-x. 3 root     root     18 Mar  1 01:15 recovery
[ec2-user@ip-172-31-4-140 ~]$ ls -l /home/recovery
total 0
drwxr-xr-x. 2 root root 6 Mar  1 01:15 logs
[ec2-user@ip-172-31-4-140 ~]$
```

18. Mount **apps-lv** logical volume on **/var/www/html**

sudo mount /dev/webdata-vg/apps-lv /var/www/html/

```
[ec2-user@ip-172-31-4-140 ~]$ sudo mount /dev/webdata-vg/apps-lv /var/www/html/
[ec2-user@ip-172-31-4-140 ~]$
```

19. Use rsync utility to backup all the files in the log directory **/var/log** into **/home/recovery/logs** (*This is required before mounting the file system*)

sudo rsync -av /var/log /home/recovery/logs

```
[ec2-user@ip-172-31-4-140 ~]$ sudo rsync -av /var/log /home/recovery/logs
sending incremental file list
log/
log/boot.log
log/btmp
log/choose_repo.log
log/cloud-init-output.log
log/cloud-init.log
log/cron
log/dnf.librepo.log
log/dnf.log
log/dnf.rpm.log
log/hawkey.log
log/lastlog
log/maillog
log/messages
log/secure
log/spooler
log/wtmp
log/anaconda/
log/anaconda/anaconda.log
log/anaconda/dbus.log
log/anaconda/dnf.librepo.log
log/anaconda/hawkey.log
log/anaconda/journal.log
log/anaconda/ks-script-2dpklpjw.log
log/anaconda/ks-script-r6k3ijtj.log
log/anaconda/ks-script-txrgle22.log
log/anaconda/lvm.log
log/anaconda/packaging.log
log/anaconda/program.log
log/anaconda/storage.log
log/anaconda/syslog
log/audit/
log/audit/audit.log
log/chrony/
log/insights-client/
log/private/
log/qemu-ga/
log/rhsm/
log/sssd/
log/sssd/sssd.log
```

```
log/sssd/sssd.log
log/sssd/sssd_implicit_files.log
log/sssd/sssd_nss.log
log/tuned/
log/tuned/tuned.log

sent 11,684,994 bytes  received 714 bytes  23,371,416.00 bytes/sec
total size is 11,679,540  speedup is 1.00
[ec2-user@ip-172-31-4-140 ~]$
```

20. Mount **/logs-lv** logical volume on **var/log** . (*Note that all the existing data on /var/log will be deleted. That is why step 19 above is very important*)

sudo mount /dev/webdata-vg/logs-lv /var/log

```
[ec2-user@ip-172-31-4-140 ~]$ sudo mount /dev/webdata-vg/logs-lv /var/log
[ec2-user@ip-172-31-4-140 ~]$
```

21. Restore log files back into **/var/log** directory

sudo rsync -av /home/recovery/logs/log/ /var/log

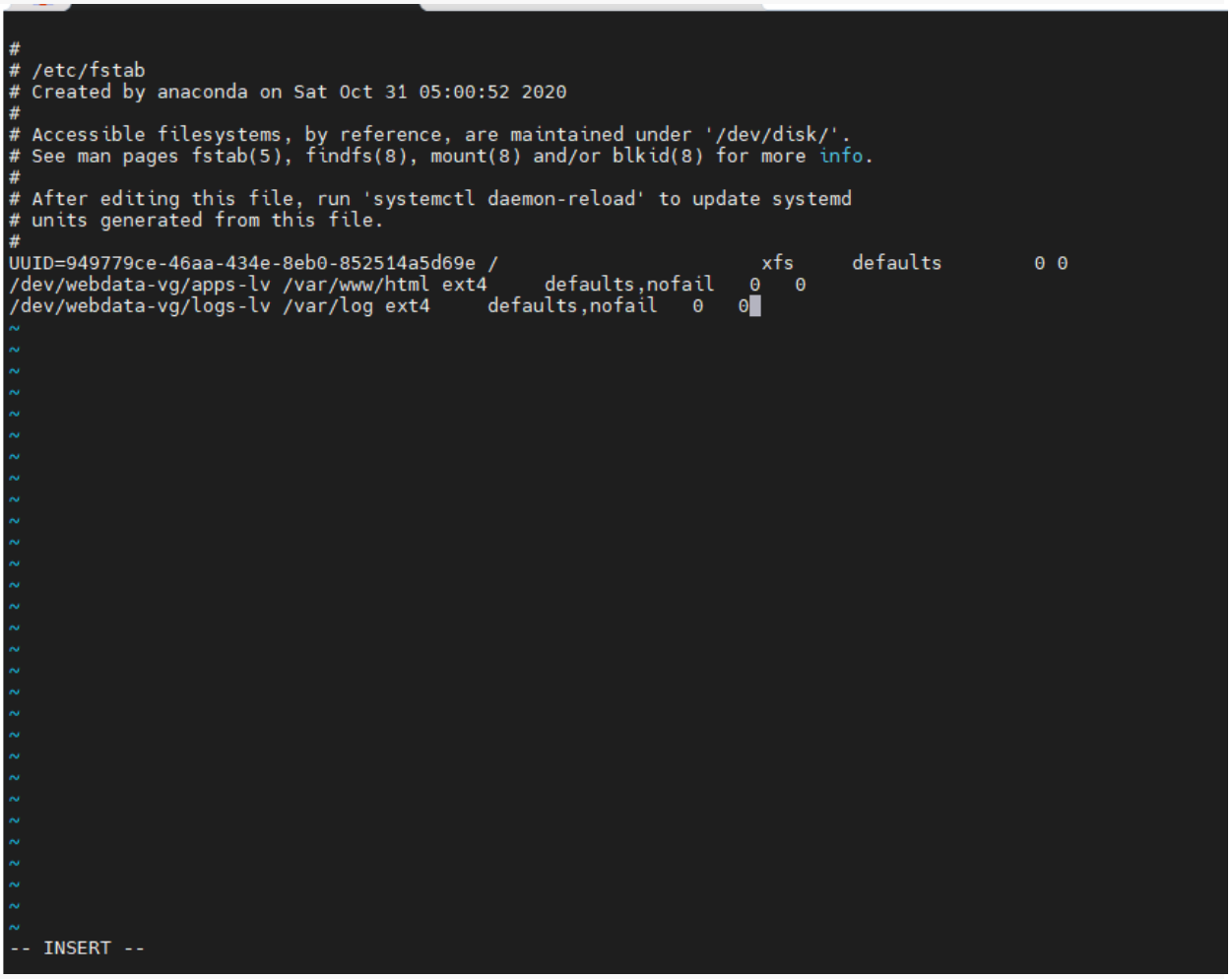
```
[ec2-user@ip-172-31-4-140 ~]$ sudo rsync -av /home/recovery/logs/log/ /var/log
sending incremental file list
./
boot.log
btmp
choose_repo.log
cloud-init-output.log
cloud-init.log
cron
dnf.librepo.log
dnf.log
dnf.rpm.log
hawkey.log
lastlog
maillog
messages
secure
spooler
wtmp
anaconda/
anaconda/anaconda.log
anaconda/dbus.log
anaconda/dnf.librepo.log
anaconda/hawkey.log
anaconda/journal.log
anaconda/ks-script-2dpklpjw.log
anaconda/ks-script-r6k3ijtj.log
anaconda/ks-script-txrgle22.log
anaconda/lvm.log
anaconda/packaging.log
anaconda/program.log
anaconda/storage.log
anaconda/syslog
audit/
audit/audit.log
chrony/
insights-client/
private/
qemu-ga/
rhsm/
sssd/
sssd/sssd.log
sssd/sssd_implicit_files.log
sssd/sssd_nss.log
```

```
sent 11,684,971 bytes  received 713 bytes  23,371,368.00 bytes/sec
total size is 11,679,540  speedup is 1.00
[ec2-user@ip-172-31-4-140 ~]$
```

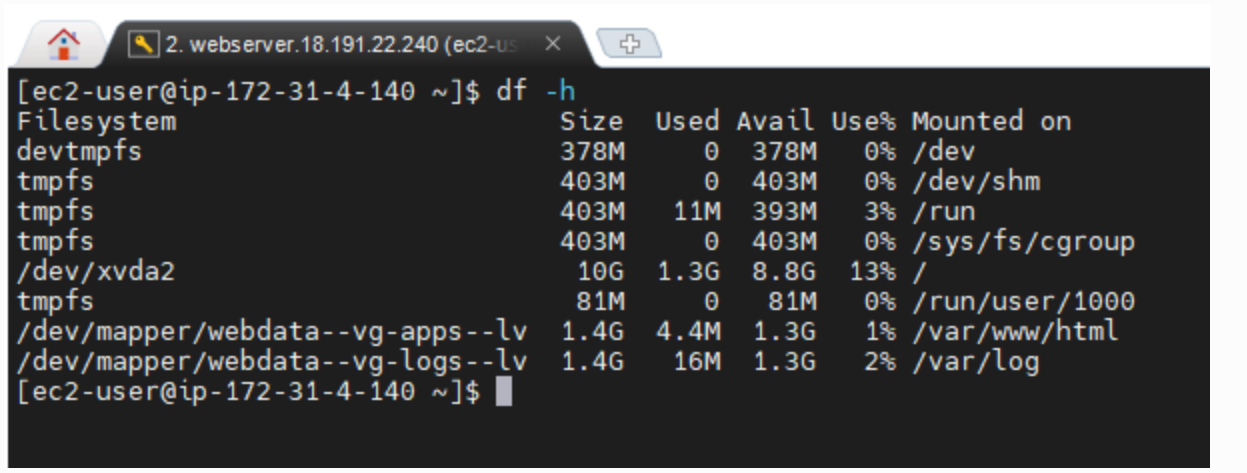
22. Update /etc/fstab file so that the mount configuration will persist after restart of the server

sudo vi /etc/fstab

#ADD THESE 2 LINES
/dev/webdata-vg/apps-lv /var/www/html ext4 defaults,nofail 0 0
/dev/webdata-vg/logs-lv /var/log ext4 defaults,nofail 0 0



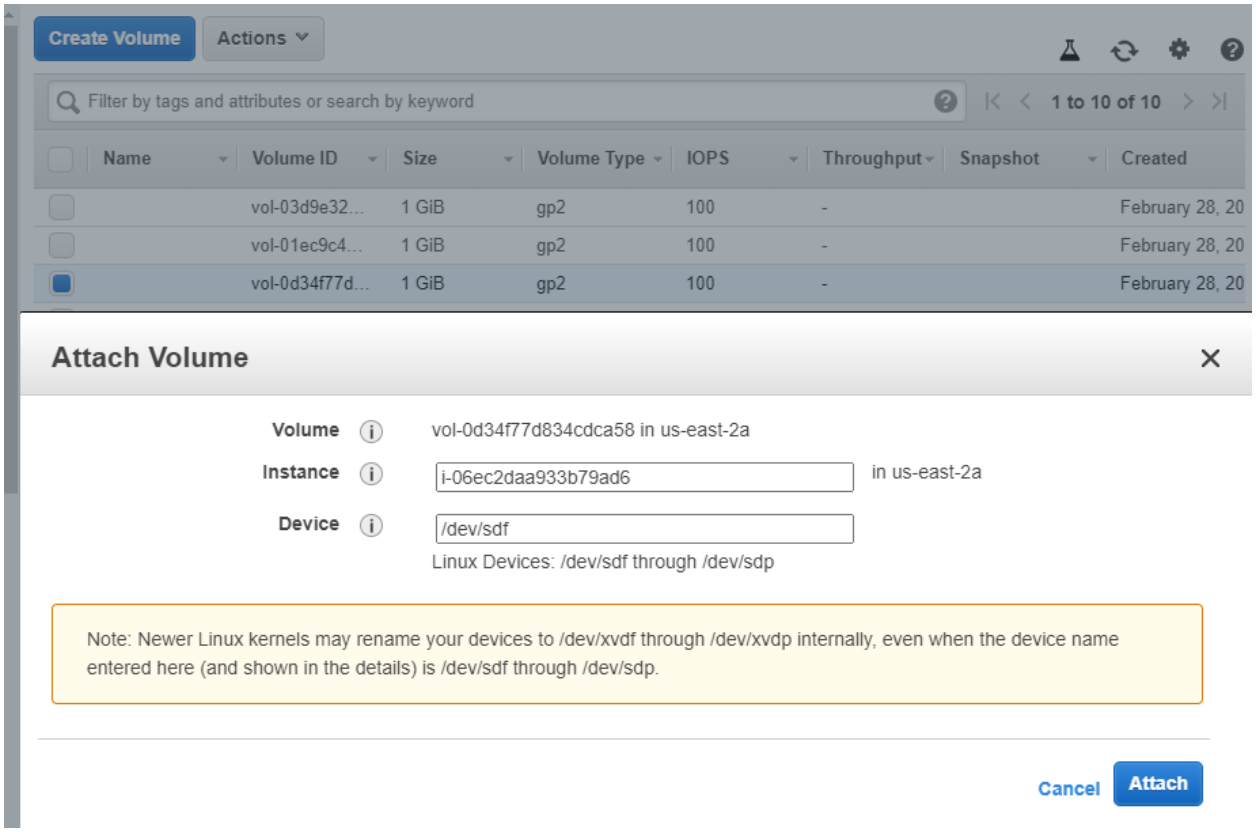
23. Verify your setup by running df -h, output must look like this:

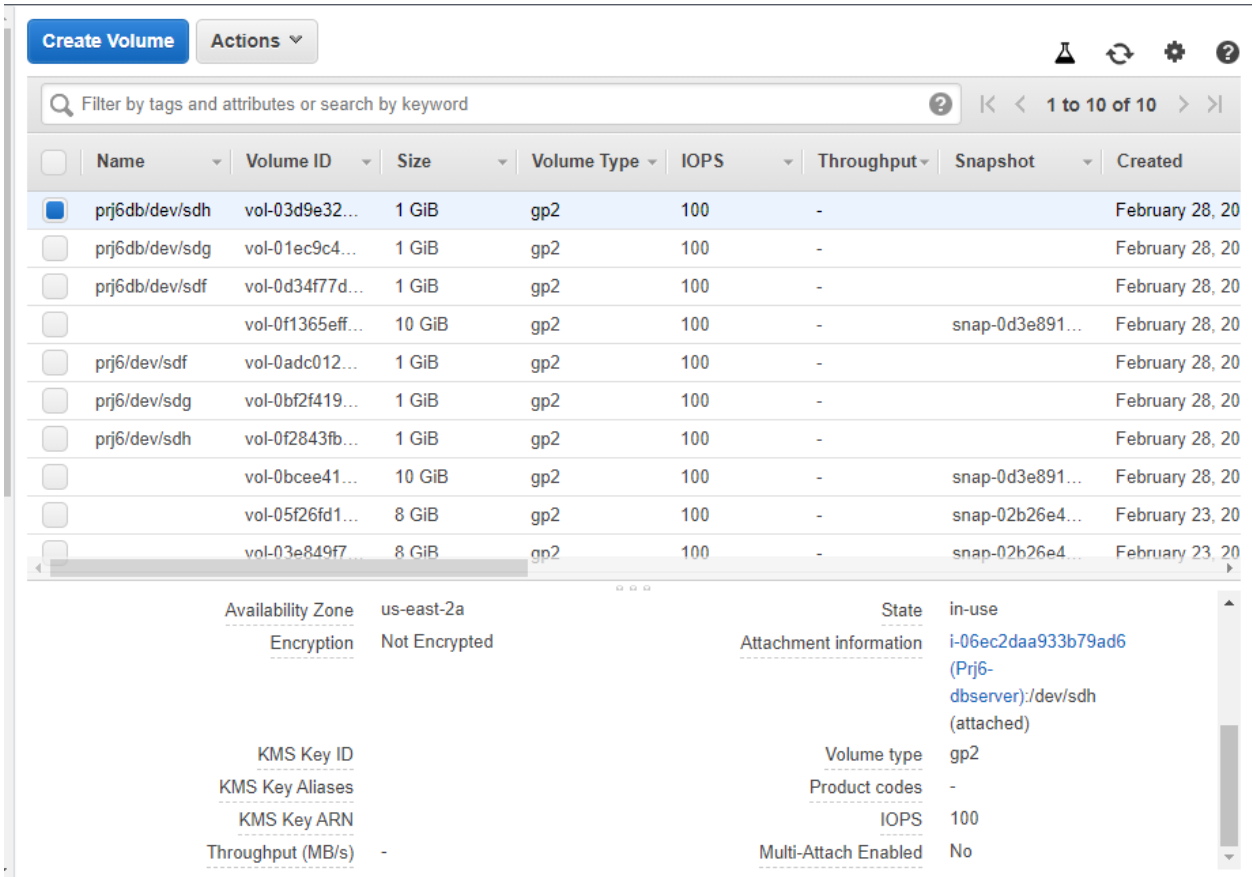


Step 2 — Prepare the Database Server

Launch a second RedHat EC2 instance that will have a role - ‘DB Server’ Repeat the same steps as for the Web Server, but instead of app-lv create db-lv and mount it to /db directory instead of /var/www/html/.

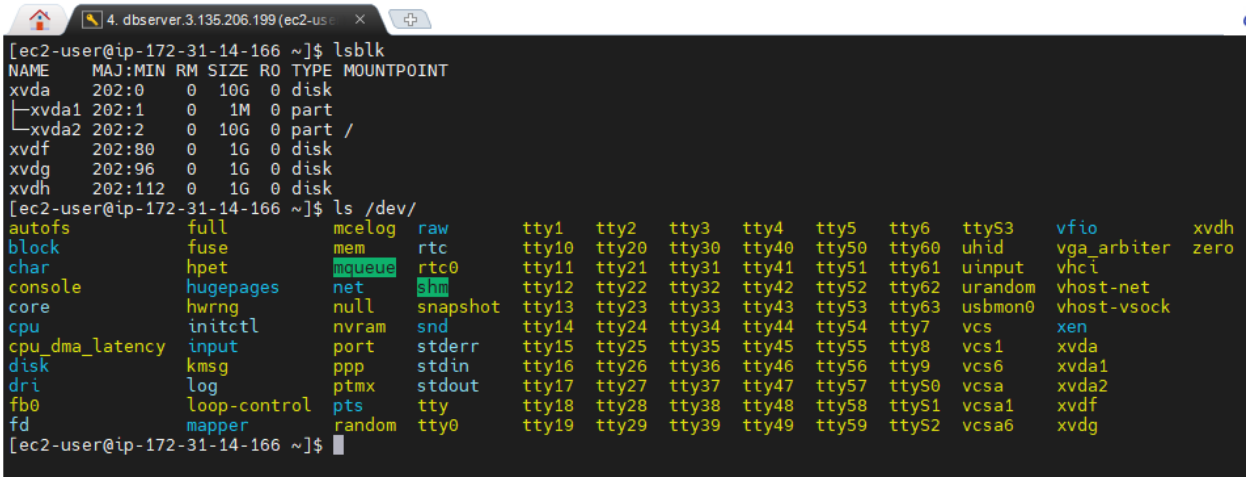
1. Launch the DB Server instance and create 3 volumes in the same AZ as DB Server EC2, each of 1 GiB.
2. Attach all three volumes one by one to your Web Server EC2 instance


Create Volume
Actions
Filter by tags and attributes or search by keyword
1 to 10 of 10
Name
Volume ID
Size
Volume Type
IOPS
Throughput
Snapshot
Created
vol-03d9e32...
1 GiB
gp2
100
-
February 28, 20
vol-01ec9c4...
1 GiB
gp2
100
-
February 28, 20
vol-0d34f77d...
1 GiB
gp2
100
-
February 28, 20
Attach Volume
Volume
vol-0d34f77d834cdca58 in us-east-2a
Instance
i-06ec2daa933b79ad6
in us-east-2a
Device
/dev/sdf
Linux Devices: /dev/sdf through /dev/sdp
Note: Newer Linux kernels may rename your devices to /dev/xvdf through /dev/xvdp internally, even when the device name entered here (and shown in the details) is /dev/sdf through /dev/sdp.
Cancel
Attach


Create Volume
Actions
Filter by tags and attributes or search by keyword
1 to 10 of 10
Name
Volume ID
Size
Volume Type
IOPS
Throughput
Snapshot
Created
prj6db/dev/sdh
vol-03d9e32...
1 GiB
gp2
100
-
February 28, 20
prj6db/dev/sdg
vol-01ec9c4...
1 GiB
gp2
100
-
February 28, 20
prj6db/dev/sdf
vol-0d34f77d...
1 GiB
gp2
100
-
February 28, 20
vol-0f1365eff...
10 GiB
gp2
100
-
snap-0d3e891...
February 28, 20
prj6/dev/sdf
vol-0adc012...
1 GiB
gp2
100
-
February 28, 20
prj6/dev/sdg
vol-0bf2f419...
1 GiB
gp2
100
-
February 28, 20
prj6/dev/sdh
vol-0f2843fb...
1 GiB
gp2
100
-
February 28, 20
vol-0bcee41...
10 GiB
gp2
100
-
snap-0d3e891...
February 28, 20
vol-05f26fd1...
8 GiB
gp2
100
-
snap-02b26e4...
February 23, 20
Availability Zone
us-east-2a
Encryption
Not Encrypted
KMS Key ID
KMS Key Aliases
KMS Key ARN
Throughput (MB/s)
-
State
in-use
Attachment information
i-06ec2daa933b79ad6 (Prj6-dbserver):/dev/sdh (attached)
Volume type
gp2
Product codes
-
IOPS
100
Multi-Attach Enabled
No

3. Open up the Linux terminal to begin configuration

4. Use lsblk command to inspect what block devices are attached to the server. Notice names of your newly created devices. All devices in Linux reside in /dev/ directory. Inspect it with ls /dev/ and make sure you see all 3 newly created block devices there - their names will likely be xvdf, xvdh, xvdg.



5. Use df -h command to see all mounts and free space on your server

6. Use gdisk utility to create a single partition on each of the 3 disks

a. sudo gdisk /dev/xvdf

```
[ec2-user@ip-172-31-14-166 ~]$ sudo gdisk /dev/xvdf
GPT fdisk (gdisk) version 1.0.3

Partition table scan:
  MBR: not present
  BSD: not present
  APM: not present
  GPT: not present

Creating new GPT entries.

Command (? for help): n
Partition number (1-128, default 1): 1
First sector (34-2097118, default = 2048) or {+-}size{KMGTP}:
Last sector (2048-2097118, default = 2097118) or {+-}size{KMGTP}:
Current type is 'Linux filesystem'
Hex code or GUID (L to show codes, Enter = 8300): 8e00
Changed type of partition to 'Linux LVM'

Command (? for help): w

Final checks complete. About to write GPT data. THIS WILL OVERWRITE EXISTING
PARTITIONS!!

Do you want to proceed? (Y/N): y
OK; writing new GUID partition table (GPT) to /dev/xvdf.
The operation has completed successfully.
[ec2-user@ip-172-31-14-166 ~]$
```

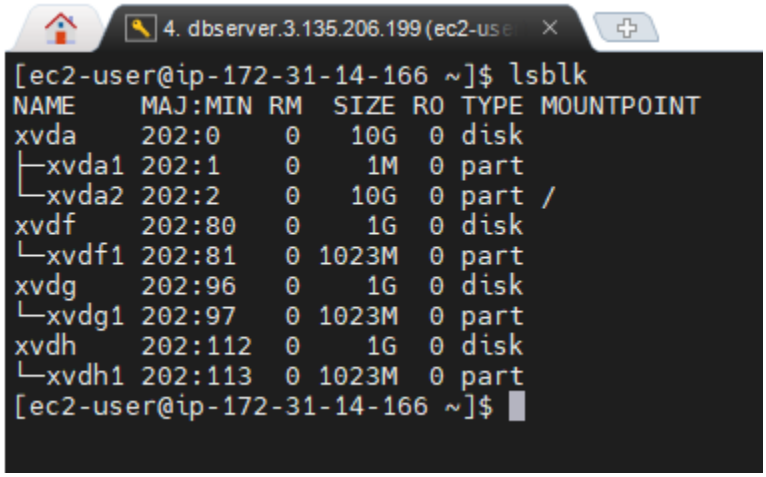
b. sudo gdisk /dev/xvdg

```
[ec2-user@ip-172-31-14-166 ~]$ sudo gdisk /dev/xvdg
GPT fdisk (gdisk) version 1.0.3

Partition table scan:
  MBR: not present
  BSD: not present
  APM: not present
  GPT: not present

Creating new GPT entries.

Command (? for help): n
Partition number (1-128, default 1): 1
First sector (34-2097118, default = 2048) or {+-}size{KMGTP}:
Last sector (2048-2097118, default = 2097118) or {+-}size{KMGTP}:
Current type is 'Linux filesystem'
Hex code or GUID (L to show codes, Enter = 8300): 8e00
Changed type of partition to 'Linux LVM'

Command (? for help): w

Final checks complete. About to write GPT data. THIS WILL OVERWRITE EXISTING
PARTITIONS!!

Do you want to proceed? (Y/N): y
OK; writing new GUID partition table (GPT) to /dev/xvdg.
The operation has completed successfully.
[ec2-user@ip-172-31-14-166 ~]$
```

c. sudo gdisk /dev/xvdh

```
[ec2-user@ip-172-31-14-166 ~]$ sudo gdisk /dev/xvdh
GPT fdisk (gdisk) version 1.0.3

Partition table scan:
  MBR: not present
  BSD: not present
  APM: not present
  GPT: not present

Creating new GPT entries.

Command (? for help): n
Partition number (1-128, default 1): 1
First sector (34-2097118, default = 2048) or {+-}size{KMGTP}:
Last sector (2048-2097118, default = 2097118) or {+-}size{KMGTP}:
Current type is 'Linux filesystem'
Hex code or GUID (L to show codes, Enter = 8300): 8e00
Changed type of partition to 'Linux LVM'

Command (? for help): w

Final checks complete. About to write GPT data. THIS WILL OVERWRITE EXISTING
PARTITIONS!!

Do you want to proceed? (Y/N): y
OK; writing new GUID partition table (GPT) to /dev/xvdh.
The operation has completed successfully.
[ec2-user@ip-172-31-14-166 ~]$
```

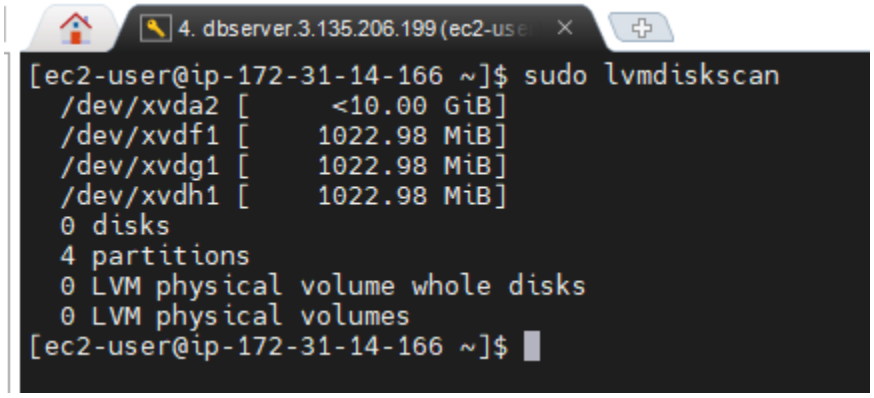
7. Use lsblk utility to view the newly configured partition on each of the 3 disks.



8. Install lvm2 package using sudo yum install lvm2.

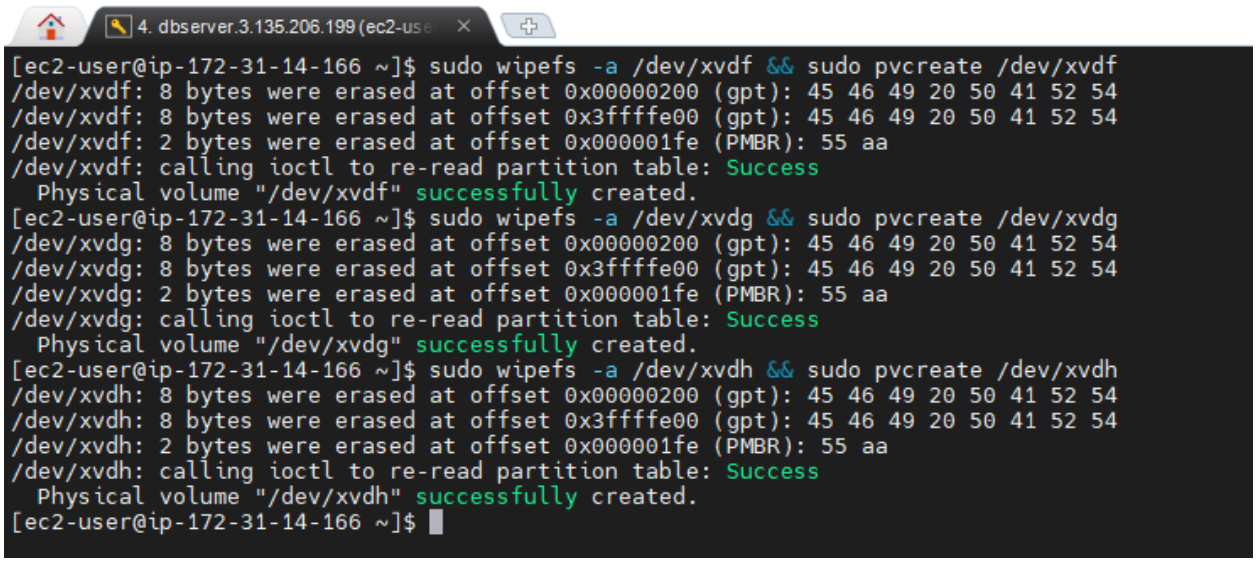
```
[ec2-user@ip-172-31-14-166 ~]$  sudo yum install lvm2
Last metadata expiration check: 0:12:58 ago on Mon 01 Mar 2021 02:12:52 AM UTC.
Dependencies resolved.
================================================================================
 Package                    Architecture  Version                  Repository                  Size
================================================================================
Installing:
 lvm2                       x86_64        8:2.03.09-5.el8_3.2      rhel-8-baseos-rhui-rpms     1.6 M
Upgrading:
 device-mapper              x86_64        8:1.02.171-5.el8_3.2     rhel-8-baseos-rhui-rpms     373 k
 device-mapper-libs         x86_64        8:1.02.171-5.el8_3.2     rhel-8-baseos-rhui-rpms     406 k
Installing dependencies:
 device-mapper-event        x86_64        8:1.02.171-5.el8_3.2     rhel-8-baseos-rhui-rpms     268 k
 device-mapper-event-libs   x86_64        8:1.02.171-5.el8_3.2     rhel-8-baseos-rhui-rpms     267 k
 device-mapper-persistent-data x86_64     0.8.5-4.el8              rhel-8-baseos-rhui-rpms     468 k
 libaio                     x86_64        0.3.112-1.el8            rhel-8-baseos-rhui-rpms      33 k
 lvm2-libs                  x86_64        8:2.03.09-5.el8_3.2      rhel-8-baseos-rhui-rpms     1.1 M

Transaction Summary
================================================================================
Install  6 Packages
Upgrade  2 Packages

Total download size: 4.5 M
Is this ok [y/N]: y
Downloading Packages:
(1/8): libaio-0.3.112-1.el8.x86_64.rpm                  274 kB/s |  33 kB     00:00
(2/8): device-mapper-event-libs-1.02.171-5.el8_3.2.x86_64.rpm  2.0 MB/s | 267 kB     00:00
(3/8): device-mapper-persistent-data-0.8.5-4.el8.x86_64.rpm  3.3 MB/s | 468 kB     00:00
(4/8): device-mapper-event-1.02.171-5.el8_3.2.x86_64.rpm  2.5 MB/s | 268 kB     00:00
(5/8): lvm2-libs-2.03.09-5.el8_3.2.x86_64.rpm           9.2 MB/s | 1.1 MB     00:00
(6/8): lvm2-2.03.09-5.el8_3.2.x86_64.rpm                 12 MB/s | 1.6 MB     00:00
(7/8): device-mapper-1.02.171-5.el8_3.2.x86_64.rpm      3.1 MB/s | 373 kB     00:00
(8/8): device-mapper-libs-1.02.171-5.el8_3.2.x86_64.rpm 3.4 MB/s | 406 kB     00:00
--------------------------------------------------------------------------------
Total                                                   8.8 MB/s | 4.5 MB     00:00
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
```

9. Run sudo lvmdiskscan command to check for available partitions.



10. Use pvcreate utility to mark each of 3 disks as physical volumes (PVs) to be used by LVM

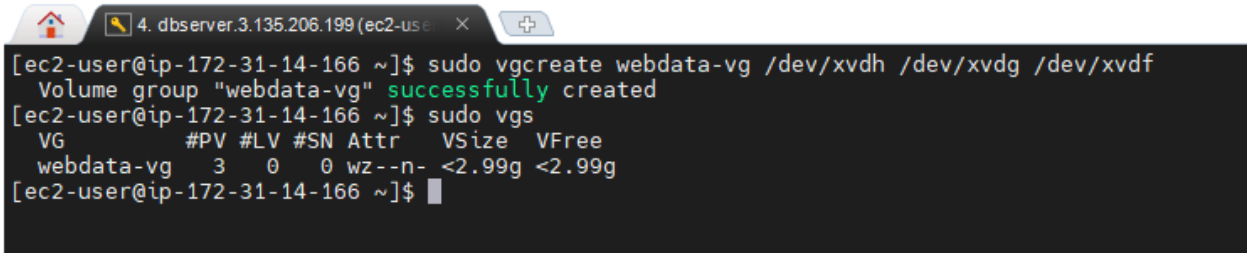
sudo wipefs -a /dev/xvdf && sudo pvcreate /dev/xvdf
sudo wipefs -a /dev/xvdg && sudo pvcreate /dev/xvdg
sudo wipefs -a /dev/xvdh && sudo pvcreate /dev/xvdh



11. Use vgcreate utility to add all 3 PVs to a volume group (VG). Name the VG webdata-vg

sudo vgcreate webdata-vg /dev/xvdh /dev/xvdg /dev/xvdf

12. Verify that your VG has been created successfully by running sudo vgs



13. Use lvcreate utility to create 2 logical volumes. db-lv (Use half of the PV size), and logs-lv Use the remaining space of the PV size. NOTE: db-lv will be used to store data for the database while, logs-lv will be used to store data for logs.

sudo lvcreate -n db-lv -L 1.44g webdata-vg

sudo lvcreate -n logs-lv -L 1.44g webdata-vg

sudo lvs

```
[ec2-user@ip-172-31-14-166 ~]$ sudo lvcreate -n db-lv -L 1.44g webdata-vg
  Rounding up size to full physical extent 1.44 GiB
  Logical volume "db-lv" created.
[ec2-user@ip-172-31-14-166 ~]$ sudo lvcreate -n logs-lv -L 1.44g webdata-vg
  Rounding up size to full physical extent 1.44 GiB
  Logical volume "logs-lv" created.
[ec2-user@ip-172-31-14-166 ~]$
[ec2-user@ip-172-31-14-166 ~]$
[ec2-user@ip-172-31-14-166 ~]$ sudo lvs
  LV      VG         Attr       LSize Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
  db-lv   webdata-vg -wi-a----- 1.44g
  logs-lv webdata-vg -wi-a----- 1.44g
[ec2-user@ip-172-31-14-166 ~]$
```

14. Verify the entire setup

sudo vgdisplay -v #view complete setup - VG, PV, and LV

```
[ec2-user@ip-172-31-14-166 ~]$ sudo vgdisplay -v #view complete setup - VG, PV, and LV
  --- Volume group ---
  VG Name               webdata-vg
  System ID
  Format                lvm2
  Metadata Areas        3
  Metadata Sequence No  3
  VG Access             read/write
  VG Status             resizable
  MAX LV                0
  Cur LV                2
  Open LV               0
  Max PV                0
  Cur PV                3
  Act PV                3
  VG Size               <2.99 GiB
  PE Size               4.00 MiB
  Total PE              765
  Alloc PE / Size       738 / 2.88 GiB
  Free  PE / Size       27 / 108.00 MiB
  VG UUID               7W7bTj-HBTU-EKk2-lNUl-oxS0-Afdw-aksnKT

  --- Logical volume ---
  LV Path                /dev/webdata-vg/db-lv
  LV Name                db-lv
  VG Name                webdata-vg
  LV UUID                VWmKTP-MIRH-Mhkw-jL9B-Ch9g-soot-J1Q20S
  LV Write Access        read/write
  LV Creation host, time ip-172-31-14-166.us-east-2.compute.internal, 2021-03-01 02:36:22 +0000
  LV Status              available
  # open                 0
  LV Size                1.44 GiB
  Current LE             369
  Segments               2
  Allocation             inherit
  Read ahead sectors     auto
  - currently set to     8192
  Block device           253:0
```

```
  --- Logical volume ---
  LV Path                /dev/webdata-vg/logs-lv
  LV Name                logs-lv
  VG Name                webdata-vg
  LV UUID                uDZeRL-rgJm-UBgy-Hg7O-fPeg-6tft-983BcC
  LV Write Access        read/write
  LV Creation host, time ip-172-31-14-166.us-east-2.compute.internal, 2021-03-01 02:37:35 +0000
  LV Status              available
  # open                 0
  LV Size                1.44 GiB
  Current LE             369
  Segments               2
  Allocation             inherit
  Read ahead sectors     auto
  - currently set to     8192
  Block device           253:1

  --- Physical volumes ---
  PV Name               /dev/xvdh
  PV UUID               YrD3bN-ksgf-c9SI-f829-0cEw-cpxv-geAeuJ
  PV Status             allocatable
  Total PE / Free PE    255 / 0

  PV Name               /dev/xvdg
  PV UUID               AWQSZ4-Ygiq-geqA-RLA3-KcuM-WEpE-zll3Mm
  PV Status             allocatable
  Total PE / Free PE    255 / 27

  PV Name               /dev/xvdf
  PV UUID               9SS33A-9d4Q-coF4-AYFr-GxFl-CK1u-HBjBsm
  PV Status             allocatable
  Total PE / Free PE    255 / 0
```

sudo lsblk

```
4. dbserver.3.135.206.199 (ec2-use
[ec2-user@ip-172-31-14-166 ~]$ clear
[ec2-user@ip-172-31-14-166 ~]$ sudo lsblk
NAME                    MAJ:MIN RM  SIZE RO TYPE MOUNTP
xvda                    202:0    0   10G  0 disk
├─xvda1                 202:1    0    1M  0 part
└─xvda2                 202:2    0   10G  0 part /
xvdf                    202:80   0    1G  0 disk
└─webdata--vg-logs--lv 253:1    0  1.5G  0 lvm
xvdg                    202:96   0    1G  0 disk
├─webdata--vg-db--lv   253:0    0  1.5G  0 lvm
└─webdata--vg-logs--lv 253:1    0  1.5G  0 lvm
xvdh                    202:112  0    1G  0 disk
└─webdata--vg-db--lv   253:0    0  1.5G  0 lvm
[ec2-user@ip-172-31-14-166 ~]$
```

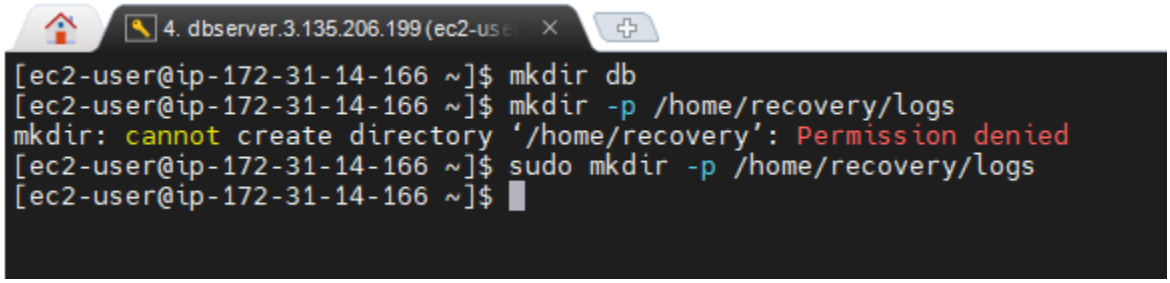
15. Use mkfs.ext4 to format the logical volumes with ext4 filesystem

sudo mkfs -t ext4 /dev/webdata-vg/db-lv

sudo mkfs -t ext4 /dev/webdata-vg/logs-lv

```
[ec2-user@ip-172-31-14-166 ~]$ sudo mkfs -t ext4 /dev/webdata-vg/db-lv
mke2fs 1.45.6 (20-Mar-2020)
Creating filesystem with 377856 4k blocks and 94464 inodes
Filesystem UUID: f6e62794-fef8-49f4-a328-cda0c9c84497
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376, 294912

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

[ec2-user@ip-172-31-14-166 ~]$
[ec2-user@ip-172-31-14-166 ~]$
[ec2-user@ip-172-31-14-166 ~]$
[ec2-user@ip-172-31-14-166 ~]$
[ec2-user@ip-172-31-14-166 ~]$
[ec2-user@ip-172-31-14-166 ~]$ sudo mkfs -t ext4 /dev/webdata-vg/logs-lv
mke2fs 1.45.6 (20-Mar-2020)
Creating filesystem with 377856 4k blocks and 94464 inodes
Filesystem UUID: 49ea984e-65c8-461c-b3fa-ffb3d38e95ec
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376, 294912

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

[ec2-user@ip-172-31-14-166 ~]$
```

16. Create /db directory to store database files
17. Create /home/recovery/logs to store backup of log data



18. Mount db-lv logical volume on /db

sudo mount /dev/webdata-vg/db-lv /db/

```
[ec2-user@ip-172-31-14-166 ~]$ sudo mount /dev/webdata-vg/db-lv db/
[ec2-user@ip-172-31-14-166 ~]$
```

19. Use rsync utility to backup all the files in the log directory /var/log into /home/recovery/logs (This is required before mounting the file system)
sudo rsync -av /var/log /home/recovery/logs

```
[ec2-user@ip-172-31-14-166 ~]$ sudo rsync -av /var/log /home/recovery/logs
sending incremental file list
log/
log/boot.log
log/btmp
log/choose_repo.log
log/cloud-init-output.log
log/cloud-init.log
log/cron
log/dnf.librepo.log
log/dnf.log
log/dnf.rpm.log
log/hawkey.log
log/lastlog
log/maillog
log/messages
log/secure
log/spooler
log/wtmp
log/anaconda/
log/anaconda/anaconda.log
log/anaconda/dbus.log
log/anaconda/dnf.librepo.log
log/anaconda/hawkey.log
log/anaconda/journal.log
log/anaconda/ks-script-2dpklpjw.log
log/anaconda/ks-script-r6k3ijtj.log
log/anaconda/ks-script-txrgle22.log
log/anaconda/lvm.log
log/anaconda/packaging.log
log/anaconda/program.log
log/anaconda/storage.log
log/anaconda/syslog
log/audit/
log/audit/audit.log
log/chrony/
log/insights-client/
log/private/
log/qemu-ga/
log/rhsm/
```

```
log/sssd/
log/sssd/sssd.log
log/sssd/sssd_implicit_files.log
log/sssd/sssd_nss.log
log/tuned/
log/tuned/tuned.log

sent 11,620,879 bytes  received 714 bytes  7,747,728.67 bytes/sec
total size is 11,615,441  speedup is 1.00
[ec2-user@ip-172-31-14-166 ~]$
```

20. Mount /logs-lv logical volume on var/log . (Note that all the existing data on /var/log will be deleted. That is why step 19 above is very important)
sudo mount /dev/webdata-vg/logs-lv /var/log

```
[ec2-user@ip-172-31-14-166 ~]$ sudo mount /dev/webdata-vg/logs-lv /var/log
[ec2-user@ip-172-31-14-166 ~]$
```

21. Restore log files back into /var/log directory

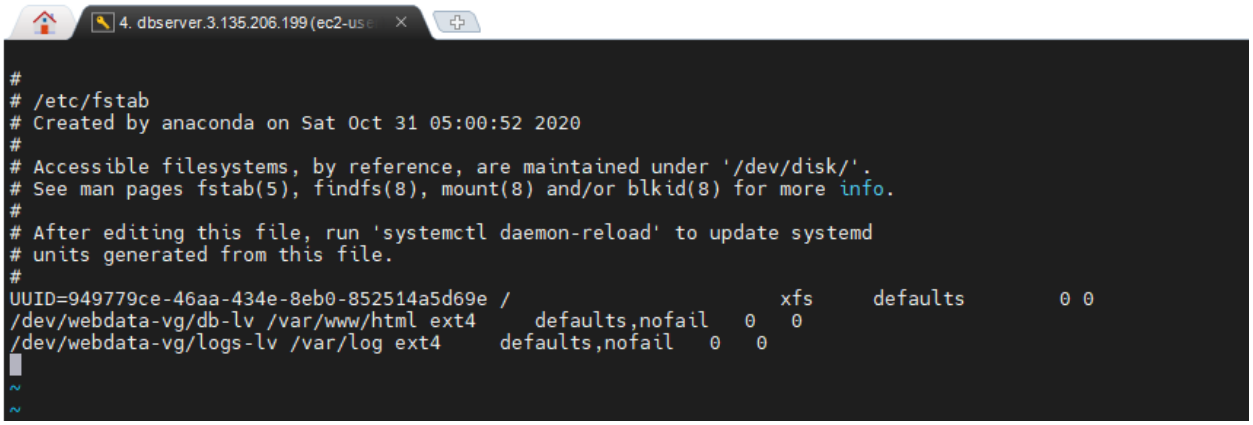
sudo rsync -av /home/recovery/logs/log/ /var/log

```
[ec2-user@ip-172-31-14-166 ~]$ sudo rsync -av /home/recovery/logs/log/ /var/log
sending incremental file list
./
boot.log
btmp
choose_repo.log
cloud-init-output.log
cloud-init.log
cron
dnf.librepo.log
dnf.log
dnf.rpm.log
hawkey.log
lastlog
maillog
messages
secure
spooler
wtmp
anaconda/
anaconda/anaconda.log
anaconda/dbus.log
anaconda/dnf.librepo.log
anaconda/hawkey.log
anaconda/journal.log
anaconda/ks-script-2dpklpjw.log
anaconda/ks-script-r6k3ijtj.log
anaconda/ks-script-txrgle22.log
anaconda/lvm.log
anaconda/packaging.log
anaconda/program.log
anaconda/storage.log
anaconda/syslog
audit/
audit/audit.log
chrony/
insights-client/
private/
qemu-ga/
rhsm/
sssd/
sssd/sssd.log
```

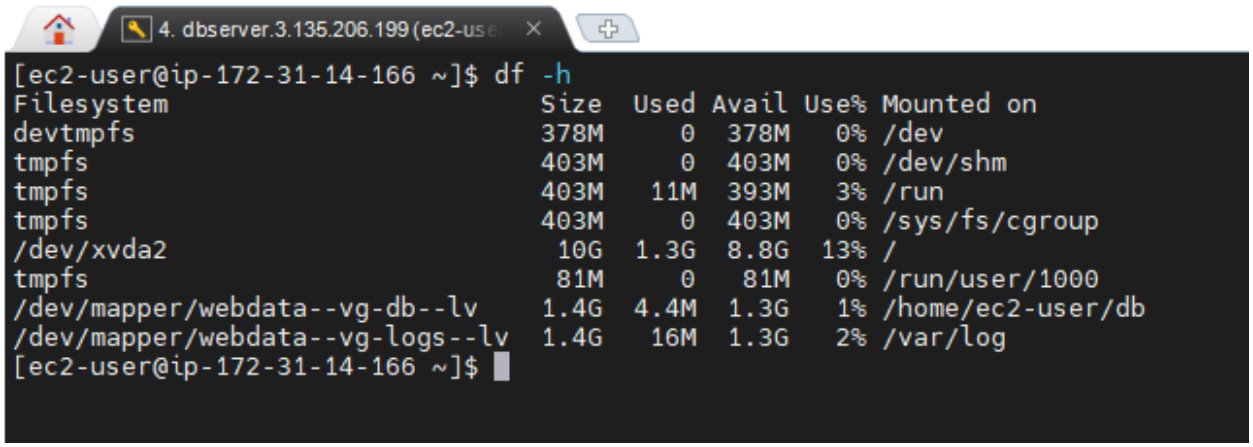
```
sssd/sssd.log
sssd/sssd_implicit_files.log
sssd/sssd_nss.log
tuned/
tuned/tuned.log

sent 11,620,856 bytes  received 713 bytes  23,243,138.00 bytes/sec
total size is 11,615,441  speedup is 1.00
[ec2-user@ip-172-31-14-166 ~]$
```

22. Update /etc/fstab file so that the mount configuration will persist after restart of the server
sudo vi /etc/fstab

#ADD THESE 2 LINES
/dev/webdata-vg/db-lv /var/www/html ext4 defaults,nofail 0 0
/dev/webdata-vg/logs-lv /var/log ext4 defaults,nofail 0 0



23. Verify your setup by running df -h



Step 3 — Install Wordpress on your Web Server EC2

1. Install WordPress and other necessary packages

sudo yum -y update

```
[ec2-user@ip-172-31-4-140 ~]$ sudo yum -y update
Red Hat Update Infrastructure 3 Client Configuration Server 8                19 kB/s | 2.1 kB     00:00
Red Hat Enterprise Linux 8 for x86_64 - AppStream from RHUI (RPMs)           19 kB/s | 2.8 kB     00:00
Red Hat Enterprise Linux 8 for x86_64 - BaseOS from RHUI (RPMs)              15 kB/s | 2.4 kB     00:00
Dependencies resolved.
================================================================================================================
 Package                              Arch   Version                                Repository                Size
================================================================================================================
Installing:
 kernel                               x86_64 4.18.0-240.15.1.el8_3                  rhel-8-baseos-rhui-rpms   4.3 M
 kernel-core                          x86_64 4.18.0-240.15.1.el8_3                  rhel-8-baseos-rhui-rpms    30 M
 kernel-modules                       x86_64 4.18.0-240.15.1.el8_3                  rhel-8-baseos-rhui-rpms    26 M
Upgrading:
 NetworkManager                       x86_64 1:1.26.0-13.el8_3                      rhel-8-baseos-rhui-rpms   2.4 M
 NetworkManager-libnm                 x86_64 1:1.26.0-13.el8_3                      rhel-8-baseos-rhui-rpms   1.8 M
 NetworkManager-team                  x86_64 1:1.26.0-13.el8_3                      rhel-8-baseos-rhui-rpms   142 k
 NetworkManager-tui                   x86_64 1:1.26.0-13.el8_3                      rhel-8-baseos-rhui-rpms   320 k
 cloud-init                           noarch 19.4-11.el8_3.2                        rhel-8-appstream-rhui-rpms 945 k
 curl                                 x86_64 7.61.1-14.el8_3.1                      rhel-8-baseos-rhui-rpms   353 k
 dbus                                 x86_64 1:1.12.8-12.el8_3                      rhel-8-baseos-rhui-rpms    41 k
 dbus-common                          noarch 1:1.12.8-12.el8_3                      rhel-8-baseos-rhui-rpms    45 k
 dbus-daemon                          x86_64 1:1.12.8-12.el8_3                      rhel-8-baseos-rhui-rpms   240 k
 dbus-libs                            x86_64 1:1.12.8-12.el8_3                      rhel-8-baseos-rhui-rpms   183 k
 dbus-tools                           x86_64 1:1.12.8-12.el8_3                      rhel-8-baseos-rhui-rpms    85 k
 dnf-plugin-subscription-manager      x86_64 1.27.18-1.el8_3                        rhel-8-baseos-rhui-rpms   288 k
 dracut                               x86_64 049-95.git20200804.el8_3.4             rhel-8-baseos-rhui-rpms   368 k
 dracut-config-generic                x86_64 049-95.git20200804.el8_3.4             rhel-8-baseos-rhui-rpms    55 k
```

```
Installed:
  kernel-4.18.0-240.15.1.el8_3.x86_64                 kernel-core-4.18.0-240.15.1.el8_3.x86_64
  kernel-modules-4.18.0-240.15.1.el8_3.x86_64         linux-firmware-20200619-101.git3890db36.el8_3.noarch

Complete!
```

sudo yum -y install wget httpd php php-mysqlnd php-fpm php-json

```
[ec2-user@ip-172-31-4-140 ~]$ sudo yum -y install wget httpd php php-mysqlnd php-fpm php-json
Last metadata expiration check: 0:02:21 ago on Tue 02 Mar 2021 12:50:03 AM UTC.
Dependencies resolved.
================================================================================================================
 Package                 Arch       Version                                    Repository                  Size
================================================================================================================
Installing:
 httpd                   x86_64     2.4.37-30.module+el8.3.0+7001+0766b9e7     rhel-8-appstream-rhui-rpms  1.4 M
 php                     x86_64     7.2.24-1.module+el8.2.0+4601+7c76a223      rhel-8-appstream-rhui-rpms  1.5 M
 php-fpm                 x86_64     7.2.24-1.module+el8.2.0+4601+7c76a223      rhel-8-appstream-rhui-rpms  1.6 M
 php-json                x86_64     7.2.24-1.module+el8.2.0+4601+7c76a223      rhel-8-appstream-rhui-rpms   73 k
 php-mysqlnd             x86_64     7.2.24-1.module+el8.2.0+4601+7c76a223      rhel-8-appstream-rhui-rpms  191 k
 wget                    x86_64     1.19.5-10.el8                              rhel-8-appstream-rhui-rpms  734 k
Installing dependencies:
 apr                     x86_64     1.6.3-11.el8                               rhel-8-appstream-rhui-rpms  125 k
 apr-util                x86_64     1.6.1-6.el8                                rhel-8-appstream-rhui-rpms  105 k
 httpd-filesystem        noarch     2.4.37-30.module+el8.3.0+7001+0766b9e7     rhel-8-appstream-rhui-rpms   37 k
 httpd-tools             x86_64     2.4.37-30.module+el8.3.0+7001+0766b9e7     rhel-8-appstream-rhui-rpms  104 k
 mailcap                 noarch     2.1.48-3.el8                               rhel-8-baseos-rhui-rpms      39 k
 mod_http2               x86_64     1.15.7-2.module+el8.3.0+7670+8bf57d29      rhel-8-appstream-rhui-rpms  154 k
 nginx-filesystem        noarch     1:1.14.1-9.module+el8.0.0+4108+af250afe    rhel-8-appstream-rhui-rpms   24 k
 php-cli                 x86_64     7.2.24-1.module+el8.2.0+4601+7c76a223      rhel-8-appstream-rhui-rpms  3.1 M
 php-common              x86_64     7.2.24-1.module+el8.2.0+4601+7c76a223      rhel-8-appstream-rhui-rpms  662 k
 php-pdo                 x86_64     7.2.24-1.module+el8.2.0+4601+7c76a223      rhel-8-appstream-rhui-rpms  123 k
 redhat-logos-httpd      noarch     81.1-1.el8                                 rhel-8-baseos-rhui-rpms      26 k
Installing weak dependencies:
 apr-util-bdb            x86_64     1.6.1-6.el8                                rhel-8-appstream-rhui-rpms   25 k
 apr-util-openssl        x86_64     1.6.1-6.el8                                rhel-8-appstream-rhui-rpms   27 k
Enabling module streams:
 httpd                              2.4
 nginx                              1.14
 php                                7.2

Transaction Summary
================================================================================================================
Install  19 Packages

Total download size: 10 M
Installed size: 34 M
Downloading Packages:
(1/19): apr-util-openssl-1.6.1-6.el8.x86_64.rpm                  212 kB/s |  27 kB     00:00
(2/19): apr-util-1.6.1-6.el8.x86_64.rpm                          793 kB/s | 105 kB     00:00
(3/19): apr-util-bdb-1.6.1-6.el8.x86_64.rpm                      179 kB/s |  25 kB     00:00
```

```
Installed:
  apr-1.6.3-11.el8.x86_64
  apr-util-1.6.1-6.el8.x86_64
  apr-util-bdb-1.6.1-6.el8.x86_64
  apr-util-openssl-1.6.1-6.el8.x86_64
  httpd-2.4.37-30.module+el8.3.0+7001+0766b9e7.x86_64
  httpd-filesystem-2.4.37-30.module+el8.3.0+7001+0766b9e7.noarch
  httpd-tools-2.4.37-30.module+el8.3.0+7001+0766b9e7.x86_64
  mailcap-2.1.48-3.el8.noarch
  mod_http2-1.15.7-2.module+el8.3.0+7670+8bf57d29.x86_64
  nginx-filesystem-1:1.14.1-9.module+el8.0.0+4108+af250afe.noarch
  php-7.2.24-1.module+el8.2.0+4601+7c76a223.x86_64
  php-cli-7.2.24-1.module+el8.2.0+4601+7c76a223.x86_64
  php-common-7.2.24-1.module+el8.2.0+4601+7c76a223.x86_64
  php-fpm-7.2.24-1.module+el8.2.0+4601+7c76a223.x86_64
  php-json-7.2.24-1.module+el8.2.0+4601+7c76a223.x86_64
  php-mysqlnd-7.2.24-1.module+el8.2.0+4601+7c76a223.x86_64
  php-pdo-7.2.24-1.module+el8.2.0+4601+7c76a223.x86_64
  redhat-logos-httpd-81.1-1.el8.noarch
  wget-1.19.5-10.el8.x86_64

Complete!
[ec2-user@ip-172-31-4-140 ~]$
```

cd /var/www/html

```
[ec2-user@ip-172-31-4-140 ~]$ cd /var/www/html
[ec2-user@ip-172-31-4-140 html]$ pwd
/var/www/html
[ec2-user@ip-172-31-4-140 html]$
```

sudo wget http://wordpress.org/latest.tar.gz

```
[ec2-user@ip-172-31-4-140 html]$ sudo wget http://wordpress.org/latest.tar.gz
--2021-03-02 00:54:56--  http://wordpress.org/latest.tar.gz
Resolving wordpress.org (wordpress.org)... 198.143.164.252
Connecting to wordpress.org (wordpress.org)|198.143.164.252|:80... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: https://wordpress.org/latest.tar.gz [following]
--2021-03-02 00:54:56--  https://wordpress.org/latest.tar.gz
Connecting to wordpress.org (wordpress.org)|198.143.164.252|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 15603881 (15M) [application/octet-stream]
Saving to: 'latest.tar.gz'

latest.tar.gz               100%[=============================================>]  14.88M  12.7MB/s    in 1.2s

2021-03-02 00:54:58 (12.7 MB/s) - 'latest.tar.gz' saved [15603881/15603881]

[ec2-user@ip-172-31-4-140 html]$
```

sudo tar xzvf latest.tar.gz

```
[ec2-user@ip-172-31-4-140 html]$ sudo tar xzvf latest.tar.gz
wordpress/
wordpress/xmlrpc.php
wordpress/wp-blog-header.php
wordpress/readme.html
wordpress/wp-signup.php
wordpress/index.php
wordpress/wp-cron.php
wordpress/wp-config-sample.php
wordpress/wp-login.php
wordpress/wp-settings.php
wordpress/license.txt
wordpress/wp-content/
wordpress/wp-content/themes/
wordpress/wp-content/themes/twentynineteen/
wordpress/wp-content/themes/twentynineteen/images/
wordpress/wp-content/themes/twentynineteen/images/pattern_02.jpg
wordpress/wp-content/themes/twentynineteen/images/pattern_04.jpg
wordpress/wp-content/themes/twentynineteen/images/pattern_03.jpg
wordpress/wp-content/themes/twentynineteen/images/pattern_01.jpg
wordpress/wp-content/themes/twentynineteen/footer.php
wordpress/wp-content/themes/twentynineteen/template-parts/
wordpress/wp-content/themes/twentynineteen/template-parts/content/
wordpress/wp-content/themes/twentynineteen/template-parts/content/content-excerpt.php
wordpress/wp-content/themes/twentynineteen/template-parts/content/content-page.php
wordpress/wp-content/themes/twentynineteen/template-parts/content/content-none.php
wordpress/wp-content/themes/twentynineteen/template-parts/content/content.php
```

cp -r wordpress /var/www/html

```
[ec2-user@ip-172-31-4-140 html]$ cp -r wordpress /var/www/html
cp: 'wordpress' and '/var/www/html/wordpress' are the same file
[ec2-user@ip-172-31-4-140 html]$
```

sudo systemctl enable httpd

```
[ec2-user@ip-172-31-4-140 html]$ sudo systemctl enable httpd
Created symlink /etc/systemd/system/multi-user.target.wants/httpd.service → /usr/lib/systemd/system/httpd.service.
[ec2-user@ip-172-31-4-140 html]$
```

Step 4 — Install MySQL on your DB Server EC2

sudo yum update

```
[ec2-user@ip-172-31-14-166 ~]$ sudo yum update
Last metadata expiration check: 0:18:26 ago on Tue 02 Mar 2021 12:50:30 AM UTC.

Dependencies resolved.
================================================================================
 Package                 Arch   Version                     Repository      Size
================================================================================
Installing:
 kernel                  x86_64 4.18.0-240.15.1.el8_3       rhel-8-baseos-rhui-rpms  4.3 M
 kernel-core             x86_64 4.18.0-240.15.1.el8_3       rhel-8-baseos-rhui-rpms   30 M
 kernel-modules          x86_64 4.18.0-240.15.1.el8_3       rhel-8-baseos-rhui-rpms   26 M
Upgrading:
 NetworkManager          x86_64 1:1.26.0-13.el8_3           rhel-8-baseos-rhui-rpms  2.4 M
 NetworkManager-libnm    x86_64 1:1.26.0-13.el8_3           rhel-8-baseos-rhui-rpms  1.8 M
 NetworkManager-team     x86_64 1:1.26.0-13.el8_3           rhel-8-baseos-rhui-rpms  142 k
 NetworkManager-tui      x86_64 1:1.26.0-13.el8_3           rhel-8-baseos-rhui-rpms  320 k
 cloud-init              noarch 19.4-11.el8_3.2             rhel-8-appstream-rhui-rpms 945 k
 curl                    x86_64 7.61.1-14.el8_3.1           rhel-8-baseos-rhui-rpms  353 k
 dbus                    x86_64 1:1.12.8-12.el8_3           rhel-8-baseos-rhui-rpms   41 k
```

sudo yum install mysql-server

```
[ec2-user@ip-172-31-14-166 ~]$ sudo yum install mysql-server
Red Hat Update Infrastructure 3 Client Configuration Server 8   9.0 kB/s | 2.1 kB     00:00
Red Hat Enterprise Linux 8 for x86_64 - AppStream from RHUI (RPMs)   18 kB/s | 2.8 kB     00:00
Red Hat Enterprise Linux 8 for x86_64 - BaseOS from RHUI (RPMs)   17 kB/s | 2.4 kB     00:00
Dependencies resolved.
================================================================================
 Package                 Arch     Version                     Repository      Size
================================================================================
Installing:
 mysql-server            x86_64   8.0.21-1.module+el8.2.0+7855+47abd494     rhel-8-appstream-rhui-rpms   22 M
Installing dependencies:
 mariadb-connector-c-config noarch 3.1.11-2.el8_3            rhel-8-appstream-rhui-rpms   15 k
 mecab                   x86_64   0.996-1.module+el8+2459+7cb96738.9        rhel-8-appstream-rhui-rpms  398 k
 mysql                   x86_64   8.0.21-1.module+el8.2.0+7855+47abd494     rhel-8-appstream-rhui-rpms   12 M
 mysql-common            x86_64   8.0.21-1.module+el8.2.0+7855+47abd494     rhel-8-appstream-rhui-rpms  148 k
```

Verify that the service is up and running by using sudo systemctl status mysqld, if it is not running, restart the service and enable it so it will be running even after reboot:

sudo systemctl restart mysqld
sudo systemctl enable mysqld

```
[ec2-user@ip-172-31-14-166 ~]$
[ec2-user@ip-172-31-14-166 ~]$ sudo systemctl status mysqld
● mysqld.service - MySQL 8.0 database server
   Loaded: loaded (/usr/lib/systemd/system/mysqld.service; disabled; vendor preset: disabled)
   Active: inactive (dead)
[ec2-user@ip-172-31-14-166 ~]$ sudo systemctl restart mysqld
[ec2-user@ip-172-31-14-166 ~]$ sudo systemctl enable mysqld
Created symlink /etc/systemd/system/multi-user.target.wants/mysqld.service → /usr/lib/systemd/system/mysqld.service.
[ec2-user@ip-172-31-14-166 ~]$ sudo systemctl status mysqld
● mysqld.service - MySQL 8.0 database server
   Loaded: loaded (/usr/lib/systemd/system/mysqld.service; enabled; vendor preset: disabled)
   Active: active (running) since Tue 2021-03-02 01:29:12 UTC; 2min 14s ago
 Main PID: 49612 (mysqld)
   Status: "Server is operational"
    Tasks: 38 (limit: 4836)
   Memory: 444.8M
   CGroup: /system.slice/mysqld.service
           └─49612 /usr/libexec/mysqld --basedir=/usr

Mar 02 01:29:05 ip-172-31-14-166.us-east-2.compute.internal systemd[1]: Starting MySQL 8.0 database server...
Mar 02 01:29:05 ip-172-31-14-166.us-east-2.compute.internal mysql-prepare-db-dir[49529]: Initializing MySQL database
Mar 02 01:29:12 ip-172-31-14-166.us-east-2.compute.internal systemd[1]: Started MySQL 8.0 database server.
```

Step 5 — Configure DB to work with WordPress

sudo mysql
CREATE DATABASE wordpress;
CREATE USER `myuser`@`<Web-Server-Private-IP-Address>` IDENTIFIED BY 'mypass';
GRANT ALL ON wordpress.* TO 'myuser'@'<Web-Server-Private-IP-Address>';
FLUSH PRIVILEGES;
SHOW DATABASES;

```
[ec2-user@ip-172-31-14-166 ~]$ sudo mysql
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 8
Server version: 8.0.21 Source distribution

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owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> CREATE DATABASE wordpress;
Query OK, 1 row affected (0.01 sec)

mysql> CREATE USER `teamleads`@`172.31.4.140` IDENTIFIED BY 'sql12345';
Query OK, 0 rows affected (0.01 sec)

mysql> GRANT ALL ON wordpress.* TO 'myuser'@'<Web-Server-Private-IP-Address>';
ERROR 1410 (42000): You are not allowed to create a user with GRANT
mysql> GRANT ALL ON wordpress.* TO 'teamleads'@'172.31.4.140';
Query OK, 0 rows affected (0.01 sec)

mysql> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.00 sec)

mysql> SHOW DATABASES;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql              |
| performance_schema |
| sys                |
| wordpress          |
+--------------------+
5 rows in set (0.01 sec)

mysql>
```
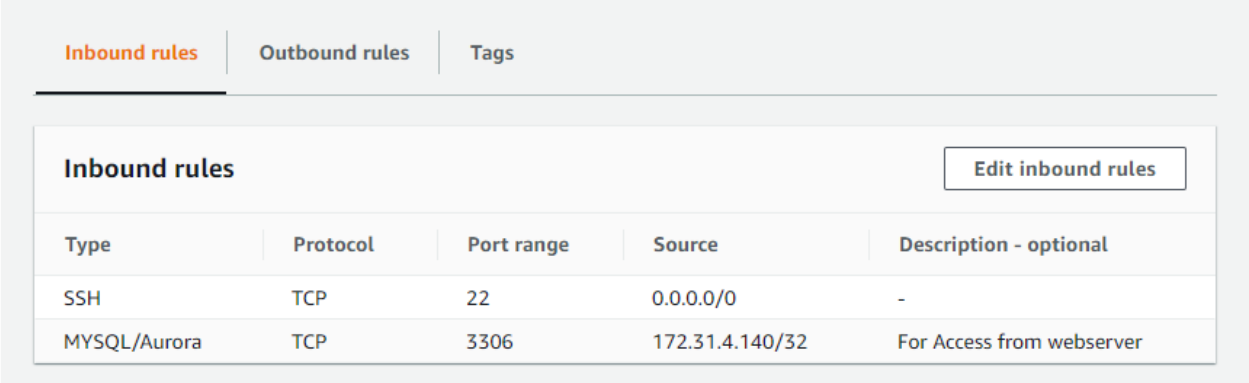

New user account created after for new webserver instance

```
mysql> CREATE USER `tmleads`@`172.31.0.225` IDENTIFIED BY 'sql12345';
Query OK, 0 rows affected (0.01 sec)

mysql> GRANT ALL ON wordpress.* TO 'tmleads'@'172.31.0.225';
Query OK, 0 rows affected (0.01 sec)

mysql> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.00 sec)
```

```
exit
```

Step 6 — Configure WordPress to connect to remote database.

Hint: Do not forget to open MySQL port 3306 on DB Server EC2. For extra security, you shall allow access to the DB server **ONLY** from your Web Server's IP address, so in the Inbound Rule configuration specify source as /32



1. Install MySQL client and test that you can connect from your Web Server to your DB server by using mysql-client
2. Verify if you can successfully execute SHOW DATABASES; command and see a list of existing databases

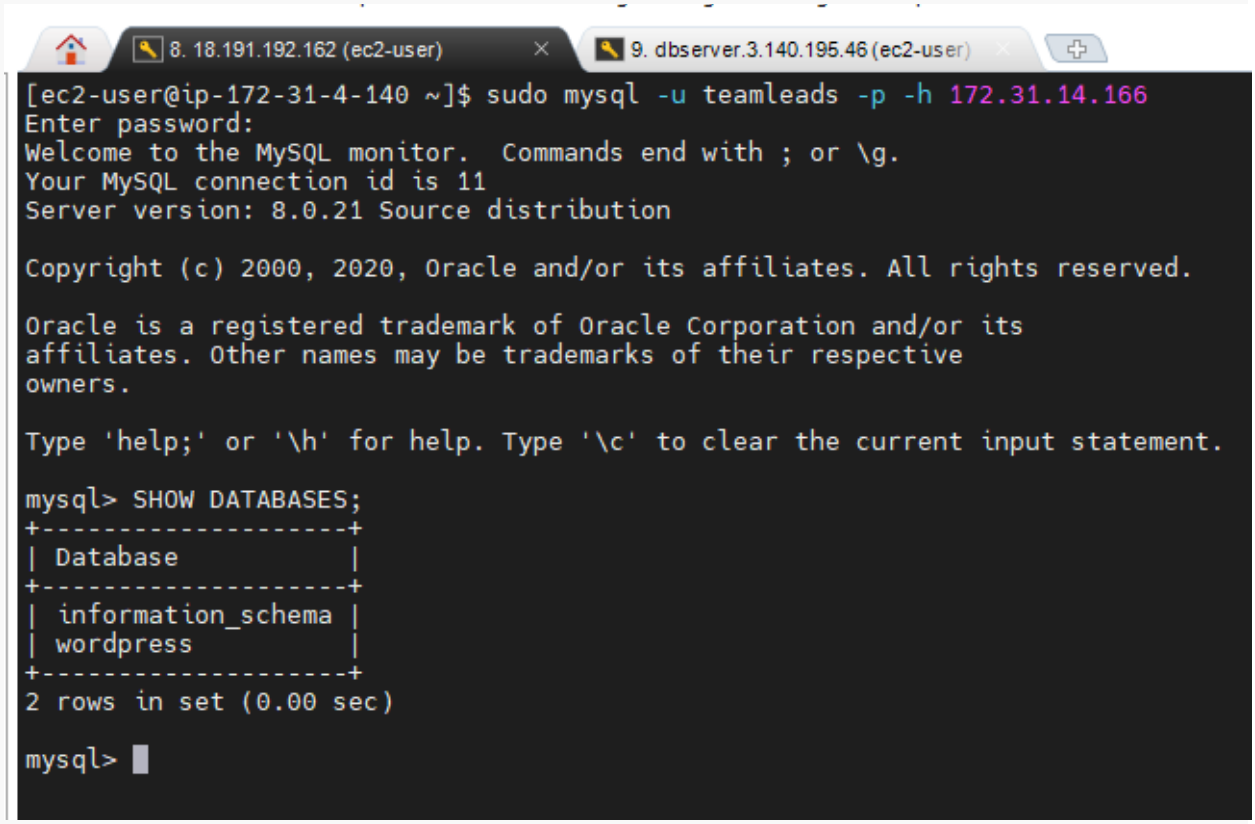
```
sudo yum install mysql
```

```
[ec2-user@ip-172-31-4-140 ~]$ sudo yum install mysql
Last metadata expiration check: 1:32:19 ago on Tue 02 Mar 2021 12:50:03 AM UTC.
Dependencies resolved.
================================================================================
 Package                    Arch      Version                                 Repository                    Size
================================================================================
Installing:
 mysql                      x86_64    8.0.21-1.module+el8.2.0+7855+47abd494   rhel-8-appstream-rhui-rpms    12 M
Installing dependencies:
 mariadb-connector-c-config noarch    3.1.11-2.el8_3                          rhel-8-appstream-rhui-rpms    15 k
 mysql-common               x86_64    8.0.21-1.module+el8.2.0+7855+47abd494   rhel-8-appstream-rhui-rpms   148 k
Enabling module streams:
 mysql                              8.0

Transaction Summary
================================================================================
Install  3 Packages

Total download size: 12 M
Installed size: 63 M
Is this ok [y/N]: y
Downloading Packages:
(1/3): mariadb-connector-c-config-3.1.11-2.el8_3.noarch.rpm  106 kB/s |  15 kB     00:00
(2/3): mysql-common-8.0.21-1.module+el8.2.0+7855+47abd494.x86_64.rpm  1.0 MB/s | 148 kB     00:00
(3/3): mysql-8.0.21-1.module+el8.2.0+7855+47abd494.x86_64.rpm  43 MB/s |  12 MB     00:00
--------------------------------------------------------------------------------
Total                                                        38 MB/s |  12 MB     00:00
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing        :                                                        1/1
  Installing       : mariadb-connector-c-config-3.1.11-2.el8_3.noarch       1/3
  Installing       : mysql-common-8.0.21-1.module+el8.2.0+7855+47abd494.x86_64  2/3
  Installing       : mysql-8.0.21-1.module+el8.2.0+7855+47abd494.x86_64     3/3
  Running scriptlet: mysql-8.0.21-1.module+el8.2.0+7855+47abd494.x86_64     3/3
  Verifying        : mysql-8.0.21-1.module+el8.2.0+7855+47abd494.x86_64     1/3
  Verifying        : mysql-common-8.0.21-1.module+el8.2.0+7855+47abd494.x86_64  2/3
  Verifying        : mariadb-connector-c-config-3.1.11-2.el8_3.noarch       3/3

Installed:
  mariadb-connector-c-config-3.1.11-2.el8_3.noarch          mysql-8.0.21-1.module+el8.2.0+7855+47abd494.x86_64
  mysql-common-8.0.21-1.module+el8.2.0+7855+47abd494.x86_64
```

sudo mysql -u admin -p -h <DB-Server-Private-IP-address>

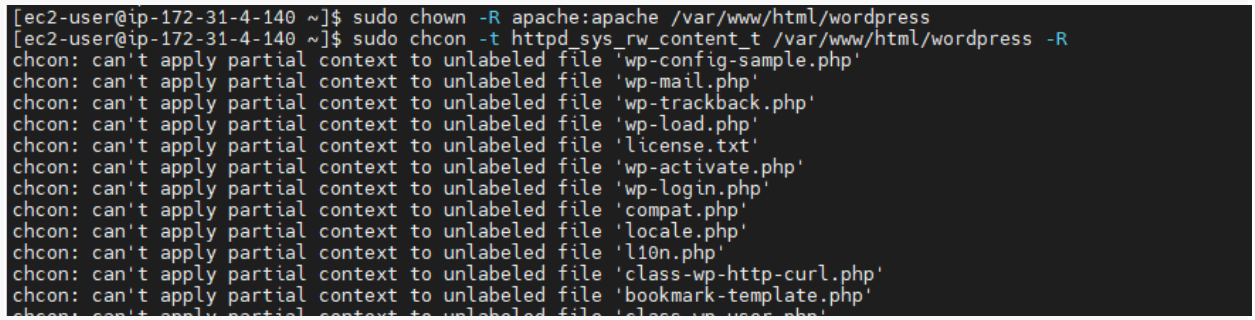
sudo mysql -u teamleads -p -h 172.31.14.166

sudo mysql -u tmleads -p -h 172.31.14.166



3. Change permissions and configuration so Apache could use WordPress:

sudo chown -R apache:apache /var/www/html/wordpress
sudo chcon -t httpd_sys_rw_content_t /var/www/html/wordpress -R



Challenge encountered

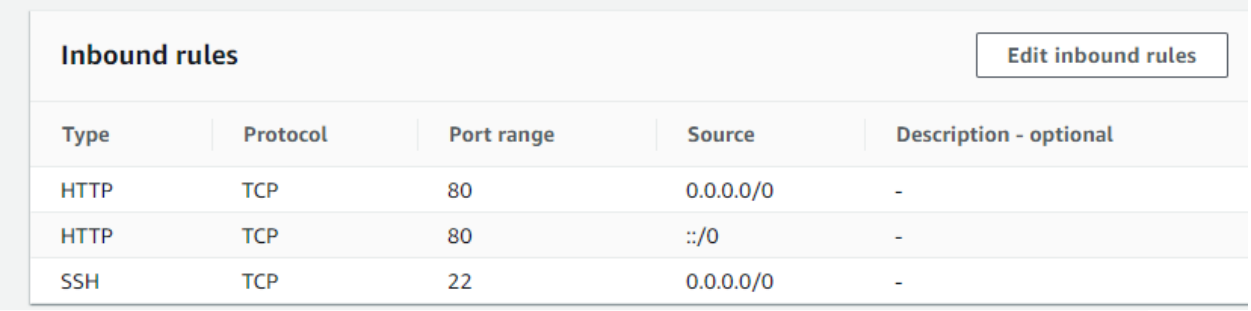
I ran the chcon command as above but errors. I tried to resolve it by enabling back selinux using `vi /etc/sysconfig/selinux to` start enforcing again but after I rebooted my instance, it failed to connect to the terminal. I opened all the ports on webserver security group to allow all traffic but did not succeed.

I created a new instance for the webserver, detached the 3 volumes from the previous instance and reattached to the new instance with the hope that the files will be recopied automatically. This did not work so it is just like am configuring the webserver instance from the scratch

sudo setsebool -P httpd_can_network_connect=1

```
[ec2-user@ip-172-31-0-225 html]$ sudo chown -R apache:apache /var/www/html/wordpress
[ec2-user@ip-172-31-0-225 html]$ sudo setsebool -P httpd_can_network_connect=1
[ec2-user@ip-172-31-0-225 html]$
```

4. Enable TCP port 80 in Inbound Rules configuration for your Web Server EC2 (enable from everywhere 0.0.0.0/0 or from your workstation's IP)



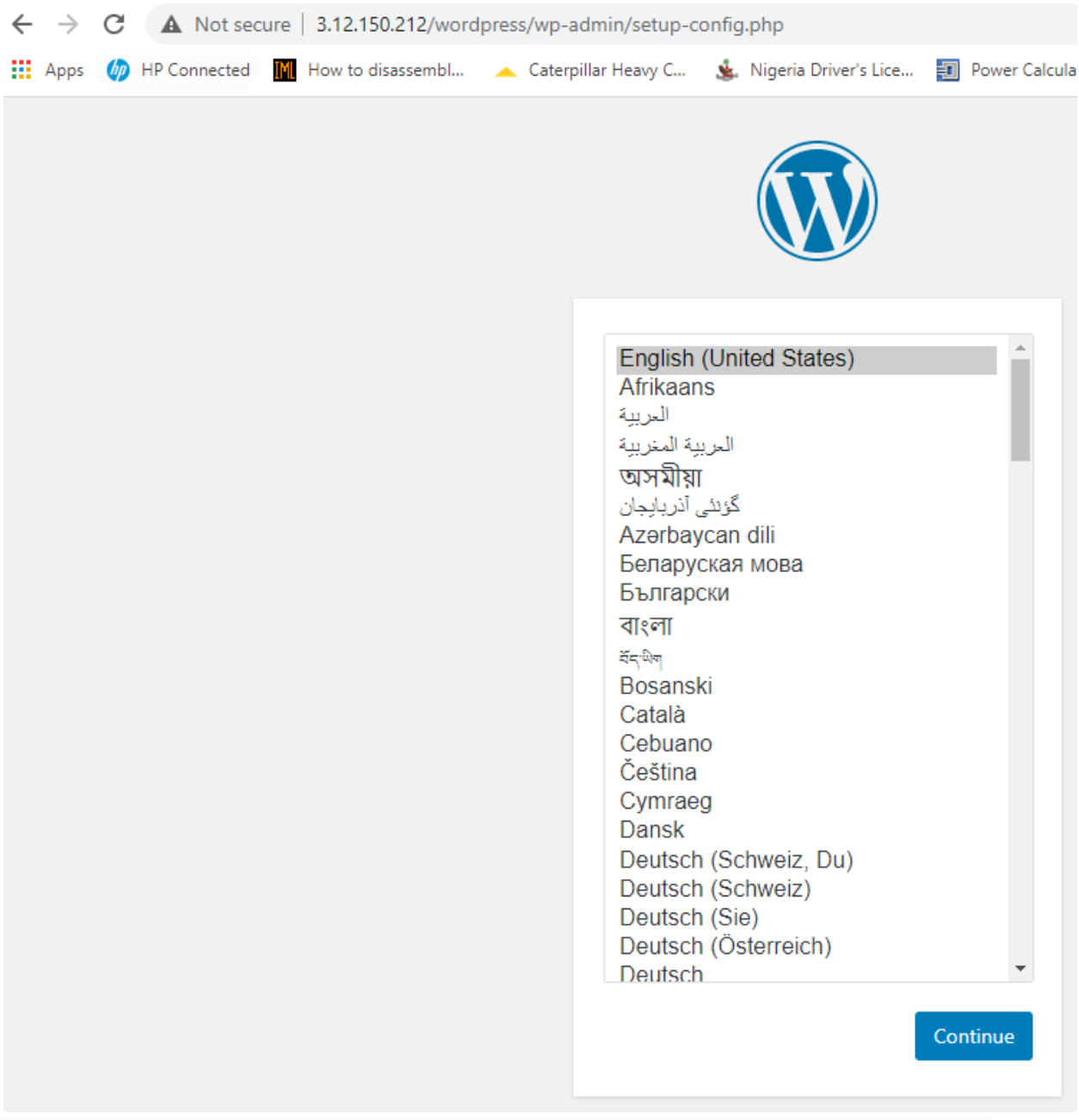
Inbound rules — Edit inbound rules

Type	Protocol	Port range	Source	Description - optional
HTTP	TCP	80	0.0.0.0/0	-
HTTP	TCP	80	::/0	-
SSH	TCP	22	0.0.0.0/0	-

5. Try to access from browser the link to WordPress

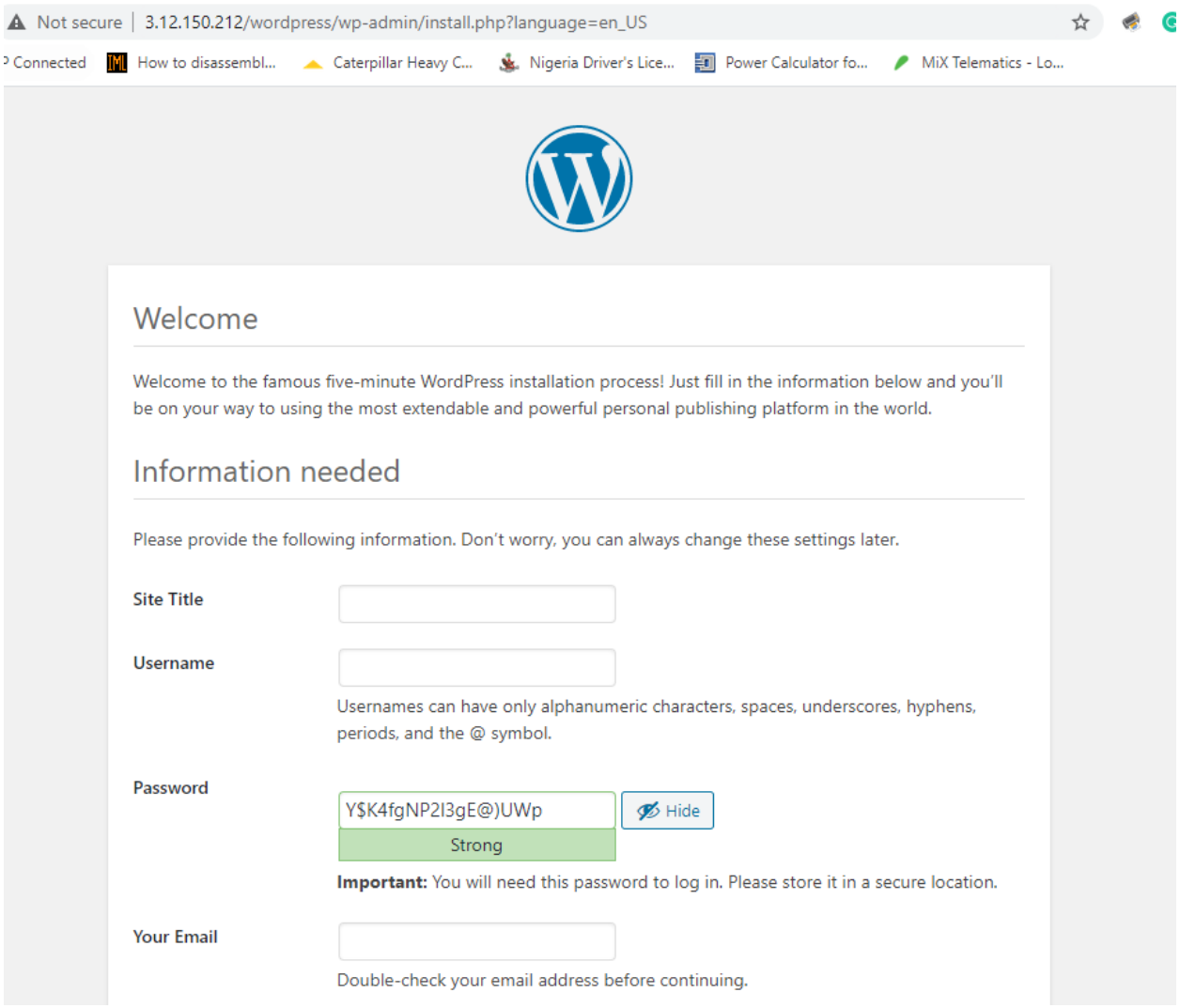
http://<Web-Server-Public-IP-Address>/wordpress/

http://3.12.150.212/wordpress/



Creating the wp-config.php file manually...

```
[ec2-user@ip-172-31-0-225 wordpress]$ ls -l
total 216
-rw-r--r--.  1 apache apache   405 Feb  6  2020 index.php
-rw-r--r--.  1 apache apache 19915 Feb 12  2020 license.txt
-rw-r--r--.  1 apache apache  7278 Jun 26  2020 readme.html
-rw-r--r--.  1 apache apache  7101 Jul 28  2020 wp-activate.php
drwxr-xr-x.  9 apache apache  4096 Feb 22 15:10 wp-admin
-rw-r--r--.  1 apache apache   351 Feb  6  2020 wp-blog-header.php
-rw-r--r--.  1 apache apache  2328 Oct  8 21:15 wp-comments-post.php
-rw-r--r--.  1 apache apache  2913 Feb  6  2020 wp-config-sample.php
drwxr-xr-x.  4 apache apache  4096 Mar  2 17:53 wp-content
-rw-r--r--.  1 apache apache  3939 Jul 30  2020 wp-cron.php
drwxr-xr-x. 25 apache apache 12288 Feb 22 15:10 wp-includes
-rw-r--r--.  1 apache apache  2496 Feb  6  2020 wp-links-opml.php
-rw-r--r--.  1 apache apache  3300 Feb  6  2020 wp-load.php
-rw-r--r--.  1 apache apache 49831 Nov  9 10:53 wp-login.php
-rw-r--r--.  1 apache apache  8509 Apr 14  2020 wp-mail.php
-rw-r--r--.  1 apache apache 20975 Nov 12 14:43 wp-settings.php
-rw-r--r--.  1 apache apache 31337 Sep 30 21:54 wp-signup.php
-rw-r--r--.  1 apache apache  4747 Oct  8 21:15 wp-trackback.php
-rw-r--r--.  1 apache apache  3236 Jun  8  2020 xmlrpc.php
[ec2-user@ip-172-31-0-225 wordpress]$ nano wp-config.php
-bash: nano: command not found
[ec2-user@ip-172-31-0-225 wordpress]$ sudo wp-config.php
sudo: wp-config.php: command not found
[ec2-user@ip-172-31-0-225 wordpress]$ sudo vi wp-config.php
[ec2-user@ip-172-31-0-225 wordpress]$
```



Summary

In this project, I learnt how to configure Linux storage subsystem and was able to deploy a full-scale Web Solution using WordPress Content Management System and MySQL RDBMS!

Resources

https://www.thegeekdiary.com/centos-redhat-how-to-set-selinux-modes/#:~:text=kernel%20boot%20parameters.-,Edit%20the%20%2Fetc%2Fgrub.,disable%20SELinux%20at%20the%20booting.

https://unix.stackexchange.com/questions/274360/chcon-cant-apply-partial-context-to-unlabeled-file-usr-sbin-xrdp