PROJECT 6-REVIEWED

WEB SOLUTION WITH WORDPRESS

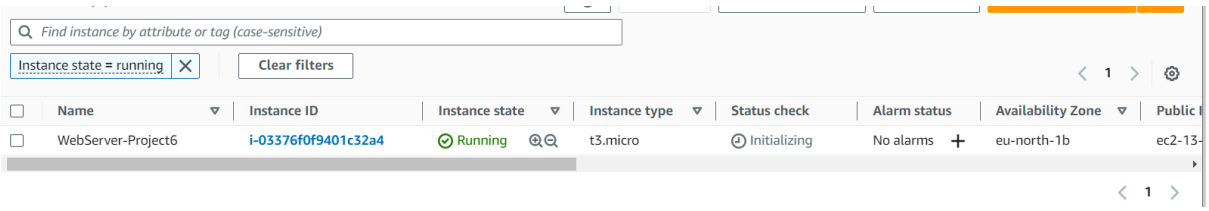
STEP1: Preparing the Web Server

Your 3-Tier Setup

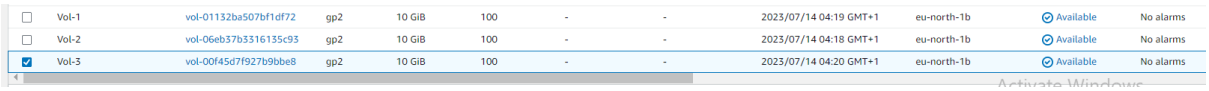
1. A Laptop or PC to serve as a client
2. An EC2 Linux Server as a web server (This is where you will install WordPress)
3. An EC2 Linux server as a database (DB) server

NB: ***Use `RedHat` OS for this project***

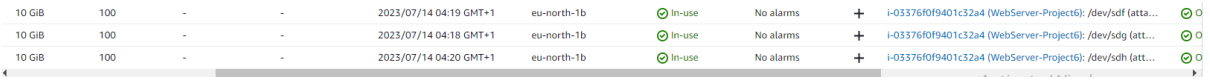
- Launch an EC2 instance that will serve as “Web Server”
- create 3 storage volumes for the instance(Web Server). This serves as additional external storage to our EC2 machine



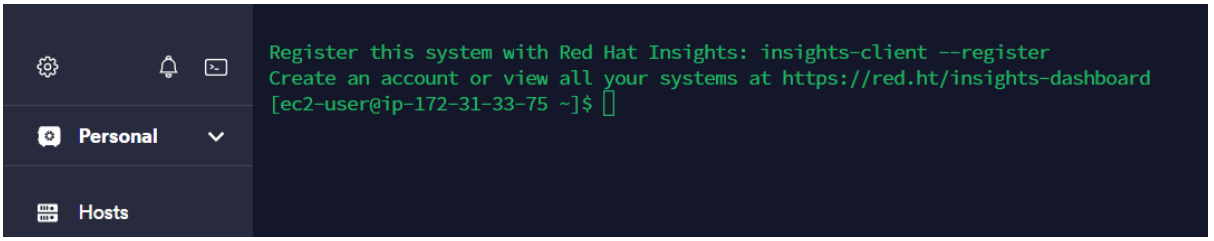
Below are the 3 Volumes created which will serve as an external storage for the webserver.



Attached are the 3 volumes created



- Login to the webserver



- Use `lsblk` command to inspect what block devices are attached to the server

```
Register this system with Red Hat Insights: insights-client --register
Create an account or view all your systems at https://red.ht/insights-dashboard
[ec2-user@ip-172-31-33-75 ~]$ lsblk
NAME        MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
nvme0n1     259:0    0   10G  0 disk
├─nvme0n1p1 259:1    0    1M  0 part
├─nvme0n1p2 259:2    0  200M  0 part /boot/efi
├─nvme0n1p3 259:3    0  500M  0 part /boot
└─nvme0n1p4 259:4    0  9.3G  0 part /
nvme1n1     259:5    0   10G  0 disk
nvme2n1     259:6    0   10G  0 disk
nvme3n1     259:7    0   10G  0 disk
[ec2-user@ip-172-31-33-75 ~]$
```

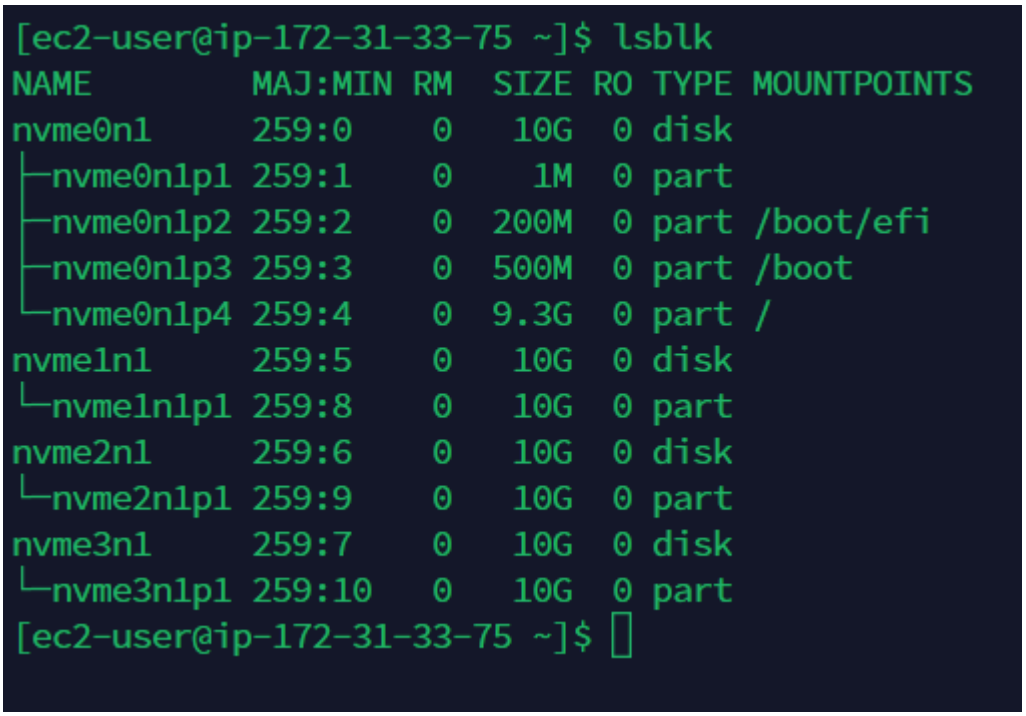
- To see all mounts and free spaces on our server

```
[ec2-user@ip-172-31-33-75 ~]$ df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        4.0M     0  4.0M   0% /dev
tmpfs           372M     0  372M   0% /dev/shm
tmpfs           149M  3.6M  146M   3% /run
/dev/nvme0n1p4  9.4G  1.2G  8.2G  13% /
/dev/nvme0n1p3  495M  153M  343M  31% /boot
/dev/nvme0n1p2  200M  8.0K  200M   1% /boot/efi
tmpfs            75M     0   75M   0% /run/user/1000
[ec2-user@ip-172-31-33-75 ~]$
```

- Create single partitions on each volume on the webserver using `gdisk`

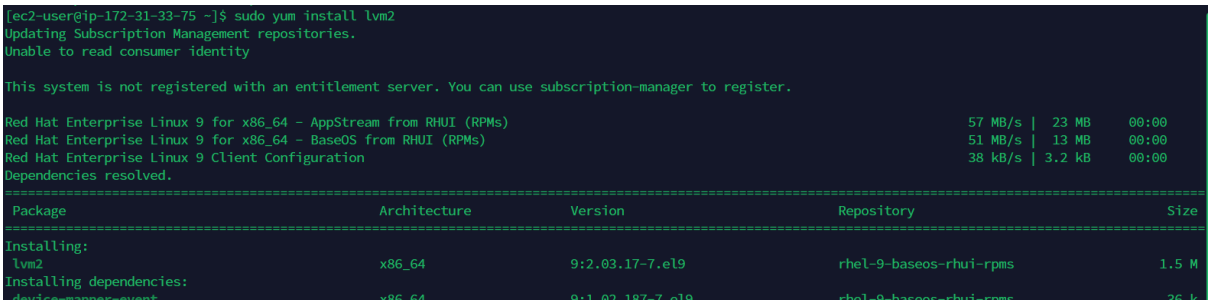
```
[ec2-user@ip-172-31-33-75 ~]$ sudo gdisk /dev/nvme1n1
GPT fdisk (gdisk) version 1.0.7

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

Creating new GPT entries in memory.

Command (? for help): n
Partition number (1-128, default 1):
First sector (34-20971486, default = 2048) or {+-}size{KMGTP}:
Last sector (2048-20971486, default = 20971486) or {+-}size{KMGTP}:
Current type is 8300 (Linux filesystem)
Hex code or GUID (L to show codes, Enter = 8300):
Changed type of partition to 'Linux filesystem'

Command (? for help): p
Disk /dev/nvme1n1: 20971520 sectors, 10.0 GiB
Model: Amazon Elastic Block Store
Sector size (logical/physical): 512/512 bytes
Disk identifier (GUID): A8E42C53-5929-4793-9602-F68AF1C54422
Partition table holds up to 128 entries
Main partition table begins at sector 2 and ends at sector 33
First usable sector is 34, last usable sector is 20971486
Partitions will be aligned on 2048-sector boundaries
Total free space is 2014 sectors (1007.0 KiB)

Number  Start (sector)    End (sector)  Size       Code  Name
   1            2048        20971486   10.0 GiB    8300  Linux filesystem

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/nvme1n1.
The operation has completed successfully.
```

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



- Install LVM2 package for creating logical volumes on a linux server.

  Sudo yum install lvm2



- Create Physical Volumes on the partitioned disk volumes

  `sudo pvcreate <partition_path>`

```
[ec2-user@ip-172-31-33-75 ~]$ sudo pvcreate /dev/nvme1n1p1
  Physical volume "/dev/nvme1n1p1" successfully created.
  Creating devices file /etc/lvm/devices/system.devices
[ec2-user@ip-172-31-33-75 ~]$ sudo pvcreate /dev/nvme2n1p1
  Physical volume "/dev/nvme2n1p1" successfully created.
[ec2-user@ip-172-31-33-75 ~]$ sudo pvcreate /dev/nvme3n1p1
  Physical volume "/dev/nvme3n1p1" successfully created.
[ec2-user@ip-172-31-33-75 ~]$ sudo pvs
  PV             VG Fmt  Attr PSize   PFree
  /dev/nvme1n1p1    lvm2 ---  <10.00g <10.00g
  /dev/nvme2n1p1    lvm2 ---  <10.00g <10.00g
  /dev/nvme3n1p1    lvm2 ---  <10.00g <10.00g
[ec2-user@ip-172-31-33-75 ~]$
```

  - We add up each physical volumes into a volume group called webdata-vg

    `sudo vgcreate <grp_name> <pv_path1> ... <pv_path1000>`

```
[ec2-user@ip-172-31-33-75 ~]$ sudo vgcreate webdata-vg /dev/nvme1n1p1 /dev/nvme2n1p1 /dev/nvme3n1p1
  Volume group "webdata-vg" successfully created
[ec2-user@ip-172-31-33-75 ~]$ sudo vgs
  VG         #PV #LV #SN Attr   VSize   VFree
  webdata-vg   3   0   0 wz--n- <29.99g <29.99g
[ec2-user@ip-172-31-33-75 ~]$
```

- Create Logical volumes for the volume group. The two logical volumes are; **apps-lv** and **logs-lv. They will share the webdata-vg into two equal half.**

`sudo lvcreate -n <lv_name> -L <lv_size> <vg_name>`

```
[ec2-user@ip-172-31-33-75 ~]$ sudo lvcreate -n apps-lv -L 14G webdata-vg
  Logical volume "apps-lv" created.
[ec2-user@ip-172-31-33-75 ~]$ sudo lvcreate -n logs-lv -L 14G webdata-vg
  Logical volume "logs-lv" created.
[ec2-user@ip-172-31-33-75 ~]$ sudo lvs
  LV      VG         Attr       LSize  Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
  apps-lv webdata-vg -wi-a----- 14.00g
  logs-lv webdata-vg -wi-a----- 14.00g
[ec2-user@ip-172-31-33-75 ~]$
```

- **Verify the entire setup**

```
[ec2-user@ip-172-31-33-75 ~]$ sudo lsblk
NAME                      MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
nvme0n1                   259:0    0   10G  0 disk
├─nvme0n1p1               259:1    0    1M  0 part
├─nvme0n1p2               259:2    0  200M  0 part /boot/efi
├─nvme0n1p3               259:3    0  500M  0 part /boot
└─nvme0n1p4               259:4    0  9.3G  0 part /
nvme1n1                   259:5    0   10G  0 disk
└─nvme1n1p1               259:8    0   10G  0 part
  └─webdata--vg-apps--lv 253:0    0   14G  0 lvm
nvme2n1                   259:6    0   10G  0 disk
└─nvme2n1p1               259:9    0   10G  0 part
  ├─webdata--vg-apps--lv 253:0    0   14G  0 lvm
  └─webdata--vg-logs--lv 253:1    0   14G  0 lvm
nvme3n1                   259:7    0   10G  0 disk
└─nvme3n1p1               259:10   0   10G  0 part
  └─webdata--vg-logs--lv 253:1    0   14G  0 lvm
[ec2-user@ip-172-31-33-75 ~]$
```

- **The three logical volumes are ready to be used as filesystems for storing application and log data.**
- **Use `mkfs.ext4` to format the logical volumes with ext4 filesystem**

```
[ec2-user@ip-172-31-33-75 ~]$ sudo mkfs -t ext4 /dev/webdata-vg/apps-lv
mke2fs 1.46.5 (30-Dec-2021)
Creating filesystem with 3670016 4k blocks and 917504 inodes
Filesystem UUID: 83bd31be-98ec-47d5-a289-e29d568cd703
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208

Allocating group tables: done
Writing inode tables: done
Creating journal (16384 blocks): done
Writing superblocks and filesystem accounting information: done

[ec2-user@ip-172-31-33-75 ~]$ sudo mkfs -t ext4 /dev/webdata-vg/logs-lv
mke2fs 1.46.5 (30-Dec-2021)
Creating filesystem with 3670016 4k blocks and 917504 inodes
Filesystem UUID: ea14dc47-8ed0-4b3f-9b32-1c6d1a4b4a42
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208

Allocating group tables: done
Writing inode tables: done
Creating journal (16384 blocks): done
Writing superblocks and filesystem accounting information: done

[ec2-user@ip-172-31-33-75 ~]$
```

- **The apache webserver is going to use the html folder in the var directory to store web content. We create this directory and also a directory for collecting log data of our application**

```
sudo mkdir -p /var/www/html

sudo mkdir -p /home/recovery/logs
```

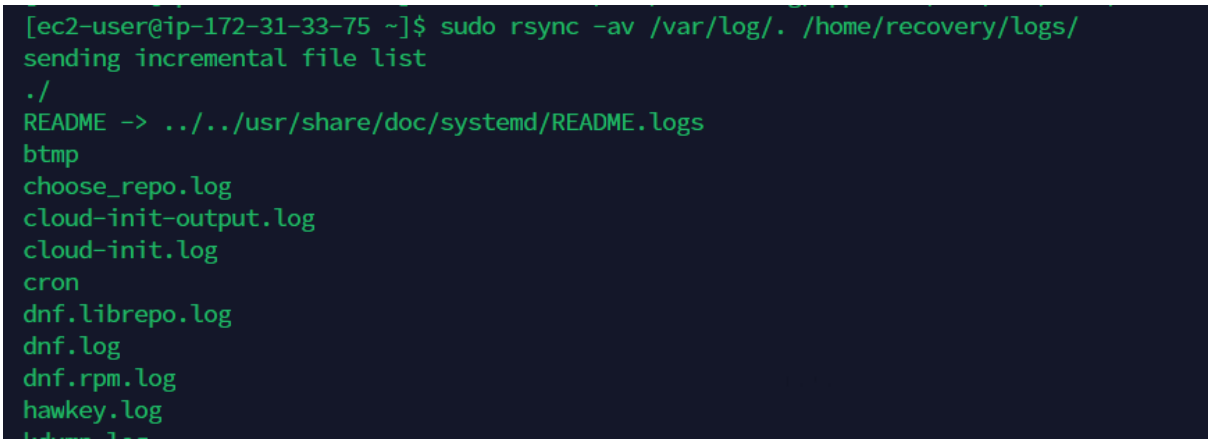
```
[ec2-user@ip-172-31-33-75 ~]$ sudo mkdir -p /var/www/html
[ec2-user@ip-172-31-33-75 ~]$ sudo mkdir -p /home/recovery/logs
[ec2-user@ip-172-31-33-75 ~]$
```

- **For our filesystem to be used by the webserver, we need to mount it on the apache directory . Also we mount the logs filesystem to the log directory.**

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

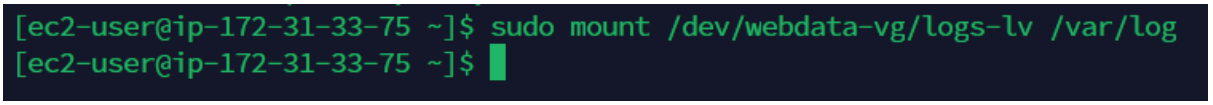
- **Use `rsync` utility to backup all the files in the log directory /var/log into /home/recovery/logs (*This is required before mounting the file system*)**

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



- **Mount logs logical volume to var/logs. I.e Mount /var/log on logs-lv logical volume**

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



- **Restore log files back into /var/log directory**

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

```
[ec2-user@ip-172-31-33-75 ~]$ sudo rsync -av /home/recovery/logs/ /var/log
sending incremental file list
./
README -> ../../usr/share/doc/systemd/README.logs
btmp
choose_repo.log
cloud-init-output.log
cloud-init.log
cron
dnf.librepo.log
dnf.log
dnf.rpm.log
hawkey.log
kdump.log
lastlog
maillog
messages
secure
spooler
tallylog
wtmp
audit/
audit/audit.log
chrony/
insights-client/
private/
rhsm/
rhsm/rhsm.log
rhsm/rhsmcertd.log
sssd/
tuned/
tuned/tuned.log

sent 857,318 bytes  received 461 bytes  1,715,558.00 bytes/sec
total size is 855,360  speedup is 1.00
[ec2-user@ip-172-31-33-75 ~]$ ^C
```

- Update `/etc/fstab` file so that the mount configuration will persist after restart of the server. The UUID of the device will be used to update the `/etc/fstab` file; So use the command below to get the UUID;

`sudo blkid`

```
[ec2-user@ip-172-31-33-75 ~]$ sudo blkid
/dev/nvme0n1p4: LABEL="root" UUID="287d9c0b-0e0f-4e92-8534-45733aa3dc68" TYPE="xfs" PARTUUID="6264d520-3fb9-423f-8ab8-7a0a8e3d3562"
/dev/mapper/webdata--vg-logs--lv: UUID="ea14dc47-8ed0-4b3f-9b32-1c6d1a4b4a42" TYPE="ext4"
/dev/nvme0n1p3: LABEL="boot" UUID="7bc24af7-289d-4bce-b17e-300c3aafe968" TYPE="xfs" PARTUUID="cb07c243-bc44-4717-853e-28852021225b"
/dev/nvme0n1p1: PARTUUID="fac7f1fb-3e8d-4137-a512-961de09a5549"
/dev/nvme0n1p2: SEC_TYPE="msdos" UUID="7B77-95E7" TYPE="vfat" PARTUUID="68b2905b-df3e-4fb3-80fa-49d1e773aa33"
/dev/nvme3n1p1: UUID="8iA1V0-s7VY-ayrP-NE3x-Yuo7-J8rW-nhkOje" TYPE="LVM2_member" PARTLABEL="Linux filesystem" PARTUUID="ababfcc6-cecc-48ea-9f01-729a30d42f15"
/dev/nvme2n1p1: UUID="uz3CBK-4zB4-wpnm-Dqg7-NR8e-J2ES-CsTykP" TYPE="LVM2_member" PARTLABEL="Linux filesystem" PARTUUID="d8cbb659-b6ca-4c6d-b9ce-6881b0329bb8"
/dev/mapper/webdata--vg-apps--lv: UUID="83bd31be-98ec-47d5-a289-e29d568cd703" TYPE="ext4"
/dev/nvme1n1p1: UUID="vomJC2-u0zH-bfCl-7Z02-pson-doCR-35hcXv" TYPE="LVM2_member" PARTLABEL="Linux filesystem" PARTUUID="d0ad76ef-aa4f-4f21-b2c5-9ed1d6ce363f"
[ec2-user@ip-172-31-33-75 ~]$
```

```
UUID=287d9c0b-0e0f-4e92-8534-45733aa3dc68       /       xfs     defaults        0       0
UUID=7bc24af7-289d-4bce-b17e-300c3aafe968       /boot   xfs     defaults        0       0
UUID=7B77-95E7  /boot/efi       vfat    defaults,uid=0,gid=0,umask=077,shortname=winnt  0       2

UUID=83bd31be-98ec-47d5-a289-e29d568cd703 /var/www/html ext4 defaults 0 0
UUID=ea14dc47-8ed0-4b3f-9b32-1c6d1a4b4a42 /var/log      ext4 defaults 0 0
~
~
~
~
~
~
~
~
```

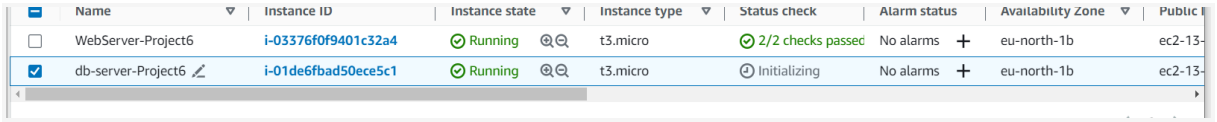
- **Test the configuration and reload the daemon**

```
sudo mount -a
sudo systemctl daemon-reload
```

```
[ec2-user@ip-172-31-33-75 ~]$ sudo mount -a
[ec2-user@ip-172-31-33-75 ~]$ sudo systemctl daemon-reload

[ec2-user@ip-172-31-33-75 ~]$ df -h
Filesystem                      Size  Used Avail Use% Mounted on
devtmpfs                        4.0M     0  4.0M   0% /dev
tmpfs                           372M     0  372M   0% /dev/shm
tmpfs                           149M  3.6M  146M   3% /run
/dev/nvme0n1p4                  9.4G  1.3G  8.1G  14% /
/dev/nvme0n1p3                  495M  153M  343M  31% /boot
/dev/nvme0n1p2                  200M  8.0K  200M   1% /boot/efi
tmpfs                            75M     0   75M   0% /run/user/1000
/dev/mapper/webdata--vg-apps--lv   14G   24K   13G   1% /var/www/html
/dev/mapper/webdata--vg-logs--lv   14G  924K   13G   1% /var/log
[ec2-user@ip-172-31-33-75 ~]$
```

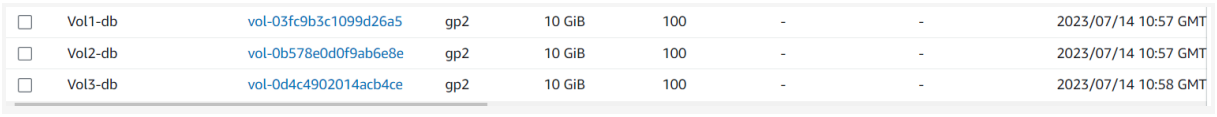
Step2:

- **Launch EC2 Database server**



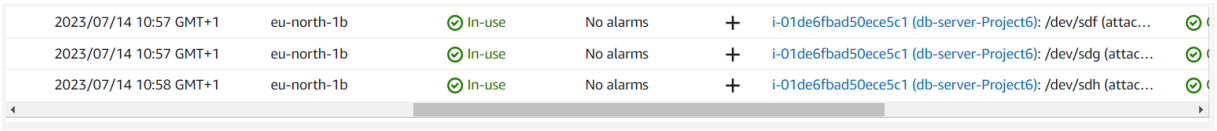
Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public I
WebServer-Project6	i-03376f0f9401c32a4	Running	t3.micro	2/2 checks passed	No alarms	eu-north-1b	ec2-13-
db-server-Project6	i-01de6fbad50ece5c1	Running	t3.micro	Initializing	No alarms	eu-north-1b	ec2-13-

- **Create 3 Volumes**



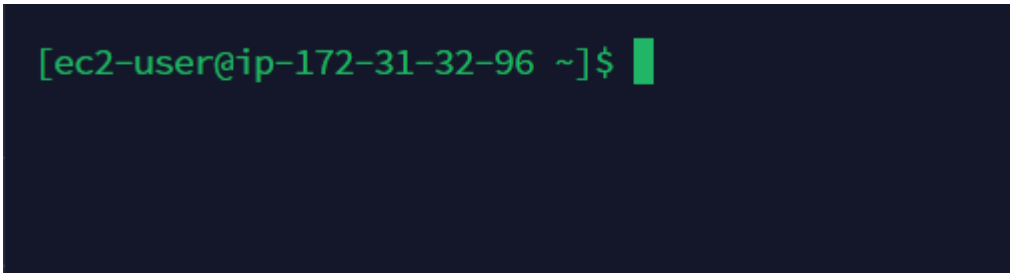
Vol1-db	vol-03fc9b3c1099d26a5	gp2	10 GiB	100	-	-	2023/07/14 10:57 GMT
Vol2-db	vol-0b578e0d0f9ab6e8e	gp2	10 GiB	100	-	-	2023/07/14 10:57 GMT
Vol3-db	vol-0d4c4902014acb4ce	gp2	10 GiB	100	-	-	2023/07/14 10:58 GMT

- **Attach the 3 Volumes to the db-server**

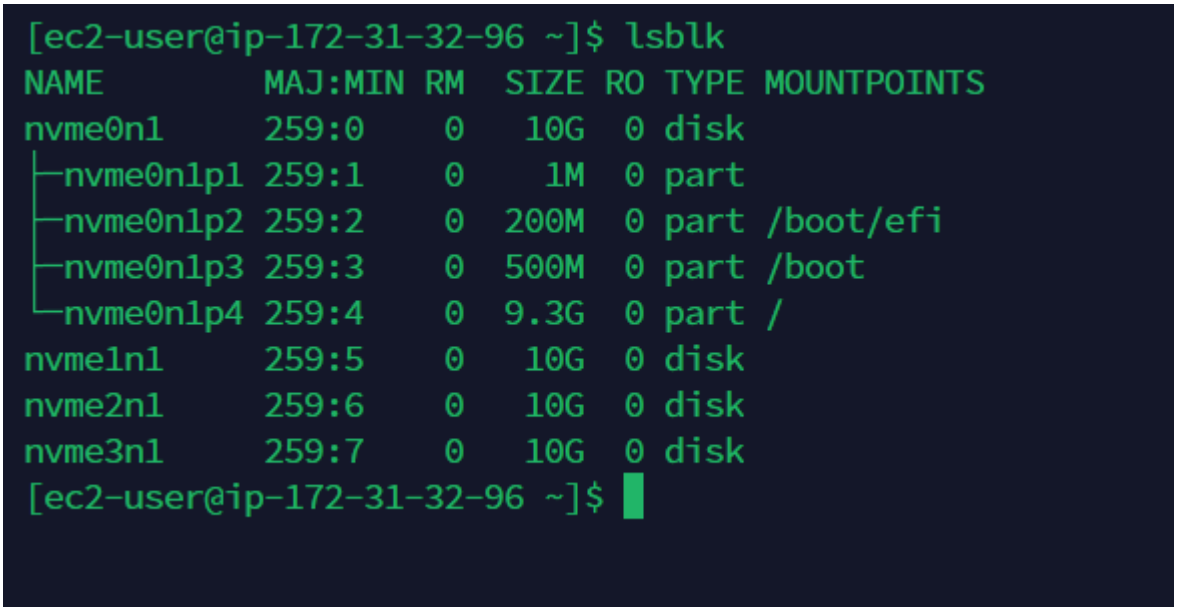


2023/07/14 10:57 GMT+1	eu-north-1b	In-use	No alarms	+	i-01de6fbad50ece5c1 (db-server-Project6): /dev/sdf (attac...
2023/07/14 10:57 GMT+1	eu-north-1b	In-use	No alarms	+	i-01de6fbad50ece5c1 (db-server-Project6): /dev/sdg (attac...
2023/07/14 10:58 GMT+1	eu-north-1b	In-use	No alarms	+	i-01de6fbad50ece5c1 (db-server-Project6): /dev/sdh (attac...

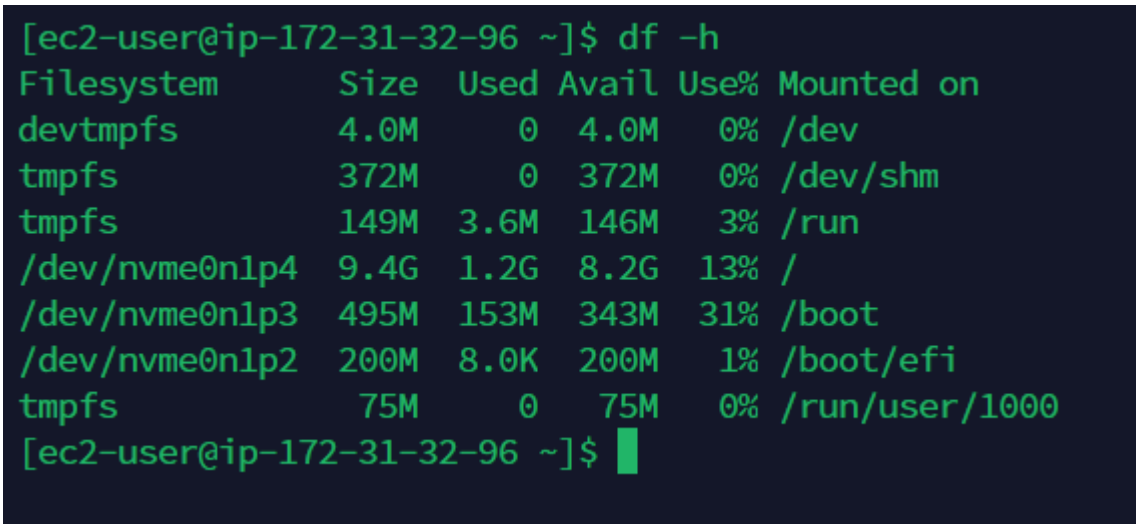
- Login to the webserver



- Use `lsblk` command to inspect what block devices are attached to the server

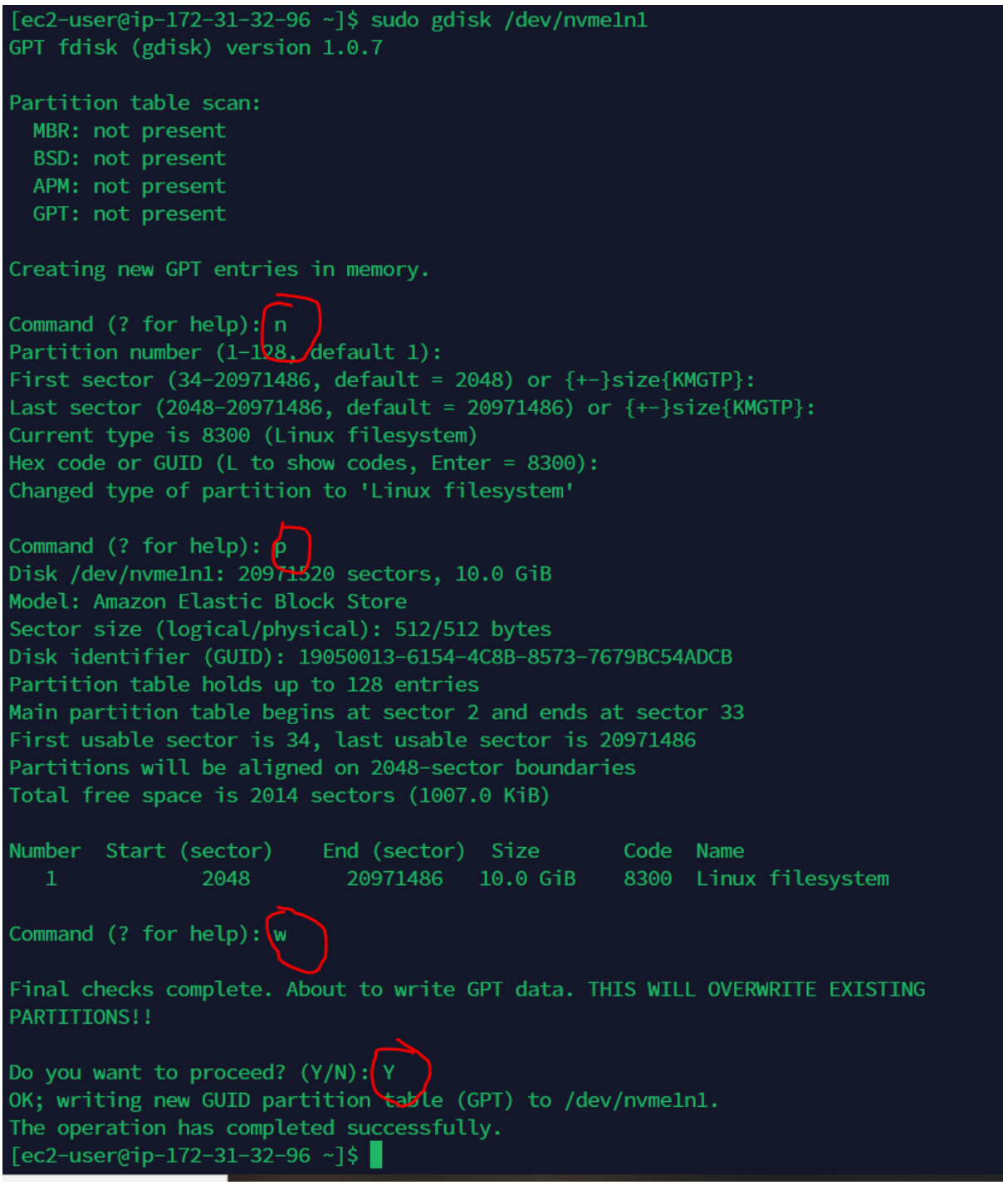


- To see all mounts and free spaces on our server df -h



- Create single partitions on each volume on the webserver using `gdisk`

  `sudo gdisk /dev/XXX`

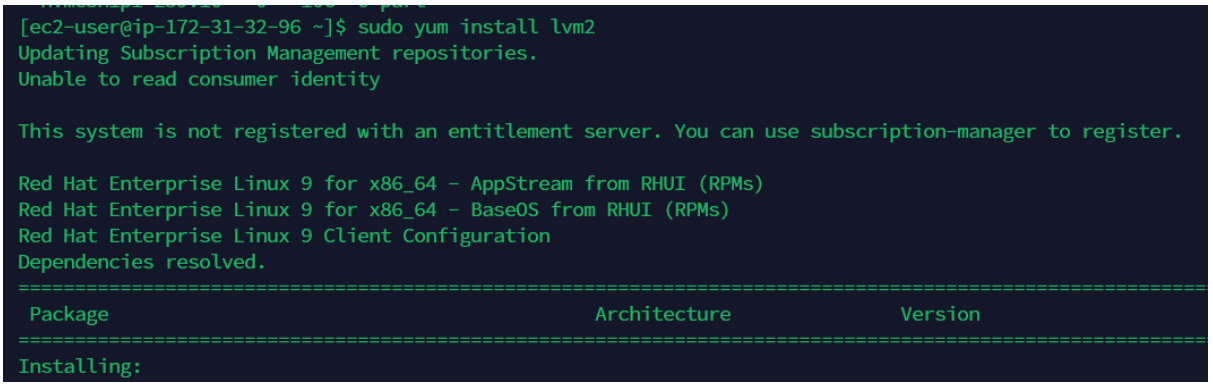


NB: You will repeat this step for the 3 Volumes

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

- Install LVM2 package for creating logical volumes on a linux server.

  Sudo yum install lvm2



- Create Physical Volumes on the partitioned disk volumes

  `sudo pvcreate <partition_path>`

```
[ec2-user@ip-172-31-32-96 ~]$ sudo pvcreate /dev/nvme1n1p1
  Physical volume "/dev/nvme1n1p1" successfully created.
  Creating devices file /etc/lvm/devices/system.devices
[ec2-user@ip-172-31-32-96 ~]$ sudo pvcreate /dev/nvme2n1p1
  Physical volume "/dev/nvme2n1p1" successfully created.
[ec2-user@ip-172-31-32-96 ~]$ sudo pvcreate /dev/nvme3n1p1
  Physical volume "/dev/nvme3n1p1" successfully created.
[ec2-user@ip-172-31-32-96 ~]$ sudo pvs
  PV             VG Fmt  Attr PSize   PFree
  /dev/nvme1n1p1    lvm2 ---  <10.00g <10.00g
  /dev/nvme2n1p1    lvm2 ---  <10.00g <10.00g
  /dev/nvme3n1p1    lvm2 ---  <10.00g <10.00g
[ec2-user@ip-172-31-32-96 ~]$
```

- We add up each physical volumes into a volume group called dbdata-vg

  `sudo vgcreate <grp_name> <pv_path1> ... <pv_path1000>`

```
[ec2-user@ip-172-31-32-96 ~]$ sudo vgcreate dbdata-vg /dev/nvme1n1p1 /dev/nvme2n1p1 /dev/nvme3n1p1
  Volume group "dbdata-vg" successfully created
[ec2-user@ip-172-31-32-96 ~]$ sudo vgs
  VG        #PV #LV #SN Attr   VSize   VFree
  dbdata-vg   3   0   0 wz--n- <29.99g <29.99g
[ec2-user@ip-172-31-32-96 ~]$
```

- Create Logical volumes for the volume group. The two logical volumes are; **db-lv** and **logs-lv. They will share the dbdata-vg into two equal half.**

`sudo lvcreate -n <lv_name> -L <lv_size> <vg_name>`

```
[ec2-user@ip-172-31-32-96 ~]$ sudo lvcreate -n logs-lv -L 14G dbdata-vg
  Logical volume "logs-lv" created.
[ec2-user@ip-172-31-32-96 ~]$ sudo lvs
  LV      VG        Attr       LSize  Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
  db-lv   dbdata-vg -wi-a----- 14.00g
  logs-lv dbdata-vg -wi-a----- 14.00g
[ec2-user@ip-172-31-32-96 ~]$
```

- **Verify the entire setup**

```
[ec2-user@ip-172-31-32-96 ~]$ lsblk
NAME                    MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
nvme0n1                 259:0    0   10G  0 disk
├─nvme0n1p1             259:1    0    1M  0 part
├─nvme0n1p2             259:2    0  200M  0 part /boot/efi
├─nvme0n1p3             259:3    0  500M  0 part /boot
└─nvme0n1p4             259:4    0  9.3G  0 part /
nvme1n1                 259:5    0   10G  0 disk
└─nvme1n1p1             259:9    0   10G  0 part
  └─dbdata--vg-db--lv   253:0    0   14G  0 lvm
nvme2n1                 259:6    0   10G  0 disk
└─nvme2n1p1             259:8    0   10G  0 part
  ├─dbdata--vg-db--lv   253:0    0   14G  0 lvm
  └─dbdata--vg-logs--lv 253:1    0   14G  0 lvm
nvme3n1                 259:7    0   10G  0 disk
└─nvme3n1p1             259:10   0   10G  0 part
  └─dbdata--vg-logs--lv 253:1    0   14G  0 lvm
[ec2-user@ip-172-31-32-96 ~]$
```

- **The two logical volumes are ready to be used as filesystems for storing database and log data.**
- **Use `mkfs.ext4` to format the logical volumes with ext4 filesystem**

```
[ec2-user@ip-172-31-32-96 ~]$ sudo mkfs -t ext4 /dev/dbdata-vg/db-lv
mke2fs 1.46.5 (30-Dec-2021)
Creating filesystem with 3670016 4k blocks and 917504 inodes
Filesystem UUID: 0abfb8e6-0fe2-418a-be01-631aa6dfa98c
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208

Allocating group tables: done
Writing inode tables: done
Creating journal (16384 blocks): done
Writing superblocks and filesystem accounting information: done

[ec2-user@ip-172-31-32-96 ~]$
```

- **Create a /db directory**

sudo mkdir /db

```
[ec2-user@ip-172-31-32-96 ~]$ sudo mkdir /db
[ec2-user@ip-172-31-32-96 ~]$
```

NB: Check if anything is existing before you mount pls.

E.g

```
[ec2-user@ip-172-31-32-96 ~]$ sudo mkdir /db
[ec2-user@ip-172-31-32-96 ~]$ ls -l /db
total 0
[ec2-user@ip-172-31-32-96 ~]$
```

So we do not need to backup anything.

- **Mount db-lv to /db directory**

```
[ec2-user@ip-172-31-32-96 ~]$ sudo mount /dev/dbdata-vg/db-lv /db
[ec2-user@ip-172-31-32-96 ~]$ df -h
Filesystem                      Size  Used Avail Use% Mounted on
devtmpfs                        4.0M     0  4.0M   0% /dev
tmpfs                           372M     0  372M   0% /dev/shm
tmpfs                           149M  4.6M  145M   4% /run
/dev/nvme0n1p4                  9.4G  1.3G  8.1G  14% /
/dev/nvme0n1p3                  495M  153M  343M  31% /boot
/dev/nvme0n1p2                  200M  8.0K  200M   1% /boot/efi
tmpfs                            75M     0   75M   0% /run/user/1000
/dev/mapper/dbdata--vg-db--lv   14G   24K   13G   1% /db
[ec2-user@ip-172-31-32-96 ~]$
```

- **Update `/etc/fstab` file so that the mount configuration will persist after restart of the server. The UUID of the device will be used to update the `/etc/fstab` file; So use the command below to get the UUID;**

sudo blkid

```
[ec2-user@ip-172-31-32-96 ~]$ sudo blkid
/dev/nvme0n1p4: LABEL="root" UUID="287d9c0b-0e0f-4e92-8534-45733aa3dc68" TYPE="xfs" PARTUUID="6264d520-3fb9-423f-8ab8-7a0a8e3d3562"
/dev/nvme0n1p3: LABEL="boot" UUID="7bc24af7-289d-4bce-b17e-300c3aafe968" TYPE="xfs" PARTUUID="cb07c243-bc44-4717-853e-28852021225b"
/dev/nvme0n1p1: PARTUUID="fac7f1fb-3e8d-4137-a512-961de09a5549"
/dev/nvme0n1p2: SEC_TYPE="msdos" UUID="7B77-95E7" TYPE="vfat" PARTUUID="68b2905b-df3e-4fb3-80fa-49d1e773aa33"
/dev/nvme3n1p1: UUID="xVE0x9-I9en-GZ06-5Lgy-iTKB-v81W-JOJTYC" TYPE="LVM2_member" PARTLABEL="Linux filesystem" PARTUUID="6f1ee7f9-e8a4-440f-a57a-3862d95e68ab"
/dev/nvme2n1p1: UUID="GHGW1v-WvS8-MzAn-3ZqQ-3Yo4-MFx4-k5AM9X" TYPE="LVM2_member" PARTLABEL="Linux filesystem" PARTUUID="e5cafac7-9cfe-42c4-b561-d33e9b0cfc01"
/dev/mapper/dbdata--vg-db--lv: UUID="0abfb8e6-0fe2-418a-be01-631aa6dfa98c" TYPE="ext4"
/dev/nvme1n1p1: UUID="v3e30e-IZO6-gFp2-ZBtc-tHRr-nbz2-edoUN5" TYPE="LVM2_member" PARTLABEL="Linux filesystem" PARTUUID="3ee99947-4e6[illegible]"
[ec2-user@ip-172-31-32-96 ~]$ ^C
```


sudo vi /etc/fstab

To confirm if the update and config is right, run this command sudo mount -a

```
[ec2-user@ip-172-31-32-96 ~]$ sudo vi /etc/fstab
[ec2-user@ip-172-31-32-96 ~]$  sudo mount -a
[ec2-user@ip-172-31-32-96 ~]$
```

sudo systemctl daemon-reload. This command is to save the configs.

3. Install WordPress on your Web Server EC2

- **Update the repository**

  ```
  sudo yum -y update
  ```

```
[ec2-user@ip-172-31-33-75 ~]$ sudo yum -y update
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use subscription-manager to register.

Last metadata expiration check: 3:40:31 ago on Sat 15 Jul 2023 02:15:50 AM UTC.
Dependencies resolved.
================================================================================
 Package                 Architecture  Version                 Repository      Size
================================================================================
Installing:
 kernel                  x86_64        5.14.0-284.18.1.el9_2   rhel-9-baseos-rhui-rpms  3.4 M
 kernel-core             x86_64        5.14.0-284.18.1.el9_2   rhel-9-baseos-rhui-rpms   17 M
 kernel-modules          x86_64        5.14.0-284.18.1.el9_2   rhel-9-baseos-rhui-rpms   37 M
 kernel-modules-core     x86_64        5.14.0-284.18.1.el9_2   rhel-9-baseos-rhui-rpms   36 M
Upgrading:
 NetworkManager          x86_64        1:1.42.2-3.el9_2        rhel-9-baseos-rhui-rpms  2.2 M
 NetworkManager-cloud-setup x86_64     1:1.42.2-3.el9_2        rhel-9-appstream-rhui-rpms   73 k
 NetworkManager-libnm    x86_64        1:1.42.2-3.el9_2        rhel-9-baseos-rhui-rpms  1.8 M
```

- **Install wget, Apache and it's dependencies**

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

```
[ec2-user@ip-172-31-33-75 ~]$ sudo yum -y install wget httpd php php-mysqlnd php-fpm php-json
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use subscription-manager to register.

Last metadata expiration check: 3:45:49 ago on Sat 15 Jul 2023 02:15:50 AM UTC.
Dependencies resolved.
================================================================================
 Package                 Architecture  Version                 Repository      Size
================================================================================
Installing:
 httpd                   x86_64        2.4.53-11.el9_2.5       rhel-9-appstream-rhui-rpms   53 k
 php                     x86_64        8.0.27-1.el9_1          rhel-9-appstream-rhui-rpms   11 k
 php-common              x86_64        8.0.27-1.el9_1          rhel-9-appstream-rhui-rpms  686 k
 php-fpm                 x86_64        8.0.27-1.el9_1          rhel-9-appstream-rhui-rpms  1.6 M
 php-mysqlnd             x86_64        8.0.27-1.el9_1          rhel-9-appstream-rhui-rpms  154 k
```

- **Start Apache**

`sudo systemctl enable httpd`

`sudo systemctl start httpd`

```
[ec2-user@ip-172-31-33-75 ~]$ sudo systemctl enable httpd
Created symlink /etc/systemd/system/multi-user.target.wants/httpd.service → /usr/lib/systemd/system/httpd.service.
[ec2-user@ip-172-31-33-75 ~]$ sudo systemctl start httpd
[ec2-user@ip-172-31-33-75 ~]$
```

- **To install PHP and it's depemdencies**

`sudo yum install https://dl.fedoraproject.org/pub/epel/epel-release-latest-8.noarch.rpm`

```
[ec2-user@ip-172-31-33-75 ~]$ sudo yum install https://dl.fedoraproject.org/pub/epel/epel-release-latest-8.noarch.rpm
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use subscription-manager to register.

Last metadata expiration check: 3:48:31 ago on Sat 15 Jul 2023 02:15:50 AM UTC.
epel-release-latest-8.noarch.rpm                                                    41 kB/s |  25 kB     00:00
Dependencies resolved.
================================================================================================================================
 Package                         Architecture                Version                   Repository                          Size
================================================================================================================================
Installing:
 epel-release                    noarch                      8-19.el8                  @commandline                        25 k

Transaction Summary
================================================================================================================================
Install  1 Package

Total size: 25 k
Installed size: 35 k
Is this ok [y/N]: y
Downloading Packages:
```

`sudo yum install yum-utils http://rpms.remirepo.net/enterprise/remi-release-8.rpm`

```
[ec2-user@ip-172-31-33-75 ~]$ sudo yum install yum-utils http://rpms.remirepo.net/enterprise/remi-release-8.rpm
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use subscription-manager to register.

Extra Packages for Enterprise Linux 8 - x86_64                                      37 MB/s |  16 MB     00:00
Last metadata expiration check: 0:00:05 ago on Sat 15 Jul 2023 06:05:39 AM UTC.
remi-release-8.rpm                                                                 204 kB/s |  32 kB     00:00
Package yum-utils-4.3.0-5.el9_2.noarch is already installed.
Error:
 Problem: conflicting requests
  - nothing provides system-release(releasever) = 8 needed by remi-release-8.8-1.el8.remi.noarch
(try to add '--skip-broken' to skip uninstallable packages or '--nobest' to use not only best candidate packages)
[ec2-user@ip-172-31-33-75 ~]$
```

`sudo yum module list php`

```
[ec2-user@ip-172-31-33-75 ~]$ sudo yum module list php
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use subscription-manager to register.

Last metadata expiration check: 0:00:59 ago on Sat 15 Jul 2023 06:05:39 AM UTC.
Red Hat Enterprise Linux 9 for x86_64 - AppStream from RHUI (RPMs)
Name                         Stream                       Profiles                                  Summary
php                          8.1                          common [d], devel, minimal                PHP scripting language

Hint: [d]efault, [e]nabled, [x]disabled, [i]nstalled
[ec2-user@ip-172-31-33-75 ~]$
```

`sudo yum module reset php`

```
[ec2-user@ip-172-31-33-75 ~]$ sudo yum module reset php
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use subscription-manager to register.

Last metadata expiration check: 0:02:21 ago on Sat 15 Jul 2023 06:05:39 AM UTC.
Dependencies resolved.
Nothing to do.
Complete!
[ec2-user@ip-172-31-33-75 ~]$
```

```
sudo yum module enable php:remi-7.4
```

```
[ec2-user@ip-172-31-33-75 ~]$ sudo yum module enable php:remi-7.4
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use subscription-manager to register.

Last metadata expiration check: 0:03:02 ago on Sat 15 Jul 2023 06:05:39 AM UTC.
Error: Problems in request:
missing groups or modules: php:remi-7.4
[ec2-user@ip-172-31-33-75 ~]$
```

```
sudo yum install php php-opcache php-gd php-curl php-mysqlnd
```

```
[ec2-user@ip-172-31-33-75 ~]$ sudo yum install php php-opcache php-gd php-curl php-mysqlnd
Updating Subscription Management repositories.
Unable to read consumer identity

This system is not registered with an entitlement server. You can use subscription-manager to register.

Last metadata expiration check: 0:03:51 ago on Sat 15 Jul 2023 06:05:39 AM UTC.
Package php-8.0.27-1.el9_1.x86_64 is already installed.
Package php-opcache-8.0.27-1.el9_1.x86_64 is already installed.
Package php-common-8.0.27-1.el9_1.x86_64 is already installed.
Package php-mysqlnd-8.0.27-1.el9_1.x86_64 is already installed.
Dependencies resolved.
================================================================================================================================================
 Package                         Architecture                Version                          Repository                                  Size
================================================================================================================================================
Installing:
 php-gd                          x86_64                      8.0.27-1.el9_1                   rhel-9-appstream-rhui-rpms                  43 k
Installing dependencies:
 fontconfig                      x86_64                      2.14.0-2.el9_1                   rhel-9-appstream-rhui-rpms                 301 k
```

```
sudo systemctl start php-fpm
sudo systemctl enable php-fpm
 setsebool -P httpd_execmem 1
```

```
[ec2-user@ip-172-31-33-75 ~]$ sudo systemctl start php-fpm
[ec2-user@ip-172-31-33-75 ~]$ sudo systemctl enable php-fpm
Created symlink /etc/systemd/system/multi-user.target.wants/php-fpm.service → /usr/lib/systemd/system/php-fpm.service.
[ec2-user@ip-172-31-33-75 ~]$ sudo setsebool -P httpd_execmem 1
[ec2-user@ip-172-31-33-75 ~]$
```

- **Restart Apache**
  `sudo systemctl restart httpd`
- **Download wordpress and copy wordpress to** `var/www/html`

```
mkdir wordpress
cd   wordpress
sudo wget http://wordpress.org/latest.tar.gz
```

```
[ec2-user@ip-172-31-33-75 wordpress]$ sudo wget http://wordpress.org/latest.tar.gz
--2023-07-15 06:15:41--  http://wordpress.org/latest.tar.gz
Resolving wordpress.org (wordpress.org)... 198.143.164.253
Connecting to wordpress.org (wordpress.org)|198.143.164.253|:80... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: https://wordpress.org/latest.tar.gz [following]
--2023-07-15 06:15:41--  https://wordpress.org/latest.tar.gz
Connecting to wordpress.org (wordpress.org)|198.143.164.253|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 23020109 (22M) [application/octet-stream]
Saving to: 'latest.tar.gz'

latest.tar.gz                       100%[=============================================================================>]  21.95M  6.99MB/s    in 3.4s

2023-07-15 06:15:45 (6.47 MB/s) - 'latest.tar.gz' saved [23020109/23020109]

[ec2-user@ip-172-31-33-75 wordpress]$
```

```
sudo tar xzvf latest.tar.gz
sudo rm -rf latest.tar.gz
cp wordpress/wp-config-sample.php wordpress/wp-config.php
cp -R wordpress /var/www/html/
```

- **Configure SELinux Policies**

```
sudo chown -R apache:apache /var/www/html/wordpress
sudo chcon -t httpd_sys_rw_content_t /var/www/html/wordpress -R
sudo setsebool -P httpd_can_network_connect=1
```

4. Install MySQL on your DB Server EC2

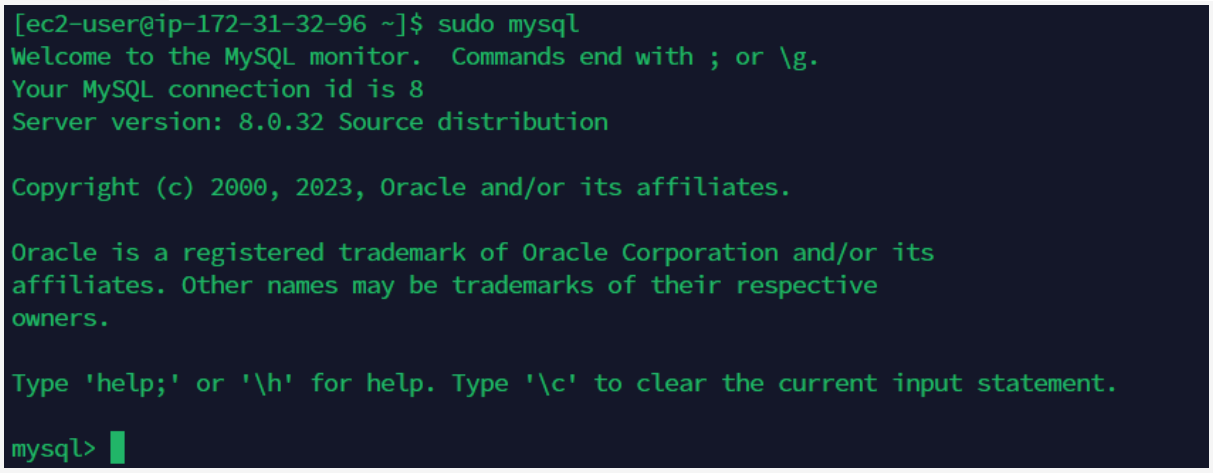
```
sudo yum update
sudo yum install mysql-server
```

- **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
```

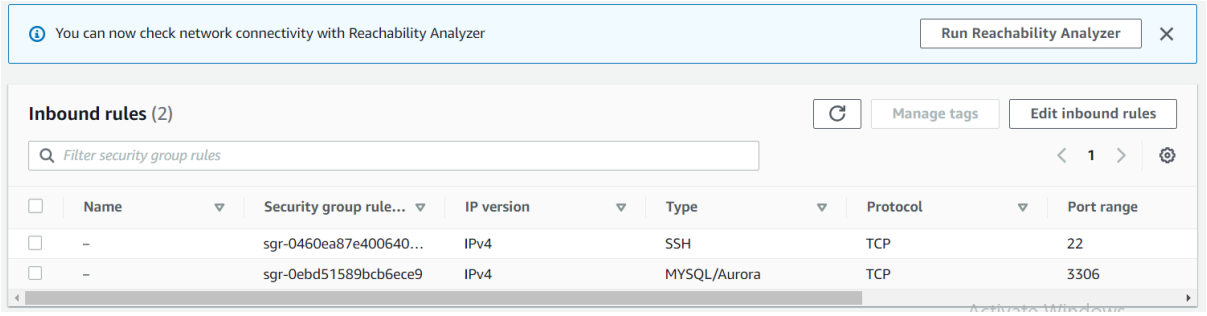
5. Configure DB to work with WordPress

```
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;
Exit
```

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



- Login to webserver

Install MySQL client and test that you can connect from your Web Server to your DB server by using `mysql-client`

```
sudo yum install mysql
```

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

```
[ec2-user@ip-172-31-33-75 wordpress]$ sudo mysql -u myuser -p -h 172.31.32.96
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 11
Server version: 8.0.32 Source distribution

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affiliates. Other names may be trademarks of their respective
owners.

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

mysql>
```
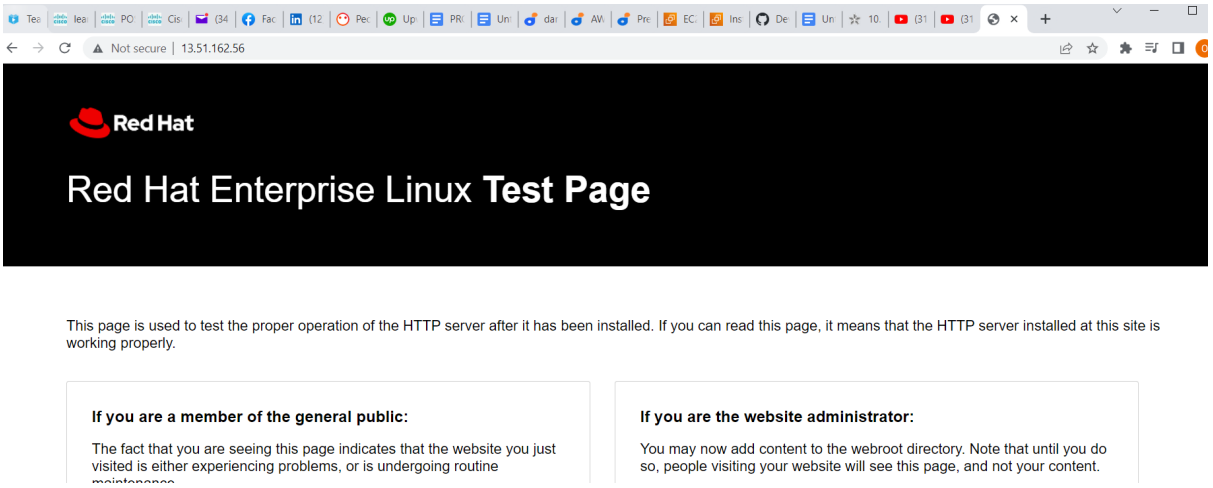

- **Verify if you can successfully execute `SHOW DATABASES;` command and see a list of existing databases.**

```
mysql> SHOW DATABASES;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| performance_schema |
| wordpress          |
+--------------------+
3 rows in set (0.00 sec)

mysql>
```

On the webster perform the following again:



6. Configure WordPress to connect to remote database.

- **We also need to edit our config.php with the database name, IP address, username and the password.**

  sudo vi wp-config.php

```
<?php
/**
 * The base configuration for WordPress
 *
 * The wp-config.php creation script uses this file during the installation.
 * You don't have to use the web site, you can copy this file to "wp-config.php"
 * and fill in the values.
 *
 * This file contains the following configurations:
 *
 * * Database settings
 * * Secret keys
 * * Database table prefix
 * * ABSPATH
 *
 * @link https://wordpress.org/documentation/article/editing-wp-config-php/
 *
 * @package WordPress
 */

// ** Database settings - You can get this info from your web host ** //
/** The name of the database for WordPress */
define( 'DB_NAME', 'wordpress' );

/** Database username */
define( 'DB_USER', 'myuser' );

/** Database password */
define( 'DB_PASSWORD', 'mypass' );

/** Database hostname */
define( 'DB_HOST', '172.31.32.96' );

/** Database charset to use in creating database tables. */
define( 'DB_CHARSET', 'utf8' );

/** The database collate type. Don't change this if in doubt. */
define( 'DB_COLLATE', '' );

/**#@+
 * Authentication unique keys and salts.
 *
-- INSERT --
```

sudo systemctl restart httpd

- **Disable the default page of Apache server.**

sudo mv /etc/httpd/conf.d/welcome.conf /etc/httpd/conf.d/welcome.conf_backup

- **Change permissions and configuration so Apache could use WordPress:**

Now everything is being owned by root;

```
[ec2-user@ip-172-31-33-75 html]$ ls -l
total 252
-rw-r--r--.  1 root   root     405 Jul 15 08:00 index.php
-rw-r--r--.  1 root   root   19915 Jul 15 08:00 license.txt
drwx------.  2 root   root   16384 Jul 14 04:16 lost+found
-rw-r--r--.  1 root   root    7402 Jul 15 08:00 readme.html
drwxr-xr-x.  5 apache apache  4096 Jul 15 06:18 wordpress
-rw-r--r--.  1 root   root    7205 Jul 15 08:00 wp-activate.php
drwxr-xr-x.  9 root   root    4096 Jul 15 08:00 wp-admin
-rw-r--r--.  1 root   root     351 Jul 15 08:00 wp-blog-header.php
-rw-r--r--.  1 root   root    2338 Jul 15 08:00 wp-comments-post.php
-rw-r--r--.  1 root   root    2993 Jul 15 08:18 wp-config.php
-rw-r--r--.  1 root   root    3013 Jul 15 08:00 wp-config-sample.php
drwxr-xr-x.  4 root   root    4096 Jul 15 08:00 wp-content
-rw-r--r--.  1 root   root    5536 Jul 15 08:00 wp-cron.php
drwxr-xr-x. 28 root   root   12288 Jul 15 08:00 wp-includes
-rw-r--r--.  1 root   root    2502 Jul 15 08:00 wp-links-opml.php
-rw-r--r--.  1 root   root    3792 Jul 15 08:00 wp-load.php
-rw-r--r--.  1 root   root   49330 Jul 15 08:00 wp-login.php
-rw-r--r--.  1 root   root    8541 Jul 15 08:00 wp-mail.php
-rw-r--r--.  1 root   root   24993 Jul 15 08:00 wp-settings.php
-rw-r--r--.  1 root   root   34350 Jul 15 08:00 wp-signup.php
-rw-r--r--.  1 root   root    4889 Jul 15 08:00 wp-trackback.php
-rw-r--r--.  1 root   root    3238 Jul 15 08:00 xmlrpc.php
```

With this apache can not access the wordpress.

sudo chown -R apache:apache /var/www/html/

sudo chown -R apache:apache /var/www/html/

sudo chcon -t httpd_sys_rw_content_t /var/www/html/ -R

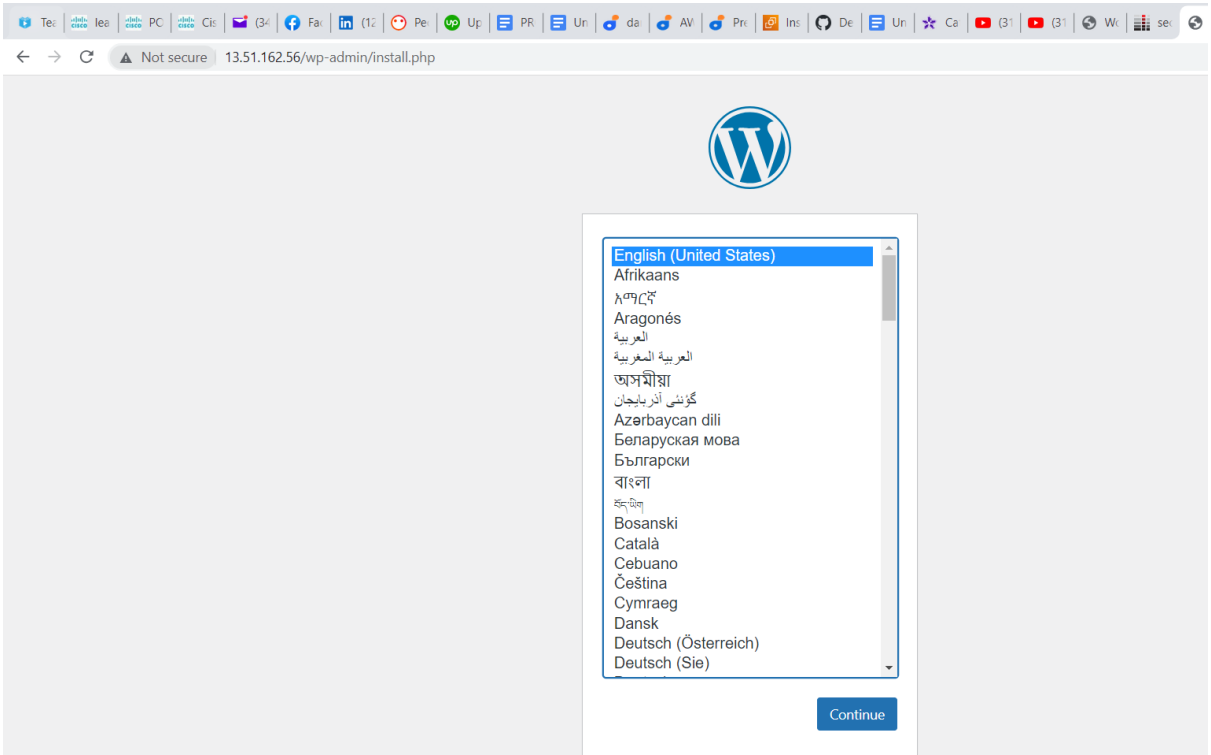
sudo setsebool -P httpd_can_network_connect=1

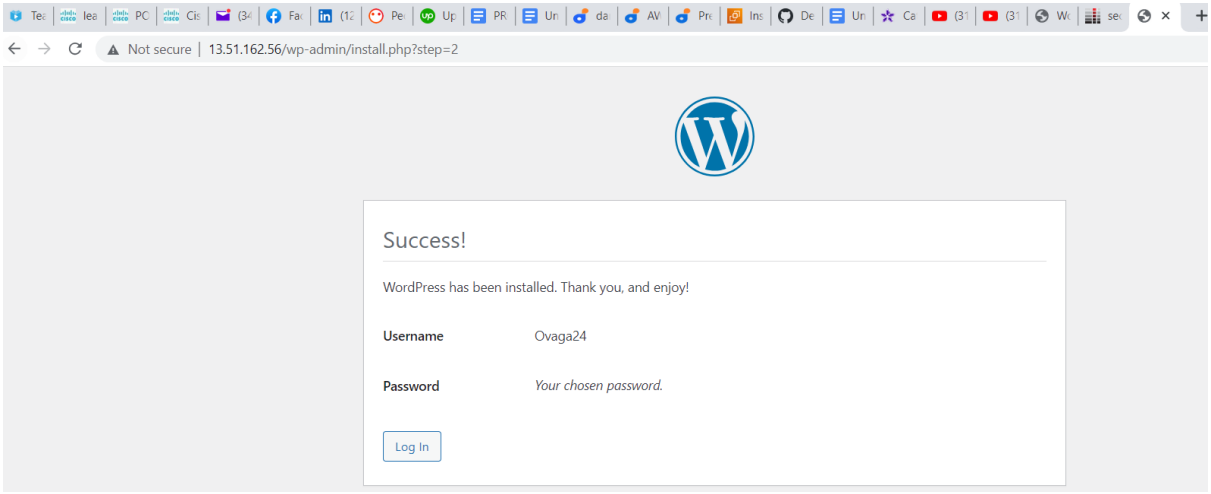
sudo setsebool -P httpd_can_network_connect_db 1

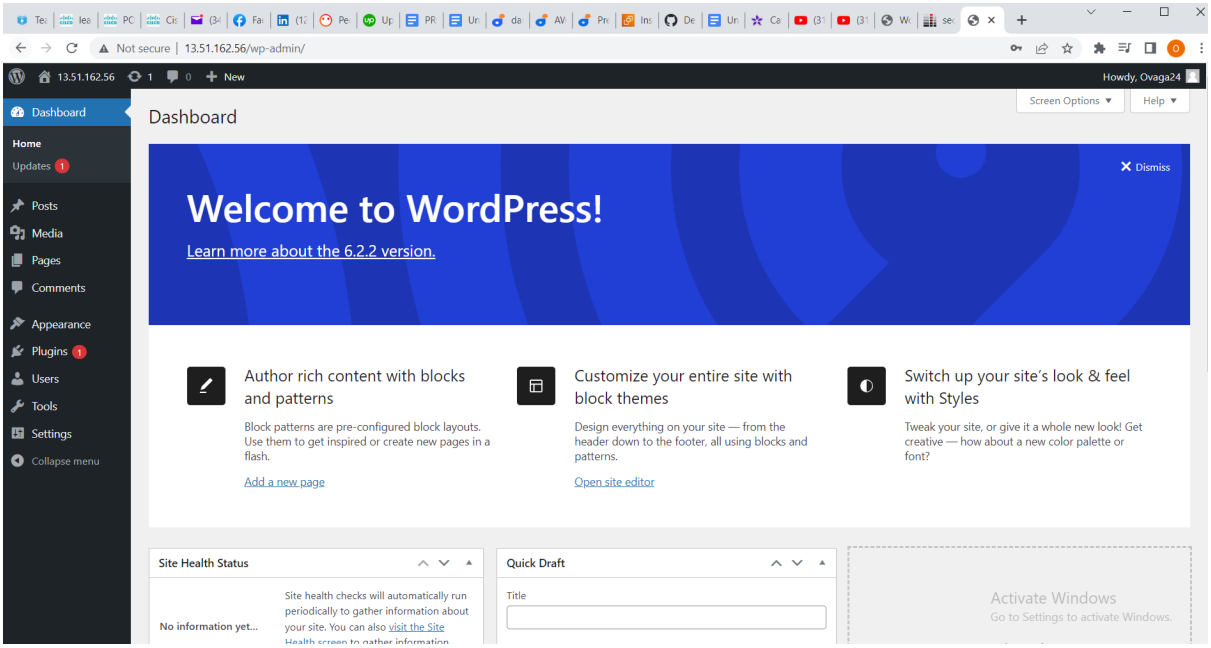
```
[ec2-user@ip-172-31-33-75 html]$ sudo chown -R apache:apache /var/www/html/
[ec2-user@ip-172-31-33-75 html]$ ls -l
total 252
-rw-r--r--.  1 apache apache   405 Jul 15 08:00 index.php
-rw-r--r--.  1 apache apache 19915 Jul 15 08:00 license.txt
drwx------.  2 apache apache 16384 Jul 14 04:16 lost+found
-rw-r--r--.  1 apache apache  7402 Jul 15 08:00 readme.html
drwxr-xr-x.  5 apache apache  4096 Jul 15 06:18 wordpress
-rw-r--r--.  1 apache apache  7205 Jul 15 08:00 wp-activate.php
drwxr-xr-x.  9 apache apache  4096 Jul 15 08:00 wp-admin
-rw-r--r--.  1 apache apache   351 Jul 15 08:00 wp-blog-header.php
-rw-r--r--.  1 apache apache  2338 Jul 15 08:00 wp-comments-post.php
-rw-r--r--.  1 apache apache  2993 Jul 15 08:18 wp-config.php
-rw-r--r--.  1 apache apache  3013 Jul 15 08:00 wp-config-sample.php
drwxr-xr-x.  4 apache apache  4096 Jul 15 08:00 wp-content
-rw-r--r--.  1 apache apache  5536 Jul 15 08:00 wp-cron.php
drwxr-xr-x. 28 apache apache 12288 Jul 15 08:00 wp-includes
-rw-r--r--.  1 apache apache  2502 Jul 15 08:00 wp-links-opml.php
-rw-r--r--.  1 apache apache  3792 Jul 15 08:00 wp-load.php
-rw-r--r--.  1 apache apache 49330 Jul 15 08:00 wp-login.php
-rw-r--r--.  1 apache apache  8541 Jul 15 08:00 wp-mail.php
-rw-r--r--.  1 apache apache 24993 Jul 15 08:00 wp-settings.php
-rw-r--r--.  1 apache apache 34350 Jul 15 08:00 wp-signup.php
-rw-r--r--.  1 apache apache  4889 Jul 15 08:00 wp-trackback.php
-rw-r--r--.  1 apache apache  3238 Jul 15 08:00 xmlrpc.php
[ec2-user@ip-172-31-33-75 html]$
```

```
[ec2-user@ip-172-31-33-75 html]$ sudo chown -t httpd_sys_rw_content_t /var/www/html/
chown: invalid option -- 't'
Try 'chown --help' for more information.
[ec2-user@ip-172-31-33-75 html]$ sudo chown -t httpd_sys_rw_content_t /var/www/html/ -R
chown: invalid option -- 't'
Try 'chown --help' for more information.
[ec2-user@ip-172-31-33-75 html]$ sudo chcon -t httpd_sys_rw_content_t /var/www/html/ -R
[ec2-user@ip-172-31-33-75 html]$ ^C
[ec2-user@ip-172-31-33-75 html]$ sudo setsebool -p httpd_can_network_connect=1
setsebool: invalid option -- 'p'

Usage:  setsebool [ -NPV ] boolean value | bool1=val1 bool2=val2...

[ec2-user@ip-172-31-33-75 html]$ sudo setsebool -P httpd_can_network_connect=1
[ec2-user@ip-172-31-33-75 html]$ ^C
[ec2-user@ip-172-31-33-75 html]$ sudo setsebool -P httpd_can_network_connect_db 1
[ec2-user@ip-172-31-33-75 html]$
```

- **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)**
- **Try to access from your browser the link to your WordPress** `http://<Web-Server-Public-IP-Address>/wordpress/`







That is the end of the project6. To God be the glory.

- **Fill out your DB credentials:**