SUMMARY:

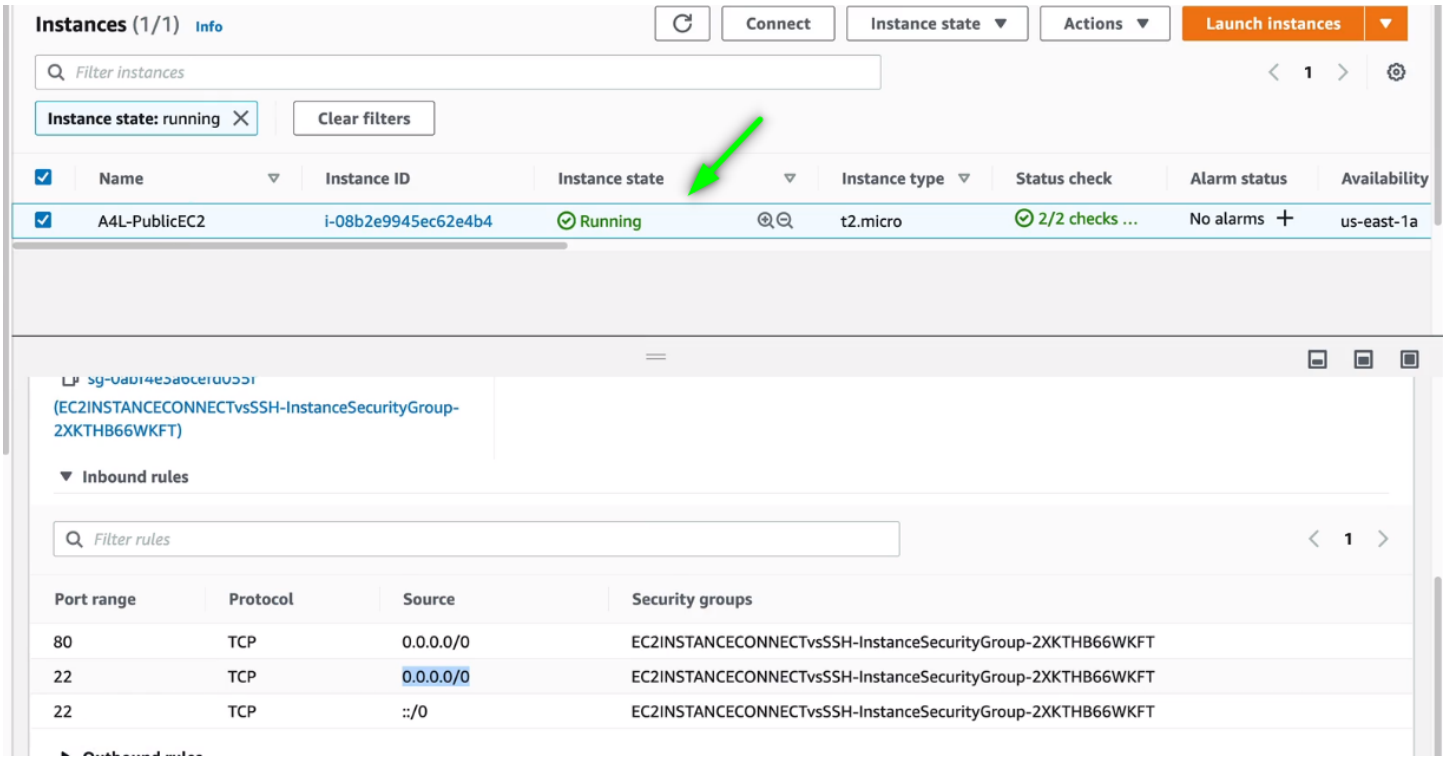
This Lab covers EC2: SSH vs Instance Connect, Snapshots & Instance Stores, Manaul WP on EC2, creating an AMI

Contents

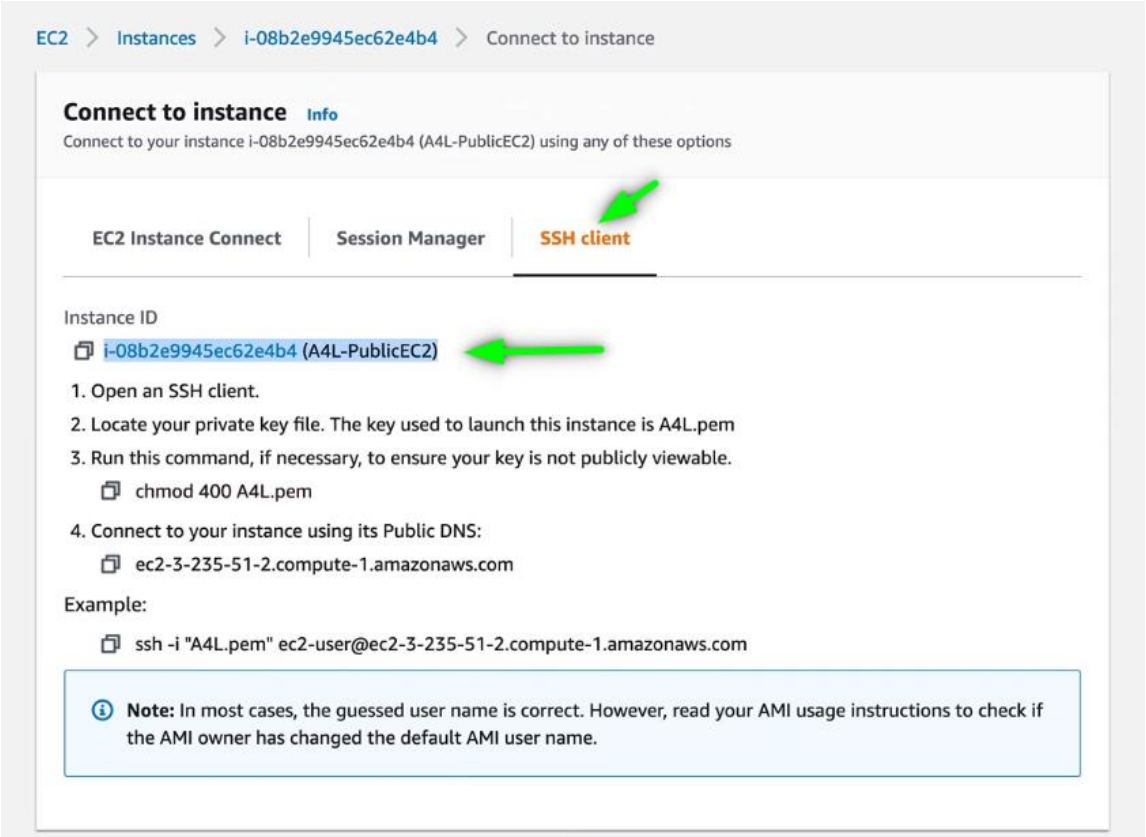
1. EC2 SSH vs EC2 Instance Connect

Amazon EC2 Instance Connect provides a simple and secure way to connect to your Linux instances using Secure Shell (SSH). With EC2 Instance Connect, you use AWS Identity and Access Management (IAM) policies and principals to control SSH access to your instances, removing the need to share and manage SSH keys.

Create instance:

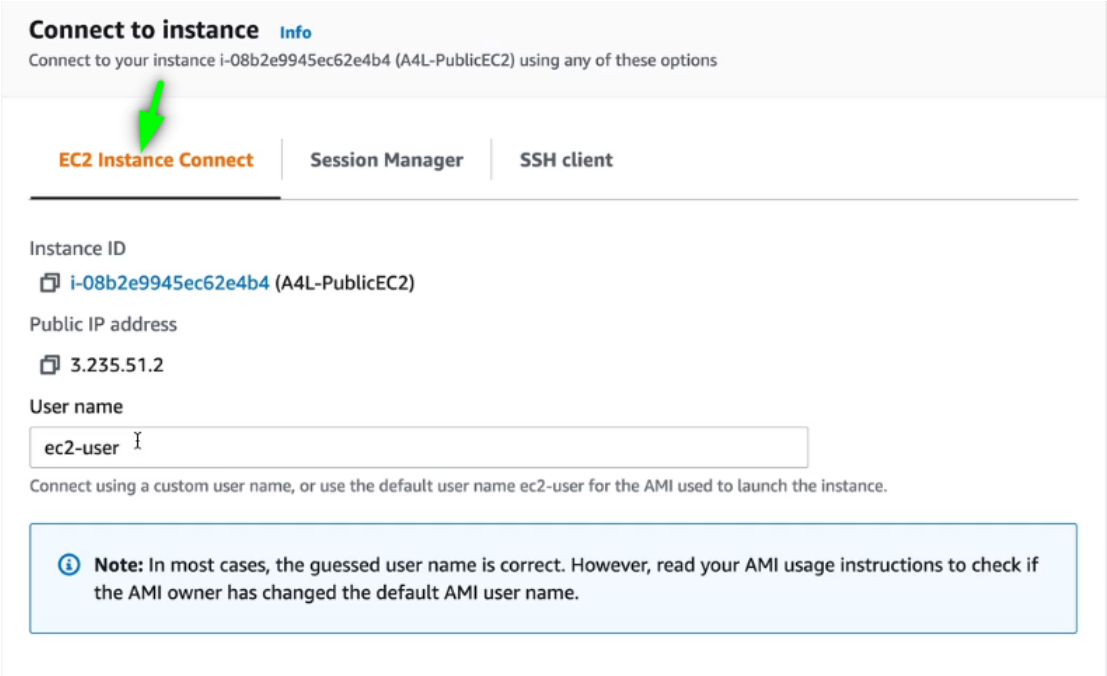


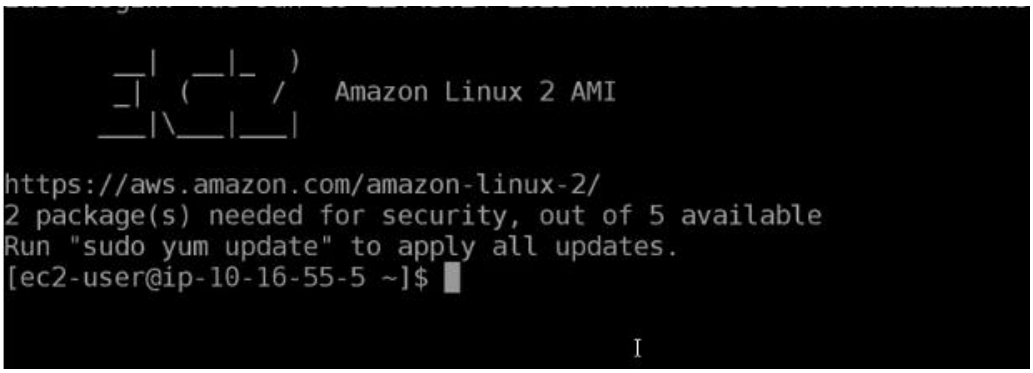
Connect via SSH:



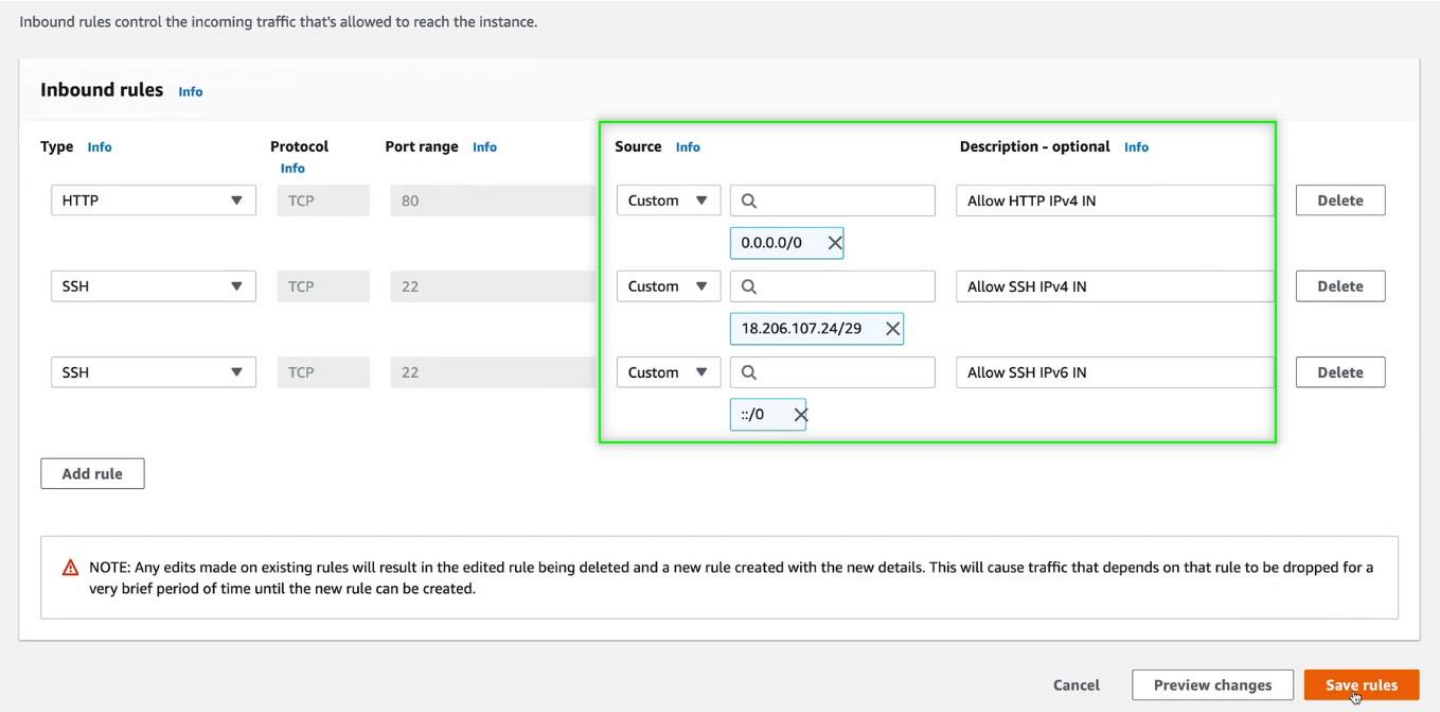

```
❯ cd Downloads
❯ ssh -i "A4L.pem" ec2-user@ec2-3-235-51-2.compute-1.amazonaws.com
The authenticity of host 'ec2-3-235-51-2.compute-1.amazonaws.com (3.235.51.2)' can't be established.
ECDSA key fingerprint is SHA256:Jx/Eajrzqre+onuNJD3lykZaSFnKTzw7eG8uQuoLyUA.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-3-235-51-2.compute-1.amazonaws.com,3.235.51.2' (ECDSA) to the list of known hosts.
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
@         WARNING: UNPROTECTED PRIVATE KEY FILE!          @
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
Permissions 0644 for 'A4L.pem' are too open.
It is required that your private key files are NOT accessible by others.
This private key will be ignored.
Load key "A4L.pem": bad permissions
ec2-user@ec2-3-235-51-2.compute-1.amazonaws.com: Permission denied (publickey,gssapi-keyex,gssapi-with-mic).
❯ chmod 400 A4L.pem
❯ ssh -i "A4L.pem" ec2-user@ec2-3-235-51-2.compute-1.amazonaws.com

       __|  __|_  )
       _|  (     /   Amazon Linux 2 AMI
      ___|\___|___|

https://aws.amazon.com/amazon-linux-2/
2 package(s) needed for security, out of 5 available
Run "sudo yum update" to apply all updates.
[ec2-user@ip-10-16-55-5 ~]$
```

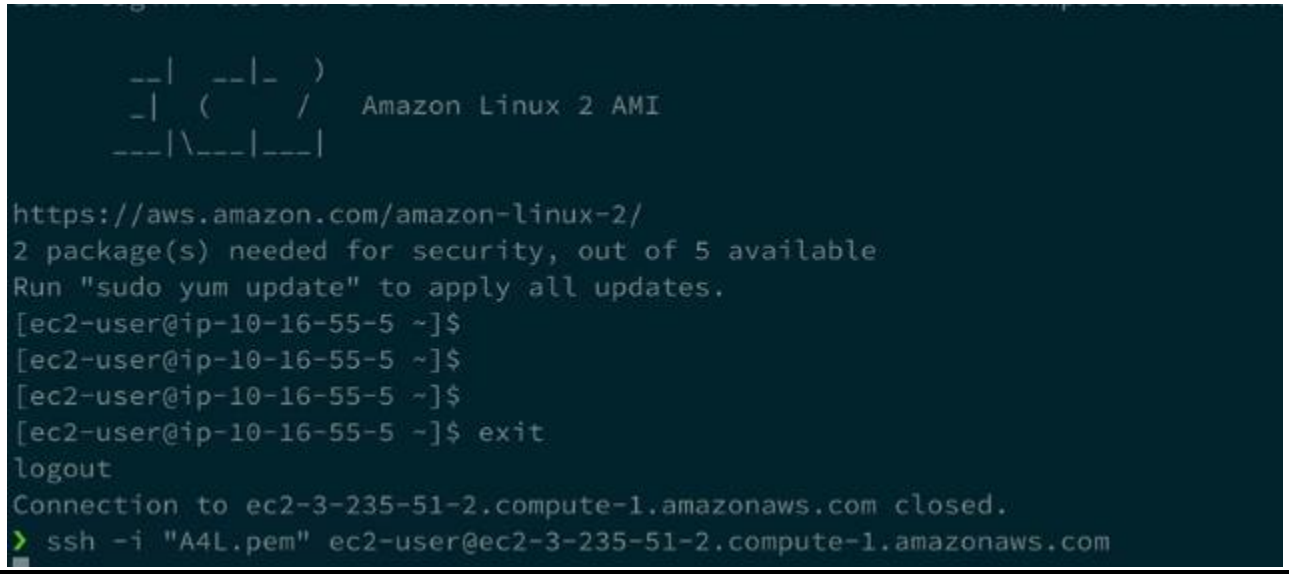
Connect via instance connect:





Configure instance inbound rules to allow for interaction with SSH:



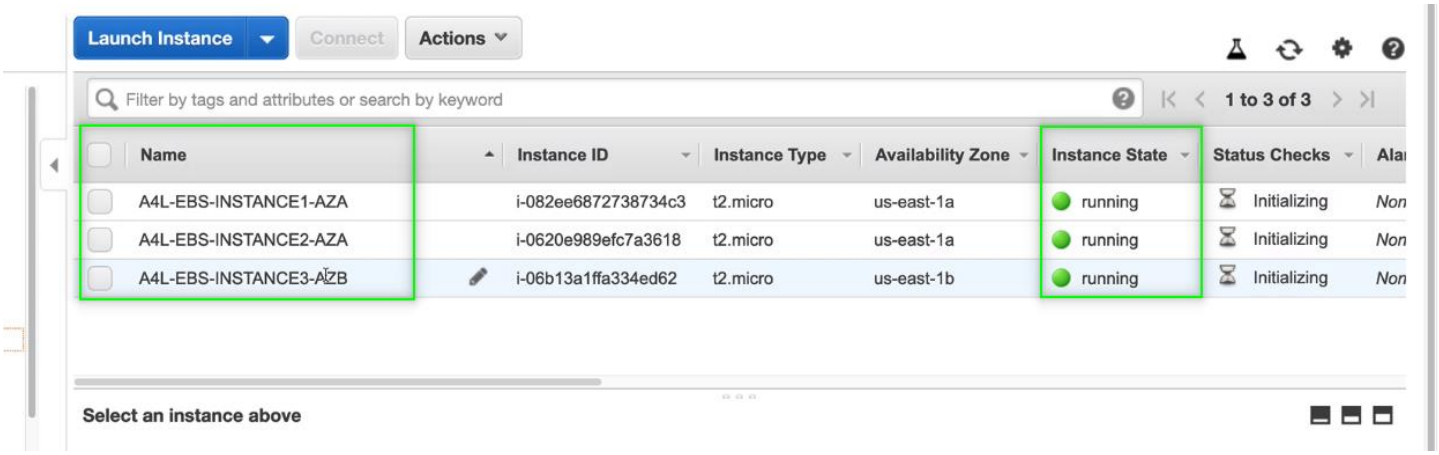


2. EBS, Snapshots and Instance Store Volumes

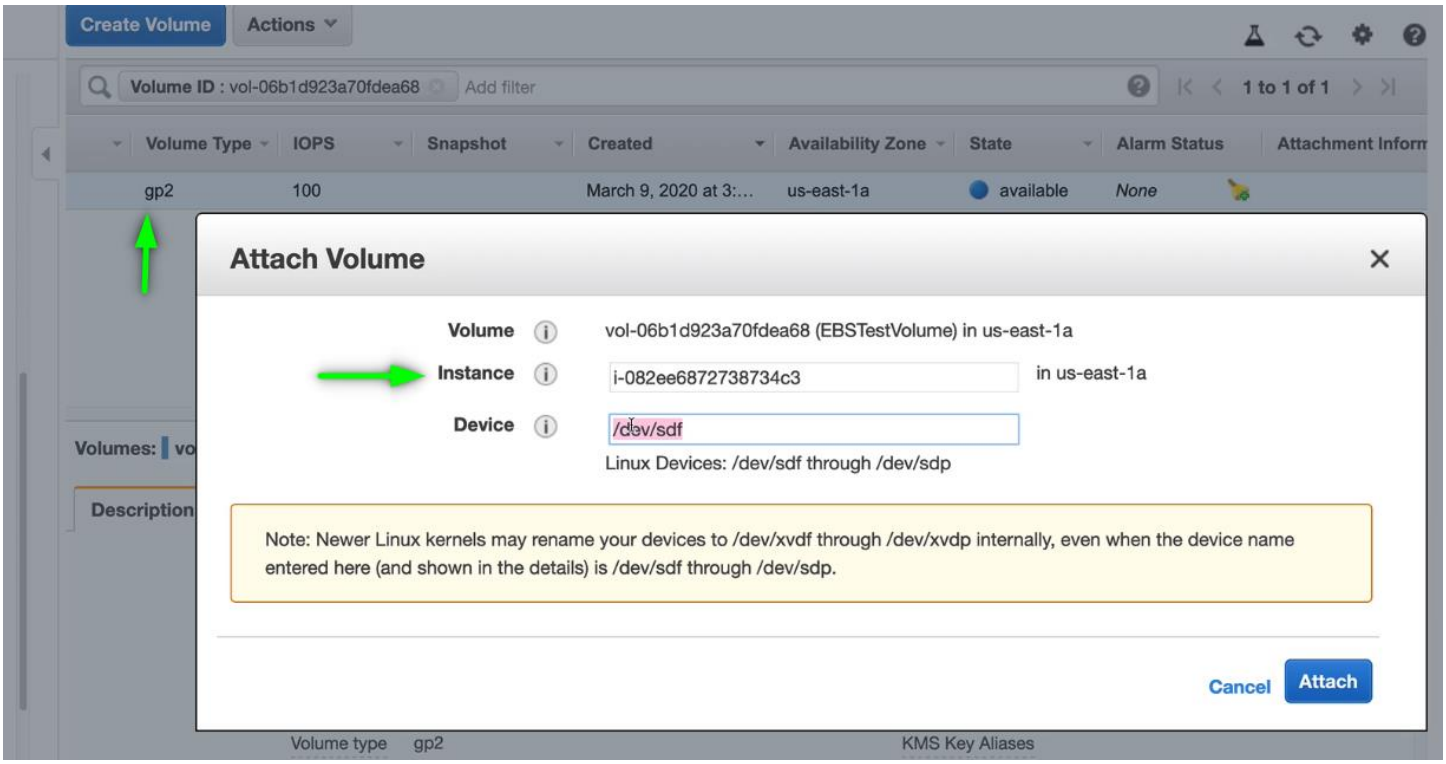
1. Create an EBS Volume
2. Mount it to an EC2 instance
3. Create and Mount a file system
4. Generate a test file
5. Migrate the volume to another EC2 instance in the same AZ
6. Verify the file system and file are intact
7. Create a EBS SNapshot from the volume
8. Create a new EBS Volume in AZ-B
9. Verify the filesystem and file are intact

10. Copy the snapshot to another region
11. Create an EC2 instance with instance store volumes
12. Create a filesystem and test file
13. Restart instance and verify the file system is intact
14. Stop and Start the instance
15. Verify the file system is no longer present - new EC2 Host.

Create EC2 instances:



Create volume and attach to instance:



Create test file in instance connect:

```
https://console.aws.amazon.com/ec2/v2/connect/ec2-user/i-082ee6872738734c3
[ec2-user@ip-10-16-60-135 ebstest]$ ls -la
total 4
drwxr-xr-x  2 root root  33 Mar  9 05:46 .
dr-xr-xr-x 20 root root 281 Mar  9 05:44 ..
-rw-r--r--  1 root root  23 Mar  9 05:46 amazingtestfile.txt
[ec2-user@ip-10-16-60-135 ebstest]$
```

Confirm file in EBS:

```
[ec2-user@ip-10-16-60-135 ~]$ sudo mount -a
[ec2-user@ip-10-16-60-135 ~]$ df -k
Filesystem     1K-blocks    Used Available Use% Mounted on
devtmpfs          485472       0    485472   0% /dev
tmpfs             503484       0    503484   0% /dev/shm
tmpfs             503484     440    503044   1% /run
tmpfs             503484       0    503484   0% /sys/fs/cgroup
/dev/xvda1       8376300 1307776   7068524  16% /
tmpfs             100700       0    100700   0% /run/user/1000
/dev/xvdf       10475520   43476  10432044   1% /ebstest
[ec2-user@ip-10-16-60-135 ~]$ cd /ebstest
[ec2-user@ip-10-16-60-135 ebstest]$ ls
amazingtestfile.txt
[ec2-user@ip-10-16-60-135 ebstest]$
```

Attach volume to instance 2, check for test file:

```
https://console.aws.amazon.com/ec2/v2/connect/ec2-user/i-0620e989efc7a3618
       __|  __|_  )
       _|  (     /   Amazon Linux 2 AMI
      ___|\___|___|

https://aws.amazon.com/amazon-linux-2/
1 package(s) needed for security, out of 26 available
Run "sudo yum update" to apply all updates.
[ec2-user@ip-10-16-59-228 ~]$ lsblk
NAME    MAJ:MIN RM SIZE RO TYPE MOUNTPOINT
xvda    202:0    0   8G  0 disk
└─xvda1 202:1    0   8G  0 part /
xvdf    202:80   0  10G  0 disk
[ec2-user@ip-10-16-59-228 ~]$ sudo file -s /dev/xvdf
/dev/xvdf: SGI XFS filesystem data (blksz 4096, inosz 512, v2 dirs)
[ec2-user@ip-10-16-59-228 ~]$ sudo mkdir /ebstest
[ec2-user@ip-10-16-59-228 ~]$ sudo mount /dev/xvdf /ebstest
[ec2-user@ip-10-16-59-228 ~]$ cd /ebstest/
[ec2-user@ip-10-16-59-228 ebstest]$ ls -la
total 4
drwxr-xr-x  2 root root  33 Mar  9 05:46 .
dr-xr-xr-x 20 root root 281 Mar  9 05:54 ..
-rw-r--r--  1 root root  23 Mar  9 05:46 amazingtestfile.txt
[ec2-user@ip-10-16-59-228 ebstest]$
```

Create instance store:

1. Choose AMI | 2. Choose Instance Type | 3. Configure Instance | 4. Add Storage | 5. Add Tags | 6. Configure Security Group | 7. Review

Step 4: Add Storage

Your instance will be launched with the following storage device settings. You can attach additional EBS volumes and instance store volumes to your instance, or edit the settings of the root volume. You can also attach additional EBS volumes after launching an instance, but not instance store volumes. Learn more about storage options in Amazon EC2.

Volume Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Throughput (MB/s)	Delete on Termination	Encryption
Root	/dev/xvda	snap-03a475f314b035167	8	General Purpose SSD (gp2)	100 / 3000	N/A	☑	Not Encrypte
ephemeral0	/dev/nvme0n1	N/A	75	NVMe SSD	N/A	N/A	N/A	Hardware Encrypted

Add New Volume

Launch Instance | Connect | Actions

search : i-0924d6e8ce11d7a91 | Add filter | 1 to 1 of 1

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Ala
InstanceStoreTest	i-0924d6e8ce11d7a91	m5dn.large	us-east-1a	running	Initializing	Non

Instance: i-0924d6e8ce11d7a91 (InstanceStoreTest) Public DNS: ec2-52-206-106-102.compute-1.amazonaws.com

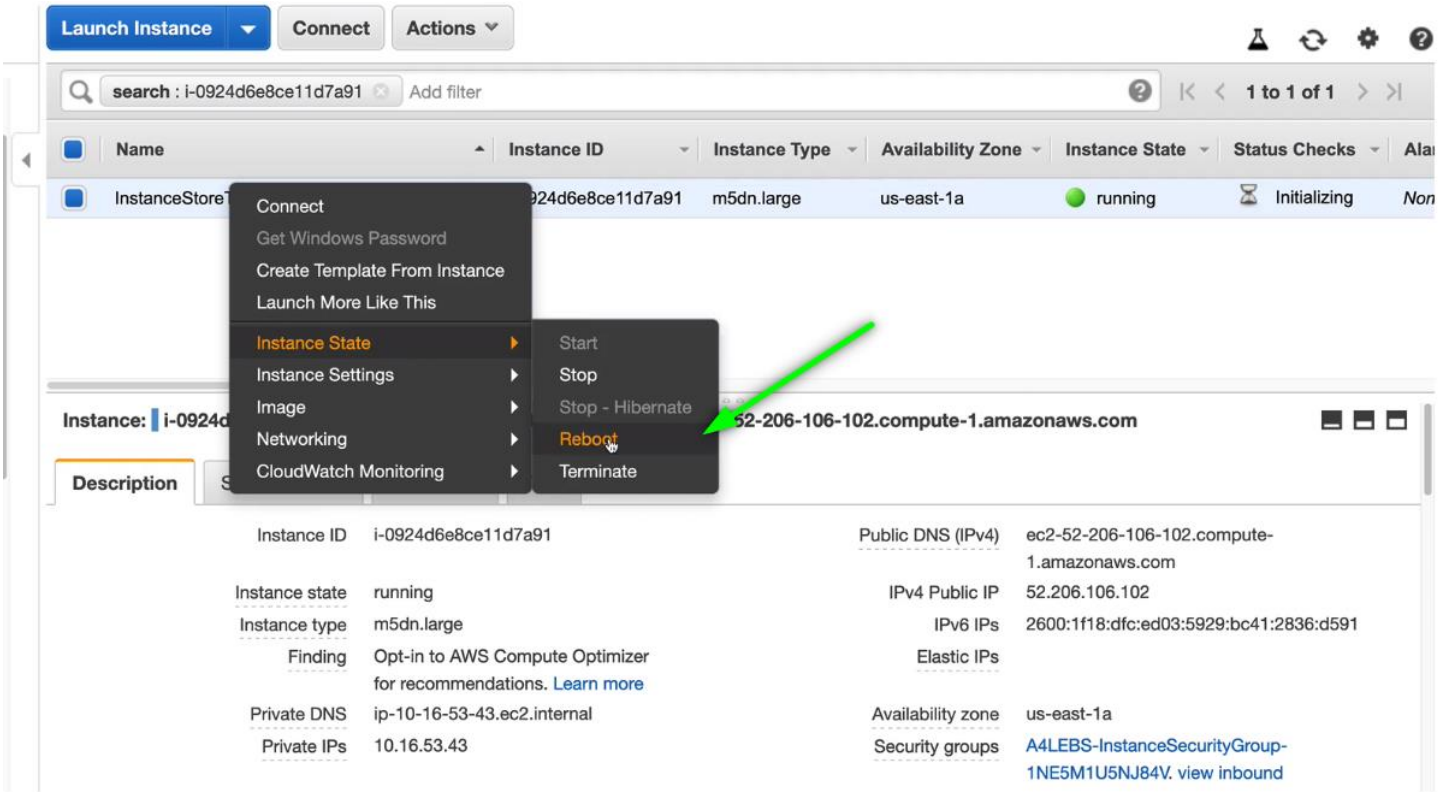
Description | Status Checks | Monitoring | Tags

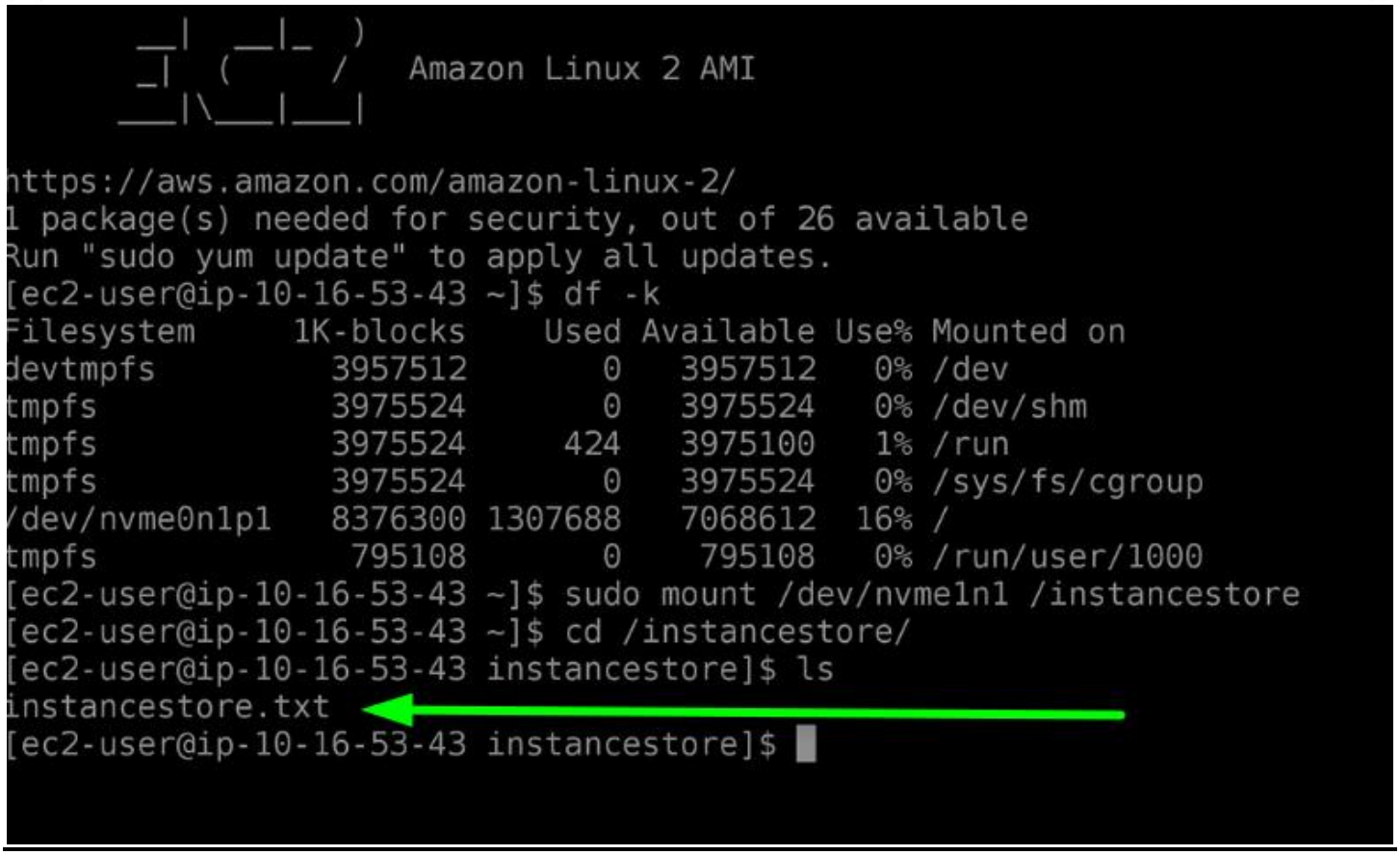
Instance ID	i-0924d6e8ce11d7a91	Public DNS (IPv4)	ec2-52-206-106-102.compute-1.amazonaws.com
Instance state	running	IPv4 Public IP	52.206.106.102
Instance type	m5dn.large	IPv6 IPs	2600:1f18:dfc:ed03:5929:bc41:2836:d591
Finding	Opt-in to AWS Compute Optimizer for recommendations. Learn more	Elastic IPs	
Private DNS	ip-10-16-53-43.ec2.internal	Availability zone	us-east-1a
Private IPs	10.16.53.43	Security groups	A4LEBS-InstanceSecurityGroup-1NE5M1U5NJ84V. view inbound

Create test file in instance store connect:

```
├─nvme0n1p1   259:2    0    8G  0 part /
└─nvme0n1p128 259:3    0    1M  0 part
[ec2-user@ip-10-16-53-43 ~]$ sudo file -s /dev/nvme1n1
/dev/nvme1n1: data
[ec2-user@ip-10-16-53-43 ~]$ sudo mkfs -t xfs /dev/nvme1n1
meta-data=/dev/nvme1n1           isize=512    agcount=4, agsize=4577637 blks
         =                       sectsz=512   attr=2, projid32bit=1
         =                       crc=1        finobt=1, sparse=0
data     =                       bsize=4096   blocks=18310546, imaxpct=25
         =                       sunit=0      swidth=0 blks
naming   =version 2              bsize=4096   ascii-ci=0 ftype=1
log      =internal log           bsize=4096   blocks=8940, version=2
         =                       sectsz=512   sunit=0 blks, lazy-count=1
realtime =none                   extsz=4096   blocks=0, rtextents=0
[ec2-user@ip-10-16-53-43 ~]$ sudo file -s /dev/nvme1n1
/dev/nvme1n1: SGI XFS filesystem data (blksz 4096, inosz 512, v2 dirs)
[ec2-user@ip-10-16-53-43 ~]$ sudo mkdir /instancestore
[ec2-user@ip-10-16-53-43 ~]$ sudo mount /dev/nvme1n1 /instancestore
[ec2-user@ip-10-16-53-43 ~]$ cd /instancestore/
[ec2-user@ip-10-16-53-43 instancestore]$ ls -la
total 0
drwxr-xr-x  2 root root   6 Mar  9 06:13 .
dr-xr-xr-x 20 root root 287 Mar  9 06:14 ..
[ec2-user@ip-10-16-53-43 instancestore]$ sudo touch instancestore.txt
[ec2-user@ip-10-16-53-43 instancestore]$ ls -la
total 0
drwxr-xr-x  2 root root  31 Mar  9 06:14 .
dr-xr-xr-x 20 root root 287 Mar  9 06:14 ..
-rw-r--r--  1 root root   0 Mar  9 06:14 instancestore.txt
[ec2-user@ip-10-16-53-43 instancestore]$
```

Reboot instance – then check for file, file should still be there. Stopping the instance store however will clear everything, instance stores are ephemeral storage – very fast, but not durable.


Launch Instance
Connect
Actions
search : i-0924d6e8ce11d7a91
Add filter
1 to 1 of 1
Name
Instance ID
Instance Type
Availability Zone
Instance State
Status Checks
InstanceStore
924d6e8ce11d7a91
m5dn.large
us-east-1a
running
Initializing
Connect
Get Windows Password
Create Template From Instance
Launch More Like This
Instance State
Instance Settings
Image
Networking
CloudWatch Monitoring
Start
Stop
Stop - Hibernate
Reboot
Terminate
Instance: i-0924d
52-206-106-102.compute-1.amazonaws.com
Description
Instance ID
i-0924d6e8ce11d7a91
Instance state
running
Instance type
m5dn.large
Finding
Opt-in to AWS Compute Optimizer for recommendations. Learn more
Private DNS
ip-10-16-53-43.ec2.internal
Private IPs
10.16.53.43
Public DNS (IPv4)
ec2-52-206-106-102.compute-1.amazonaws.com
IPv4 Public IP
52.206.106.102
IPv6 IPs
2600:1f18:dfc:ed03:5929:bc41:2836:d591
Elastic IPs
Availability zone
us-east-1a
Security groups
A4LEBS-InstanceSecurityGroup-1NE5M1U5NJ84V. view inbound


Amazon Linux 2 AMI
https://aws.amazon.com/amazon-linux-2/
1 package(s) needed for security, out of 26 available
Run "sudo yum update" to apply all updates.
[ec2-user@ip-10-16-53-43 ~]$ df -k
Filesystem 1K-blocks Used Available Use% Mounted on
devtmpfs 3957512 0 3957512 0% /dev
tmpfs 3975524 0 3975524 0% /dev/shm
tmpfs 3975524 424 3975100 1% /run
tmpfs 3975524 0 3975524 0% /sys/fs/cgroup
/dev/nvme0n1p1 8376300 1307688 7068612 16% /
tmpfs 795108 0 795108 0% /run/user/1000
[ec2-user@ip-10-16-53-43 ~]$ sudo mount /dev/nvme1n1 /instancestore
[ec2-user@ip-10-16-53-43 ~]$ cd /instancestore/
[ec2-user@ip-10-16-53-43 instancestore]$ ls
instancestore.txt
[ec2-user@ip-10-16-53-43 instancestore]$

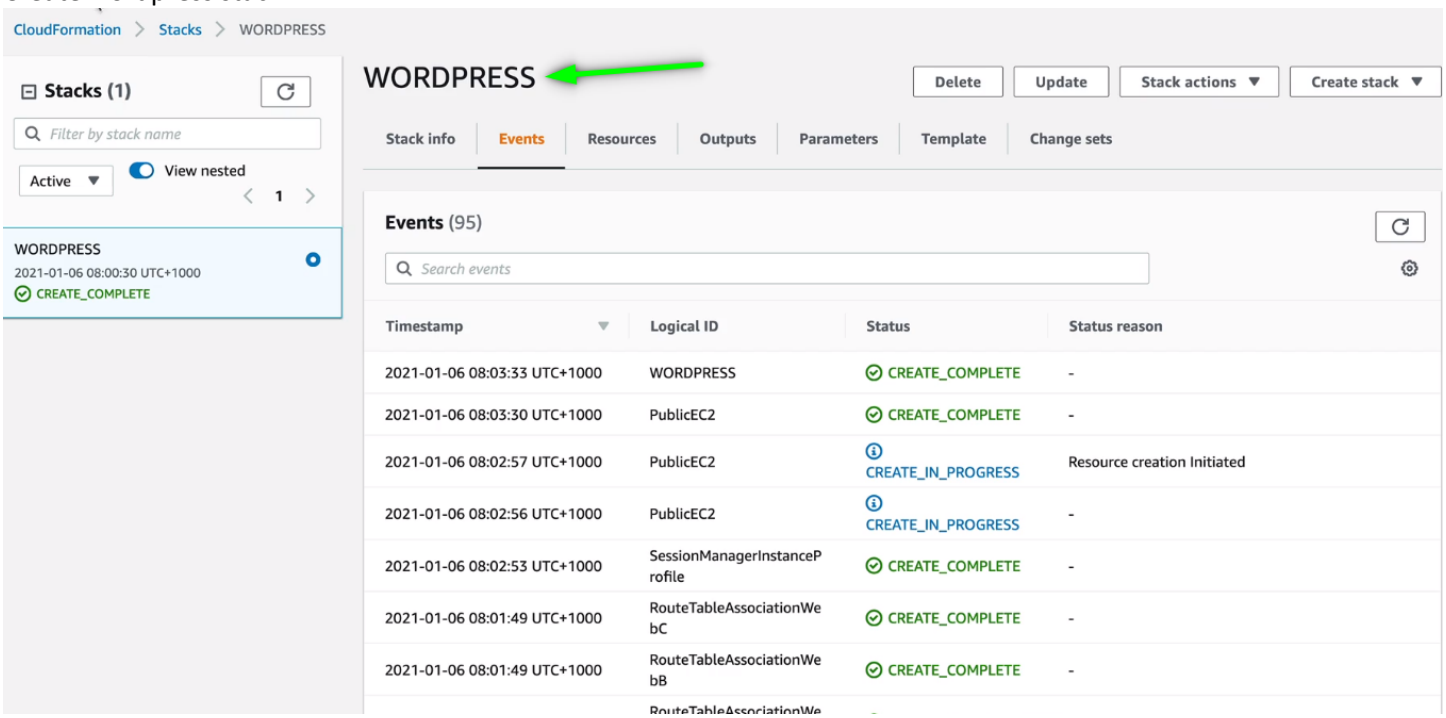
3. Manual Install of Wordpress on EC2

- In this [DEMO] lesson you will install wordpress on an EC2 instance.
- To appreciate the automation and efficiency which can be achieved within AWS you first need to experience the process manually.
- We will use EC2, install MariaDB, Apache & libraries and then download and install wordpress.

Commands for Manual WP install:

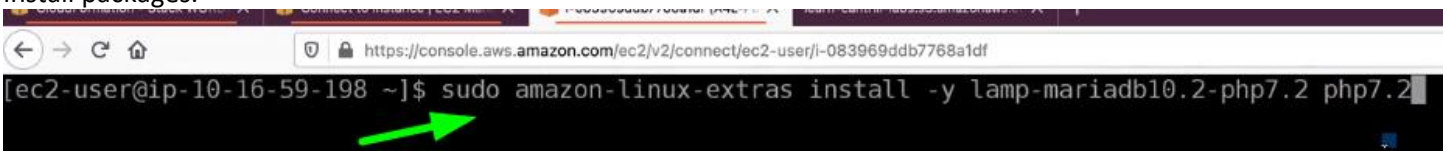
```
# DBName=database name for wordpress
# DBUser=mariadb user for wordpress
# DBPassword=password for the mariadb user for wordpress
# DBRootPassword = root password for mariadb
# STEP 1 - Configure Authentication Variables which are used below
DBName='a4lwordpress'
DBUser='a4lwordpress'
DBPassword='REPLACEME'
DBRootPassword='REPLACEME'
# STEP 2 - Install system software - including Web and DB
sudo yum install -y mariadb-server httpd wget
sudo amazon-linux-extras install -y lamp-mariadb10.2-php7.2 php7.2
# STEP 3 - Web and DB Servers Online - and set to startup
sudo systemctl enable httpd
sudo systemctl enable mariadb
sudo systemctl start httpd
sudo systemctl start mariadb
# STEP 4 - Set Mariadb Root Password
mysqladmin -u root password $DBRootPassword
# STEP 5 - Install Wordpress
sudo wget http://wordpress.org/latest.tar.gz -P /var/www/html
cd /var/www/html
sudo tar -zxvf latest.tar.gz
sudo cp -rvf wordpress/* .
sudo rm -R wordpress
sudo rm latest.tar.gz
# STEP 6 - Configure Wordpress
sudo cp ./wp-config-sample.php ./wp-config.php
sudo sed -i "s/'database_name_here'/'$DBName'/g" wp-config.php
sudo sed -i "s/'username_here'/'$DBUser'/g" wp-config.php
sudo sed -i "s/'password_here'/'$DBPassword'/g" wp-config.php
sudo chown apache:apache * -R
# STEP 7 Create Wordpress DB
echo "CREATE DATABASE $DBName;" >> /tmp/db.setup
echo "CREATE USER '$DBUser'@'localhost' IDENTIFIED BY '$DBPassword';" >> /tmp/db.setup
echo "GRANT ALL ON $DBName.* TO '$DBUser'@'localhost';" >> /tmp/db.setup
echo "FLUSH PRIVILEGES;" >> /tmp/db.setup
mysql -u root --password=$DBRootPassword < /tmp/db.setup
sudo rm /tmp/db.setup
# STEP 8 - Browse to http://your_instance_public_ipv4_ip
```

Create wordpress stack:



Set variables in instance:

Install packages:



Tar the wordpress .gz files

```
[ec2-user@ip-10-16-59-198 ~]$ mysqladmin -u root password $DBRootPassword
[ec2-user@ip-10-16-59-198 ~]$ sudo wget http://wordpress.org/latest.tar.gz -P /var/www/html
--2021-01-05 22:18:45--  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]
--2021-01-05 22:18:45--  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: 15422346 (15M) [application/octet-stream]
Saving to: '/var/www/html/latest.tar.gz'

100%[===================================================================================================>] 15,422,346  18.8MB/s   in 0.8s

2021-01-05 22:18:46 (18.8 MB/s) - '/var/www/html/latest.tar.gz' saved [15422346/15422346]

[ec2-user@ip-10-16-59-198 ~]$ cd /var/www/html
[ec2-user@ip-10-16-59-198 html]$ sudo tar -zxvf latest.tar.gz
```

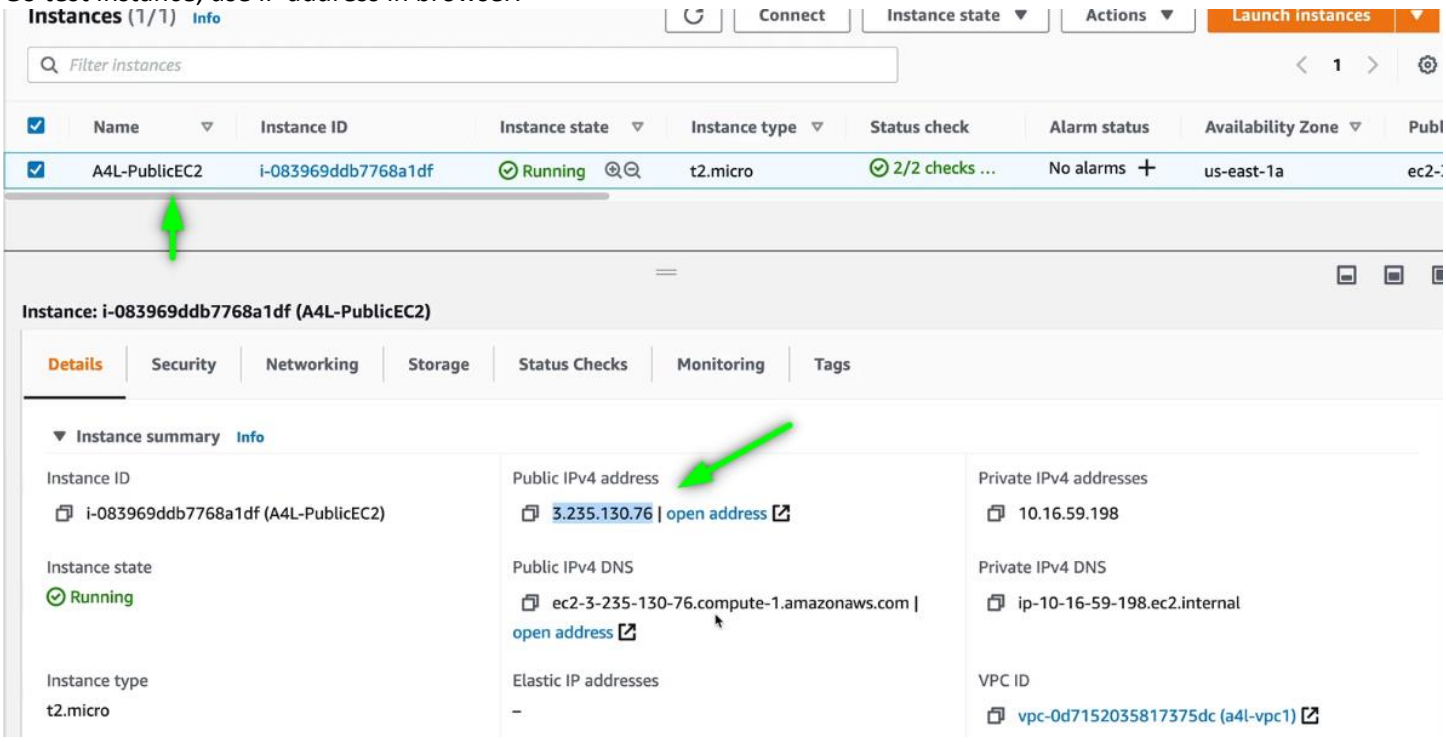
Confirm files in instance:

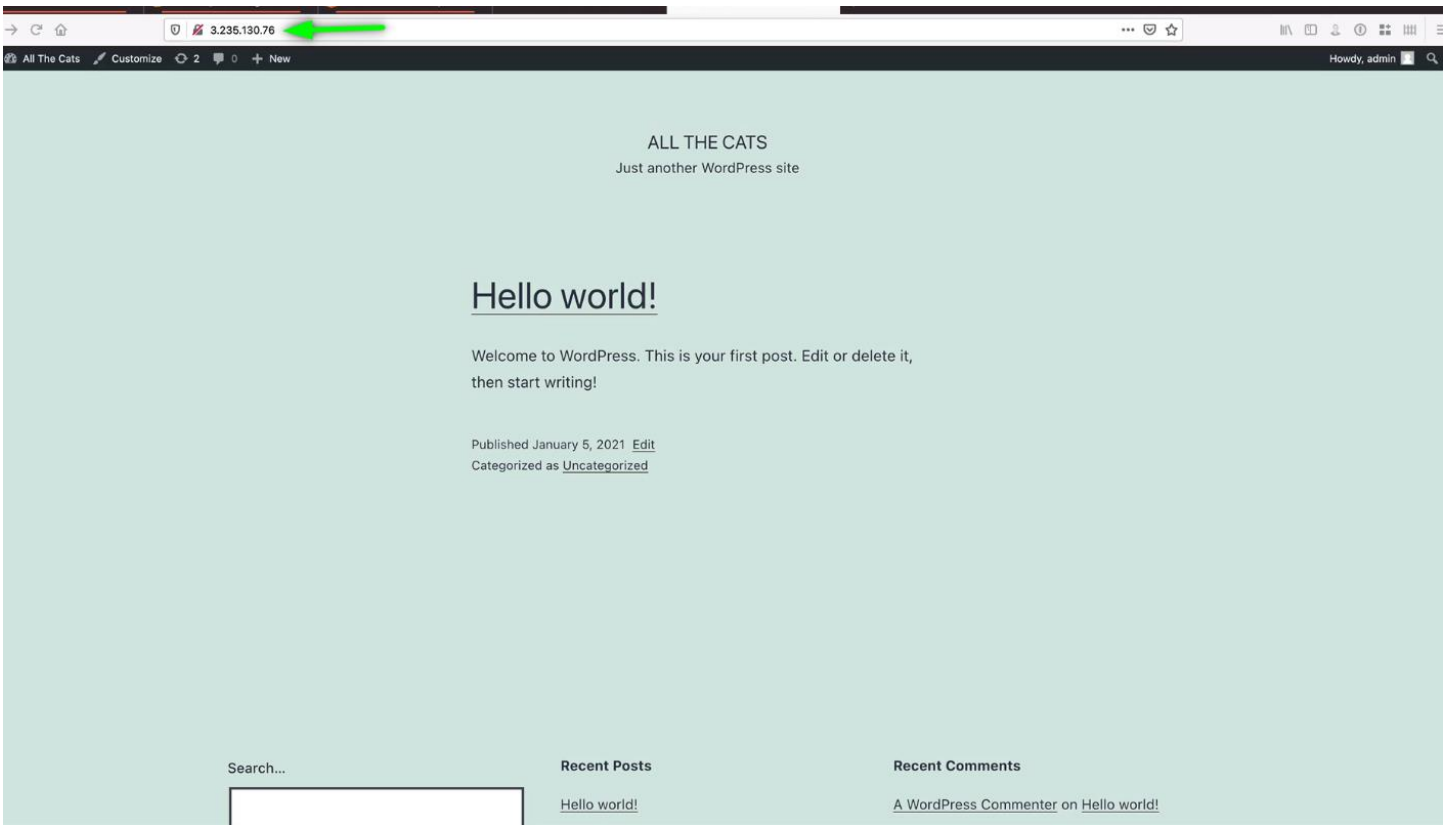
```
[ec2-user@ip-10-16-59-198 html]$ ls -la
total 216
drwxr-xr-x  5 root root  4096 Jan  5 22:21 .
drwxr-xr-x  4 root root    33 Jan  5 22:12 ..
-rw-r--r--  1 root root   405 Jan  5 22:20 index.php
-rw-r--r--  1 root root 19915 Jan  5 22:20 license.txt
-rw-r--r--  1 root root  7278 Jan  5 22:20 readme.html
-rw-r--r--  1 root root  7101 Jan  5 22:20 wp-activate.php
drwxr-xr-x  9 root root  4096 Jan  5 22:20 wp-admin
-rw-r--r--  1 root root   351 Jan  5 22:20 wp-blog-header.php
-rw-r--r--  1 root root  2328 Jan  5 22:20 wp-comments-post.php
-rw-r--r--  1 root root  2913 Jan  5 22:20 wp-config-sample.php
drwxr-xr-x  4 root root    52 Jan  5 22:20 wp-content
-rw-r--r--  1 root root  3939 Jan  5 22:20 wp-cron.php
drwxr-xr-x 25 root root  8192 Jan  5 22:20 wp-includes
-rw-r--r--  1 root root  2496 Jan  5 22:20 wp-links-opml.php
-rw-r--r--  1 root root  3300 Jan  5 22:20 wp-load.php
-rw-r--r--  1 root root 49831 Jan  5 22:20 wp-login.php
-rw-r--r--  1 root root  8509 Jan  5 22:20 wp-mail.php
-rw-r--r--  1 root root 20975 Jan  5 22:20 wp-settings.php
-rw-r--r--  1 root root 31337 Jan  5 22:20 wp-signup.php
-rw-r--r--  1 root root  4747 Jan  5 22:20 wp-trackback.php
-rw-r--r--  1 root root  3236 Jan  5 22:20 xmlrpc.php
[ec2-user@ip-10-16-59-198 html]$
```

Finish wordpress setup:

```
[ec2-user@ip-10-16-59-198 html]$ echo "CREATE DATABASE $DBName;" >> /tmp/db.setup
[ec2-user@ip-10-16-59-198 html]$ echo "CREATE USER '$DBUser'@'localhost' IDENTIFIED BY '$DBPassword';" >> /tmp/db.setup
[ec2-user@ip-10-16-59-198 html]$ echo "GRANT ALL ON $DBName.* TO '$DBUser'@'localhost';" >> /tmp/db.setup
[ec2-user@ip-10-16-59-198 html]$ echo "FLUSH PRIVILEGES;" >> /tmp/db.setup
[ec2-user@ip-10-16-59-198 html]$ cat /tmp/db.setup
CREATE DATABASE a4lwordpress;
CREATE USER 'a4lwordpress'@'localhost' IDENTIFIED BY '4n1m4l$4L1f3';
GRANT ALL ON a4lwordpress.* TO 'a4lwordpress'@'localhost';
FLUSH PRIVILEGES;
[ec2-user@ip-10-16-59-198 html]$ mysql -u root --password=$DBRootPassword < /tmp/db.setup
[ec2-user@ip-10-16-59-198 html]$ sudo rm /tmp/db.setup
```

Go test instance, use IP address in browser:





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4. Creating an Animals4life AMI

- In this [DEMO] after recovering from the announcement that you will AGAIN have to install wordpress manually on EC2 .. you create a customized EC2 instance which has wordpress installed and configured right up to the 'create site' stage.
- Additionally you improve the EC2 login screen by replacing the usual banned, with one provided by `cowsay` (It's animal themed !!)
- Once the EC2 instance is ready - you will create an AMI from the customized source instance and use this to deploy a custom EC2 instance from this AMI.
- Its a simple example - but mirrors real world usage of AMI Baking.

Pause WP instance, create image, snapshot, and AMI:

Image name

Animals4lifeTemplateWordpress

Maximum 127 characters. Can't be modified after creation.

Image description - *optional*

Animals4lifeTemplateWordpress

Maximum 255 characters

No reboot

☐ Enable

Instance volumes

Volume type	Device	Snapshot	Size	Volume type	IOPS	Throughput	Delete on termination	Encrypted
EBS	/dev/x...	Create new snapshot fr...	8	EBS General Purpose SS...	100		☑ Enable	☐ Enable

Add volume

ⓘ During the image creation process, Amazon EC2 creates a snapshot of each of the above volumes.

Tags - *optional*

A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

◉ Tag image and snapshots together
Tag the image and the snapshots with the same tag.

○ Tag image and snapshots separately
Tag the image and the snapshots with different tags.

Create Snapshot | Actions

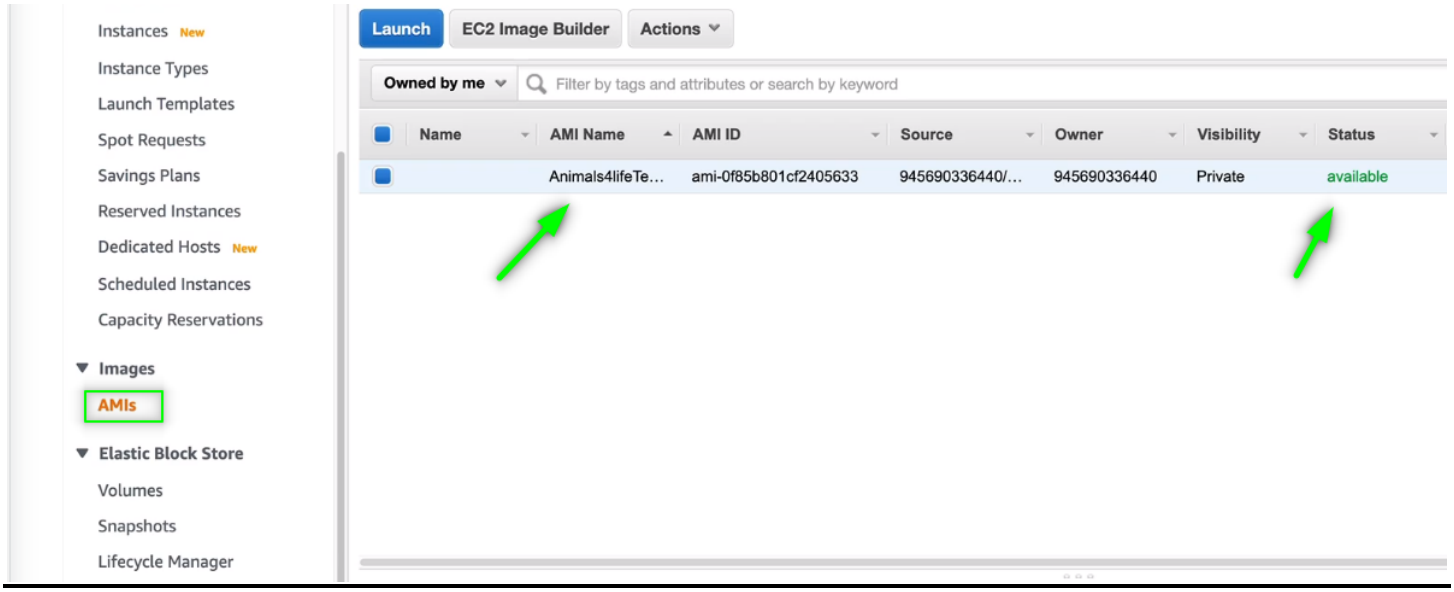
Owned By Me | Filter by tags and attributes or search by keyword

Name	Snapshot ID	Size	Description	Status
	snap-0778d5de87e...	8 GiB	Created by CreateImage(i-0fe4835fbab21eacd) for ami-0f85b8...	complet

Snapshot: snap-0778d5de87ea72968

Description | Permissions | Tags

Snapshot ID	snap-0778d5de87ea72968	Progress	100%
Status	completed	Capacity	8 GiB


Instances New
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances
Dedicated Hosts New
Scheduled Instances
Capacity Reservations
Images
AMIs
Elastic Block Store
Volumes
Snapshots
Lifecycle Manager
Launch
EC2 Image Builder
Actions
Owned by me
Filter by tags and attributes or search by keyword
Name
AMI Name
AMI ID
Source
Owner
Visibility
Status
Animals4lifeTe...
ami-0f85b801cf2405633
945690336440/...
945690336440
Private
available