

Assignment – VPC

1) VPC Creation

Created VPC 'vpc-efs-assignment' with CIDR 172.31.0.0/16

VPC > Your VPCs > vpc-0e4c61e2ceb7d4401

vpc-0e4c61e2ceb7d4401 / vpc-efs-assignment Actions ▼

Details [Info](#)

VPC ID vpc-0e4c61e2ceb7d4401	State Available	DNS hostnames Enabled	DNS resolution Enabled
Tenancy Default	DHCP option set dopt-025cf209bc456c85b	Main route table rtb-01f7c8ebbc036e80d / rt-efs-assignment	Main network ACL acl-0418fc8b974dad3ef
Default VPC Yes	IPv4 CIDR 172.31.0.0/16	IPv6 pool -	IPv6 CIDR -
Network Address Usage metrics Disabled	Route 53 Resolver DNS Firewall rule groups -	Owner ID 010526255569	

2) Subnet Creation

Created subnets in different AZs for high availability

Subnets (3) [Info](#)

Find resources by attribute or tag

Last updated 3 minutes ago Actions ▼ Create subnet

<input type="checkbox"/>	Name	Subnet ID	State	VPC	IPv4 CIDR	IPv6 ...	IPv6 ...	Avail...	Availability Zone
<input type="checkbox"/>	subnet-ubuntu	subnet-0837e13463b2ae4ad	Available	vpc-0e4c61e2ceb7d4401 vpc-...	172.31.16.0/20	-	-	4090	eu-west-1a
<input type="checkbox"/>	subnet-redhat	subnet-0a6fa8ae1d5fa4111	Available	vpc-0e4c61e2ceb7d4401 vpc-...	172.31.32.0/20	-	-	4090	eu-west-1b
<input type="checkbox"/>	subnet-amazon	subnet-01047710648a26dc3	Available	vpc-0e4c61e2ceb7d4401 vpc-...	172.31.0.0/20	-	-	4090	eu-west-1c

3) Route Table

Created one route table and associated all three subnets under it as the routing rule for all can be same.

VPC > Route tables > rtb-01f7c8ebbc036e80d

rtb-01f7c8ebbc036e80d / rt-efs-assignment Actions

Details [Info](#)

Route table ID rtb-01f7c8ebbc036e80d	Main Yes	Explicit subnet associations 3 subnets	Edge associations -
VPC vpc-0e4c61e2ceb7d4401 vpc-efs-assignment	Owner ID 010526255569		

[Routes](#) [Subnet associations](#) [Edge associations](#) [Route propagation](#) [Tags](#)

Explicit subnet associations (3) Edit subnet associations

Name	Subnet ID	IPv4 CIDR	IPv6 CIDR
subnet-ubuntu	subnet-0837e13463b2ae4ad	172.31.16.0/20	-
subnet-redhat	subnet-0a6fa8ae1d5fa4111	172.31.32.0/20	-
subnet-amazon	subnet-01047710648a26dc3	172.31.0.0/20	-

Subnet association

VPC > Route tables > rtb-01f7c8ebbc036e80d

rtb-01f7c8ebbc036e80d / rt-efs-assignment Actions

Details [Info](#)

Route table ID rtb-01f7c8ebbc036e80d	Main Yes	Explicit subnet associations 3 subnets	Edge associations -
VPC vpc-0e4c61e2ceb7d4401 vpc-efs-assignment	Owner ID 010526255569		

[Routes](#) [Subnet associations](#) [Edge associations](#) [Route propagation](#) [Tags](#)

Routes (2) Both Edit routes

Destination	Target	Status	Propagated
0.0.0.0/0	igw-0d470d15ae65bdcae	Active	No
172.31.0.0/16	local	Active	No

Routing rules

4) Security Groups

Created security groups to secure the ENI and also created inbound & outbound rules for them. All the rules have been granted access on port 2049 for enabling NFS on the servers.

NOTE: Only 1 SG can also be created for this scenario

Security Groups (3) Info						
<input type="text" value="Find resources by attribute or tag"/>						
<input type="checkbox"/>	Name	Security group ID	Security group name	VPC ID	Description	
<input type="checkbox"/>	sg-amazon	sg-083c363b02eb50679	amazon-sg	ypc-0e4c61e2ceb7d4401	default VPC	
<input type="checkbox"/>	sg-redhat	sg-0eb391be119398cb1	redhat-sg	ypc-0e4c61e2ceb7d4401	default VPC	
<input type="checkbox"/>	sg-ubuntu	sg-051dc4c04c23d6efc	default	ypc-0e4c61e2ceb7d4401	default VPC	

Security Groups

VPC > Security Groups > sg-083c363b02eb50679

sg-083c363b02eb50679 - amazon-sg

Actions

Details

Security group name

amazon-sg

Security group ID

sg-083c363b02eb50679

Description

default VPC security group

VPC ID

ypc-0e4c61e2ceb7d4401

Owner

010526255569

Inbound rules count

4 Permission entries

Outbound rules count

3 Permission entries

Inbound rules

Outbound rules

Tags

Inbound rules (4)

Manage tags

Edit inbound rules

Search

	Name	Security group rule...	IP version	Type	Protocol	Port range	Source	Description
<input type="checkbox"/>	-	sg-03883326795f2bc16	IPv4	SSH	TCP	22	0.0.0.0/0	-
<input type="checkbox"/>	-	sg-07740b8f66aa87657	IPv4	HTTP	TCP	80	0.0.0.0/0	-
<input type="checkbox"/>	-	sg-051037076bfe6c32f	IPv4	NFS	TCP	2049	0.0.0.0/0	-
<input type="checkbox"/>	-	sg-0c42487b4a92f0722	IPv4	HTTPS	TCP	443	0.0.0.0/0	-

VPC > Security Groups > sg-083c363b02eb50679 - amazon-sg

sg-083c363b02eb50679 - amazon-sg

Actions

Details

Security group name

amazon-sg

Security group ID

sg-083c363b02eb50679

Description

default VPC security group

VPC ID

ypc-0e4c61e2ceb7d4401

Owner

010526255569

Inbound rules count

4 Permission entries

Outbound rules count

3 Permission entries

Inbound rules

Outbound rules

Tags

Outbound rules (3)

🔄

Manage tags

Edit outbound rules

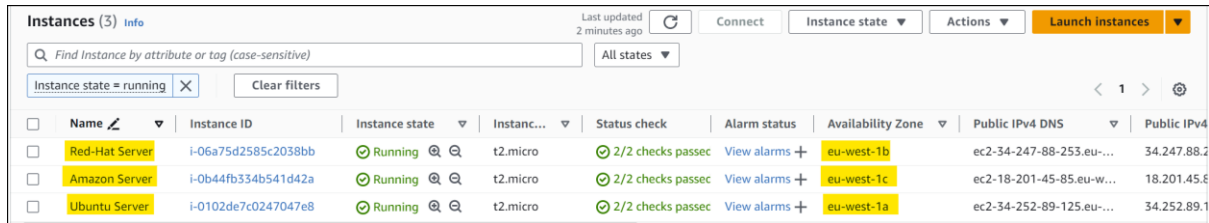
🔍 Search

<input type="checkbox"/>	Name	Security group rule...	IP version	Type	Protocol	Port range	Destination	Description
<input type="checkbox"/>	-	sg-0724016b2cfc8c95	IPv4	SSH	TCP	22	0.0.0.0/0	-
<input type="checkbox"/>	-	sg-08cd6e7bcf9430e78	IPv4	All traffic	All	All	0.0.0.0/0	-
<input type="checkbox"/>	-	sg-003d07fee94c87211	IPv4	NFS	TCP	2049	0.0.0.0/0	-

The rules are same for all security groups as all need to be linked to EFS.

5) EC2 Creation

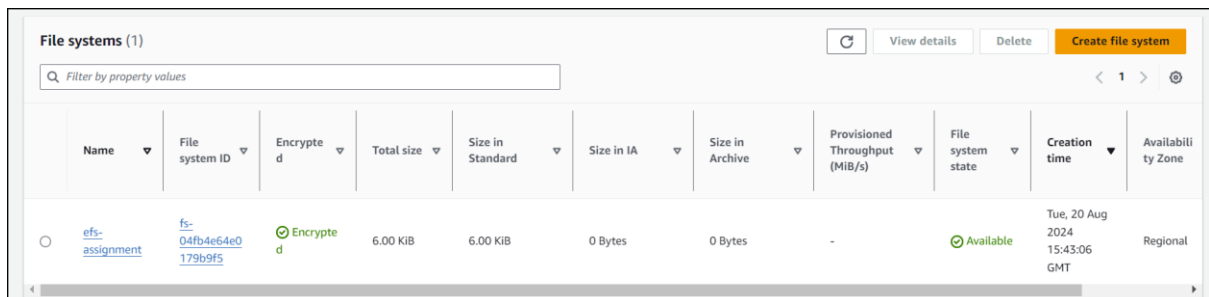
Created three EC2 instances, Red Hat Linux, Amazon Linux and Ubuntu and attached each to subnets in different AZs for high availability.



	Name	Instance ID	Instance state	Instanc...	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4
<input type="checkbox"/>	Red-Hat Server	i-06a75d2585c2038bb	Running	t2.micro	2/2 checks passed	View alarms +	eu-west-1b	ec2-34-247-88-253.eu-...	34.247.88.2
<input type="checkbox"/>	Amazon Server	i-0b44fb334b541d42a	Running	t2.micro	2/2 checks passed	View alarms +	eu-west-1c	ec2-18-201-45-85.eu-w...	18.201.45.6
<input type="checkbox"/>	Ubuntu Server	i-0102de7c0247047e8	Running	t2.micro	2/2 checks passed	View alarms +	eu-west-1a	ec2-34-252-89-125.eu-...	34.252.89.1

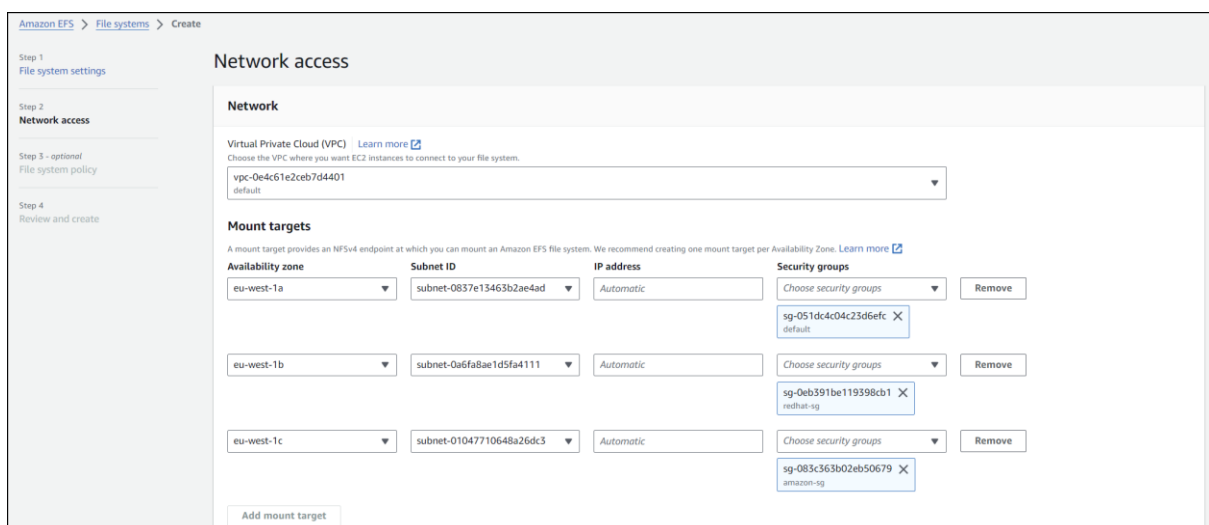
6) EFS Creation

Created three EC2 instances, Red Hat Linux, Amazon Linux and Ubuntu and attached each to subnets in different AZs for high availability.



	Name	File system ID	Encrypte d	Total size	Size in Standard	Size in IA	Size in Archive	Provisioned Throughput (MiB/s)	File system state	Creation time	Availabili ty Zone
<input type="radio"/>	efs-assignment	fs-04fb4e64e0179b9f5	Encrypte d	6.00 KiB	6.00 KiB	0 Bytes	0 Bytes	-	Available	Tue, 20 Aug 2024 15:43:06 GMT	Regional

The mount targets were configured on security groups for Ubuntu, Red Hat Linux and Amazon Linux respectively.



Amazon EFS > File systems > Create

Step 1: File system settings

Step 2: Network access

Step 3 - optional: File system policy

Step 4: Review and create

Network access

Network

Virtual Private Cloud (VPC) [Learn more](#)

Choose the VPC where you want EC2 instances to connect to your file system.

vpc-0e4c61e2ceb7d4401

default

Mount targets

A mount target provides an NFSv4 endpoint at which you can mount an Amazon EFS file system. We recommend creating one mount target per Availability Zone. [Learn more](#)

Availability zone	Subnet ID	IP address	Security groups	
eu-west-1a	subnet-0837e13463b2ae4ad	Automatic	Choose security groups	Remove
			sg-051dc4c04c23d6efc	default
eu-west-1b	subnet-0a6fa8ae1d5fa4111	Automatic	Choose security groups	Remove
			sg-0eb391be119398cb1	redhat-sg
eu-west-1c	subnet-01047710648a26dc3	Automatic	Choose security groups	Remove
			sg-083c363b02eb50679	amazon-sg

[Add mount target](#)

8) Mounting EC2

Launch each EC2 instances and install NFS utils on them

a) Red Hat Linux EC2

Red Hat Linux instance cannot be launched directly from AWS console. To launch the instance, open command prompt and navigate to the folder where key pair file is saved.

```
Microsoft Windows [Version 10.0.22631.4037]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Taeb>cd downloads

C:\Users\Taeb\Downloads>dir
Volume in drive C is OS
Volume Serial Number is 4AB8-0596

Directory of C:\Users\Taeb\Downloads

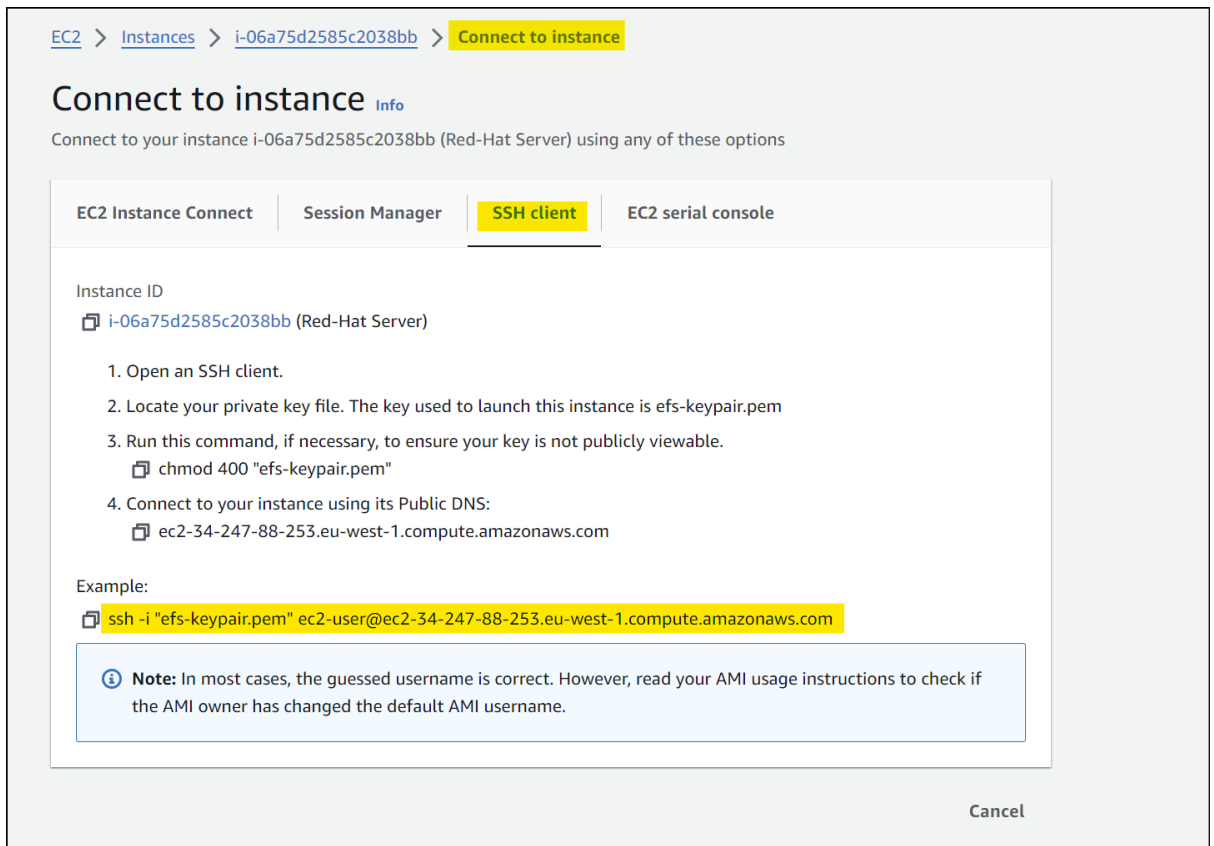
19-08-2024  21:30    <DIR>          .
20-08-2024  20:31    <DIR>          ..
19-08-2024  20:16             1,678 efs-keypair.pem
19-08-2024  21:29          263,131 home (1).htm
19-08-2024  21:29          263,131 home (2).htm
19-08-2024  21:29          175,819 home (3).htm
19-08-2024  21:30          263,131 home (4).htm
19-08-2024  21:29          263,131 home.htm
02-08-2024  19:12    <DIR>          New folder (2)
19-08-2024  19:58          1,430 test-keypair.ppk
              7 File(s)          1,231,451 bytes
              3 Dir(s)  216,314,810,368 bytes free

C:\Users\Taeb\Downloads>
```

Check for Key Pair

Once, we have moved to the necessary folder, we can connect to the instance using its public DNS which can be located in the 'SSH Client' tab when Connect button is clicked.

Instances (1/3) Info									
Find Instance by attribute or tag (case-sensitive)									
All states									
Instance state = running X Clear filters									
	Name	Instance ID	Instance state	Instanc...	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4
<input checked="" type="checkbox"/>	Red-Hat Server	i-06a75d2585c2038bb	Running	t2.micro	2/2 checks passec	View alarms +	eu-west-1b	ec2-34-247-88-253.eu-...	34.247.88.2
<input type="checkbox"/>	Amazon Server	i-0b44fb334b541d42a	Running	t2.micro	2/2 checks passec	View alarms +	eu-west-1c	ec2-18-201-45-85.eu-w...	18.201.45.8
<input type="checkbox"/>	Ubuntu Server	i-0102de7c0247047e8	Running	t2.micro	2/2 checks passec	View alarms +	eu-west-1a	ec2-34-252-89-125.eu-...	34.252.89.1



Copy the URL from the page as highlighted in the screenshot and in command prompt, paste it in directory where key pair is placed

```
C:\Users\Taeb\Downloads>ssh -i "efs-keypair.pem" ec2-user@ec2-34-247-88-253.eu-west-1.compute.amazonaws.com
Register this system with Red Hat Insights: insights-client --register
Create an account or view all your systems at https://red.ht/insights-dashboard
Last login: Tue Aug 20 15:01:41 2024 from 111.125.235.31
[ec2-user@ip-172-31-38-64 ~]$
```

Once the connection is established instance, install NFS utils

```
[root@ip-172-31-38-64 ec2-user]# sudo yum install -y nfs-utils

Installed:
  gssproxy-0.8.4-6.el9.x86_64      keyutils-1.6.3-1.el9.x86_64      libev-4.33-5.el9.x86_64
  libnfsidmap-1:2.5.4-25.el9.x86_64  libtirpc-1.3.3-8.el9.x86_64      libverto-libev-0.3.2-3.el9.x86_64
  nfs-utils-1:2.5.4-25.el9.x86_64    quota-1:4.06-6.el9.x86_64        quota-nls-1:4.06-6.el9.noarch
  rpcbind-1.2.6-7.el9.x86_64         sssd-nfs-idmap-2.9.4-6.el9.x86_64

Complete!
[root@ip-172-31-38-64 ec2-user]#
```

Create a Mount Point

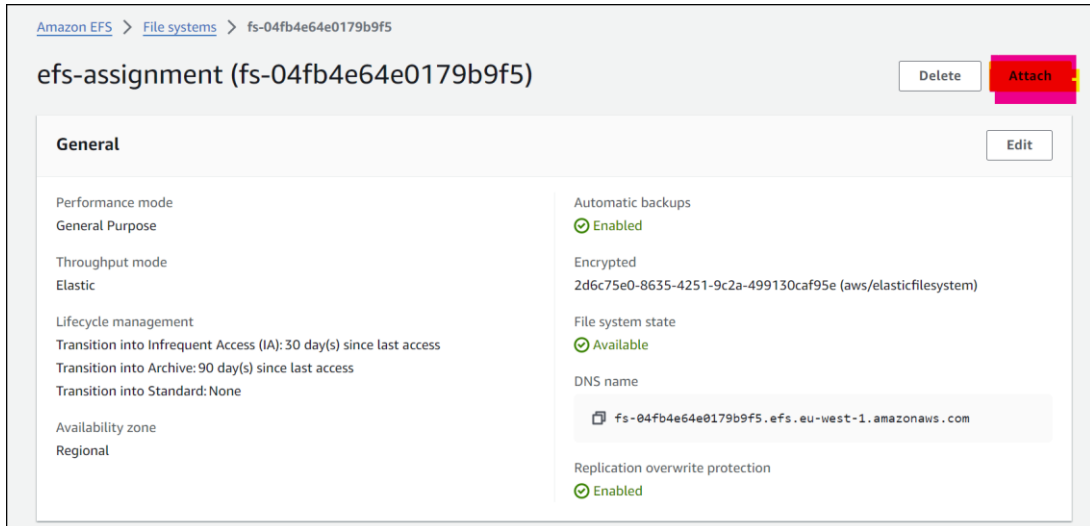
```
[root@ip-172-31-38-64 ec2-user]# mkdir efsTest
```

Verify folder creation

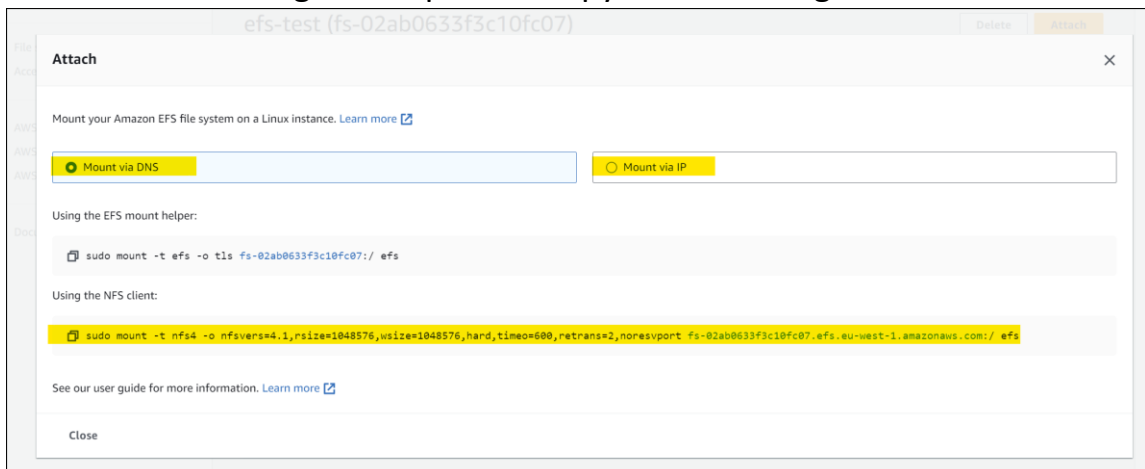
```
[root@ip-172-31-38-64 ec2-user]# ll
total 0
drwxr-xr-x. 2 root root 6 Aug 20 16:22 efsTest
```

Mount the EFS

Go to EFS instance created and click 'Attach'



Select the mounting technique and copy the mounting URL



Paste the URL in command prompt and at the end replace efs with the mounting folder

```
[root@ip-172-31-38-64 ec2-user]# sudo mount -t nfs4 -o nfsvers=4.1,rsize=1048576,wsiz=1048576,hard,timeo=600,retrans=2,noresvport fs-02ab0633f3c10fc07.efs.eu-west-1.amazonaws.com:/ efsTest
[root@ip-172-31-38-64 ec2-user]#
```

```
[root@ip-172-31-38-64 ec2-user]# df -h
Filesystem                                Size  Used Avail Use% Mounted on
devtmpfs                                4.0M    0   4.0M   0% /dev
tmpfs                                   383M    0   383M   0% /dev/shm
tmpfs                                   154M  4.4M   149M   3% /run
/dev/xvda4                             8.8G  1.6G   7.3G  18% /
/dev/xvda3                             960M  168M   793M  18% /boot
/dev/xvda2                             200M   7.1M   193M   4% /boot/efi
tmpfs                                   77M    0    77M   0% /run/user/1000
fs-02ab0633f3c10fc07.efs.eu-west-1.amazonaws.com:/ 8.0E    0   8.0E   0% /home/ec2-user/efsTest
[root@ip-172-31-38-64 ec2-user]#
```

Launch Amazon Linux EC2 instance and check if NFS utils is installed

```
A newer release of "Amazon Linux" is available.
Version 2023.5.20240819:
Run "/usr/bin/dnf check-release-update" for full release and version update info

#
~\##### Amazon Linux 2023
~~\#####\
~~\#####|
~~\#/ https://aws.amazon.com/linux/amazon-linux-2023
~~V~' '~>
~~~
~~~.~.~
~~~/_m/'

Last login: Tue Aug 20 15:08:34 2024 from 18.202.216.52
[ec2-user@ip-172-31-10-205 ~]$ sudo su
[root@ip-172-31-10-205 ec2-user]# sudo yum install -y amazon-efs-utils
Last metadata expiration check: 4:11:06 ago on Tue Aug 20 12:22:04 2024.
Package amazon-efs-utils-2.0.4-1.amzn2023.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[root@ip-172-31-10-205 ec2-user]#
```


Once verified, create mounting folder with the same commands as used in red hat Linux server

Mounting of folder completed on Amazon Linux EC2

```
[root@ip-172-31-10-205 /]# sudo mount -t nfs4 -o nfsvers=4.1,rsize=1048576,wsiz=1048576,hard,timeo=600,fsid=/efsAmazon .amazonaws.com:/ efsAmazon
[root@ip-172-31-10-205 /]# df -h
```

Filesystem	Size	Used	Avail	Use%	Mounted on
devtmpfs	4.0M	0	4.0M	0%	/dev
tmpfs	475M	0	475M	0%	/dev/shm
tmpfs	190M	440K	190M	1%	/run
/dev/xvda1	8.0G	1.6G	6.4G	20%	/
tmpfs	475M	0	475M	0%	/tmp
/dev/xvda128	10M	1.3M	8.7M	13%	/boot/efi
tmpfs	95M	0	95M	0%	/run/user/1000
fs-02ab0633f3c10fc07.efs.eu-west-1.amazonaws.com:/	8.0E	0	8.0E	0%	/efsAmazon

```
[root@ip-172-31-10-205 /]#
```

c) Ubuntu instance

Launch Ubuntu EC2 instance and check if NFS utils is installed

```
root@ip-172-31-16-88:/home/ubuntu# sudo apt-get update
sudo apt-get install -y nfs-common
Hit:1 http://eu-west-1.ec2.archive.ubuntu.com/ubuntu jammy InRelease
Hit:2 http://eu-west-1.ec2.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:3 http://eu-west-1.ec2.archive.ubuntu.com/ubuntu jammy-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu jammy-security InRelease
Reading package lists... Done
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
nfs-common is already the newest version (1:2.6.1-1ubuntu1.2).
0 upgraded, 0 newly installed, 0 to remove and 35 not upgraded.
root@ip-172-31-16-88:/home/ubuntu#
```

i-0102de7c0247047e8 (Ubuntu Server)

PublicIPs: 34.252.89.125 PrivateIPs: 172.31.16.88

Once verified, create mounting folder with the same commands as used in Red Hat Linux and Amazon Linux servers

Mounting of folder completed on Ubuntu EC2

```
root@ip-172-31-16-88:/# sudo mount -t nfs4 -o nfsvers=4.1,rsize=1048576,wsiz=1048576,hard,timeo=600,fsid=/efsUbuntu .amazonaws.com:/ efsUbuntu
root@ip-172-31-16-88:/# df -h
```

Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/root	7.6G	2.0G	5.6G	27%	/
tmpfs	475M	0	475M	0%	/dev/shm
tmpfs	190M	876K	189M	1%	/run
tmpfs	5.0M	0	5.0M	0%	/run/lock
/dev/xvda15	105M	6.1M	99M	6%	/boot/efi
tmpfs	95M	4.0K	95M	1%	/run/user/1000
fs-02ab0633f3c10fc07.efs.eu-west-1.amazonaws.com:/	8.0E	0	8.0E	0%	/efsUbuntu

```
root@ip-172-31-16-88:/#
```

9) Test EFS establishment

Create a sample file in the mounted folder and write some text into it. If EFS connection was established successfully between the servers, the other EC2 instances should also be able to access the file.

Move to the mounted folder and create a file

```
[root@ip-172-31-38-64 /]# cd efsRedHat
[root@ip-172-31-38-64 efsRedHat]# vi TestEFSTestConnection.txt
```

Write to the file

```
This is a test for EFS connection.
Let's see
```

2

!wq:

: wq !

Note: To save the file, press ESC button, then enter colon, press 's' to save and 'q' to quit and '!' and hit ENTER.

Verify file content

```
[root@ip-172-31-38-64 efsRedHat]# cat TestEFSConnection.txt
This is a test for EFS connection.
Let's see
[root@ip-172-31-38-64 efsRedHat]#
```

10) Verify the created file in other servers

Ubuntu

Move to the mounted folder and check if file exists

```
root@ip-172-31-16-88:/efsUbuntu# ll
total 12
drwxr-xr-x  2 root root 6144 Aug 20 17:14 ./
drwxr-xr-x 20 root root 4096 Aug 20 16:45 ../
-rw-r--r--  1 root root   45 Aug 20 17:14 TestEFSConnection.txt
root@ip-172-31-16-88:/efsUbuntu#
```

```
root@ip-172-31-16-88:/efsUbuntu# cat TestEFSConnection.txt
This is a test for EFS connection.
Let's see
root@ip-172-31-16-88:/efsUbuntu#
```

The file exists; hence, we can conclude that this server is mounted properly to the EFS

Amazon Linux

Move to the mounted folder and check if file exists

```
[root@ip-172-31-10-205 /]# cd efsAmazon
```

```
[root@ip-172-31-10-205 efsAmazon]# ll
total 4
-rw-r--r--. 1 root root 45 Aug 20 17:14 TestEFSConnection.txt
```

```
[root@ip-172-31-10-205 efsAmazon]# cat TestEFSConnection.txt
This is a test for EFS connection.
Let's see
[root@ip-172-31-10-205 efsAmazon]#
```

As all servers are able to access the file created in one of the mounted folders, we can conclude that the EFS connection was established successfully