

How to attach EFS to Multiple EC2 Instances

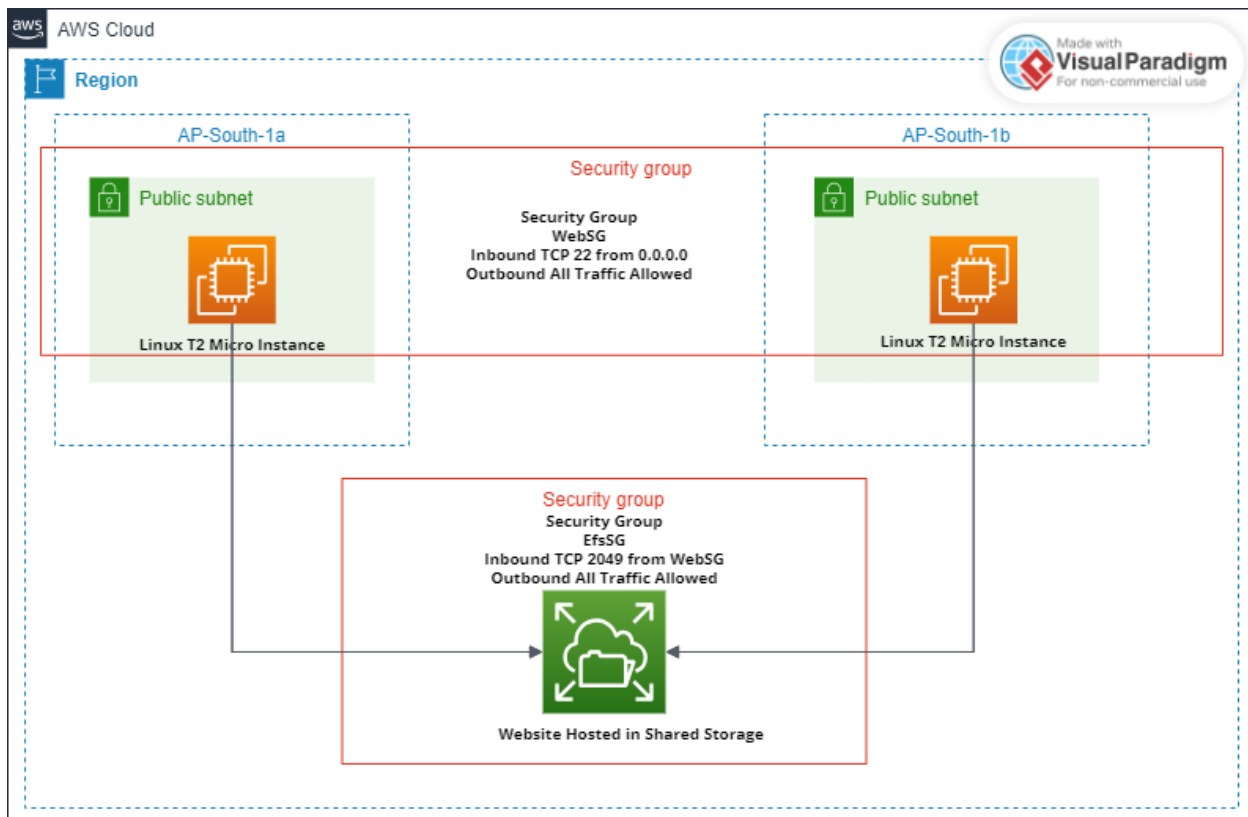
In this project we will explore how we can connect single EFS in to two or more EC2 Instances.

As we know the main disadvantage of EBS is we can't use EBS as shared storage, since EBS is a DAS (Direct Attached Storage).

EFS is a File Storage which can be used as Shared Storage across multiple Instances.

EC2 only supports Linux as EFS is a NFS (Network File System) which is part of Linux File System.

Architecture:-



Here we create EFS and attach that EFS into EC2 Instances hosted in two different AZ. We create two security group one for EFS and one more for the EC2 Instances.

We will only allow EC2 instances to access EFS.

EFS is a managed storage for EC2.

We can achieve High availability with multi-AZ website hosting with shared file storage.

Step 1 (Create Security Group)

- Create Security Groups for Web Server “WebSG”.
 - Security name
 - Select VPC
 - Add Inbound rules
 - Add Outbound rules

EC2 > Security Groups > Create security group

Create security group [Info](#)

A security group acts as a virtual firewall for your instance to control inbound and outbound traffic. To create a new security group, complete the fields below.

Basic details

Security group name [Info](#)

Name cannot be edited after creation.

Description [Info](#)

VPC [Info](#)

EC2 > Security Groups > Create security group

Inbound rules [Info](#)

Type Info	Protocol Info	Port range Info	Source Info	Description - optional Info
Custom TCP	TCP	22	Anywhere... <input type="text" value="0.0.0.0/0"/>	<input type="text"/>
Add rule				

Rules with source of 0.0.0.0/0 or ::/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

Outbound rules [Info](#)

Type Info	Protocol Info	Port range Info	Destination Info	Description - optional Info
All traffic	All	All	Custom <input type="text" value="0.0.0.0/0"/>	<input type="text"/>
Add rule				

Rules with destination of 0.0.0.0/0 or ::/0 allow your instances to send traffic to any IPv4 or IPv6 address. We recommend setting security group rules to be more restrictive and to only allow traffic to specific known IP addresses.

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.

No tags associated with the resource.

[Add new tag](#)

You can add up to 50 more tags

[Cancel](#) [Create security group](#)

- Create Security Groups for “EFS”
 - Security name
 - Select VPC
 - Add Inbound rules (EFS default port 2049 add webserver security group as inbound traffic)
 - Add Outbound rules

EC2 > Security Groups > Create security group

Create security group Info

A security group acts as a virtual firewall for your instance to control inbound and outbound traffic. To create a new security group, complete the fields below.

Basic details

Security group name Info

Name cannot be edited after creation.

Description Info

VPC Info

Inbound rules Info

Type Info Protocol Info Port range Info Source Info Description - optional Info

NFS TCP 2049 Custom sg-0e90dd23d377fd1d X

sg-0e90dd23d377fd1d X

Add rule

Outbound rules Info

Type Info Protocol Info Port range Info Destination Info Description - optional Info

All traffic All All Custom 0.0.0.0 X

Add rule

Rules with destination of 0.0.0.0/0 or ::/0 allow your instances to send traffic to any IPv4 or IPv6 address. We recommend setting security group rules to be more restrictive and to only allow traffic to specific known IP addresses. X

Security Group

Dashboard EC2 Global View Events

Security group (sg-088e87638810e3f3c | NFS) was created successfully

Details

Security Groups (3) Info Actions Export security groups to CSV Create security group

Find resources by attribute or tag

	Name	Security group ID	Security group name	VPC ID	Description	Owner	In
<input type="checkbox"/>	WebSG	sg-0e90dd23d377fd1d	WebSG	vpc-060c8882095d0a8d8	Security group for EFS	529088293565	11
<input type="checkbox"/>	EFS-SG	sg-088e87638810e3f3c	NFS	vpc-060c8882095d0a8d8	Security Group For EFS	529088293565	11
<input type="checkbox"/>	-	sg-0553230d1f91a673f	default	vpc-060c8882095d0a8d8	default VPC security group	529088293565	81

Step2 (Create EC2 Instances)

- Create 2 Linux Machine and ensure both under different AZ
 - First Linux Machine

Launch an instance

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.

Name and tags

Name: [Add additional tags](#)

Application and OS Images (Amazon Machine Image)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below.

Recents **Quick Start**

Amazon Linux macOS Ubuntu Windows Red Hat SUSE Linux Debian

Amazon Machine Image (AMI)

Ubuntu Server 24.04 LTS (HVM), 55D Volume Type
ami-0672f5b9210aa093 (64-bit (x86)) / ami-0c2e5288624699c8b (64-bit (Arm))
Virtualization: hvm ENA enabled: true Root device type: ebs

Summary

Number of instances:

Software Image (AMI)
Canonical, Ubuntu, 24.04, amd64...read more
ami-0672f5b9210aa093

Virtual server type (instance type)
t2.micro

Firewall (security group)
WebSG

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GiB of snapshots, and 100 GiB of bandwidth to the internet.

[Cancel](#) [Launch instance](#) [Preview code](#)

Description

Ubuntu Server 24.04 LTS (HVM), EBS General Purpose (SSD) Volume Type. Support available from Canonical (<http://www.ubuntu.com/cloud/services>).

Canonical, Ubuntu, 24.04, amd64 noble image

Architecture **AMI ID** **Username**

64-bit (x86) ami-0672f5b9210aa093 ubuntu [Verified provider](#)

Instance type

Instance type: **t2.micro** [Free tier eligible](#)

Family: t2 1 vCPU 1 GiB Memory Current generation: true

On-Demand Ubuntu Pro base pricing: 0.0164 USD per Hour On-Demand Linux base pricing: 0.0146 USD per Hour

On-Demand Windows base pricing: 0.0193 USD per Hour On-Demand RHEL base pricing: 0.029 USD per Hour

On-Demand SUSE base pricing: 0.0146 USD per Hour

[Additional costs apply for AMIs with pre-installed software](#)

Key pair (login)

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - required: [Create new key pair](#)

Summary

Number of instances:

Software Image (AMI)
Canonical, Ubuntu, 24.04, amd64...read more
ami-0672f5b9210aa093

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t2.micro

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[Cancel](#) [Launch instance](#) [Preview code](#)

EC2 > Instances > Launch an instance

Amazon Machine Image (AMI)

Ubuntu Server 24.04 LTS (HVM), SSD Volume Type
ami-0672f5d5b9210aa093 (64-bit (x86)) / ami-0c2e5288624699c08 (64-bit (Arm))
Virtualization: hvm ENA enabled: true Root device type: ebs

Free tier eligible

Description
Ubuntu Server 24.04 LTS (HVM), EBS General Purpose (SSD) Volume Type. Support available from Canonical (<http://www.ubuntu.com/cloud/services>).
Canonical, Ubuntu, 24.04, amd64 noble image

Architecture
64-bit (x86)

AMI ID
ami-0672f5d5b9210aa093

Username
ubuntu

Verified provider

Instance type info | Get advice

Instance type
t2.micro
Family: t2 1 vCPU 1 GiB Memory Current generation: true
On-Demand Linux base pricing: 0.0164 USD per Hour On-Demand Linux base pricing: 0.0146 USD per Hour
On-Demand Windows base pricing: 0.0192 USD per Hour On-Demand RHEL base pricing: 0.029 USD per Hour
On-Demand SUSE base pricing: 0.0146 USD per Hour

Free tier eligible

All generations

Compare instance types

Additional costs apply for AMIs with pre-installed software

Key pair (login) info

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - required
Demo

Create new key pair

Summary

Number of instances | Info
1

Software Image (AMI)
Canonical, Ubuntu, 24.04, amd64...read more
ami-0672f5d5b9210aa093

Virtual server type (instance type)
t2.micro

Firewall (security group)
New security group

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GiB of snapshots, and 100 GB of bandwidth to the internet.

Cancel Launch instance Preview code

EC2 > Instances > Launch an instance

Network settings info

VPC - required info
vpc-060c882095d0a8d8 (default)
172.31.0.0/16

Subnet info
subnet-009383e7a56b75eab
VPC: vpc-060c882095d0a8d8 Owner: 529688293565 Availability Zone: ap-southeast-1b
Zone type: Availability Zone IP addresses available: 4091 CIDR: 172.31.32.0/20

Create new subnet

Auto-assign public IP info
Enable

Additional charges apply when outside of free tier allowance

Firewall (security groups) info
A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.
Create security group Select existing security group

Common security groups info
Select security groups
WebSG sg-0e90dd32d377fd1d
VPC: vpc-060c882095d0a8d8

Compare security group rules

Security groups that you add or remove here will be added to or removed from all your network interfaces.

Advanced network configuration

Configure storage info Advanced

1x 8 GiB gp3 Root volume 3000 IOPS (Not encrypted)

Free tier eligible customers can get up to 30 GiB of EBS General Purpose (SSD) or Magnetic storage

Add new volume

Summary

Number of instances | Info
1

Software Image (AMI)
Canonical, Ubuntu, 24.04, amd64...read more
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Virtual server type (instance type)
t2.micro

Firewall (security group)
WebSG

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million I/Os, 1 GiB of snapshots, and 100 GB of bandwidth to the internet.

Cancel Launch instance Preview code

○ Running EC2 Instances

Successfully initiated termination (deletion) of i-05813a2a2b32e1acf1-090047d2c66573f06

Notifications 0 0 2 0 0 0

Instances (2) info

Find Instance by attribute or tag (case-sensitive) Running

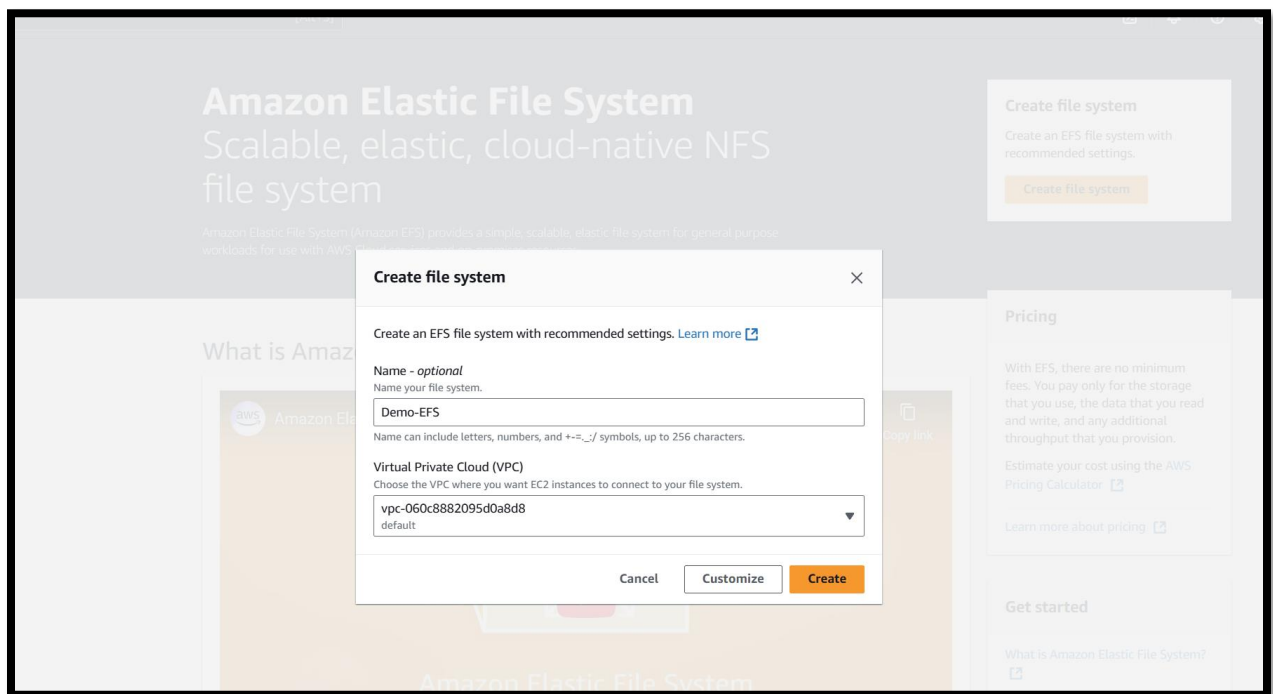
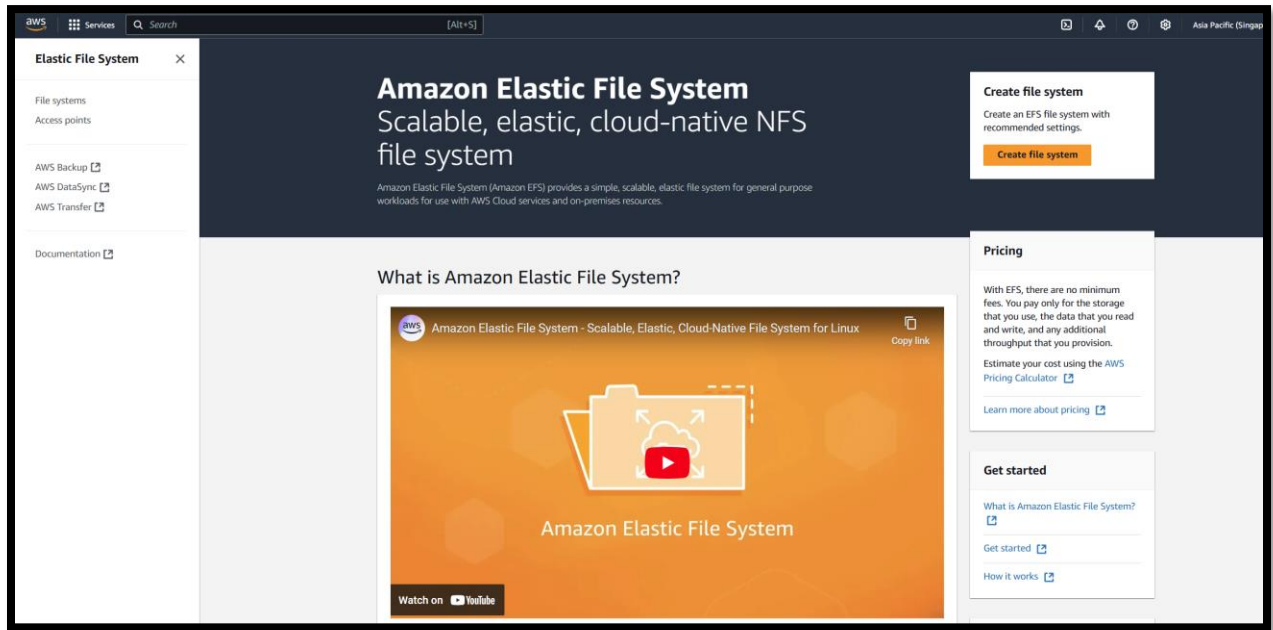
Last updated less than a minute ago Connect Instance state Actions Launch instances

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP
WebServer2	i-0e30e0f58c572a8a8	Running	t2.micro	Initializing	View alarms +	ap-southeast-1b	ec2-52-221-230-187.ap...	52.221.230.187	-
WebServer1	i-05ae2b22dabfdee52	Running	t2.micro	2/2 checks passed	View alarms +	ap-southeast-1a	ec2-18-139-1-244.ap-s...	18.139.1.244	-

Select an instance

Step3 (Create a File System (EFS))

- Navigate to EFS Dashboard
- Create file
- Click on file server and select VPC then click on “Customize”.



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

File system settings

General

Name - optional
Name your file system.
EFS-Demo

File system type
Choose to either store data across multiple Availability Zones or within a single Availability Zone. [Learn more](#)

☒ **Regional**
Offers the highest levels of availability and durability by storing file system data across multiple Availability Zones within an AWS Region.

☐ **One Zone**
Provides continuous availability to data within a single Availability Zone within an AWS Region.

Automatic backups
Automatically backup your file system data with AWS Backup using recommended settings. Additional pricing applies. [Learn more](#)

☒ **Enable automatic backups**

Lifecycle management
Automatically save money as access patterns change by moving files into the Infrequent Access (IA) or Archive storage class. [Learn more](#)

Transition into Infrequent Access (IA)
Transition files to IA based on the time since they were last accessed in Standard storage.
30 day(s) since last access

Transition into Archive
Transition files to Archive based on the time since they were last accessed in Standard storage.
90 day(s) since last access

Transition into Standard
Transition files back to Standard storage based on when they are first accessed in IA or Archive storage.
None

Encryption
Choose to enable encryption of your file system's data at rest. Uses the AWS KMS service key (aws/elasticfilesystem) by default. [Learn more](#)

☒ **Enable encryption of data at rest**

► [Customize encryption settings](#)

- Click next for Network Settings
 - Remove the default security group and add created security group in Mount Target section.

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-060c882095d0a8d8
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	
ap-southeast-1a	subnet-0fb6511a7a6acb3b1	Automatic	Choose security groups sg-088e87638810e3f3c NFS	Remove
ap-southeast-1b	subnet-009383e7a56b75eab	Automatic	Choose security groups sg-088e87638810e3f3c NFS	Remove
ap-southeast-1c	subnet-0166c37dec87dde9	Automatic	Choose security groups sg-088e87638810e3f3c NFS	Remove

[Add mount target](#)

You can only create one mount target per Availability Zone.

Cancel Previous **Next**

- Review and create

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

Review and create

Step 1: File system settings

Edit

Field	Value	Is editable?
Name	EFS-Demo	Yes
Performance mode	General Purpose	No
Throughput mode	Elastic	Yes
Encrypted	Yes	No
KMS Key ID	-	No
Lifecycle management	Transition into Infrequent Access (IA): 30 day(s) since last access Transition into Archive: 90 day(s) since last access Transition into Standard: None	Yes
Automatic backups	Yes	Yes
VPC ID	vpc-060c8882095d0a8d8 (default)	Yes
Availability Zone	Regional	No

Elastic File System

Success! File system (fs-0F55315c3a6b1b186) is available.

View file system

Amazon EFS > File systems

File systems (1)

Filter by property values

	Name	File system ID	Encrypted	Total size	Size in Standard	Size in IA	Size in Archive	Provisioned Throughput (MiB/s)	File system state	Creation time	Availability Zone	Replication overwrite protection
<input type="radio"/>	EFS-Demo	fs-0F55315c3a6b1b186		6.00 KiB	6.00 KiB	0 Bytes	0 Bytes	-		Sun, 26 Jan 2025 03:09:53 GMT	Regional	

Step4 (Accessing our EC2 instances from CMD)

- Accessing VM1 & VM2
- `sudo apt install -y nfs-common`
- Navigate to EFS dashboard (AWS)

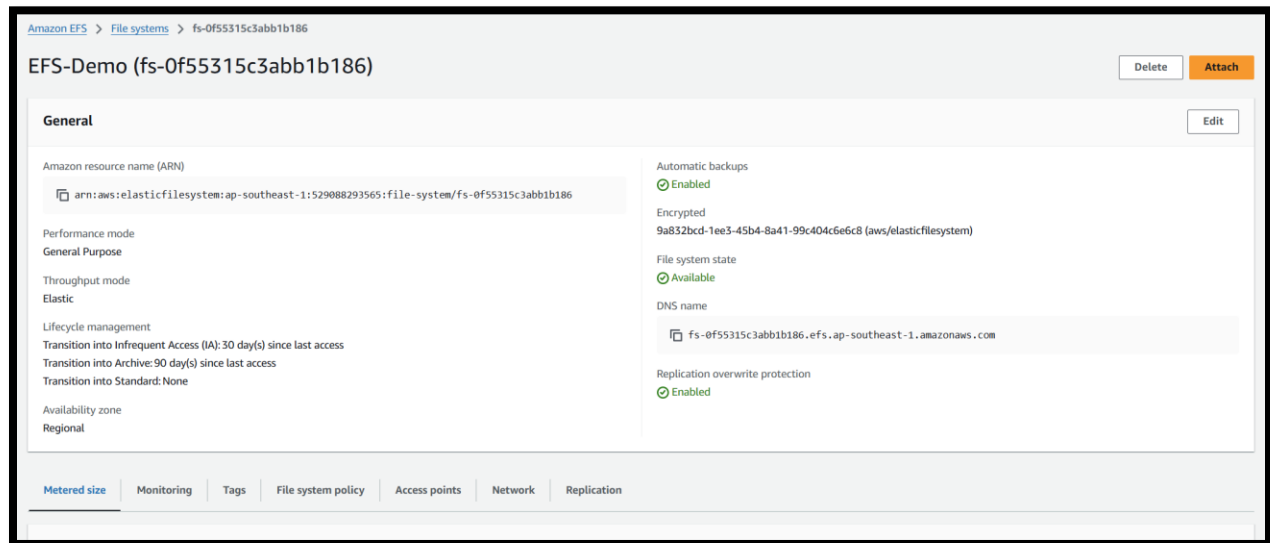
Amazon EFS > File systems

File systems (1)

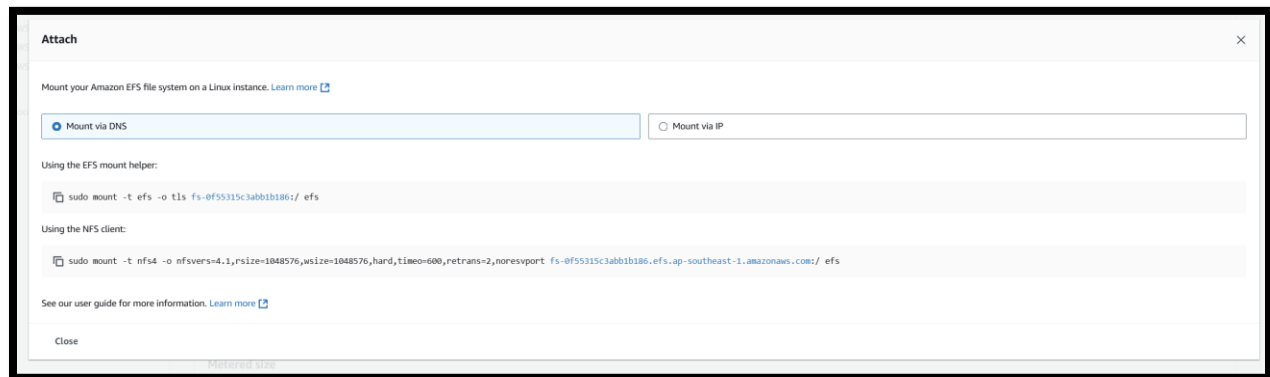
Filter by property values

	Name	File system ID	Encrypted	Total size	Size in Standard	Size in IA	Size in Archive	Provisioned Throughput (MiB/s)	File system state	Creation time	Availability Zone	Replication overwrite protection
<input type="radio"/>	EFS-Demo	fs-0F55315c3a6b1b186		6.00 KiB	6.00 KiB	0 Bytes	0 Bytes	-		Sun, 26 Jan 2025 03:09:53 GMT	Regional	

- View details
- Click Attach



- Run below command in the VM1 & VM2



Step5 (Mount the EFS) do this for both vm

- Create efs directory (mkdir efs)
- `sudo mount -t nfs4 -o nfsvers=4.1,rsize=1048576,wsiz=1048576,hard,timeo=600,retrans=2,noresvport fs-0f55315c3abb1b186.efs.ap-southeast-1.amazonaws.com:/ efs`

```
dnw@ubuntu:~$ mkdir efs
dnw@ubuntu:~$ sudo mount -t nfs4 -o nfsvers=4.1,rsize=1048576,wsiz=1048576,hard,timeo=600,retrans=2,noresvport fs-0f55315c3abb1b186.efs.ap-southeast-1.amazonaws.com:/ efs
dnw@ubuntu:~$
```

Step6 (Verification of attached EFS)

- Navigate to EFS dir in VM1
- Create test file
- Confirm if the file available in VM2

VM1

```
ubuntu@ip-172-31-18-159: ~/efs
ubuntu@ip-172-31-18-159:~/efs$ ll
total 8
drwxr-xr-x 2 root root 6144 Jan 26 03:09 ./
drwxr-x--- 5 ubuntu ubuntu 4096 Jan 26 03:44 ../
ubuntu@ip-172-31-18-159:~/efs$ sudo touch test.1
ubuntu@ip-172-31-18-159:~/efs$ ll
total 12
drwxr-xr-x 2 root root 6144 Jan 26 04:03 ./
drwxr-x--- 5 ubuntu ubuntu 4096 Jan 26 03:44 ../
-rw-r--r-- 1 root root 0 Jan 26 04:03 test.1
ubuntu@ip-172-31-18-159:~/efs$
```

VM2

```
ubuntu@ip-172-31-39-55: ~/efs
ubuntu@ip-172-31-39-55:~$ sudo mount -t nfs4 -o nfsvers=4.1,rsize=
ubuntu@ip-172-31-39-55:~$ ll
total 32
drwxr-x--- 5 ubuntu ubuntu 4096 Jan 26 04:06 ./
drwxr-xr-x 3 root root 4096 Jan 26 01:37 ../
-rw-r--r-- 1 ubuntu ubuntu 220 Mar 31 2024 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 3771 Mar 31 2024 .bashrc
drwx----- 2 ubuntu ubuntu 4096 Jan 26 04:05 .cache/
-rw-r--r-- 1 ubuntu ubuntu 807 Mar 31 2024 .profile
drwx----- 2 ubuntu ubuntu 4096 Jan 26 01:37 .ssh/
-rw-r--r-- 1 ubuntu ubuntu 0 Jan 26 04:06 .sudo_as_admin_successful
drwxr-xr-x 2 root root 6144 Jan 26 04:03 efs/
ubuntu@ip-172-31-39-55:~$ cd efs/
ubuntu@ip-172-31-39-55:~/efs$ ll
total 12
drwxr-xr-x 2 root root 6144 Jan 26 04:03 ./
drwxr-x--- 5 ubuntu ubuntu 4096 Jan 26 04:06 ../
-rw-r--r-- 1 root root 0 Jan 26 04:03 test.1
ubuntu@ip-172-31-39-55:~/efs$
```