L1 – Project

Centralized File Sharing and Backup System

Content

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Introduction

The objective of this project is to design and implement a centralized file-sharing system on AWS using two EC2 instances connected to a shared Amazon EFS file system. Any file created, modified, or deleted on either EC2 instance is instantly updated in EFS, ensuring seamless collaboration. Additionally, a real-time sync mechanism using *inotifywait* continuously monitors the EFS directory and synchronizes all changes to an S3 bucket. This provides both high availability and secure backup storage for long-term retention.

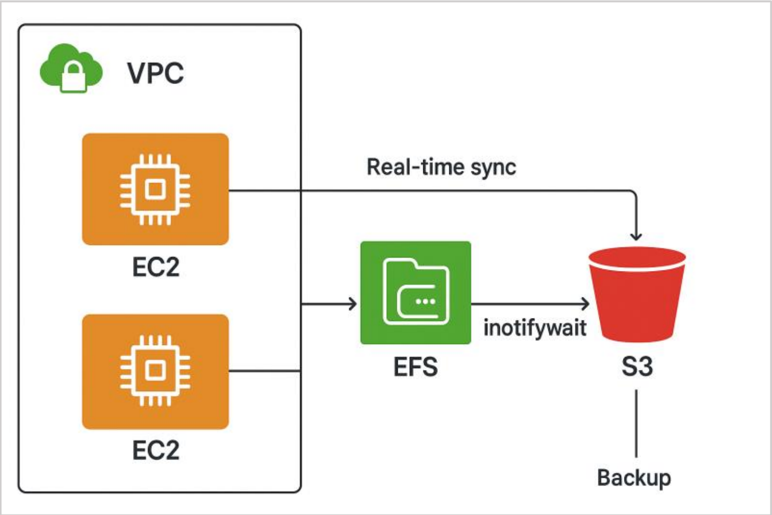
Objectives

The object of this project is to design and implement an AWS architecture where two EC2 instances, hosted in a custom VPC, share an Amazon EFS file system. Any file or directory created or modified inside the mount point **/ share/projects** on either instance must be **automatically** uploaded to an **Amazon S3 Bucket within Seconds**.

AWS Services Used

- Amazon EC2 – two Linux servers
- Amazon VPC – custom private network
- Amazon EFS – shared storage mounted on both EC2
- Amazon S3 – target storage bucket for sync
- AWS IAM – role with S3 Full Access for EC2 instances

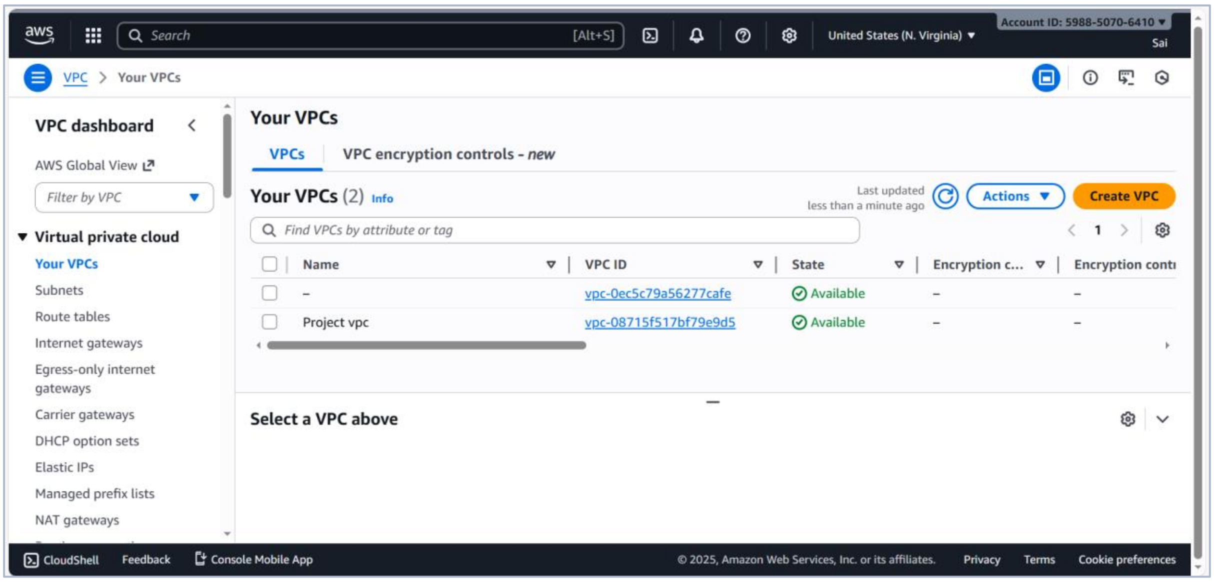
Architecture Diagram



Project Implementation setup:

Step -1 - Setup VPC & EC2 Instances.

1.Created a Custom VPC



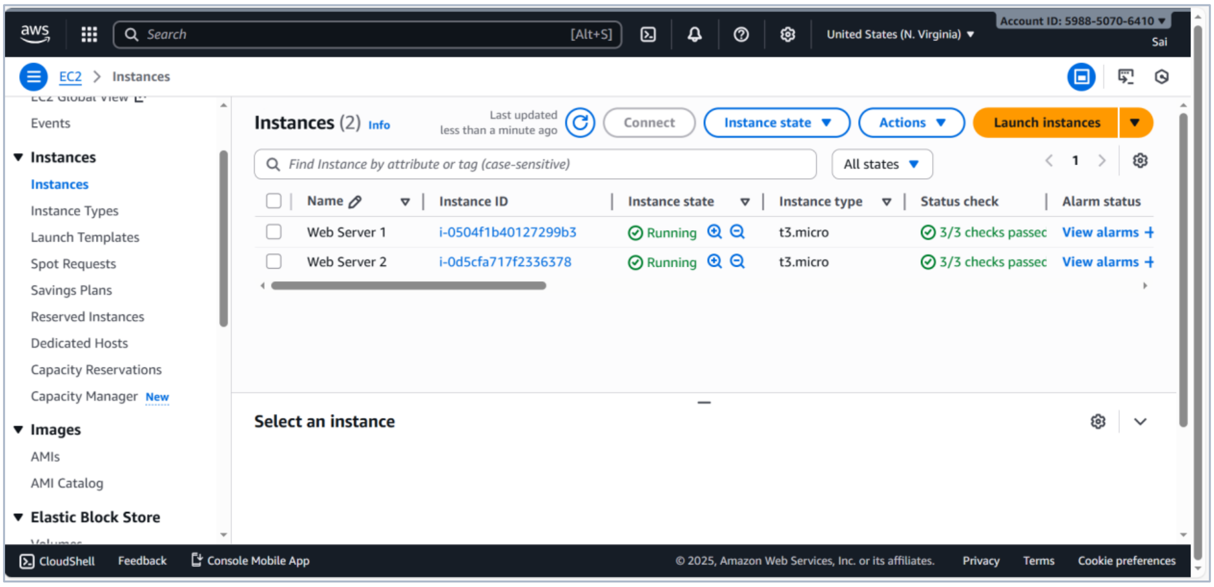
Name	VPC ID	State	Encryption c...	Encryption conti
–	vpc-0ec5c79a56277cafe	Available	–	–
Project vpc	vpc-08715f517bf79e9d5	Available	–	–

Launch **TWO EC2** instances in this VPC.

Choose AMI: Amazon Linux

Created Web Server 1 in Subnet -1

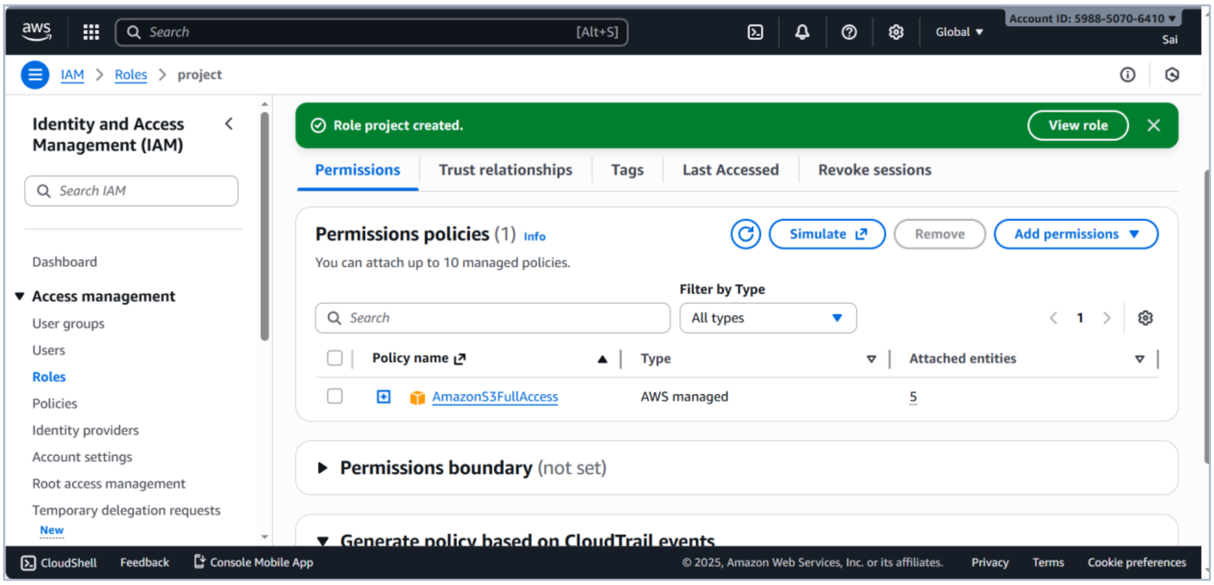
And Web Server 2 in subnet 2



Name	Instance ID	Instance state	Instance type	Status check	Alarm status
Web Server 1	i-0504f1b40127299b3	Running	t3.micro	3/3 checks passec	View alarms +
Web Server 2	i-0d5cfa717f2336378	Running	t3.micro	3/3 checks passec	View alarms +

Step: 2 - Create IAM Role

Create IAM role with Amazon S3 Full access permission



Role project created.

Permissions policies (1)

You can attach up to 10 managed policies.

Filter by Type: All types

Policy name	Type	Attached entities
AmazonS3FullAccess	AWS managed	5

Account ID: 5988-5070-6410

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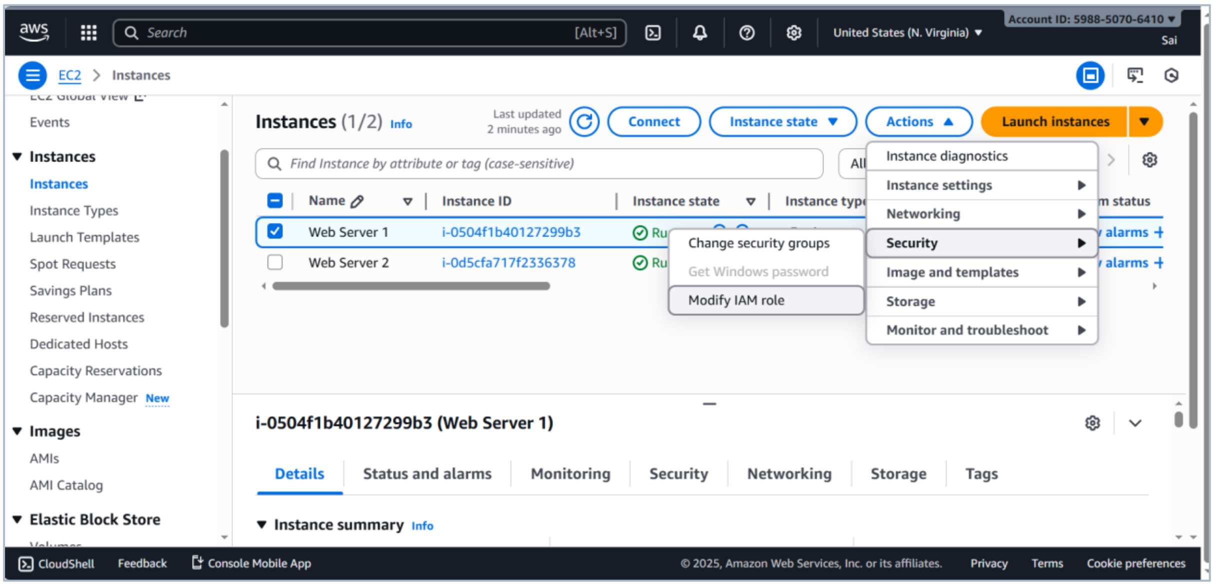
Attach the Role to two EC2 Server already created.



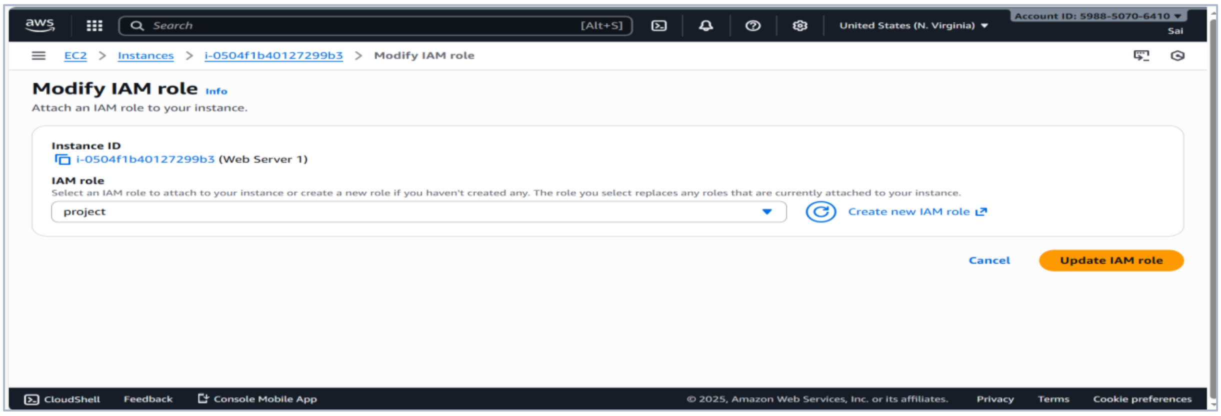
Instances (1/2) — Last updated 2 minutes ago

Find Instance by attribute or tag (case-sensitive)

	Name	Instance ID	Instance state
☑	Web Server 1	i-0504f1b40127299b3	Ru
□	Web Server 2	i-0d5cfa717f2336378	Ru

i-0504f1b40127299b3 (Web Server 1)

United States (N. Virginia) — Account ID: 5988-5070-6410



EC2 > Instances > i-0504f1b40127299b3 > Modify IAM role
Create new IAM role
Cancel
Update IAM role
CloudShell Feedback Console Mobile App

Modify IAM role

Attach an IAM role to your instance.

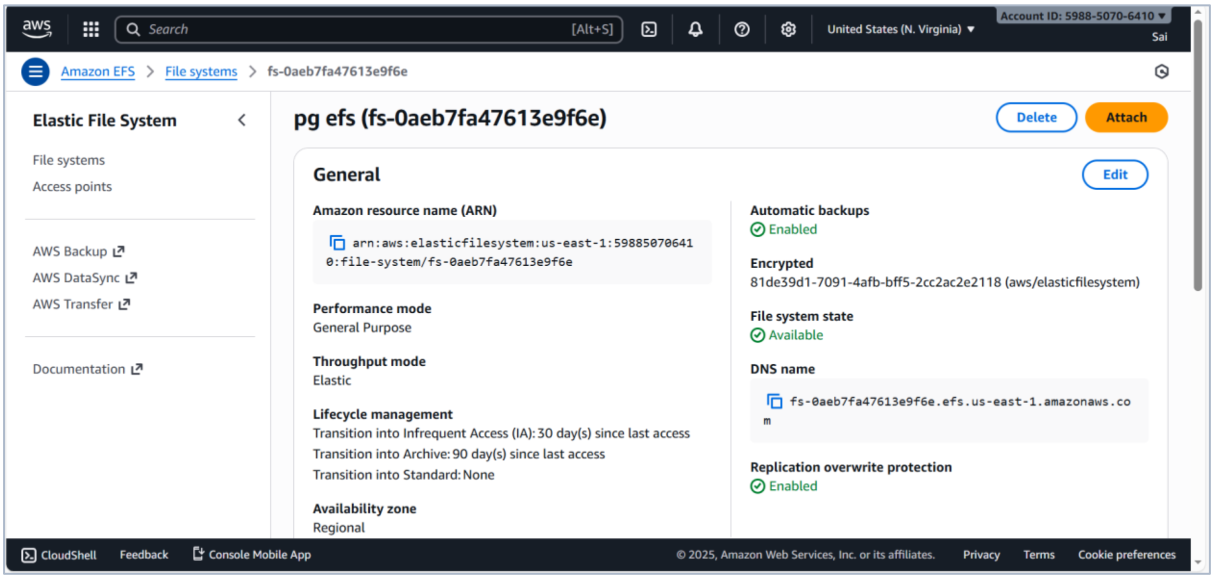
Instance ID: i-0504f1b40127299b3 (Web Server 1)

IAM role: Select an IAM role to attach to your instance or create a new role if you haven't created any. The role you select replaces any roles that are currently attached to your instance.

project

Step: 3 - Create & Mount EFS

1.Create an EFS File System in the same VPC



pg efs (fs-0aeb7fa47613e9f6e)

General

Amazon resource name (ARN)
arn:aws:elasticfilesystem:us-east-1:598850706410:file-system/fs-0aeb7fa47613e9f6e

Performance mode
General Purpose

Throughput mode
Elastic

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

Availability zone
Regional

Automatic backups
Enabled

Encrypted
81de39d1-7091-4afb-bff5-2cc2ac2e2118 (aws/elasticfilesystem)

File system state
Available

DNS name
fs-0aeb7fa47613e9f6e.efs.us-east-1.amazonaws.com

Replication overwrite protection
Enabled

Create a mount target in the same subnet as yours EC2

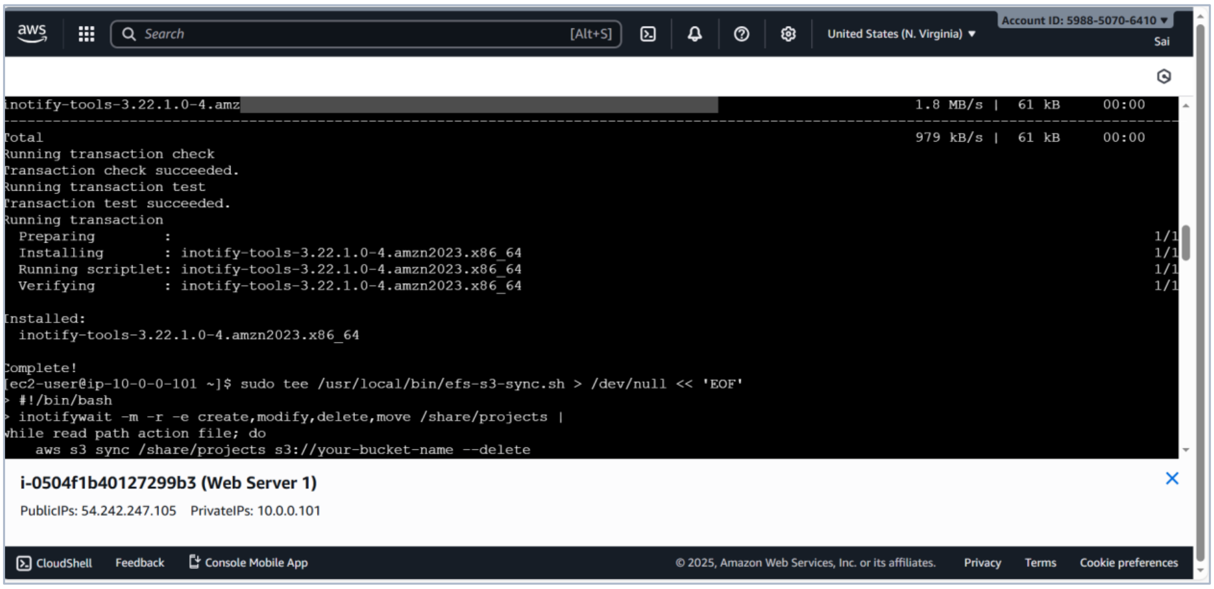
Mount EFS on both EC2 servers:

sudo yum install -y amazon-efs-utils

sudo mkdir -p /share/projects

sudo mount -t efs fs-0aeb7fa47613e9f6e:/ /share/projects

/share/projects will be our centralized folder.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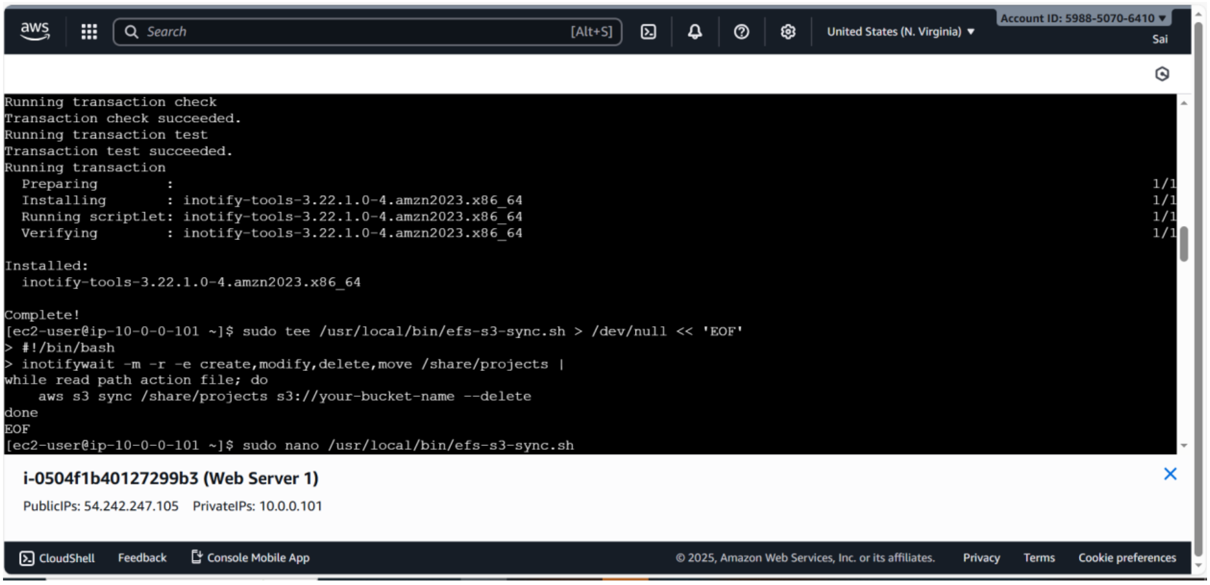
```
inotify-tools-3.22.1.0-4.amz                                            1.8 MB/s |  61 kB     00:00
--------------------------------------------------------------------------------------------------------
Total                                                                   979 kB/s |  61 kB     00:00
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing        :                                                                              1/1
  Installing       : inotify-tools-3.22.1.0-4.amzn2023.x86_64                                     1/1
  Running scriptlet: inotify-tools-3.22.1.0-4.amzn2023.x86_64                                     1/1
  Verifying        : inotify-tools-3.22.1.0-4.amzn2023.x86_64                                     1/1

Installed:
  inotify-tools-3.22.1.0-4.amzn2023.x86_64

Complete!
[ec2-user@ip-10-0-0-101 ~]$ sudo tee /usr/local/bin/efs-s3-sync.sh > /dev/null << 'EOF'
> #!/bin/bash
> inotifywait -m -r -e create,modify,delete,move /share/projects |
while read path action file; do
    aws s3 sync /share/projects s3://your-bucket-name --delete
```

i-0504f1b40127299b3 (Web Server 1)

PublicIPs: 54.242.247.105   PrivateIPs: 10.0.0.101

Make the folder Writable:



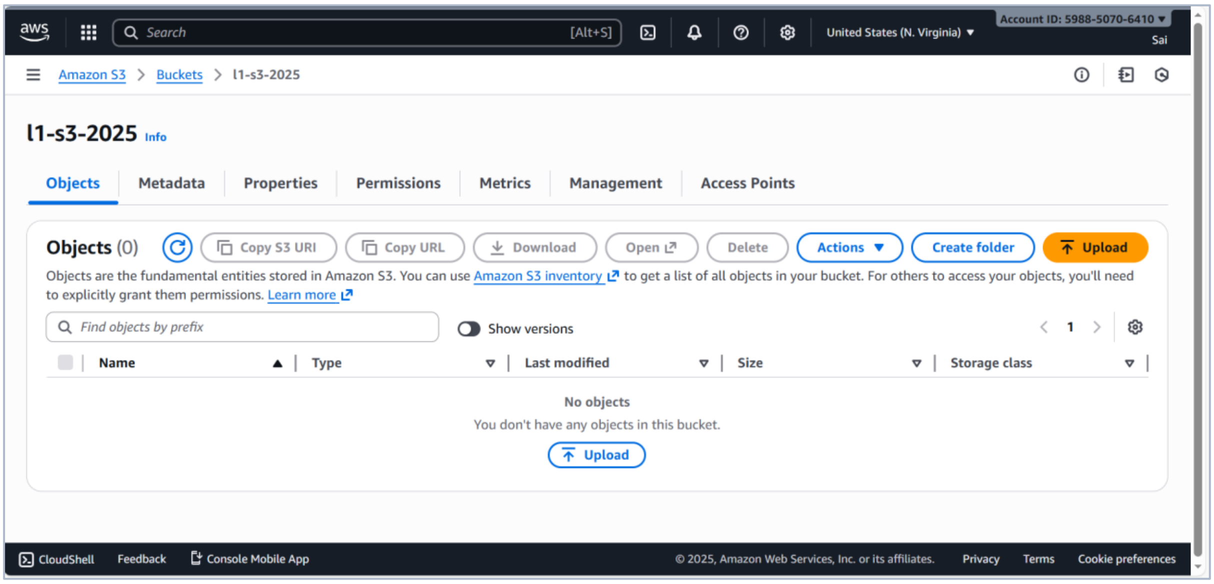
```
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing        :                                                        1/1
  Installing       : inotify-tools-3.22.1.0-4.amzn2023.x86_64               1/1
  Running scriptlet: inotify-tools-3.22.1.0-4.amzn2023.x86_64               1/1
  Verifying        : inotify-tools-3.22.1.0-4.amzn2023.x86_64               1/1

Installed:
  inotify-tools-3.22.1.0-4.amzn2023.x86_64

Complete!
[ec2-user@ip-10-0-0-101 ~]$ sudo tee /usr/local/bin/efs-s3-sync.sh > /dev/null << 'EOF'
> #!/bin/bash
> inotifywait -m -r -e create,modify,delete,move /share/projects |
while read path action file; do
    aws s3 sync /share/projects s3://your-bucket-name --delete
done
EOF
[ec2-user@ip-10-0-0-101 ~]$ sudo nano /usr/local/bin/efs-s3-sync.sh
```

i-0504f1b40127299b3 (Web Server 1)

PublicIPs: 54.242.247.105 PrivateIPs: 10.0.0.101

Step 4: - Create S3 Bucket

Bucket: s3:// **l1-s3-2025**



l1-s3-2025

Objects (0)

Objects are the fundamental entities stored in Amazon S3. You can use Amazon S3 inventory to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. Learn more

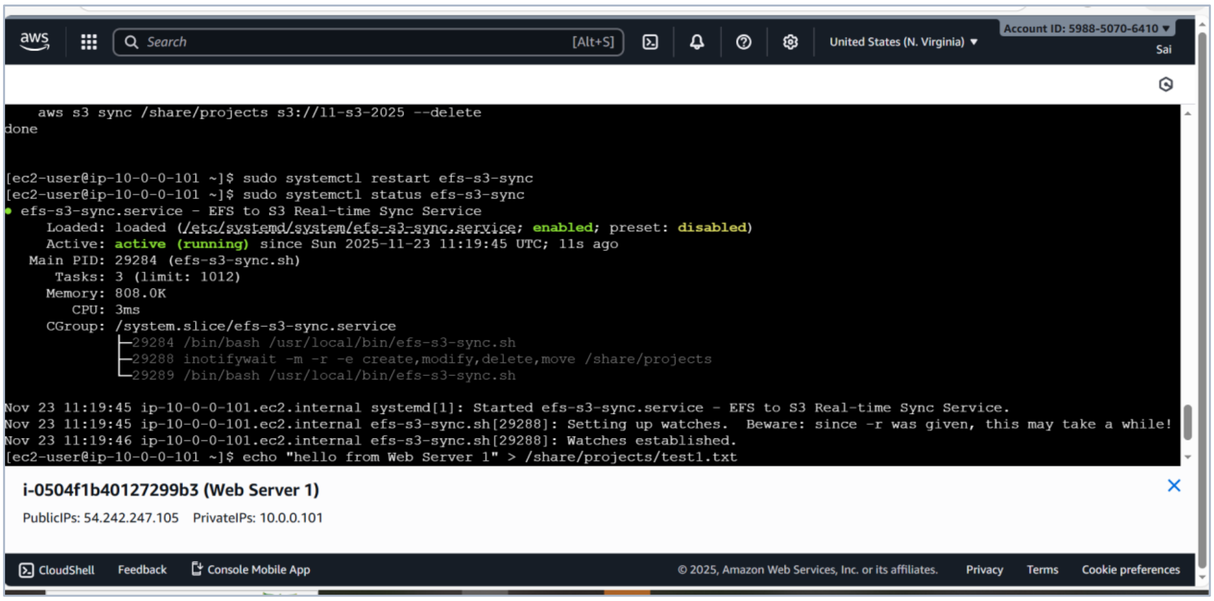
No objects

You don't have any objects in this bucket.

Make sure EC2 IAM Role can access it.

Step:5 - Install Dependencies

Sudo yum install -y inotify-tools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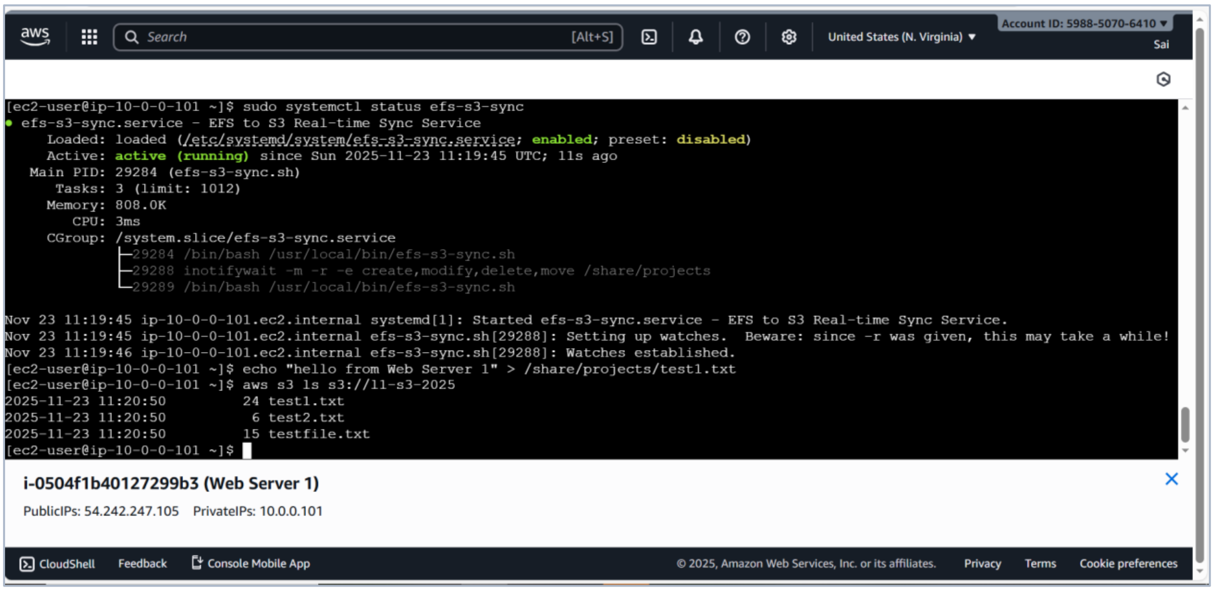
```
    aws s3 sync /share/projects s3://l1-s3-2025 --delete
done


[ec2-user@ip-10-0-0-101 ~]$ sudo systemctl restart efs-s3-sync
[ec2-user@ip-10-0-0-101 ~]$ sudo systemctl status efs-s3-sync
● efs-s3-sync.service - EFS to S3 Real-time Sync Service
     Loaded: loaded (/etc/systemd/system/efs-s3-sync.service; enabled; preset: disabled)
     Active: active (running) since Sun 2025-11-23 11:19:45 UTC; 11s ago
   Main PID: 29284 (efs-s3-sync.sh)
      Tasks: 3 (limit: 1012)
     Memory: 808.0K
        CPU: 3ms
     CGroup: /system.slice/efs-s3-sync.service
             ├─29284 /bin/bash /usr/local/bin/efs-s3-sync.sh
             ├─29288 inotifywait -m -r -e create,modify,delete,move /share/projects
             └─29289 /bin/bash /usr/local/bin/efs-s3-sync.sh

Nov 23 11:19:45 ip-10-0-0-101.ec2.internal systemd[1]: Started efs-s3-sync.service - EFS to S3 Real-time Sync Service.
Nov 23 11:19:45 ip-10-0-0-101.ec2.internal efs-s3-sync.sh[29288]: Setting up watches.  Beware: since -r was given, this may take a while!
Nov 23 11:19:46 ip-10-0-0-101.ec2.internal efs-s3-sync.sh[29288]: Watches established.
[ec2-user@ip-10-0-0-101 ~]$ echo "hello from Web Server 1" > /share/projects/test1.txt
```

i-0504f1b40127299b3 (Web Server 1)

PublicIPs: 54.242.247.105 PrivateIPs: 10.0.0.101

Ensure AWS CLI works with our IAM role:

aws s3 ls s3:// l1-s3-2025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```
[ec2-user@ip-10-0-0-101 ~]$ sudo systemctl status efs-s3-sync
● efs-s3-sync.service - EFS to S3 Real-time Sync Service
     Loaded: loaded (/etc/systemd/system/efs-s3-sync.service; enabled; preset: disabled)
     Active: active (running) since Sun 2025-11-23 11:19:45 UTC; 11s ago
   Main PID: 29284 (efs-s3-sync.sh)
      Tasks: 3 (limit: 1012)
     Memory: 808.0K
        CPU: 3ms
     CGroup: /system.slice/efs-s3-sync.service
             ├─29284 /bin/bash /usr/local/bin/efs-s3-sync.sh
             ├─29288 inotifywait -m -r -e create,modify,delete,move /share/projects
             └─29289 /bin/bash /usr/local/bin/efs-s3-sync.sh

Nov 23 11:19:45 ip-10-0-0-101.ec2.internal systemd[1]: Started efs-s3-sync.service - EFS to S3 Real-time Sync Service.
Nov 23 11:19:45 ip-10-0-0-101.ec2.internal efs-s3-sync.sh[29288]: Setting up watches.  Beware: since -r was given, this may take a while!
Nov 23 11:19:46 ip-10-0-0-101.ec2.internal efs-s3-sync.sh[29288]: Watches established.
[ec2-user@ip-10-0-0-101 ~]$ echo "hello from Web Server 1" > /share/projects/test1.txt
[ec2-user@ip-10-0-0-101 ~]$ aws s3 ls s3://l1-s3-2025
2025-11-23 11:20:50         24 test1.txt
2025-11-23 11:20:50          6 test2.txt
2025-11-23 11:20:50         15 testfile.txt
[ec2-user@ip-10-0-0-101 ~]$ █
```

i-0504f1b40127299b3 (Web Server 1)

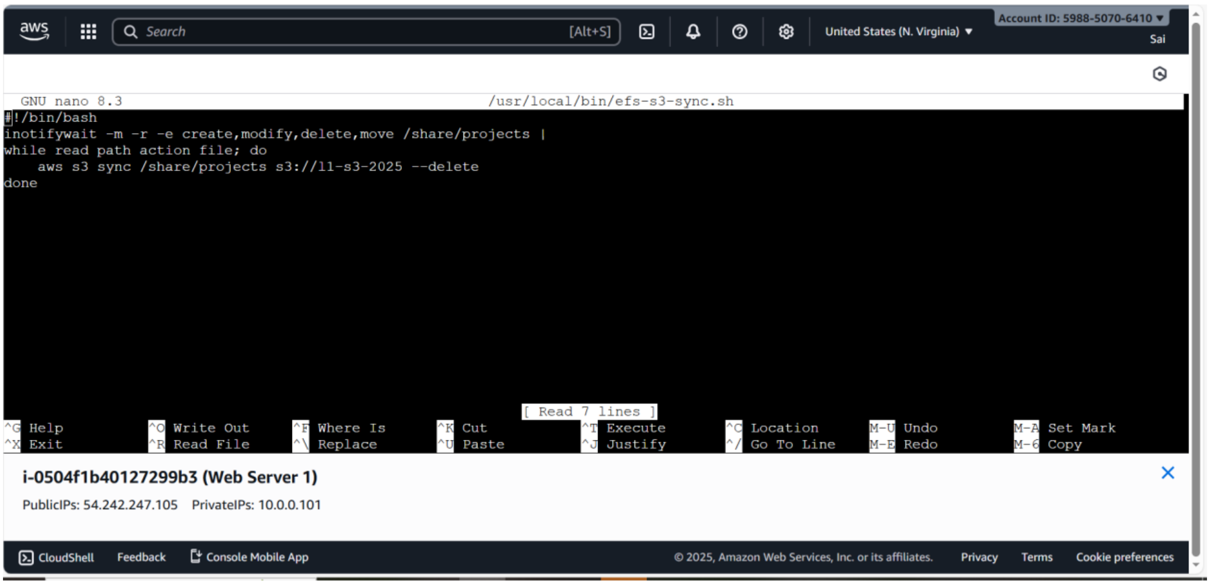
PublicIPs: 54.242.247.105 PrivateIPs: 10.0.0.101

Step: 6 - Create inotify sync script

Implement a near real-time sync mechanism using inotify-based monitoring

1. Create the script file:

/usr/local/bin/efs-s3-sync.sh



```
  GNU nano 8.3                    /usr/local/bin/efs-s3-sync.sh
#!/bin/bash
inotifywait -m -r -e create,modify,delete,move /share/projects |
while read path action file; do
    aws s3 sync /share/projects s3://11-s3-2025 --delete
done





                                       [ Read 7 lines ]
^G Help        ^O Write Out   ^F Where Is    ^K Cut         ^T Execute     ^C Location    M-U Undo       M-A Set Mark
^X Exit        ^R Read File   ^\ Replace     ^U Paste       ^J Justify     ^/ Go To Line  M-E Redo       M-6 Copy
```

i-0504f1b40127299b3 (Web Server 1)

PublicIPs: 54.242.247.105 PrivateIPs: 10.0.0.101

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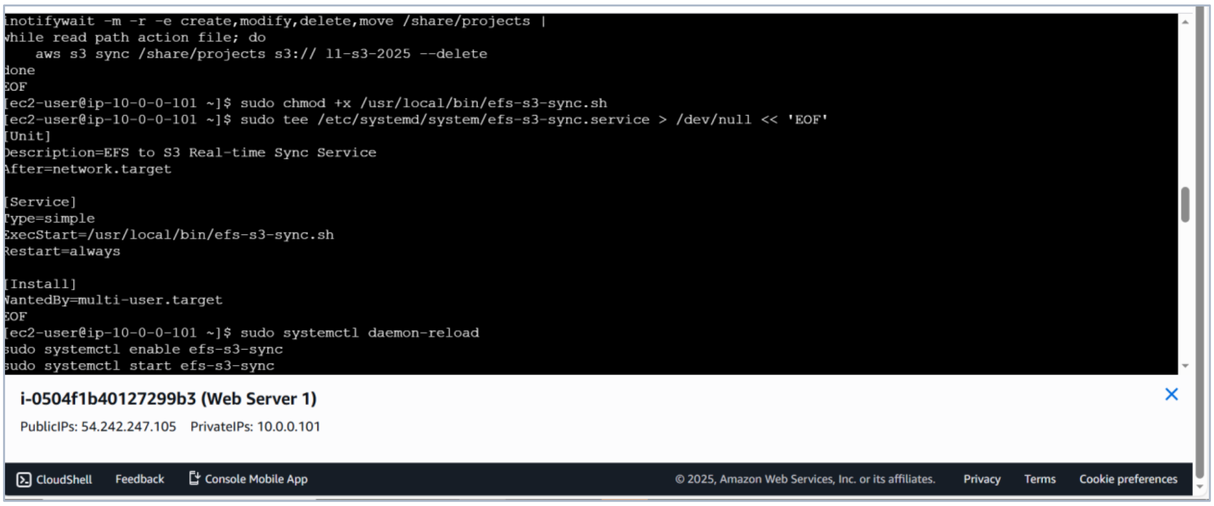
Make it Executable:

chmod +x /home/ec2-user/efs-s3-watch.sh



```
inotifywait -m -r -e create,modify,delete,move /share/projects |
while read path action file; do
    aws s3 sync /share/projects s3:// 11-s3-2025 --delete
done
EOF
[ec2-user@ip-10-0-0-101 ~]$ sudo chmod +x /usr/local/bin/efs-s3-sync.sh
[ec2-user@ip-10-0-0-101 ~]$ sudo tee /etc/systemd/system/efs-s3-sync.service > /dev/null << 'EOF'
[Unit]
Description=EFS to S3 Real-time Sync Service
After=network.target

[Service]
Type=simple
ExecStart=/usr/local/bin/efs-s3-sync.sh
Restart=always

[Install]
WantedBy=multi-user.target
EOF
[ec2-user@ip-10-0-0-101 ~]$ sudo systemctl daemon-reload
sudo systemctl enable efs-s3-sync
sudo systemctl start efs-s3-sync
```

i-0504f1b40127299b3 (Web Server 1)

PublicIPs: 54.242.247.105 PrivateIPs: 10.0.0.101

Step:7 - Run the Script in Background

This script that syncs EFS → S3

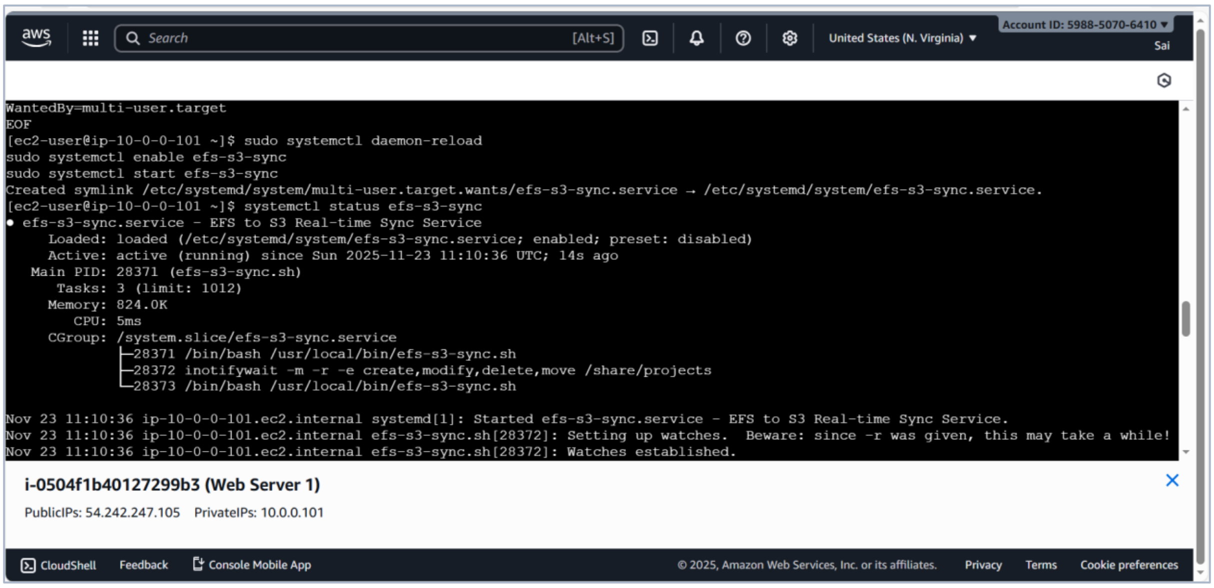
- /usr/local/bin/efs-s3-sync.sh

Runs the script in background after you log out

- /etc/systemd/system/efs-s3-sync.service

Check that it's running

- systemctl status efs-s3-sync



```
WantedBy=multi-user.target
EOF
[ec2-user@ip-10-0-0-101 ~]$ sudo systemctl daemon-reload
sudo systemctl enable efs-s3-sync
sudo systemctl start efs-s3-sync
Created symlink /etc/systemd/system/multi-user.target.wants/efs-s3-sync.service → /etc/systemd/system/efs-s3-sync.service.
[ec2-user@ip-10-0-0-101 ~]$ systemctl status efs-s3-sync
● efs-s3-sync.service - EFS to S3 Real-time Sync Service
     Loaded: loaded (/etc/systemd/system/efs-s3-sync.service; enabled; preset: disabled)
     Active: active (running) since Sun 2025-11-23 11:10:36 UTC; 14s ago
   Main PID: 28371 (efs-s3-sync.sh)
      Tasks: 3 (limit: 1012)
     Memory: 824.0K
        CPU: 5ms
     CGroup: /system.slice/efs-s3-sync.service
             ├─28371 /bin/bash /usr/local/bin/efs-s3-sync.sh
             ├─28372 inotifywait -m -r -e create,modify,delete,move /share/projects
             └─28373 /bin/bash /usr/local/bin/efs-s3-sync.sh

Nov 23 11:10:36 ip-10-0-0-101.ec2.internal systemd[1]: Started efs-s3-sync.service - EFS to S3 Real-time Sync Service.
Nov 23 11:10:36 ip-10-0-0-101.ec2.internal efs-s3-sync.sh[28372]: Setting up watches.  Beware: since -r was given, this may take a while!
Nov 23 11:10:36 ip-10-0-0-101.ec2.internal efs-s3-sync.sh[28372]: Watches established.
```

i-0504f1b40127299b3 (Web Server 1)

PublicIPs: 54.242.247.105 PrivateIPs: 10.0.0.101

Step:8 - Test Automatic Sync

1.Create a file in EFS:

echo "hello from Web Server 1" > /share/projects/test1.txt

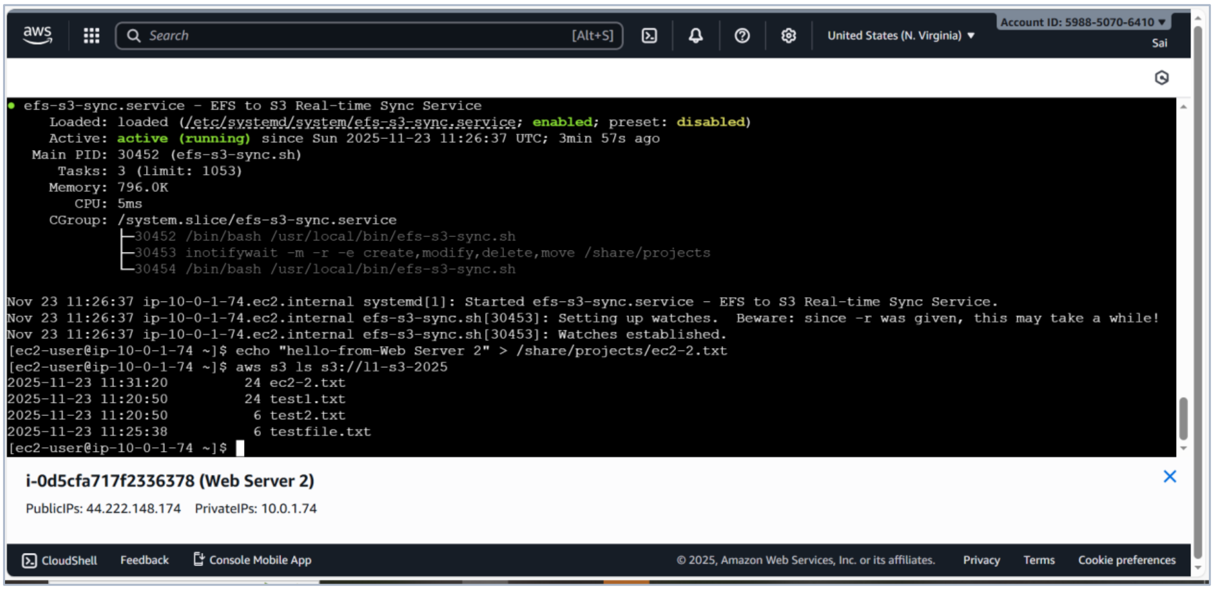
2. Wait a few seconds.

3. Check S3:

aws s3 ls s3://l1-s3-2025

- File should appear automatically.
- Check log: cat /var/log/efs-s3-sync.log

Step: 9 - Same command run into the Web Server 2 (EC2-2)



```
● efs-s3-sync.service - EFS to S3 Real-time Sync Service
     Loaded: loaded (/etc/systemd/system/efs-s3-sync.service; enabled; preset: disabled)
     Active: active (running) since Sun 2025-11-23 11:26:37 UTC; 3min 57s ago
   Main PID: 30452 (efs-s3-sync.sh)
      Tasks: 3 (limit: 1053)
     Memory: 796.0K
        CPU: 5ms
     CGroup: /system.slice/efs-s3-sync.service
             ├─30452 /bin/bash /usr/local/bin/efs-s3-sync.sh
             ├─30453 inotifywait -m -r -e create,modify,delete,move /share/projects
             └─30454 /bin/bash /usr/local/bin/efs-s3-sync.sh

Nov 23 11:26:37 ip-10-0-1-74.ec2.internal systemd[1]: Started efs-s3-sync.service - EFS to S3 Real-time Sync Service.
Nov 23 11:26:37 ip-10-0-1-74.ec2.internal efs-s3-sync.sh[30453]: Setting up watches.  Beware: since -r was given, this may take a while!
Nov 23 11:26:37 ip-10-0-1-74.ec2.internal efs-s3-sync.sh[30453]: Watches established.
[ec2-user@ip-10-0-1-74 ~]$ echo "hello-from-Web Server 2" > /share/projects/ec2-2.txt
[ec2-user@ip-10-0-1-74 ~]$ aws s3 ls s3://l1-s3-2025
2025-11-23 11:31:20         24 ec2-2.txt
2025-11-23 11:20:50         24 test1.txt
2025-11-23 11:20:50          6 test2.txt
2025-11-23 11:25:38          6 testfile.txt
[ec2-user@ip-10-0-1-74 ~]$ 
```

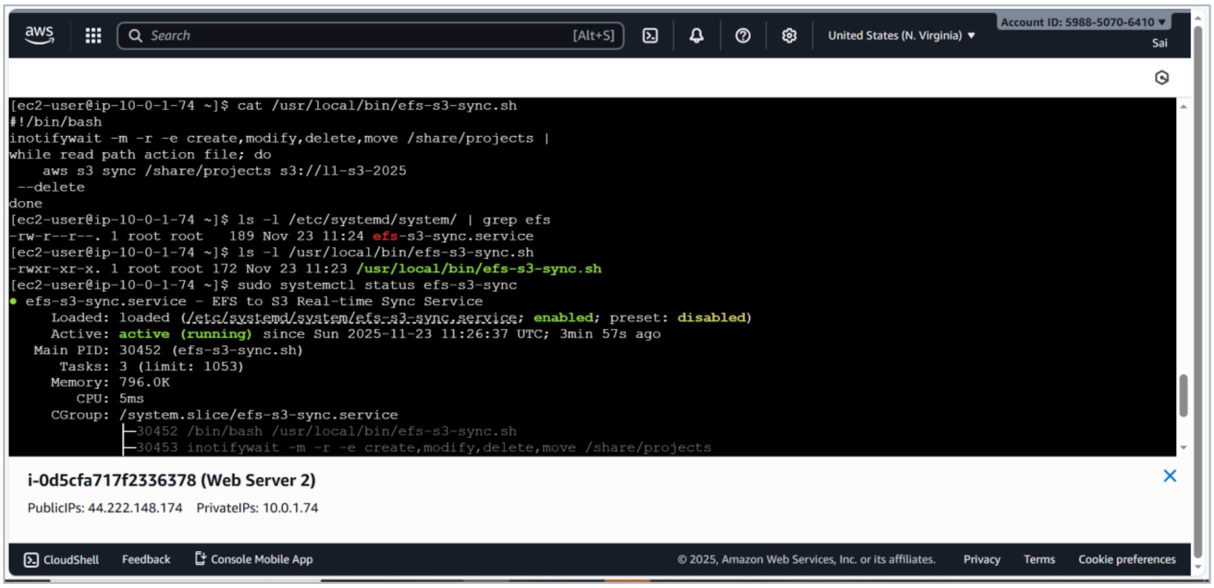
i-0d5cfa717f2336378 (Web Server 2)

PublicIPs: 44.222.148.174 PrivateIPs: 10.0.1.74

Step:10 - Make Script Start on Boot (systemd service)

1. Create a systemd service file:

ls -l /etc/systemd/system/ | grep efs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Account ID: 5988-5070-6410 ▾
Sai
CloudShell
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```
[ec2-user@ip-10-0-1-74 ~]$ cat /usr/local/bin/efs-s3-sync.sh
#!/bin/bash
inotifywait -m -r -e create,modify,delete,move /share/projects |
while read path action file; do
    aws s3 sync /share/projects s3://11-s3-2025
 --delete
done
[ec2-user@ip-10-0-1-74 ~]$ ls -l /etc/systemd/system/ | grep efs
-rw-r--r--. 1 root root   189 Nov 23 11:24 efs-s3-sync.service
[ec2-user@ip-10-0-1-74 ~]$ ls -l /usr/local/bin/efs-s3-sync.sh
-rwxr-xr-x. 1 root root 172 Nov 23 11:23 /usr/local/bin/efs-s3-sync.sh
[ec2-user@ip-10-0-1-74 ~]$ sudo systemctl status efs-s3-sync
● efs-s3-sync.service - EFS to S3 Real-time Sync Service
     Loaded: loaded (/etc/systemd/system/efs-s3-sync.service; enabled; preset: disabled)
     Active: active (running) since Sun 2025-11-23 11:26:37 UTC; 3min 57s ago
   Main PID: 30452 (efs-s3-sync.sh)
      Tasks: 3 (limit: 1053)
     Memory: 796.0K
        CPU: 5ms
     CGroup: /system.slice/efs-s3-sync.service
             ├─30452 /bin/bash /usr/local/bin/efs-s3-sync.sh
             ├─30453 inotifywait -m -r -e create,modify,delete,move /share/projects
```

i-0d5cfa717f2336378 (Web Server 2)

PublicIPs: 44.222.148.174 PrivateIPs: 10.0.1.74

Enable auto-start at boot

- ○ sudo systemctl enable efs-s3-sync

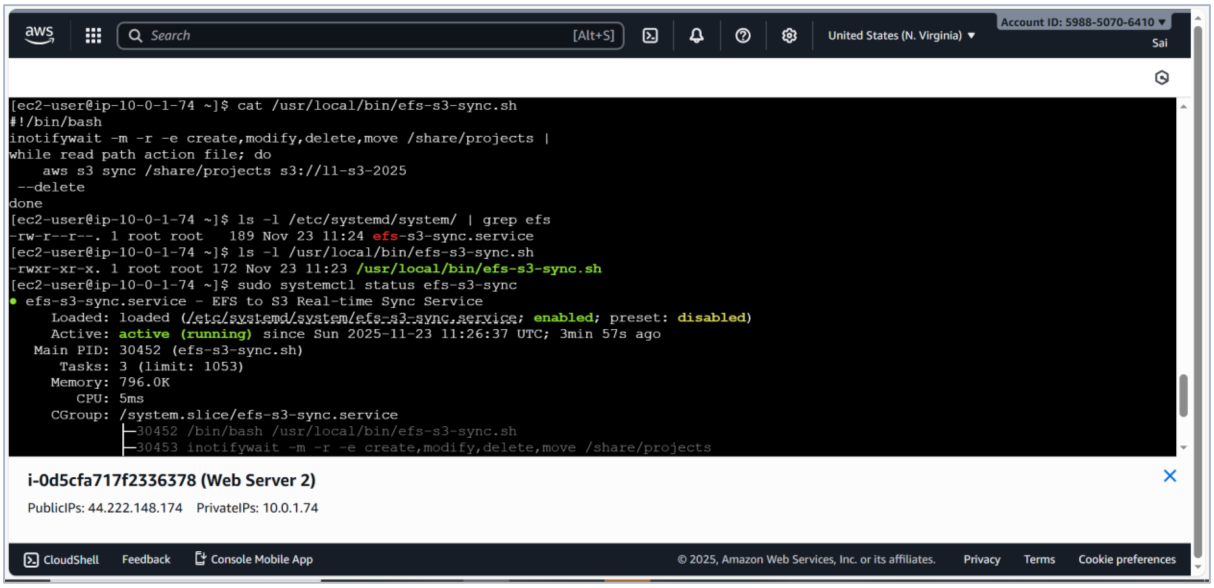
Start service now

- ○ sudo systemctl start efs-s3-sync

Check if running

- ○ systemctl status efs-s3-sync

Now the service is active (running),Now test file sync.

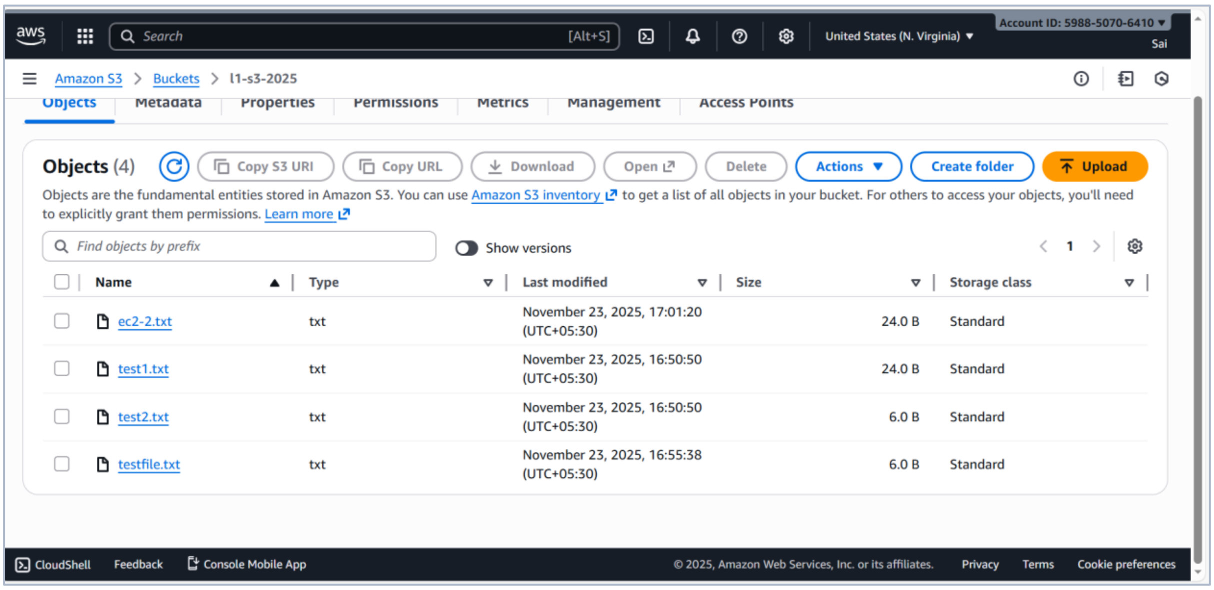

aws
Search
[Alt+S]
United States (N. Virginia) ▾
Account ID: 5988-5070-6410 ▾
Sai
CloudShell
Feedback
Console Mobile App
© 2025, Amazon Web Services, Inc. or its affiliates.
Privacy
Terms
Cookie preferences

```
[ec2-user@ip-10-0-1-74 ~]$ cat /usr/local/bin/efs-s3-sync.sh
#!/bin/bash
inotifywait -m -r -e create,modify,delete,move /share/projects |
while read path action file; do
    aws s3 sync /share/projects s3://11-s3-2025
 --delete
done
[ec2-user@ip-10-0-1-74 ~]$ ls -l /etc/systemd/system/ | grep efs
-rw-r--r--. 1 root root   189 Nov 23 11:24 efs-s3-sync.service
[ec2-user@ip-10-0-1-74 ~]$ ls -l /usr/local/bin/efs-s3-sync.sh
-rwxr-xr-x. 1 root root 172 Nov 23 11:23 /usr/local/bin/efs-s3-sync.sh
[ec2-user@ip-10-0-1-74 ~]$ sudo systemctl status efs-s3-sync
● efs-s3-sync.service - EFS to S3 Real-time Sync Service
     Loaded: loaded (/etc/systemd/system/efs-s3-sync.service; enabled; preset: disabled)
     Active: active (running) since Sun 2025-11-23 11:26:37 UTC; 3min 57s ago
   Main PID: 30452 (efs-s3-sync.sh)
      Tasks: 3 (limit: 1053)
     Memory: 796.0K
        CPU: 5ms
     CGroup: /system.slice/efs-s3-sync.service
             ├─30452 /bin/bash /usr/local/bin/efs-s3-sync.sh
             ├─30453 inotifywait -m -r -e create,modify,delete,move /share/projects
```

i-0d5cfa717f2336378 (Web Server 2)

PublicIPs: 44.222.148.174 PrivateIPs: 10.0.1.74

Result - The Instances automatically uploaded to an Amazon S3 Bucket within seconds.



Objects (4)

Objects are the fundamental entities stored in Amazon S3. You can use Amazon S3 inventory to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. Learn more

□	Name	Type	Last modified	Size	Storage class
□	ec2-2.txt	txt	November 23, 2025, 17:01:20 (UTC+05:30)	24.0 B	Standard
□	test1.txt	txt	November 23, 2025, 16:50:50 (UTC+05:30)	24.0 B	Standard
□	test2.txt	txt	November 23, 2025, 16:50:50 (UTC+05:30)	6.0 B	Standard
□	testfile.txt	txt	November 23, 2025, 16:55:38 (UTC+05:30)	6.0 B	Standard