Amazon Elastic File System (EFS)

Project: Shared File Storage in AWS using EFS

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1. Introduction

Amazon Elastic File System (EFS) is a fully managed, serverless, elastic file storage system designed to be mounted by multiple Amazon EC2 instances. It offers a scalable solution for applications that require shared access to file systems, such as web servers, content management systems, development environments, and big data workloads.

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2. Objectives

- To set up a scalable and shared storage system using Amazon EFS.
- To demonstrate mounting the same EFS on multiple EC2 instances.
- To validate real-time file sharing between EC2 instances using EFS.

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3. Key Features of Amazon EFS

Feature	Description
Scalability	Grows and shrinks automatically as files are added or removed.
Shared Access	Multiple EC2 instances can simultaneously access the file system.
Elasticity	No need to provision storage capacity in advance.
High Availability	Designed for high availability across multiple AZs in a region.
Security	Supports IAM policies, security groups, and encryption (at rest and in transit).
Integration	Easily integrates with EC2, Lambda, ECS, and other AWS services.

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4. Use Case

This project sets up a shared file system accessible by multiple EC2 instances. It can be used in:

- Website hosting (centralized content)
- Multi-user development environments
- Data analysis platforms needing concurrent access
- Container-based applications (via EFS integration with ECS/EKS)

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5. System Architecture

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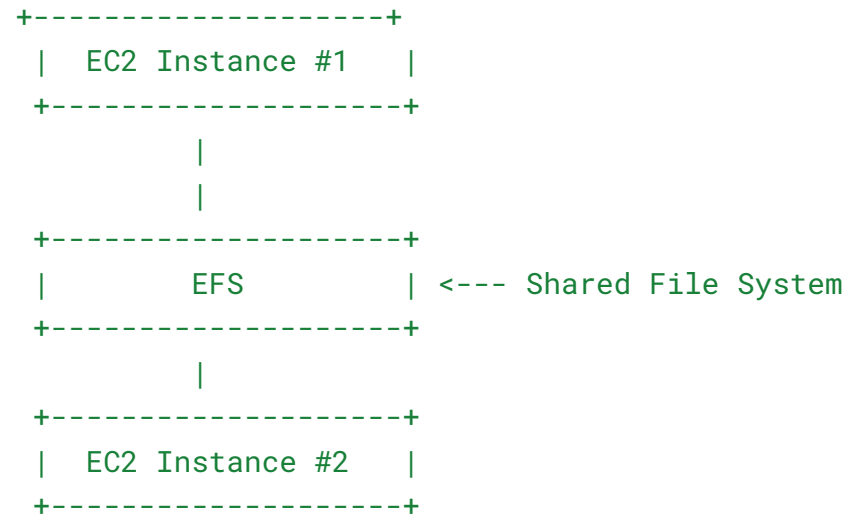

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6. Implementation Steps

🔶 Step 1: Create the EFS File System

- Open AWS Console → **EFS**
- Click **Create file system**
- Choose VPC and availability zones

- Name it (e.g., `ProjectEFS`) and click **Create**

📷 *[Image Reference — EFS Creation Screen]*

🔶 Step 2: Mount Target Configuration

- Automatically done for each selected Availability Zone
- Ensures VPC subnets can connect to the EFS file system

📷 *[Image Reference — Mount Target View]*

🔶 Step 3: Launch EC2 Instances

- Create two EC2 instances (Amazon Linux 2)
- Attach them to the same VPC and subnets as EFS
- Ensure the Security Group allows:
    - **SSH (port 22)**
    - **NFS (port 2049)**

🔶 Step 4: Install NFS Utilities on EC2

Login via SSH and run:

```
sudo yum update -y
sudo yum install -y amazon-efs-utils
```

🔶 Step 5: Mount EFS on EC2 Instances

On each instance:

```
sudo mkdir /mnt/efs
sudo mount -t efs fs-xxxxxxxx:/ /mnt/efs
```

(Replace `fs-xxxxxxxx` with your actual File System ID)

🔶 Step 6: Test File Sharing

On **EC2-1**:

```
echo "Hello from EC2-1" > /mnt/efs/message.txt
```

On **EC2-2**:

```
cat /mnt/efs/message.txt
```

➡️ Output should be: `Hello from EC2-1`

📷 *[Image Reference — Shared File Access]*

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7. Benefits of Using EFS

- No manual storage provisioning
- Real-time access to shared data
- Easy to set up and integrate
- Works across multiple availability zones
- Durable and highly available file storage

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8. Limitations

- Higher latency than EBS for single-instance workloads
- Slightly higher cost compared to S3 or EBS for specific use cases

- Mounting not natively supported on Windows instances

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9. Conclusion

Amazon EFS is a powerful tool for creating shared file systems in the AWS cloud. Through this project, a shared storage environment was successfully implemented using EFS and EC2. It demonstrates efficient, elastic, and scalable file sharing suitable for multi-instance workloads and modern application environments.