Amazon
Elastic File System (EFS)

AWS Elastic File System (EFS) is a scalable and fully managed cloud-based file storage service designed to be used with AWS services and on-premises resources. It allows multiple Amazon EC2 instances to access the same file system simultaneously, enabling file sharing across instances. EFS automatically grows and shrinks as you add and remove files, eliminating the need to provision storage in advance. It's ideal for scenarios where you need a distributed file system to store and share data among multiple resources.

**Key Features of AWS EFS:**

- **Scalability**: Automatically scales up and down as files are added or removed, so you pay only for what you use.
- **Performance Modes**: Offers different performance modes (General Purpose and Max I/O) to optimize for specific workloads.
- **Availability and Durability**: EFS is designed for high availability and durability, with data stored redundantly across multiple Availability Zones (AZs).
- **Security**: Provides encryption at rest and in transit, and integrates with AWS Identity and Access Management (IAM) for fine-grained access control.
- **Mounting Options**: Supports NFSv4 and can be mounted on on-premises servers using AWS Direct Connect or a VPN.

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**Intro Parameters**

- AWS managed Network File System (NFS)
- Can be mounted to multiple EC2 instances **across AZs**
- **Pay per use** (no capacity provisioning)
- **Auto scaling** (up to PBs)
- Compatible with **Linux** based AMIs (**POSIX** file system)

**Performance Mode**

- **General Purpose** (default)
    - latency-sensitive use cases (web server, CMS, etc.)
- **Max I/O**
    - higher latency & throughput (big data, media processing)

**Throughput Mode**

- **Bursting** (default)
    - Throughput: 50MB/s per TB
    - Burst of up to 100MB/s.
- **Provisioned**
    - Fixed throughput (provisioned)

**Storage Tiers**

- **Standard** - for frequently accessed files
- **Infrequent access (EFS-IA)** - cost to retrieve files, lower price to store
- Lifecycle management feature to move files to **EFS-IA** after N days

**Security**

- **Security Groups** to control network traffic
- **POSIX Permissions** to control access from hosts by IAM User or Group

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We saw EBS in the previous lecture & we learnt the EFS in today's lecture

What are the key differences …!!

| Feature | Amazon EBS | Amazon EFS |
|---|---|---|
| **Storage Type** | Block Storage | File Storage |
| **Accessibility** | Attaches to a single EC2 instance (or multi-attach in some cases) | Can be mounted by multiple EC2 instances across different AZs |
| **Use Case** | High-performance storage for a single EC2 instance | Shared file storage for multiple EC2 instances |
| **Performance Modes** | General Purpose SSD (gp3, gp2), Provisioned IOPS SSD (io2, io1), Throughput Optimized HDD (st1), Cold HDD (sc1) | General Purpose, Max I/O |
| **Scalability** | Size must be provisioned (can be increased as needed) | Automatically scales up or down based on stored data |
| **Pricing** | Charged based on provisioned size and performance type | Charged based on the amount of data stored and access patterns |
| **Data Durability** | Data is replicated within a single AZ | Data is replicated across multiple AZs |
| **Backup and Snapshots** | Supports snapshots for backup | Does not natively support snapshots (need to use external backup solutions) |
| **Latency** | Typically lower latency, high IOPS | Higher latency compared to EBS, suitable for large-scale data sharing |
| **Encryption** | Supports encryption at rest and in transit | Supports encryption at rest and in transit |
| **Supported Protocols** | Can be used as a boot volume, supports any file system supported by the OS | Supports NFS (Network File System) protocol |
| **Durability and Availability** | High durability within a single AZ, but lower availability compared to EFS | High durability and availability across multiple AZs |

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**When to Choose Amazon EBS:**

- **Single Instance High Performance**: Use EBS when you need high-performance storage attached to a single EC2 instance. This is ideal for databases, transactional workloads, or systems that require low-latency and high IOPS.
- **Boot Volumes**: EBS is suitable for use as a root/boot volume for an EC2 instance.
- **Custom File Systems**: If you need a custom file system or block-level storage for applications that require it (e.g., databases like MySQL, MongoDB).

**When to Choose Amazon EFS:**

- **Shared Storage Across Instances**: Choose EFS when multiple EC2 instances need to share the same file system, such as for content management systems, home directories, or shared project directories.
- **Scalable File Storage**: If you need a file system that can automatically scale with the size of your data without manual intervention.
- **High Availability and Durability**: EFS is ideal for applications that require a highly available and durable file system, spread across multiple AZs

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EFS Scenario based questions...!!

https://lisireddy.medium.com/aws-efs-scenario-based-questions-61f954eeb14e

Wish you the best … ! Happy Learning ..!

Yours' Love (@lisireddy across all the platforms)