AWS EFS

## Service Overview

*Amazon Elastic File System (Amazon EFS) provides a simple, serverless, set-and-forget elastic file system for use with AWS Cloud services and on-premises resources. It is built to scale on demand to 00petabytes without disrupting applications, growing and shrining automatically as you add and remove files, eliminating the need to provision and manage capacity to accommodate growth. Amazon EFS has a simple web services interface that allows you to create and configure file systems quickly and easily. The service manages all the file storage infrastructure for you, meaning that you can avoid the complexity of deploying, patching, and maintaining complex file system configurations.*

*Amazon EFS supports the Network File System version 4 (NFSv4.1 and NFSv4.0) protocol, so the applications and tools that you use today work seamlessly with Amazon EFS. Multiple compute instances, including Amazon EC2, Amazon ECS, and AWS Lambda, can access an Amazon EFS file system at the same time, providing a common data source for workloads and applications running on more than one compute instance or server.*

*The service is designed to be highly scalable, highly available, and highly durable. Amazon EFS file systems using Standard storage classes store data and metadata across multiple Availability Zones in an AWS Region. EFS file systems can grow to petabyte scale, drive high levels of throughput, and allow massively parallel access from compute instances to your data.*

*Amazon EFS provides file system access semantics, such as strong data consistency and file locking. For more information, see* [*Data consistency in Amazon EFS*](https://docs.aws.amazon.com/efs/latest/ug/how-it-works.html#consistency)*. Amazon EFS also enables you to control access to your file systems through Portable Operating System Interface (POSIX) permissions. For more information, see* [*Security in Amazon EFS*](https://docs.aws.amazon.com/efs/latest/ug/security-considerations.html)*.*

*Amazon EFS supports authentication, authorization, and encryption capabilities to help you meet your security and compliance requirements. Amazon EFS supports two forms of encryption for file systems, encryption in transit and encryption at rest. You can enable encryption at rest when creating an Amazon EFS file system. If you do, all your data and metadata is encrypted. You can enable encryption in transit when you mount the file system. NFS client access to EFS is controlled by both AWS Identity and Access Management (IAM) policies and network security policies like security groups. For more information, see* [*Data encryption in Amazon EFS*](https://docs.aws.amazon.com/efs/latest/ug/encryption.html)*,* [*Identity and Access Management for Amazon EFS*](https://docs.aws.amazon.com/efs/latest/ug/auth-and-access-control.html)*, and* [*Controlling network access to Amazon EFS file systems for NFS clients*](https://docs.aws.amazon.com/efs/latest/ug/NFS-access-control-efs.html)*.*

*Amazon EFS is designed to provide the throughput, IOPS, and low latency needed for a broad range of workloads. With Amazon EFS, you can choose from two performance modes and two throughput modes:*

* *The default* ***General Purpose*** *performance mode is ideal for latency-sensitive use cases, like web serving environments, content management systems, home directories, and general file serving. File systems in the Max I/O mode can scale to higher levels of aggregate throughput and operations per second with a tradeoff of slightly higher latencies for file metadata operations. For more information, see* [*Performance modes*](https://docs.aws.amazon.com/efs/latest/ug/performance.html#performancemodes)*.*
* *Using the default* ***Bursting Throughput*** *mode, throughput scales as your file system grows. Using* ***Provisioned Throughput*** *mode, you can specify the throughput of your file system independent of the amount of data stored. For more information, see* [*Amazon EFS performance*](https://docs.aws.amazon.com/efs/latest/ug/performance.html)*.*

*So, the brief recap of what AWS EFS stands for and its features:*

* *Managed NFS (network file system) that can be mounted on multiple compute instances*
* *File system grow to Petabyte-scale network file system, automatically, no capacity planning*
* *Highly available (EFS works with multiple Amazon EC2, Amazon ECS, and AWS Lambda’s in multi-AZ) and scalable (1000s of concurrent NFS clients, 10 GB+ /s throughput)*
* *Uses NFSv4.1 protocol and POSIX file system (~Linux) that has a standard file API*
* *Compatible with Linux based AMI (not Windows)*
* *Have a couple of Performance mode (set at EFS creation time):*
  + ***General purpose*** *(default): latency-sensitive use cases (web server, CMS, etc…)*
  + ***Max I/O*** *– higher latency, throughput, highly parallel (big data, media processing)*
* *Storage Tiers (lifecycle management feature – move file after N days):*
  + ***Standard****: for frequently accessed files*
  + ***Infrequent access (EFS-IA)****: cost to retrieve files, lower price to store*
* *Uses security group to control access to EFS*
* *Encryption at rest using KMS*
* *Rather expensive (has a higher price point than EBS, 3x gp2), pay per use*

## Use cases / Considerations

*As an example, suppose that you have one or more EC2 instances launched in your VPC. Now you want to create and use a file system on these instances. Following are the typical steps you need to perform to use Amazon EFS file systems in the VPC:*

* ***Create an Amazon EFS file system*** *– When creating a file system, we recommend that you consider using the* ***Name*** *tag because the* ***Name*** *tag value appears in the console and makes it easier to identify the file system. You can also add other optional tags to the file system.*
* ***Create mount targets*** *for the file system – To access the file system in your VPC and mount the file system to your Amazon EC2 instance, you must create mount targets in the VPC subnets.* *You mount your file system on an EC2 instance in your virtual private cloud (VPC) using a mount target that you create for the file system. Managing file system network accessibility refers to managing the mount targets.*


        Diagram showing 3 Availability Zones in a VPC, containing EC2 instances and mount
          targets, and a mounted EFS file system.
      

* ***Create security groups*** *– Both an Amazon EC2 instance and a mount target need to have associated security groups. These security groups act as a virtual firewall that controls the traffic between them. You can use the security group you associated with the mount target to control inbound traffic to your file system by adding an inbound rule to the mount target security group that allows access from a specific EC2 instance. Then, you can mount the file system only on that EC2 instance.*

*For more information, see* [*Working with Amazon EFS resources*](https://docs.aws.amazon.com/efs/latest/ug/creating-using.html)*.*

*Also, EFS share is often uses for website files (in conjunction with Apache Web Server, for example). You can find more detailed information* [*here*](https://docs.aws.amazon.com/efs/latest/ug/wt2-apache-web-server.html)*.*

## Governance

## Backup

*There are two options available for protecting your data by backing up your EFS file systems.*

* ***AWS Backup service***
* *The* ***EFS-to-EFS backup*** *solution*

***AWS Backup*** *is a simple and cost-effective way to back up your Amazon EFS file systems that are in AWS Regions where the AWS Backup service is available. AWS Backup is a unified backup service designed to simplify the creation, migration, restoration, and deletion of backups, while providing improved reporting and auditing. For more information, see* [*Using AWS Backup with Amazon EFS*](https://docs.aws.amazon.com/efs/latest/ug/awsbackup.html)*.*

*The* ***EFS-to-EFS backup*** *solution is suitable for all Amazon EFS file systems in all AWS Regions. It includes an AWS CloudFormation template that launches, configures, and runs the AWS services required to deploy this solution. This solution follows AWS best practices for security and availability. For more information, see* [*EFS-to-EFS Backup Solution*](https://aws.amazon.com/answers/infrastructure-management/efs-backup/)

## Monitoring

*You should collect monitoring data from all of the parts of your AWS solution so that you can more easily debug a multi-point failure if one occurs.*

*Before you start monitoring Amazon EFS, however, you should create a monitoring plan that includes answers to all monitoring-related questions.*

*The next step is to establish a baseline for normal Amazon EFS performance in your environment, by measuring performance at various times and under different load conditions.*

*As you monitor Amazon EFS, you should consider storing historical monitoring data. This stored data will give you a baseline to compare against with current performance data, identify normal performance patterns and performance anomalies, and devise methods to address issues.*

*For example, with Amazon EFS, you can monitor network throughput, I/O for read, write, and/or metadata operations, client connections, and burst credit balances for your file systems. When performance falls outside your established baseline, you might need to change the size of your file system or the number of connected clients to optimize the file system for your workload.*

*To establish a baseline you should, at a minimum, monitor the following items:*

* *Your file system's network throughput.*
* *The number of client connections to a file system.*
* *The number of bytes for each file system operation, including data read, data write, and metadata operations.*

*For more information, see* [*EFS Monitoring tools*](https://docs.aws.amazon.com/efs/latest/ug/monitoring_automated_manual.html)

## Pricing considerations

*With Amazon EFS, you pay only for the storage used by your file system and there is no minimum fee or setup cost. Amazon EFS offers a range of storage classes designed for different use cases. These include:*

* ***Standard storage classes*** *– EFS Standard and EFS Standard–Infrequent Access (Standard–IA), which offer multi-AZ resilience and the highest levels of durability and availability.*
* ***One Zone storage classes*** *– EFS One Zone and EFS One Zone–Infrequent Access (EFS One Zone–IA), which offer customers the choice of additional savings by choosing to save their data in a single AZ’.*

*For more information, see* [*Managing EFS storage classes*](https://docs.aws.amazon.com/efs/latest/ug/storage-classes.html)*.*

*Costs related to Provisioned Throughput are determined by the throughput values you specify. For more information, see* [*Amazon EFS Pricing*](https://aws.amazon.com/efs/pricing)

## More details

*Use official Amazon documentation* [*https://docs.aws.amazon.com/efs/latest/ug/index.html*](https://docs.aws.amazon.com/efs/latest/ug/index.html)