Storage in AWS

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Elastic Block Storage

Amazon Elastic Block Store (Amazon EBS) is a cloud-based block storage service provided by Amazon Web Services (AWS). It allows users to create persistent block-level storage volumes and attach them to Amazon Elastic Compute Cloud (Amazon EC2) instances. EBS volumes are highly available and can provide low-latency performance, making them suitable for a wide range of use cases.

Block Storage: Amazon EBS provides block-level storage volumes, which means it can be formatted with a filesystem of your choice and used as if it were a physical disk attached to an EC2 instance.

Persistent Storage: EBS volumes are independent of EC2 instances, meaning the data on the volume persists even if the associated instance is stopped or terminated.

Elasticity and Scalability: You can easily create, attach, and detach EBS volumes to EC2 instances as needed. You can also increase the size of an existing EBS volume on-the-fly without interrupting the instance.

Snapshots: Amazon EBS allows you to create point-in-time snapshots of your EBS volumes. Snapshots are stored in Amazon Simple Storage Service (Amazon S3) and can be used to back up data, restore volumes, and clone volumes in different regions.

Encryption: EBS volumes can be encrypted using AWS Key Management Service (KMS) encryption keys, ensuring data security at rest.

Regionally Distributed and Redundant: EBS volumes are replicated within the same Availability Zone (AZ) and are designed for high availability. For additional durability, you can use EBS volume snapshots stored in S3.

EBS Snapshot:

An Amazon Elastic Block Store (EBS) snapshot is a point-in-time copy of an EBS volume data . It provides a cost-effective and efficient way to back up your EBS volumes, protect against data loss, and create new volumes with the same data as the source volume. EBS snapshots are an essential part of AWS's data protection and disaster recovery strategy.

Incremental Backups: EBS snapshots use an incremental backup method. When you create the first snapshot of an EBS volume, it captures the entire data set. Subsequent snapshots only capture the data that has changed since the previous snapshot. This incremental approach saves storage space and reduces the time needed to create new snapshots.

Data Consistency: To ensure data consistency in a snapshot, it's recommended to either stop or detach the EBS volume from the EC2 instance before taking the snapshot. For applications like databases, it's crucial to perform database-level flushes or quiescing to prevent data corruption in the snapshot.

Sharing and Copying Snapshots: EBS snapshots can be shared with other AWS accounts or made publicly accessible, allowing you to share data between different projects or teams securely. Additionally, you can copy snapshots to different AWS regions, which is useful for disaster recovery and migration purposes.

Let's dive Hands on !

Elastic File System

What is a File System?

A file system is a method used by operating systems to organize and store data

It provides a hierarchical structure for storing and retrieving files and directories.

A file system is essential for managing data, enabling users and applications to access and manipulate files efficiently.

What is a File System

Traditional file systems work by dividing the storage medium into blocks or clusters, each of a fixed size.

These blocks are the smallest units of storage that the file system can manage.

Files are then stored in these blocks, and the file system keeps track of where each file's blocks are located on the storage device.

Partitioning: The storage device (e.g., hard drive) is divided into one or more partitions, each with its own file system. Partitions act as logical containers for data, allowing the file system to manage the storage space more effectively.

Directory Structure: The file system organizes files and directories in a hierarchical structure. Directories act as containers for files and other directories. Each directory contains a list of entries pointing to the metadata (e.g., MFT entry or inode) of its contents.

File Allocation: When a file is created or saved, the file system allocates a certain number of blocks to store the file's data. The size of these blocks is predetermined by the file system. If the file size exceeds the size of a single block, multiple blocks are allocated to store the entire file.

File Access: When a user or application wants to access a file, the file system uses the file's metadata to locate the data blocks on the storage device. It then reads the data from those blocks and presents it to the user or application.
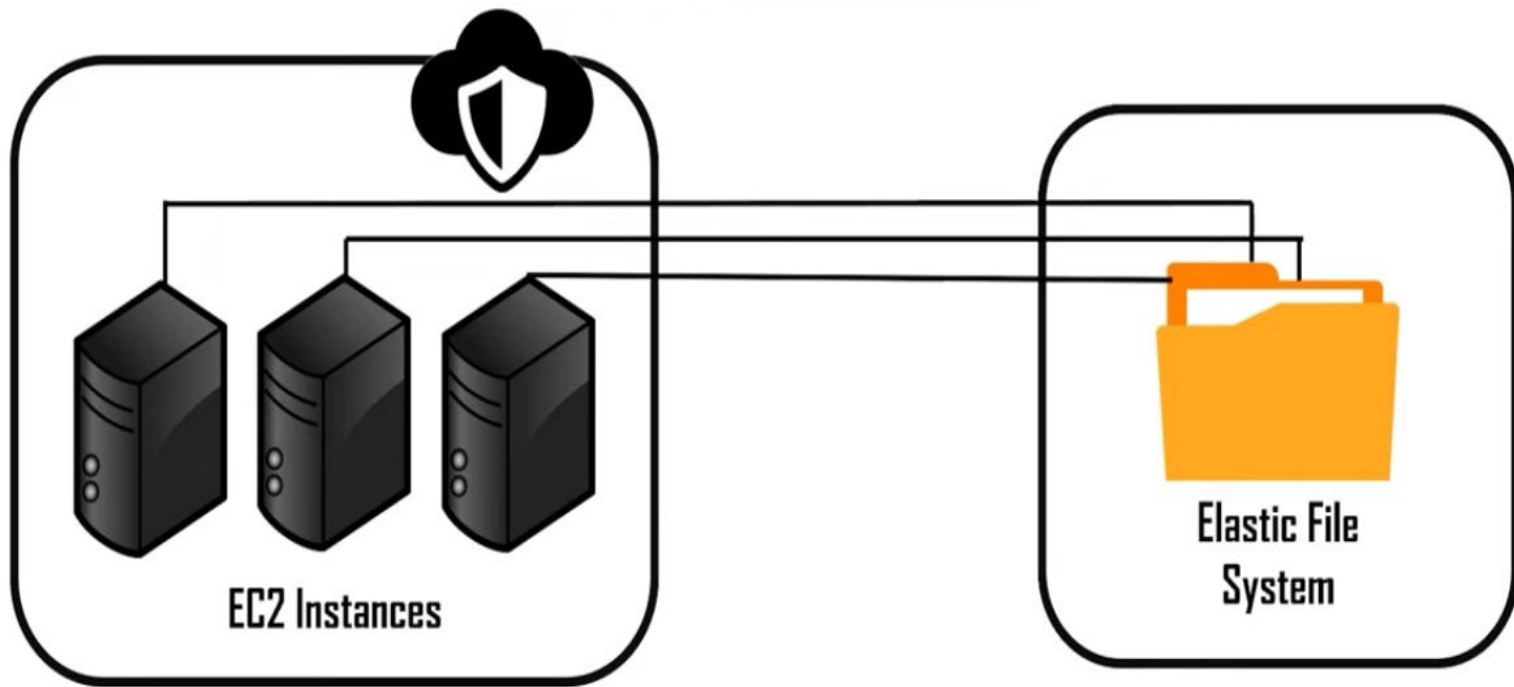
WHAT IS AWS ELASTIC FILE SYSTEM?

Cloud

On Premises

Amazon Elastic File System (Amazon EFS) provides a simple, serverless & elastic file system that lets you share file data without provisioning or managing storage

EC2 Instances

Elastic File System

Amazon Elastic File System (Amazon EFS)

Simple, serverless, set-and-forget, elastic file system for AWS compute

Serverless shared storage

Serverless and scalable

No provisioning, scale capacity, connections, and IOPS

Full AWS compute integration

EC2 Instances, containers, and serverless

Supports 10,000s of connections

Simple and highly reliable

Elastic

Pay only for capacity used

Performance built-in, scales with capacity

Highly durable and available

Designed for 11 9s of durability

99.99% availability SLA

Performant and cost-optimized

Performant

High throughput and IOPS

Storage classes

Automatic lifecycle-based cost optimization

Scalability: AWS EFS can automatically scale to accommodate growing storage needs without any upfront provisioning. It can handle petabytes of data and an unlimited number of file system operations, making it suitable for applications with varying workloads.

Performance: EFS provides low-latency performance, which is essential for applications that require fast and concurrent access to files. It supports high levels of throughput and IOPS, allowing it to cater to demanding workloads.

Fully Managed: EFS is a fully managed service, meaning AWS takes care of the underlying infrastructure, maintenance, and updates. This relieves users of the operational burden and ensures high availability and durability of data.

Multi-AZ Availability: AWS EFS offers data replication across multiple Availability Zones (AZs) within a region. This ensures data redundancy and high availability, protecting against failures in a single AZ.

Elasticity and Pay-as-You-Go: With EFS, you don't need to pre-allocate storage capacity. It automatically scales up or down based on demand, and you only pay for the storage you use, making it cost-effective for workloads with varying storage requirements.

Integration with AWS Services: AWS EFS can seamlessly integrate with various AWS services like Amazon EC2, AWS Lambda, Amazon ECS, and more. This enables easy data sharing and collaboration between multiple applications and services

Let's dive Hands on !