**EBS (Elastic Block Store)**

1. block level storage volumes for use with EC2 instances.
2. EBS volumes that are attached to an instance are exposed as storage volumes that persist independently from the life of the instance
3. Amazon EBS Multi-Attach can turn EBS into multi-instance storage, like EFS. only io1 /io2 EBS volumes support multi-attach .
4. EBS is a block storage service, which means all data within EBS is stored in equally sized blocks. This system offers some performance advantages over traditional storage

**Usages**

* create a file system on top of these volumes
* use them in any way you would use a block device (such as a hard drive)
* EBS is for data that must be quickly accessible and requires long-term persistence
* EBS volumes are particularly well-suited for use as the primary storage for file systems, databases
* throughput-intensive applications that perform long, continuous reads and writes.
* EBS Instances can be either General Purpose SSD (for general use) or Provisioned IOPS SSD, for mission-critical workloads.

**Features of EBS**

* EBS volumes can be attached to instances of same AZ (Availability zones).
* Low-latency performance – Up to 16,000 IOPS for General Purpose SSDs and up to 256,000 IOPS for the new Provisioned IOPS SSD
* Easy data backup and restoration – via snapshots that can be taken at hourly intervals, EBS ensures all your data is well protected.
* EBS snapshots can be utilized to create volume in multiple AZ of same region but can backed up to other regions also.
* To prevent accidental, delete of EBS snapshot Recycle-bin can be set up.
* Highly available – 99.8% – 99.9% for General Purpose SSDs and 99.999% for the Provisioned IOPS SSD
* EBS encryption – there’s no need to worry about key management, as EBS handles that for you.
* With Amazon EBS, you pay only for what you use.
* Multiple EBS volumes can be attached to same ec2 instance.
* Delete on termination is enable in EBS then EBS volume will be deleted on termination of ec2 instance.
* gp2/gp3 and io1/io2 can be used as boot volumes for ec2 instances.

**EFS (Elastic file system)**

1. Amazon Elastic File System (Amazon EFS) provides a simple, scalable, fully managed elastic NFS file system for use with AWS Cloud services and on-premises resources. It is built to scale on demand to petabytes without disrupting applications, growing and shrinking automatically as you add and remove files, eliminating the need to provision and manage capacity to accommodate growth. Amazon EFS is designed to provide massively parallel shared access to thousands of Amazon EC2 instances, enabling your applications to achieve high levels of aggregate throughput and IOPS with consistent low latencies.
2. 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.
3. Unlike EBS, EFS can be mounted by multiple EC2 instances, meaning many virtual machines may store files within an EFS instance.
4. main feature is its scalability. EFS can grow or shrink according to demand, with more and more files being added without disturbing your application or having to provision new infrastructure.
5. Adaptive throughput – EFS’s performance can scale in-line with its storage, operating at a higher throughput for sudden, high-volume file dumps, reaching up to 500,000 IOPS or 10 GB per second
6. Totally elastic – once you’ve spun up an EFS instance, you can add files without worrying about provisioning or disturbing your application’s performance
7. Additional accessibility – EFS can be mounted from different EC2 instances, but it can also cross the AWS region boundary via the use of VPC peering.
8. Shared file storage-Amazon EFS provides secure access for thousands of connections. Amazon EC2 instances and on-premises servers can simultaneously access a shared Amazon EFS file system using a traditional file permissions model, file locking capabilities, and hierarchical directory structure via the NFSv4 protocol. Amazon EC2 instances can access your file system across AZs and AWS Regions while on-premises servers can access using AWS Direct Connect or AWS VPN.

**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 Availability Zone.

**S3: object storage for complex queries and archived data**

S3 is scalable, like EFS, and has access to multiple EC2 instances. However, it can also be accessed by other cloud services, and its object storage system makes it ideal for handling large volumes of static data as well as complex queries.

**What kind of storage is S3?**

S3 is an object storage service. Unlike file storage – in which all data is organised hierarchically in a top-down network of folders – data in S3 is contained on the same flat plane, with more comprehensive metadata (labels) to make it manageable.

Think of the difference between a family tree, and a family party at which each family member is wearing a name tag. In the first scenario, people exist in hierarchal relation to one another; in the second all are milling about on equal footing.

Having each object marked like this makes it easier to run complex queries on each object without reference to an existing hierarchy.

**S3’s key benefits**

Within its role as a object storage system, S3 offers many benefits:

* Running analytics – because S3 can interface with other services like AWS Lake Formation and analytics tools, it can be used as a data lake, with other services running complex queries on its data to draw insights
* Data archiving – S3 is capable of archiving data, meaning simpler forms of your data can be stored at a lower cost than a ‘fuller’ version would
* Incredibly durable – Amazon S3 Standard, S3 Standard–IA, S3 Intelligent-Tiering, S3 One Zone-IA, S3 Glacier, and S3 Glacier Deep Archive are all designed to provide 99.999999999% (11 9’s) of data durability of objects over a given year. This durability level corresponds to an average annual expected loss of 0.000000001% of objects. If you store 10,000,000 objects with Amazon S3, you can on average expect to incur a loss of a single object once every 10,000 years.
* Highly available – S3 boasts 99.99% + availability
* Flexible – S3 can be mounted on an application to act as a shared drive, making files shareable across multiple instances running the web application

**When to use S3?**

* S3 is good at storing long-term data due to its archiving system. Things like reports and records, which may go unused for years, can be stored on S3 at a lower cost than the other two storage services discussed.
* As already stated, S3 is also useful for storing data on which complex queries may be run. This makes it useful for data related to customer purchases, behaviour or profiles, because that data can be easily queried and fed into analytics tools.
* This  capacity for interfacing with other tools also makes S3 great for back-up and restoration, as it can be paired with Amazon Glacier for even more secure backing up.
* S3 also supports static websites, so if you need to host a static HTML page, S3 is a good choice.
* EBS is a high-performance per-instance block storage system designed to act as storage for a single EC2 instance (most of the time)
* EFS is a highly scalable file storage system designed to provide flexible storage for multiple EC2 instances
* S3 is an object storage system, designed to provide archiving and data control options and to interface with other services beyond EC2. It’s also useful for storing static html pages and shared storage for applications

**Note:**

User can create image from existing EC2 instance and can be used to create new EC2 instances.

Imaging process takes backup every EBS volume attached to it.

Multiple EBS volume can be attached to single EC2 instance.

If **Delete on termination** flag is set then once EC2 instance is terminated.

Graphical user interface, text, application

Description automatically generated

**Creating image from existing ec2 instance**

Graphical user interface, application

Description automatically generated

Graphical user interface, text, application

Description automatically generated