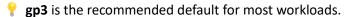
What is EBS?

Amazon **EBS (Elastic Block Store)** is **block-level storage** that you can attach to EC2 instances. It behaves like a traditional hard drive or SSD.

- Persistent: Data remains after instance stops.
- Attached to EC2: One EBS volume can only attach to one EC2 instance at a time (except Multi-Attach).
- **Highly available** within a single **Availability Zone**.

EBS Volume Types (2024)

Туре	Use Case	Max IOPS / Throughput
gp3	General purpose SSD (default)	16,000 IOPS / 1,000 MB/s
gp2	Previous-gen general SSD	Performance scales with size
io2/io1	High-performance SSD	Up to 256,000 IOPS (io2 Block Express)
st1	Throughput-optimized HDD	Big data, log processing
sc1	Cold HDD	Infrequently accessed data
Magnetic	Deprecated legacy HDD	Low-cost, legacy support



EBS Features

- **Snapshots**: Point-in-time backups stored in S3.
- **Encryption**: At rest using AWS KMS (automatic for new volumes).
- Multi-Attach: io1/io2 volumes can be attached to multiple EC2 instances (Nitro only).
- Resize on the fly: Can increase size, IOPS, and throughput without downtime.
- **Volume Lifecycle Management**: Automate snapshot backups with Amazon Data Lifecycle Manager (DLM).

EBS vs Instance Store

Feature **EBS Instance Store** X No (ephemeral) Persistent Yes Resizable Yes X No AZ Scope Single AZ Single AZ Use Case General use High-speed temp storage Data on Stop/Terminate <a> Retained (unless deleted) <a> Lost

Snapshot Usage

- Can be used to **create a new volume** or **copy across regions**.
- Incremental: Only the changed blocks are stored.
- Supports Fast Snapshot Restore (FSR) for low-latency volume creation.

Best Practices (EBS)

- ✓ Use gp3 or io2 based on workload
- Always enable encryption (enabled by default)
- Schedule automated snapshots
- Prefer Multi-AZ apps to survive AZ failures
- Use EBS-optimized EC2 instances for high performance

AWS EFS (Elastic File System) – Full Notes

What is EFS?

Amazon EFS is a **fully managed, serverless, scalable file system** for use with AWS services and onpremises systems.

- Network file system (NFSv4.1/v4.2)
- Mountable on multiple EC2 instances simultaneously
- Designed for **shared access**, like Linux file systems

EFS Features

Feature Description

Fully managed No provisioning or scaling needed

Elastic Grows and shrinks automatically

Multi-AZ Data is stored redundantly across multiple AZs

POSIX compliant Supports Linux file permissions

Encryption In transit and at rest (via KMS)

Backup Integration Built-in support with AWS Backup

Access Points Simplified sharing and isolation per app/user

EFS Storage Classes

Storage Class Use Case Cost

Standard Frequently accessed files High

Infrequent Access (IA) Cost-optimized for less-accessed files ~92% cheaper

• You can use **Lifecycle Management** to move files to IA after N days.

• EFS Performance Modes

Mode Description

General Purpose Default, low-latency for most apps

Max I/O High throughput for big data or analytics workloads (adds some latency)

EFS Throughput Modes

Mode Description

Bursting Scales with file system size

Provisioned You define throughput (e.g., 100 MiB/s)

Mounting EFS

Mount using:

sudo mount -t nfs4 -o tls fs-xxxxxxxx.efs.<region>.amazonaws.com://mnt/efs

Use **EFS mount helper** or fstab entries for auto-mounting on boot.

• EFS vs EBS vs S3

Feature EBS EFS S3

Type Block Storage File Storage Object Storage

Multi-AZ X (AZ-specific) ✓ (multi-AZ) ✓ (global)

Multi-attach Limited (io2 only) ✓ Yes ✓ Yes (HTTP APIs)

Use Case OS disk, DBs Shared file system Backup, archive, web hosting

EFS Security

- Integrated with IAM and POSIX permissions
- Supports VPC security groups
- Supports KMS encryption
- Use Access Points to isolate app directories

Pricing (as of 2024)

Service Pricing Model

EBS Per GB/month + IOPS (for io2)

EFS Standard Per GB/month

EFS IA Much lower per GB, + per request

Snapshots Separate cost (for EBS only)

Use AWS Cost Explorer to optimize costs.

Best Practices (EFS)

- Use IA lifecycle policy to cut costs
- Always enable encryption
- Use Access Points to isolate users/apps
- Combine with Mount Targets in each AZ
- ✓ Monitor with **CloudWatch metrics**

Common Use Cases

Use Case EBS EFS Yes X No OS Boot Disk Databases (e.g., MySQL) ✓ Recommended X Not ideal X No Shared Storage Yes Machine Learning Output
☐ Fast read/write ☐ Shared output WordPress or Web Hosting ✓ or 🗶 ✓ Ideal for PHP code HPC / Analytics or io2 ✓ Max I/O mode