AWS EBS - Elastic Block Store

What is AWS EBS?
Amazon Elastic Block Store (AWS EBS) is a persistent block-level storage (volume) service designed to be used with Amazon EC2 instances. **EBS is AZ specific** & automatically replicated within its AZ to protect from component failure, offering high availability and durability.

Types of EBS:

SSD-backed volumes (Solid State Drive)	**Optimized for transactional workloads** (small and frequent I/O) - IOPS	
Types SSD	**General Purpose SSD- gp2** (1 GiB — 16 TiB) IOPS : 3000 to 20000 Max / Volume	Boot volumes Development /Test Low-latency Apps Virtual Desktops
	Provisioned IOPS SSD (io1) low-latency or high-throughput Consistent IOPS (16,000+ IOPS) Transactional workloads	MongoDB / NoSQL MySQL / RDS Latency Critical Apps
HDD-backed volumes: (Magnetic Drive)	**Low-Cost throughput-intensive workloads** (Not Suitable for Low Latency(IOPS) -- i.e. booting)	
Types HDD	**Throughput Optimized HDD (st1)** Low Cost - Frequently accessed, throughput-intensive & Large-Sequential O/I -- 500 MB/s	Stream Processing Big Data Processing Data Warehouse
	Cold HDD (sc1) Lowest Cost - less frequently accessed data Throughput : 250 MiB/s	Colder Data requires fewer scans per day.

Features:

- EBS can be formatted with a specific file system.
- High Performance (Provides single-digit-millisecond latency for high-performance)
- Highly Scalable (Scale to petabytes)
- Offers high availability (guaranteed 99.999% by Amazon) & Durability
- Offers seamless encryption of data at rest through Amazon Key Management Service (KMS).
- Automate Backups through **data lifecycle policies** using EBS Snapshots to S3 Storage.
- EBS detached from an EC2 instance and attached to another one quickly.

Key Points to Remember:

- **Backup/Migration:** To move a volume across AZs, you first need to take a snapshot.
- **Provisioned capacity:** capacity needs to be provisioned in advanced (GBs & IOPS)
- You can increase the capacity of the drive over time.
- It can be detached from an EC2 instance and attached to another one quickly.
- It's locked to **Single Availability Zone (AZ)**
- The default volume type is General Purpose SSD (gp2)
- EBS Volume can be mounted parallely using RAID Settings:
    - RAID 0 (increase performance)
    - RAID 1 (increase fault tolerance)
- It's a network drive (i.e. not a physical drive).
- Encryption has a minimum impact on EBS performance.
- Unencrypted volume can be encrypted using an encrypted snapshot
- Snapshot of the encrypted volume is encrypted by default.
- When you share an encrypted snapshot, you must also share the customer-managed CMK used to encrypt the snapshot.

Best Practice:

- Select the Right Type of EBS as per price-performance ratio & need as per the business context.
- Automate Backup using Data life cycle policies (Disaster Recovery)
- Encrypt volume for better security/compliance.
- Periodically Clean up unnecessary Data.
- Monitor performance using CloudWatch Metrics

Pricing:

- You will get billed for all the provisioned capacity & snapshots on S3 Storage + Sharing Cost between AZs/Regions

EBS vs Instance Store

Instance Store (ephemeral storage) :

- It is ideal for temporary block-level storage like buffers, caches, temporary content
- Data on an instance store volume persists only during the life of the associated instance. (As it is volatile storage - lose data if stop the instance/instance crash)
- **Physically attached to ec2 instance** - hence, the **lowest possible latency.**
- **Massive IOPS - High performance**
- Instance store backed Instances can be of maximum 10GiB volume size
- Instance store volume cannot be attached to an instance, once the Instance is up and running.
- Instance store volume can be used as root volume.
- You cannot create a snapshot of an instance store volume.

EBS :

- Persistent Storage.

- Reliable & Durable Storage.
- EBS volume can be detached from one instance and attached to another instance.
- EBS boots faster than instance stores.