EBS VOLUME

(Elastic Block Storage) ----> usage is Billable

Volumes in AWS are a critical component of the **Amazon Elastic Block Store (EBS)** service, which provides persistent block storage for Amazon EC2 instances. They are like virtual hard drives that store data for your instances. Below is an overview of the **Volumes concept in AWS**:

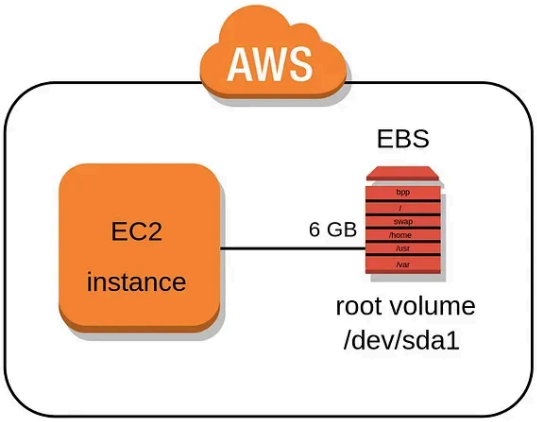
1. What Are EBS Volumes?

- **Definition**: EBS volumes are block storage devices that can be attached to EC2 instances. They provide low-latency storage that can persist independently of the lifecycle of the instance.
- **Use Case**: They are used to store operating systems, applications, databases, and logs.

2. Types of EBS Volumes

AWS offers different types of volumes optimized for specific use cases:

1. **General Purpose SSD (gp3 and gp2):**
   - Cost-effective storage for a wide range of workloads.
   - Suitable for boot volumes, development, and testing environments.
2. **Provisioned IOPS SSD (io2 and io1):**
   - Designed for applications requiring high IOPS, low latency.
   - Best for databases like SQL, Oracle, and NoSQL workloads.
3. **Throughput Optimized HDD (st1):**
   - Optimized for throughput-intensive workloads.
   - Ideal for data warehouses and log processing.
4. **Cold HDD (sc1):**
   - Low-cost storage for infrequently accessed data.
   - Used for archiving data or large datasets that are rarely updated.
5. **Magnetic (Standard):**
   - Legacy option, slower than other types.
   - Used when cost is the priority over performance.



3. Key Features of EBS Volumes

1. **Durability**:
   - EBS volumes are automatically replicated within their Availability Zone (AZ) to protect against hardware failures.
2. **Snapshots**:
   - You can create backups of EBS volumes using snapshots stored in Amazon S3.
   - Snapshots can be used to create new volumes or restore existing ones.
3. **Scalability**:
   - Volumes can be dynamically resized without downtime.
   - Volume types can also be changed using Elastic Volumes.
4. **Encryption**:
   - EBS volumes support encryption at rest.
   - Managed by AWS Key Management Service (KMS) for enhanced security.
5. **Performance**:
   - IOPS and throughput performance can be customized based on volume type and size.
6. **Attachment**:
   - EBS volumes can only be attached to one EC2 instance at a time (except for multi-attach capable io2 volumes).
   - Volumes can be detached and attached to another instance.

4. Lifecycle of an EBS Volume

1. **Creation**:
   - EBS volumes can be created from the AWS Management Console, CLI, or SDK.
2. **Attachment**:
   - Attach the volume to an EC2 instance.
3. **Formatting**:
   - After attachment, the volume needs to be formatted with a file system.
4. **Mounting**:
   - Mount the volume to a directory on the EC2 instance.
5. **Usage**:
   - Start using the volume for storage.
6. **Snapshot**:
   - Create snapshots to back up data periodically.

7. **Detachment and Deletion**:
    - Detach the volume if it's no longer needed.
    - Delete it to save costs.

5. Common Use Cases

1. **Boot Volumes**:
    - Storing the operating system for EC2 instances.
2. **Data Storage**:
    - Storing application data, logs, and databases.
3. **Disaster Recovery**:
    - Using snapshots for backups and disaster recovery plans.
4. **Scaling Storage**:
    - Resizing volumes to meet growing storage needs.

6. Pricing

- Pricing depends on the type, size, provisioned IOPS, and data transfer.
- Snapshots incur additional costs based on the amount of data stored.

7. Limitations

- EBS volumes are tied to a single AZ and cannot be accessed directly from another AZ.
- Multi-attach volumes (io2) are limited to certain instance types and configurations.

Understanding EBS volumes is critical for managing storage in AWS, ensuring data availability, and optimizing performance for various workloads

IMP points:

- EBS Volume max size = 16 TB
- EBS is billable
- for windows ----> 30 GB (default given by AWS)
- for Linux -----> 8 Gb (default given by AWS)
- Default volume type : gp2
- Additional volumes supports all types of EBS volumes
- Root volume supports gp2,gp3,io1,io2 and standard
- volume size can be increased on Fly(no need to stop the Ec2 instances ---> no downtime)
- Volume Size can't be decreased (delete the volume and re create it based on requirement size)
- EC2 can have only 1 root volume
- Ec2 can have multiple additional volumes