



ELASTIC BLOCK STORE

Amazon Elastic Block Store (Amazon EBS) is a block storage service provided by Amazon Web Services (AWS) for use with Amazon EC2 (Elastic Compute Cloud) instances. It provides durable, high-performance block-level storage that you can attach to your EC2 instances. Here are some key features of Amazon EBS:

1. **Block Storage:** Amazon EBS provides block-level storage volumes, which can be used as raw block devices by EC2 instances. These volumes can be attached to EC2 instances, and the operating system treats them as if they were physical disks.
2. **Durability and Availability:** EBS volumes are designed for durability and high availability. They are automatically replicated within the same Availability Zone (AZ) to protect against component failure.
3. **Elasticity:** You can easily increase or decrease the size of your EBS volumes, and you can also change the volume type to optimize performance based on your workload requirements.
4. **Snapshot and Backup:** EBS volumes can be backed up using snapshots. Snapshots are point-in-time copies of your volumes that are stored in Amazon S3. You can use snapshots to create new volumes or to move volumes across Availability Zones.
5. **Different Volume Types:** Amazon EBS offers different volume types, each designed for specific use cases. These include:
 - a) **General Purpose (gp2):** Balanced performance for a variety of workloads.
 - b) **Provisioned IOPS (io1):** High-performance SSD volume designed for I/O-intensive workloads.
 - c) **Throughput Optimized (st1):** Low-cost HDD volume designed for frequently accessed, throughput-intensive workloads.
 - d) **Cold HDD (sc1):** Lowest-cost HDD volume designed for less frequently accessed workloads.
6. **Encrypted Volumes:** Amazon EBS supports volume encryption, allowing you to encrypt your data at rest.
7. **Lifecycle Management:** You can use Amazon EBS Lifecycle Manager to automate the creation, deletion, and snapshotting of EBS volumes according to a defined policy.

When you launch an EC2 instance, you can attach one or more Amazon EBS volumes to it to provide the necessary storage for your applications and data. This separation of storage and compute resources allows for greater flexibility and scalability in AWS environments.



USE CASES OF ELASTIC BLOCK STORE:

Amazon Elastic Block Store (EBS) is a versatile storage solution that serves various use cases within AWS. Here are some common use cases for EBS:

1. **Operating System and Application Storage:** EBS volumes are often used to store the operating system, applications, and other software for EC2 instances. This allows for quick and easy provisioning of EC2 instances with the necessary software stack.
2. **Database Storage:** EBS is commonly used to provide storage for databases running on EC2 instances. The durability, performance, and snapshot capabilities of EBS make it suitable for hosting database files.
3. **Data Warehousing:** For data warehousing scenarios, where large amounts of data need to be stored and accessed with high performance, provisioned IOPS (io1) volumes can be used to meet the I/O requirements.

4. **Backup and Disaster Recovery:** EBS snapshots allow you to create point-in-time backups of your volumes. These snapshots can be used for backup purposes or to create new volumes, providing a mechanism for disaster recovery.
5. **Development and Testing Environments:** EBS volumes are useful for creating development and testing environments. Snapshots can be used to quickly replicate environments, and the ability to resize volumes provides flexibility in adapting to changing storage requirements.
6. **High-Performance Applications:** Provisioned IOPS (io1) volumes are designed for high-performance applications that require low-latency and consistent I/O performance, such as large-scale transactional databases.
7. **Log and Data Analysis:** For applications that involve log and data analysis, such as big data processing or log processing systems, EBS volumes provide the necessary storage for storing and retrieving large amounts of data.
8. **Content Management Systems (CMS):** EBS volumes can be used to store content and data for content management systems. The ability to resize volumes and take snapshots makes it easier to manage and scale CMS deployments.
9. **Custom Applications with Unique Storage Requirements:** Depending on the specific storage characteristics required by custom applications, different EBS volume types can be selected to optimize performance and cost. This flexibility makes EBS suitable for a wide range of applications.
10. **Encrypted Storage:** EBS volumes support encryption, making them suitable for scenarios where data security and compliance are critical. This is particularly important for storing sensitive data and meeting regulatory requirements.

😊 TO BEGIN WITH THE LAB:

😊 STEP 1: CREATE AN EC2 INSTANCE

1. Log into AWS Console. Then navigate to EC2.
2. On EC2 you have to create an instance for Linux based machine.
3. Once you have created your instance. Now you have to log into your instance.
4. Use **Putty** for logging into the server.

Instances (1 / 1) Info										
C Connect Instance state Actions Launch instances										
<input type="text"/> Find Instance by attribute or tag (case-sensitive)										
Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP	
<input checked="" type="checkbox"/> appvm01	i-0487d9b46ca2b7a68	Running Q Q	t2.micro	2/2 checks passed No alarms +		eu-west-2a	ec2-18-170-51-102.eu...	18.170.51.102	-	

```

ubuntu@ip-172-31-29-140: ~
login as: ubuntu
Authenticating with public key "imported-openssh-key"
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-1017-aws x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/advantage

System information as of Thu Jan 11 09:44:12 UTC 2024

System load: 0.0          Processes: 103
Usage of /: 23.4% of 7.57GB  Users logged in: 1
Memory usage: 23%          IPv4 address for eth0: 172.31.29.140
Swap usage: 0%          

Expanded Security Maintenance for Applications is not enabled.

33 updates can be applied immediately.
21 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Thu Jan 11 09:44:13 2024 from 192.140.153.216
ubuntu@ip-172-31-29-140:~$ 

```

STEP 2: CREATE AN EBS VOLUME AND ATTACH IT TO THE INSTANCE

1. Now you should navigate to EBS (Elastic Block Store) volumes.
2. There you will see a volume that has been created for the Linux instance with 8gb of memory.
3. First thing to do is give this volume a name.

Volumes (1/1) Info											
Actions Create volume											
<input type="text" value="Search"/> Clear filters											
	Name	Volume ID	Type	Size	IOPS	Throughput	Snapshot	Created	Availability Zone	Volume state	Alarm
<input checked="" type="checkbox"/>	appvm01-root	vol-0ccf0b3d69227b518	gp2	8 GiB	100	-	snap-06005d1...	2024/01/11 14:28 GMT+5:...	eu-west-2a	In-use	No alg

4. Now you have to create a new volume which you can attach to your EC2 instance.
5. For that click on create volume.
6. Now you have to select **General Purpose SSD (gp2)** for your volume type.
7. Then for the size reduce it to 16gb. You can reduce the size more if you want.
8. Then select the availability zone.
9. **Always remember, select the availability zone in which you have launched your instance.**
10. Then click on create volume.

Volume settings

Volume type | [Info](#)

General Purpose SSD (gp2) ▾

Size (GiB) | [Info](#)

16

Min: 1 GiB, Max: 16384 GiB. The value must be an integer.

IOPS | [Info](#)

100 / 3000

Baseline of 3 IOPS per GiB with a minimum of 100 IOPS, burstable to 3000 IOPS.

Throughput (MiB/s) | [Info](#)

Not applicable

Availability Zone | [Info](#)

eu-west-2a ▾

Snapshot ID - *optional* | [Info](#)

Don't create volume from a snapshot ▾ C

Encryption | [Info](#)

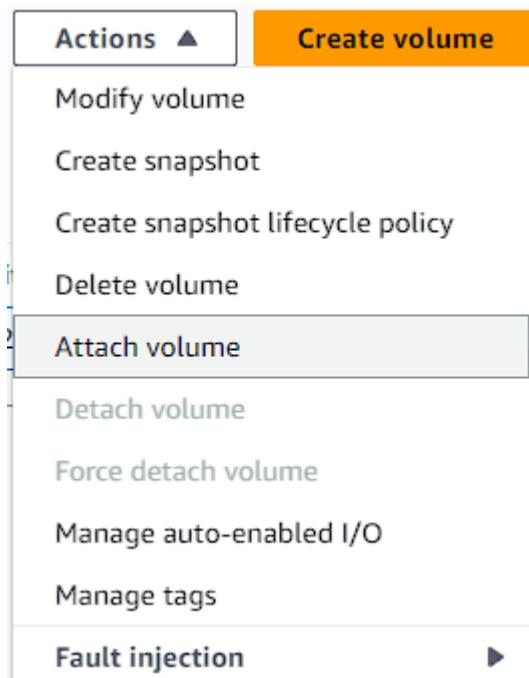
Use Amazon EBS encryption as an encryption solution for your EBS resources associated with your EC2 instances.

Encrypt this volume

11. As you can see the volume has been created and it has renamed too.
12. Currently the volume is in available state. It is not in use.
13. To make it in use for the instance, you have to click on actions then click on attach volume.

Search appvm01-data X Clear filters

<input checked="" type="checkbox"/>	Name	Volume ID	Type	Size	IOPS	Throughput	Snapshot	Created	Availability Zone	Volume state
<input checked="" type="checkbox"/>	appvm01-data	vol-03614324e8020e0f9	gp2	16 GiB	100	-	-	2024/01/11 15:24 GMT+5...	eu-west-2a	Available



14. Once you have clicked on attach volume you can see that you have to select your instance here.
15. Then click on attach volume.

Attach volume Info

Attach a volume to an instance to use it as you would a regular physical hard disk drive.

Basic details

Volume ID
 vol-03614324e8020e0f9 (appvm01-data)

Availability Zone
eu-west-2a

Instance Info
 Only instances in the same Availability Zone as the selected volume are displayed.

Device name Info

Recommended device names for Linux: /dev/sda1 for root volume. /dev/sd[f-p] for data volumes.

i Newer Linux kernels may rename your devices to `/dev/xvdf` through `/dev/xvdp` internally, even when the device name entered here (and shown in the details) is `/dev/sdf` through `/dev/sdp`.

Cancel

16. Here you can see that the volume is in running state now. Or say it is in use for your instance.

	Name	Volume ID	Type	Size	IOPS	Throughput	Snapshot	Created	Availability Zone	Volume state	In-use
	appvm01-data	vol-03614324e8020e0f9	gp2	16 GiB	100	-	-	2024/01/11 15:24 GMT+5:...	eu-west-2a	 In-use	

17. After all the setup thus far now, you have to open putty where you have logged into your instance.

18. Now here is the link for official amazon documentation on how you can mount this volume onto your instance.

<https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ebs-using-volumes.html>

19. Now in Putty if you will run this command, you can see all the storage attached to your instance. You will also see that 16gb if volume that you have created.

Lsblk

```
Last login: Thu Jan 11 09:44:42 2024 from 192.140.153.216
ubuntu@ip-172-31-29-140:~$ lsblk
NAME   MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
loop0    7:0    0 24.9M  1 loop /snap/amazon-ssm-agent/7628
loop1    7:1    0 55.7M  1 loop /snap/core18/2812
loop2    7:2    0 63.5M  1 loop /snap/core20/2015
loop3    7:3    0 111.9M 1 loop /snap/lxd/24322
loop4    7:4    0 40.9M  1 loop /snap/snapd/20290
xvda    202:0   0     8G  0 disk 
└─xvda1  202:1   0    7.9G 0 part /
└─xvda14 202:14  0      4M 0 part 
└─xvda15 202:15  0   106M 0 part /boot/efi
xvdf    202:80   0    16G  0 disk
ubuntu@ip-172-31-29-140:~$
```

20. Now you have to create a directory for your volume. This is the directory where you will mount this volume of yours.

Sudo mkdir /data

```
ubuntu@ip-172-31-29-140:~$ sudo mkdir /data
ubuntu@ip-172-31-29-140:~$
```

21. Then you have to create a file system for the volume.

sudo mkfs -t xfs /dev/xvdf

```
ubuntu@ip-172-31-29-140:~$ sudo mkfs -t xfs /dev/xvdf
meta-data=/dev/xvdf              isize=512    agcount=4, agsize=1048576 blks
                                =          sectsz=512   attr=2, projid32bit=1
                                =          crc=1     finobt=1, sparse=1, rmapbt=0
data     =          reflink=1   bigtime=0 inobtcount=0
        =          bsize=4096   blocks=4194304, imaxpct=25
        =          sunit=0     swidth=0 blks
naming   =version 2             bsize=4096   ascii-ci=0, ftype=1
log      =internal log         bsize=4096   blocks=2560, version=2
        =          sectsz=512   sunit=0 blks, lazy-count=1
realtime =none                 extsz=4096   blocks=0, rtextents=0
ubuntu@ip-172-31-29-140:~$
```

22. Now you have to mount the volume.

sudo mount /dev/xvdf /data

```
ubuntu@ip-172-31-29-140:~$ sudo mount /dev/xvdf /data
ubuntu@ip-172-31-29-140:~$
```

23. Now as you have successfully mounted the volume. Now you can go inside your volume.

```
ubuntu@ip-172-31-29-140:~$ cd /data
ubuntu@ip-172-31-29-140:/data$
```

24. Now if you will try to create a file inside of your new volume. You will see that the permission for that has been denied.

```
ubuntu@ip-172-31-29-140:~$ cd /data
ubuntu@ip-172-31-29-140:/data$ echo "This is the data volume" > file.txt
-bash: file.txt: Permission denied
```

25. So, to give appropriate permission, for that you have to run a command.

Sudo chmod 777 /data

```
ubuntu@ip-172-31-29-140:/$ sudo chmod 777 /data
```

26. After running this command try go back to the directory and save the file and this you will succeed.

27. Once you have saved the file now list it. After that you will your file in the place.

28. Then if you want to look at the file content, for that run this command and you will be able to see the content of the file.

echo "This is the data volume" > file.txt

ls

more file.txt

```
ubuntu@ip-172-31-29-140:/$ cd data
ubuntu@ip-172-31-29-140:/data$ echo "This is the data volume" > file.txt
ubuntu@ip-172-31-29-140:/data$ ls
file.txt
ubuntu@ip-172-31-29-140:/data$ more file.txt
This is the data volume
ubuntu@ip-172-31-29-140:/data$
```