



## **Immersion Day**

Working with Elastic Block Store (EBS) volumes

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## Overview

The purpose of this AWS Immersion Day hands-on lab is to familiarize you with the Amazon Elastic Block Store (EBS) service. EBS is a block storage service that enables you to create volumes, and attach / detach them to Elastic Compute Cloud (EC2) instances. You can create EBS volumes with different volume types, such as: Provisioned IOPS (io1), General Purpose Solid State (gp2), Throughput Optimized HDD (st1), or Cold HDD (sc1), depending on the performance characteristics of your application. Once an EBS volume has been created, you can switch between different volume types, using the **ModifyVolume** API. Keep in mind that EBS volume modifications are limited to once every six (6) hours.

During this lab, you'll create an EBS volume, attach it to an EC2 instance, format and mount the volume, generate some ongoing disk activity, and then modify the volume attributes to increase its performance.

For more information about EBS volume types, pricing, and links to service documentation, please visit the [EBS Pricing Page](#). Visit the [announcement about EBS Elastic Volumes](#), enabling EBS volume attributes to be modified on-the-fly.

## Prerequisites

In order to complete this lab, you will need an AWS account with the ability to launch CloudFormation templates, create EC2 instances and modify EBS volumes.

## Lab Steps

1. Create and attach an EBS volume
2. Run a disk-heavy workload
3. Modify EBS volume attributes
4. Optional: Create a snapshot

## Create and attach an EBS Volume

1. Please create a key pair in the region where the EC2 instances will be launched. Refer to this: <https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ec2-key-pairs.html#having-ec2-create-your-key-pair>
2. This [Cloudformation template](#) will launch an EC2 instance with the keypair that you've created. [Please make sure you have the default vpc in the region otherwise this will fail]

The screenshot shows the 'Specify Details' step of the AWS CloudFormation console. On the left, there is a navigation menu with 'Select Template', 'Specify Details' (highlighted), 'Options', and 'Review'. The main area is titled 'Specify Details' and contains a text box for 'Stack name' with the value 'EC2SecurityGroupSample'. Below this is a section titled 'Parameters' with three fields: 'InstanceType' set to 't2.small' (with a note 'WebServer EC2 instance type'), 'KeyName' set to 'nickdev' (with a note 'Name of an existing EC2 KeyPair to enable SSH access to the instance'), and 'SSHLocation' set to '0.0.0.0/0' (with a note 'The IP address range that can be used to SSH to the EC2 instances'). At the bottom right are 'Cancel', 'Previous', and 'Next' buttons.

3. Navigate to the **Amazon EC2** service and click on **Instances**

The screenshot shows the 'Instances' page in the Amazon EC2 console. On the left is a navigation menu with 'EC2 Dashboard', 'Events', 'Tags', 'Reports', 'Limits', and 'INSTANCES' (highlighted). The main area has a 'Launch Instance' button, a 'Connect' button, and an 'Actions' dropdown. Below these is a search bar and a table of instances. The table has columns: 'Name', 'Instance ID', 'Instance Type', 'Availability Zone', 'Instance State', and 'Status Checks'. One instance is listed with the following details:

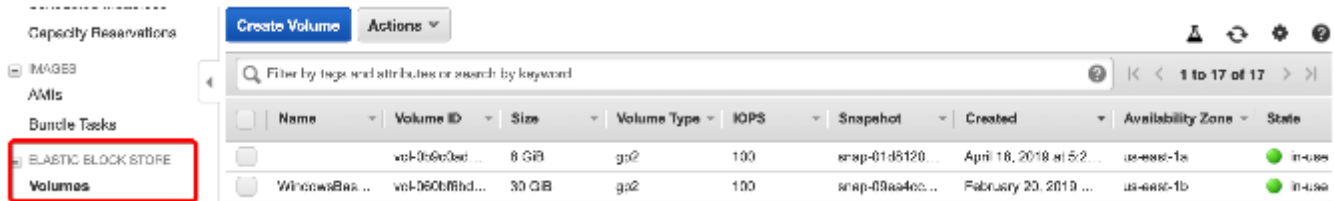
Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks
	i-0a98f8893871fc0e	t2.small	us-east-1a	running	2/2 checks ...

4. Note the **InstanceID** and **Availability Zone** of your EC2 instance; you'll need this in a moment

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- Under the **Elastic Block Store** heading, click **Volumes**



- Click on the **Create Volume** button
- Choose Volume Type: **General Purpose SSD (gp2)**
- Size: **100 GB**
- Availability Zone: Use the Availability Zone noted in **Step #4**

### Create Volume

**Volume Type** General Purpose SSD (gp2) ⓘ

**Size (GiB)** 100 (Min: 1 GiB, Max: 16384 GiB) ⓘ

**IOPS** 300 / 3000 (Baseline of 3 IOPS per GiB with a minimum of 100 IOPS, burstable to 3000 IOPS) ⓘ

**Availability Zone\*** us-east-1a ⓘ

**Throughput (MB/s)** Not applicable ⓘ

**Snapshot ID** Select a snapshot ⓘ

**Encryption** ☐ Encrypt this volume ⓘ

- Click the link containing the new EBS VolumeId

Volumes > Create Volume

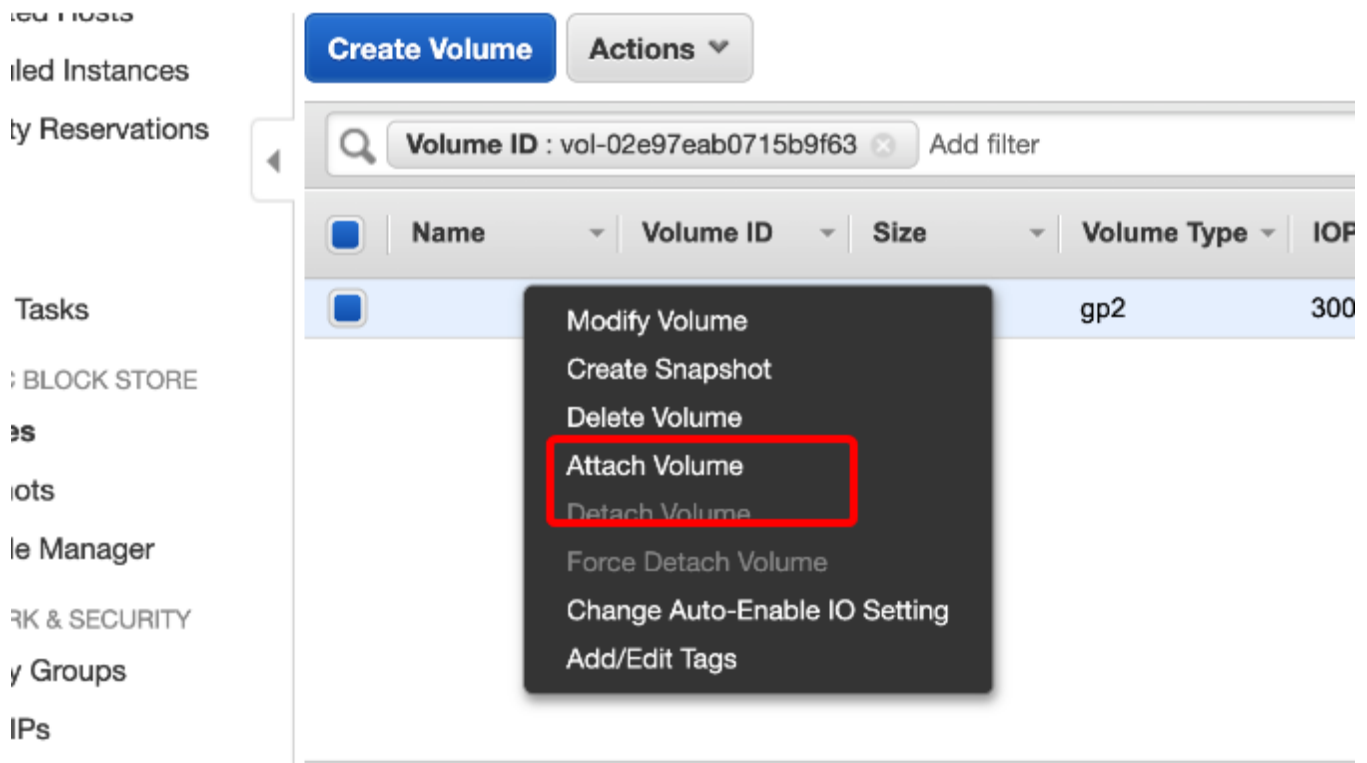
## Create Volume

✓ Volume created successfully

Volume ID [vol-02e97eab0715b9f63](#)

Close

11. Right-click the new volume and click **Attach Volume**



The screenshot shows the AWS Management Console interface for the 'Volumes' section. On the left, there is a navigation pane with various AWS services. The main area displays a table of volumes. A search bar at the top shows the volume ID 'vol-02e97eab0715b9f63'. The table has columns for Name, Volume ID, Size, Volume Type, and IOPS. One volume is listed with a 'gp2' type and '300' IOPS. A context menu is open over this volume, listing several actions. The 'Attach Volume' option is highlighted with a red rectangular box.

	Name	Volume ID	Size	Volume Type	IOPS
<input type="checkbox"/>		vol-02e97eab0715b9f63		gp2	300

- Modify Volume
- Create Snapshot
- Delete Volume
- Attach Volume**
- Detach Volume
- Force Detach Volume
- Change Auto-Enable IO Setting
- Add/Edit Tags

12. Search for the **InstanceID** from step #4

13. Click the **Attach** button

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**Attach Volume**

Volume ⓘ vol-02e97eab0715b9f63 in us-east-1a

Instance ⓘ i-0aa98f8893971fc0e in us-east-1a

Device ⓘ /dev/sdf  
Linux Devices: /dev/sdf through /dev/sdp

Note: 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 Attach

At this point, your new EBS volume should be created and attached to your EC2 instance.

## Run a Disk-heavy Workload

Now that you've created an EBS volume, and attached it to an EC2 instance, you'll generate some ongoing disk activity. In the steps below, you'll log into your EC2 instance, create a filesystem on the EBS volume, mount the volume, and then initiate some disk activity.

1. Log into the EC2 instance via SSH:

**ssh -i ~/<privatekey.pem> ec2-user@ipaddress**

2. Find the disk device using the **lsblk** command

```
[ec2-user@ip-172-31-81-103 ~]$ lsblk
[ec2-user@ip-172-31-81-103 ~]$ lsblk
NAME        MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
xvda        202:0    0   8G  0 disk
└─xvda1     202:1    0   8G  0 part /
xvdf        202:80   0 100G  0 disk
[ec2-user@ip-172-31-81-103 ~]$
```

3. Create a filesystem on the disk, using the device name from step #2:

**sudo mkfs.ext4 /dev/xvdf**

```
[ec2-user@ip-172-31-81-103 ~]$ sudo mkfs.ext4 /dev/xvdf
mke2fs 1.43.5 (04-Aug-2017)
Creating filesystem with 26214400 4k blocks and 6553600 inodes
Filesystem UUID: 5471c34a-4000-4b8c-a67d-5bd7fafeddf7
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
    4096000, 7962624, 11239424, 20480000, 23887872

Allocating group tables: done
Writing inode tables: done
Creating journal (131072 blocks): done
Writing superblocks and filesystem accounting information: done

[ec2-user@ip-172-31-81-103 ~]$
```

4. Mount the filesystem using the mount command:

```
mkdir ~/ebstest; cd ~/ebstest; sudo mount /dev/xvdf ~/ebstest
```

5. Run this Bash command to generate disk activity:

```
while [ true ]; do uuid=$(uuidgen); echo $uuid | sudo tee $uuid.json > /dev/null; done;
```

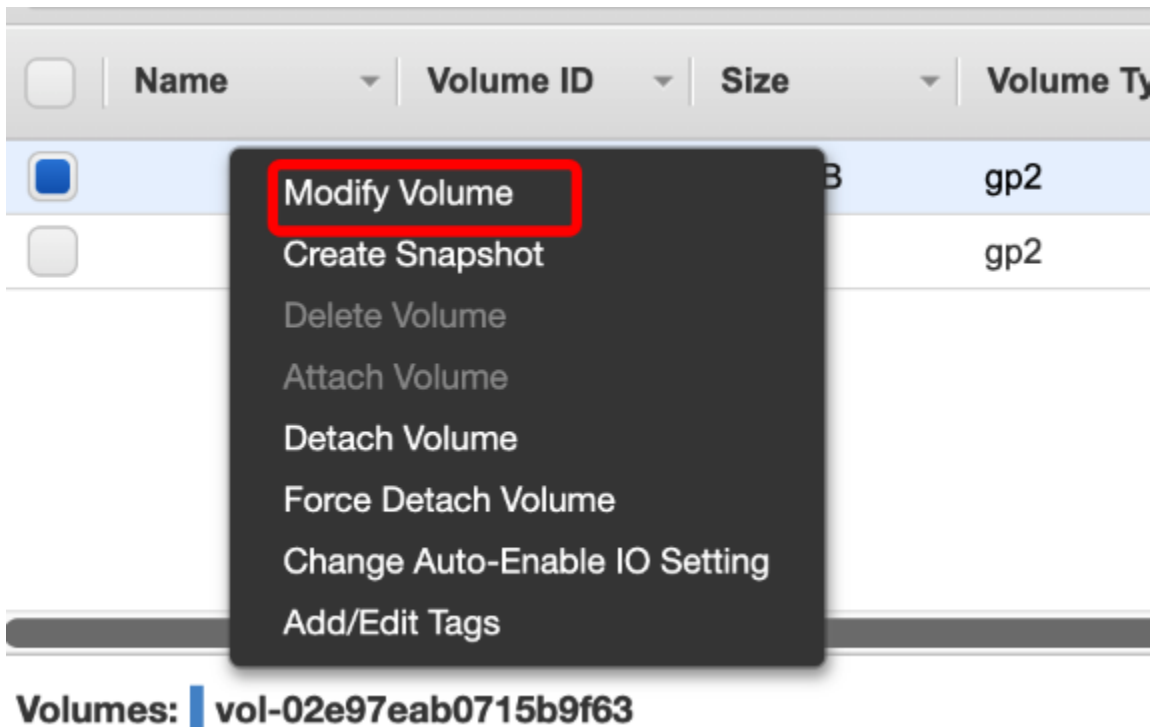
The Bash script will write some random JSON files to the disk drive. Let the previous Bash command run while you move onto the next step.

## Modify EBS Volume Attributes

While the Bash script is still running on your EC2 instance, generating new data, you'll modify the attributes of the Elastic Block Store (EBS) volume, to scale it up to a different volume type and increase its IOPS.

1. Open the AWS Management Console
2. Navigate to the **Amazon EC2** service
3. Under the **Elastic Block Store** heading, click **Volumes**
4. Right-click your volume and click **Modify Volume**





5. For **Volume Type**, choose **Provisioned IOPS SSD (IO1)**
6. For **lops**, type **5000**
7. Click the **Modify** button, then **Yes** to confirm

Your volume will take some time to change its attributes to the newly specified volume type and IOPS performance level. Notice that the disk activity on your Linux EC2 instance continues to run while the EBS volume is being modified.

## Optional: Create a Snapshot

An EBS snapshot is used to create a point-in-time, incremental backup of an EBS volume. Snapshots are stored in Amazon S3 and can be used at any time to create new EBS volumes. In the steps below, you will create a snapshot of your EBS volume.

1. Navigate to the **Amazon EC2** service
2. Under the **Elastic Block Store** heading, click **Volumes**
3. Right-click your volume and click **Create Snapshot**

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**Create Volume** **Actions** ^

Filter by tags

**Create Snapshot**

Modify Volume  
Delete Volume  
Attach Volume  
Detach Volume  
Force Detach Volume  
Change Auto-Enable IO Setting  
Add/Edit Tags

Name	Volume Type	IOPS	Snapshots
Docker	gp2	100	snap-048
lagger	gp2	100	snap-002
SECURITY	gp2	100	snap-002
ips	gp2	100	
a.etcd-event...	gp2	100	
a.etcd-main...	gp2	100	
roups	io1	500	
Test	gp2	100	

**Volumes:** vol-0110d9100cb2d2548

4. Enter a **description** and **add a tag**

## Create Snapshot

**Volume** vol-0110d9100cb2d2548 ⓘ

**Description** This is a test snapshot ⓘ

**Encrypted** Not Encrypted ⓘ

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**Key** (127 characters maximum) **Value** (255 characters maximum)

**Name** Test Snapshot ⓘ

**Add Tag** 4/9 remaining (Up to 50 tags maximum)

5. Once the snapshot is created you can navigate to the **Snapshots** section to view the snapshot

ELASTIC BLOCK STORE

Volumes	Name	Snapshot ID	Size	Description	Status	Started
<b>Snapshots</b>	Test Snapshot	snap-0ff1d168e8834...	20 GiB	This is a test snapshot	completed	June 4, 2019

## Cleanup

After completing this lab, make sure you clean up any resources that you created during execution of the lab steps.

1. Detach the EBS volume from the EC2 instance
2. Delete the EBS volume
3. If you created a snapshot from the EBS volume, delete the snapshot
4. Delete the CloudFormation stack

## Conclusion

After completing this lab, you should be familiar with the essentials of the Amazon Elastic Block Store (EBS) service. You've learned how to create a new EBS volume and attach it to an EC2 instance. Next, you logged into your EC2 instance and partitioned and mounted the disk, and generated some mock disk activity. Finally, you used the AWS Management Console to reconfigure the EBS volume's attributes to change the volume type and increase its performance.

To learn more about Amazon Elastic Block Store, visit the [service documentation](#).