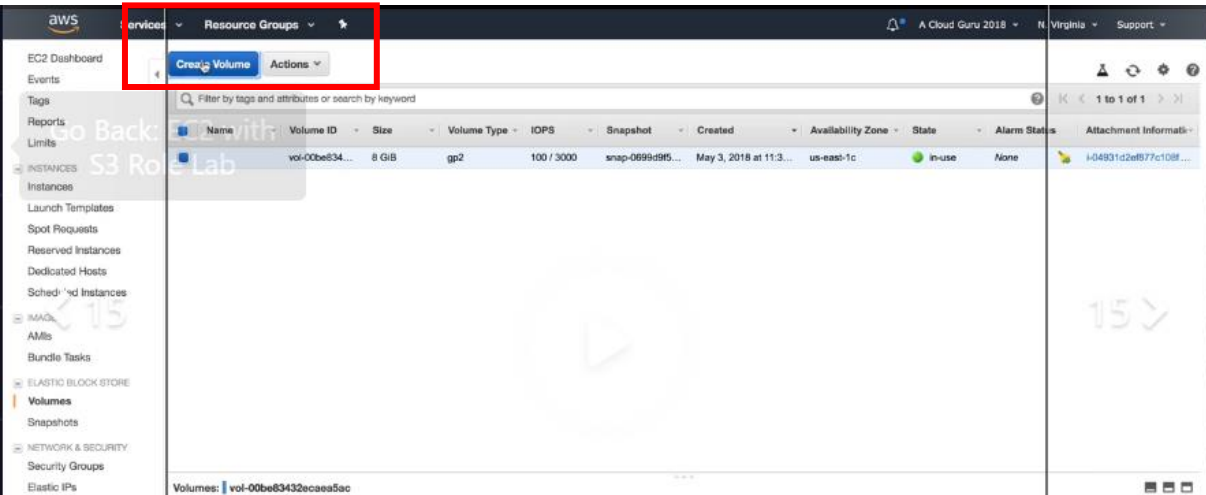
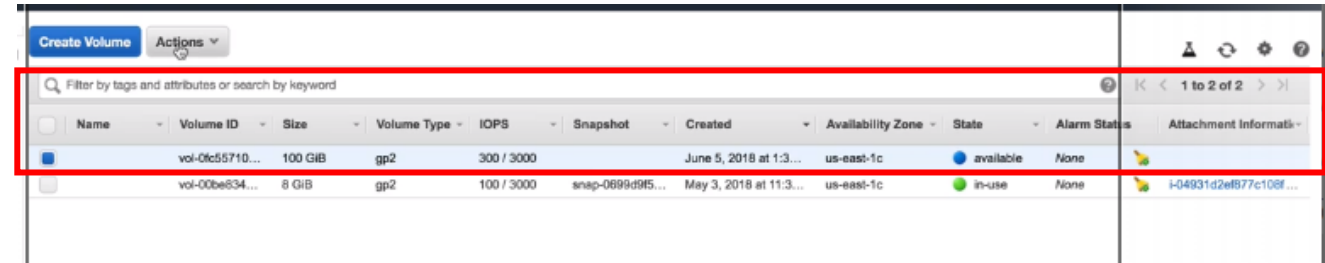


1

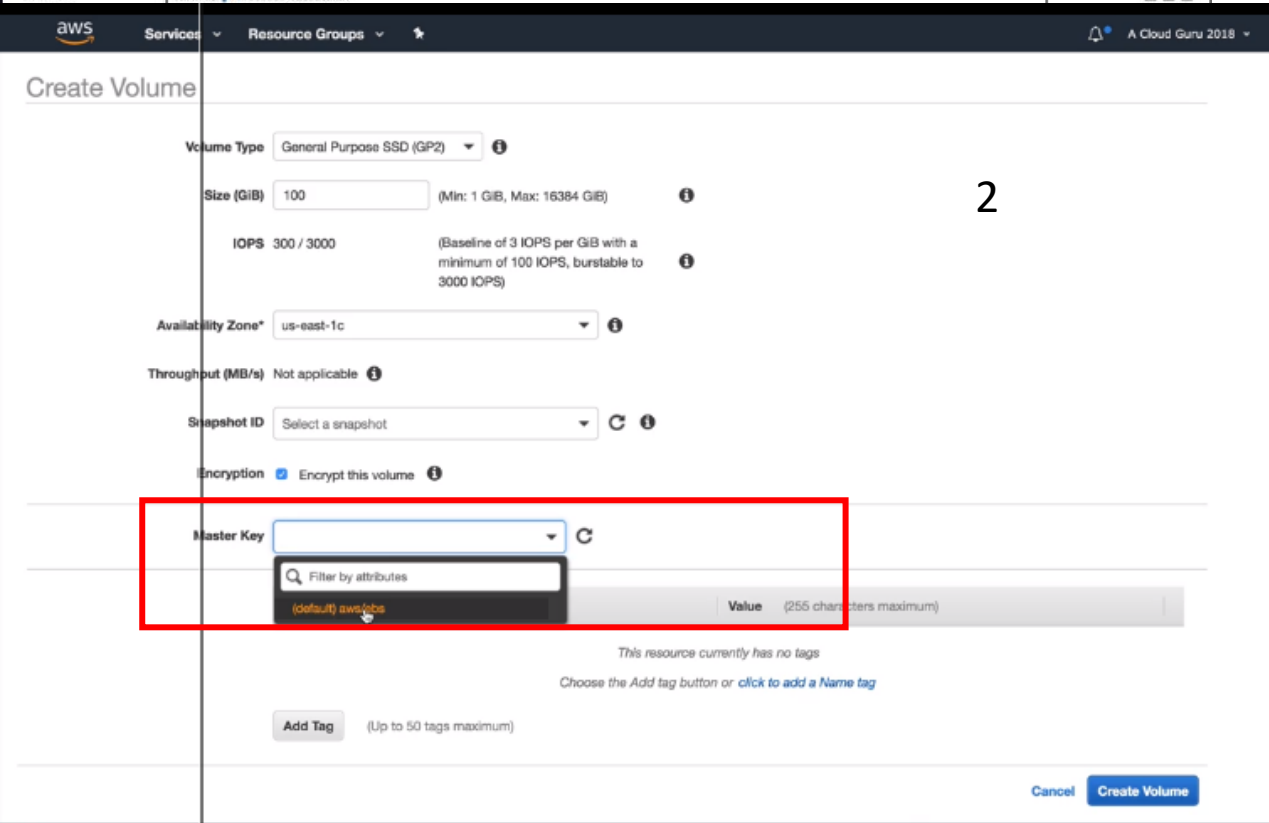


Creating the volume

3



2



4

The screenshot shows the AWS Management Console interface. On the left, the navigation pane includes sections for EC2 Dashboard, INSTANCES, IMAGES, ELASTIC BLOCK STORE, NETWORK & SECURITY, and LOAD BALANCING. The 'Volumes' link under ELASTIC BLOCK STORE is selected. The main content area displays a table of EBS volumes. A red box highlights the 'Actions' dropdown menu for the first volume, with 'Attach Volume' selected. Below the table, the details for the selected volume (vol-0fc55710cf25aa571) are shown, including its ID, size (100 GiB), creation time, state (available), and attachment information (gp2 volume type).

Name	Volume Type	IOPS	Snapshot	Created	Availability Zone	State	Alarm Status	Attachment Information
	gp2	300 / 3000		June 5, 2018 at 1:3...	us-east-1c	available	None	
	gp2	100 / 3000	snap-0b99d995...	May 3, 2018 at 11:3...	us-east-1c	in-use	None	i-04931d2ef877c108f...

Volumes: **vol-0fc55710cf25aa571**

Description | Status Checks | Monitoring | Tags

Volume ID: vol-0fc55710cf25aa571
Size: 100 GiB
Created: June 5, 2018 at 1:35:26 PM UTC+1
State: available
Attachment information: Volume type: gp2, Product codes: m1000000...

Attaching
volume to Ec2

5

The 'Attach Volume' dialog box is shown. It contains a message: 'This volume is encrypted and can only be attached to an instance that supports EBS encryption. Your supported instances are listed below.' Below this, there are three fields: 'Volume' (vol-0fc55710cf25aa571 in us-east-1c), 'Instance' (a search box with 'Search instance ID or Name tag' placeholder), and 'Device' (i-04931d2ef877c108f (running)). A red box highlights the 'Instance' and 'Device' fields. At the bottom right, there are 'Cancel' and 'Attach' buttons.

5

The 'Attach Volume' dialog box is shown. It contains a message: 'This volume is encrypted and can only be attached to an instance that supports EBS encryption. Your supported instances are listed below.' Below this, there are three fields: 'Volume' (vol-0fc55710cf25aa571 in us-east-1c), 'Instance' (i-04931d2ef877c108f in us-east-1c), and 'Device' (/dev/sdf). A red box highlights the 'Device' field. Below the 'Device' field, it says 'Linux Devices: /dev/sdf through /dev/sdp'. At the bottom right, there are 'Cancel' and 'Attach' buttons. A note at the bottom states: '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.'

```
Ryans-iMac:Downloads acloudguru$ ssh ec2-user@35.153.184.58 -i MyNewKey1
air.pem
Last login: Tue Jun  5 10:27:17 2018 from 90.152.124.231
```

```
--|  --|  )
_| (    /   Amazon Linux AMI
---| \---|---
```

```
15 < 15/ aws.amazon.com/amazon-linux-ami/2018.03-release-notes/
17 package(s) needed for security, out of 19 available
Run "sudo yum update" to apply all updates.
```

```
[ec2-user@ip-172-31-36-54 ~]$ sudo su
[root@ip-172-31-36-54 ec2-user]#
```

List volumes

```
2 [root@ip-172-31-36-54 ec2-user]# 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
[root@ip-172-31-36-54 ec2-user]# file -s /dev/xvdf
/dev/xvdf: data
```

Creating a filesystem on the volume

```
3 [root@ip-172-31-36-54 ec2-user]# mkfs -t ext4 /dev/xvdf
mke2fs 1.42.12 (29-Aug-2014)
Creating filesystem with 26214400 4k blocks and 6553600 inodes
Filesystem UUID: 2276aec8-2a6e-4011-be2f-29f916e14f2e
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2
    654208,
    4096000, 7962624, 11239424, 20480000, 23887872
```

```
Allocating group tables: done
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done
```

```
[root@ip-172-31-36-54 ec2-user]# file -s /dev/xvdf
/dev/xvdf: Linux rev 1.0 ext4 filesystem data, UUID=2276aec8-2a6e-4011-b
e2f-29f916e14f2e (extents) (large files) (huge files)
```

Check if there is filesystem in the volume

```
[root@ip-172-31-36-54 ec2-user]# 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

[root@ip-172-31-36-54 ec2-user]# cd /
[root@ip-172-31-36-54 /]# mkdir filesystem
[root@ip-172-31-36-54 /]# mount /dev/xvdf /filesystem
[root@ip-172-31-36-54 /]# 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 /filesystem

[root@ip-172-31-36-54 /]# cd filesystem
[root@ip-172-31-36-54 filesystem]# echo "Hello Cloud Gurus" > hello.txt
[root@ip-172-31-36-54 filesystem]# ls
hello.txt  lost+found
```

Mounting volume to the
filesystem

Unmounting the volume
to file system

```
[root@ip-172-31-36-54 filesystem]# cd /
[root@ip-172-31-36-54 /]# 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 /filesystem

[root@ip-172-31-36-54 /]# umount -d /dev/xvdf
[root@ip-172-31-36-54 /]# 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

[root@ip-172-31-36-54 /]#
```


- Detach the volume
- Restore it with the snapshot
- Mount back
- Able to access the txt file

1. EC2 instance → Actions → detach volume (unmount the volume) → status should be available
2. Actions → create snapshots

Volumes > Create Snapshot

Create Snapshot

Volume: vol-0fc55710cf25aa571

Description: myencryptedsnap

Encrypted: Encrypted

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

This resource currently has no tags. Choose the Add tag button or click to add a Name tag.

Add Tag (Up to 50 tags maximum)

Cancel Create Snapshot

1

EC2 Dashboard

Events

Tags

Reports

Limits

INSTANCES

Instances

Launch Templates

Spot Requests

Reserved Instances

Dedicated Hosts

Scheduled Instances

IMAGES

AMIs

Bundle Tasks

Create Snapshot

Actions

Owned By Me

Filter by tags and attributes or search by keyword

Name	Snapshot ID	Size	Description	Status	Started	Progress	Encrypt
	snap-0e9fbb422ae...	100 GiB	myencryptedsnap	completed	June 5, 2018 at 1:47:30 PM ...	available (100%)	Encrypted

EC2 Dashboard

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Filter by tags

Name	Volume Type	IOPS	Snapshot	Created	Availability Zone	State	Alarm Status	Attachment Information
	gp2	300 / 3000		June 5, 2018 at 1:3...	us-east-1c	available	None	
	gp2	100 / 3000	snap-0899d9f5...	May 3, 2018 at 11:3...	us-east-1c	in-use	None	i-04931d2ef877c10ef...

EC2 Dashboard

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Filter by tags

Delete Volume

Attach Volume

Detach Volume

Force Detach Volume

Change Auto-Enable IO Setting

Add/Edit Tags

Volumes: vol-0fc55710cf25aa571

Description

Status Checks

Monitoring

Tags

Volume ID	vol-0fc55710cf25aa571	Alarm status	None
Size	100 GiB	Snapshot	-
Created	June 5, 2018 at 1:35:26 PM UTC+1	Availability Zone	us-east-1c
State	available	Encrypted	Encrypted
Attachment information		KMS Key ID	aws/ebs
Volume type	gp2	KMS Key Aliases	aws/ebs

2

3

15

```
[root@ip-172-31-36-54 /]# 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
```

```
[root@ip-172-31-36-54 /]# lsblk
NAME        MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
xvda 15      202:0    0   8G   0 disk
└─xvda1     202:1    0   8G   0 part /
```

```
[root@ip-172-31-36-54 /]# ls
bin      etc      lib      media    root     srv      var
boot     filesystem  lib64    mnt      run      sys
cgroup   hello2.txt local    opt      sbin     tmp
dev      home     lost+found proc     selinux  usr
```

```
[root@ip-172-31-36-54 /]# cd filesystem
```

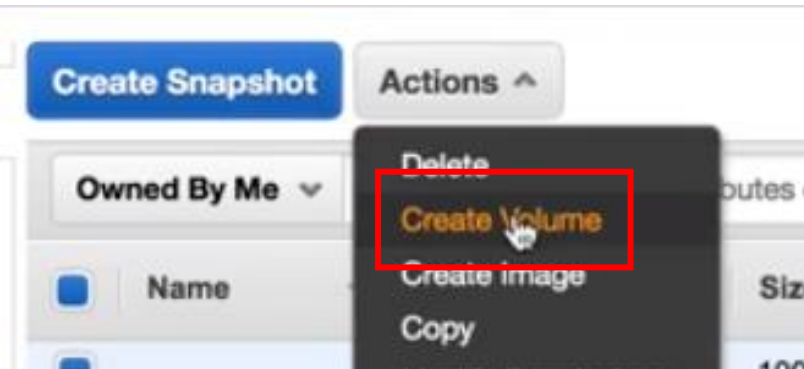
```
[root@ip-172-31-36-54 filesystem]# ls
```

```
[root@ip-172-31-36-54 filesystem]#
```

We cant see xvdf

We can see folder
filesystem but content of it
is not visible as the volume
is unmounted / detached

Snapshot → actions → create volume



Filter by tags and attributes or search by keyword										
	Name	Volume ID	Size	Volume Type	IOPS	Snapshot	Created	Availability Zone	State	Alarm Status
<input type="checkbox"/>		vol-0ccc8574...	100 GiB	gp2	300 / 3000	snap-0e9fbbb4...	June 5, 2018 at 1:5...	us-east-1c	available	None
<input type="checkbox"/>		vol-00be834...	8 GiB	gp2	100 / 3000	snap-0699d9f5...	May 3, 2018 at 11:3...	us-east-1c	in-use	None

Go back to volume and status is available

Snapshots > Create Volume

Create Volume

Snapshot ID: snap-0e9fbbb422aec6505

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-1c

Throughput (MB/s): Not applicable

Encryption: Encrypted

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

This resource currently has no tags. Choose the Add tag button or click to add a Name tag.

Add Tag (Up to 50 tags maximum)

Cancel Create Volume

Snap is already encrypted and volume can't be unencrypted. That's why it's by default encrypted

Create Volume Actions

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

Select the volume and select modify volume

Attach Volume

This volume is encrypted and can only be attached to an instance that supports EBS encryption. Your supported instances are listed below.

Volume *i* vol-0ccc8574664562c2e in us-east-1c

Instance *i* in us-east-1c

Device *i*
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

Provide instance id and the region same as ec2 instance

Filter by tags and attributes or search by keyword

	Name	Volume ID	Size	Volume Type	IOPS	Snapshot	Created	Availability Zone	State	Alarm Status	Attachment Information
		vol-0ccc8574...	100 GiB	gp2	300 / 3000	snap-0e9fbbb4...	June 5, 2018 at 1:5...	us-east-1c	in-use	None	i-04931d2ef877c108f...
		vol-00be834...	8 GiB	gp2	100 / 3000	snap-0699d9f5...	May 3, 2018 at 11:3...	us-east-1c	in-use	None	i-04931d2ef877c108f...

Attached to the ec2 instance


```

[root@ip-172-31-36-54 filesystem]# 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
[root@ip-172-31-36-54 filesystem]# file -s /dev/xvdf
/dev/xvdf: Linux rev 1.0 ext4 filesystem data, UUID=2276aec8-2a6e-4011-b
e2f-29f916e14f2e (extents) (large files) (huge files)
[root@ip-172-31-36-54 filesystem]# cd ..
[root@ip-172-31-36-54 /]# mount /dev/xvdf /filesystem
[root@ip-172-31-36-54 /]# cd filesystem/
[root@ip-172-31-36-54 filesystem]# ls
hello.txt  lost+found
[root@ip-172-31-36-54 filesystem]# nano hello.txt
[root@ip-172-31-36-54 filesystem]#

```

Xvdf is visible
Has the filesystem of type ext4
Content of the file are safe

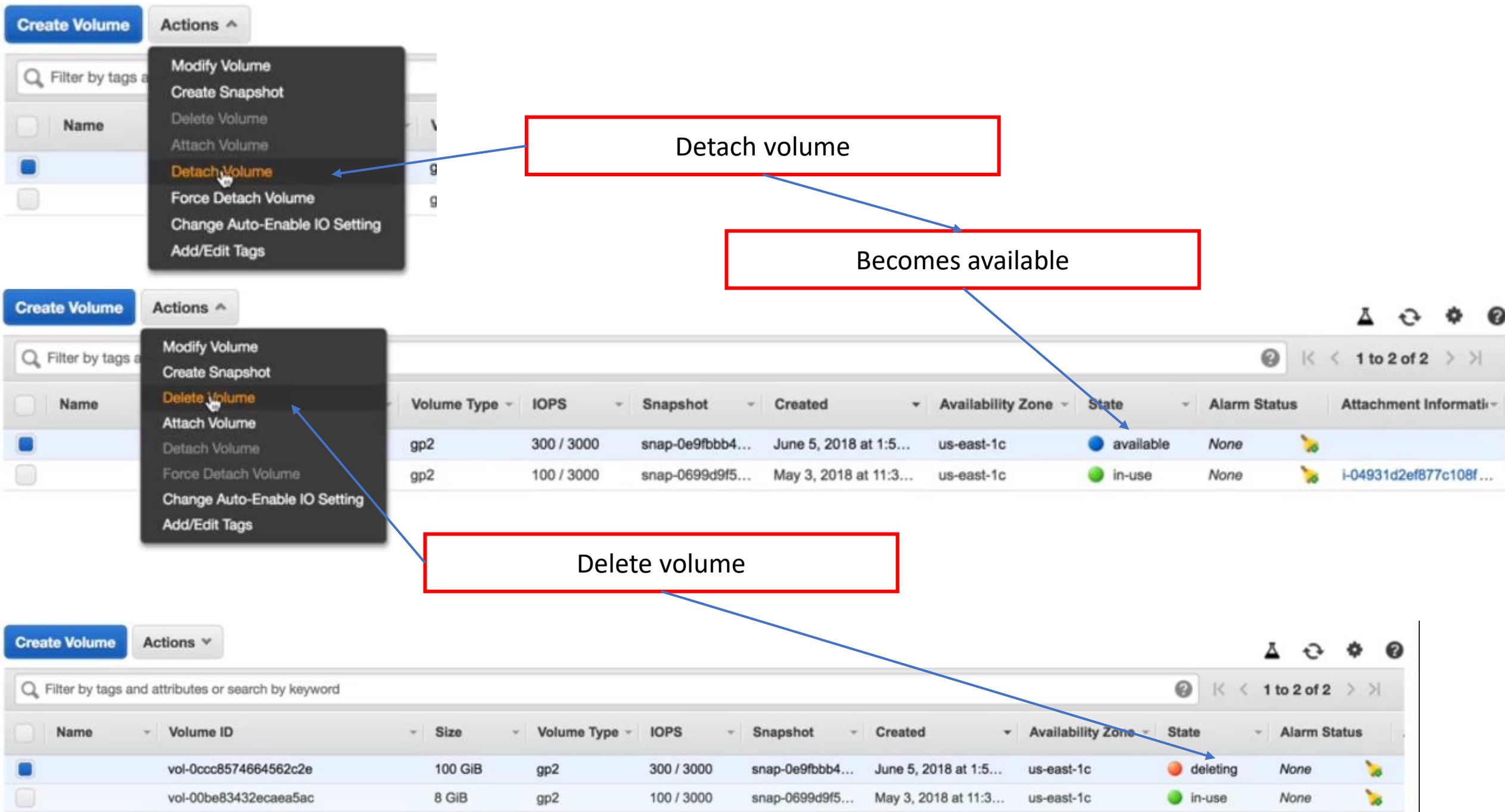
To unmount

The overall steps we did:
Encrypted additional volume
Took snapshot of this
Deleted the volume
Restored the volume from the snapshot

```

[root@ip-172-31-36-54 filesystem]# cd ..
[root@ip-172-31-36-54 /]# umount -d /dev/xvdf
[root@ip-172-31-36-54 /]# 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
[root@ip-172-31-36-54 /]#

```



How to encrypt root device volume

Volume ID of the root and is not encrypted

Create Volume Actions

Filter by tags and attributes or search by keyword

	Name	Volume ID	Size	Volume Type	IOPS	Snapshot	Created	Availability Zone	State	Alarm Status
		vol-0ccc8574664562c2e	100 GiB	gp2	300 / 3000	snap-0e9fbbb4...	June 5, 2018 at 1:5...	us-east-1c	deleting	None
		vol-00be83432ecaea5ac	8 GiB	gp2	100 / 3000	snap-0699d9f5...	May 3, 2018 at 11:3...	us-east-1c	in-use	None

Other columns
Encrypted
= not
encrypted.

Two ways to encrypt:

1. Use OS to encrypt the volume (windows = bitlocker)
2. Take snapshot of the volume (cleaner way)

Take snapshot of the volume to encrypt root volume(cleaner way)

Volumes > Create Snapshot
1
Create Snapshot

Select volume id → actions → create snapshot

Volume vol-00be83432ecaea5ac ⓘ

Description ⓘ

Encrypted Not Encrypted ⓘ

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

This resource currently has no tags
Choose the Add tag button or [click to add a Name tag](#)

Add Tag (Up to 50 tags maximum)

Cancel Create Snapshot

Snapshot option under EBS

Create SnapshotActions

Owned By MeFilter by tags and attributes or search by keyword1 to 2 of 2

	Name	Snapshot ID	Size	Description	Status	Started	Progress	Encrypt
<input type="checkbox"/>		snap-0af836a8bc42...	8 GiB	MyUnencryptedSnap	completed	June 5, 2018 at 2:02:11 PM ...	available (100%)	Not Encry
<input type="checkbox"/>		snap-0e9fbbb422ae...	100 GiB	myencryptedsnap	completed	June 5, 2018 at 1:47:30 PM ...	available (100%)	Encrypted

2

Create Volume

Snapshot ID snap-0af836a8bc42ed27a

Volume Type General Purpose SSD (GP2) ⓘ

Size (GiB) 8 (Min: 1 GiB, Max: 16384 GiB) ⓘ

IOPS 100 / 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 ⓘ

Encryption Not Encrypted ⓘ

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

This resource currently has no tags
Choose the Add tag button or [click to add a Name tag](#)

Add Tag (Up to 50 tags maximum)

Actions → create volume (doesn't help as by default its not encrypted and provides no option to encrypt)

Name	Snapshot ID	Size	Description	Status	Started	Progress	Encryption
<input type="checkbox"/>	snap-0451b935fbc4...	8 GiB	myencryptedRootVolume	completed	June 5, 2018 at 2:13:51 PM ...	available (100%)	Encrypted
<input checked="" type="checkbox"/>	snap-0af836a8bc42...	8 GiB	MyUnencryptedSnap	completed	June 5, 2018 at 2:02:11 PM ...	available (100%)	Not Encrypted
<input type="checkbox"/>	snap-0e9fbbb422ae...	100 GiB	myencryptedsnap	completed	June 5, 2018 at 1:47:30 PM ...	available (100%)	Encrypted

Instead of creating volume, copy the snapshot.
Actions → copy → gives option to encrypt the snapshot

Cancel Create Volume

Copy Snapshot 3

This snapshot, snap-0af836a8bc42ed27a, will be copied to a new snapshot. Set the new snapshot settings below:

Destination Region US East (N. Virginia) ⓘ

Description myencryptedRootVolume ⓘ

Encryption ☒ Encrypt this snapshot ⓘ

Master Key (default) aws/ebs ⓘ

Key Details

Description Default master key that protects my EBS volumes when no other key is defined

Account This account (673164704829)

KMS Key ID f6e6a45b-0d44-42a4-af33-909aa2d3531f

KMS Key ARN arn:aws:kms:us-east-1:673164704829:key/f6e6a45b-0d44-42a4-af33-909aa2d3531f

Cancel Copy

Create Image from EBS Snapshot

4

Actions → create image (this is AMI). Use this AMI to deploy new EC2 instance)

Name MyEC2EncryptedRootDeviceVolume

Description MyEC2EncryptedRootDeviceVolume

Architecture x86_64

Virtualization type Paravirtual

Root device name /dev/sda1

Kernel ID Use default

RAM disk ID Use default

Block Device Mappings

Volume Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Throughput (MB/s)	Delete on Termination	Encrypted
Root	/dev/sda1	snap-0451b935fbe40932b	8	General Purpose SSD (GP2)	100 / 3000	N/A	<input checked="" type="checkbox"/>	Encrypted

Add New Volume

Cancel Create

Images → AMI

Launch

Actions

5

Owned by me										
Filter by tags and attributes or search by keyword										
	Name	AMI Name	AMI ID	Source	Owner	Visibility	Status	Creation Date	Platform	Root Device 1
<input checked="" type="checkbox"/>		MyEC2Encrypt...	ami-9bd9aae4	673164704829/...	673164704829	Private	available	June 5, 2018 at 2:19:59 PM ...	Other Linux	ebs

It will launch as root volume. Since root volume is encrypted, it cant use free tier type instead use large instances

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 2: Choose an Instance Type 6

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

Filter by: All instance types All generations Show/Hide Columns

Currently selected: m3.medium (3 ECUs, 1 vCPUs, 2.5 GHz, Intel Xeon E5-2670v2, 3.75 GiB memory, 1 x 4 GiB Storage Capacity)

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance	IPv6 Support
🗑	Micro instances	t1.micro Free tier eligible	1	0.613	EBS only	-	Very Low	-
🗑	General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
🗑	General purpose	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate	Yes
🗑	General purpose	t2.small	1	2	EBS only	-	Low to Moderate	Yes
🗑	General purpose	t2.medium	2	4	EBS only	-	Low to Moderate	Yes
🗑	General purpose	t2.large	2	8	EBS only	-	Low to Moderate	Yes
🗑	General purpose	t2.xlarge	4	16	EBS only	-	Moderate	Yes
🗑	General purpose	t2.2xlarge	8	32	EBS only	-	Moderate	Yes
🗑	General purpose	m5d.large	2	8	1 x 75 (SSD)	Yes	Up to 10 Gigabit	Yes
🗑	General purpose	m5d.xlarge	4	16	1 x 150 (SSD)	Yes	Up to 10 Gigabit	Yes
🗑	General purpose	m5d.2xlarge	8	32	1 x 300 (SSD)	Yes	Up to 10 Gigabit	Yes

Cancel Previous **Review and Launch** Next: Configure Instance Details

EXAM TIPS



- You can encrypt the root device volume (the volume the OS is installed on) using Operating System level encryption
- You can encrypt the root device volume by first taking a snapshot of that volume, and then creating a copy of that snap with encryption. You can then make an AMI of this snap and deploy the encrypted root device volume
- You can encrypt additional attached volumes using the console, CLI or API