

CLOUD COMPUTING ARCHITECTURE LAB

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BATCH- 05

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Experiment 5: Attaching EBS to Amazon EC2 Linux and Windows Instance.

Ques 1: Differentiate between EBS, EFS and S3

storage of AWS?

Ans:

Storage Options	EBS	EFS	S3
Storage Type	Block storage for an EC2 instance.	File system storage for multiple EC2 instances.	Object storage.
Pricing	Pay for provisioning capacity	Pay as you use	Pay as you use
Features	High performance for workloads of a single EC2 instance.	Strong consistency, concurrent accessibility, and file locking features.	Can be accessible to any service or person
Use cases	Boot volumes, transactional and NoSQL databases, data warehousing & ETL.	Home directories, database backups, developer tools, container storage, big data analytics.	Web applications, content management, photos, videos, backups, big data.
Durability	Stored in a single AZ.	Stored across multiple AZs.	Multiple AZs.
Scalability	Scales both horizontally and vertically.	Grow and shrink as files are uploaded/deleted.	Limitless scalability.
Service endpoint	Within a VPC.	Within a VPC.	Within VPC, Without VPC (S3 URL).

Ques 2: Write the uses cases where EBS (block storage) will be more useful than others.

Ans: Amazon Elastic Block Store (EBS) provides block level storage volumes for use with a single EC2 instance or multiple servers available in the same availability zone.

- EBS is best suited for scenarios where frequent IO operations (especially read and write) are required.
- If minimised disk latency is a need, EBS is best suited.
- EBS is also the best option for relational and NoSQL Databases.
- EBS is also comparatively a cost-effective storage.
- Where high availability (99.99%) is the demand, EBS is best suited.
- EBS supports data persistency because its data does not get deleted even if the EC2 instance is terminated.
- With EBS, data is well protected as point-in-time snapshots can be taken.
- It is also used for enterprise applications such as ERP systems, mail servers, middleware etc.

Step 1:- Create a windows EC2 instance

Services

Search

[Alt+S]

Name and tags [Info](#)

Name

windowsserver

Add additional tags

▼ Application and OS Images (Amazon Machine Image) [Info](#)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

Q Search our full catalog including 1000s of application and OS images

Recents

Quick Start

Amazon Linux

aws

macOS

Mac

Ubuntu

ubuntu

Windows

Microsoft

Red Hat

Red Hat

S

Q

Browse more AMIs

Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Microsoft Windows Server 2022 Base

ami-05f53c2def3a51a08 (64-bit (x86))

Virtualization: hvm ENA enabled: true Root device type: ebs

Free tier eligible

Create key pair

X

Key pairs allow you to connect to your instance securely.

Enter the name of the key pair below. When prompted, store the private key in a secure and accessible location on your computer. **You will need it later to connect to your instance.** [Learn more](#)

Key pair name

keypair

The name can include upto 255 ASCII characters. It can't include leading or trailing spaces.

Private key file format

☒ .pem

For use with OpenSSH

☐ .ppk

For use with PuTTY

Cancel

Create key pair

▼ Network settings [Info](#)

Edit

Network [Info](#)

vpc-05525b34412abb13b

Subnet [Info](#)

No preference (Default subnet in any availability zone)

Auto-assign public IP [Info](#)

Enable

Firewall (security groups) [Info](#)

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

☒ Create security group

☐ Select existing security group

We'll create a new security group called 'launch-wizard-1' with the following rules:

☒ Allow RDP traffic from

Helps you connect to your instance

Anywhere

0.0.0.0/0

☒ Allow HTTPS traffic from the internet

To set up an endpoint, for example when creating a web server

☒ Allow HTTP traffic from the internet

To set up an endpoint, for example when creating a web server

⚠ Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

X

▼ Summary

Number of instances [Info](#)

1

Software Image (AMI)

Microsoft Windows Server 2022 ...[read more](#)

ami-05f53c2def3a51a08

Virtual server type (instance type)

t2.micro

Firewall (security group)

New security group

Storage (volumes)

1 volume(s) - 30 GiB

Cancel

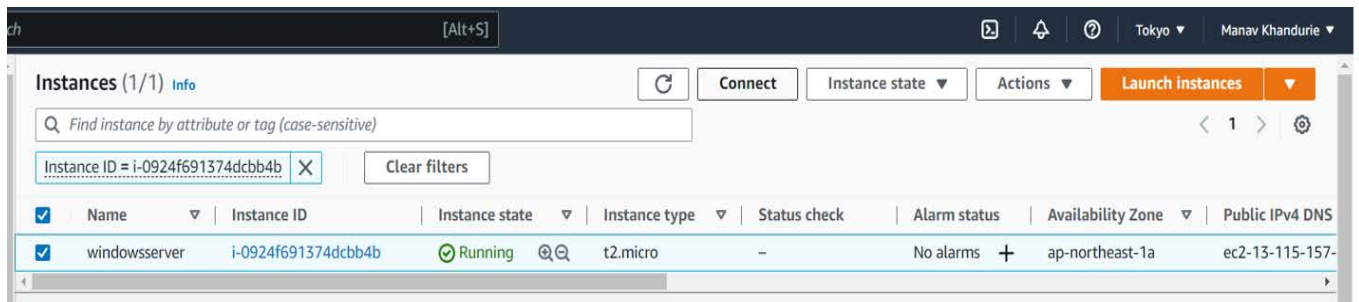
Launch instance

EC2 > Instances > Launch an instance

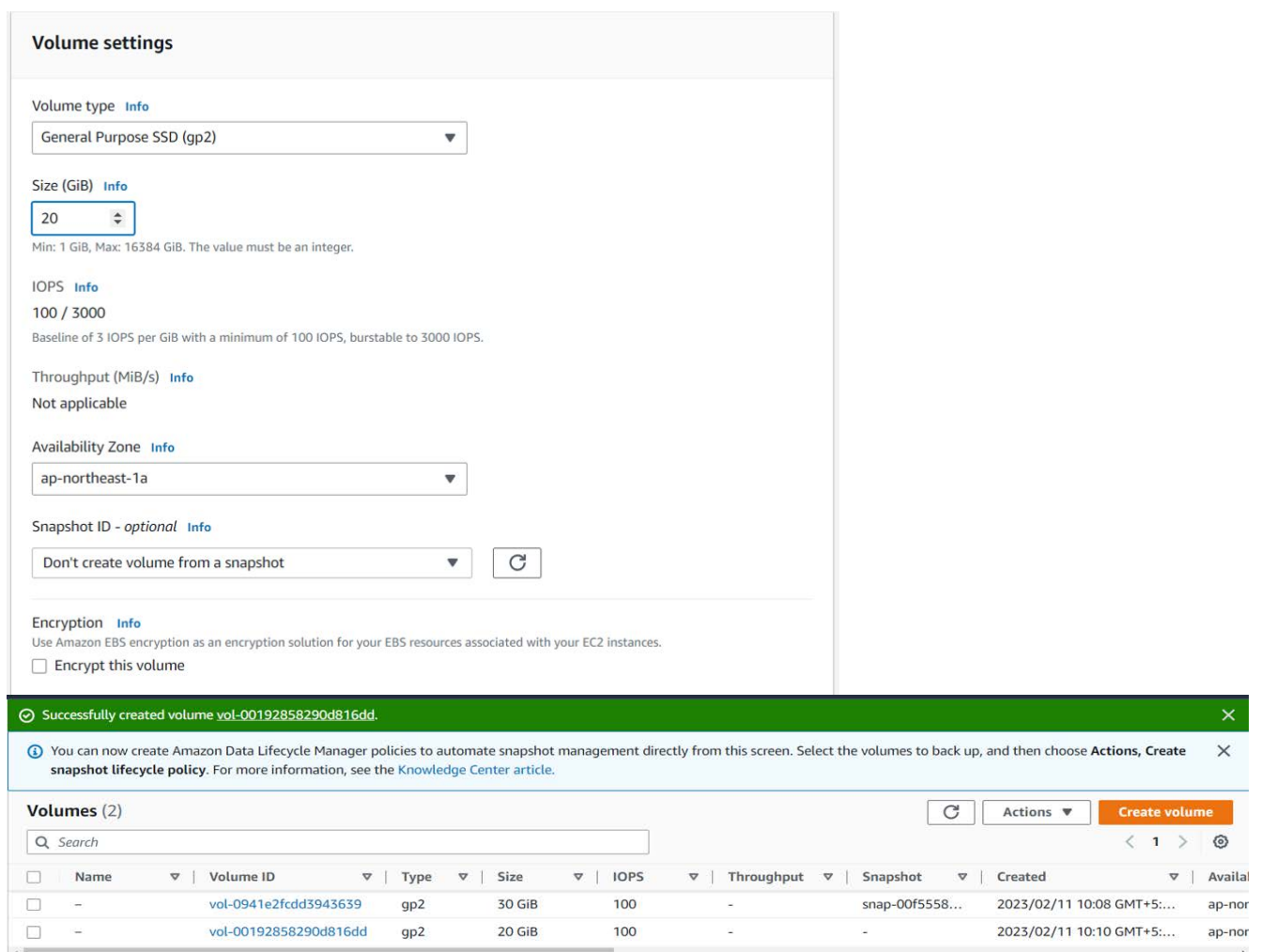
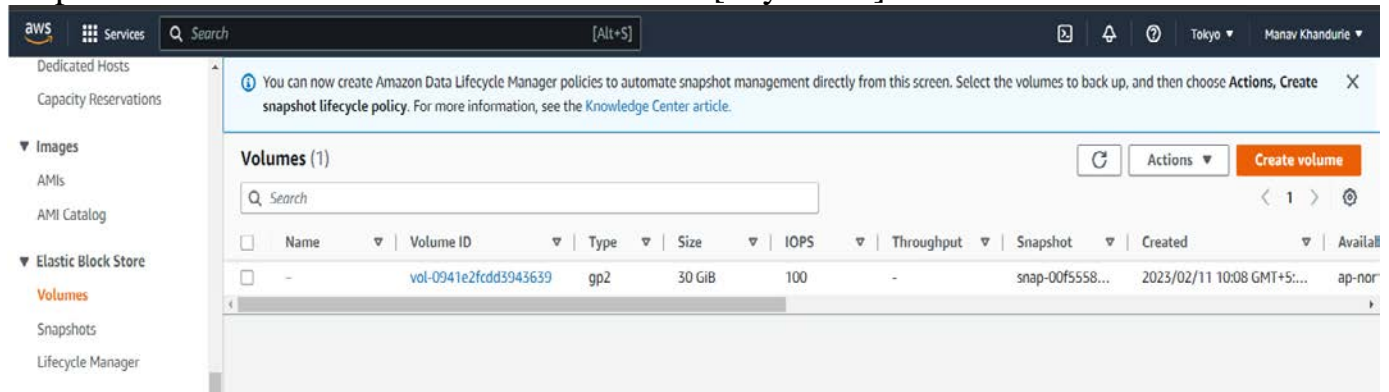
✓ Success

Successfully initiated launch of instance (i-0924f691374dccb4b)

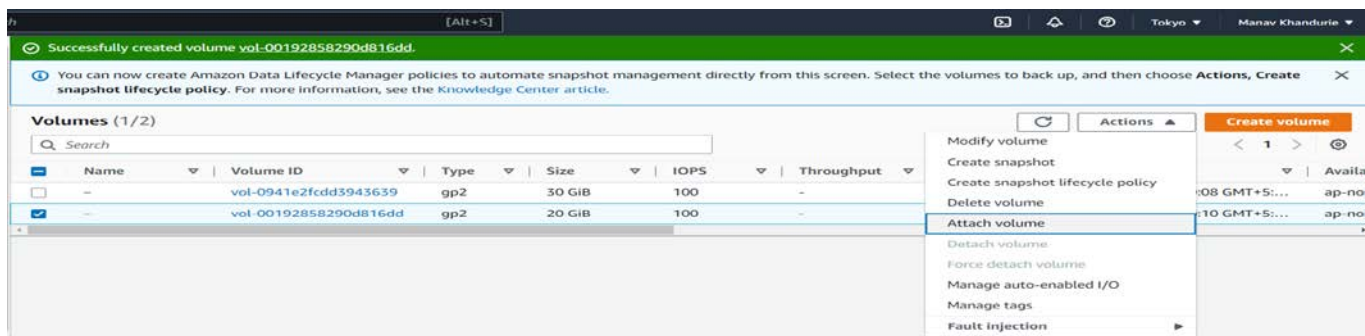
► Launch log



Step 2:- Go to Elastic Block Store -> Volumes [Say 20Gb]



Step 3:- Select the volume created in step 2 and click on actions-> Attach volume and select the instance running



EC2 > Volumes > vol-00192858290d816dd > 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-00192858290d816dd](#)

Availability Zone

ap-northeast-1a

Instance [Info](#)

i-0924f691374dcb4b

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

Device name [Info](#)

xvdf

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

Cancel

Attach volume

Details

Volume ID

[vol-00192858290d816dd](#)

AWS Compute Optimizer finding

Opt-in to AWS Compute Optimizer for recommendations. | [Learn more](#)

Encryption

Not encrypted

Snapshot

-

Attached Instances

i-0924f691374dcb4b (windowsserver): xvdf (attached)

Size

20 GiB

Volume state

In-use

KMS key ID

-

Availability Zone

ap-northeast-1a

Outposts ARN

-

Type

gp2

IOPS

100

KMS key alias

-

Created

Sat Feb 11 2023 10:10:26 GMT+0530 (India Standard Time)

Volume status

Okay

Throughput

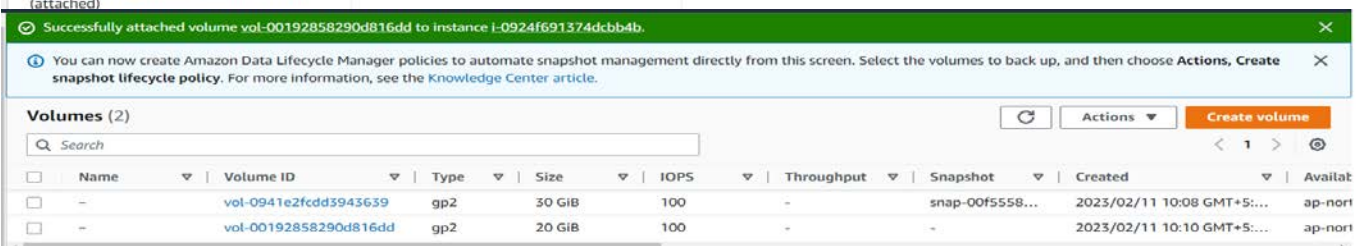
-

KMS key ARN

-

Multi-Attach enabled

No



Step 4:- Connect to the instance created in step 1

Session Manager
RDP client
EC2 serial console

Instance ID
i-0924f691374dccb4b (windowsserver)

Connection Type

Connect using RDP client
Download a file to use with your RDP client and retrieve your password.

Connect using Fleet Manager
To connect to the instance using Fleet Manager Remote Desktop, the SSM Agent must be installed and running on the instance. For more information, see [Working with SSM Agent](#)

You can connect to your Windows instance using a remote desktop client of your choice, and by downloading and running the RDP shortcut file below:

Download remote desktop file

When prompted, connect to your instance using the following details:

Public DNS
ec2-13-115-157-156.ap-northeast-1.compute.amazonaws.com

User name
Administrator

Password
@Mg9Z5=tFGmhnYMPv@v\$88FBxY8Qa7%

Remote Desktop Connection

The publisher of this remote connection can't be identified. Do you want to connect anyway?

This remote connection could harm your local or remote computer. Do not connect unless you know where this connection came from or have used it before.

Publisher: Unknown publisher
Type: Remote Desktop Connection
Remote computer: ec2-13-115-157-156.ap-northeast-1.compute.amazonaws.com

☐ Don't ask me again for connections to this computer

Show Details
Connect
Cancel

Windows Security
Enter your credentials

These credentials will be used to connect to ec2-13-115-157-156.ap-northeast-1.compute.amazonaws.com.

Administrator

DESKTOP-8R92DN7\Administrator

☐ Remember me

More choices

OK
Cancel

Remote Desktop Connection

The identity of the remote computer cannot be verified. Do you want to connect anyway?

The remote computer could not be authenticated due to problems with its security certificate. It may be unsafe to proceed.

Certificate name

Name in the certificate from the remote computer: EC2AMAZ-SK57FSS

Certificate errors

The following errors were encountered while validating the remote computer's certificate:

The certificate is not from a trusted certifying authority.

Do you want to connect despite these certificate errors?

☐ Don't ask me again for connections to this computer

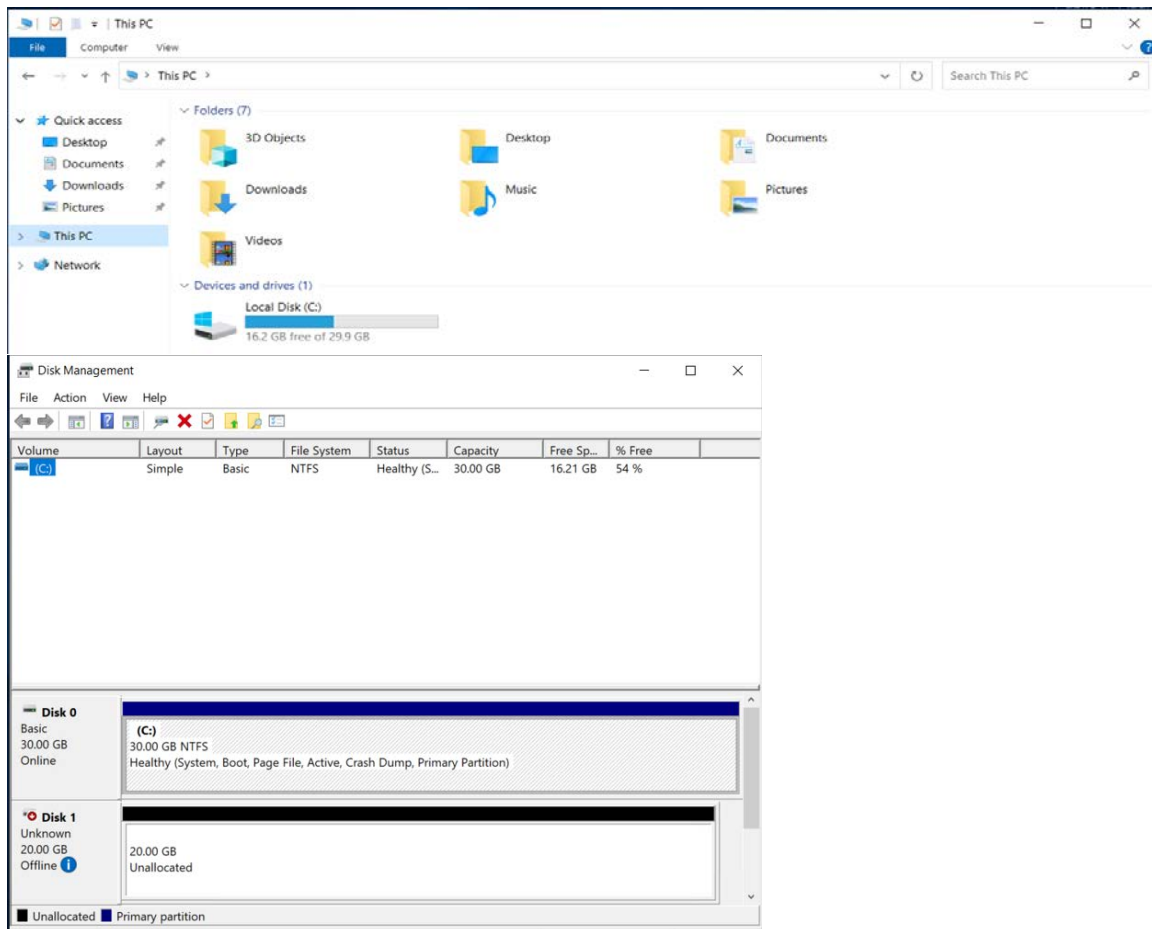
View certificate...
Yes
No

windowsserver - ec2-13-115-157-156.ap-northeast-1.compute.amazonaws.com - Remote Desktop Connection

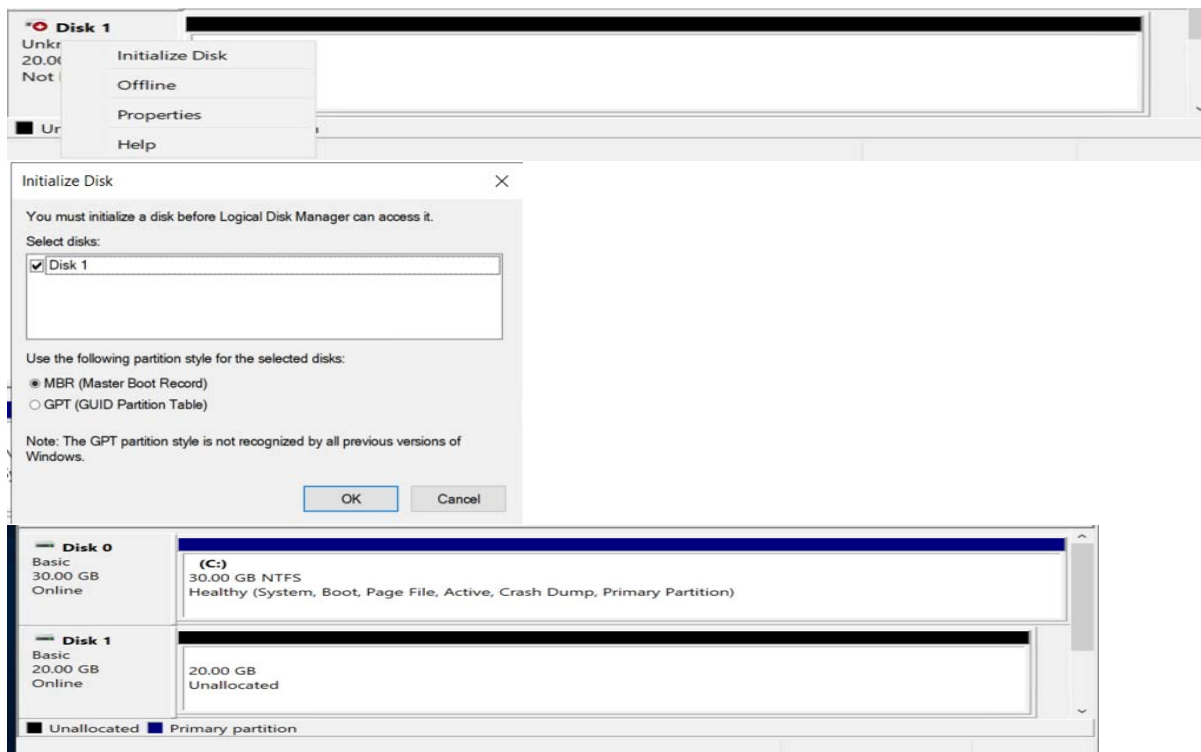
Recycle Bin
EC2 Feedback
EC2 Microsoft

Hostname: EC2AMAZ-SK57FSS
Instance ID: i-0924f691374dccb4b
Private IP Address: 172.31.45.171
Public IP Address: 13.115.157.156
Instance Size: t2.micro
Availability Zone: ap-northeast-1a
Architecture: AMD64
Total Memory: 1024
Network: Low to Moderate

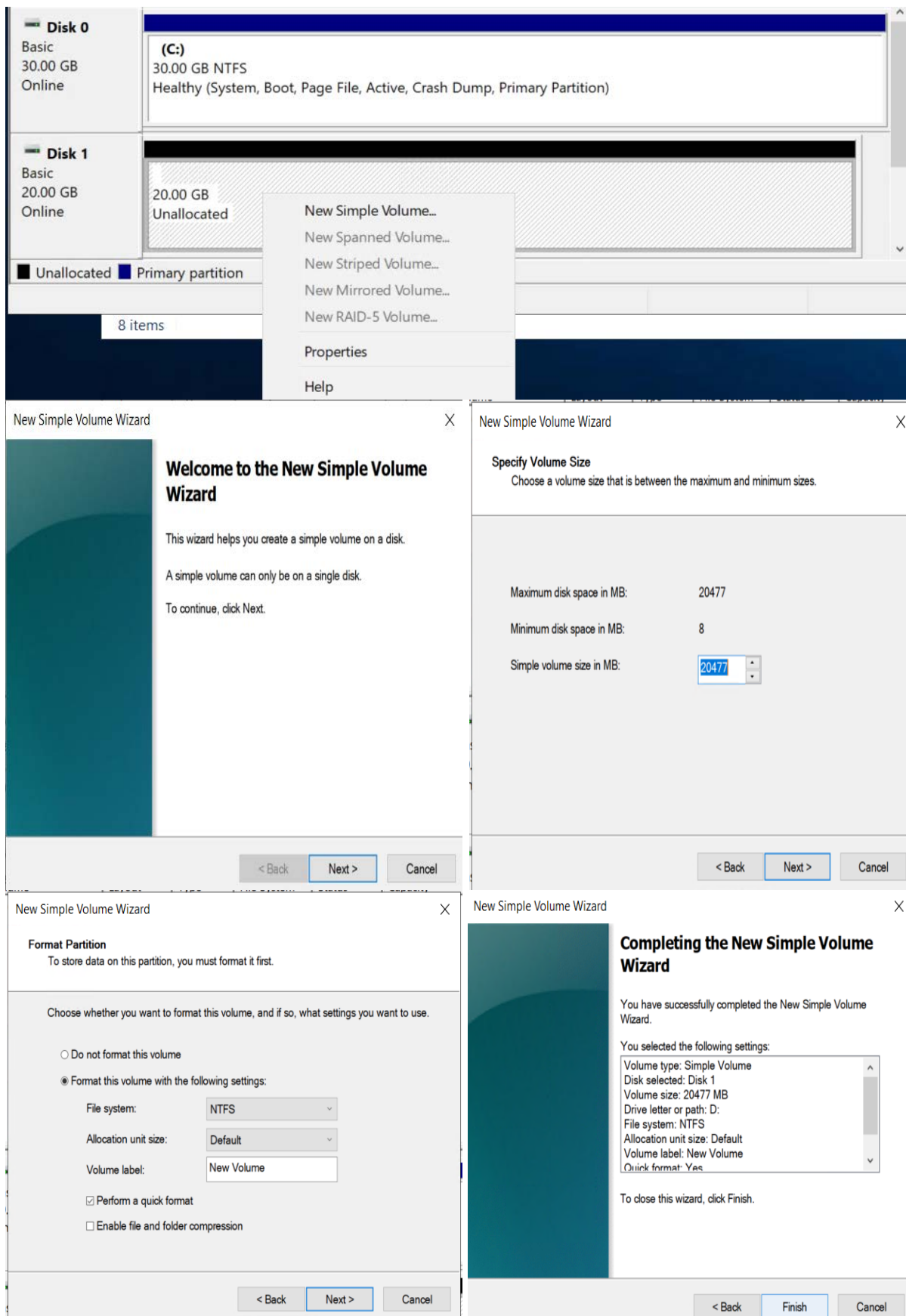
Step 5:- Initially the attached storage is not visible in control panel , to initialize the disk we goto the disk manager (win + x + k)



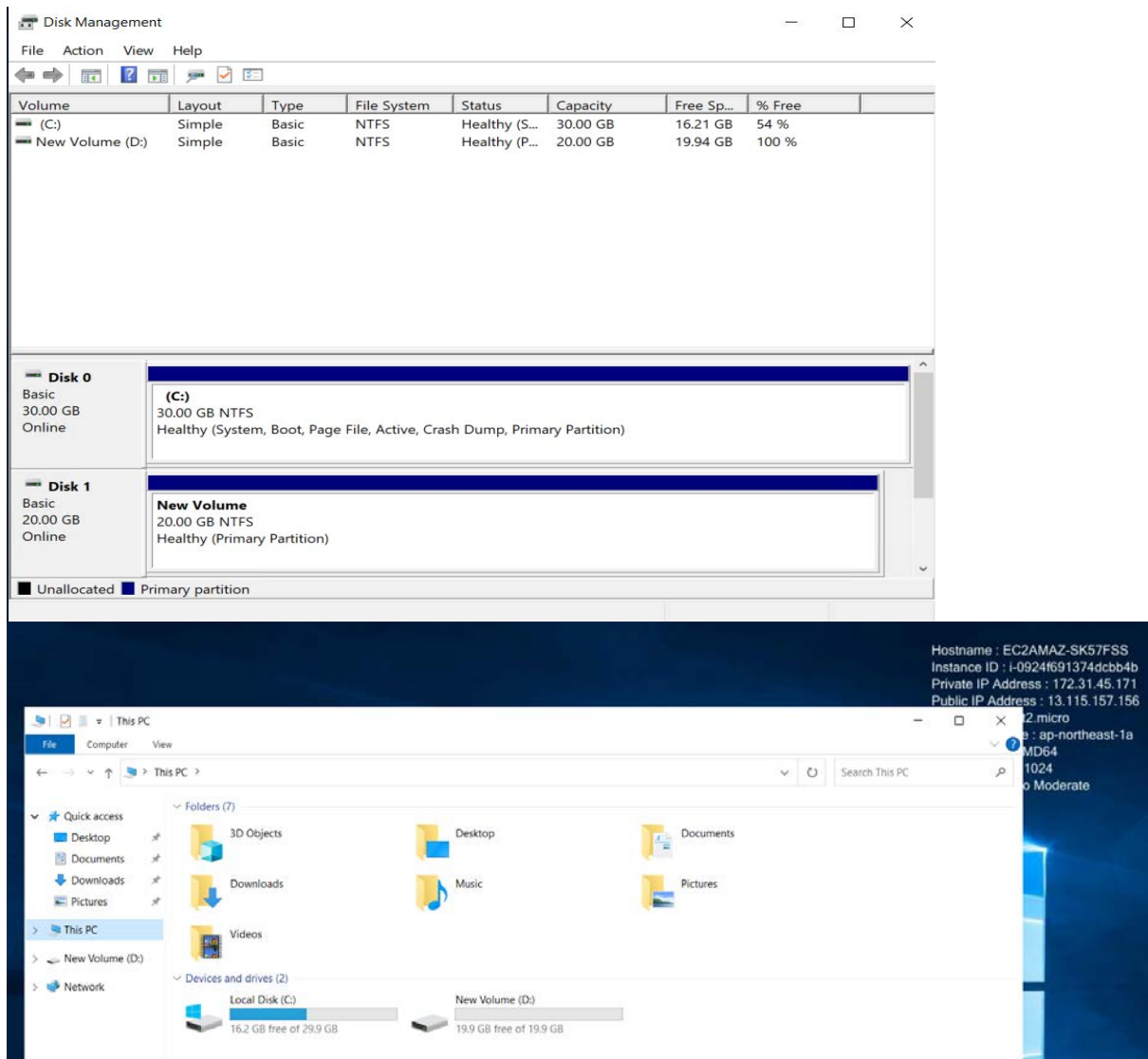
Step 6:- Right click on the unallocated disk and click on initialize the disk



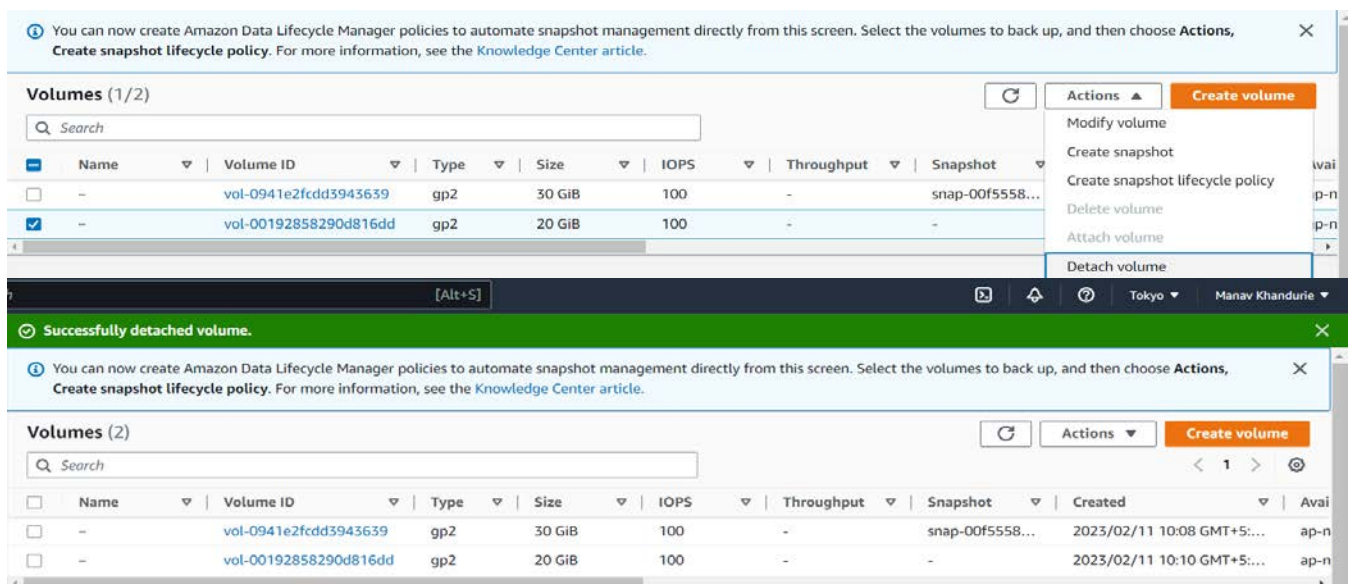
Step 7:- Right click on the unallocated disk and click on “new simple volume” and finish the Volume wizard



Step 8:- Click on finish and the new volume will get allocated



Step 9:- Terminate the instances and detach and delete the EBS volume



[Alt+S]

TokyoManav Khandurie

Successfully detached volume.

You can now create Amazon Data Lifecycle Manager policies to automate snapshot management directly from this screen. Select the volumes to back up, and then choose **Actions**, **Create snapshot lifecycle policy**. For more information, see the [Knowledge Center article](#).

Volumes (1/2)

Search

	Name	Volume ID	Type	Size	IOPS	Throughput	Snapshot
<input type="checkbox"/>	-	vol-0941e2fcdd3943639	gp2	30 GiB	100	-	snap-00f5558...
<input checked="" type="checkbox"/>	-	vol-00192858290d816dd	gp2	20 GiB	100	-	-

Actions

Create volume

Modify volume

Create snapshot

Create snapshot lifecycle policy

Delete volume

Attach volume

Successfully deleted volume vol-00192858290d816dd.

You can now create Amazon Data Lifecycle Manager policies to automate snapshot management directly from this screen. Select the volumes to back up, and then choose **Actions**, **Create snapshot lifecycle policy**. For more information, see the [Knowledge Center article](#).

Volumes (1)

Search

	Name	Volume ID	Type	Size	IOPS	Throughput	Snapshot	Created	Avail
<input type="checkbox"/>	-	vol-0941e2fcdd3943639	gp2	30 GiB	100	-	snap-00f5558...	2023/02/11 10:08 GMT+5...	ap-n

Instances (1/1) Info

Find instance by attribute or tag (case-sensitive)

	Name	Instance ID	Instance state	Instance type	Status
<input checked="" type="checkbox"/>	windowsserver	i-0924f691374dccb4b	Running	t2.micro	2/2

Instance state

Stop instance

Start instance

Reboot instance

Hibernate instance

Terminate instance

Actions

Launch instances

Availability Zone

Public IPv4 DNS

ap-northeast-1a

ec2-13-115-157

FOR LINUX SERVER-

Step 1:- Create a Linux EC2 instance

Name and tags [Info](#)

Name

linuxserver

Add additional tags

▼ Application and OS Images (Amazon Machine Image) [Info](#)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

Q Search our full catalog including 1000s of application and OS images

Recents

Quick Start

Amazon Linux

aws

macOS

Mac

Ubuntu

ubuntu

Windows

Microsoft

Red Hat

Red Hat

S

Browse more AMIs

Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Amazon Linux 2 AMI (HVM) - Kernel 5.10, SSD Volume Type

Free tier eligible

ami-06ee4e2261a4dc5c3 (64-bit (x86)) / ami-0dee43a4abd99c264 (64-bit (Arm))

Virtualization: hvm ENA enabled: true Root device type: ebs

▼ Network settings [Info](#)

Network [Info](#)

vpc-05525b34412abb13b

Subnet [Info](#)

No preference (Default subnet in any availability zone)

Auto-assign public IP [Info](#)

Enable

Firewall (security groups) [Info](#)

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

Create security group

Select existing security group

We'll create a new security group called 'launch-wizard-2' with the following rules:

☒ Allow SSH traffic from

Helps you connect to your instance

Anywhere

0.0.0.0/0

☒ Allow HTTPS traffic from the internet

To set up an endpoint, for example when creating a web server

☒ Allow HTTP traffic from the internet

To set up an endpoint, for example when creating a web server

Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

×

▼ Summary

Number of instances [Info](#)

1

Software Image (AMI)

Amazon Linux 2 Kernel 5.10...[read more](#)

ami-06ee4e2261a4dc5c3

Virtual server type (instance type)

t2.micro

Firewall (security group)

New security group

Storage (volumes)

1 volume(s) - 8 GiB

Cancel

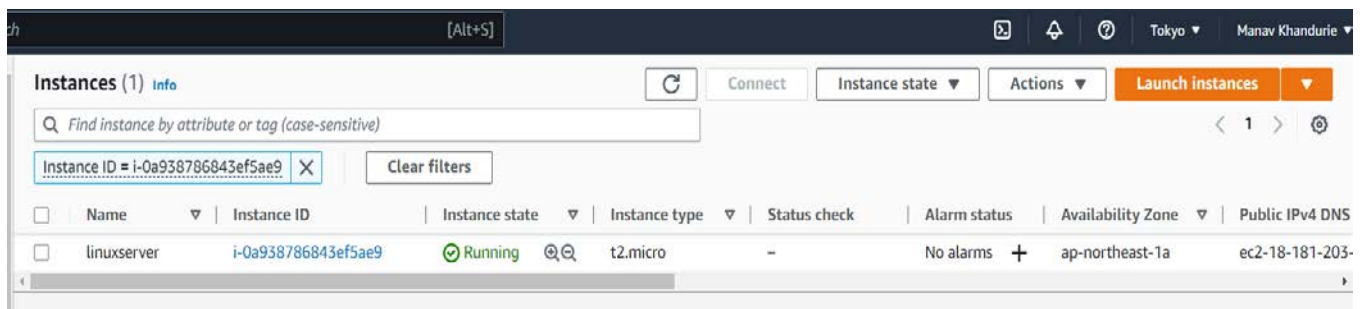
Launch instance

EC2 > Instances > Launch an instance

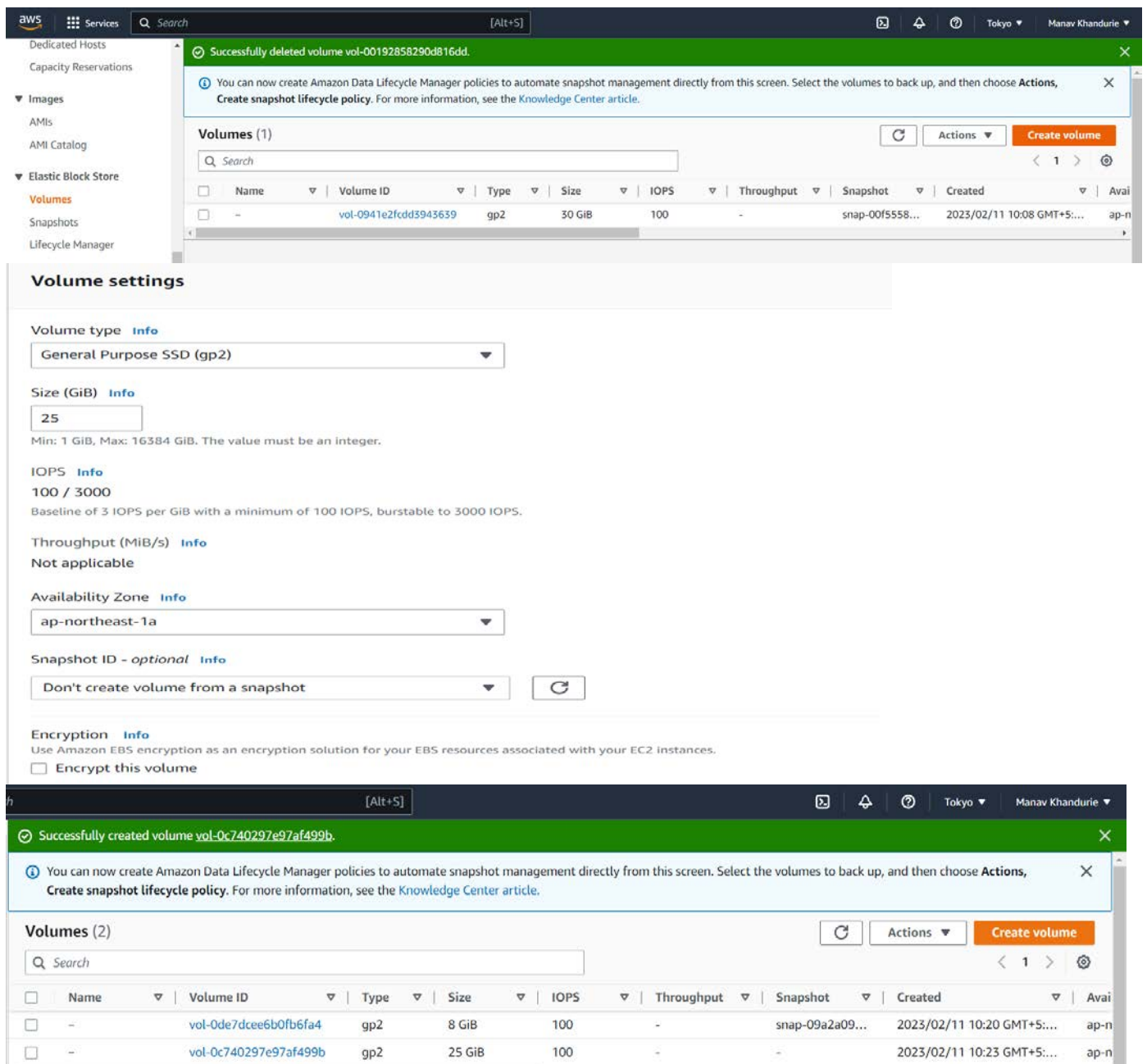
Success

Successfully initiated launch of instance (i-0a938786843ef5ae9)

► Launch log



Step 2:- Go to Elastic block Store -> Volumes



Step 3:- Attach the volume created in step 2 to the instance created in step 1

You can now create Amazon Data Lifecycle Manager policies to automate snapshot management directly from this screen. Select the volumes to back up, and then choose **Actions**, **Create snapshot lifecycle policy**. For more information, see the [Knowledge Center article](#).

Volumes (1/2)

Search

	Name	Volume ID	Type	Size	IOPS	Throughput	Snapshot
<input type="checkbox"/>	-	vol-0de7dcee6b0fb6fa4	gp2	8 GiB	100	-	snap-09a2a09...
<input checked="" type="checkbox"/>	-	vol-0c740297e97af499b	gp2	25 GiB	100	-	-

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-0c740297e97af499b

Availability Zone
ap-northeast-1a

Instance [Info](#)
i-0a938786843ef5ae9

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

Device name [Info](#)
/dev/sdf

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

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 volume**

[Alt+S]

Successfully attached volume vol-0c740297e97af499b to instance i-0a938786843ef5ae9.

You can now create Amazon Data Lifecycle Manager policies to automate snapshot management directly from this screen. Select the volumes to back up, and then choose **Actions**, **Create snapshot lifecycle policy**. For more information, see the [Knowledge Center article](#).

Volumes (1/2)

Search

	Name	Volume ID	Type	Size	IOPS	Throughput	Snapshot	Created	Avai
<input type="checkbox"/>	-	vol-0de7dcee6b0fb6fa4	gp2	8 GiB	100	-	snap-09a2a09...	2023/02/11 10:20 GMT+5:...	ap-n
<input checked="" type="checkbox"/>	-	vol-0c740297e97af499b	gp2	25 GiB	100	-	-	2023/02/11 10:23 GMT+5:...	ap-n

Details

Volume ID vol-0c740297e97af499b	Size 25 GiB	Type gp2	Volume status Okay
AWS Compute Optimizer finding Opt-in to AWS Compute Optimizer for recommendations. Learn more	Volume state In-use	IOPS 100	Throughput -
Encryption Not encrypted	KMS key ID -	KMS key alias -	KMS key ARN -
Snapshot -	Availability Zone ap-northeast-1a	Created Sat Feb 11 2023 10:23:12 GMT+0500 (India Standard Time)	Multi-Attach enabled No
Attached Instances i-0a938786843ef5ae9 (linuxserver): /dev/sdf (attached)	Outposts ARN -		

Step 4:- Connect to the instance created in step 1 and type the command ->
df -h

➔ df -> df shows the amount of free space that is left on a file system

➔ h -> Its an attribute that displays output in human readable form(in Gbs)


```
aws Services Search [Alt+S] Tokyo Manav Khandurie

_ _ _ _ _
_ | ( _ _ / Amazon Linux 2 AMI
_ | \ _ _ _ |

https://aws.amazon.com/amazon-linux-2/
16 package(s) needed for security, out of 16 available
Run "sudo yum update" to apply all updates.
[ec2-user@ip-172-31-38-180 ~]$ whoami
ec2-user
[ec2-user@ip-172-31-38-180 ~]$ df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        474M   0  474M   0% /dev
tmpfs           483M   0  483M   0% /dev/shm
tmpfs           483M 408K  482M   1% /run
tmpfs           483M   0  483M   0% /sys/fs/cgroup
/dev/xvda1      8.0G  1.6G  6.5G  20% /
tmpfs           97M   0   97M   0% /run/user/1000
[ec2-user@ip-172-31-38-180 ~]$
```

i-0a938786843ef5ae9 (linuxserver)
PublicIPs: 18.181.203.250 PrivateIPs: 172.31.38.180

Step 5:- Use the command ->

lsblk

➔ lsblk -> lists information about all available or the specified block devices.

```
https://aws.amazon.com/amazon-linux-2/
16 package(s) needed for security, out of 16 available
Run "sudo yum update" to apply all updates.
[ec2-user@ip-172-31-38-180 ~]$ whoami
ec2-user
[ec2-user@ip-172-31-38-180 ~]$ df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        474M   0  474M   0% /dev
tmpfs           483M   0  483M   0% /dev/shm
tmpfs           483M 408K  482M   1% /run
tmpfs           483M   0  483M   0% /sys/fs/cgroup
/dev/xvda1      8.0G  1.6G  6.5G  20% /
tmpfs           97M   0   97M   0% /run/user/1000
[ec2-user@ip-172-31-38-180 ~]$ sudo su
[root@ip-172-31-38-180 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  25G  0 disk
```


Step 6:- Use the command `sudo su` to run commands as root user

`sudo su`

➔ `sudo su` -> allows you to run programs as another user, by default the root user

```
[ec2-user@ip-172-31-38-180 ~]$ df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        474M   0    474M   0% /dev
tmpfs           483M   0    483M   0% /dev/shm
tmpfs           483M 408K   482M   1% /run
tmpfs           483M   0    483M   0% /sys/fs/cgroup
/dev/xvda1      8.0G 1.6G   6.5G  20% /
tmpfs           97M   0     97M   0% /run/user/1000
[ec2-user@ip-172-31-38-180 ~]$ sudo su
[root@ip-172-31-38-180 ec2-user]# lsblk
```

Step 7:- Use the command

`file -s /dev/xvdf`

➔ `file` -> determines the actual type of a file, no matter what its extension is.

➔ `-s` -> “s” indicates the file has the setuid bit set.

```
[root@ip-172-31-38-180 ec2-user]# file -s /dev/xvdf
/dev/xvdf: data
[root@ip-172-31-38-180 ec2-user]#
```

Step 8:- Use the command

`mkfs -t xfs /dev/xvdf`

➔ `Mkfs` -> makes a new file system on a specified device [everything in linux is file]

➔ XFS is a high-performing, journaling Linux file system

➔ “-t” tag formats the display of output on the terminal screen

```
[root@ip-172-31-38-180 ec2-user]# mkfs -t xfs /dev/xvdf
meta-data=/dev/xvdf            isize=512    agcount=4, agsize=1638400 blks
      =                       sectsz=512    attr=2, projid32bit=1
      =                       crc=1        finobt=1, sparse=1, rmapbt=0
      =                       reflink=1    bigtime=0 inobtcount=0
data      =                    bsize=4096    blocks=6553600, imaxpct=25
      =                       sunit=0      swidth=0 blks
naming    =version 2          bsize=4096  ascii-ci=0, ftype=1
log       =internal log      bsize=4096  blocks=3200, version=2
      =                       sectsz=512   sunit=0 blks, lazy-count=1
realtime  =none              extsz=4096   blocks=0, rtextents=0
[root@ip-172-31-38-180 ec2-user]#
```

i-0a938786843ef5ae9 (linuxserver)

PublicIPs: 18.181.203.250 PrivateIPs: 172.31.38.180

Step 9:- Use the command

`cd ~`

➔ `Cd` command changes directory

➔ `~` is used to exit the directory

➔ `pwd` returns the full path name

```
[root@ip-172-31-38-180 ec2-user]# ls
[root@ip-172-31-38-180 ec2-user]# mkdir test
[root@ip-172-31-38-180 ec2-user]# ls
test
[root@ip-172-31-38-180 ec2-user]# cd test
[root@ip-172-31-38-180 test]# pwd
/home/ec2-user/test
[root@ip-172-31-38-180 test]# cd ~
[root@ip-172-31-38-180 ~]# mkdir /apps/my-data/
```

Step 10:- Use the command

`mkdir -p /apps/volume/new-volume`

➔ `mkdir` allows the user to create directories

➔ `-p` will create parent directory first, if it doesn't exist

```
[root@ip-172-31-38-180 ~]# mkdir /apps/my-data/
mkdir: cannot create directory '/apps/my-data/': No such file or directory
[root@ip-172-31-38-180 ~]# mkdir -p /apps/volume/new-volume
[root@ip-172-31-38-180 ~]# ls
```

Step 11:- Use the command and then use the `df` command

`mount /dev/xvdf /apps/volume/new-volume`

➔ `mount` command is used to mount the filesystem found on a device to big tree structure(Linux filesystem) rooted at '/'

➔ its goes by syntax , `mount device dir`

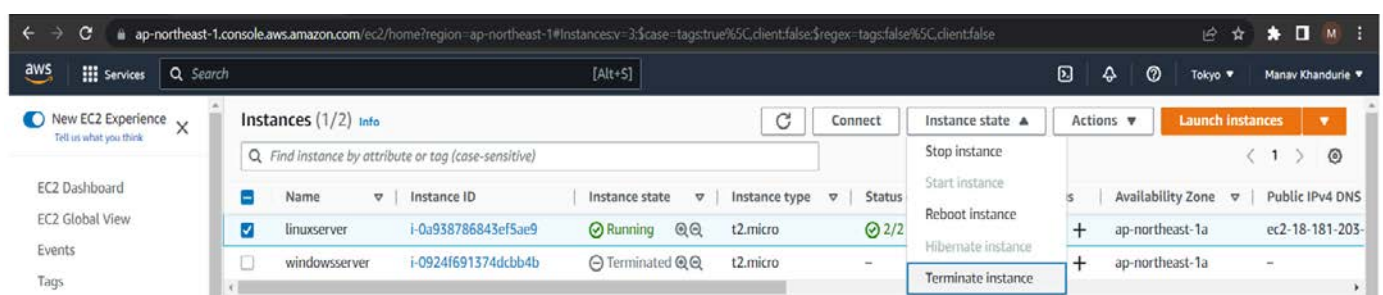
```
[root@ip-172-31-38-180 ~]# mount /dev/xvdf /apps/volume/new-volume
[root@ip-172-31-38-180 ~]# df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        474M   0    474M   0% /dev
tmpfs           483M   0    483M   0% /dev/shm
tmpfs           483M 468K   482M   1% /run
tmpfs           483M   0    483M   0% /sys/fs/cgroup
/dev/xvda1      8.0G  1.6G   6.5G  20% /
tmpfs           97M   0     97M   0% /run/user/1000
tmpfs           97M   0     97M   0% /run/user/0
/dev/xvdf       25G  211M   25G   1% /apps/volume/new-volume
[root@ip-172-31-38-180 ~]#
```

i-0a938786843ef5ae9 (linuxserver)

PublicIPs: 18.181.203.250 PrivateIPs: 172.31.38.180

Step 12:- The new volume that was created in step 3 is attached and online as shown above

Step 13:- Terminate the instances and delete and detach the volumes



Successfully terminated i-0924f691374dccb4b

Instances (2) Info

Find instance by attribute or tag (case-sensitive)

	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
<input type="checkbox"/>	linuxserver	i-0a938786843ef5ae9	Terminated	t2.micro	-	No alarms	ap-northeast-1a	-
<input type="checkbox"/>	windowserver	i-0924f691374dccb4b	Terminated	t2.micro	-	No alarms	ap-northeast-1a	-

Successfully attached volume vol-0c740297e97af499b to instance i-0a938786843ef5ae9.

Create snapshot lifecycle policy. For more information, see the Knowledge Center article.

Volumes (1/1)

Search

	Name	Volume ID	Type	Size	IOPS	Throughput	Snapshot
<input checked="" type="checkbox"/>	-	vol-0c740297e97af499b	gp2	25 GiB	100	-	-

Actions

Create volume

Modify volume

Create snapshot

Create snapshot lifecycle policy

Delete volume

Attach volume

Detach volume

Successfully deleted volume vol-0c740297e97af499b.

Create snapshot lifecycle policy. For more information, see the Knowledge Center article.

Volumes

Search

	Name	Volume ID	Type	Size	IOPS	Throughput	Snapshot	Created	Avai
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You currently have no volumes in this region

New EC2 Experience

EC2 Dashboard

EC2 Global View

Events

Tags

Limits

