

Purpose:

This was the second set of AWS foundations lab. These labs covered Amazon Elastic Block Storage (EBS), Amazon Relational Database Storage (RDS), and Amazon Elastic Load Balancing (ELB). These services are focused on because they are fundamental components of Amazon AWS due to their widespread use by clients. The widespread use of these services makes learning them even more essential in order to understand AWS cloud architecture.

Background Information:

Lab 4: Working with EBS. Amazon EBS is a scalable block storage service within AWS to pair with an EC2 instance allowing for persistent storage for EC2 instances even if the EC2 instance is terminated. This allows for reliable storage for an EC2 instance for transactional workloads such as databases and boot volumes.

Lab 5: Creating a Database. Amazon RDS is a managed database service within AWS that simplifies building, operating, and scaling Relational Databases in the cloud. It is used to manage time-consuming database tasks allowing clients to focus on other parts of their AWS infrastructure and/or other parts of their business. Amazon RDS provides clients with six database engines. These include; Amazon Aurora, Oracle, Microsoft SQL Server, PostgreSQL, MySQL, and MariaDB.

Amazon RDS also features high availability as well as automated backup and Point-in-Time recovery. This allows RDS to be very reliable and minimal downtime in case of failure.

Lab 6: Amazon ELB is an AWS service which allows automatically balances out application traffic across multiple EC2 instances. This allows for high availability and fault tolerance as ELB can distribute traffic across multiple availability zones. This also allows for better application performance as ELB will evenly distribute traffic among all the EC2 instances ensuring that no one instance gets overwhelmed with traffic a spike in traffic. ELB also does health checks on EC2 instances to ensure that traffic is not being routed to instances in

poor health where the traffic will not be able to be handled by the EC2 instance.

EC2 Auto Scaling allows for an application to handle sudden surges in traffic without having spare resources sitting idle when traffic is off-peak. This helps to maintain application availability while also keeping costs low for the client who doesn't have to pay for idle EC2 instances. Auto Scaling works by automatically increasing the number of EC2 instances when there is a peak in traffic and shutting down EC2 instances when it's off peak to conserve resources and lower costs for clients. Clients choose the Desired, Minimum, and Maximum number of EC2 instances in the Auto Scaling group. This gives the client control over the range of EC2 instances Auto Scaling has open at any given time allowing for control over the cost to services ratio.

Auto Scaling comes in 4 different types, these include Dynamic, Manual, Scheduled, and predictive.

-Dynamic automatically increases or decreases the number of EC2 instances in the Auto Scaling group based on the amount of traffic to the application.

-Manual scaling allows clients to manually adjust the capacity for non-predictive traffic spikes.

-Scheduled scaling allows users to plan out and set up schedules for changes in capacity. This is used for predictable traffic spikes or dips based on hours of the day or days of the week.

-Predictive Scaling is an enhanced version of Dynamic Scaling with AI algorithms to predict the future demand and automatically adjust the capacity of the Auto Scaling group. This method of scaling requires a history of data of the Auto Scaling group to determine future demand.

Lab Summary:

Lab 4: In this EBS lab we created an EBS volume and attached it to our EC2 lab instance. Using PuTTY, we used SSH to remotely connect to our EC2 instance where we were able to attach and mount our volume into the EC2 instance. We also added a file containing text into the volume. We created a snapshot backup of the volume before deleting that volume. Using the snapshot

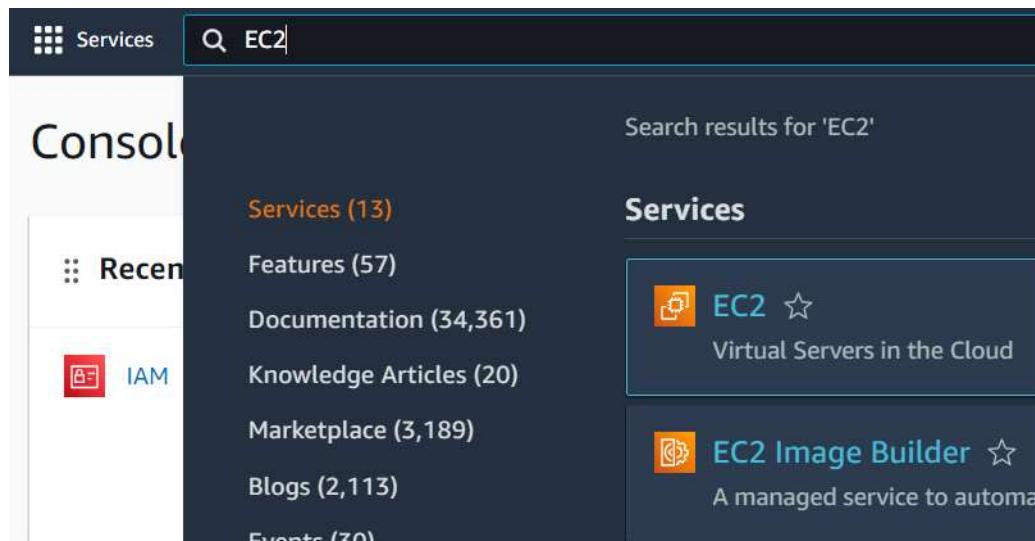
we created a new volume which we preceded to attach and mount onto the EC2 instance.

Lab 5: In this RDS lab we created a security group for an DB instance. We then created an RDS DB instance with the security group we just created. This DB instance also was set up with an instance identifier, username, and password for us to later connect to it. When we connected to it, we went to the IP address within AWS academy. We then used the Enpoint value from within the AWS management console and typed in our instance identifier, username and password. After a few seconds we were able to access and modify the Address Book within our Database Server.

Lab 6: In this Scale and Load Balancing lab we created an AMI from a running instance, a load balancer, a launch template and an Auto Scaling group. This allowed us to use multiple EC2 instances for our web server and balance the traffic among the instances equally to reduce stress on a single instance. We then did a load test on the web server in order to test auto scaling and used Amazon CloudWatch to see the Auto Scaling group alarms go off.

Procedure:

Lab 4:



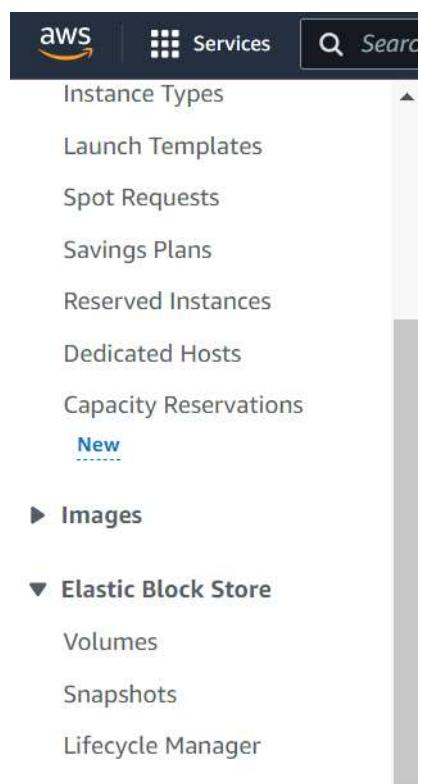
1: In the top left corner, search for EC2 and click it.

The screenshot shows the AWS EC2 Dashboard. On the left, there's a navigation sidebar with links like 'EC2 Dashboard', 'EC2 Global View', 'Events', 'Console-to-Code', 'Preview', and a expanded 'Instances' section containing 'Instances', 'Instance Types', 'Launch Templates', 'Spot Requests', 'Savings Plans', 'Reserved Instances', and 'Dedicated Hosts'. The main content area is titled 'Resources' and displays a summary of Amazon EC2 resources. It includes a message: 'You are using the following Amazon EC2 resources i'. Below this are six boxes: 'Instances (running)' with value '2', 'Dedicated Hosts' with value '0', 'Instances' with value '2', 'Load balancers' with a red 'API Error' icon and value '0', 'Security groups' with value '5', and 'Volumes' with value '2'.

2: In the navigation column, select Instances

| Instances (2) Info | | C | Connect | Instance state ▾ | Actions ▾ | Launch inst |
|---|--------------|---------------------|--|------------------|--|-----------------------------|
| <input type="text"/> Find Instance by attribute or tag (case-sensitive) | | | | | | |
| <input type="checkbox"/> | Name ↴ | Instance ID | Instance state | Instance type | Status check | Alarm status |
| <input type="checkbox"/> | Lab | i-09ba378c0226972f3 | Running Q Q | t2.micro | 2/2 checks passed View alarms + | us-east-1 |
| <input type="checkbox"/> | Bastion Host | i-08505876a6552520a | Running Q Q | t2.micro | 2/2 checks passed View alarms + | us-east-1 |

3: You will see that there is already a Lab instance created, note the Availability Zone it is in.



4: In the left hand navigation menu, select Volumes.

Volumes (2) [Info](#)

[C](#) Actions ▾ [Create](#)

Search

| <input type="checkbox"/> | Name | Volume ID | Type | Size | IOPS | Throughput | Snapshot |
|--------------------------|------|-----------------------|------|-------|------|------------|-----------------|
| <input type="checkbox"/> | - | vol-053a9818a7d14c9fa | gp3 | 8 GiB | 3000 | 125 | snap-01fce2d... |
| <input type="checkbox"/> | - | vol-0e5c9cc436e58f0fa | gp3 | 8 GiB | 3000 | 125 | snap-01fce2d... |

5: Click Create Volume.

Volume settings

Volume type [Info](#)

General Purpose SSD (gp3) ▾

i General Purpose SSD gp3 is now the default selection. gp3 provides up to 20% lower cost per GB than gp2.
[Learn More](#) 

Size (GiB) [Info](#)

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

IOPS [Info](#)

3000
Min: 3000 IOPS, Max: 16000 IOPS. The value must be an integer.

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

125
Min: 125 MiB, Max: 1000 MiB. Baseline: 125 MiB/s.

Availability Zone [Info](#)

us-east-1a ▾

6: Configure:

-Volume Type: General Purpose SSD (gp2)

-Size (GiB): 1

-Availability Zones: Same Zone as your EC2 instance

Tags - optional [Info](#)

A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and track your AWS costs.

| Key | Value - optional | |
|--|---|---------------------|
| <input type="text"/> Name X | <input type="text"/> My Volume X | Remove |
| Add tag | | |

You can add 49 more tags.

Snapshot summary [Info](#)

① Click refresh to view backup information

The volume type that you select and the tags that you assign determine whether the volume will be backed up by any Data Lifecycle Manager policies.

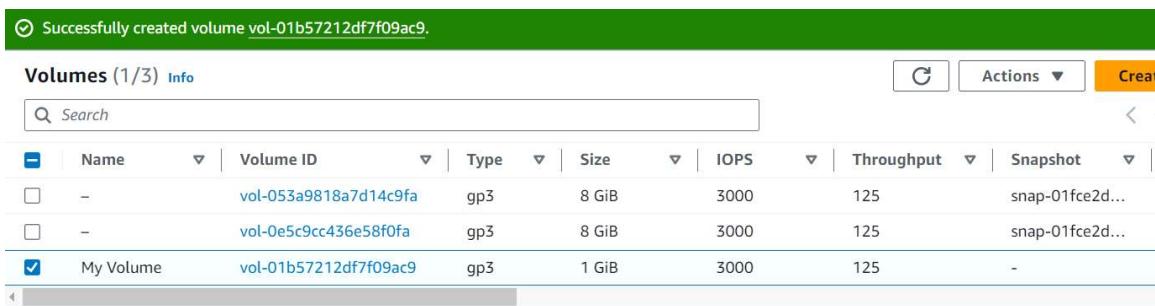
Cancel Create

7: Choose Add Tag and select the values:

-Key: Name

-Value: My Volume

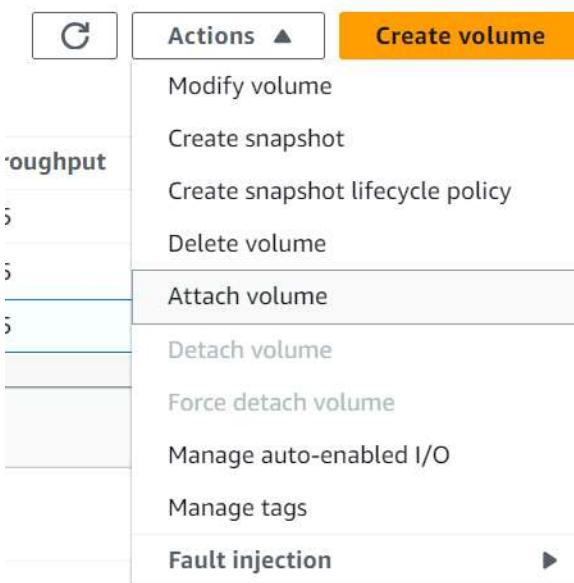
-click Create.



Successfully created volume vol-01b57212df7f09ac9.

| Volumes (1/3) Info | | | | | | | | Actions | Create |
|-------------------------------------|-----------|-----------------------|------|-------|------|------------|-----------------|-------------------------|------------------------|
| | Name | Volume ID | Type | Size | IOPS | Throughput | Snapshot | | |
| <input type="checkbox"/> | - | vol-053a9818a7d14c9fa | gp3 | 8 GiB | 3000 | 125 | snap-01fce2d... | | |
| <input type="checkbox"/> | - | vol-0e5c9cc436e58f0fa | gp3 | 8 GiB | 3000 | 125 | snap-01fce2d... | | |
| <input checked="" type="checkbox"/> | My Volume | vol-01b57212df7f09ac9 | gp3 | 1 GiB | 3000 | 125 | - | | |

8: You have now successfully created a volume, select it.



9: Under actions, select Attach volume.

Basic details

Volume ID
vol-01b57212df7f09ac9 (My Volume)

Availability Zone
 us-east-1a

Instance [Info](#)
 ▼ C

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.

ⓘ 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

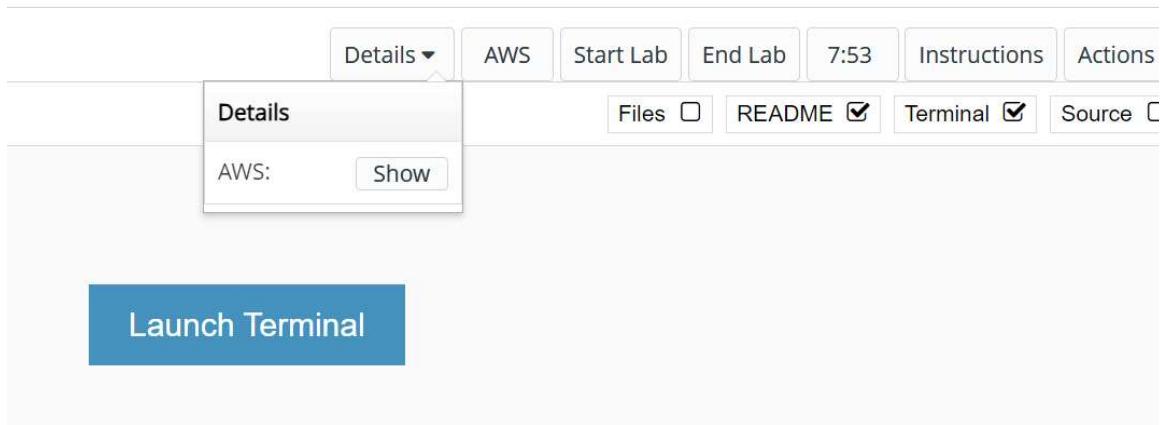
10: In the Instance field, select your Lab instance.

⌚ Successfully attached volume vol-01b57212df7f09ac9 to instance i-09ba378c0226972f3.

Volumes (3) [Info](#)

| <input type="checkbox"/> | Name | Volume ID | Type | Size | IOPS | Throughput | Snapshot | Created |
|--------------------------|-----------|-----------------------|------|-------|------|------------|-----------------|------------------------|
| <input type="checkbox"/> | - | vol-053a9818a7d14c9fa | gp3 | 8 GiB | 3000 | 125 | snap-01fce2d... | 2024/01/17 16:12 GMT-8 |
| <input type="checkbox"/> | - | vol-0e5cc436e58f0fa | gp3 | 8 GiB | 3000 | 125 | snap-01fce2d... | 2024/01/17 16:13 GMT-8 |
| <input type="checkbox"/> | My Volume | vol-01b57212df7f09ac9 | gp3 | 1 GiB | 3000 | 125 | - | 2024/01/17 16:27 GMT-8 |

11: You have now attached the volume to your EC2 instance.



12: Go back to AWS academy and click Details > AWS: Show

Credentials

Cloud Access

AWS CLI: [Show](#)

Cloud Labs

Remaining session time: 07:54:38 (475 minutes)
Session started at: 2024-01-18T08:29:10-0800
Session to end at: 2024-01-18T16:32:42-0800

Accumulated lab time: 08:08:00 (488 minutes)

(1) ips -- public:3.238.39.51, private:10.1.11.146 (2) ips -- public:34.237.145.239, private:10.0.0.162

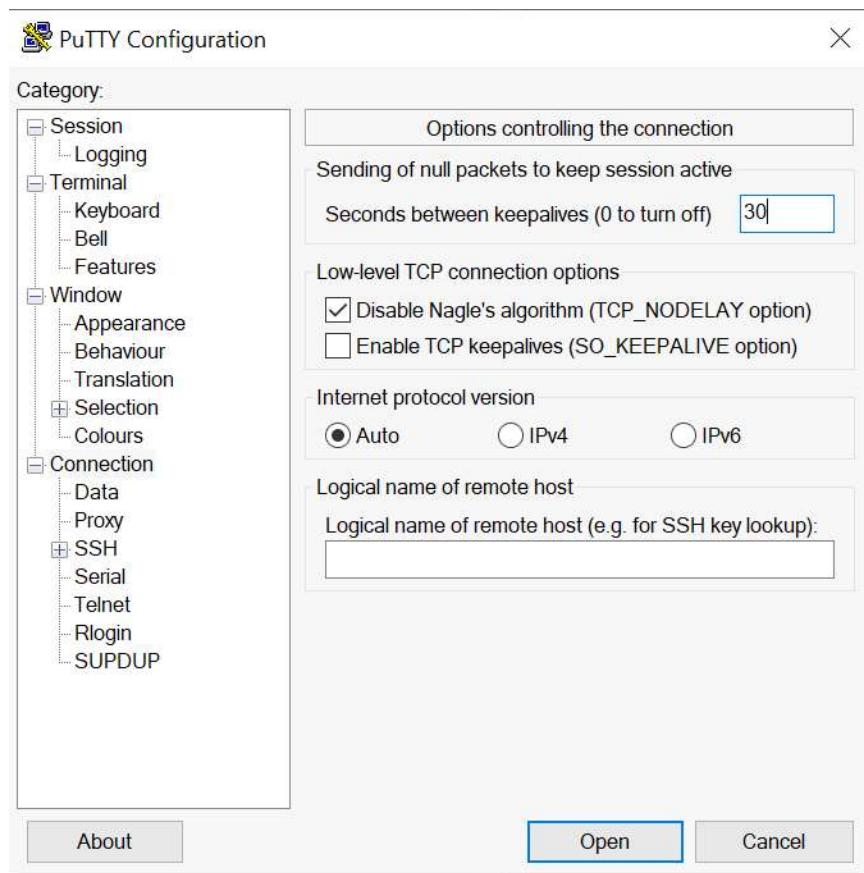
SSH key: [Show](#) [Download PEM](#) [Download PPK](#)

AWS SSO: [Download URL](#)

| | |
|------------------|--|
| SecretKey | yhafxx9Y/dvgLmFnTW8skRDpyh6uzeq0x6/2VAcW |
| BastionHost | 34.237.145.239 |
| Region | us-east-1 |
| AvailabilityZone | us-east-1a |
| AccessKey | AKIA6C2B6Q4UAW2TG2ZX |
| LabInstance | 3.238.39.51 |

13: This panel will show up, click download PPK

14: Next you will be using PuTTY to SSH into your EC2 instance, if you don't have PuTTY, download it.



15: Open up PuTTY and go to Connection. Set Seconds between keepalives to 30

Instance: i-05573f2559736342c (Lab)

Details Status and alarms New Monitoring Security Networking Storage Tags

Instance summary Info

Instance ID: i-05573f2559736342c (Lab)

IPv6 address:

Hostname: t2m1

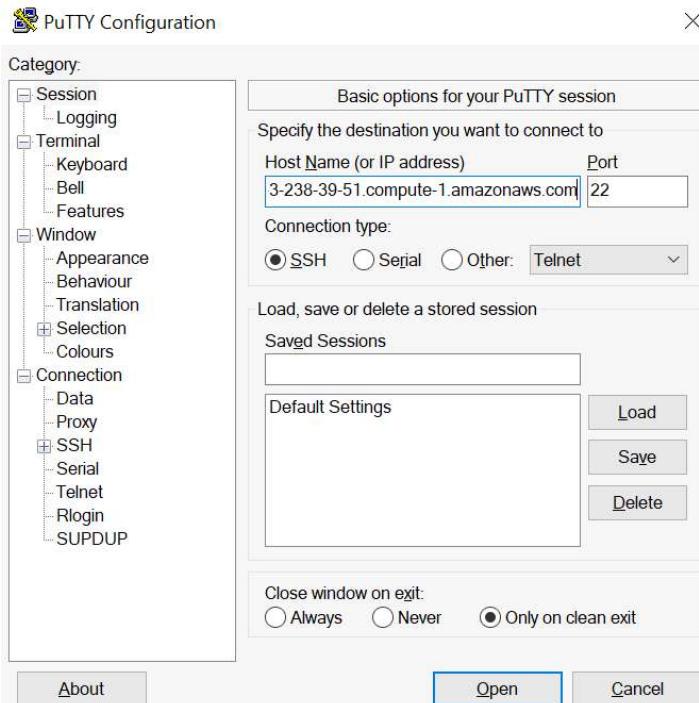
Public IPv4 address: 3.238.39.51 [open address]

instance state: Running

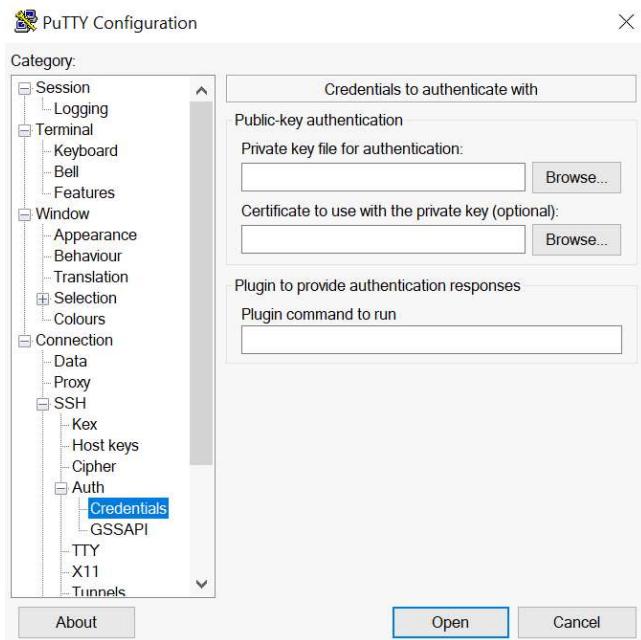
Private IP: 10.1.11.146

Public IPv4 DNS: ec2-3-238-39-51.compute-1.amazonaws.com [open address]

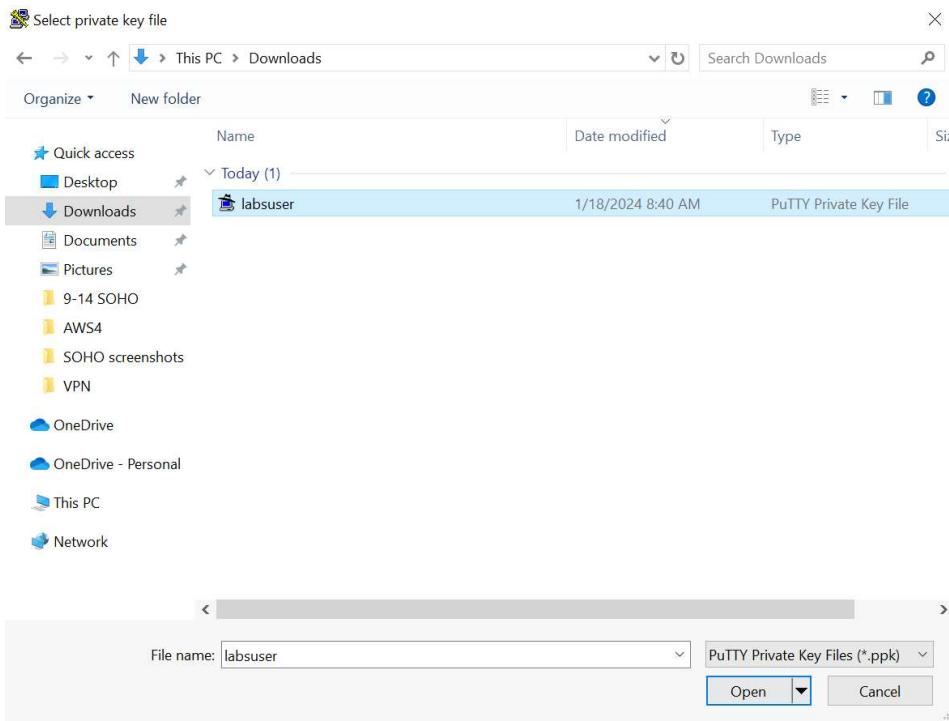
16: Go back to your AWS management console and copy the Public IPv4 DNS.



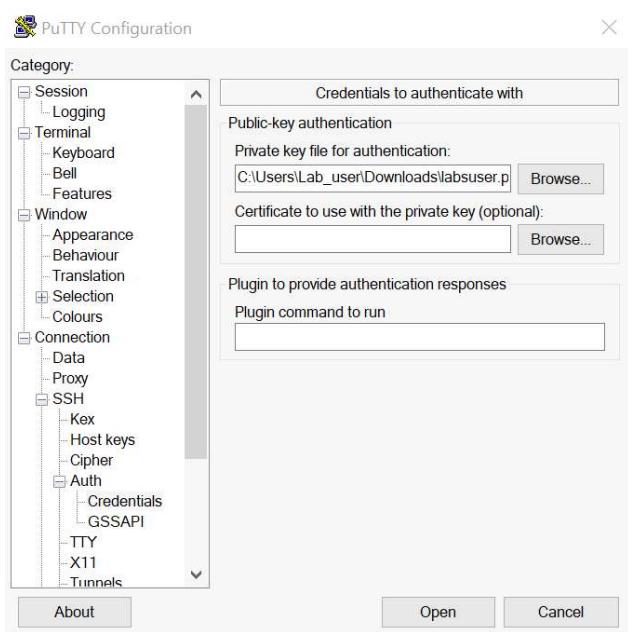
17: Go back to PuTTY and select the Session category. Paste the IPv4 DNS address you just copied into the Host Name text box. Make sure the Connection type is SSH.



18: SSH > Auth > Credentials. Then Browse for a Private key for authentication.



19: Select the PuTTY key named labuser, it should be inside your downloads folder. Click Open.



20: You should now have your Private key. Click open.



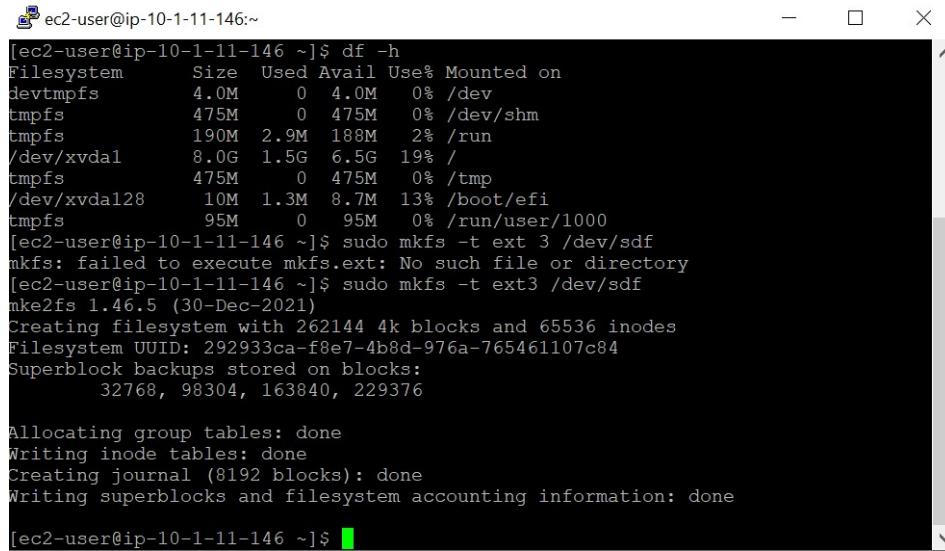
The screenshot shows a terminal window with the following content:

```
ec2-user@login:~$  
[ec2-user@login:~]$ login as: ec2-user  
[ec2-user@login:~]$ Authenticating with public key "imported-openssh-key" from agent  
[ec2-user@login:~]$ , #  
[ec2-user@login:~]$ ~\_\#\#\#\_\#  
[ec2-user@login:~]$ ~~ \_\#\#\#\#\_\#\#\#\|  
[ec2-user@login:~]$ ~~ \#\#\#\|  
[ec2-user@login:~]$ ~~ \#/ , __> https://aws.amazon.com/linux/amazon-linux-2023  
[ec2-user@login:~]$ ~~ V~, __>  
[ec2-user@login:~]$ ~~ /  
[ec2-user@login:~]$ ~~ ._. / /  
[ec2-user@login:~]$ ~~ / / / /  
[ec2-user@login:~]$ ~~ /m/ , / /  
[ec2-user@login:~]$ [ec2-user@login:~]$
```

21: Login as “ec2-user”. You are now connected to your EC2 instance.

```
ec2-user@ip-10-1-11-146:~  
login as: ec2-user  
Authenticating with public key "imported-openssh-key" from agent  
      #  
     ~\_\_ #####\ Amazon Linux 2023  
     ~~ \_\#\#\#\|  
     ~~ \#\#\#|  
     ~~ \#/ \_\_\_> https://aws.amazon.com/linux/amazon-linux-2023  
     ~~ V~' \_\_\_>  
     ~~~ /  
     ~~ ._. /  
     ~~ /_\_\_/  
     /m/'  
[ec2-user@ip-10-1-11-146 ~]$ df -h  
Filesystem      Size  Used Avail Use% Mounted on  
devtmpfs        4.0M    0  4.0M   0% /dev  
tmpfs          475M    0  475M   0% /dev/shm  
tmpfs          190M  2.9M 188M   2% /run  
/dev/xvda1       8.0G  1.5G  6.5G  19% /  
tmpfs          475M    0  475M   0% /tmp  
/dev/xvda128     10M  1.3M  8.7M  13% /boot/efi  
tmpfs          95M    0  95M   0% /run/user/1000  
[ec2-user@ip-10-1-11-146 ~]$
```

22: Type “df -h” to view the storage on your instance.



The screenshot shows a terminal window with the following command history:

```
[ec2-user@ip-10-1-11-146 ~]$ df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        4.0M   0    4.0M  0% /dev
tmpfs          475M   0   475M  0% /dev/shm
tmpfs          190M  2.9M  188M  2% /run
/dev/xvda1      8.0G  1.5G  6.5G 19% /
tmpfs          475M   0   475M  0% /tmp
/dev/xvda128    10M  1.3M  8.7M 13% /boot/efi
tmpfs          95M   0    95M  0% /run/user/1000
[ec2-user@ip-10-1-11-146 ~]$ sudo mkfs -t ext 3 /dev/sdf
mkfs: failed to execute mkfs.ext: No such file or directory
[ec2-user@ip-10-1-11-146 ~]$ sudo mkfs -t ext3 /dev/sdf
mkfs.ext 1.46.5 (30-Dec-2021)
Creating filesystem with 262144 4k blocks and 65536 inodes
Filesystem UUID: 292933ca-f8e7-4b8d-976a-765461107c84
Superblock backups stored on blocks:
      32768, 98304, 163840, 229376

Allocating group tables: done
Writing inode tables: done
Creating journal (8192 blocks): done
Writing superblocks and filesystem accounting information: done
[ec2-user@ip-10-1-11-146 ~]$
```

23: Create an ext3 file system in your volume with the command “sudo mkfs -t ext3 /dev/sdf”

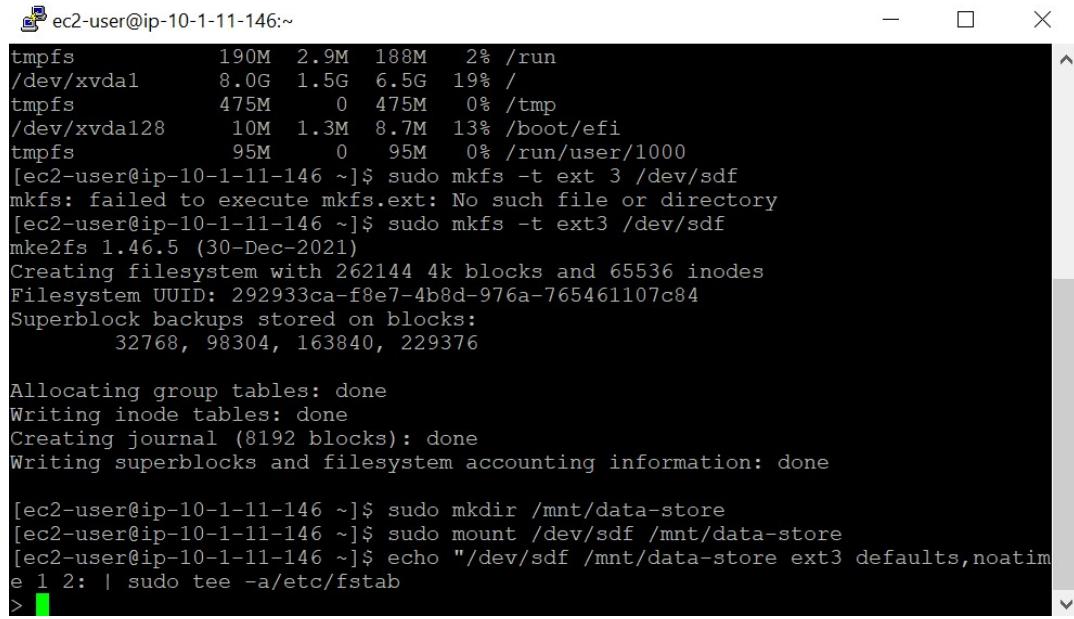
```
ec2-user@ip-10-1-11-146:~ - □ X
/devtmpfs      4.0M    0  4.0M  0% /dev
tmpfs         475M    0  475M  0% /dev/shm
tmpfs        190M  2.9M 188M  2% /run
/dev/xvda1     8.0G  1.5G 6.5G 19% /
tmpfs         475M    0  475M  0% /tmp
/dev/xvda128   10M  1.3M 8.7M 13% /boot/efi
tmpfs         95M    0  95M  0% /run/user/1000
[ec2-user@ip-10-1-11-146 ~]$ sudo mkfs -t ext 3 /dev/sdf
mkfs: failed to execute mkfs.ext: No such file or directory
[ec2-user@ip-10-1-11-146 ~]$ sudo mkfs -t ext3 /dev/sdf
mke2fs 1.46.5 (30-Dec-2021)
Creating filesystem with 262144 4k blocks and 65536 inodes
Filesystem UUID: 292933ca-f8e7-4b8d-976a-765461107c84
Superblock backups stored on blocks:
      32768, 98304, 163840, 229376

Allocating group tables: done
Writing inode tables: done
Creating journal (8192 blocks): done
Writing superblocks and filesystem accounting information: done

[ec2-user@ip-10-1-11-146 ~]$ sudo mkdir /mnt/data-store
[ec2-user@ip-10-1-11-146 ~]$ sudo mount /dev/sdf /mnt/data-store
[ec2-user@ip-10-1-11-146 ~]$ █
```

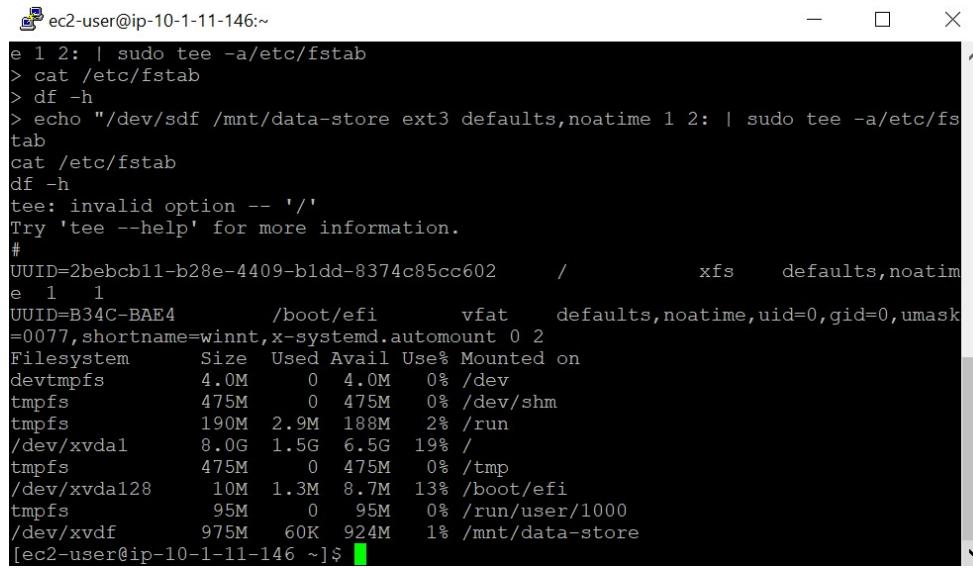
24: Create a directory to mount your storage volume with the command “sudo mkdir /mnt/data-store”.

25: Mount the directory. “sudo mount /dev/sdf /mnt/data-store”



```
ec2-user@ip-10-1-11-146:~  
tmpfs      190M  2.9M  188M  2% /run  
/dev/xvda1    8.0G  1.5G  6.5G  19% /  
tmpfs      475M     0  475M   0% /tmp  
/dev/xvda128   10M  1.3M  8.7M  13% /boot/efi  
tmpfs      95M     0   95M   0% /run/user/1000  
[ec2-user@ip-10-1-11-146 ~]$ sudo mkfs -t ext3 /dev/sdf  
mkfs: failed to execute mkfs.ext: No such file or directory  
[ec2-user@ip-10-1-11-146 ~]$ sudo mkfs -t ext3 /dev/sdf  
mke2fs 1.46.5 (30-Dec-2021)  
Creating filesystem with 262144 4k blocks and 65536 inodes  
Filesystem UUID: 292933ca-f8e7-4b8d-976a-765461107c84  
Superblock backups stored on blocks:  
      32768, 98304, 163840, 229376  
  
Allocating group tables: done  
Writing inode tables: done  
Creating journal (8192 blocks): done  
Writing superblocks and filesystem accounting information: done  
  
[ec2-user@ip-10-1-11-146 ~]$ sudo mkdir /mnt/data-store  
[ec2-user@ip-10-1-11-146 ~]$ sudo mount /dev/sdf /mnt/data-store  
[ec2-user@ip-10-1-11-146 ~]$ echo "/dev/sdf /mnt/data-store ext3 defaults,noatime 1 2: | sudo tee -a /etc/fstab"  
> [REDACTED]
```

25.5: In order for Linux to mount this volume whenever it is started you will need to add: “echo “/dev/sdf /mnt/data-store ext default,noatime 1 2” | sudo tee -a /etc/fstab”



```
ec2-user@ip-10-1-11-146:~  
e 1 2: | sudo tee -a /etc/fstab  
> cat /etc/fstab  
> df -h  
> echo "/dev/sdf /mnt/data-store ext3 defaults,noatime 1 2: | sudo tee -a /etc/fstab  
cat /etc/fstab  
df -h  
tee: invalid option -- '/'  
Try 'tee --help' for more information.  
#  
UUID=2bebcb11-b28e-4409-b1dd-8374c85cc602      /          xfs    defaults,noatim  
e 1 1  
UUID=B34C-BAE4        /boot/efi      vfat    defaults,noatime,uid=0,gid=0,umask  
=0077,shortname=winnt,x-systemd.automount 0 2  
Filesystem      Size  Used Avail Use% Mounted on  
devtmpfs        4.0M   0  4.0M   0% /dev  
tmpfs          475M   0  475M   0% /dev/shm  
tmpfs          190M  2.9M 188M   2% /run  
/dev/xvda1     8.0G  1.5G 6.5G  19% /  
tmpfs          475M   0  475M   0% /tmp  
/dev/xvda128    10M  1.3M  8.7M  13% /boot/efi  
tmpfs          95M   0  95M   0% /run/user/1000  
/dev/xvdf      975M  60K  924M   1% /mnt/data-store  
[ec2-user@ip-10-1-11-146 ~]$
```

26: To view the Configuration file of the setting of the last line: “cat /etc/stab”

View the storage again: “fd -h”

```
ec2-user@ip-10-1-11-146:~  
tee: invalid option -- '/'  
Try 'tee --help' for more information.  
#  
UUID=2bebcb11-b28e-4409-b1dd-8374c85cc602      /          xfs    defaults,n  
e 1 1  
UUID=B34C-BAE4          /boot/efi      vfat    defaults,noatime,uid=0,gid=0,  
=0077,shortname=winnt,x-systemd.automount 0 2  
Filesystem      Size  Used Avail Use% Mounted on  
devtmpfs        4.0M   0   4.0M   0% /dev  
tmpfs          475M   0   475M   0% /dev/shm  
tmpfs          190M  2.9M  188M   2% /run  
/dev/xvda1     8.0G  1.5G  6.5G  19% /  
tmpfs          475M   0   475M   0% /tmp  
/dev/xvda128    10M  1.3M  8.7M  13% /boot/efi  
tmpfs          95M   0   95M   0% /run/user/1000  
/dev/xvdf     975M  60K  924M   1% /mnt/data-store  
[ec2-user@ip-10-1-11-146 ~]$ sudo ch -c "echo some text has been written >  
data-store/file.txt"  
sudo: ch: command not found  
[ec2-user@ip-10-1-11-146 ~]$ sudo sh -c "echo some text has been written >  
data-store/file.txt"  
[ec2-user@ip-10-1-11-146 ~]$ cat /mnt/data-store/file.txt  
some text has been written  
[ec2-user@ip-10-1-11-146 ~]$
```

27: On the mount volume, create a file with some text: “sudo sh -c “echo some text has been written > /mnt/data-store/file.txt””

28: Verify that the text has been written on the volume: “cat /mnt/data-store/file.txt”

| Volumes (1/5) Index | | | | | | | | | | | | | | |
|-------------------------------------|-----------------------|-------|-------|------|----------------|------------------------|------------------------|-----------------------|-----------------------|-------------------|-----------------------------|-----------------------------|--|--|
| Name | Volume ID | Type | Size | IOPS | Throughput | Snapshot | Created | Availability Zone | Volume state | Alarm status | Attached resources | | | |
| vol-0c55abdc1ef6cc2f7 | gp3 | 8 GiB | 5000 | 125 | snap-01fe2d... | 2024/01/18 08:29 GMT+8 | us-east-1a | ● In use | No alarms | + | i-05575f5f2550736542c (L... | | | |
| vol-030e54977ca0418fe | gp3 | 8 GiB | 3000 | 125 | snap-01fe26... | 2024/01/18 08:31 GMT+8 | us-east-1a | ● In use | No alarms | + | i-0279fa8aa83a4baa (Bus... | | | |
| My Volume | vol-0c501158170494812 | gp3 | 1 GiB | 3000 | 125 | - | 2024/01/18 08:37 GMT+8 | us-east-1a | ● In use | No alarms | + | i-05575f5f2550736542c (L... | | |

Images

AMIs

AMI Catalog

Elastic Block Store

Volumes

Snapshots

29: In the AWS management console; volume > select My Volume. Then in the Actions menu, choose Create Snapshot

Create snapshot Info

Create a point-in-time snapshot to back up the data on an Amazon EBS volume to Amazon S3.

Details

Volume ID
 vol-0e30d138370494812 (My Volume)

Description
Add a description for your snapshot

255 characters maximum.

Encryption Info
Not encrypted

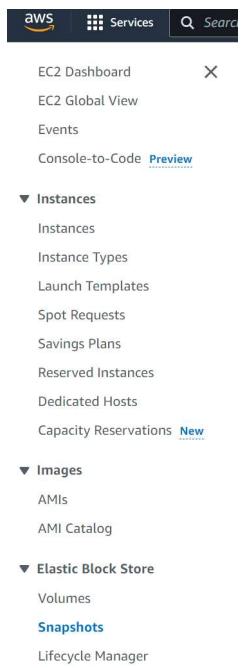
Tags Info
A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

| Key | Value - optional |
|-------------------------------------|--|
| <input type="text" value="Name"/> X | <input type="text" value="My Snapshot"/> X |

Add tag
You can add 49 more tags.

Cancel **Create snapshot**

30: Choose Add tag and configure Key to be Name and Value to be My Snapshot



31: In the lefthand menu, choose Snapshots

```

ec2-user@ip-10-1-11-146:~$ sudo ch -c "echo some text has been written > /mnt/
data-store/file.txt"
sudo: ch: command not found
[ec2-user@ip-10-1-11-146:~]$ sudo sh -c "echo some text has been written > /mnt/
data-store/file.txt"
[ec2-user@ip-10-1-11-146:~]$ cat /mnt/data-store/file.txt
some text has been written
[ec2-user@ip-10-1-11-146:~]$ s
-bash: s: command not found
[ec2-user@ip-10-1-11-146:~]$ sudo rm /mnt/data-store/files.txt
rm: cannot remove '/mnt/data-store/files.txt': No such file or directory
[ec2-user@ip-10-1-11-146:~]$ sudo rm /mnt/data-store/file.txt
[ec2-user@ip-10-1-11-146:~]$ ls /mnt/data-store/
lost+found
[ec2-user@ip-10-1-11-146:~]$ sudo rm /mnt/data-store/file.txt
rm: cannot remove '/mnt/data-store/file.txt': No such file or directory
[ec2-user@ip-10-1-11-146:~]$ ls /mnt/data-store/
lost+found
[ec2-user@ip-10-1-11-146:~]$ 

```

32: Go back to PuTTY and delete the file in your volume. “sudo rm /mnt/data-store/file.txt”

33: Verify that the file has been deleted “ls /mnt/data-store/”

| Snapshots (1/1) Info | | | | | | | | | | |
|--------------------------------------|-------------|------------------------|-------------|-------------|--------------|-----------------|------------------------|------------------|---------------|------------|
| Owned by me | | Search | | | | | | | | |
| <input checked="" type="checkbox"/> | Name | Snapshot ID | Volume size | Description | Storage tier | Snapshot status | Started | Progress | Encryption | KMS key ID |
| <input checked="" type="checkbox"/> | My Snapshot | snap-0e02d461cf65d/e85 | 1 GiB | - | Standard | Completed | 2024/01/18 09:14 GMT-8 | Available (100%) | Not encrypted | - |

[Create i](#)
[Copy sn](#)
[Delete i](#)

[Manage](#)
[Snapshot](#)
[Archiv](#)

34: In the Amazon Management Console Select My Snapshot, then in the Actions menu > Create volume from snapshot

Availability Zone | [Info](#)

us-east-1a ▾

Fast snapshot restore | [Info](#)

Not enabled for selected snapshot

Encryption

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

Encrypt this volume

Tags - optional | [Info](#)

A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

| Key | Value - optional |
|-------------------------------------|--|
| <input type="text" value="Name"/> X | <input type="text" value="Restored Volume"/> X |

[Add tag](#)

You can add 49 more tags.

Snapshot summary

⟳

④ Click refresh to view backup information
The volume type that you select and the tags that you assign determine whether the volume will be backed up by any Data Lifecycle Manager policies.

[Cancel](#) [Create volume](#)

35: Select the Availability Zone your volume is in.

36: Add a tag with the Key “Name” and the value “Restored Volume”, Create

volume.

The screenshot shows the AWS EC2 Volumes page. On the left, there's a navigation sidebar with options like Instances, Images, AMIs, AMI Catalog, and Elastic Block Store. The main area is titled 'Volumes (1/4) info' and contains a table with columns: Name, Volume ID, Type, Size, IOPS, Throughput, Snapshot, Created, Availability Zone, Volume state, Alarm status, Attached resources, and Actions. There are four volumes listed:

| Name | Volume ID | Type | Size | IOPS | Throughput | Snapshot | Created | Availability Zone | Volume state | Alarm status | Attached resources | Actions |
|-----------------|------------------------|------|-------|------|------------|-----------------|------------------------|-------------------|--------------|--------------|------------------------------|-------------------------------------|
| - | vol-0358d81fe96d2f7 | gp3 | 8 GiB | 3000 | 125 | snap-011ce2d... | 2024/01/18 08:29 GMT-8 | us-east-1a | In-use | No alarms | + i-05573f2559736342c (Us... | <input checked="" type="checkbox"/> |
| - | vol-036e94977c04b10e | gp3 | 8 GiB | 3000 | 125 | snap-011ce2d... | 2024/01/18 08:31 GMT-8 | us-east-1a | In-use | No alarms | + i-027f1af68a85a48a (Us... | <input checked="" type="checkbox"/> |
| My Volume | vol-0e50015337c094812 | gp3 | 1 GiB | 3000 | 125 | - | 2024/01/18 08:37 GMT-8 | us-east-1a | In-use | No alarms | + i-05573f2559736342c (Us... | <input checked="" type="checkbox"/> |
| Restored Vol... | vol-0ff1a90f78f1c8c031 | gp3 | 1 GiB | 3000 | 125 | snap-0d02d4b... | 2024/01/18 09:22 GMT-8 | us-east-1a | Available | No alarms | + - | <input type="checkbox"/> |

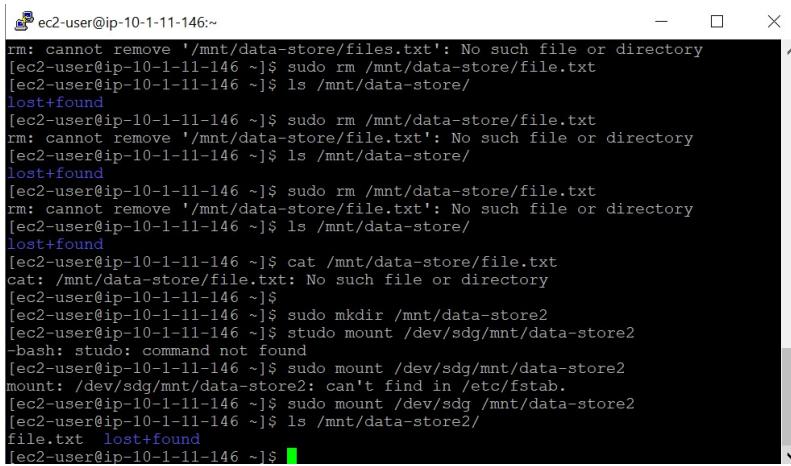
37: In Volumes select Restored Volume then Actions > Attach Volume

The screenshot shows the 'Attach volume' dialog box. It has two tabs: 'Basic details' and 'Advanced details'. The 'Basic details' tab is active, showing:

- Volume ID:** vol-0ff1a90f78f1c8c031 (Restored Volume)
- Availability Zone:** us-east-1a
- Instance:** i-05573f2559736342c (selected from a dropdown menu)
- Device name:** /dev/sdg
- Note:** Newer Linux kernels may rename your devices to /dev/xvdf through /dev/xvdः internally, even when the device name entered here (and shown in the details) is /dev/sdf through /dev/sdp.

At the bottom right are 'Cancel' and 'Attach volume' buttons.

38: Select the Instance field to be Lab instance then click Attach volume.



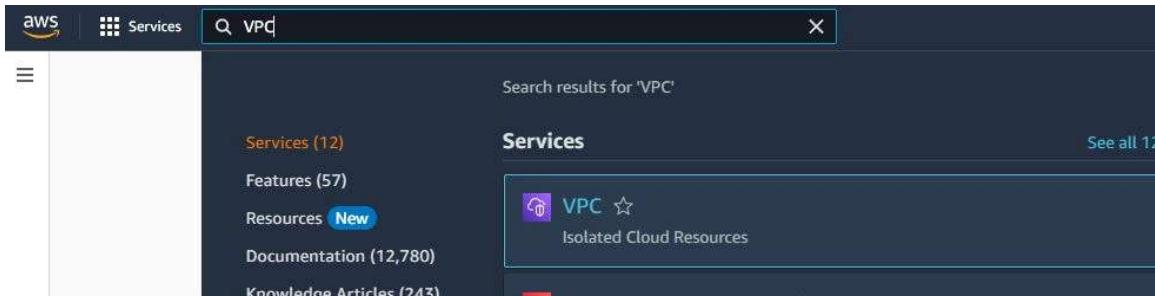
```
ec2-user@ip-10-1-11-146:~$ rm: cannot remove '/mnt/data-store/files.txt': No such file or directory
[ec2-user@ip-10-1-11-146 ~]$ sudo rm /mnt/data-store/file.txt
[ec2-user@ip-10-1-11-146 ~]$ ls /mnt/data-store/
lost+found
[ec2-user@ip-10-1-11-146 ~]$ sudo rm /mnt/data-store/file.txt
rm: cannot remove '/mnt/data-store/file.txt': No such file or directory
[ec2-user@ip-10-1-11-146 ~]$ ls /mnt/data-store/
lost+found
[ec2-user@ip-10-1-11-146 ~]$ sudo rm /mnt/data-store/file.txt
rm: cannot remove '/mnt/data-store/file.txt': No such file or directory
[ec2-user@ip-10-1-11-146 ~]$ ls /mnt/data-store/
lost+found
[ec2-user@ip-10-1-11-146 ~]$ cat /mnt/data-store/file.txt
cat: /mnt/data-store/file.txt: No such file or directory
[ec2-user@ip-10-1-11-146 ~]$ [ec2-user@ip-10-1-11-146 ~]$ sudo mkdir /mnt/data-store2
[ec2-user@ip-10-1-11-146 ~]$ studo mount /dev/sdg/mnt/data-store2
-bash: studo: command not found
[ec2-user@ip-10-1-11-146 ~]$ sudo mount /dev/sdg/mnt/data-store2
mount: /dev/sdg/mnt/data-store2: can't find in /etc/fstab.
[ec2-user@ip-10-1-11-146 ~]$ sudo mount /dev/sdg /mnt/data-store2
[ec2-user@ip-10-1-11-146 ~]$ ls /mnt/data-store2/
file.txt lost+found
[ec2-user@ip-10-1-11-146 ~]$
```

39: in PuTTY create a directory to mount the restored volume, “sudo mkdir /mnt/data-store2”

40: To mount the Volume: “sudo mount /dev/sdg/mnt/data-store2”

41: Verify that the volume has been mounted “ls /mnt/data-store2/”. You should see a file.txt

LAB 5:



1: In Services go to VPC.

A screenshot of the AWS VPC dashboard. The left sidebar shows navigation options like 'Virtual private cloud', 'Security', and 'Network ACLs'. The main area is titled 'Security Groups (5) info' and displays a table of security groups. The table has columns for Name, Security group ID, Security group name, VPC ID, and Description. The data is as follows:

2: Go to Security groups then click Create security group.

Create security group [Info](#)

A security group acts as a virtual firewall for your instance to control inbound and outbound traffic. To create a new security group, complete the fields below.

Basic details

Security group name [Info](#)
DB Security Group
Name cannot be edited after creation.

Description [Info](#)
Permit access from Web Security Group

VPC [Info](#)
vpc-0859ef1101010a638 (Lab VPC)

3: Configure:

Security group name: DB Security Group

Description: Permit access from Web Security Group

VPC: Lab VPC

The screenshot shows the 'Inbound rules' section of the AWS Security Group configuration. It includes fields for Type (MySQL/Aurora), Protocol (TCP), Port range (3306), Source (Custom, sg-0c873ee196c106053), and Description (optional). Below this is the 'Outbound rules' section with similar fields. A note at the bottom states: '⚠️ Rules with source of 0.0.0.0/0 or -/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.' The 'Tags - optional' section shows no tags associated with the resource.

4: Go to inbound rules and Add rule then configure:

Type: MySQL/Aurora

Source: type "sg" and select Web security group

Click Create security group.

The screenshot shows the AWS VPC Security Groups page. A green header bar at the top indicates that a security group was created successfully. Below the header, the page title is "sg-0091541a26a08a094 - DB Security Group". On the left, there's a "Details" section with fields: Security group name (DB Security Group), Security group ID (sg-0091541a26a08a094), Description (Permit access from Web Security Group), Owner (273436007516), Inbound rules count (1 Permission entry), Outbound rules count (1 Permission entry), and VPC ID (vpc-0859ef1101010a638). On the right, there's an "Actions" dropdown menu.

5: You now have successfully created a security group

The screenshot shows the AWS Services search results for "RDS". The search bar at the top has "RDS" typed into it. The results are categorized under "Services (12)". The first result is "RDS" with a star icon, described as the "Managed Relational Database Service". Other visible categories include "Features (37)" and "Resources New". There is also a link to "Documentation (19,690)". On the left sidebar, there are links for "VPC dashboard", "EC2 Global View", "Filter by VPC", and "Select a VPC".

6: In Services search for RDS.

The screenshot shows the AWS RDS Subnet groups page. The left sidebar has links for "Dashboard", "Databases", "Query Editor", "Performance insights", "Snapshots", "Exports in Amazon S3", "Automated backups", "Reserved instances", "Proxies", "Subnet groups", and "Parameter groups". The main content area shows a table titled "Subnet groups (0)". It includes a search bar ("Filter by subnet group") and columns for "Name", "Description", "Status", and "VPC". A message at the bottom states "No db subnet groups" and "You don't have any db subnet groups." A "Create DB subnet group" button is located at the bottom right of the table.

7: Go to Subnet Groups and click Create DB subnet group.

Create DB subnet group

To create a new subnet group, give it a name and a description, and choose an existing VPC. You will then be able to add subnets related to that VPC.

Subnet group details

Name
You won't be able to modify the name after your subnet group has been created.

Must contain from 1 to 255 characters. Alphanumeric characters, spaces, hyphens, underscores, and periods are allowed.

Description

VPC
Choose a VPC identifier that corresponds to the subnets you want to use for your DB subnet group. You won't be able to choose a different VPC identifier after your subnet group has been created.

8: Configure:

Name: DB-Subnet-Group

Description: DB Subnet Group

VPC: Lab VPC

Add subnets

Availability Zones
Choose the Availability Zones that include the subnets you want to add.

Subnets
Choose the subnets that you want to add. The list includes the subnets in the selected Availability Zones.

Subnets selected (2)

| Availability zone | Subnet ID | CIDR block |
|-------------------|--------------------------|-------------|
| us-east-1a | subnet-0585d35efb6f48f5d | 10.0.1.0/24 |
| us-east-1b | subnet-029ec4cef5fe7ee95 | 10.0.3.0/24 |

Cancel **Create**

9: Scroll down to Add subnets and configure:

Availability Zones: **us-east-1a and us-east-1b**

Subnets: **10.0.1.0/24 and 10.0.3.0/24**

Click Create.

Successfully created DB-Subnet-Group. View subnet group

RDS > Subnet groups

Subnet groups (1)

| Name | Description | Status | VPC |
|-----------------|-----------------|----------|-----------------------|
| db-subnet-group | DB Subnet Group | Complete | vpc-0859ef1101010a638 |

Create DB subnet group

10: You have now created DB subnet group.

Amazon RDS

RDS > Databases

Consider creating a Blue/Green Deployment to minimize downtime during upgrades
You may want to consider using Amazon RDS Blue/Green Deployments and minimize your downtime during upgrades. A Blue/Green Deployment provides a staging environment for changes to production.
[User Guide](#) [Aurora User Guide](#)

Databases (0)

| Group resources | Actions | Restore from S3 |
|-----------------|---------|-----------------|
|-----------------|---------|-----------------|

Filter by databases

11: In the navigation menu go to Databases and click Create database.

Create database

Choose a database creation method [Info](#)

Standard create
You set all of the configuration options, including ones for availability, security, backups, and maintenance.

Easy create
Use recommended best-practice configurations. Some configuration options can be changed after the database is created.

Engine options

Engine type [Info](#)

Aurora (MySQL Compatible) 

Aurora (PostgreSQL Compatible) 

MySQL 

MariaDB 

PostgreSQL 

Oracle 

12: In Engine options choose MySQL.

Engine Version
MySQL 8.0.35

Templates
Choose a sample template to meet your use case.

Production
Use defaults for high availability and fast, consistent performance.

Dev/Test
This instance is intended for development use outside of a production environment.

Free tier
Use RDS Free Tier to develop new applications, test existing applications, or gain hands-on experience with Amazon RDS.
[Info](#)

13: Scroll down to Templates and choose Dev/Test.

Availability and durability

Deployment options [Info](#)
The deployment options below are limited to those supported by the engine you selected above.

- Multi-AZ DB Cluster**
Creates a DB cluster with a primary DB instance and two readable standby DB instances, with each DB instance in a different Availability Zone (AZ). Provides high availability, data redundancy and increases capacity to serve read workloads.
- Multi-AZ DB instance**
Creates a primary DB instance and a standby DB instance in a different AZ. Provides high availability and data redundancy, but the standby DB instance doesn't support connections for read workloads.
- Single DB instance**
Creates a single DB instance with no standby DB instances.

14: In Availability and durability choose Multi-AZ DB instance.

Settings

DB instance identifier [Info](#)
Type a name for your DB instance. The name must be unique across all DB instances owned by your AWS account in the current AWS Region.

The DB instance identifier is case-insensitive, but is stored as all lowercase (as in "mydbinstance"). Constraints: 1 to 60 alphanumeric characters or hyphens. First character must be a letter. Can't contain two consecutive hyphens. Can't end with a hyphen.

▼ Credentials Settings

Master username [Info](#)
Type a login ID for the master user of your DB instance.

1 to 16 alphanumeric characters. The first character must be a letter.

Manage master credentials in AWS Secrets Manager
Manage master user credentials in Secrets Manager. RDS can generate a password for you and manage it throughout its lifecycle.

ⓘ If you manage the master user credentials in Secrets Manager, some RDS features aren't supported.
[Learn more](#)

Auto generate a password
Amazon RDS can generate a password for you, or you can specify your own password.

Master password [Info](#)

Constraints: At least 8 printable ASCII characters. Can't contain any of the following: / (slash), '(single quote)', "(double quote)" and @ (at sign).

Confirm master password [Info](#)

15: In settings configure:

DB instance Identifier: lab-db

Master username: main

Master password: lab-password

The screenshot shows the 'Instance configuration' section of the AWS RDS console. It includes a note that the DB instance configuration options are limited to those supported by the selected engine. Under 'DB instance class', the 'Info' link is visible. A 'Hide filters' button is present. There are three filter options: 'Show instance classes that support Amazon RDS Optimized Writes' (unchecked), 'Include previous generation classes' (checked), and 'Burstable classes (includes t classes)' (checked). A dropdown menu is open, showing 'db.t3.micro' as the selected option, along with its specifications: 2 vCPUs, 1 GiB RAM, and Network: 2,085 Mbps.

16: In Instance configuration select:

Burstable classes

db-t3-micro

Storage

Storage type [Info](#)

General Purpose SSD (gp3)
Performance scales independently from storage

Allocated storage [Info](#)

20 GiB

Minimum: 20 GiB. Maximum: 6,144 GiB

i After you modify the storage for a DB instance, the status of the DB instance will be in storage-optimization. Your instance will remain available as the storage-optimization operation completes.

[Learn more](#)

► Advanced settings
Baseline IOPS of 3,000 IOPS and storage throughput of 125 MiBps are included for allocated storage less than 400 GiB.

► Storage autoscaling

17: In Storage configure:

Storage type: General Purpose SSD

Allocated storage: 20

Connectivity [Info](#) C

Compute resource
Choose whether to set up a connection to a compute resource for this database. Setting up a connection will automatically change connectivity settings so that the compute resource can connect to this database.

Don't connect to an EC2 compute resource
Don't set up a connection to a compute resource for this database. You can manually set up a connection to a compute resource later.

Connect to an EC2 compute resource
Set up a connection to an EC2 compute resource for this database.

Virtual private cloud (VPC) [Info](#)
Choose the VPC. The VPC defines the virtual networking environment for this DB instance.

Lab VPC (vpc-0859ef1101010a638)
4 Subnets, 2 Availability Zones ▼

Only VPCs with a corresponding DB subnet group are listed.

18: Under Connectivity configure the VPC to Lab VPC

Existing VPC security groups

Choose one or more options ▼

DB Security Group X

19: Scroll down to Existing VPC security groups and choose DB Security Group and deselect the default

Monitoring

Enable Enhanced Monitoring
Enabling Enhanced Monitoring metrics are useful when you want to see how different processes or threads use the CPU.

▼ Additional configuration
Database options, encryption turned off, backup turned off, backtrack turned off, maintenance, CloudWatch Logs, delete protection turned off.

Database options

Initial database name [Info](#)

If you do not specify a database name, Amazon RDS does not create a database.

DB parameter group [Info](#)

Option group [Info](#)

Backup

Enable automated backups
Creates a point-in-time snapshot of your database.

Encryption

Enable encryption
Choose to encrypt the given instance. Master key IDs and aliases appear in the list after they have been created using the AWS Key Management Service console. [Info](#)

20: Expand Additional configuration and configure:

Initial database name: lab

Uncheck Enable automated backups

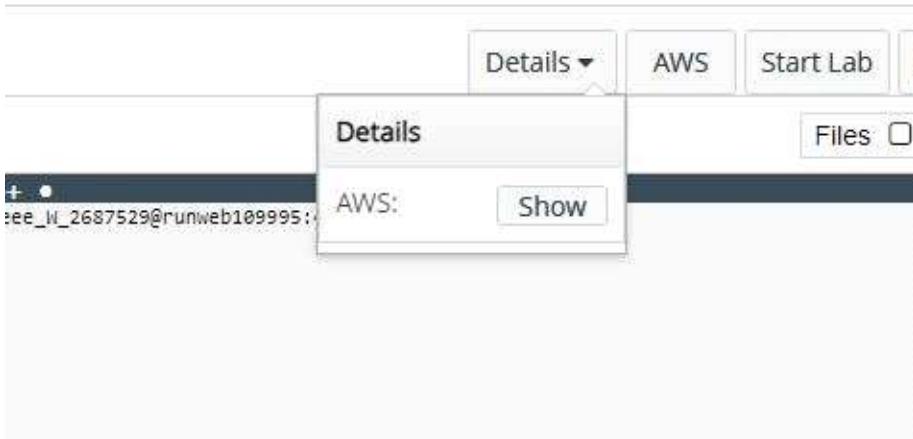
Uncheck Enable encryption

Uncheck Enable Enhanced Monitoring

Click Create database.



21: Wait approximately 4 minutes for the database status to be available, then click lab-db.



22: Go back to AWS academy and click the Details menu > AWS: Show.

Credentials

Cloud Access

AWS CLI: Show

Cloud Labs

Remaining session time: 00:34:10(35 minutes)
Session started at: 2024-01-19T00:01:22-0800
Session to end at: 2024-01-19T01:31:22-0800

Accumulated lab time: 00:55:00 (55 minutes)

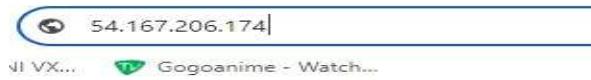
(1) ips -- public:54.167.206.174, private:10.0.0.169 (2) ips -- public:35.153.198.59, private:10.0.0.180

SSH key Show Download PEM Download PPK

AWS SSO Download URL

| | |
|-------------|--|
| SecretKey | Jq88XaqyAa2Gth+Y=ZR8x9Wu/adEDWXjQBOaiKHp |
| WebServer | 54.167.206.174 |
| BastionHost | 35.153.198.59 |
| Region | us-east-1 |
| AccessKey | AKIAT7KQOLROAGFXT5MA |

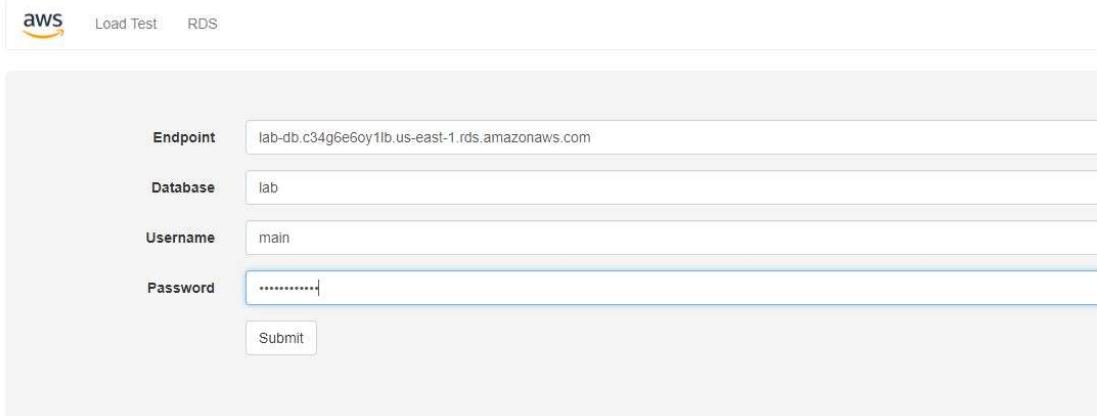
23: Copy the web server address.



24: Open a new browser and paste the IP address it, press enter.

| Connectivity & security | Monitoring | Logs & events | Configuration | Zero-ETL integrations | Maintenance & backups |
|------------------------------------|---|-------------------|--|------------------------------------|---|
| Connectivity & security | | | | | |
| Endpoint & port | | Networking | | Security | |
| Endpoint | lab-db.c34g6e6oy1lb.us-east-1.rds.amazonaws.com | Availability Zone | us-east-1a | VPC security groups | |
| Port | 3306 | VPC | Lab VPC (vpc-0859ef1101010a638) | DB Security Group (sg-009152) | Active |
| | | Subnet group | db-subnet-group | Publicly accessible | No |
| | | Subnets | subnet-0585d35efb6f48f5d subnet-029ec4cef5fe7ee95 | Certificate authority | Info rds-ca-2019 |
| | | Network type | IPv4 | Certificate authority date | August 22, 2024, 10:08 (UTC-4) |
| | | | | DB instance certificate expiration | August 22, 2024, 10:08 (UTC-4) |

22: Go back to AWS management console and scroll down to Connectivity and security and copy the Endpoint address.



The image shows a screenshot of an AWS RDS configuration interface. At the top left is the AWS logo. To its right are three tabs: "Load Test" and "RDS". Below the tabs is a large input field containing the text "lab-db.c34g6e6oy1lb.us-east-1.rds.amazonaws.com". Underneath this field are four smaller input fields: "Database" (containing "lab"), "Username" (containing "main"), and "Password" (containing "*****"). Below these password input fields is a "Submit" button.

27: Paste the endpoint address into Endpoint

Database: lab

Username: main

Password: lab-user

Click Submit

aws Load Test RDS

```
Executing Command: mysql -u main -plib-password -h lab-db.c34g6e6oy1lb.us-east-1.rds.amazonaws.com
lab < sql/addressbook.sql

Writing config out to rds.conf.php

Redirecting to rds.php in 10 seconds (or click here)
```

28: A message will say that its running a command, wait the 10 seconds.

aws Load Test RDS

Address Book

| Last name | First name | Phone | Email | Admin | Add Contact |
|-----------|------------|--------------|----------------------------|-------------|-------------|
| Doe | Jane | 010-110-1101 | janed@someotheraddress.org | Edit Remove | |
| Johnson | Roberto | 123-456-7890 | robertoj@someaddress.com | Edit Remove | |

29: It will display an Address Book. You can add, remove and edit contacts.

Lab 6:

1: In Services, search for EC2.

2: Go to Instances and select Web Server 1.

3: In the Actions menu > Image and tempares > Create image.

Create image Info

An image (also referred to as an AMI) defines the programs and settings that are applied when you launch an EC2 instance. You can create an image from the configuration of an existing instance.

| | |
|------------------------------|---|
| Instance ID | i-07cb96e6a4aba07a (Web Server 1) |
| Image name | WebServerAMI Maximum 127 characters. Can't be modified after creation. |
| Image description - optional | Lab AMI for Web Server Maximum 255 characters |

4: Configure:

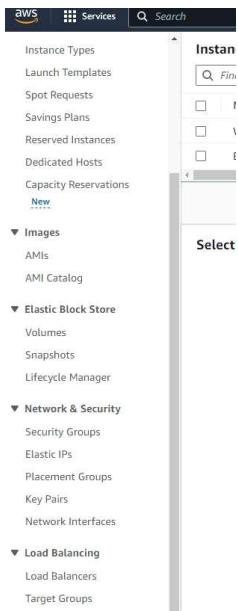
Image name: WebServerAMI

Image description: Lab AMI for Web Server

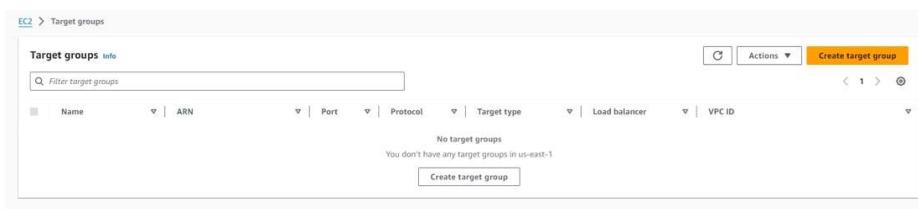
Click Create image

| Currently creating AMI named WebServerAMI from instance i-07cb96e6a4aba07a. Click here to view status & metadata before editing the image or carrying out other actions related to this AMI. | | | | | | | | | | |
|--|---------------------|----------------|---------------|-------------------|---------------|-------------------|-----------------|--------------|----------|------------|
| Instances (2) <small>Info</small> | | | | | | | | | | |
| <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 IP | IPv6 IPs | Monitoring |
| Web Server 1 | i-07cb96e6a4aba07a | Running | t2.micro | 2/2 checks passed | View alarms + | us-east-1a | - | 32.23.117.55 | - | disabled |
| Bastion Host | i-08929f90234308aff | Running | t2.micro | 2/2 checks passed | View alarms + | us-east-1a | - | 32.87.112.7 | - | disabled |

5: You now created an AMI for your EC2 instance.



6: In the navigation menu go to Target Groups



7: Click Create target group.

Basic configuration
Settings in this section can't be changed after the target group is created.

Choose a target type

Instances

- Supports load balancing to instances within a specific VPC.
- Facilitates the use of [Amazon EC2 Auto Scaling](#) to manage and scale your EC2 capacity.

IP addresses

- Supports load balancing to VPC and on-premises resources.
- Facilitates routing to multiple IP addresses and network interfaces on the same instance.
- Offers flexibility with microservice based architectures, simplifying inter-application communication.
- Supports IPv6 targets, enabling end-to-end IPv6 communication, and IPv4-to-IPv6 NAT.

Lambda function

- Facilitates routing to a single Lambda function.
- Accessible to Application Load Balancers only.

Application Load Balancer

- Offers the flexibility for a Network Load Balancer to accept and route TCP requests within a specific VPC.
- Facilitates using static IP addresses and PrivateLink with an Application Load Balancer.

Target group name

A maximum of 52 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen.

8: In basic configuration configure:

Target type: Instances

Target group name: LabGroup

VPC

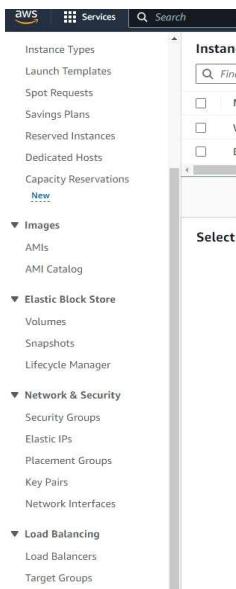
Select the VPC with the instances that you want to include in the target group. Only VPCs that support the IP address type selected above are available in this list.

Lab VPC

vpn-060f424831da1cd57
IPv4: 10.0.0.0/16

9: Scroll down to VPC and select Lab VPC.

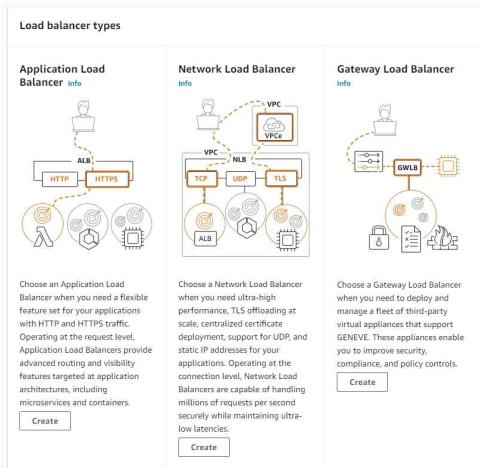
Scroll to the bottom and click Create target group.



10: Use the navigation menu to go to Load Balancers.

A screenshot of the AWS Load Balancers list page. The top navigation bar shows 'EC2 > Load balancers'. The main area displays a table with one item: 'LabELB'. The table columns are: Name, DNS name, State, VPC ID, Availability Zones, Type, and Date created. The 'LabELB' row shows: LabELB, LabELB-1661251702.us-east-1, Provisioning..., vpc-060f424831da1cd..., 2 Availability Zones, application, January 21, 2024, 23:57 (UTC-08:00). The table has a header row with sorting icons and a footer row with pagination controls (1 of 1).

11: Select Create load balancer.



12: Create an Application load balancer

The screenshot shows the 'Create Application Load Balancer' wizard. It has two main sections:

- How Application Load Balancers work**: A summary of how ALBs distribute traffic across targets.
- Basic configuration**: Fields for naming the load balancer.

In the 'Basic configuration' section, the 'Load balancer name' field contains 'LabELB'. A note below the field states: "Name must be unique within your AWS account and can't be changed after the load balancer is created." A tooltip indicates: "A maximum of 32 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen."

13: Name it LabELB

Network mapping [Info](#)

The load balancer routes traffic to targets in the selected subnets, and in accordance with your IP address settings.

VPC: Info

Select the virtual private cloud (VPC) for your targets or you can create a new VPC [\[?\]](#). Only VPCs with an internet gateway are enabled for selection. The selected VPC can't be changed after the load balancer is created. To confirm the VPC for your targets, view your [target groups](#) [\[?\]](#)

Lab VPC

vpc-060f424831da1cd57
IPv4: 10.0.0.0/16

Mappings [Info](#)

Select at least two Availability Zones and one subnet per zone. The load balancer routes traffic to targets in these Availability Zones only. Availability Zones that are not supported by the load balancer or the VPC are not available for selection.

us-east-1a (use1-az4)

Subnet

subnet-074db1e85bd602dc4 Public Subnet 1 ▾

IPv4 address Assigned by AWS

us-east-1b (use1-az6)

Subnet

subnet-06e9df92adb1f4b82 Public Subnet 2 ▾

IPv4 address Assigned by AWS

14: In Network mapping configure:

VPC: Lab VPC

Choose Public Subnet 1 and Public Subnet 2.

Security groups [Info](#)

A security group is a set of firewall rules that control the traffic to your load balancer. Select an existing security group, or you can create a new security group [\[?\]](#).

Security groups

Select up to 5 security groups ▾ [C](#)

Web Security Group X

sg-08d5ce261ce478409 VPC:vpc-060f424831da1cd57

15: In Security groups select Web Security Group

Listeners and routing [Info](#)

A listener is a process that checks for connection requests using the port and protocol you configure. The rules that you define for a listener determine how the load balancer routes requests to its registered targets.

▼ Listener HTTP:80 [Remove](#)

| | | | |
|---|------|----------------|---|
| Protocol | Port | Default action | Info |
| HTTP | : 80 | Forward to | LabGroup Target type: Instance, IPv4 |
| HTTP ▾ Edit | | | |
| Create target group ? | | | |

Listener tags - optional
Consider adding tags to your listener. Tags enable you to categorize your AWS resources so you can more easily manage them.

[Add listener tag](#)
You can add up to 50 more tags.

[Add listener](#)

16: In Listeners and routing open the dropdown Listener HTTP:80 and set the default action to Forward to LabGroup

17: Scroll down to click Create load balancer

Successfully created load balancer: LabELB
It might take a few minutes for your load balancer to be fully set up and ready to route traffic. Targets will also take a few minutes to complete the registration process and pass initial health checks.

EC2 > Load balancers > [LabELB](#) > Create Application Load Balancer

Create Application Load Balancer

Suggested next steps

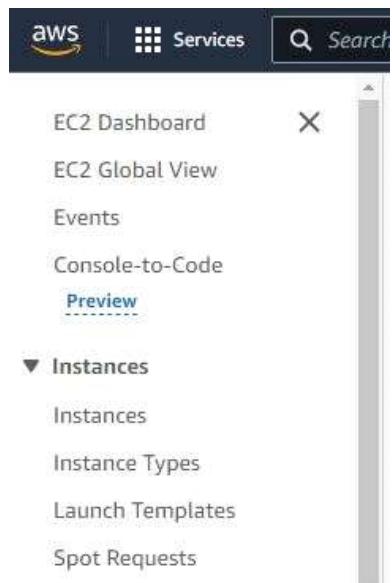
- Review, customize, or configure attributes for your load balancer and listeners using the [Description](#) and [Listeners](#) tabs within [LabELB](#).
- Discover other services that you can integrate with your load balancer. Visit the [Integrated services](#) tab within [LabELB](#).

[View load balancer](#)

18: Click View load balancer

| Load balancers (1) | | | | | | |
|---|---|---|------------------------|----------------------|-------------|-------------------------------------|
| Elastic Load Balancing scales your load balancer capacity automatically in response to changes in incoming traffic. | | | | | | |
| <input type="text"/> Filter load balancers | | 1 match | | | | |
| <input type="checkbox"/> LabELB | | <input type="checkbox"/> LabELB - LabELB-1661251702.us-e... <small>Provisioning...</small> vpc-060f424831da1cd... <small>2 Availability Zones</small> application January 21, 2024, 23:57 (UTC-08:00) | | | | |
| Name | DNS name | State | VPC ID | Availability Zones | Type | Date created |
| LabELB | LabELB-1661251702.us-east-1.elasticloadbalanc... <small>vpc-060f424831da1cd...</small> | Provisioning... | vpc-060f424831da1cd... | 2 Availability Zones | application | January 21, 2024, 23:57 (UTC-08:00) |

19: Load balancer should State Provisioning, wait for it to be ready.



20: Go to Launch Templates.

Compute

EC2 launch templates

Streamline, simplify and standardize instance launches

Use launch templates to automate instance launches, simplify permission policies, and enforce best practices across your organization. Save launch parameters in a template that can be used for on-demand launches and with managed services, including EC2 Auto Scaling and EC2 Fleet. Easily update your launch parameters by creating a new launch template version.

New launch template

Create launch template

Benefits and features

| | | |
|---|--|--|
| Streamline provisioning Minimize steps to provision instances. With EC2 Auto Scaling, updates to a launch template can be automatically passed to an Auto Scaling group. Learn more | Simplify permissions Create shorter, easier to manage IAM policies. Learn more | Documentation Documentation API reference |
| Governance Ensure best practices are used across your organization. Learn more | | |

21: Click Create launch template.

Create launch template

Creating a launch template allows you to create a saved instance configuration that can be reused, shared and launched at a later time. Templates can have multiple versions.

Launch template name and description

Launch template name - *required*
LabConfig
Must be unique to this account. Max 128 chars. No spaces or special characters like '&', '*', '@'.

Template version description
A prod webserver for MyApp
Max 255 chars

Auto Scaling guidance [Info](#)
Select this if you intend to use this template with EC2 Auto Scaling
 Provide guidance to help me set up a template that I can use with EC2 Auto Scaling

► [Template tags](#)
► [Source template](#)

22: Configure:

Launch template name: LabConfig

Select Auto Scaling

▼ Application and OS Images (Amazon Machine Image) - required [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

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

Recents | **My AMIs** | Quick Start

Owned by me Shared with me

 [Browse more AMIs](#)
Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

| | | | |
|---|---------------------|-------------------|-----------------------|
| WebServerAMI ami-0197e87b5946be849 2024-01-22T07:39:23.000Z | Virtualization: hvm | ENI enabled: true | Root device type: ebs |
|---|---------------------|-------------------|-----------------------|

Description
Lab AMI for Web Server

Architecture AMI ID
x86_64 ami-0197e87b5946be849

23: In Amazon Machine Image choose Web Server AMI

The screenshot shows the 'Instance type' selection screen. At the top left is a dropdown menu labeled '▼ Instance type'. To its right are links for 'Info' and 'Get advice', and an 'Advanced' button. Below the dropdown is a section titled 'Instance type' containing a single item: 't2.micro'. To the right of 't2.micro' is the text 'Free tier eligible'. Underneath 't2.micro' is a detailed description of the instance: 'Family: t2 1 vCPU 1 GiB Memory Current generation: true' and 'On-Demand Windows base pricing: 0.0162 USD per Hour'. Below this is a link 'Compare instance types'. On the far right of the dropdown menu is a radio button labeled 'All generations' and a link 'Compare instance types'. A note at the bottom states 'Additional costs apply for AMIs with pre-installed software'.

24: In Instance type select t2.micro.

The screenshot shows the configuration interface for a Lambda function. The 'Key pair (login)' section is expanded, showing a dropdown menu with 'vokey' selected and a link to 'Create new key pair'. The 'Network settings' section is also expanded, showing a dropdown menu set to 'Don't include in launch template' with a link to 'Create new subnet'. Under 'Firewall (security groups)', it says 'Select existing security group' is selected. The 'Security groups' dropdown contains 'Web Security Group sg-08d5ce261ce478409 X' with a VPC ID listed below it. A link to 'Compare security group rules' is also present.

▼ Key pair (login) [Info](#)

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name

vokey

[Create new key pair](#)

▼ Network settings [Info](#)

Subnet [Info](#)

Don't include in launch template

[Create new subnet](#)

When you specify a subnet, a network interface is automatically added to your template.

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.

Select existing security group

Create security group

Security groups [Info](#)

Select security groups

Web Security Group sg-08d5ce261ce478409 X

VPC: vpc-060f424831da1cd57

[Compare security group rules](#)

► Advanced network configuration

25: In Key pair select vokey.

26: In Network settings configure:

Firewall: Select existing security group

Security groups: Web Security Group

▼ Advanced details [Info](#)

IAM instance profile [Info](#)

Don't include in launch template ▾ 

Hostname type [Info](#)

Don't include in launch template ▾

DNS Hostname [Info](#)

Enable resource-based IPv4 (A record) DNS requests
 Enable resource-based IPv6 (AAAA record) DNS requests

Instance auto-recovery [Info](#)

Don't include in launch template ▾

Shutdown behavior [Info](#)

Don't include in launch template ▾
Not applicable for EC2 Auto Scaling

Stop - Hibernate behavior [Info](#)

Don't include in launch template ▾
Not applicable for Amazon EC2 Auto Scaling.

Termination protection [Info](#)

Don't include in launch template ▾

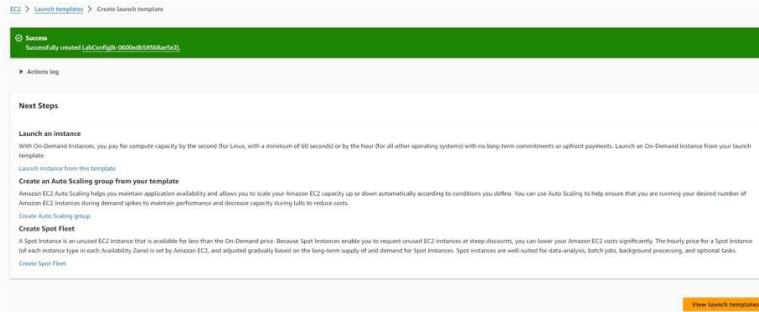
Stop protection [Info](#)

Don't include in launch template ▾

Detailed CloudWatch monitoring [Info](#)

Enable ▾
Additional charges apply

27: In advanced details Enable Detailed CloudWatch monitoring.



28: You now have successfully created a launch template, click view launch templates.

| Launch Templates (1/1) Info | | | | | | |
|--|----------------------|-----------------|----------------|--------------------------|---------------------|---|
| Search Actions ▾ Create launch template | | | | | | |
| Launch Template ID | Launch Template Name | Default Version | Latest Version | Create Time | Created By | |
| Lt-0600edb5856bae5e2 | LabConfig | 1 | 1 | 2024-01-22T08:02:34.000Z | amazwssts:917780541 | Actions ▾ Launch instance from template Modify template (Create new version) Delete template Delete template version Set default version Manage tags Create Spot Fleet Create Auto Scaling group View details |

29: Select your Launch Template, then in the Actions menu > Create Auto Scaling group.

Choose launch template Info

Specify a launch template that contains settings common to all EC2 instances that are launched by this Auto Scaling group.

| Name |
|--|
| Auto Scaling group name Enter a name to identify the group. <input type="text" value="Lab Auto Scaling Group"/> Must be unique to this account in the current Region and no more than 255 characters. |

Launch template Info

For accounts created after May 31, 2023, the EC2 console only supports creating Auto Scaling groups with launch templates. Creating Auto Scaling groups with launch configurations is not recommended but still available via the CLI and API until December 31, 2023.

Launch template
Choose a launch template that contains the instance-level settings, such as the Amazon Machine Image (AMI), instance type, key pair, and security groups.

▼ ⟳

Create a launch template ↗

30: Configure:

Name: Lab Auto Scaling Group

Launch template: LabConfig

Network Info

For most applications, you can use multiple Availability Zones and let EC2 Auto Scaling balance your instances across the zones. The default VPC and default subnets are suitable for getting started quickly.

VPC
Choose the VPC that defines the virtual network for your Auto Scaling group.

vpc-060f424831da1cd57 (Lab VPC) ▾

Create a VPC [Create a VPC](#)

Availability Zones and subnets
Define which Availability Zones and subnets your Auto Scaling group can use in the chosen VPC.

Select Availability Zones and subnets ▾

us-east-1b | subnet-0f4844f6df414cafc (Private Subnet 2)
10.0.3.0/24

us-east-1a | subnet-08521e988f52c067f (Private Subnet 1)
10.0.1.0/24

Create a subnet [Create a subnet](#)

31: In Network configure:

VPC: Lab VPC

Availability Zones and subnets: Private Subnet 2 **and** Private Subnet 1

Click Next.

Load balancing Info

Use the options below to attach your Auto Scaling group to an existing load balancer, or to a new load balancer that you define.

No load balancer
Traffic to your Auto Scaling group will not be fronted by a load balancer.

Attach to an existing load balancer
Choose from your existing load balancers.

Attach to a new load balancer
Quickly create a basic load balancer to attach to your Auto Scaling group.

Attach to an existing load balancer

Select the load balancers that you want to attach to your Auto Scaling group.

Choose from your load balancer target groups
This option allows you to attach Application, Network, or Gateway Load Balancers.

Choose from Classic Load Balancers

Existing load balancer target groups
Only instance target groups that belong to the same VPC as your Auto Scaling group are available for selection.

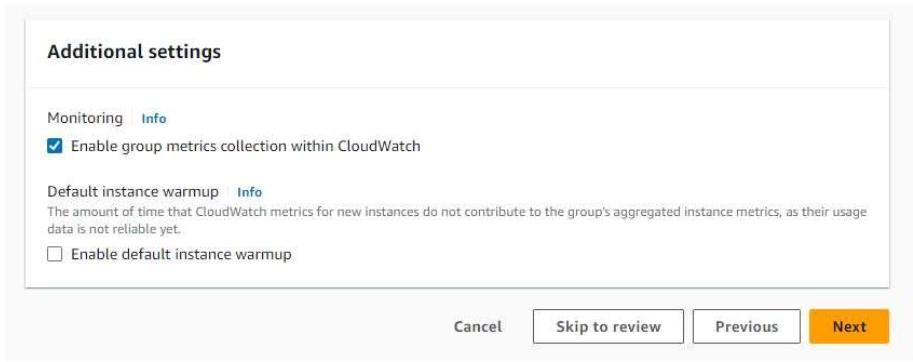
Select target groups ▾ LabGroup | HTTP X

LabGroup | HTTP
Application Load Balancer: LabELB

32: In load balancing, configure:

Attach to an existing load balancer

Existing load balancer target groups: LabGroup



33: In Additional settings Enable Monitoring.

Click Next.

Configure group size and scaling - optional Info

Define your group's desired capacity and scaling limits. You can optionally add automatic scaling to adjust the size of your group.

Group size Info
Set the initial size of the Auto Scaling group. After creating the group, you can change its size to meet demand, either manually or by using automatic scaling.

Desired capacity type
Choose the unit of measurement for the desired capacity value. vCPUs and Memory(GiB) are only supported for mixed instances groups configured with a set of instance attributes.

Units (number of instances) ▾

Desired capacity
Specify your group size.

Scaling Info
You can resize your Auto Scaling group manually or automatically to meet changes in demand.

Scaling limits
Set limits on how much your desired capacity can be increased or decreased.

| | |
|--|---|
| Min desired capacity | Max desired capacity |
| <input type="text" value="2"/> | <input type="text" value="6"/> |
| Equal or less than desired capacity | Equal or greater than desired capacity |

34: In Configure group size and scaling configure:

Desired capacity: 2

Minimum desired capacity: 2

Max desired capacity: 6

Automatic scaling - optional

Choose whether to use a target tracking policy [Info](#)
You can set up other metric-based scaling policies and scheduled scaling after creating your Auto Scaling group.

No scaling policies
Your Auto Scaling group will remain at its initial size and will not dynamically resize to meet demand.

Target tracking scaling policy
Choose a CloudWatch metric and target value and let the scaling policy adjust the desired capacity in proportion to the metric's value.

Scaling policy name

Metric type [Info](#)
Monitored metric that determines if resource utilization is too low or high. If using EC2 metrics, consider enabling detailed monitoring for better scaling performance.

Average CPU utilization

Target value

Instance warmup [Info](#)
 seconds

Disable scale in to create only a scale-out policy

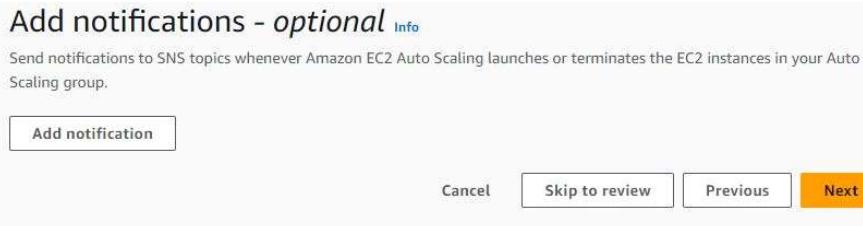
35: In Automatic scaling configure:

Scaling policy name: LabScalingPolicy

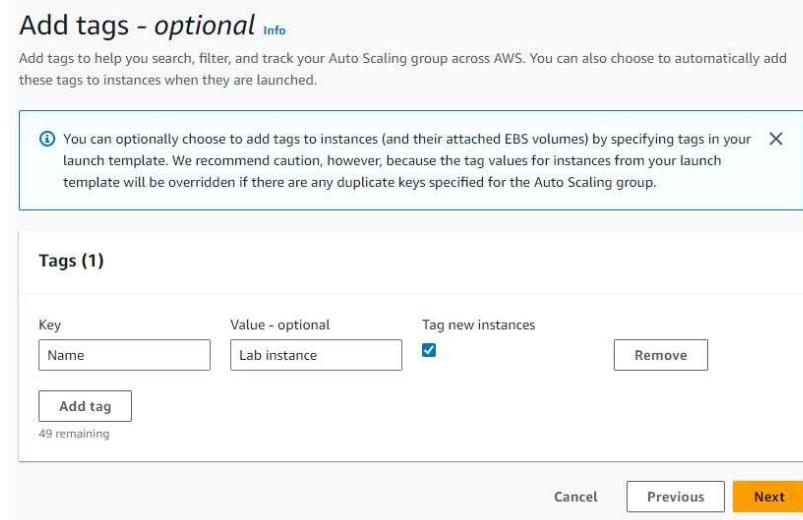
Metric type: Average CPU utilization

Target value: 60

Click Next.



36: Click Next.



37: Click Add tag and configure:

Key: Name

Value: Lab instance

Click Next.

Step 6: Add tags

| Tags (1) | | Edit |
|----------|--------------|-------------------|
| Key | Value | Tag new instances |
| Name | Lab instance | Yes |

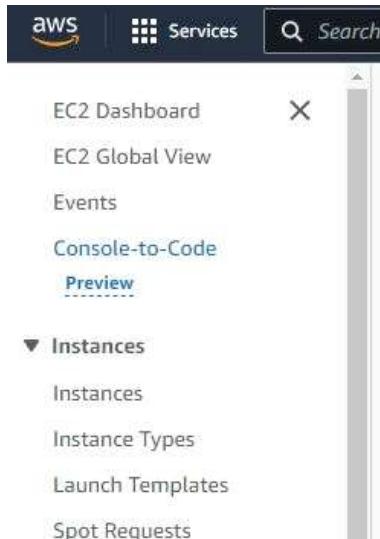
Cancel Previous **Create Auto Scaling group**

38: Click Create Auto Scaling group.

The screenshot shows the AWS Auto Scaling Groups page. At the top, a green banner indicates: "Lab Auto Scaling Group, 1 Scaling policy created successfully. Group metrics collection is enabled." Below the banner, the page title is "Auto Scaling groups (1) [Info]". There is a search bar labeled "Search your Auto Scaling groups". A navigation bar includes tabs for "Launch configurations", "Launch templates", and "Actions", along with a prominent orange "Create Auto Scaling group" button. The main table lists one item:

| Name | Launch template/configuration | Instances | Status | Desired capacity | Min | Max | Availability Zones |
|------------------------|-------------------------------|-----------|----------------------|------------------|-----|-----|------------------------|
| Lab Auto Scaling Group | LabConfig Version Default | 0 | Updating capacity... | 2 | 2 | 6 | us-east-1a, us-east-1b |

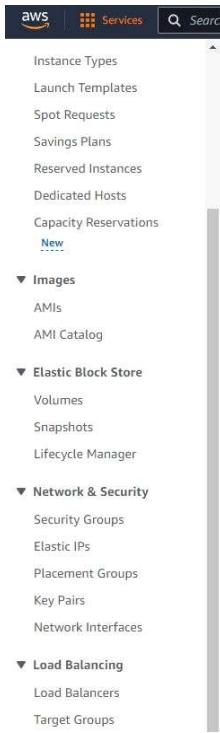
39: You have now created an Auto Scaling Group.



40: Go to Instances.

| Instances (4) Info | | | | | | | | | | | | |
|---|--------------|---------------------|----------------------|---------------|--------------------------------|-------------------------------|-------------------|-----------------|-----------------|------------|-------------------------|----------------------------------|
| <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 | Actions | Launch instances |
| <input type="checkbox"/> | Web Server 1 | i-07cbc96e6a4aba07a | Running | t2.micro | 2/2 checks passed | View alarms + | us-east-1a | - | 52.23.157.55 | - | Actions | Launch instances |
| <input type="checkbox"/> | Lab instance | i-0a274cade8fc6111b | Running | t2.micro | Initializing | View alarms + | us-east-1a | - | - | - | Actions | Launch instances |
| <input type="checkbox"/> | Bastion Host | i-08929390234368adf | Running | t2.micro | 2/2 checks passed | View alarms + | us-east-1a | - | 52.87.172.7 | - | Actions | Launch instances |
| <input type="checkbox"/> | Lab instance | i-050bb67c924fe4781 | Running | t2.micro | Initializing | View alarms + | us-east-1b | - | - | - | Actions | Launch instances |

41: You will see 2 Lab instances, these are the minimum lab instances created by Auto Scaling.



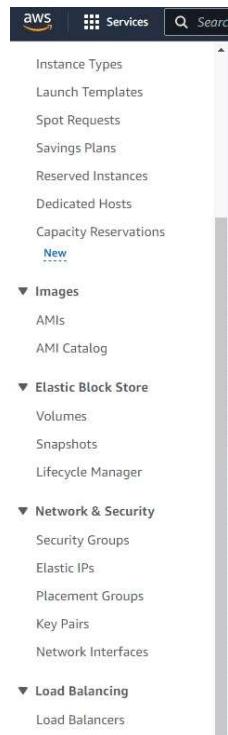
42: Use the navigation menu to go to Target Groups.

| Target groups (1/1) Info | | | | | | | | |
|---|----------|-------------------------------|------|----------|-------------|---------------|-----------------------|-------------------------|
| <input type="text"/> Filter target groups | | | | | | | | |
| <input checked="" type="checkbox"/> | Name | ARN | Port | Protocol | Target type | Load balancer | VPC ID | Actions |
| <input checked="" type="checkbox"/> | LabGroup | arn:aws:elasticloadbalanci... | 80 | HTTP | Instance | LabELB | vpc-060f424831da1cd57 | Actions |

43: Select LabGroup

| Target group: LabGroup | | | | | | | | |
|--|--------------|------------|---------------|----------------------|-----------------------|--------------------------|--|---|
| Details | Targets | Monitoring | Health checks | Attributes | Tags | | | X |
| Registered targets (2) Info | | | | | | | | |
| Target groups route requests to individual registered targets using the protocol and port number specified. Health checks are performed on all registered targets according to the target group's health check settings. Anomaly detection is automatically applied to HTTP/HTTPS target groups with at least 3 healthy targets. | | | | | | | | |
| <input type="checkbox"/> Filter targets | | | | | | | | |
| <input type="checkbox"/> Instance ID | Name | Port | Zone | Health status | Health status details | Anomaly detection result | | |
| <input type="checkbox"/> i-050bb67c924fe4781 | Lab instance | 80 | us-east-1b | Healthy | - | Normal | | |
| <input type="checkbox"/> i-0a274cadef8fc6111b | Lab instance | 80 | us-east-1a | Healthy | - | Normal | | |

44: Select the Targets tab and wait for the Status to say Healthy



45: Go to Load balancers.

| Name | DNS name | State | VPC ID | Availability Zones | Type | Date created |
|--------|---------------------------|--------|------------------------|----------------------|-------------|-------------------------------------|
| LabELB | LabELB-1661251702.us-e... | Active | vpc-060f424831da1cd... | 2 Availability Zones | application | January 21, 2024, 23:57 (UTC-08:00) |

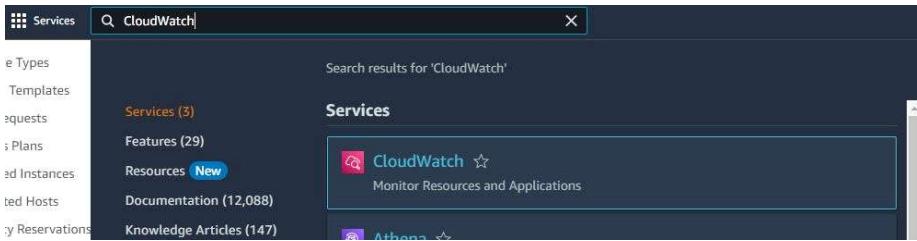
46: Select LabELB

| Details | |
|--|--|
| Load balancer type | Status |
| Application | Active |
| Scheme | VPC |
| Internet-facing | vpc-060f424831da1cd5? [2] |
| Hosted zone | IP address type |
| Z355XDOTRQ7X7K | IPv4 |
| Availability Zones | Date created |
| subnet-06e9df92ad51f4b8[2] us-east-1b (use1-az6) | January 21, 2024, 23:57 (UTC-08:00) |
| subnet-074db1e85bd602d6[4] us-east-1a (use1-az4) | |
| Load balancer ARN | DNS name info |
| arn:aws:elasticloadbalancing:us-east-1:91778054110:loadbalancer/app/LabELB/8823ea9fe6656ee20 | LabELB-1661251702.us-east-1.elb.amazonaws.com (A Record) |

47: In the Details tab, copy the DNS name (do not include the “(A Record)”)



48: Paste this into a new web browser and press Enter.



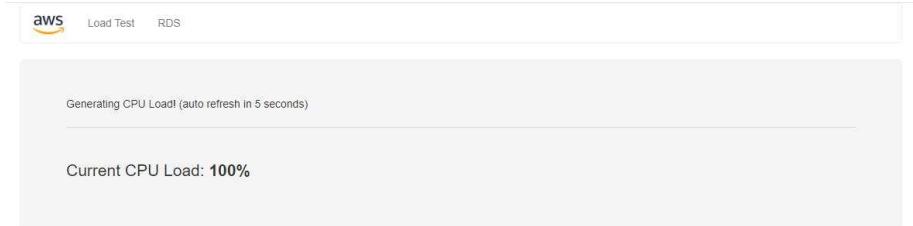
49: To test out your Auto Scaling go back to AWS Management Console and in Services find CloudWatch.



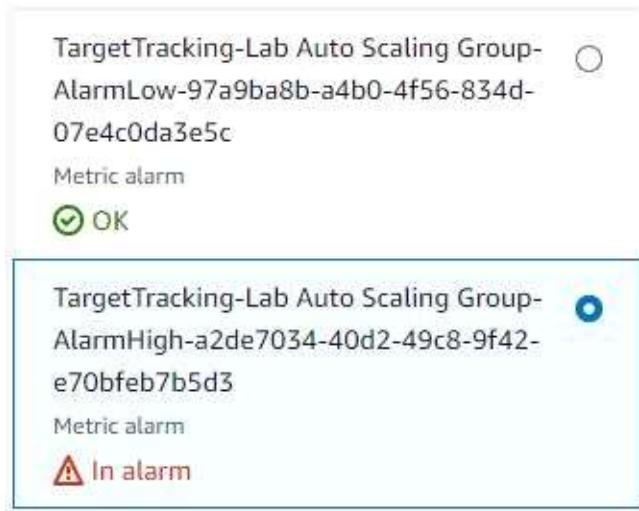
50: In the navigation panel, choose All alarms.

| CloudWatch > Alarms | | | | | | |
|---|-------------------|---------------------|---|---------------------------------------|--|---------------------------------------|
| Alarms (2) | | Actions | | Create alarm | | |
| Name | State | Last state update | Conditions | Actions | | |
| TargetTracking-Lab Auto Scaling Group-AlarmHigh-a2de7034-40e2-49c8-9f42-e70bfe7b5d3 | OK | 2024-01-22 08:15:52 | CPUUtilization > 60 for 3 datapoints within 3 minutes | <input type="radio"/> Actions enabled | <input type="radio"/> Actions disabled | <input type="radio"/> Actions pending |
| TargetTracking-Lab Auto Scaling Group-AlarmLow-059b0377-974b-48de-b441-b65b40fe2ce2 | Insufficient data | 2024-01-22 08:11:06 | CPUUtilization < 54 for 15 datapoints within 15 minutes | <input type="radio"/> Actions enabled | <input type="radio"/> Actions disabled | <input type="radio"/> Actions pending |

51: You will see 2 alarms, AlarmHigh has the status OK but AlarmLow has Insufficient data.

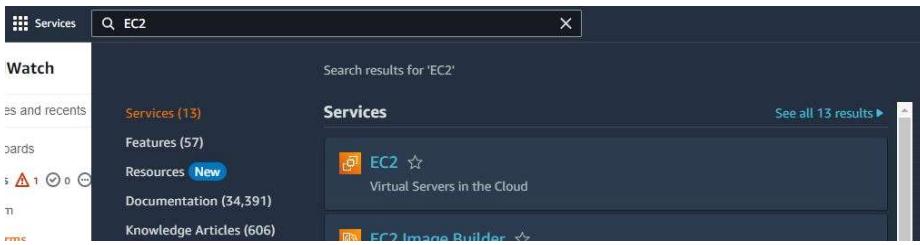


52: Back in your new web browser go to Load Test.

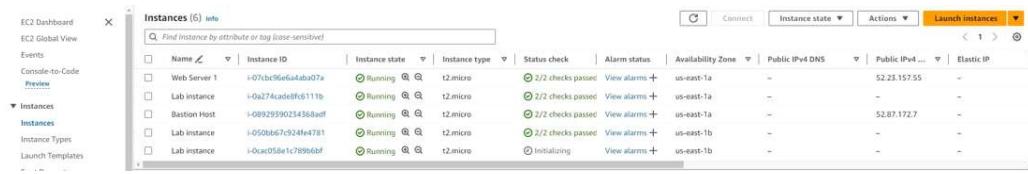


53: In a few, minutes AlarmHigh will enter the In Alarm status, AlarmLow will be

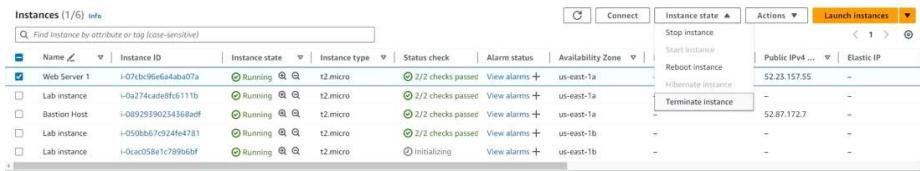
OK



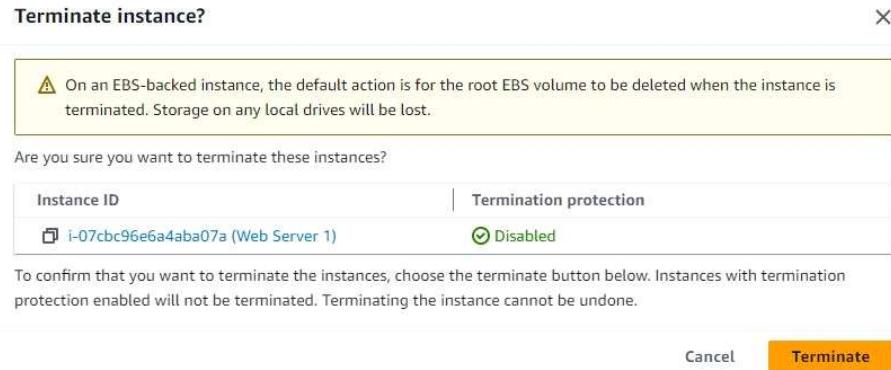
54: In services go back to EC2.



55: Go to Instances. You will now see more Lab instances, these were created by AWS Auto Scaling due to the increase in traffic via load testing.



56: Select Web Server 1 and in the Instance State menu > Terminate instance.



57: Click Terminate.

Problems:

I ran into one problem with lab 4. I went to the public library to do lab 4 without knowing that lab 4 required the use of PuTTY to SSH into the EC2 instance to mount volumes. The problem was that I was on a district laptop that had restrictions not allowing me to download PuTTY. Simple solution was to go home and do it on my own computer to download PuTTY or do it the next day at school which already had PuTTY installed. I elected to do the latter.

Conclusion:

This was the second set of AWS foundations lab. These labs covered Amazon Elastic Block Storage (EBS), Amazon Relational Database Storage (RDS), and Amazon Elastic Load Balancing (ELB). These services are focused on because they are fundamental components of Amazon AWS due to their widespread use by clients. The widespread use of these services makes learning

them even more essential in order to understand AWS cloud architecture.