Lab 03

CLOUD COMPUTING

CS-4075

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Section: SE-A

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Cloud Computing

Lab – 03

Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides resizable compute capacity in the cloud. It is designed to make web-scale cloud computing easier for developers.

Amazon EC2's simple web service interface allows you to obtain and configure capacity with minimal friction. It provides you with complete control of your computing resources and lets you run on Amazon's proven computing environment. Amazon EC2 reduces the time required to obtain and boot new server instances to minutes, allowing you to quickly scale capacity, both up and down, as your computing requirements change.

Amazon EC2 changes the economics of computing by allowing you to pay only for capacity that you actually use. Amazon EC2 provides developers the tools to build failure resilient applications and isolate themselves from common failure scenarios.

Accessing the AWS Management Console

1. At the top of these instructions, choose Start Lab to launch your lab. A Start Lab panel opens displaying the lab status.

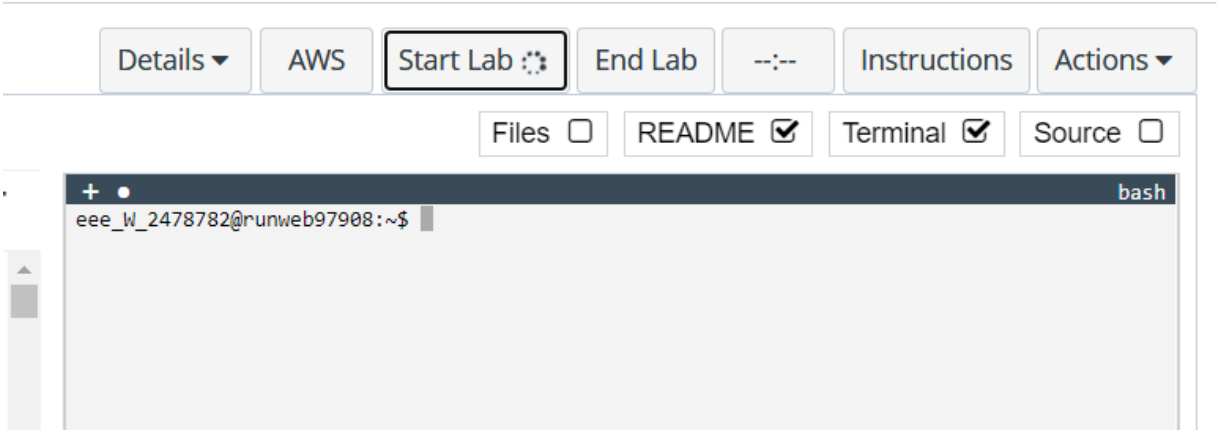

Figure 1: start the lab.

2. Wait until you see the message "**Lab status: ready**", then choose the **X** to close the Start Lab panel.

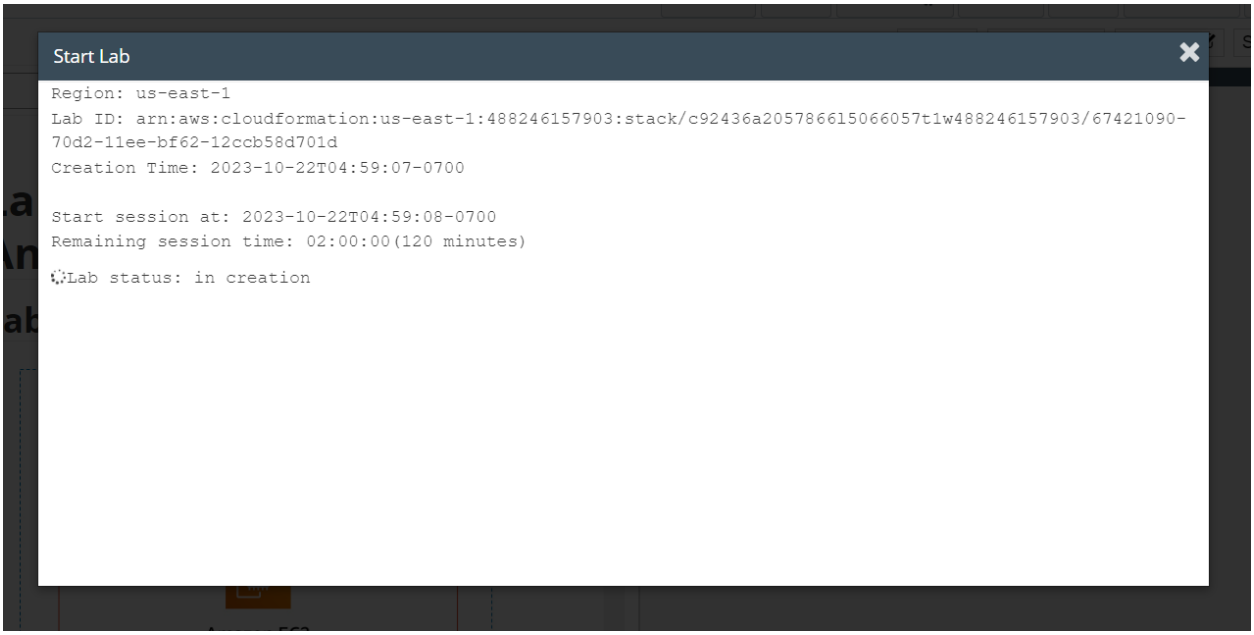

Figure 2: lab is in creation stge.

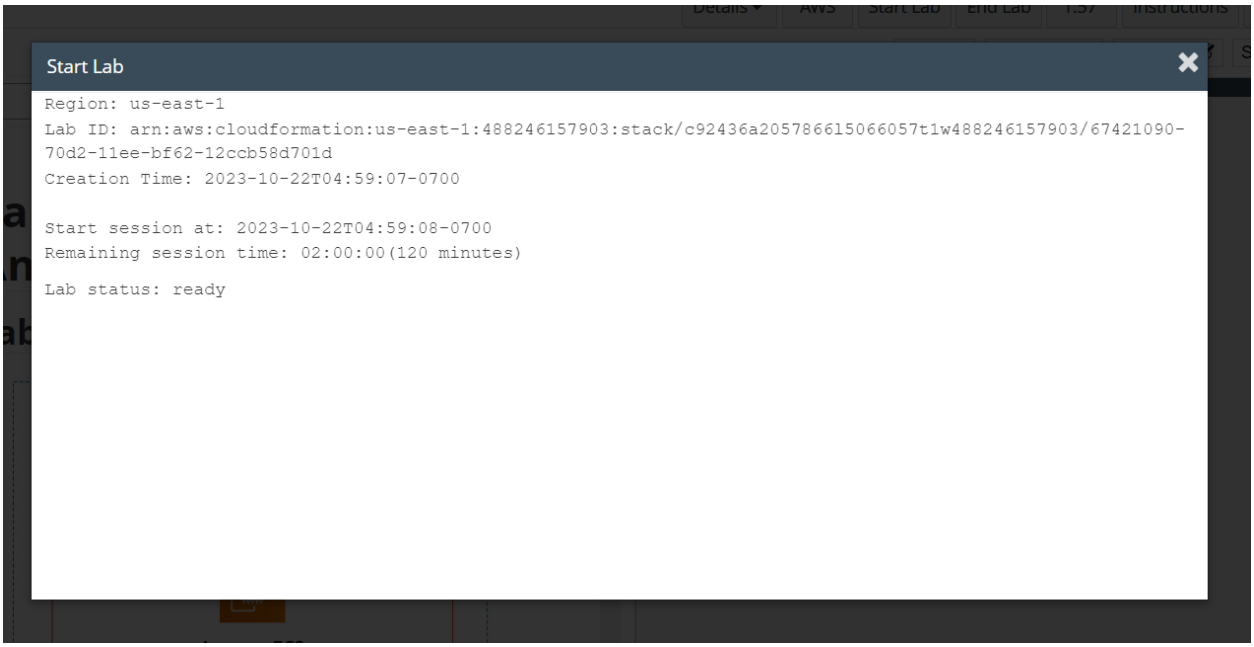

Figure 3: Lab is ready to use.

3. At the top of these instructions, choose AWS. This will open the AWS Management Console in a new browser tab. The system will automatically log you in.
4. Arrange the AWS Management Console tab so that it displays alongside these instructions. Ideally, you will be able to see both browser tabs at the same time, to make it easier to follow the lab steps.

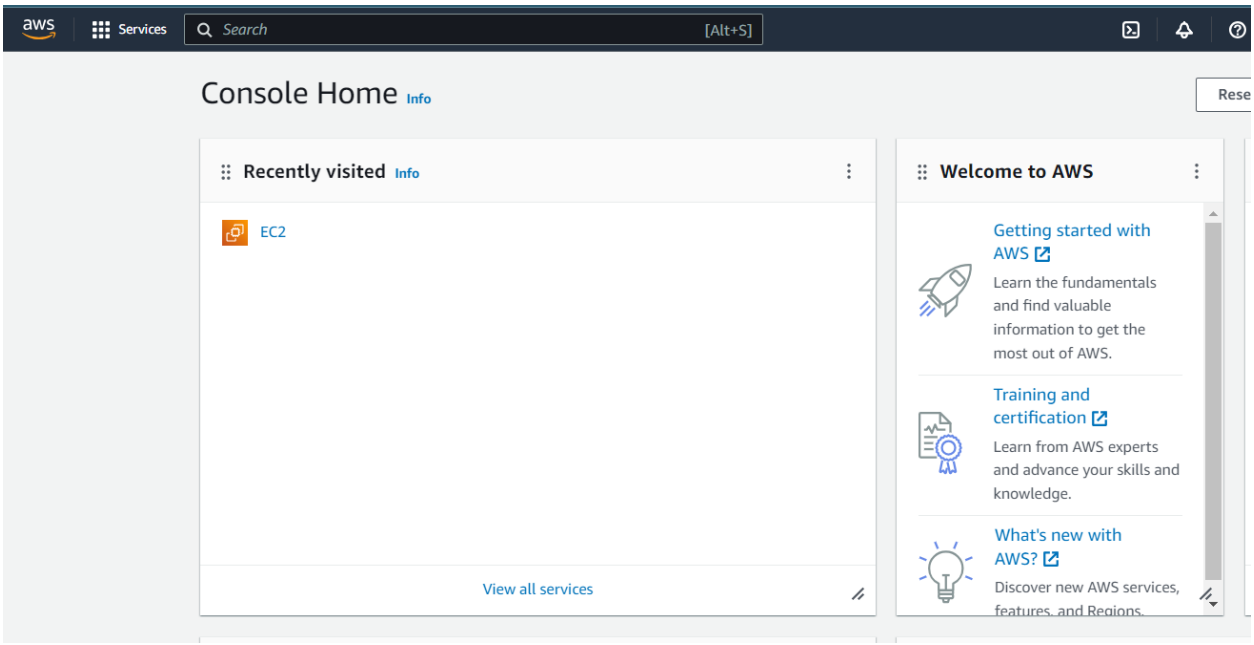

Figure 4: AWS DASHBOARD

Task 1: Launch Amazon EC2 Instance

In this task, launch an Amazon EC2 instance with *termination protection*. Termination protection prevents you from accidentally terminating an EC2 instance and deploy your instance with a User Data script that will allow you to deploy a simple web server.

5. In the **AWS Management Console** choose **Services**, choose **Compute** and then choose **EC2**.
6. Choose the Launch instance menu and select **Launch instance**.

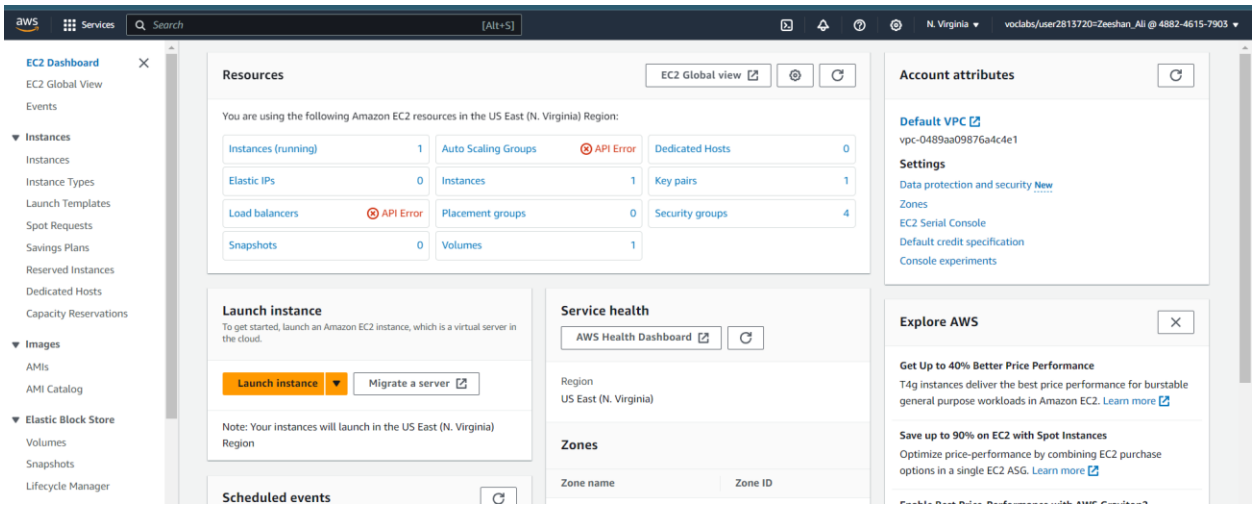

Figure 5: Launch instance.

Step 1: Name and tags

7. Give the instance the name `Web Server`.

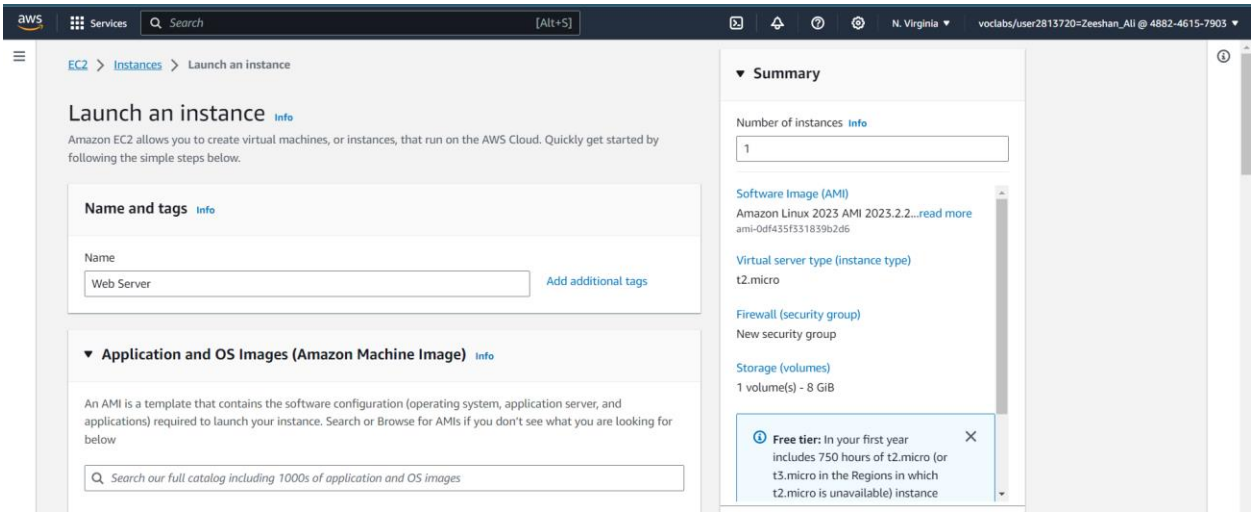

Figure 6: name the instance.

Step 2: Application and OS Images

8. In the list of available *Quick Start* AMIs, keep the default **Amazon Linux** AMI selected.

9. Also keep the default **Amazon Linux 2023 AMI** selected.

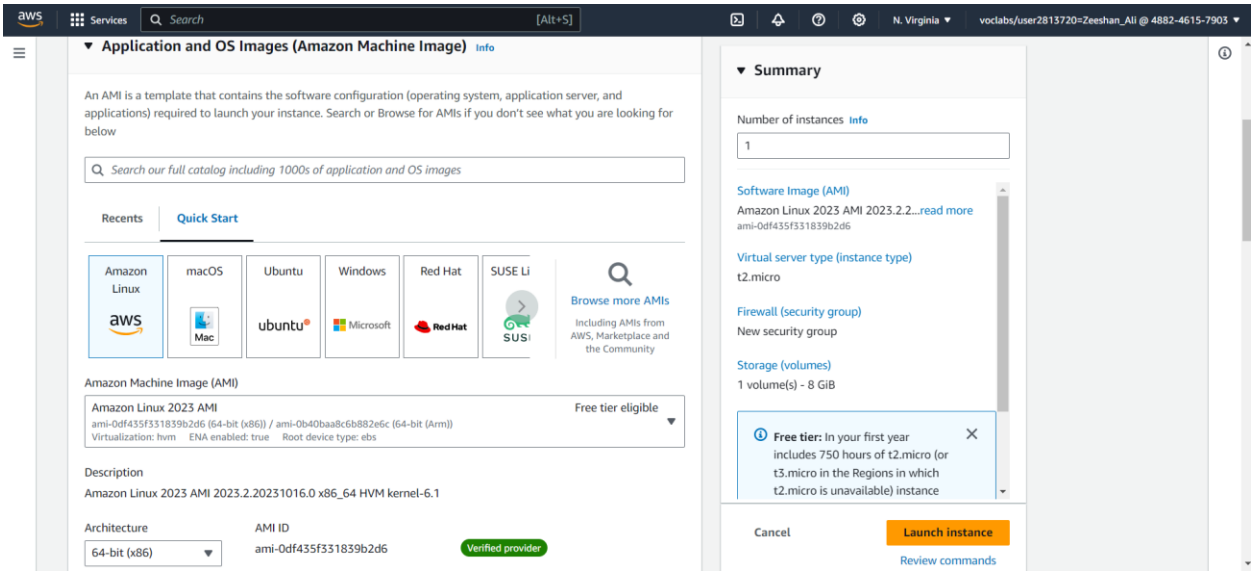

Figure 7: select Amazon Linux

An **Amazon Machine Image (AMI)** provides the information required to launch an instance, which is a virtual server in the cloud. An AMI includes:

- A template for the root volume for the instance (for example, an operating system or an application server with applications)
- Launch permissions that control which AWS accounts can use the AMI to launch instances.
- A block device mapping that specifies the volumes to attach to the instance when it is launched.

The **Quick Start** list contains the most commonly used AMIs. You can also create your own AMI or select an AMI from the AWS Marketplace, an online store where you can sell or buy software that runs on AWS.

Step 3 - 4: Instance type and Key pair (login)

10. In the *Instance type* panel, keep the default **t2.micro** selected. The t2.micro instance type has 1 virtual CPU and 1 GiB of memory. **Note**: It may be restricted from using other instance types in this lab.

11. For **Key pair name - *required***, choose **vockey**.

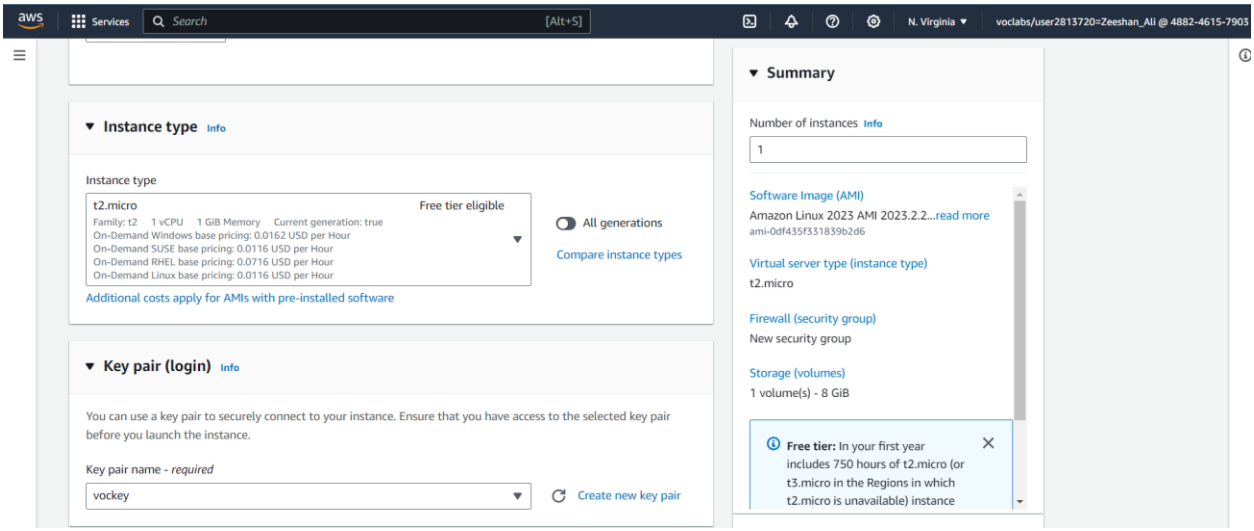

Figure 8: Instance type and Key pair login

Step 5: Network settings

12. Next to Network settings, choose **Edit**.
13. For **VPC**, select **Lab VPC**.

The Lab VPC was created using an AWS CloudFormation template during the setup process of your lab. This VPC includes two public subnets in two different Availability Zones.

14. Under **Firewall (security groups)**, choose **Create security group** and configure:
    - **Security group name:** `Web Server security group`
    - **Description:** `Security group for my web server`

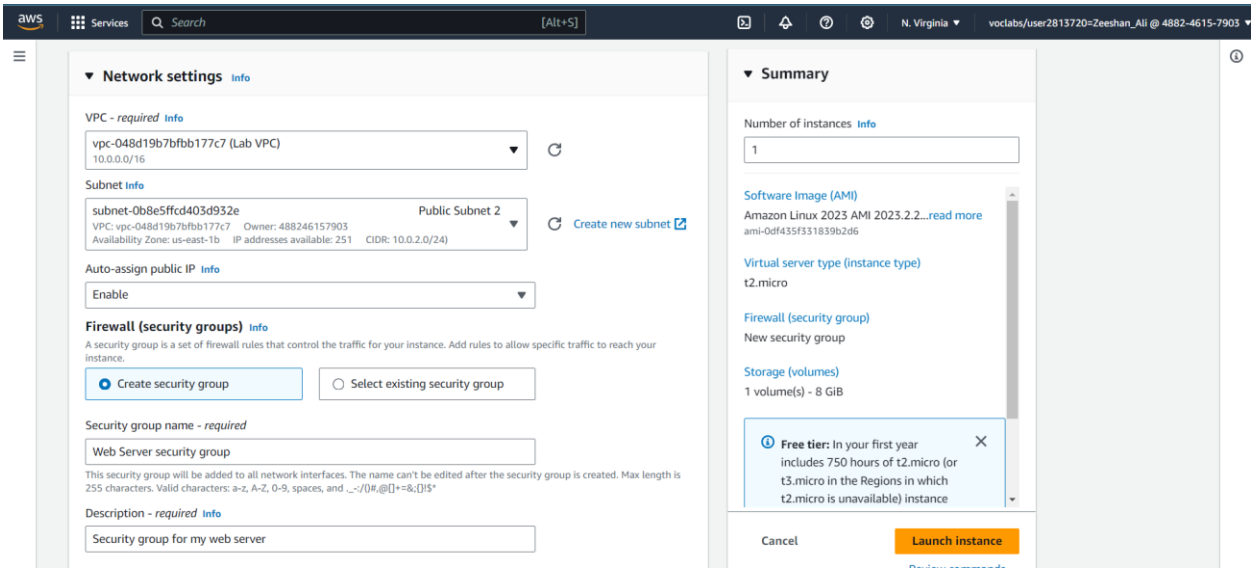

Figure 9: select Lab VPC and Create security group.

Step 6: Configure storage.

15. Under **Inbound security group rules**, notice that one rule exists. **Remove** this rule.
16. In the *Configure storage* section, keep the default settings.

Amazon EC2 stores data on a network-attached virtual disk called *Elastic Block Store*. launch the Amazon EC2 instance using a default 8 GiB disk volume. This will be your root volume (also known as a 'boot' volume).

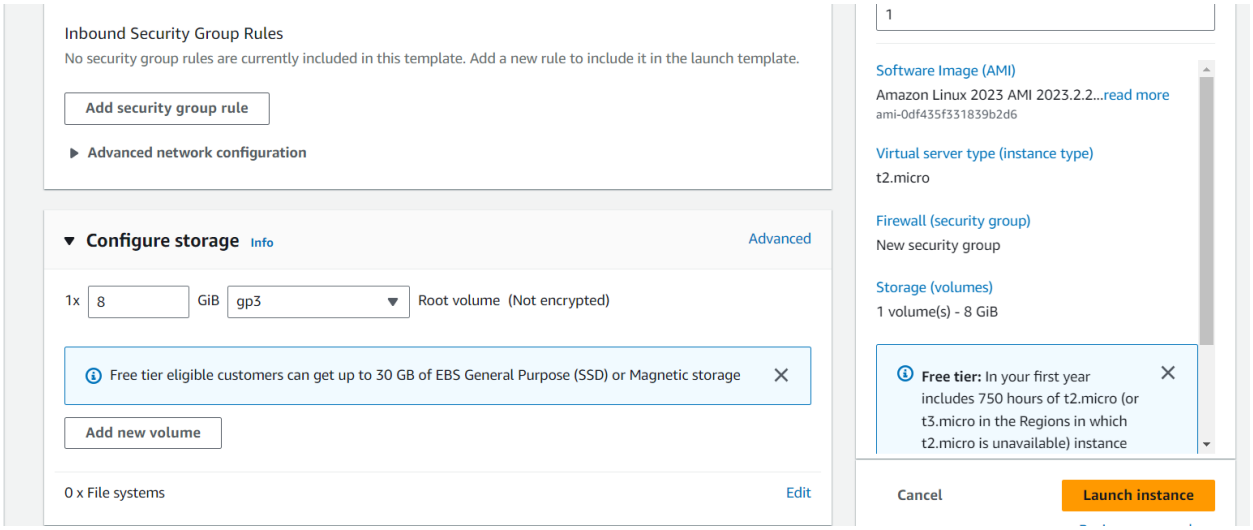

Figure 10: Configure storage.

Step 7: Advanced details

16. Expand **Advanced details**.
17. For **Termination protection**, select **Enable**.

When an Amazon EC2 instance is no longer required, it can be *terminated*, which means that the instance is deleted, and its resources are released. A terminated instance cannot be accessed again and the data that was on it cannot be recovered. If you want to prevent the instance from being accidentally terminated, you can enable *termination protection* for the instance, which prevents it from being terminated as long as this setting remains enabled.

18. Scroll to the bottom of the page and then copy and paste the code into the **User data** box.

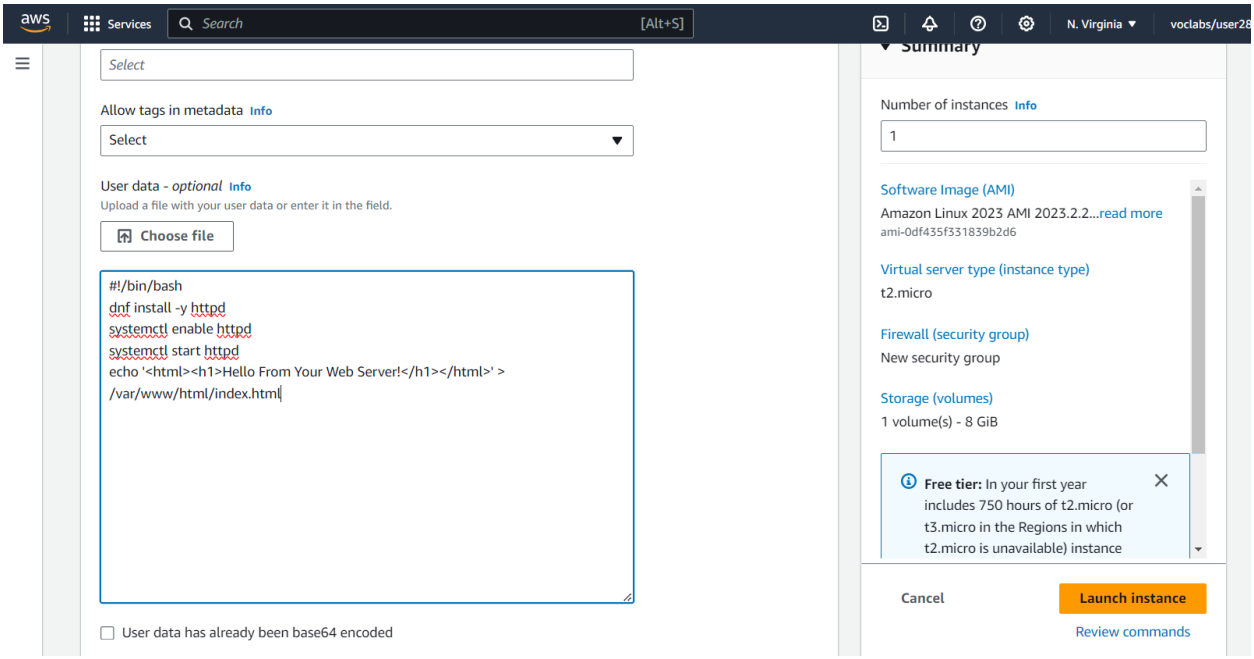

Figure 11: User data box

When you launch an instance, you can pass *user data* to the instance that can be used to perform automated installation and configuration tasks after the instance starts.

Step 8: Launch the instance.

19. At the bottom of the **Summary** panel on the right side of the screen choose Launch instance. You will see a Success message.

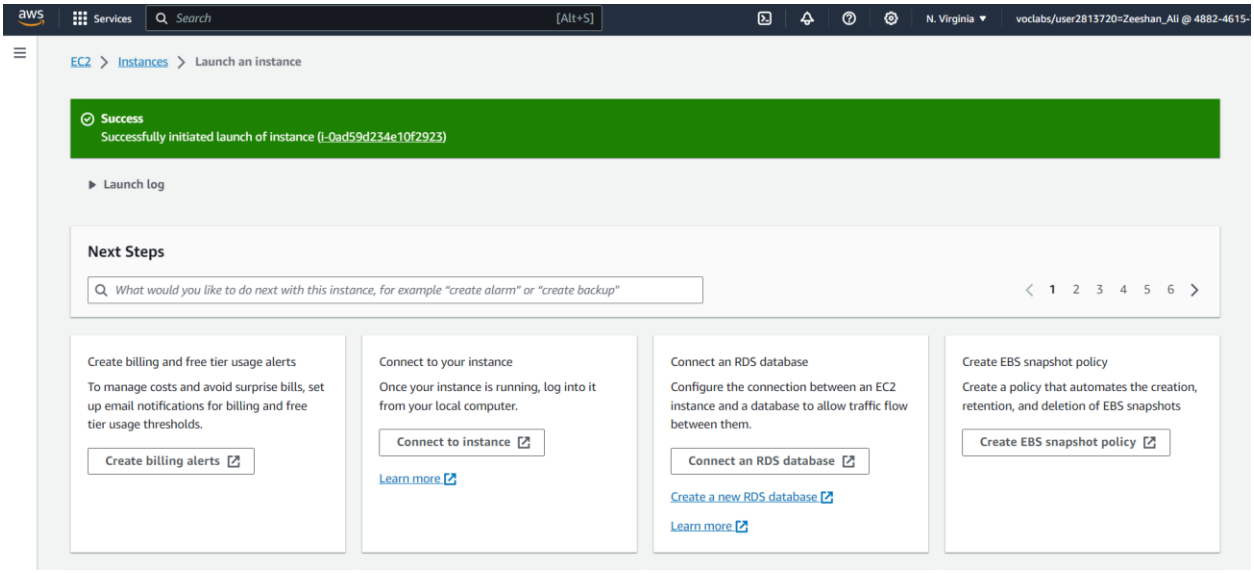

Figure 12: Success message

20. Choose View all instances.
    - In the Instances list, select **Web Server**.

The instance is assigned a *Public IPv4 DNS* that you can use to contact the instance from the Internet. the instance will appear in a *Pending* state, which means it is being launched. It will then change to *Initializing*, and finally to *Running*.

21. Wait for your instance to display the following:
    - **Instance State:** *Running*
    - **Status Checks:** *2/2 checks passed.*

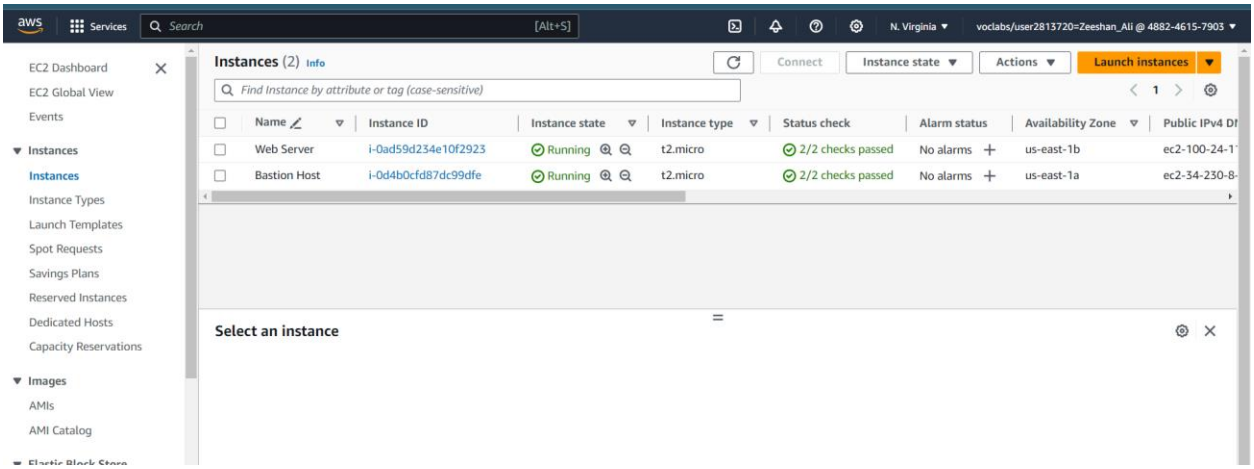

Figure 13: successfully launched EC2 instance.

Task 2: Monitor Your Instance

Monitoring is an important part of maintaining the reliability, availability, and performance of Amazon Elastic Compute Cloud (Amazon EC2) instances and AWS solutions.

22. Choose the **Status checks** tab.

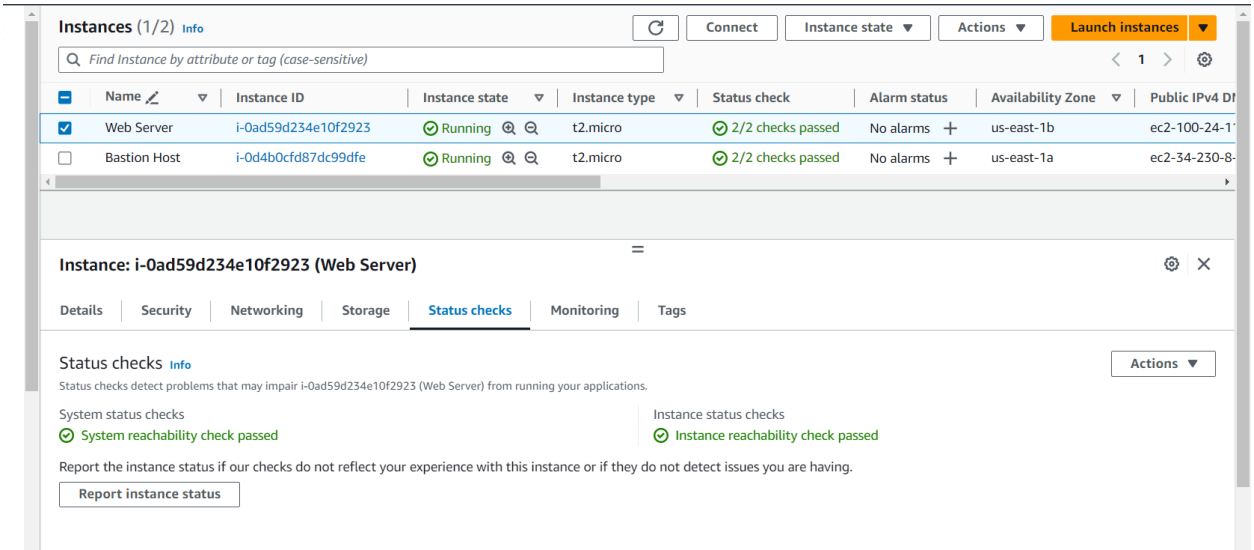

Figure 14: Status checks tab

With instance status monitoring, you can quickly determine whether Amazon EC2 has detected any problems that might prevent your instances from running applications. Amazon EC2 performs automated checks on every running EC2 instance to identify hardware and software issues.

23. Choose the **Monitoring** tab.

This tab displays Amazon CloudWatch metrics for your instance. Currently, there are not many metrics to display because the instance was recently launched.

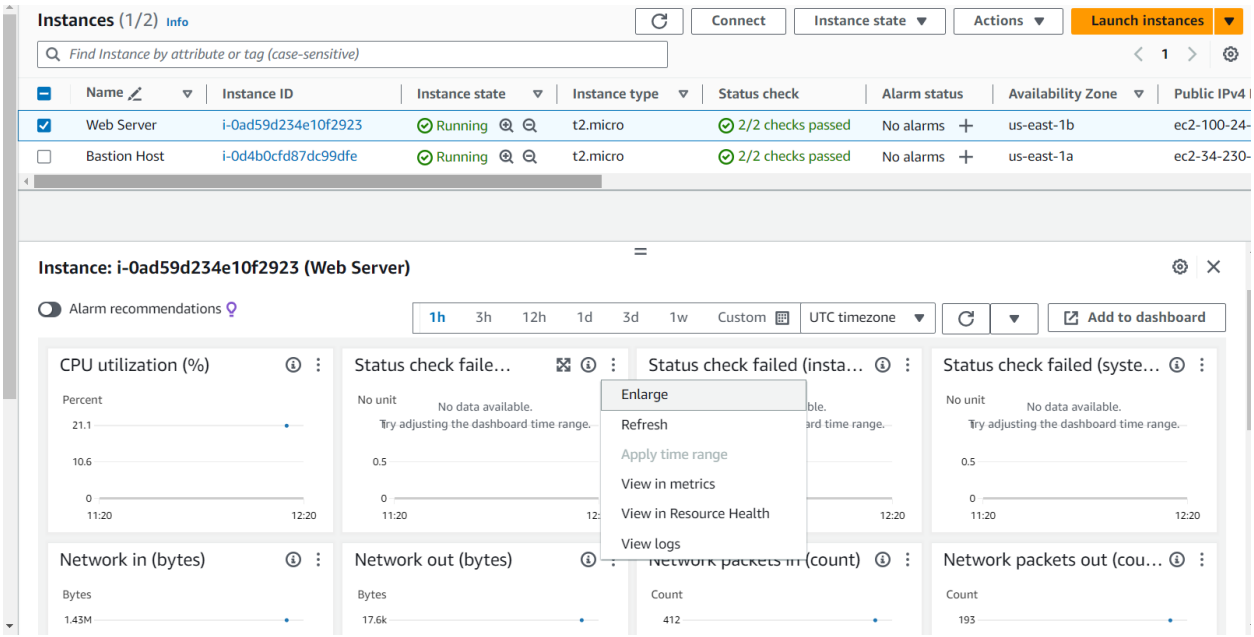

Figure 15: Monitoring tab.

24. In the Actions menu towards the top of the console, select **Monitor and troubleshoot Get system log**.

The System Log displays the console output of the instance, which is a valuable tool for problem diagnosis. It is especially useful for troubleshooting kernel problems and service configuration issues that could cause an instance to terminate or become unreachable before its SSH daemon can be started. If you do not see a system log, wait a few minutes and then try again.

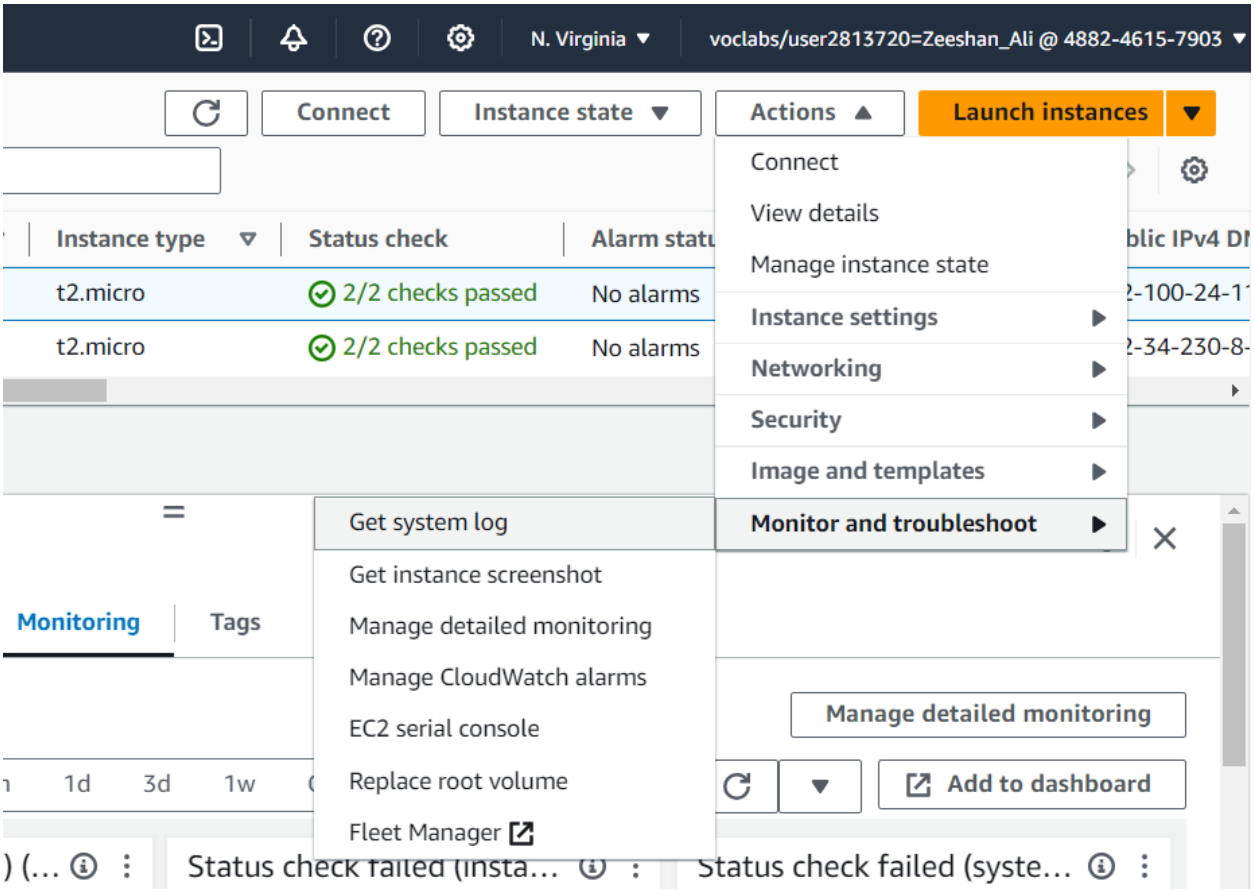

Figure 16: Actions menu

25. Scroll through the output and note that the HTTP package was installed from the **user data** that you added when you created the instance.

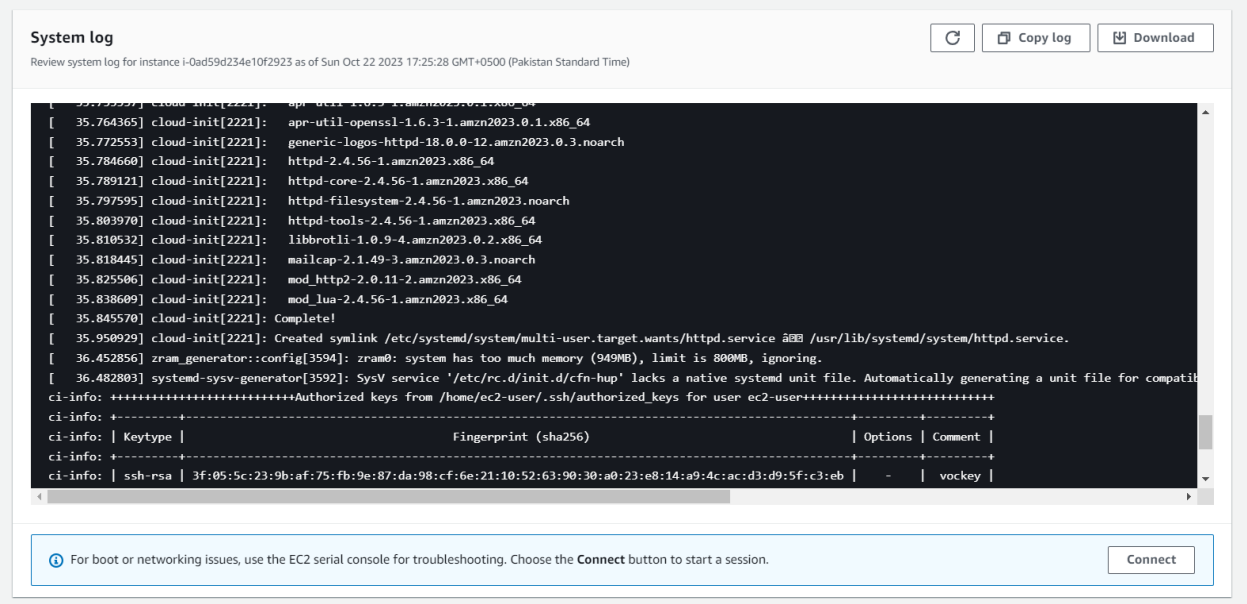

Figure 17: output the HTTP package.

26. Choose **Cancel**.
27. Ensure **Web Server** is still selected. Then, in the Actions menu, select **Monitor and troubleshoot Get instance screenshot**.

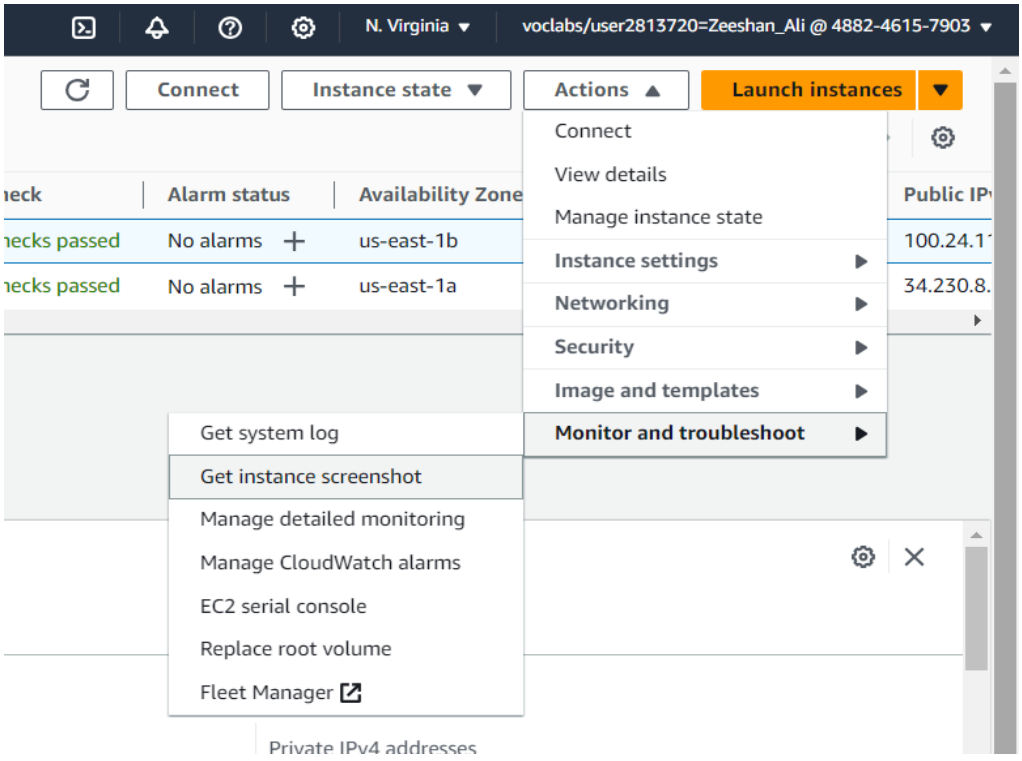

Figure 18: Actions menu

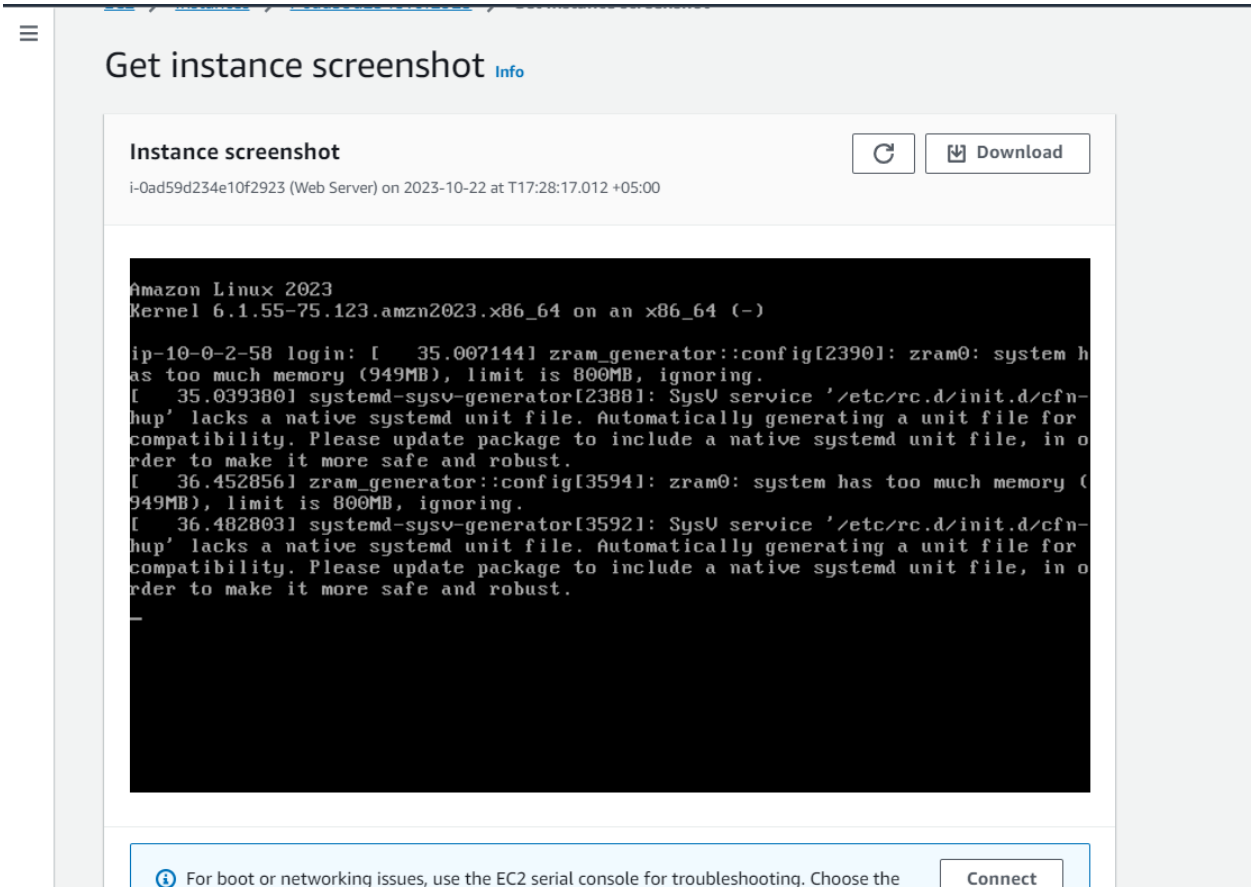

Figure 19: instance screenshot

Task 3: Update Security Group and Access the Web Server

When launched the EC2 instance, provided a script that installed a web server and created a simple web page. In this task access content from the web server.

29. Ensure **Web Server** is still selected. Choose the **Details** tab.
30. Copy the **Public IPv4 address** of your instance to your clipboard.

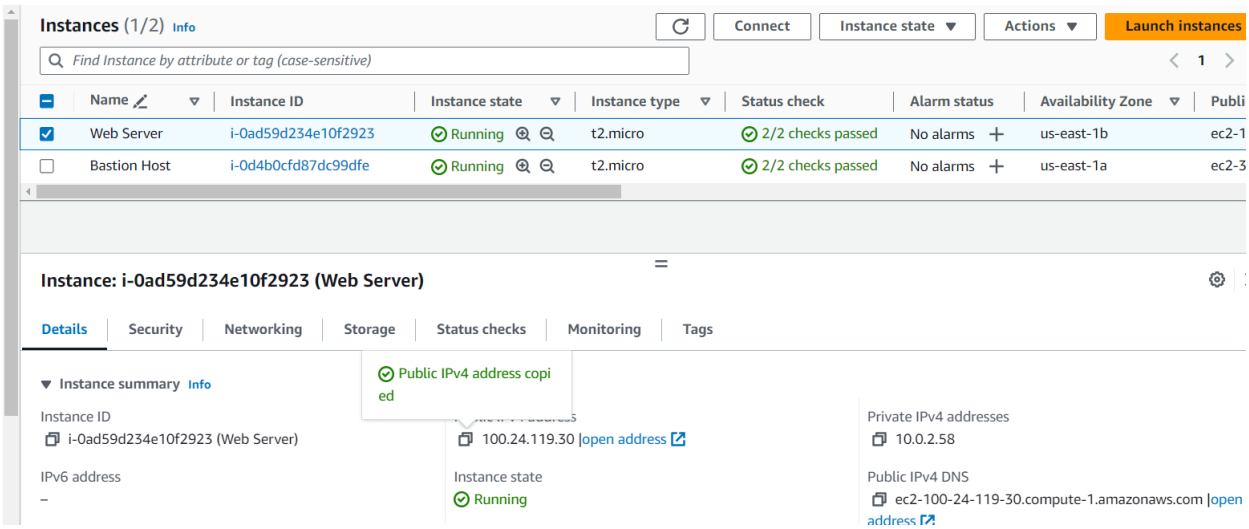

Figure 20: Web Server Details

31. Open a new tab in your web browser, paste the IP address you just copied, then press **Enter**.

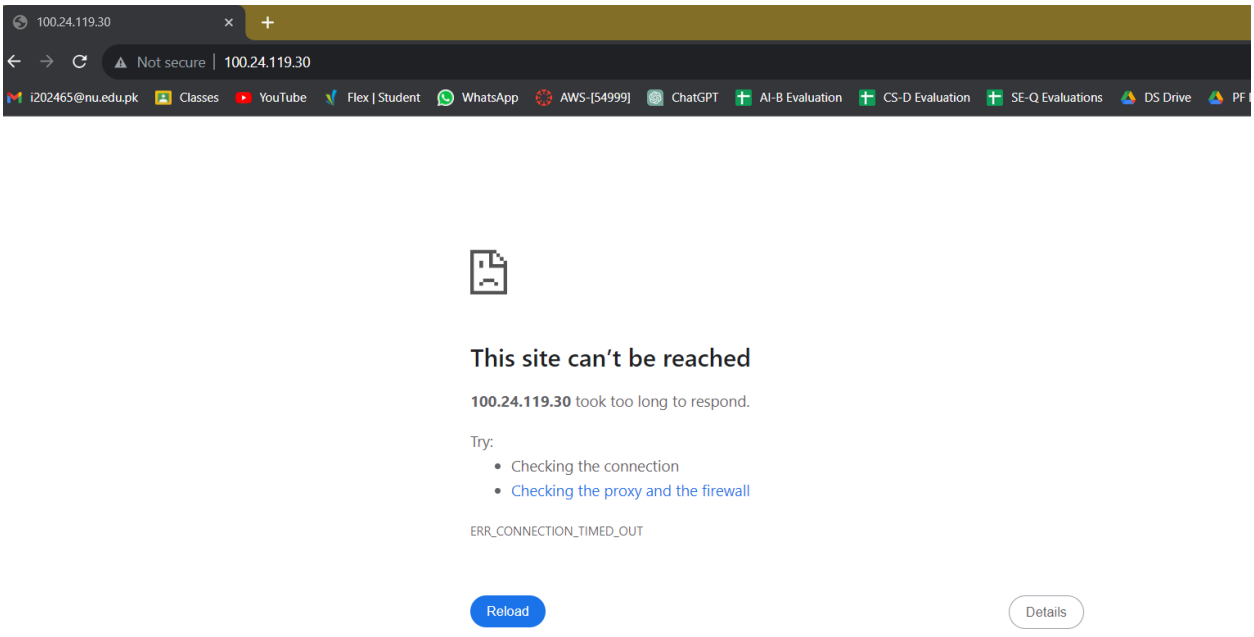

Figure 21: IP address

Question: Are you able to access your web server? Why not?

You are **not** currently able to access your web server because the *security group* is not permitting inbound traffic on port 80, which is used for HTTP web requests. This is a demonstration of using a security group as a firewall to restrict the network traffic that is allowed in and out of an instance. To correct this, you will now update the security group to permit web traffic on port 80.

32. Keep the browser tab open, but return to the **EC2 Console** tab.
33. In the left navigation pane, choose **Security Groups**.
34. Select **Web Server security group**.

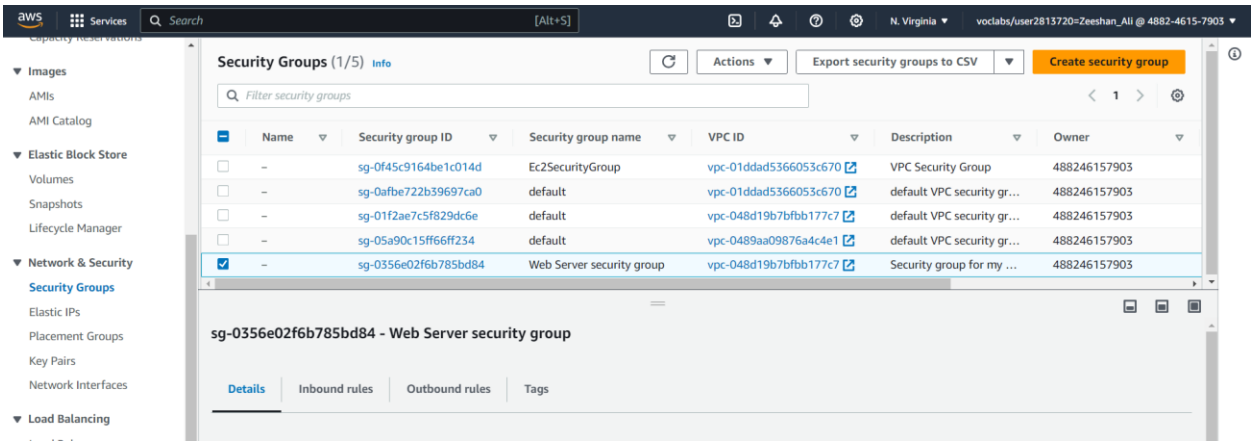

Figure 22: Web Server security group

35. Choose the **Inbound rules** tab. The security group currently has no inbound rules.

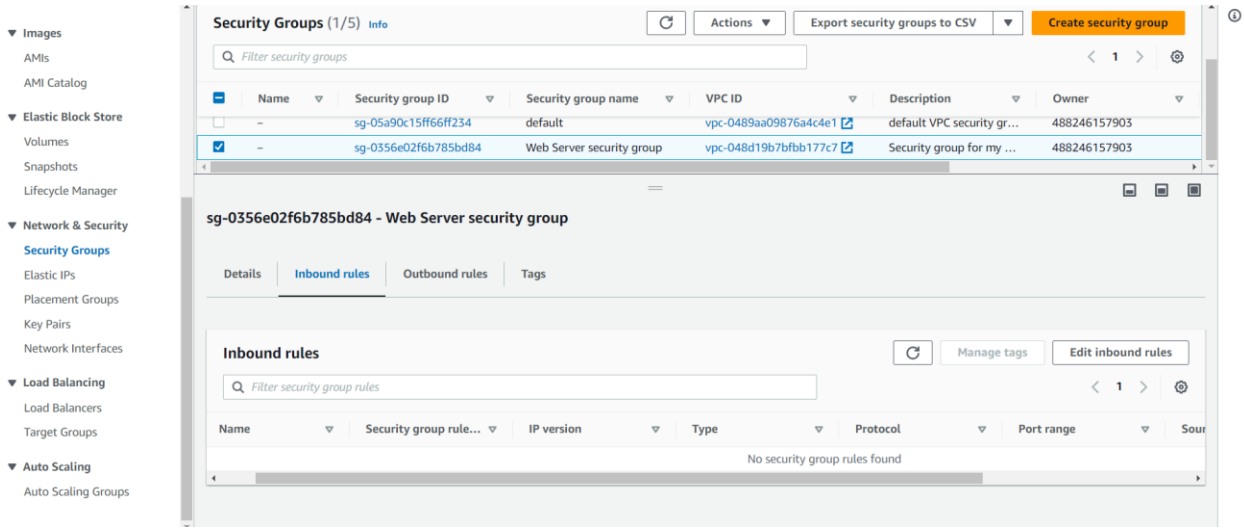

Figure 23: no Inbound rules

36. Choose Edit inbound rules, select Add rule and then configure:
    - **Type:** *HTTP*
    - **Source:** *Anywhere-IPv4*
    - Choose Save rules.

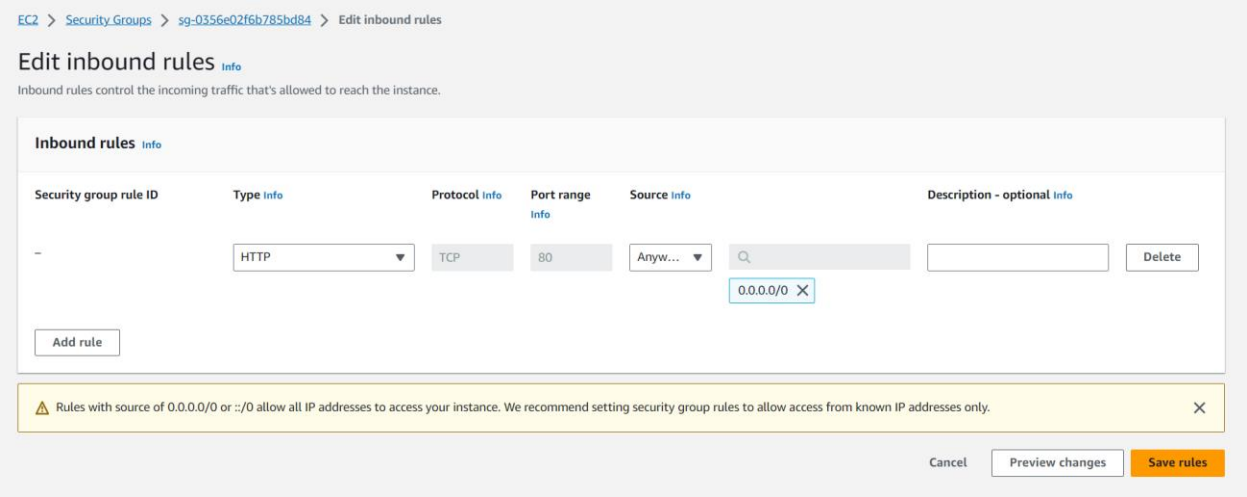

Figure 24: Edit inbound rules.

37. Return to the web server tab that you previously opened and refresh the page. You should see the message *Hello from Your Web Server!*

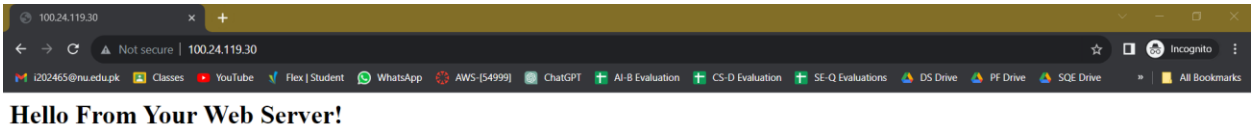

Figure 25: Hello message from Server

Congratulations! You have successfully modified your security group to permit HTTP traffic into your Amazon EC2 Instance.

Task 4: Resize Instance: Instance Type and EBS Volume

As needs change, might find that instance is over-utilized (too small) or under-utilized (too large). If so, you can change the *instance type*. For example, if a *t2.micro* instance is too small for its workload, you can change it to an *m5.medium* instance. Similarly, you can change the size of a disk.

Stop Your Instance

Before you can resize an instance, you must *stop* it. When you stop an instance, it is shut down. There is no runtime charge for a stopped EC2 instance, but the storage charge for attached Amazon EBS volumes remains.

38. On the **EC2 Management Console**, in the left navigation pane, choose **Instances**. **Web Server** should already be selected.
39. In the Instance State menu, select **Stop instance**.

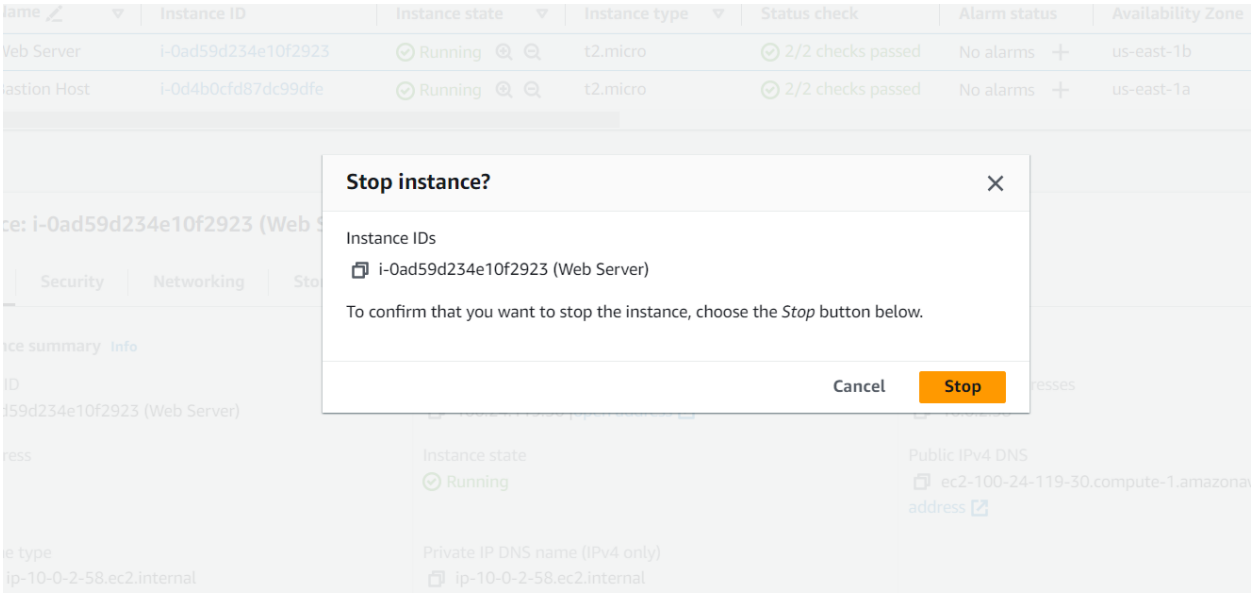

Figure 26: Stop instance.

40. Choose Stop. Your instance will perform a normal shutdown and then will stop running.

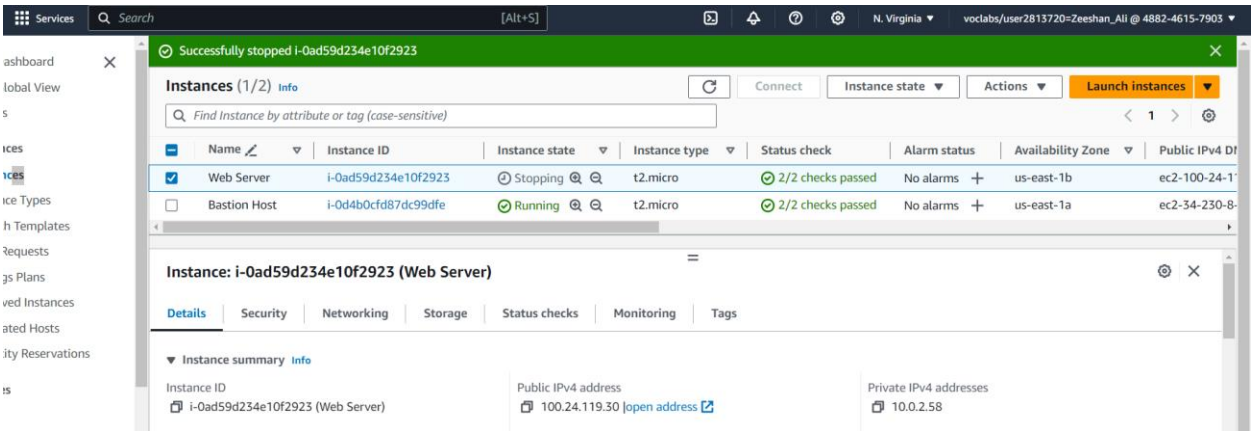

Figure 27: perform a normal shutdown.

41. Wait for the **Instance state** to display: *Stopped*.

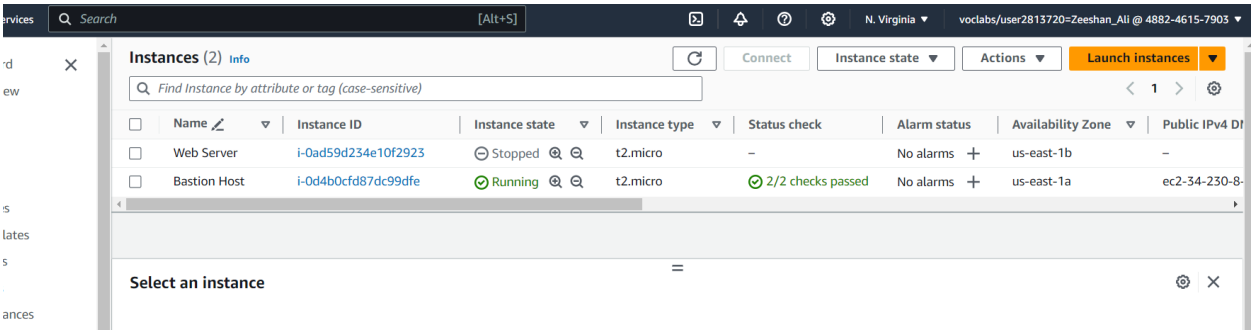

Figure 28: Instance state: Stopped

Change The Instance Type

42. In the Actions menu, select **Instance settings Change instance type**, then configure:
    - **Instance Type:** *t2.small*
    - Choose Apply

When the instance is started again it will run as a *t2.small*, which has twice as much memory as a *t2.micro* instance.

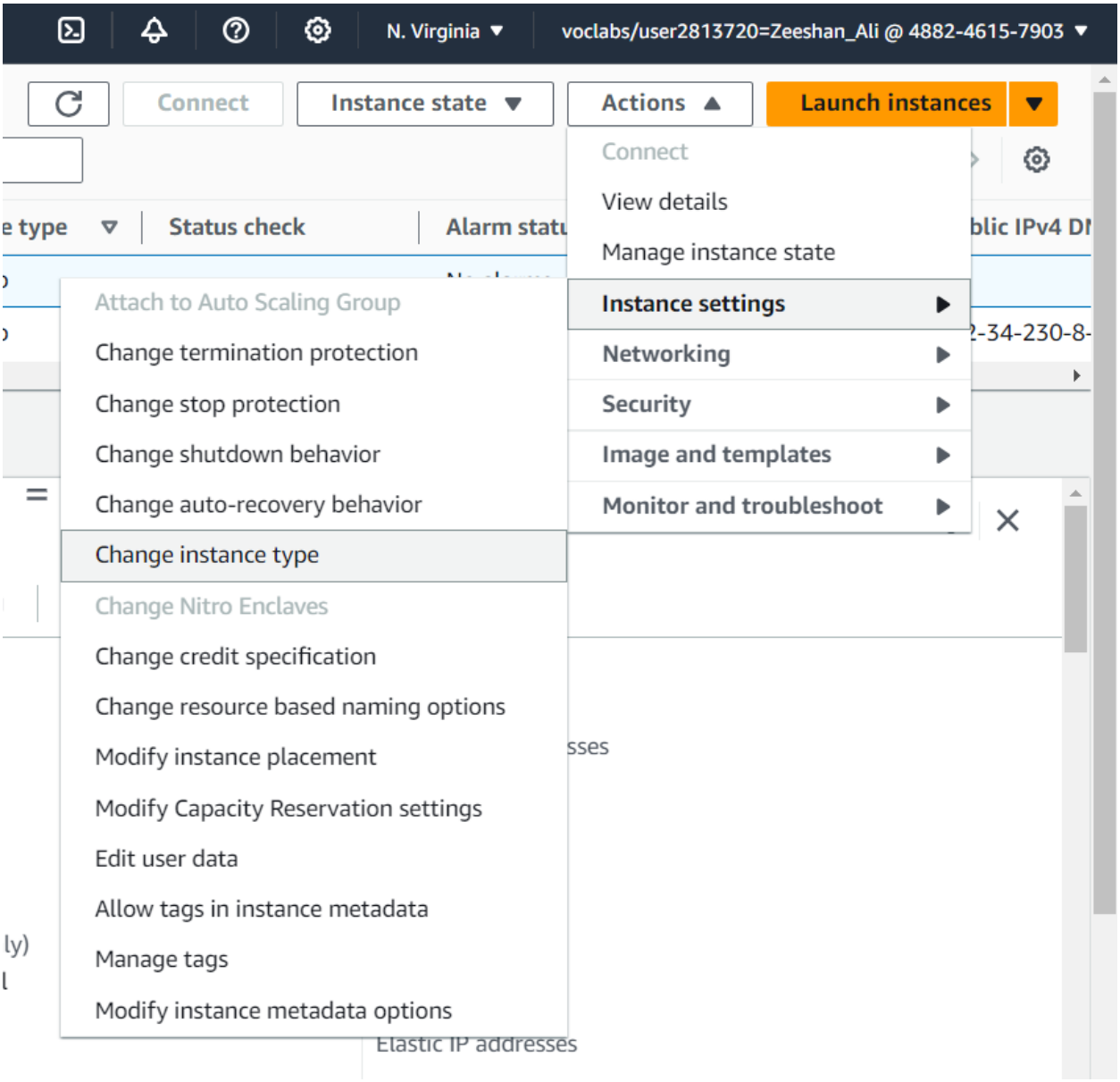

Figure 29: Change Instance Type

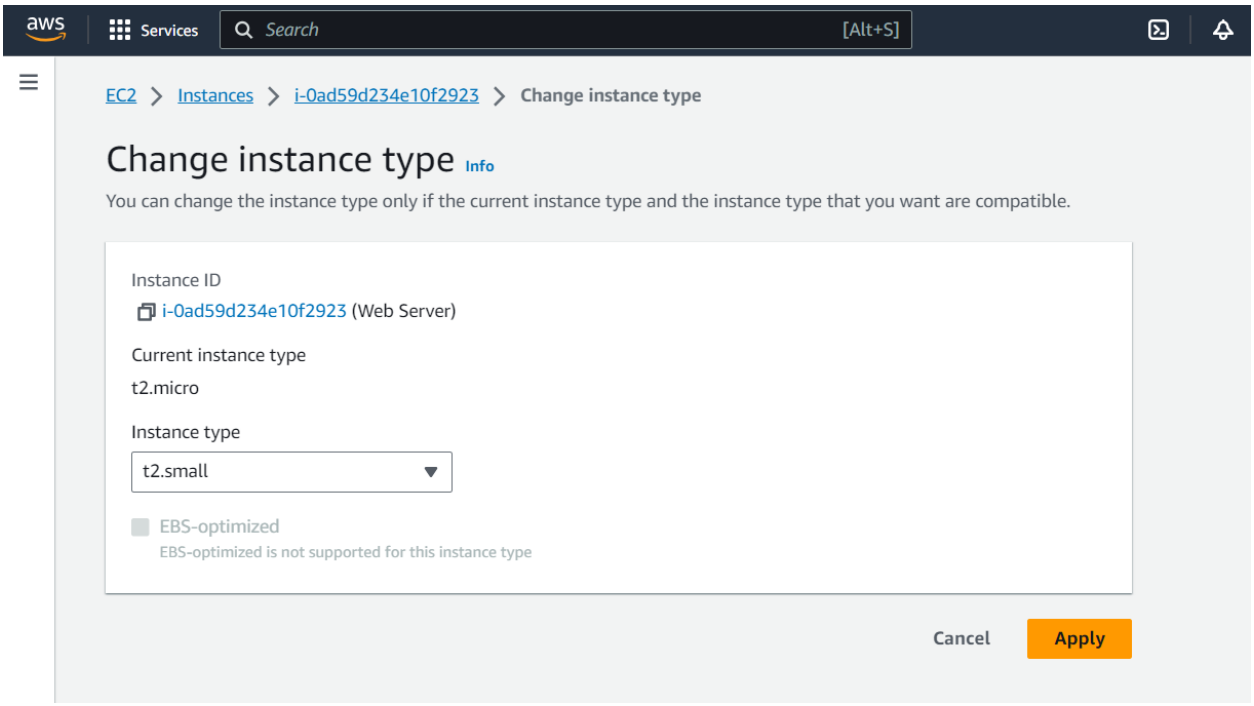

Figure 30: Instance Type: t2.small.

Resize the EBS Volume

43. With the Web Server instance still selected, choose the **Storage** tab, select the name of the Volume ID, then select the checkbox next to the volume that displays.
44. In the Actions menu, select **Modify volume**. The disk volume currently has a size of 8 GiB. You will now increase the size of this disk.

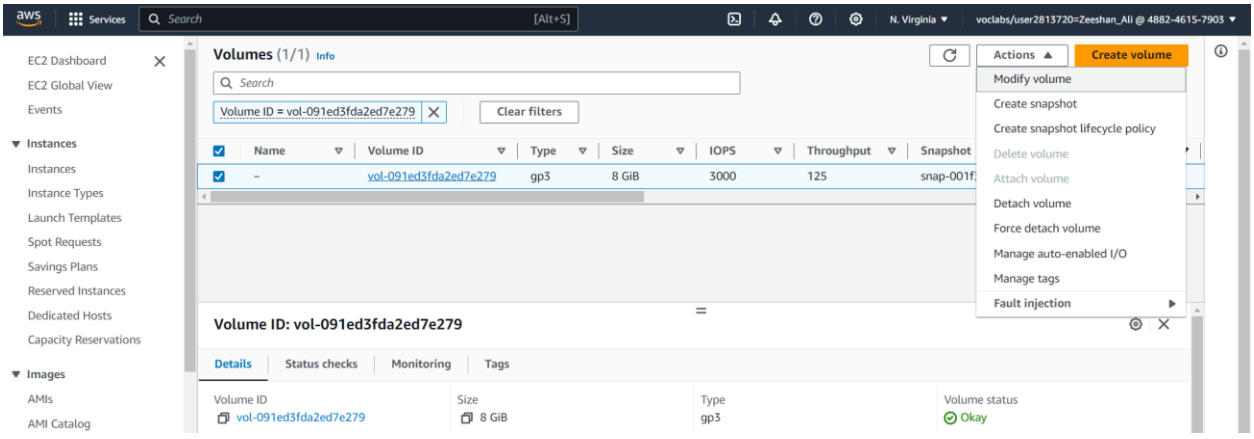

Figure 31: select Modify volume.

45. Change the size to: `10` **NOTE**: You may be restricted from creating large Amazon EBS volumes in this lab.
46. Choose Modify

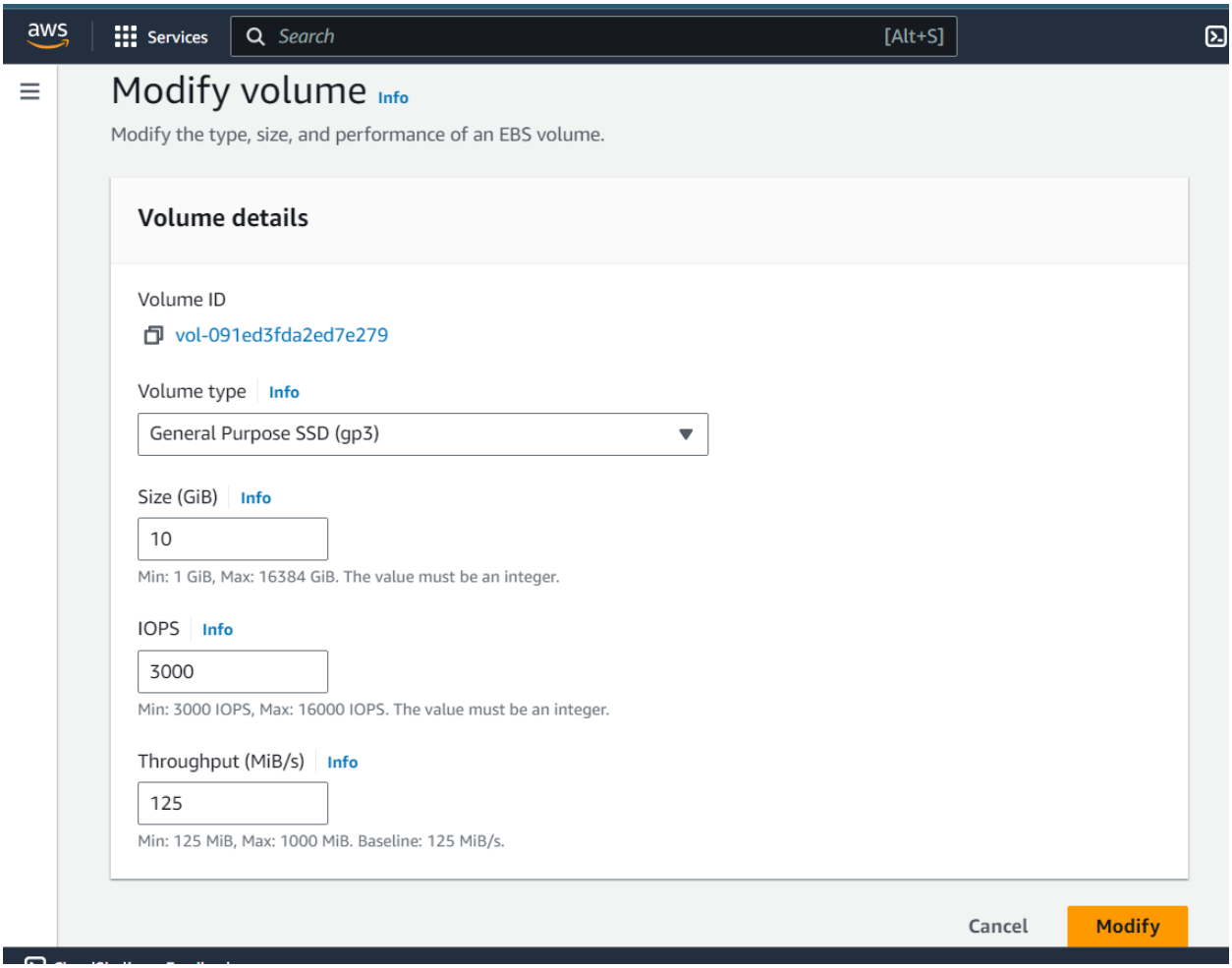

Figure 32: Modify volume.

47. Choose Modify again to confirm and increase the size of the volume.

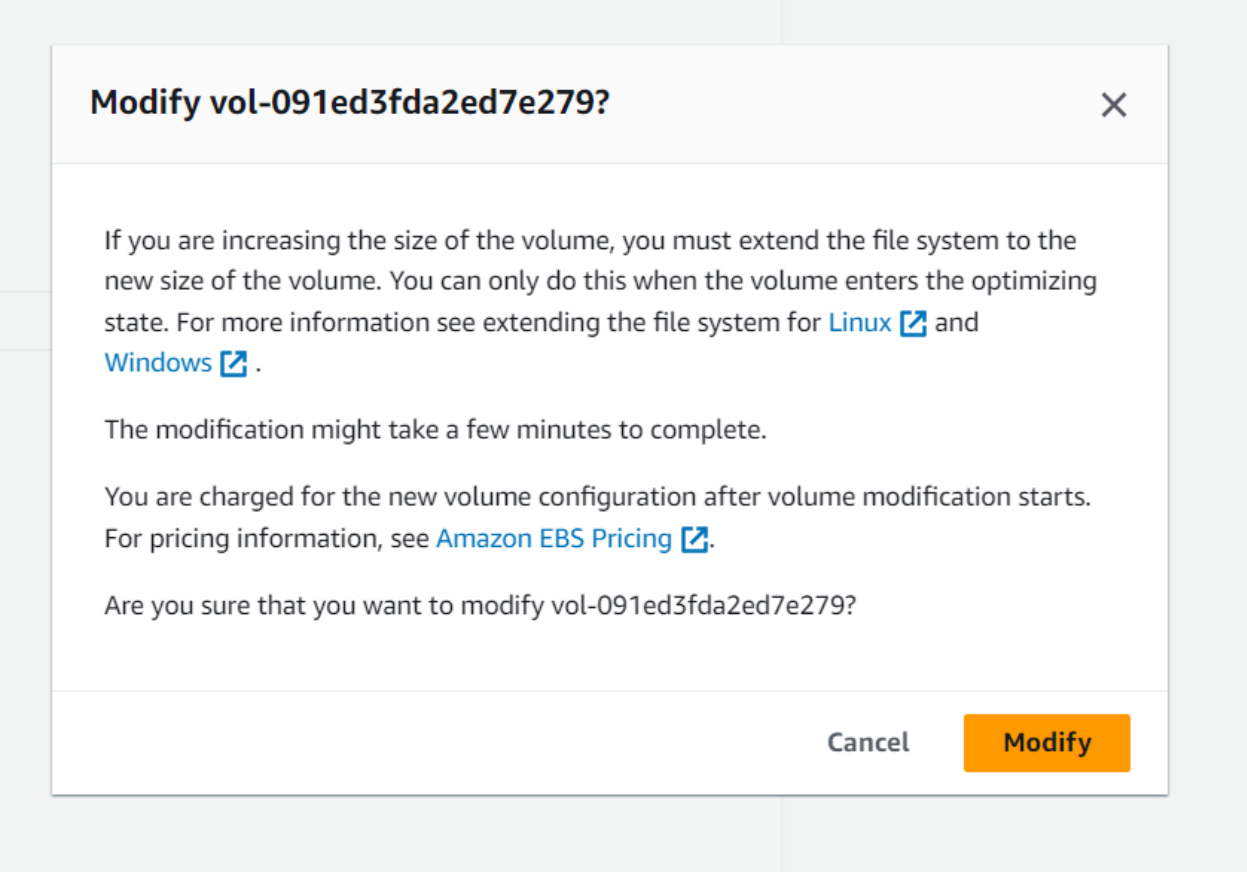

Figure 33: confirm modify.

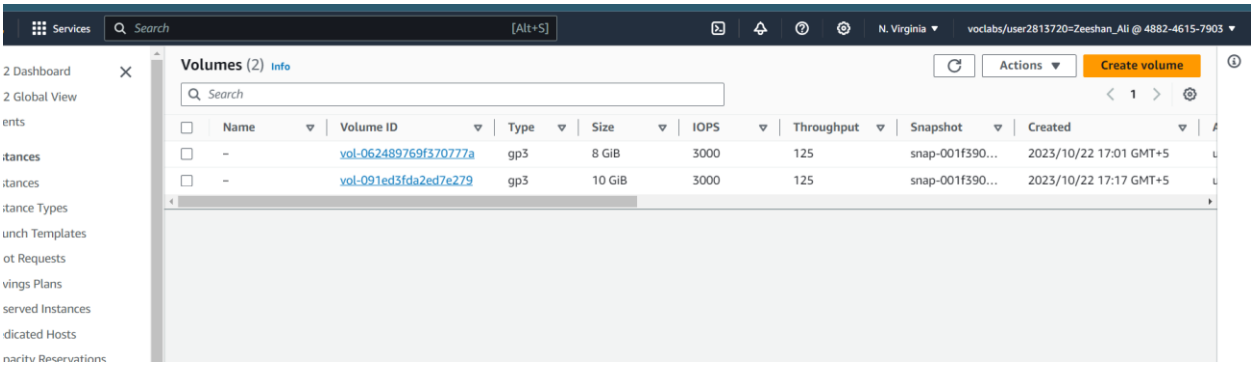

Figure 34: updated volumes.

Start the Resized Instance

You will now start the instance again, which will now have more memory and more disk space.

49. In left navigation pane, choose **Instances**.

50. Select the **Web Server** instance.
51. In the Instance state menu, select **Start instance**.

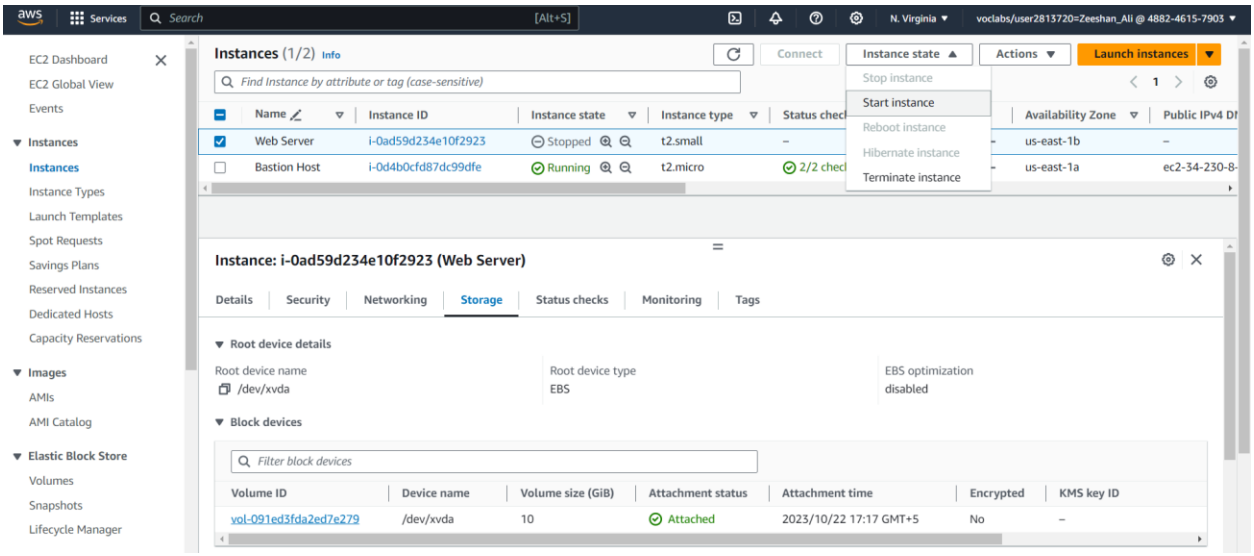

Figure 35: Start instance.

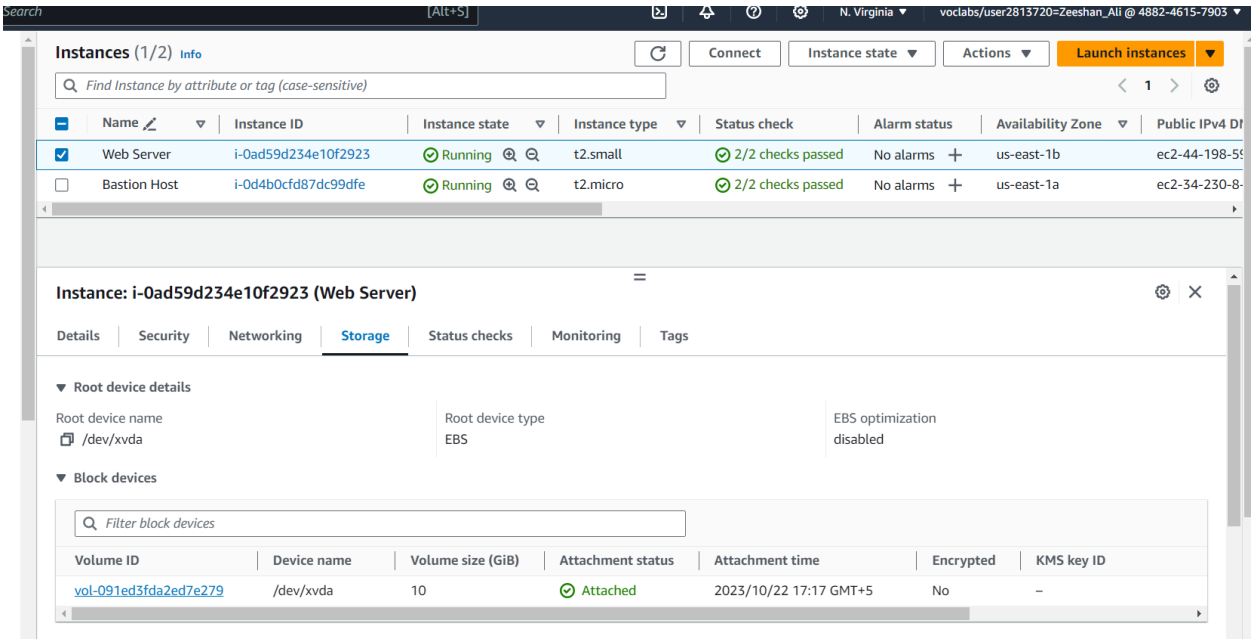

Figure 36: successfully launch resized instance.

Congratulations! You have successfully resized your Amazon EC2 Instance.

Task 5: Explore EC2 Limits

Amazon EC2 provides different resources that you can use. These resources include images, instances, volumes, and snapshots. When you create an AWS account, there are default limits on these resources on a per-region basis.

52. In the AWS Management Console, in the search box next to **Services**, search for and choose `Service Quotas`.

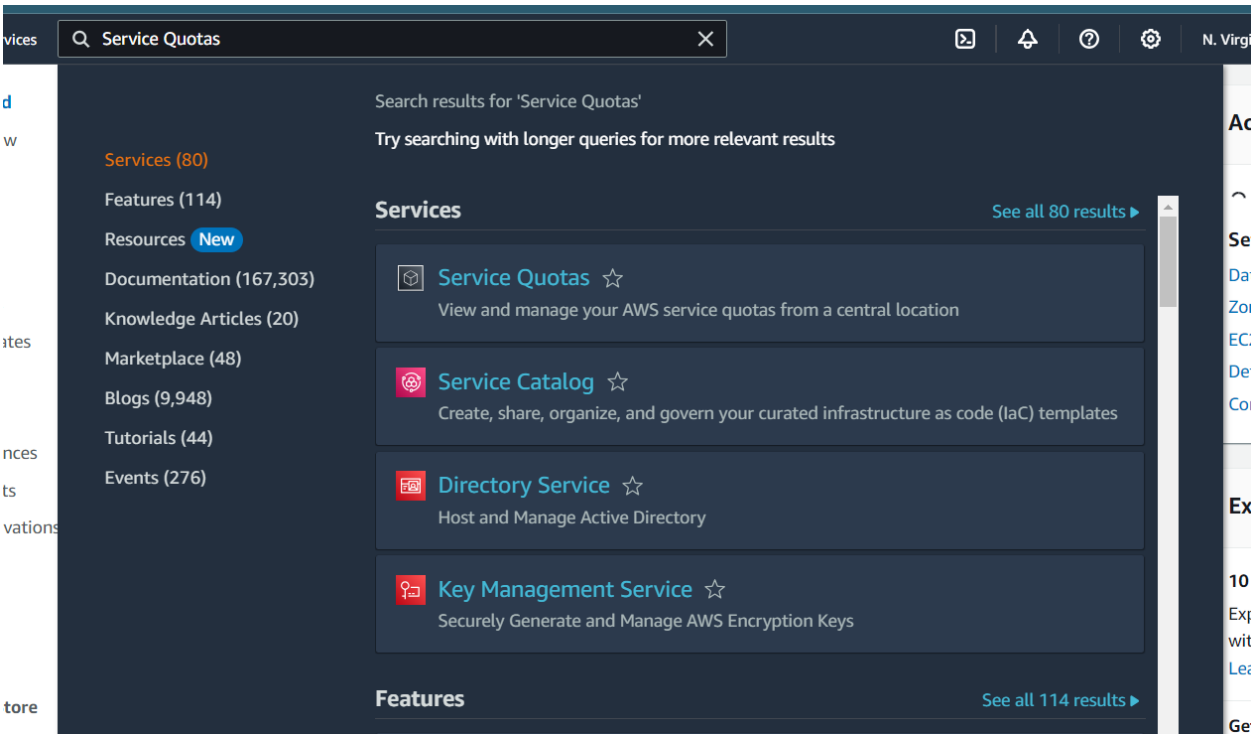

Figure 37: choose Service Quotas

53. Choose **AWS services** from the navigation menu and then in the AWS services *Find services* search bar, search for `ec2` and choose **Amazon Elastic Compute Cloud (Amazon EC2)**.

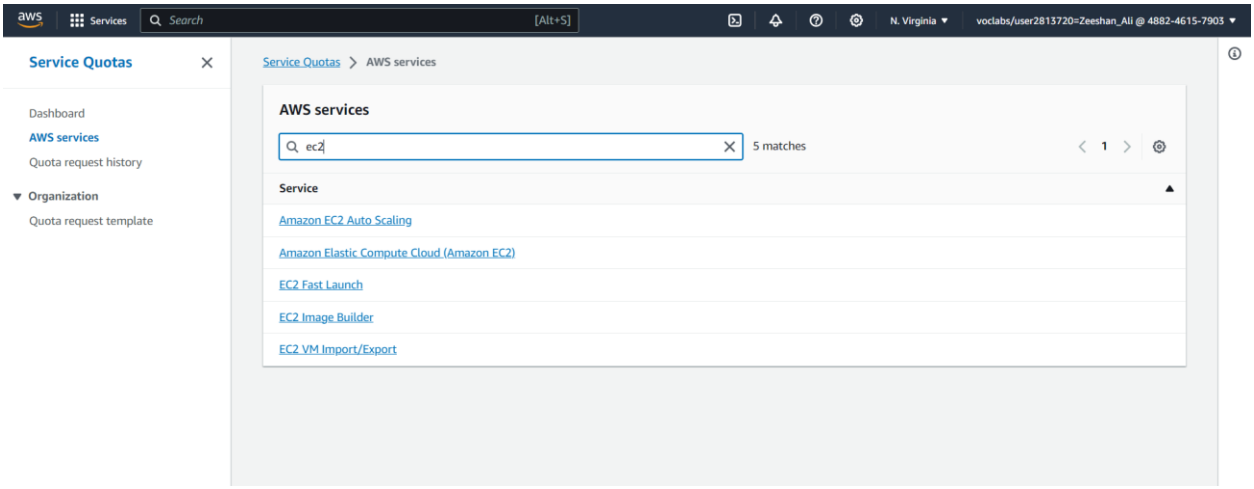

Figure 38: search for ec2

54. In the *Find quotas* search bar, search for `running on-demand`, but do not make a selection. Instead, observe the filtered list of service quotas that match the criteria.

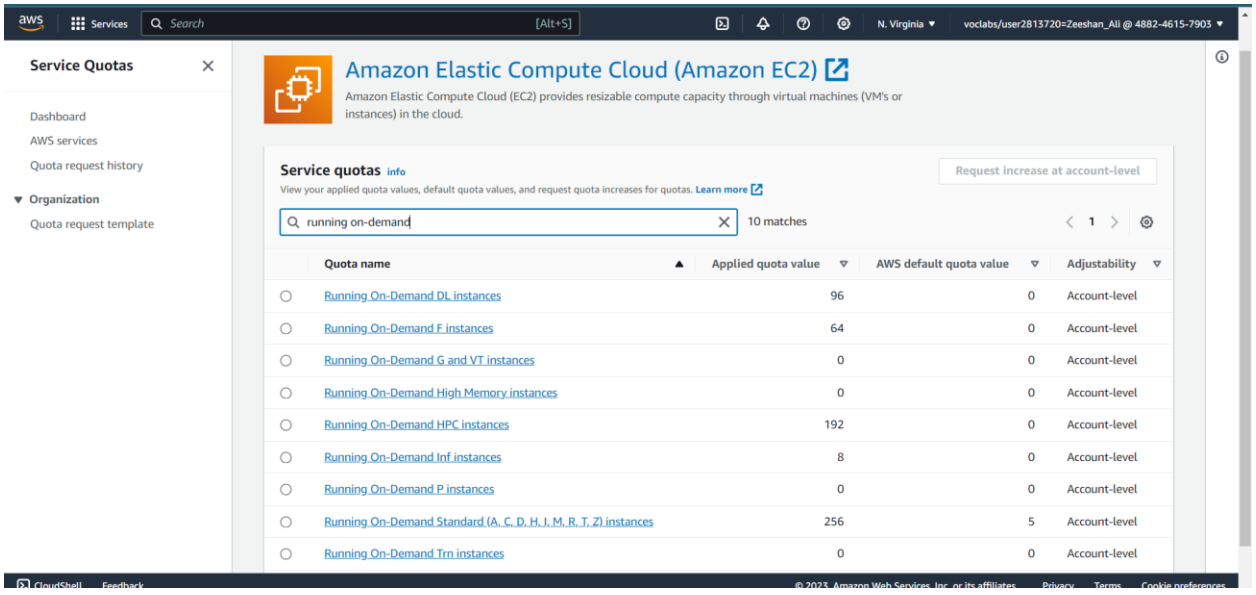

Figure 39: search for running on-demand.

Notice that there are limits on the number and types of instances that can run in a region. For example, there is a limit on the number of *Running On-Demand Standard...* instances that you can launch in this region. When launching instances, the request must not cause your usage to exceed the instance limits currently defined in that region. You can request an increase for many of these limits.

Task 6: Test Termination Protection

You can delete your instance when you no longer need it. This is referred to as *terminating* your instance. You cannot connect to or restart an instance after it has been terminated. In this task, you will learn how to use *termination protection*.

55. In the AWS Management Console, in the search box next to **Services**, search for and choose `EC2` to return to the EC2 console.
56. In left navigation pane, choose **Instances**.
57. Select the **Web Server** instance and in the Instance state menu, select **Terminate instance**.

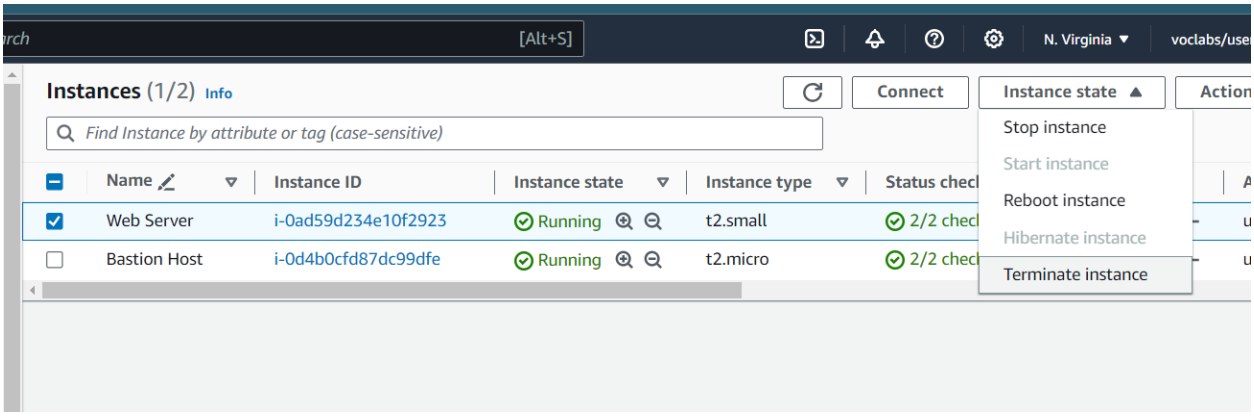

Figure 40: select Terminate instance.

58. Then choose Terminate.

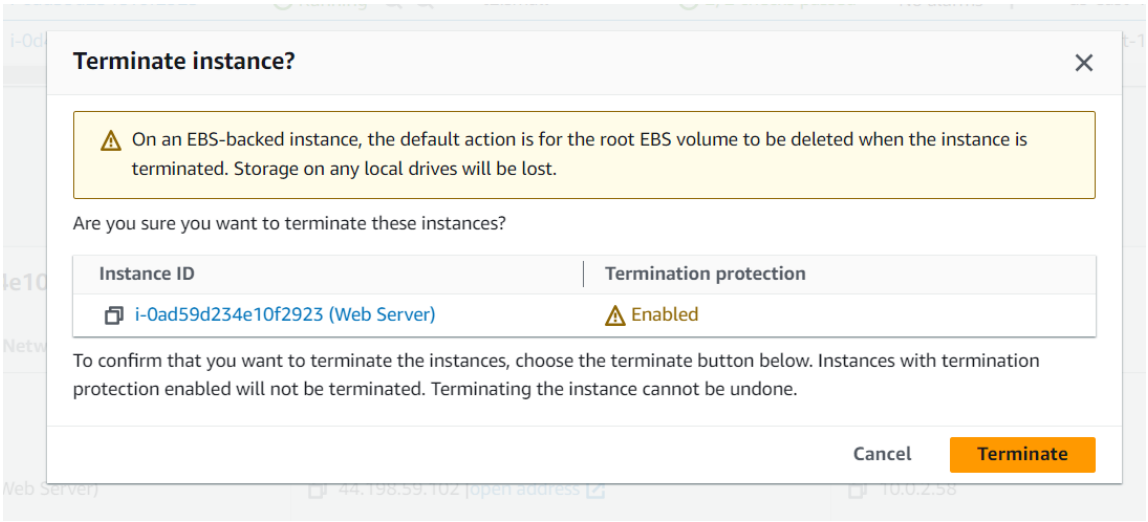

Figure 41: choose Terminate.

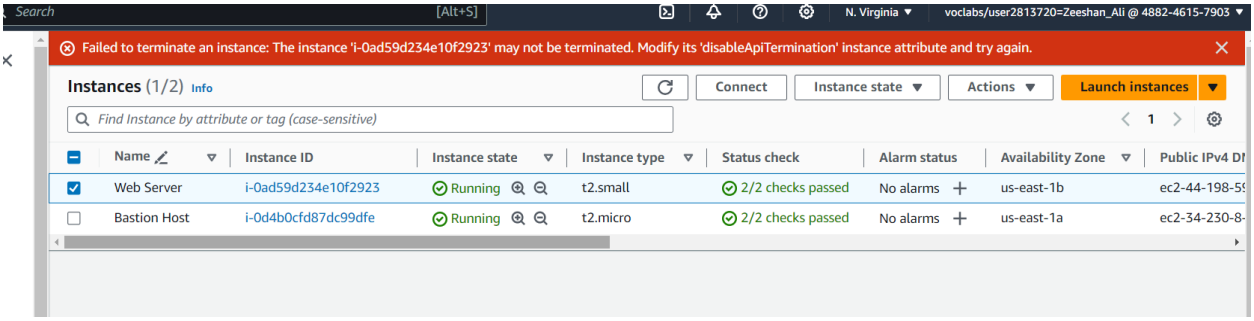

Figure 42: a message: Failed to terminate instance.

Note that there is a message that says: *Failed to terminate the instance i-1234567xxx. The instance 'i-1234567xxx' may not be terminated. Modify its 'disableApiTermination' instance attribute and try again.*

This is a safeguard to prevent the accidental termination of an instance. If you really want to terminate the instance, you will need to disable the termination protection.

59. In the Actions menu, select **Instance settings Change termination protection**.

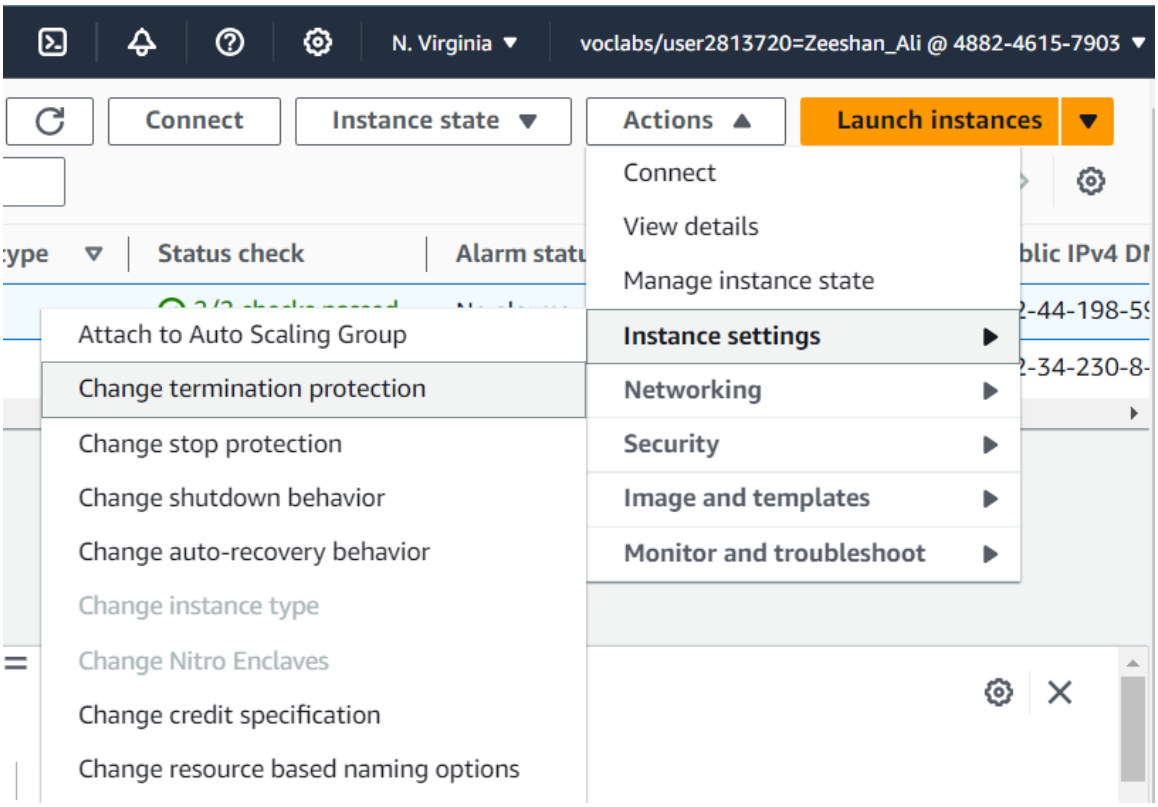

Figure 43: Change termination protection

60. Remove the check next to **Enable**.

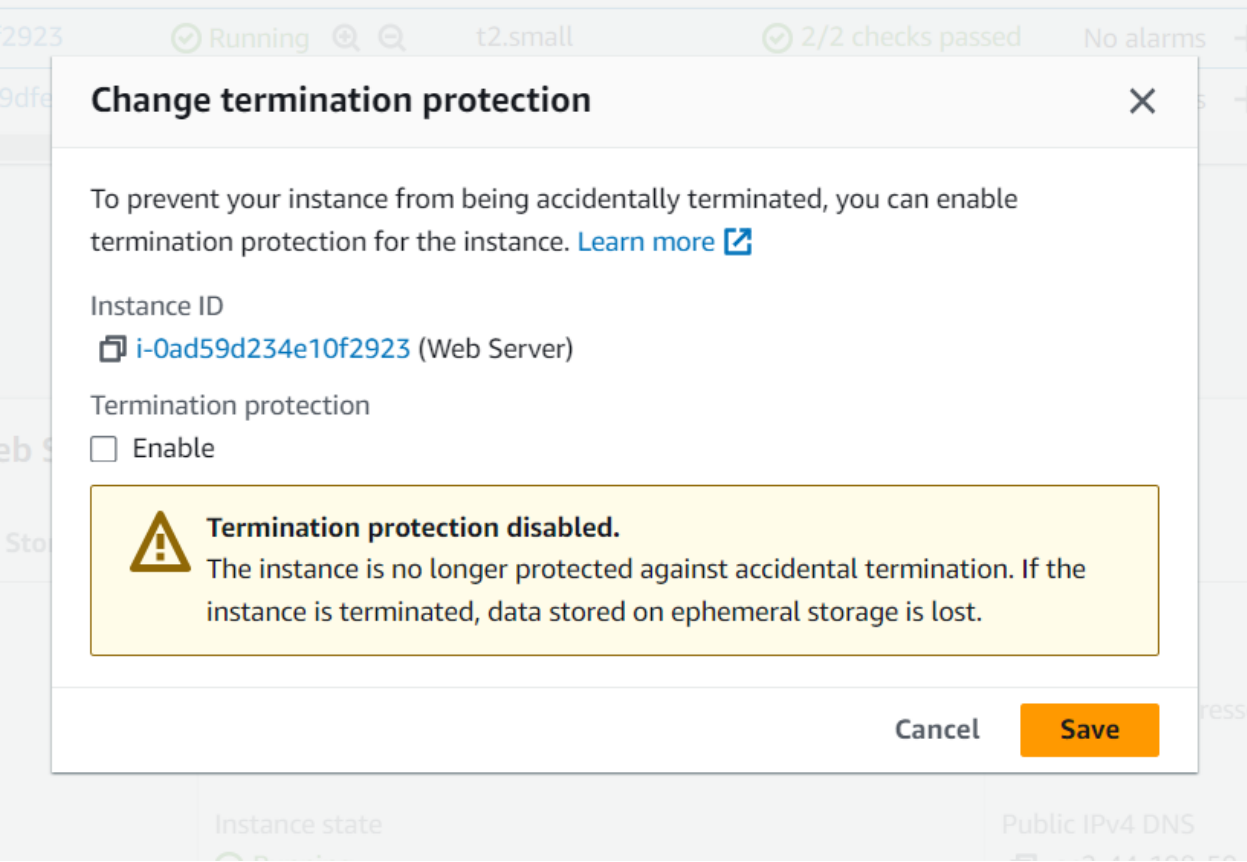

Figure 44: Remove check of Enable.

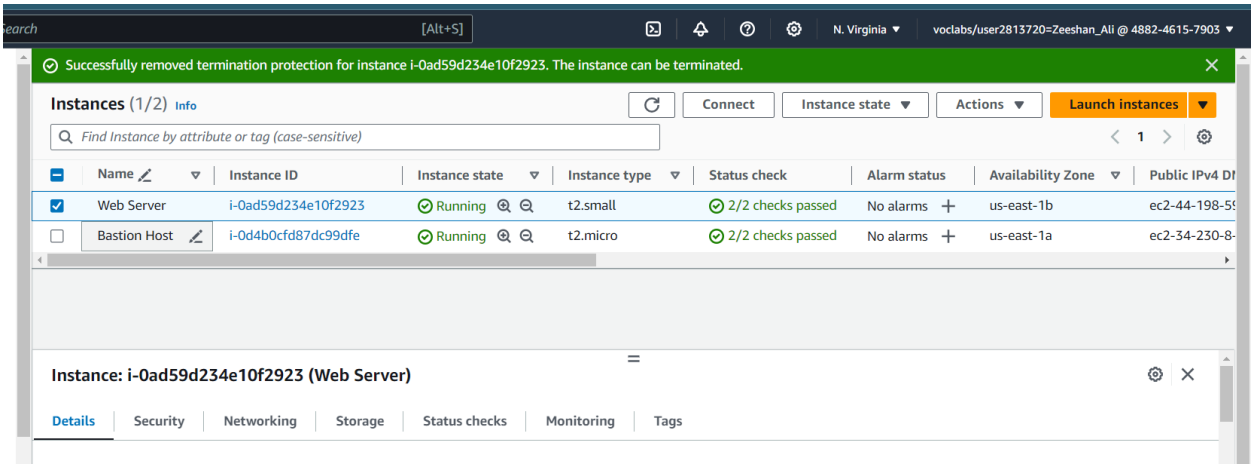

Figure 45: updated the Change termination protection.

61. Choose Save. You can now terminate the instance.

62. Select the **Web Server** instance again and in the Instance state menu, select **Terminate instance**.
63. Choose Terminate.

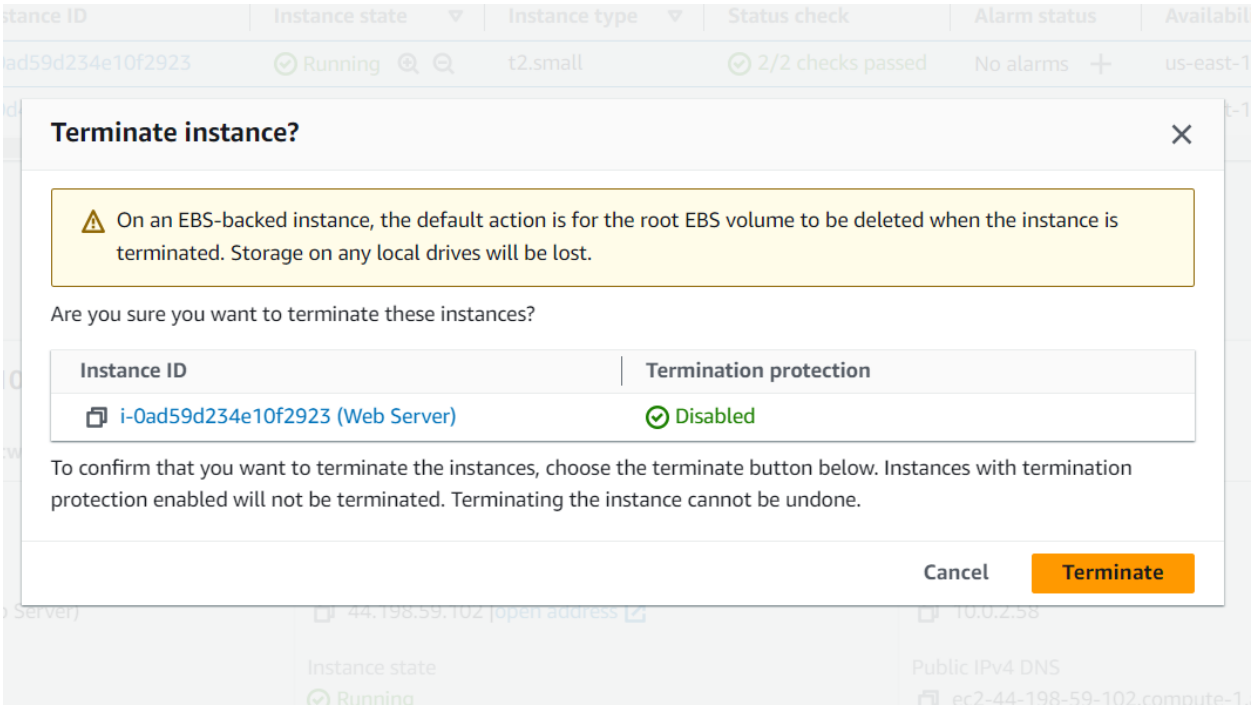

Figure 46: Choose Terminate

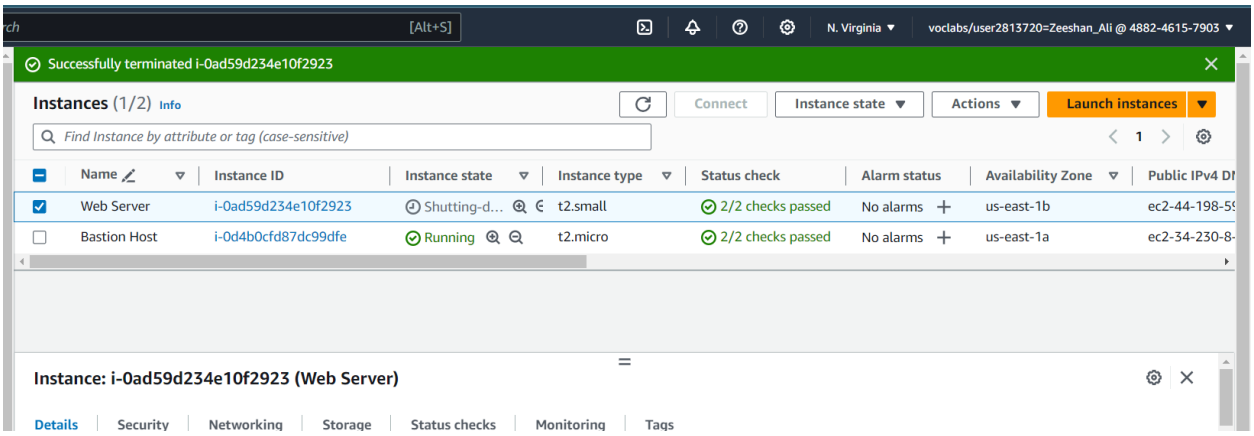

Figure 47: successfully tested termination protection.

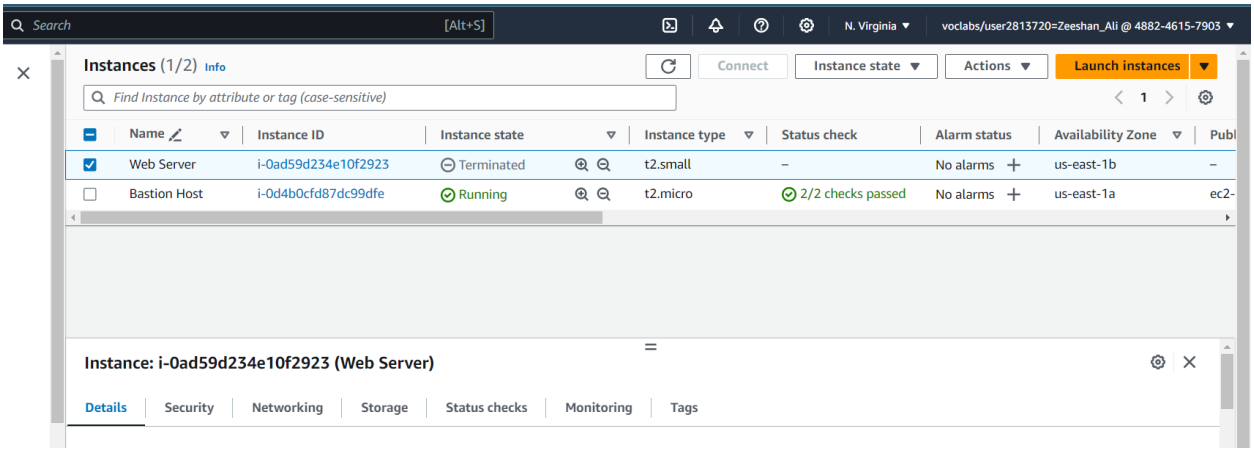

Figure 48: successfully terminated instance status.

Congratulations! You have successfully tested termination protection and terminated your instance.

Lab Complete

Congratulations! You have completed the lab.

64. Choose End Lab at the top of this page and then choose Yes to confirm that you want to end the lab.

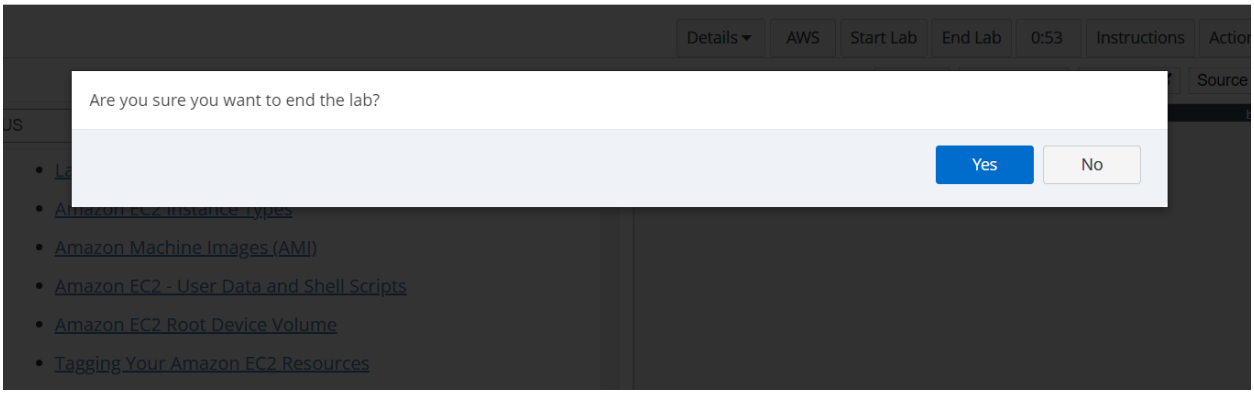

Figure 49: End Lab panel

An End Lab panel will appear, indicating that "You may close this message box now."

65. Choose the **X** in the top right corner to close the panel.

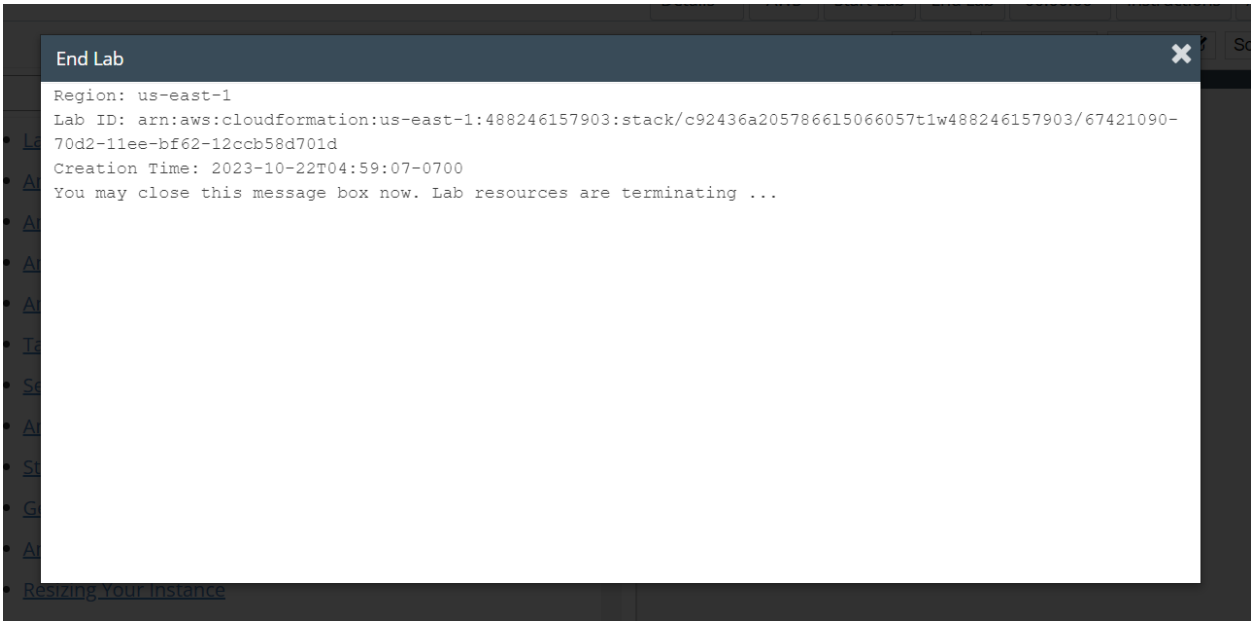

Figure 50: All resources are terminating.