COS20019

Cloud Computing Architechture

Week 2 – ACF Lab 3 Report
Introduction to EC2

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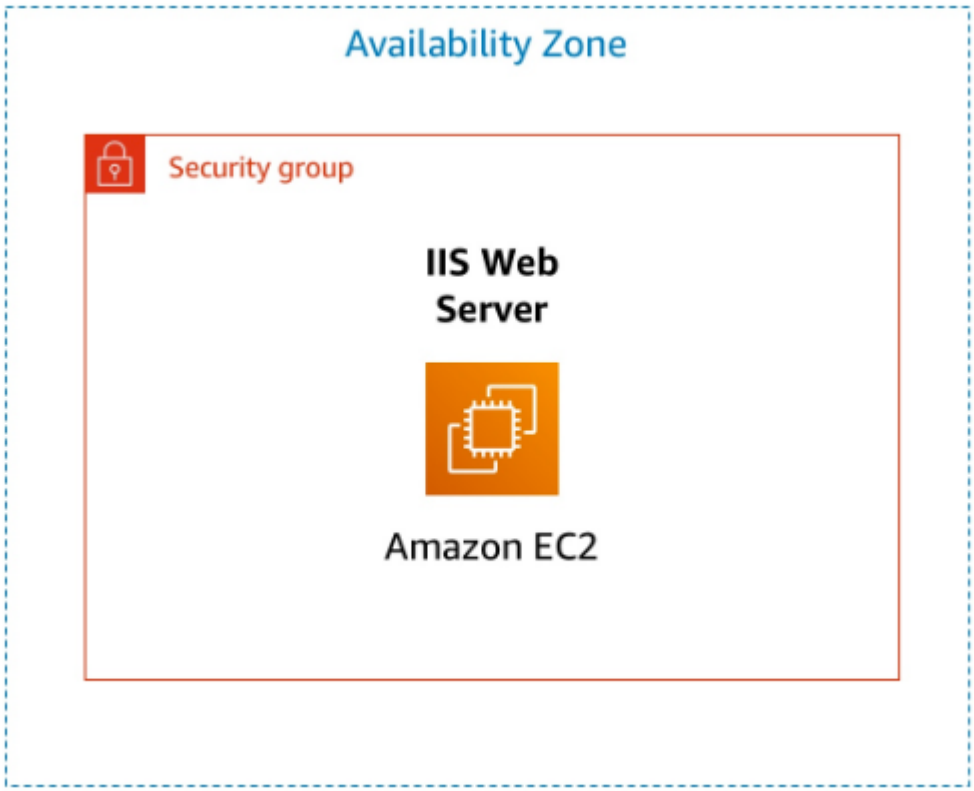
Lab 3: Introduction to Amazon EC2

A. Lab overview and objectives



This lab provides you with a basic overview of launching, resizing, managing, and monitoring an Amazon EC2 instance.

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.

After completing this lab, you should be able to do the following:

- Launch a web server with termination protection enabled
- Monitor Your EC2 instance
- Modify the security group that your web server is using to allow HTTP access
- Resize your Amazon EC2 instance to scale and enable stop protection
- Explore EC2 limits
- Test stop protection
- Stop your EC2 instance

Duration

This lab takes approximately **35 minutes** to complete.

AWS service restrictions

In this lab environment, access to AWS services and service actions might be restricted to the ones that are needed to complete the lab instructions. You might encounter errors if you attempt to access other services or perform actions beyond the ones that are described in this lab.

Accessing the AWS Management Console

1. At the top of these instructions, choose **Start Lab**.
   - The lab session starts.
   - A timer displays at the top of the page and shows the time remaining in the session.

   Tip: To refresh the session length at any time, choose **Start Lab** again before the timer reaches 0:00.

   - Before you continue, wait until the circle icon to the right of the AWS link in the upper-left corner turns green.

Figure 1: Lab Started

2. To connect to the AWS Management Console, choose the AWS link in the upper-left corner.
   - A new browser tab opens and connects you to the console.

   Tip: If a new browser tab does not open, a banner or icon is usually at the top of your browser with the message that your browser is preventing the site from opening pop-up windows. Choose the banner or icon, and then choose **Allow pop-ups**.

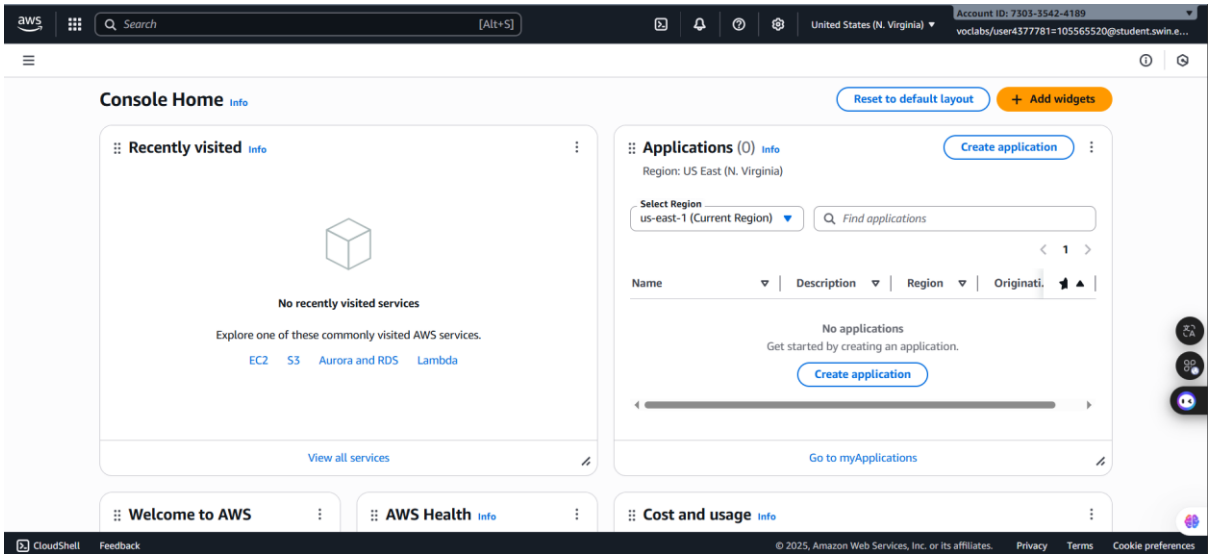


Figure 2: AWS Management Console

3. Arrange the AWS Management Console tab so that it displays along side 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.

Getting Credit for your work

At the end of this lab you will be instructed to submit the lab to receive a score based on your progress.

Tip: The script that checks you works may only award points if you name resources and set configurations as specified. In particular, values in these instructions that appear in `This Format` should be entered exactly as documented (case-sensitive).

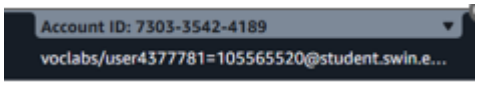
B. Tasks

Task 1: Launch Your Amazon EC2 Instance

In this task, you will launch an Amazon EC2 instance with *termination protection* and *stop protection*. Termination protection prevents you from accidentally terminating the EC2 instance and stop protection prevents you from accidentally stopping the EC2 instance. You will also specify a User Data script when you launch the instance that will deploy a simple web server

4. In the **AWS Management Console** choose **Services**, choose **Compute** and then choose **EC2**.

Note: Verify that your EC2 console is currently managing resources in the **N. Virginia** (us-east-1) region. You can verify this by looking at the drop down menu at the top of the screen, to the left of your username. If it does not already indicate N. Virginia, choose the N. Virginia region from the region menu before proceeding to the next step.



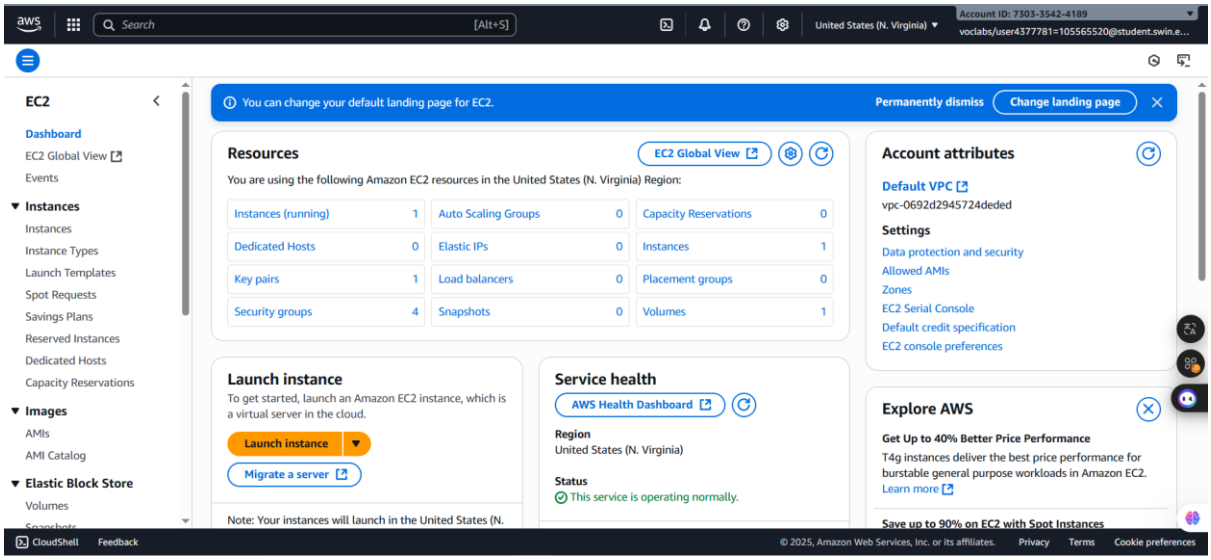


Figure 3: EC2 Dashboard

5. Choose the **Launch instance** menu and select **Launch instance**.

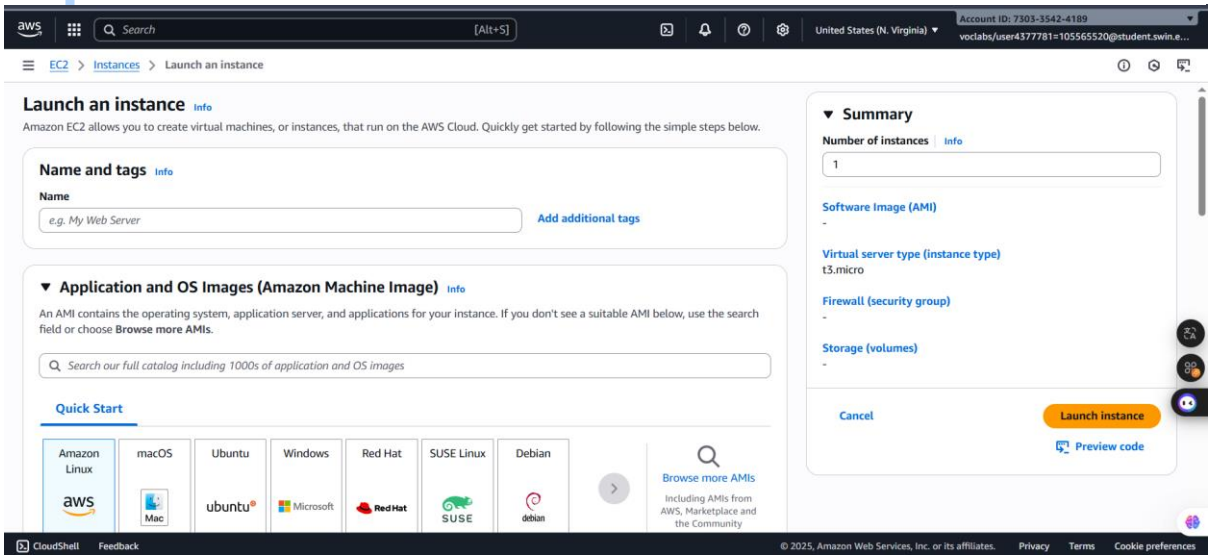


Figure 4: Launch Instance page

Step 1: Name and tags

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

ℹ The Name you give this instance will be stored as a tag. Tags enable you to categorize your AWS resources in different ways, for example, by purpose, owner, or environment. This is useful when you have many resources of the same type — you can quickly identify a specific resource based on the tags you have assigned to it. Each tag consists of a Key and a Value, both of which you define. You can define multiple tags to associate with the instance if you want to.

In this case, the tag that will be created will consist of a *key* called `Name` with a *value* of `Web Server`

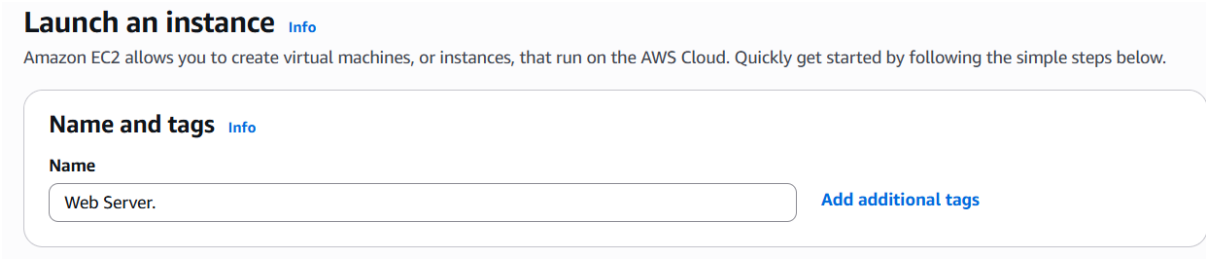


Figure 5: Set the instance name

Step 2: Application and OS Images (Amazon Machine Image)

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

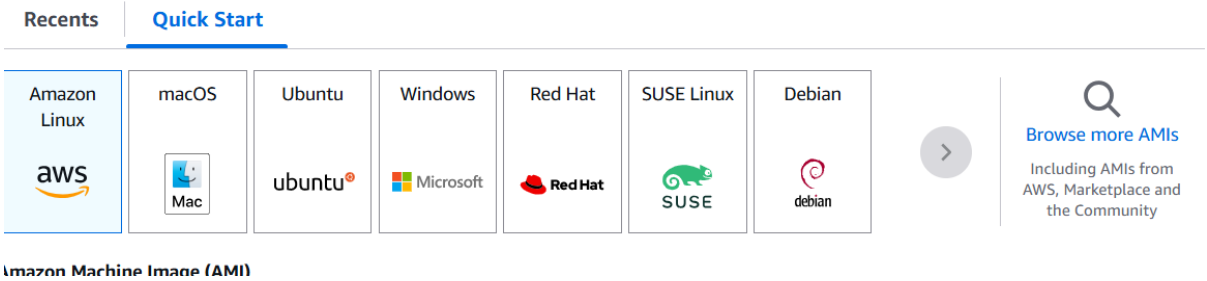


Figure 6: Quick Start Selection

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

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.

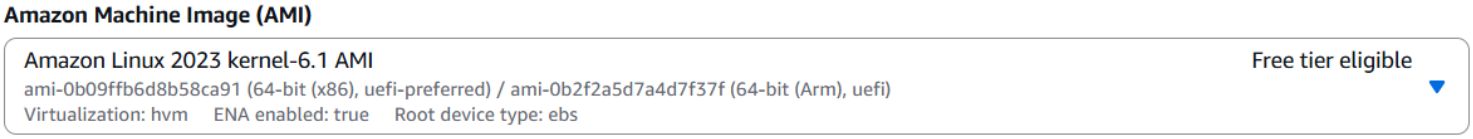


Figure 7: AMI Amazon Linux version

Step 3: Instance type

9. In the *Instance type* panel, keep the default **t2.micro** selected.

ℹ Amazon EC2 provides a wide selection of *instance types* optimized to fit different use cases. Instance types comprise varying combinations of CPU, memory, storage, and networking capacity and give you the flexibility to choose the appropriate mix of resources for your applications. Each instance type includes one or more *instance sizes*, allowing you to scale your resources to the requirements of your target workload.

The t2.micro instance type has 1 virtual CPU and 1 GiB of memory.

Note: You may be restricted from using other instance types in this lab.

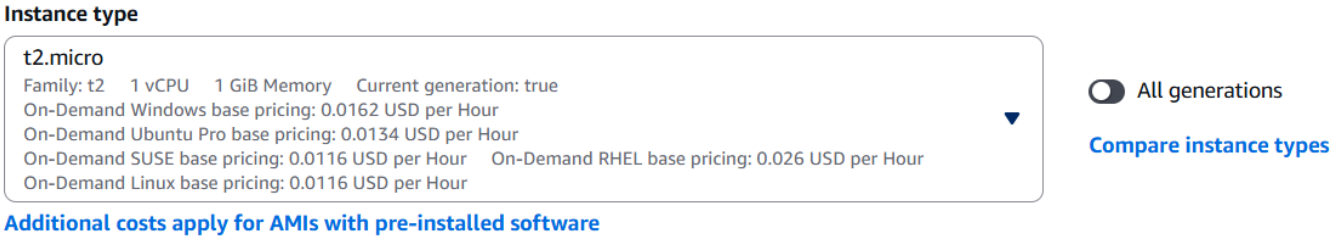


Figure 8: instance type selection

Step 4: Key pair (login)

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

ℹ Amazon EC2 uses public–key cryptography to encrypt and decrypt login information. To ensure you will be able to log in to the guest OS of the instance you create, you identify an existing key pair or create a new key pair when launching the instance. Amazon EC2 then installs the key on the guest OS when the instance is launched. That way, when you attempt to login to the instance and you provide the private key, you will be authorized to connect to the instance.

Note: In this lab you will not actually use the key pair you have specified to log into your instance.

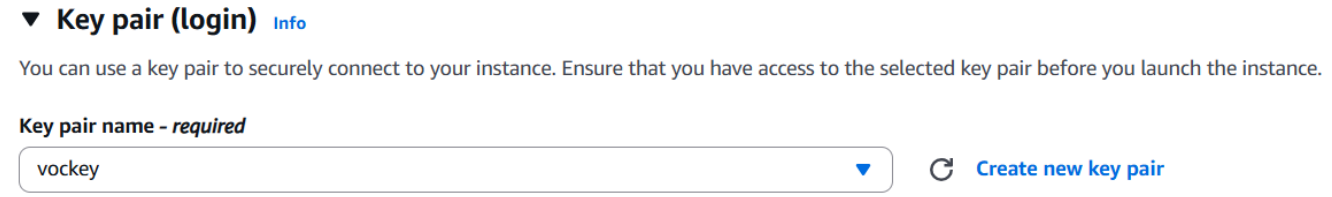


Figure 9: Key pair (login) selection

Step 5: Network settings

11. Next to Network settings, choose **Edit.**

12. 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.

ℹ **Note**: Keep the default subnet **PublicSubnet1**. This is the subnet in which the instance will run. Notice also that by default, the instance will be assigned a public IP address.

Figure 10: VPC and Subnet selection

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

      ℹ A *security group* acts as a virtual firewall that controls the traffic for one or more instances. When you launch an instance, you associate one or more security groups with the instance. You add *rules* to each security group that allow traffic to or from its associated instances. You can modify the rules for a security group at any time; the new rules are automatically applied to all instances that are associated with the security group.
    - Under **Inbound security group rules**, notice that one rule exists. **Remove** this rule.

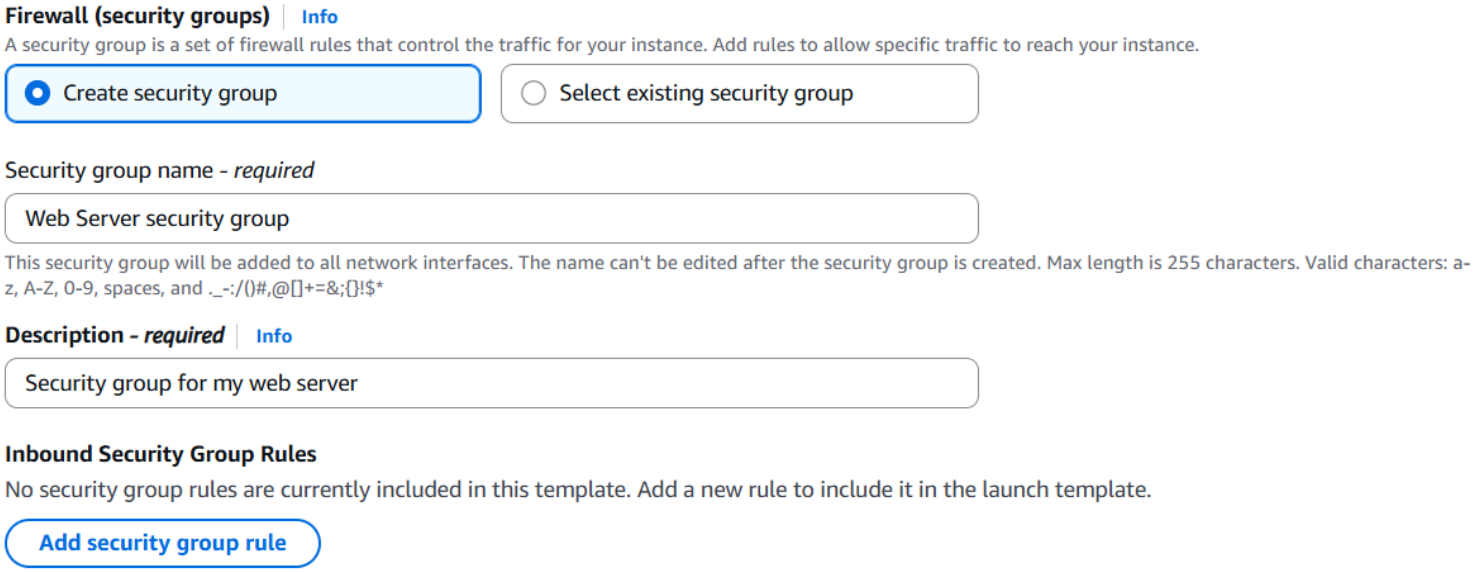


Figure 11: Firewall configuration

Step 6: Configure storage

14. In the *Configure storage* section, keep the default settings.

    ℹ Amazon EC2 stores data on a network-attached virtual disk called *Elastic Block Store*.

    You will launch the Amazon EC2 instance using a default 8 GiB disk volume. This will be your root volume (also known as a 'boot' volume).

Step 7: Advanced details

15. Expand ▸ **Advanced details.**

16. 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.

Termination protection | Info

Enable

Figure 12: Enable Terminal Protection

17. Scroll to the bottom of the page and then copy and paste the code shown below into the **User data** box:

User data - *optional* | Info

Upload a file with your user data or enter it in the field.

Choose file

```
#!/bin/bash
dnf install -y httpd
systemctl enable httpd
systemctl start httpd
echo '<html><h1>Hello From Your Web Server!</h1></html>' > /var/www/html/index.html
```

Figure 13: User data configuration

ⓘ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.

Your instance is running Amazon Linux 2023. The shell script you have specified will run as the root guest OS user when the instance starts. The script will:

- Install an Apache web server (httpd)
- Configure the web server to automatically start on boot

- Run the Web server once it has finished installing
- Create a simple web page

Step 8: Launch the instance

18. At the bottom of the **Summary** panel choose **Launch instance**

You will see a Success message.

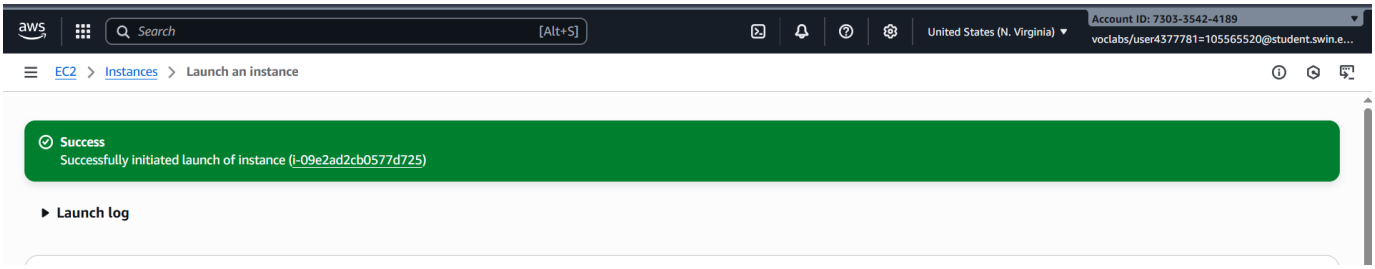


Figure 13: Launch instance successfully

19. Choose **View all instances**
    - In the Instances list, select **Web Server**.
    - Review the information displayed in the **Details** tab. It includes information about the instance type, security settings and network settings.

      The instance is assigned a *Public IPv4 DNS* that you can use to contact the instance from the Internet.

      To view more information, drag the window divider upwards.

      At first, the instance will appear in a *Pending* state, which means it is being launched. It will then change to *Initializing*, and finally to *Running*.

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

Congratulations! You have successfully launched your first Amazon EC2 instance.

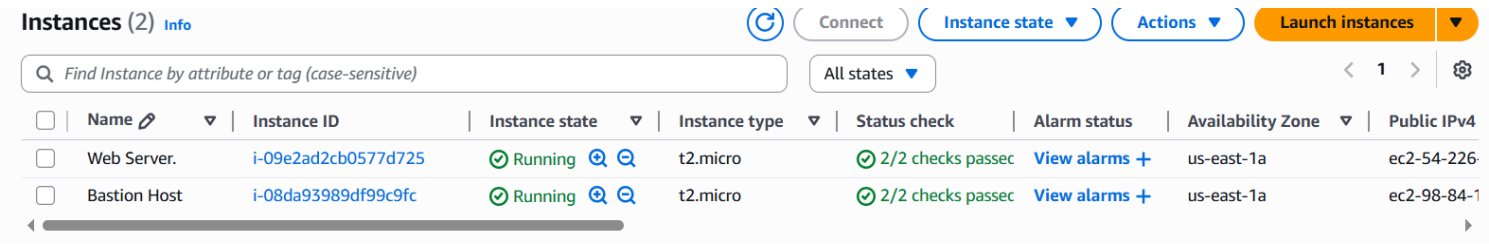


Figure 14: Launch the seb server successfully

Task 2: Monitor Your Instance

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

21. Choose the **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.

    Notice that both the **System reachability** and **Instance reachability** checks have passed.

Figure 15: Status Check

22. 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.

    You can choose the three dots icon in any graph and select **Enlarge** to see an expanded view of the chosen metric.

    Amazon EC2 sends metrics to Amazon CloudWatch for your EC2 instances. Basic (five-minute) monitoring is enabled by default. You can also enable detailed (one-minute) monitoring.

23. 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.

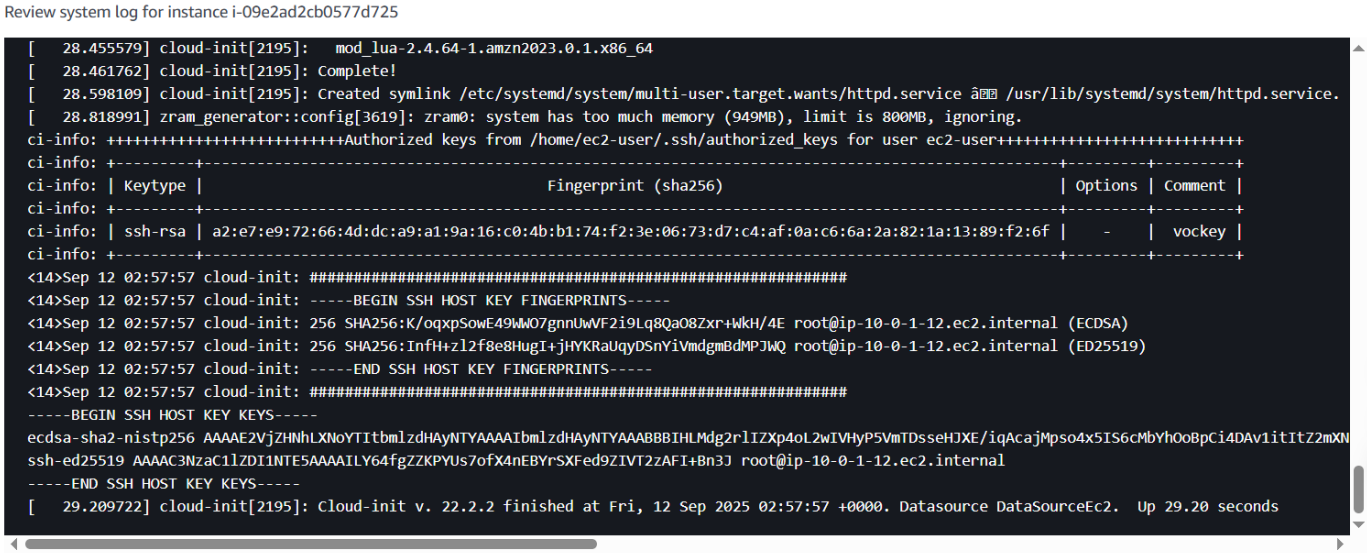


Figure 16: System Console Window

25. Choose **Cancel.**

Task 3: Update Your Security Group and Access the Web Server

28. Ensure **Web Server** is still selected. Choose the **Details** tab

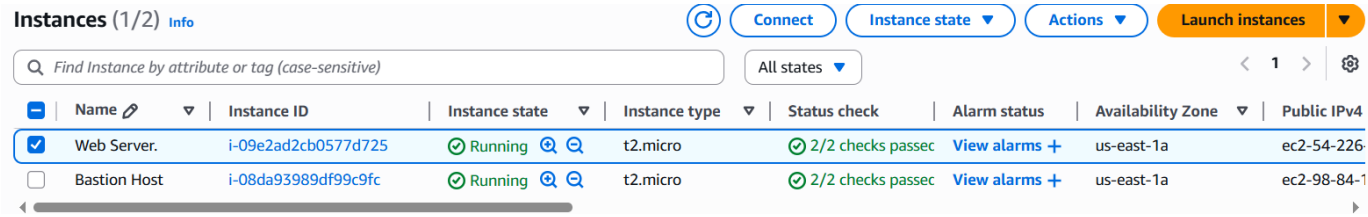


Figure 17: Web Server Selected

29. Copy the ***Public IPv4 address*** of your instance to your clipboard.

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

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.

From my perspective, I'm currently unable to access the web server because the security group is not permitting inbound traffic on port 80,, which is used for HTTP web requests. As a result, this is demostrate of using a security group as a firewall to restrict the network traffic and allowed in and out of instance

31. Keep the browser tab open, but return to the **EC2 Console** tab.

32. In the left navigation pane, choose **Security Groups**.

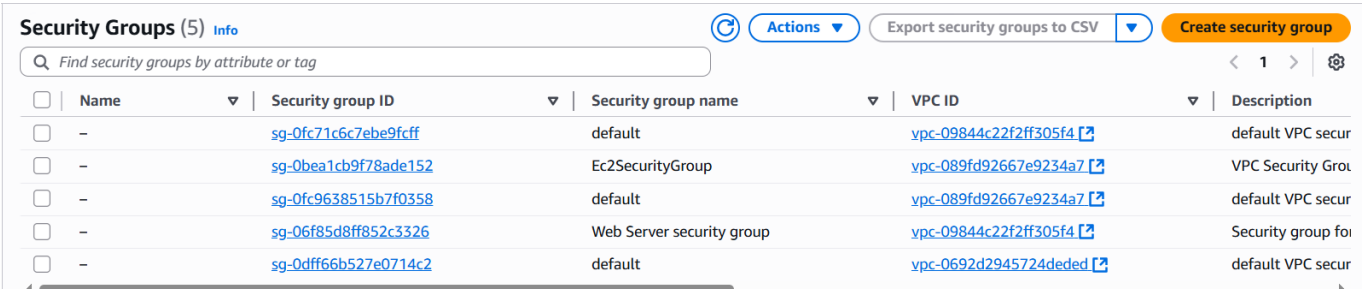


Figure 18: Security groups

33. Select **Web Server security group.**

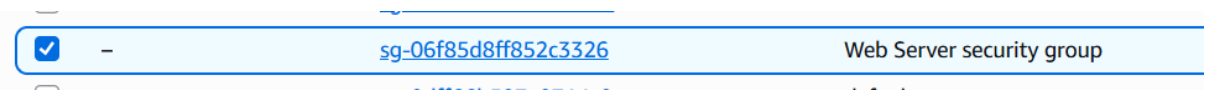


Figure 19: Wen Server Security group selected

34. Choose the **Inbound rules** tab.

The security group currently has no inbound rules.

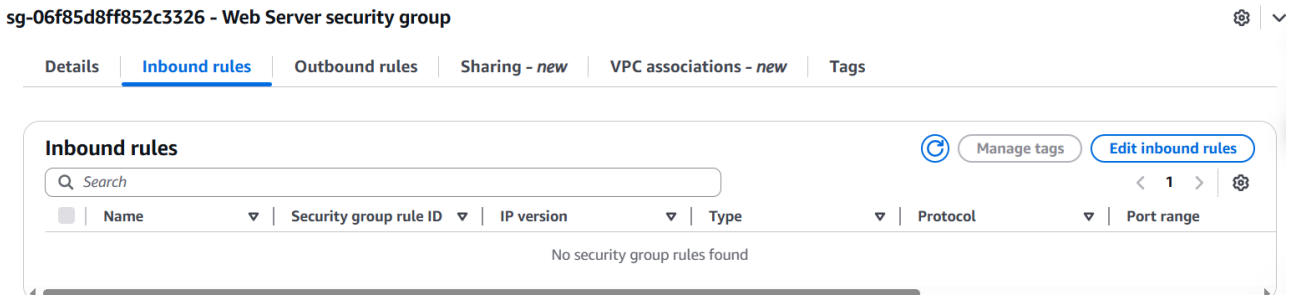


Figure 20: Inboud rules selected

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

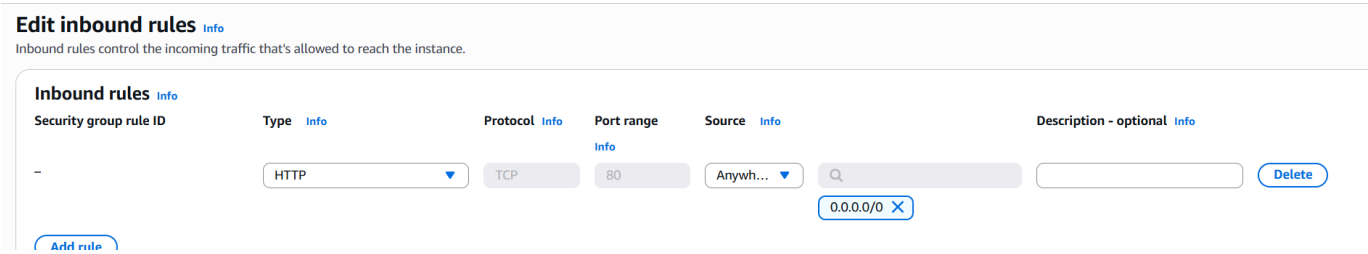


Figure 21: Inbound rules configuration

36. Return to the web server tab that you previously opened and refresh the page.

    You should see the message *Hello From Your Web Server!*

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

Task 4: Resize Your Instance: Instance Type and EBS Volume

As your needs change, you might find that your 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.

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.

37. On the **EC2 Management Console**, in the left navigation pane, choose **Instances** and then select the **Web Server** instance.

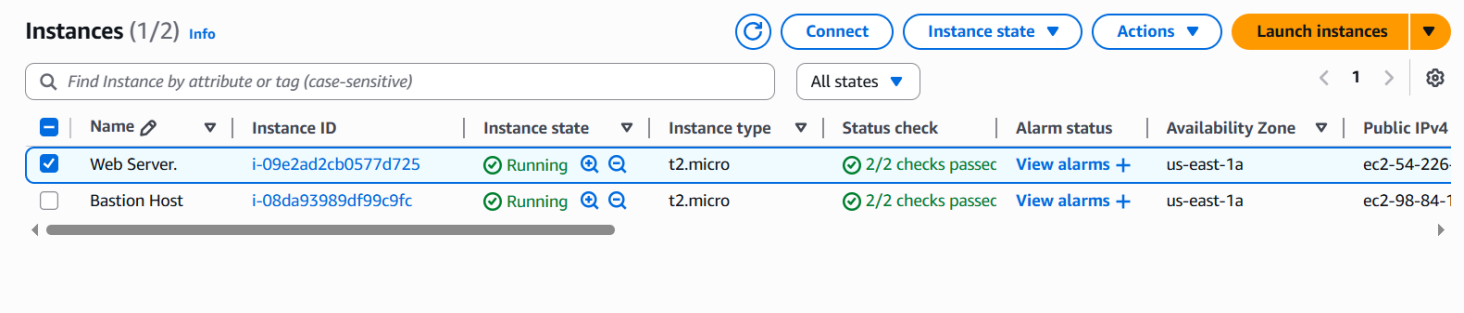


Figure 22: Web Server Instance selected

38. In the **Instance state** menu, select **Stop instance**.

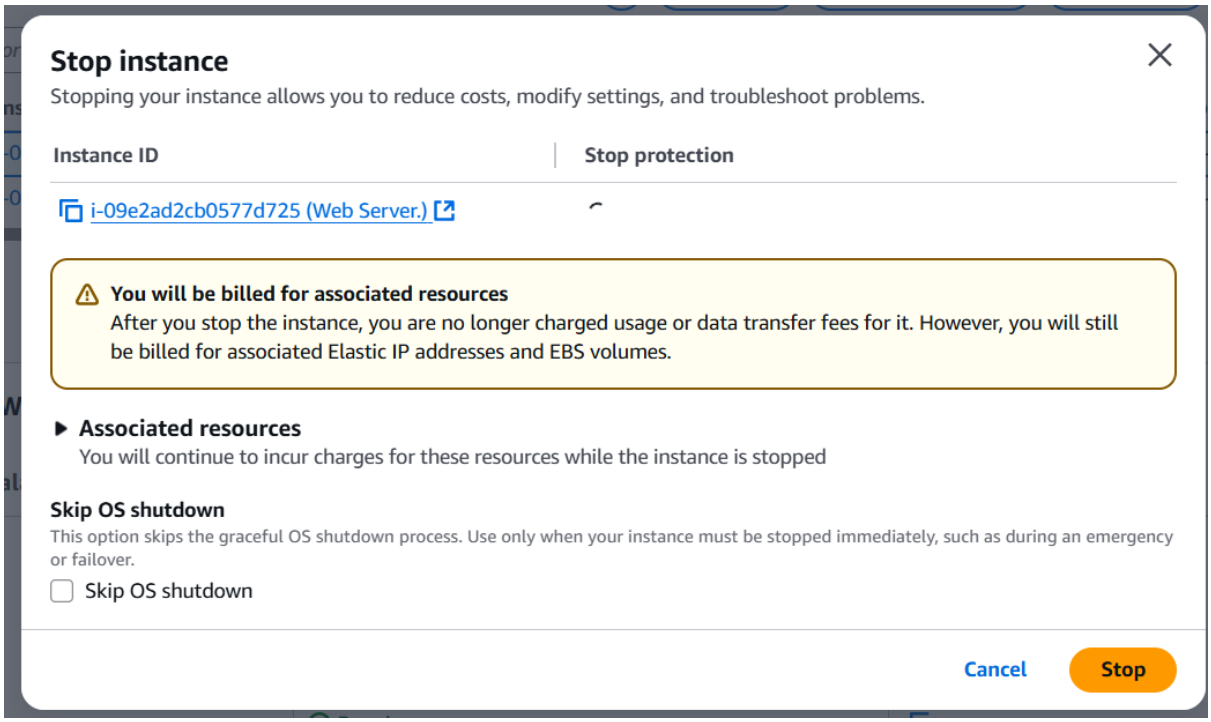


Figure 23: Stop Instance Annoucement

39. Choose **Stop**

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

40. Wait for the **Instance state** to display: 🔴 *Stopped*.

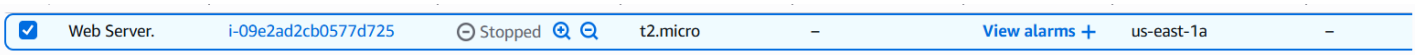


Figure 24: Instance stopped

Change The Instance Type and enable stop protection

41. Select the Web Server instance, then 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. **NOTE**: You may be restricted from using other instance types in this lab.

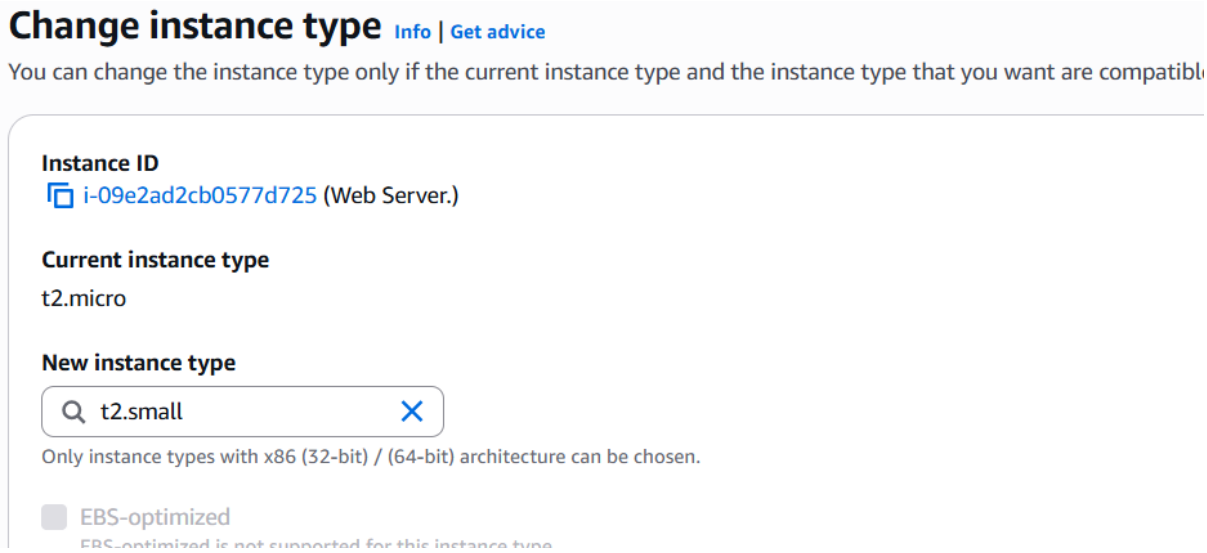


Figure 25: Change Instance type

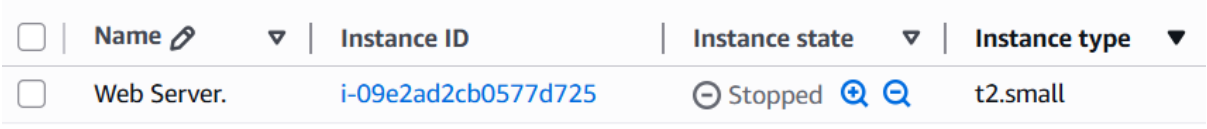


Figure 26: Instance changed successfully

42. Select the Web Server instance, then in the **Actions** menu, select **Instance settings** ▸ **Change stop protection**. Select **Enable** and then **Save** the change.

When you stop an instance, the instance shuts down. When you later start the instance, it is typically migrated to a new underlying host computer and assigned a new *public* IPv4 address. An instance retains its assigned *private* IPv4 address. When you stop an instance, it is not deleted. Any EBS volumes and the data on those volumes are retained.

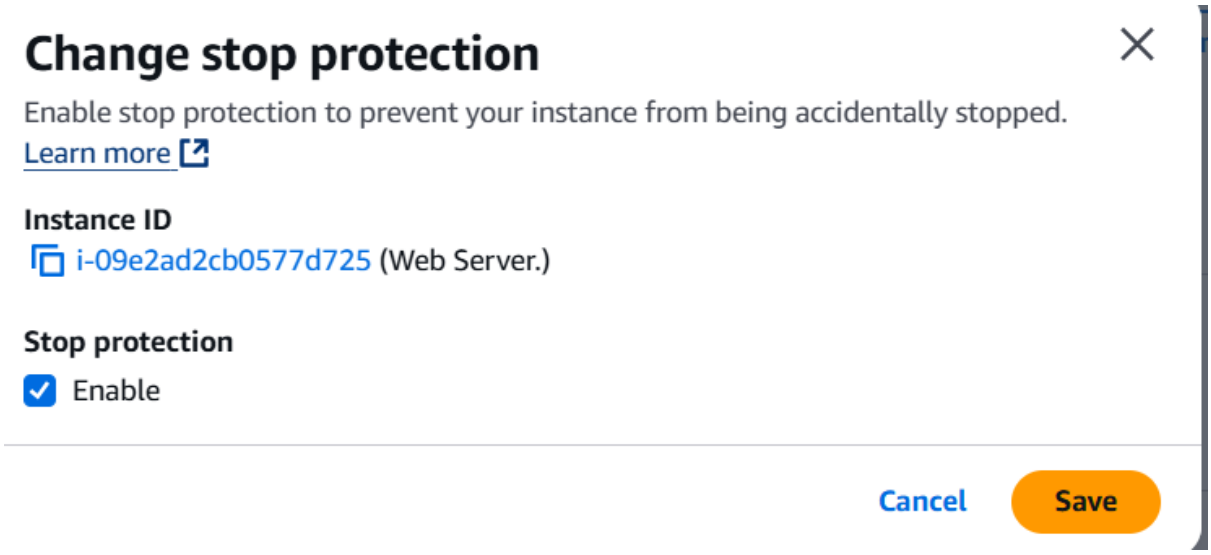


Figure 27: Stop protection configuration

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.

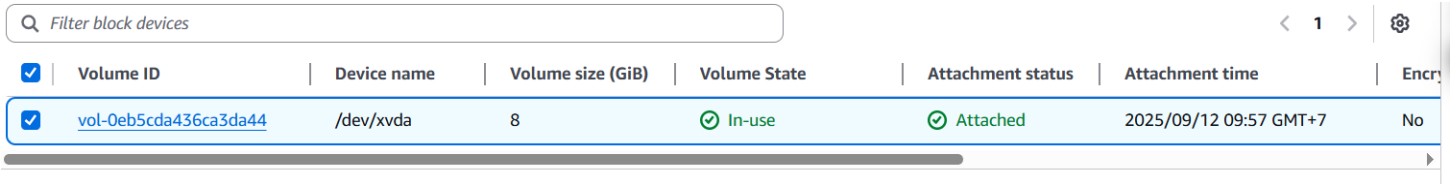


Figure 28: Storage tab

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.

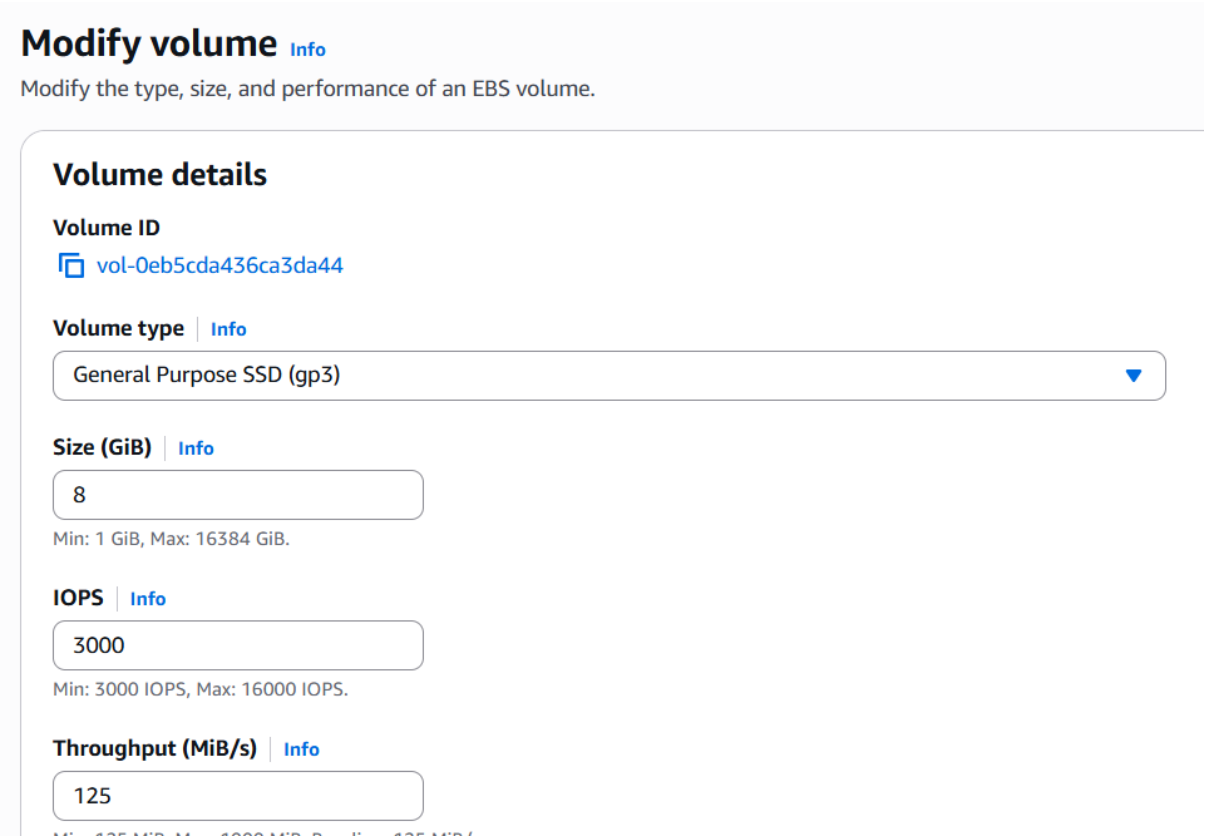


Figure 29: Modify volume

45. Change the size to: 10 **NOTE**: You may be restricted from creating Amazon EBS volumes larger than 10 GB in this lab.

Figure 30: Size changed

46. Choose **Modify**

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

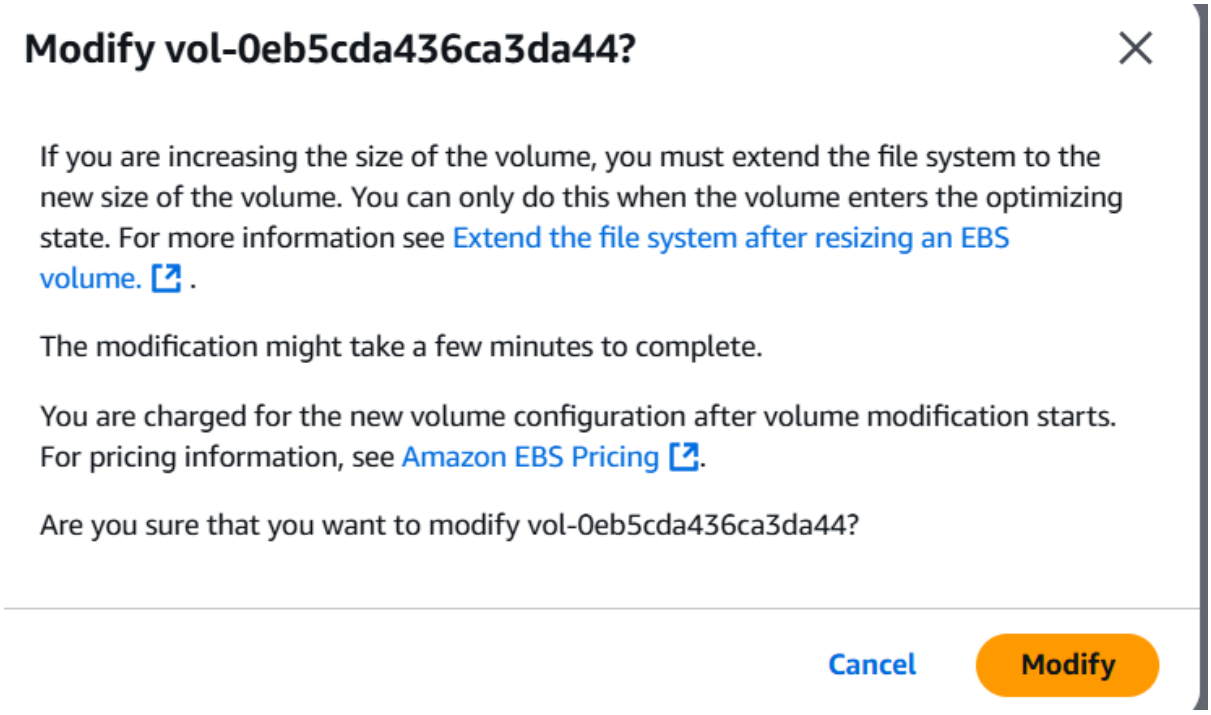


Figure 31: Modify volume size

Start the Resized Instance

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

48. In left navigation pane, choose **Instances.**
49. Select the **Web Server** instance.

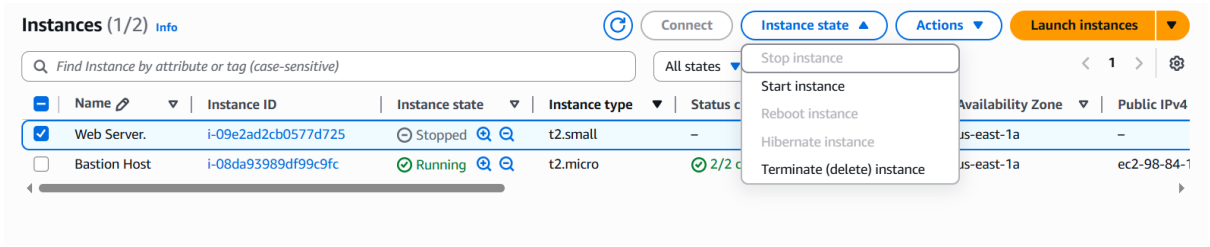


Figure 31: Start instance

50. In the **Instance state** menu, select **Start instance**.

Congratulations! You have successfully resized your Amazon EC2 Instance. In this task you changed your instance type from *t2.micro* to *t2.small*. You also modified your root disk volume from 8 GiB to 10 GiB.

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.

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

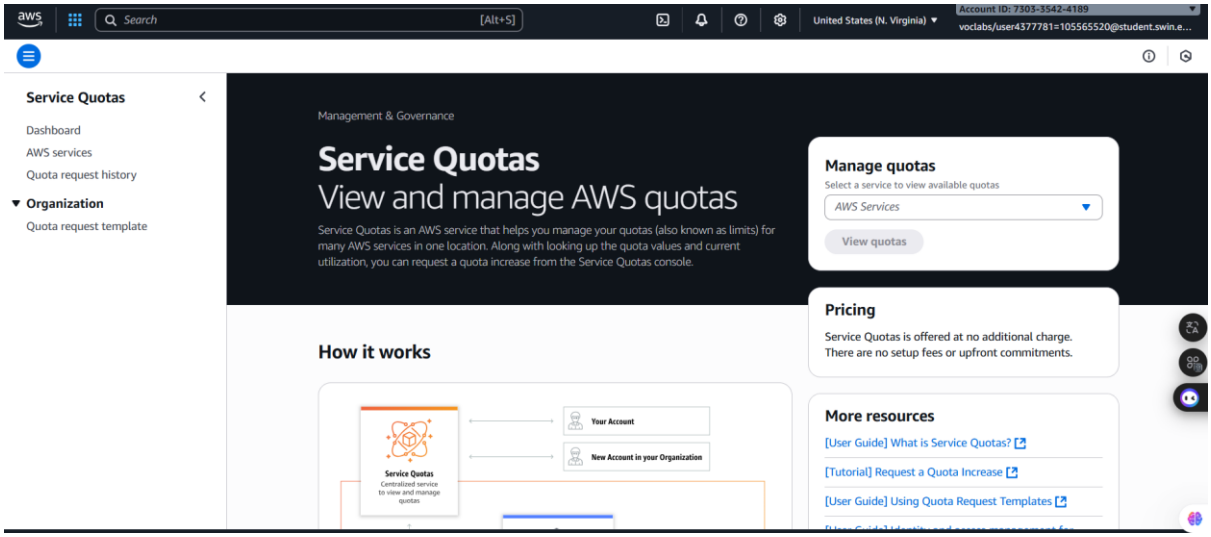


Figure 32: Service Quotas Homepage

52. 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).**

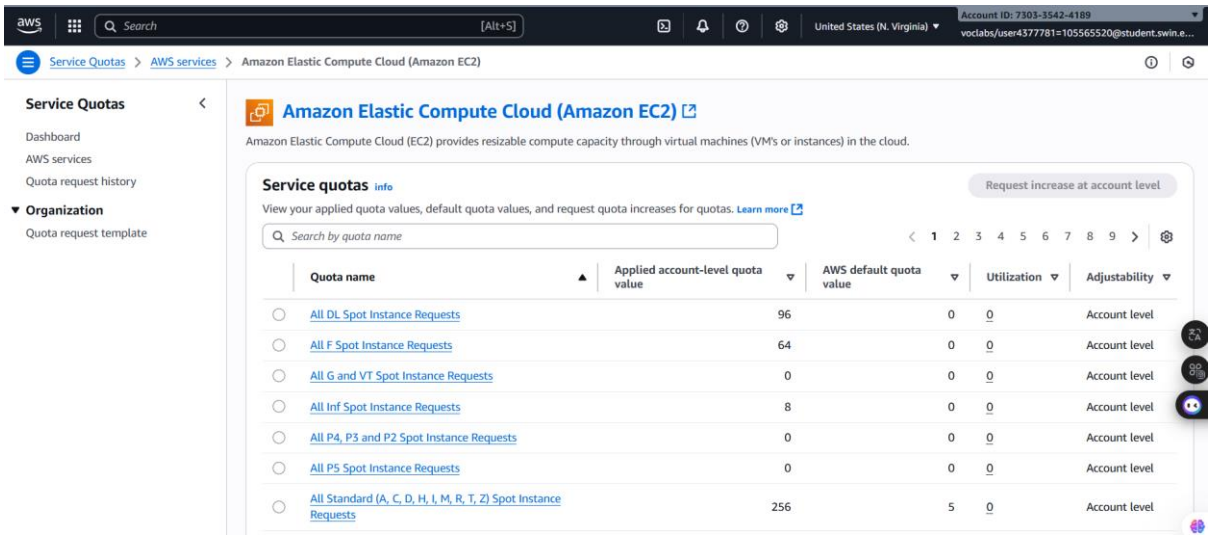


Figure 33: Searching result

53. 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.

    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.

    If you are the AWS account owner, you can request an increase for many of these limits.

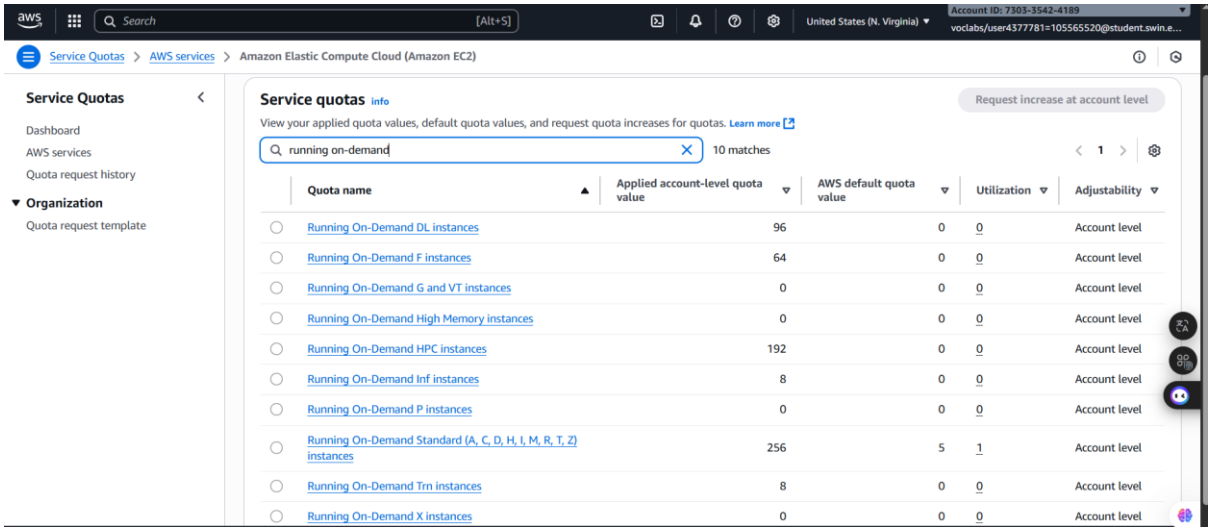


Figure 34: Criteria list

Task 6: Test Stop Protection

You can stop your instance when you do not need to access but you would still like to retain it. In this task, you will learn how to use stop protection.

54. In the AWS Management Console, in the search box next to **Services**, search for and choose `EC2` to return to the EC2 console.

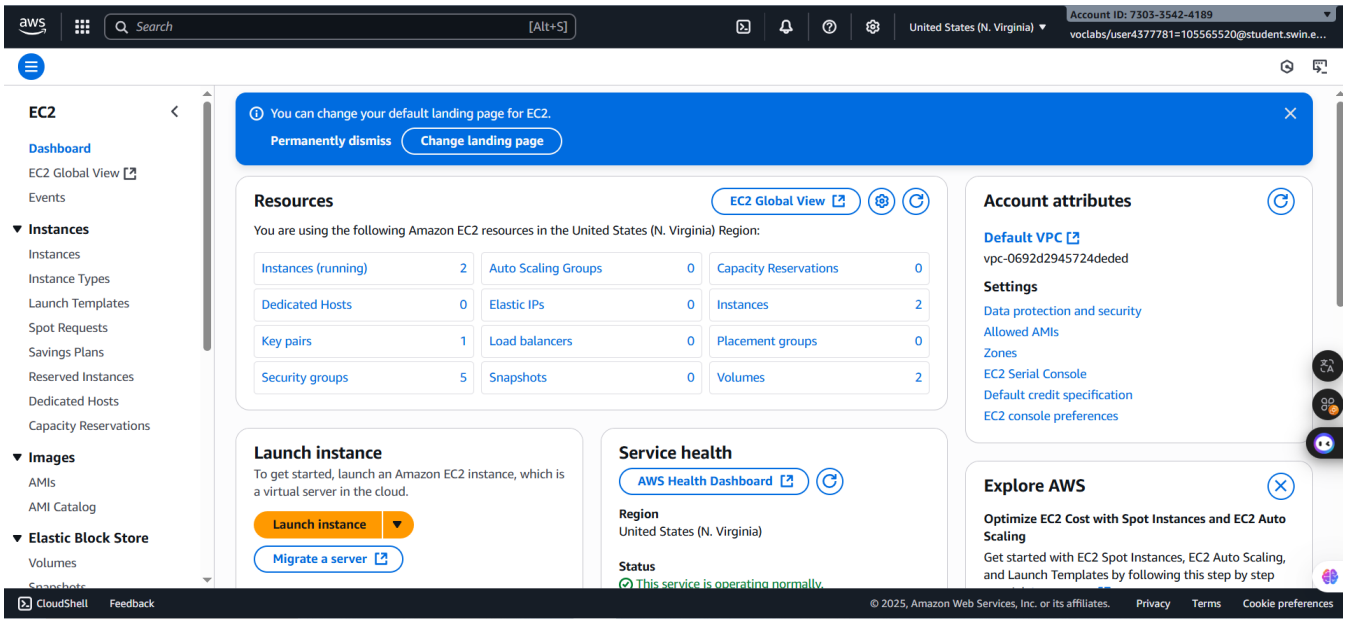


Figure 35: EC2 Homepage

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

56. Select the **Web Server** instance and in the **Instance state** menu, select **Stop instance**.

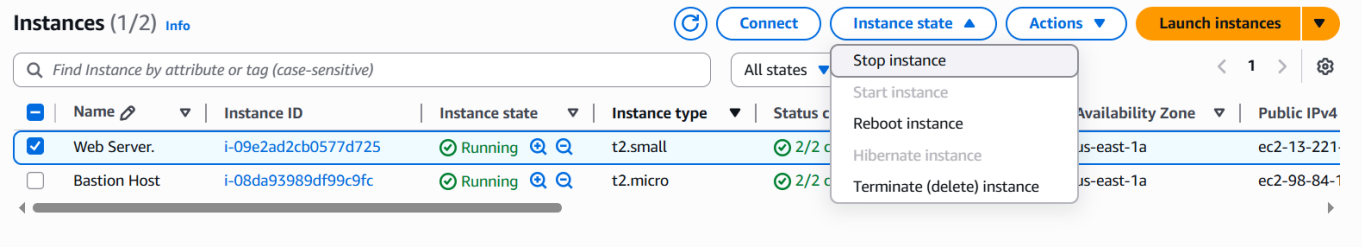


Figure 36: Choose instance to stop

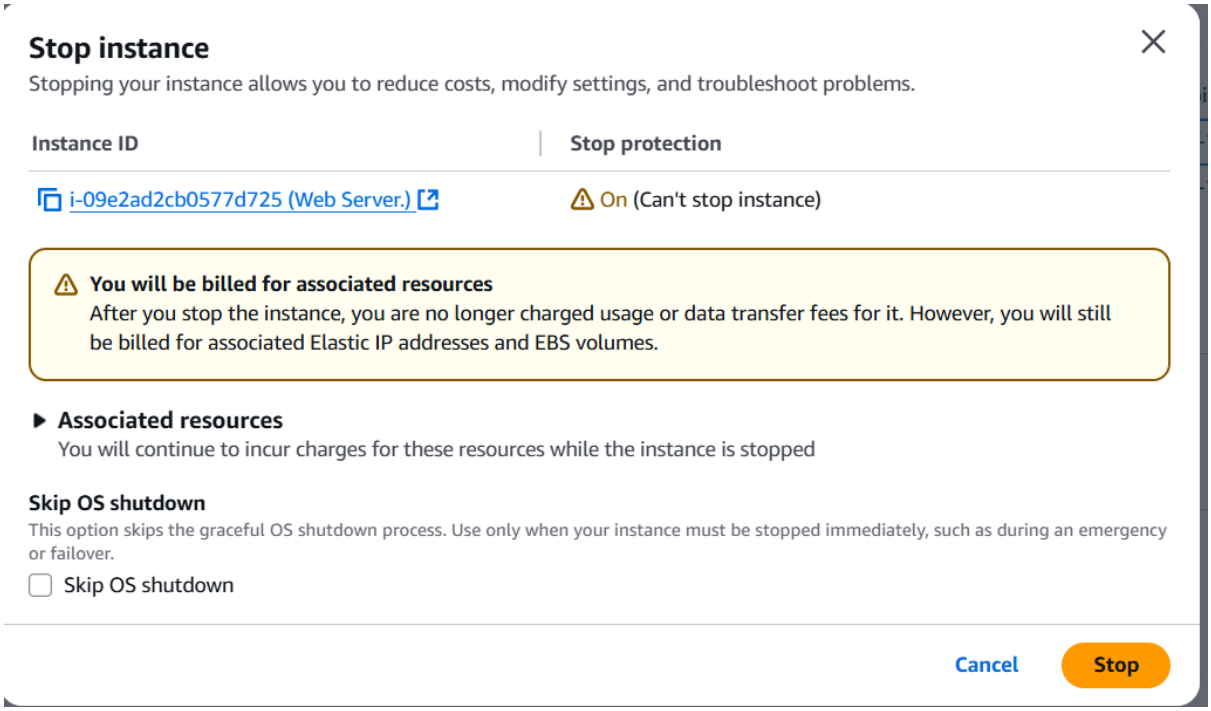


Figure 37: Stop instance announcement

57. Then choose **Stop**

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

This shows that the stop protection that you enabled earlier in this lab is now providing a safeguard to prevent the accidental stopping of an instance. If you really want to stop the instance, you will need to disable the stop protection.

58. In the **Actions** menu, select **Instance settings** ▸ **Change stop protection**.

59. Remove the check next to ☐ **Enable**.

60. Choose **Save**

    You can now stop the instance.

61. Select the **Web Server** instance again and in the **Instance state** menu, select **Stop instance**.

62. Choose **Stop**

    Congratulations! You have successfully tested stop protection and stopped your instance.

C. Submiiting My Work

63. To record your progress, choose **Submit** at the top of these instructions.

64. When prompted, choose **Yes**.

    After a couple of minutes, the grades panel appears and shows you how many points you earned for each task. If the results don't display after a couple of minutes, choose **Grades** at the top of these instructions.

    Important: Some of the checks made by the submission process in this lab will only give you credit if it has been at least 5 minutes since you completed the action. If you do not receive credit the first time you submit, you may need to wait a couple minutes and the submit again to receive credit for these items.

    Tip: You can submit your work multiple times. After you change your work, choose **Submit** again. Your last submission is recorded for this lab.

65. To find detailed feedback about your work, choose **Submission Report**.

    Tip: For any checks where you did not receive full points, there are sometimes helpful details provided in the submission report.

Total score	25/25
Task 1 - EC2 instance created correctly	5/5
Task 2 - get system log requested	5/5
Task 3 - security group updated	5/5
Task 4 - EC2 instance updated	5/5
Task 6 - Instance stopped on second try	5/5