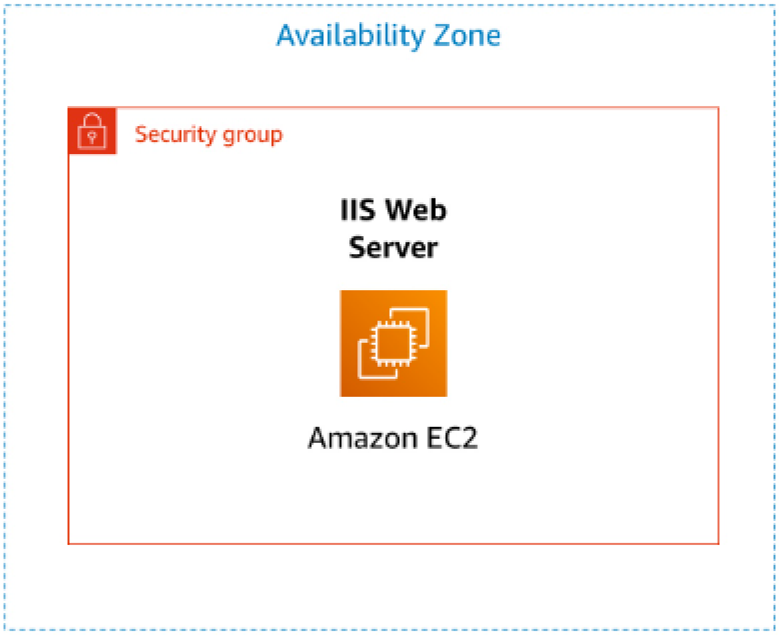
| Lab 11

Introduction to Amazon EC2

Student: Mane Zakarian
Bootcamp: Forge AWS re/Start UYMON5
Date: 2023

Overview



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.

Topics covered

By the end of this lab, you will be able to:

- 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
- Test termination protection
- Terminate your EC2 instance

Accessing the AWS Management Console

1. At the upper-right corner of these instructions, choose **Start Lab**

   Troubleshooting tip: If you get an **Access Denied** error, close the error box, and choose **Start Lab** again.

2. The lab status can be interpreted as follows:
   - A red circle next to AWS ● at the upper-left corner of this page indicates the lab has not been started.
   - A yellow circle next to AWS ● at the upper-left corner of this page indicates the lab is starting.
   - A green circle next to AWS ● at the upper-left corner of this page indicates the lab is ready.

   Wait for the lab to be ready before proceeding.

3. At the top of these instructions, choose the green circle next to AWS ●

   This option opens the AWS Management Console in a new browser tab. The system automatically sign you in.

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

4. Arrange the AWS Management Console tab so that it displays along side these instructions. Ideally, you should be able to see both browser tabs at the same time so that you can follow the lab steps.

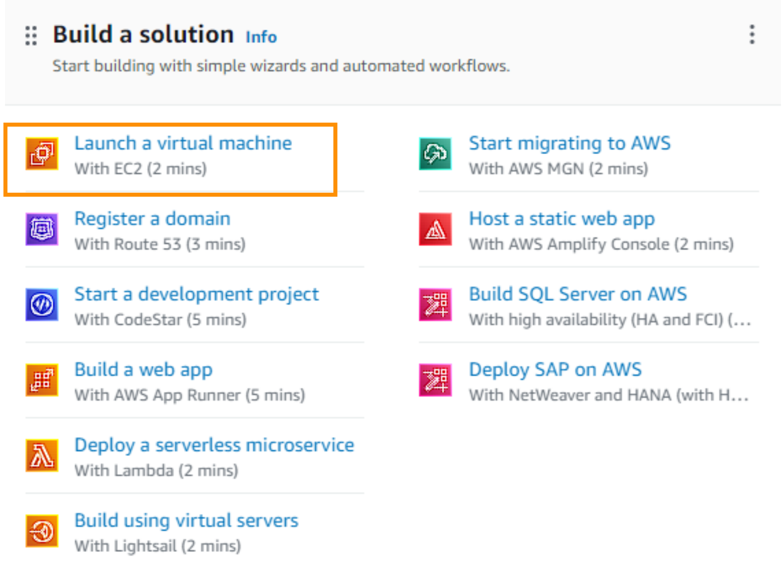
   Do not change the lab Region unless specifically instructed to do so.

   It takes a few minutes to provision the resources necessary to complete this lab.

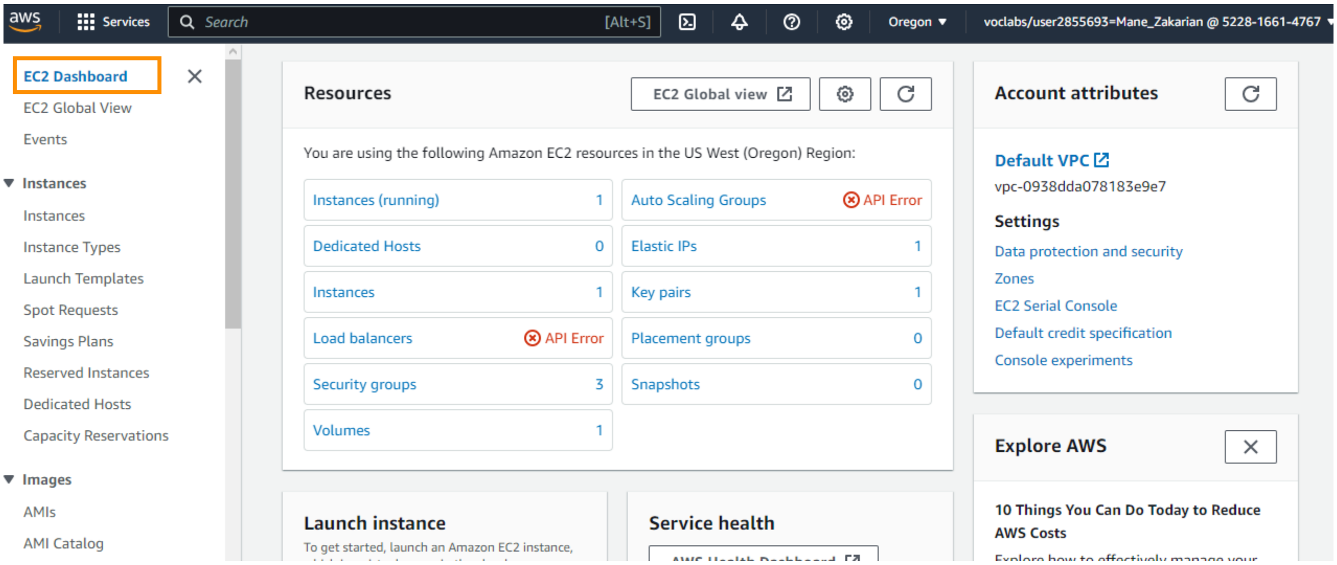
Task 1: Launching your EC2 instance

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

5. In the AWS Management Console on the **Services** menu, choose **EC2**.



6. In the left navigation pane, choose **EC2 Dashboard** to ensure that you are on the dashboard page.



EC2 Dashboard
EC2 Global View
Events

▼ Instances
Instances
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances
Dedicated Hosts
Capacity Reservations

▼ Images
AMIs
AMI Catalog

Resources EC2 Global view

You are using the following Amazon EC2 resources in the US West (Oregon) Region:

Instances (running)	1	Auto Scaling Groups	API Error
Dedicated Hosts	0	Elastic IPs	1
Instances	1	Key pairs	1
Load balancers	API Error	Placement groups	0
Security groups	3	Snapshots	0
Volumes	1		

Account attributes

Default VPC
vpc-0938dda078183e9e7

Settings
Data protection and security
Zones
EC2 Serial Console
Default credit specification
Console experiments

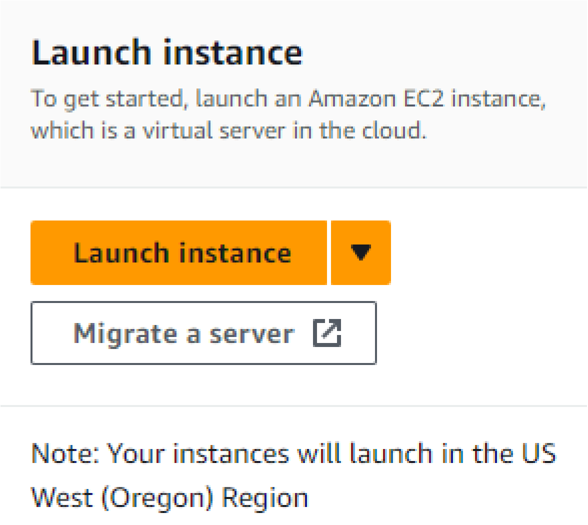
Explore AWS

10 Things You Can Do Today to Reduce AWS Costs
Explore how to effectively manage your

Launch instance
To get started, launch an Amazon EC2 instance,

Service health
AWS Health Dashboard

7. Choose Launch instance, and then select **Launch instance**.



Launch instance

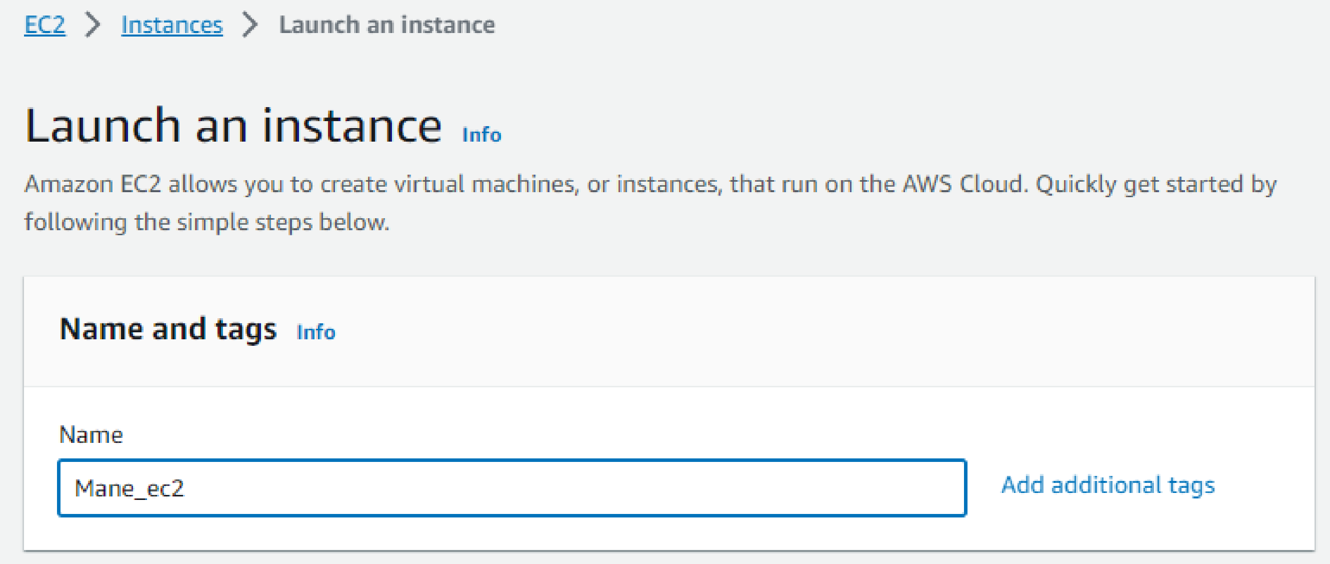
To get started, launch an Amazon EC2 instance, which is a virtual server in the cloud.

Note: Your instances will launch in the US West (Oregon) Region

Step 1: Naming your EC2 instance

When you name your instance, AWS creates a key value pair. The key for this pair is **Name**, and the value is the name you enter for your EC2 instance.

8. In the **Name and tags** pane, in the **Name** text box, enter `Web Server`.



EC2 > Instances > Launch an instance

Launch an instance Info

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.

Name and tags Info

Name

Mane_ec2

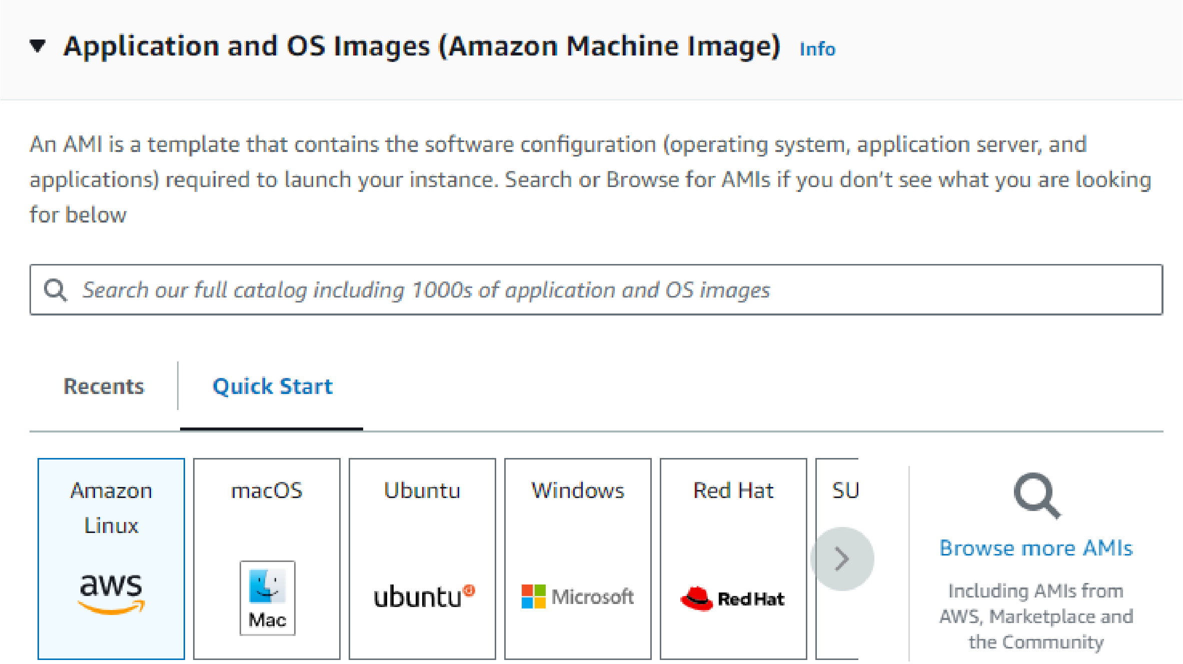
Step 2: Choosing an Amazon Machine Image (AMI)

An AMI provides the information required to launch an instance, which is a virtual server in the cloud. An AMI includes the following:

- 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.

9. Locate the **Application and OS Images (Amazon Machine Image)** pane.

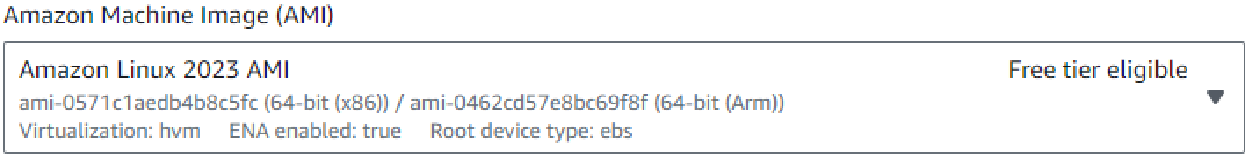


▼ Application and OS Images (Amazon Machine Image) Info

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

Search our full catalog including 1000s of application and OS images
Recents
Quick Start
Amazon Linux
aws
macOS
Mac
Ubuntu
ubuntu
Windows
Microsoft
Red Hat
Red Hat
SU
Browse more AMIs
Including AMIs from AWS, Marketplace and the Community

10. Under **AMI Machine Image (AMI)**, notice that the **Amazon Linux 2 AMI** image is selected by default. Keep this setting.



Amazon Machine Image (AMI)

Amazon Linux 2023 AMI — Free tier eligible
ami-0571c1aedb4b8c5fc (64-bit (x86)) / ami-0462cd57e8bc69f8f (64-bit (Arm))
Virtualization: hvm ENA enabled: true Root device type: ebs

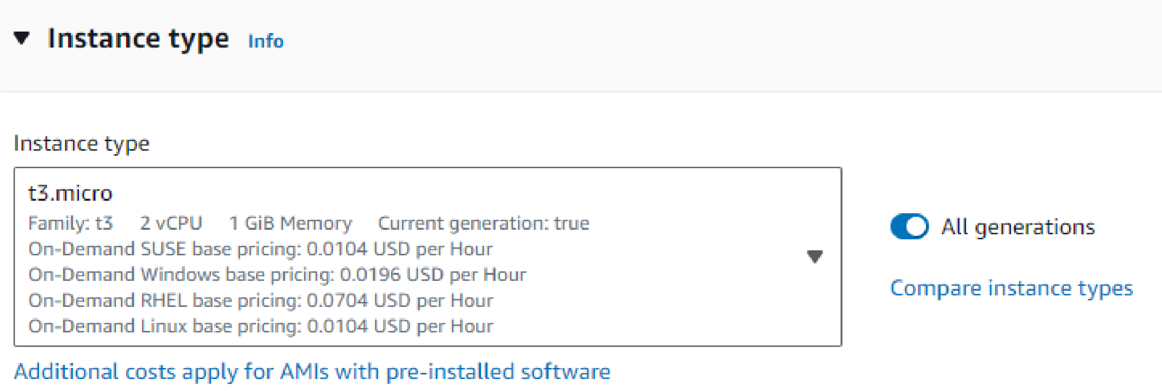
Step 3: Choosing an instance type

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* so that you can scale your resources to the requirements of your target workload.

Select a **t3.micro** instance. This instance type has 2 virtual CPU and 1 GiB of memory.

11. From the dropdown, select **t3.micro**.

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



▼ **Instance type** Info

Instance type

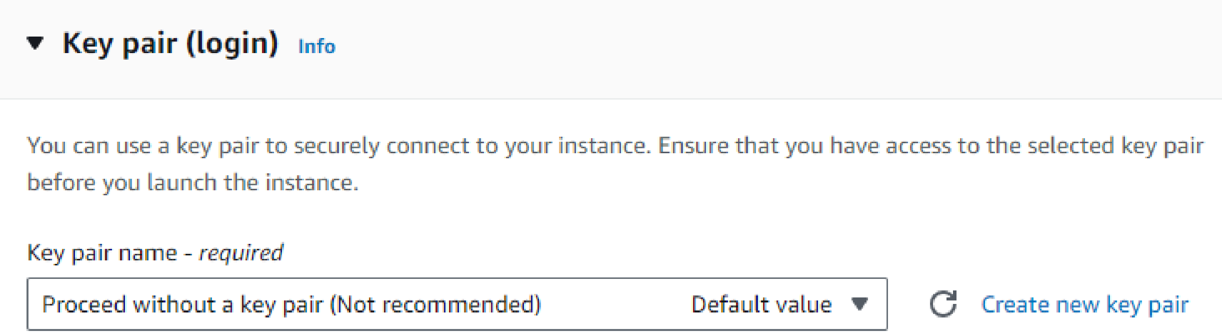
t3.micro
Family: t3 2 vCPU 1 GiB Memory Current generation: true
On-Demand SUSE base pricing: 0.0104 USD per Hour
On-Demand Windows base pricing: 0.0196 USD per Hour
On-Demand RHEL base pricing: 0.0704 USD per Hour
On-Demand Linux base pricing: 0.0104 USD per Hour

Step 4: Configuring a key pair

Amazon EC2 uses public–key cryptography to encrypt and decrypt login information. To log in to your instance, you must create a key pair, specify the name of the key pair when you launch the instance, and provide the private key when you connect to the instance.

In this lab, you do not log in to your instance, so you do not require a key pair.

12. In the **Key pair (login)** pane, select **Proceed without a key pair (Not recommended)**.



▼ **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 - *required*

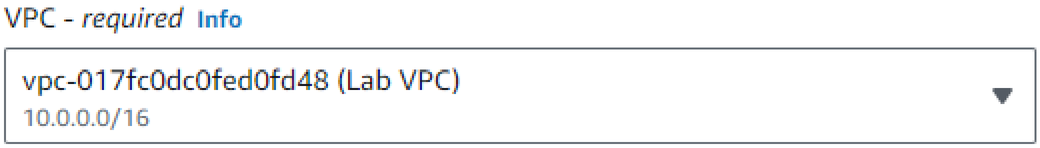
Proceed without a key pair (Not recommended) Default value

Step 5: Configuring the network settings

You use this pane to configure networking settings.

The **VPC** indicates which virtual private cloud (VPC) you want to launch the instance into. You can have multiple VPCs, including different ones for development, testing, and production.

13. In the **Network settings** pane, choose Edit
14. For **VPC - *required***, select **Lab VPC**.

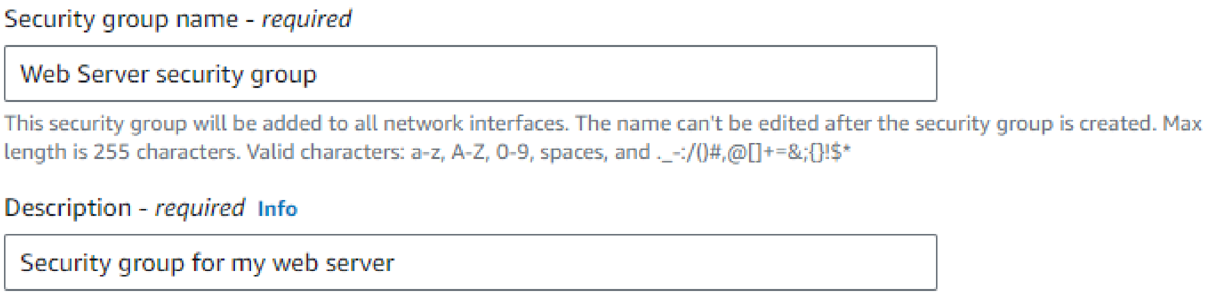


VPC - *required* Info

vpc-017fc0dc0fed0fd48 (Lab VPC)
10.0.0.0/16

15. Still in the **Network settings** pane, configure the Security Group as follows:
    - **Security group name - *required***: Web Server security group
    - **Description:** Security group for my web server

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.



Security group name - *required*

Web Server security group

This security group will be added to all network interfaces. The name can't be edited after the security group is created. Max length is 255 characters. Valid characters: a-z, A-Z, 0-9, spaces, and ._-:/()#,@[]+=&;{}!$*

Description - *required* Info

Security group for my web server

16. Under **Inbound security groups rules** select the Remove

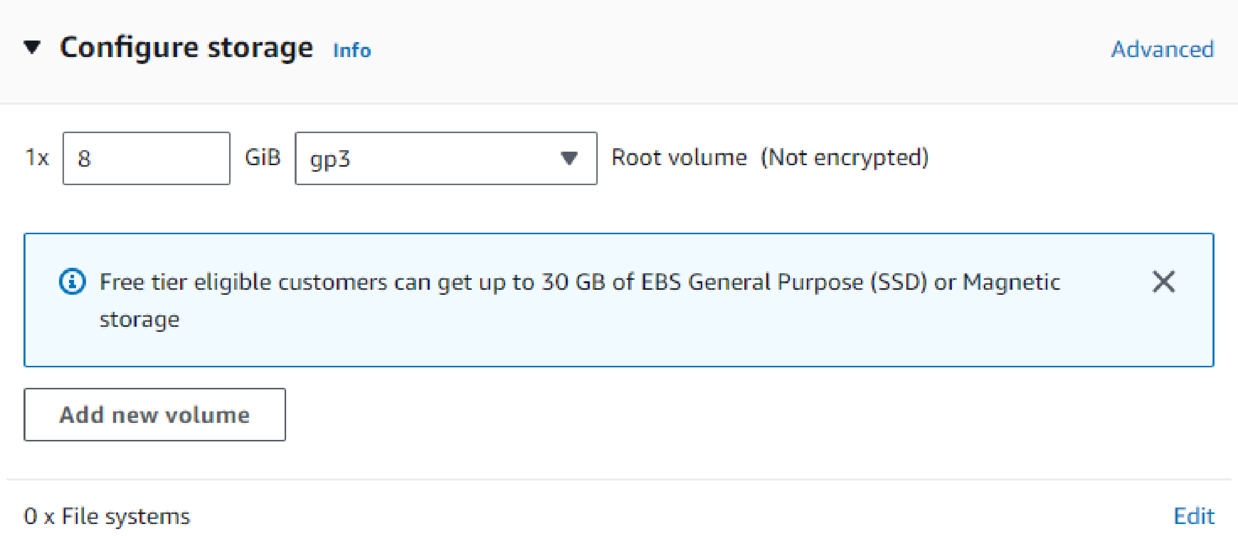
    In this lab, you will not log into your instance using SSH. Removing SSH access will improve the security of the instance.

Step 6: Adding storage

Amazon EC2 stores data on a network-attached virtual disk called Amazon Elastic Block Store (Amazon EBS).

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

17. In the **Configure storage** pane, keep the default storage configuration.



▼ Configure storage Info

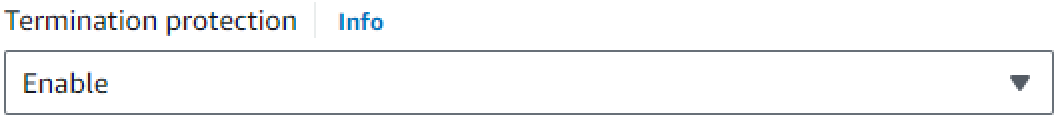
1x 8 GiB gp3 Root volume (Not encrypted)

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage

0 x File systems

Step 7: Configuring advanced details

18. Expand the **Advanced details** pane.
19. Select the dropdown for **Termination protection**, then choose **Enable**.



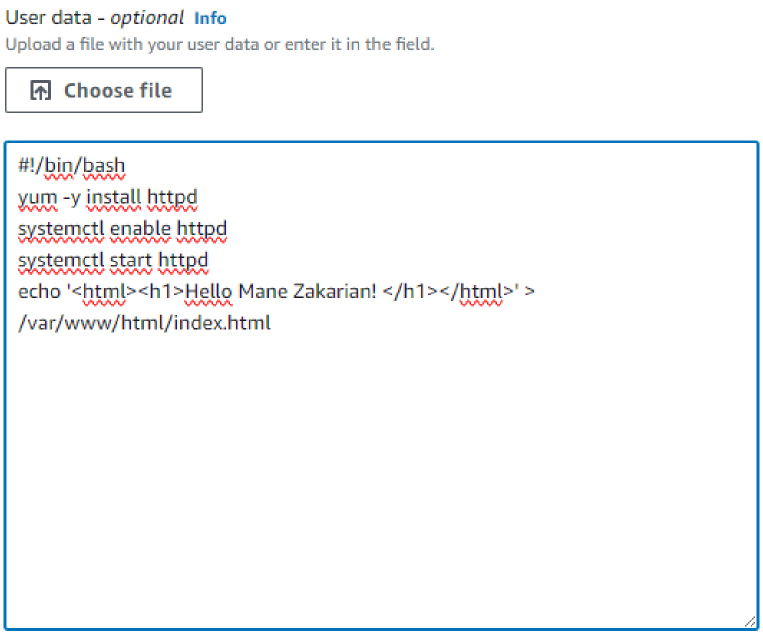
Termination protection Info

Enable

When you launch an instance in Amazon EC2, you have the option of passing user data to the instance. These commands can be used to perform common automated configuration tasks and even run scripts after the instance starts.

20. Copy the following commands, and paste them into the **User data** text box.

```
#!/bin/bash
yum -y install httpd
systemctl enable httpd
systemctl start httpd
echo '<html><h1>Hello  [Your name]!!</h1></html>' > /var/www/html/index.html
```



User data - *optional* Info

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

```
#!/bin/bash
yum -y install httpd
systemctl enable httpd
systemctl start httpd
echo '<html><h1>Hello Mane Zakarian! </h1></html>' >
/var/www/html/index.html
```

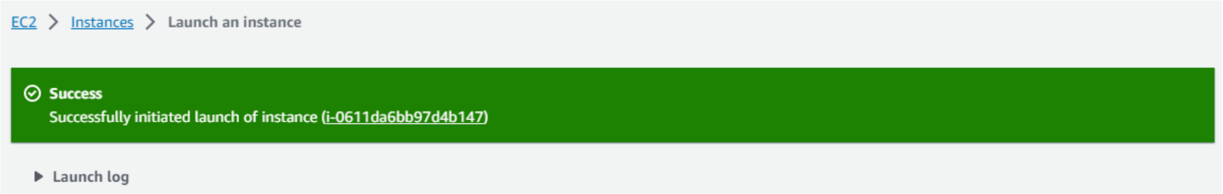
The script does the following:

- Install an Apache web server (httpd)
- Configure the web server to automatically start on boot
- Activate the Web server
- Create a simple web page

Step 8: Launching an EC2 instance

Now that you have configured your EC2 instance settings, it is time to launch your instance.

21. In the right pane, choose **Launch instance**



EC2 > Instances > Launch an instance

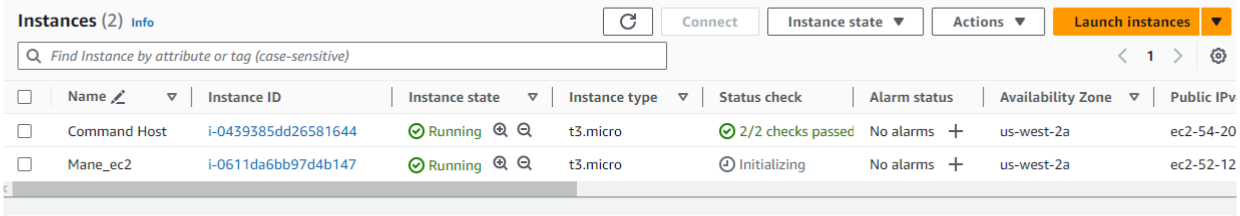
Success
Successfully initiated launch of instance (i-0611da6bb97d4b147)

▶ Launch log

22. Choose **View all instances**

The instance appears in a **Pending** state, which means it is being launched. It then changes to **Running**, which indicates that the instance has started booting. There will be a short time before you can access the instance.

The instance receives a public DNS name that you can use to contact the instance from the Internet.

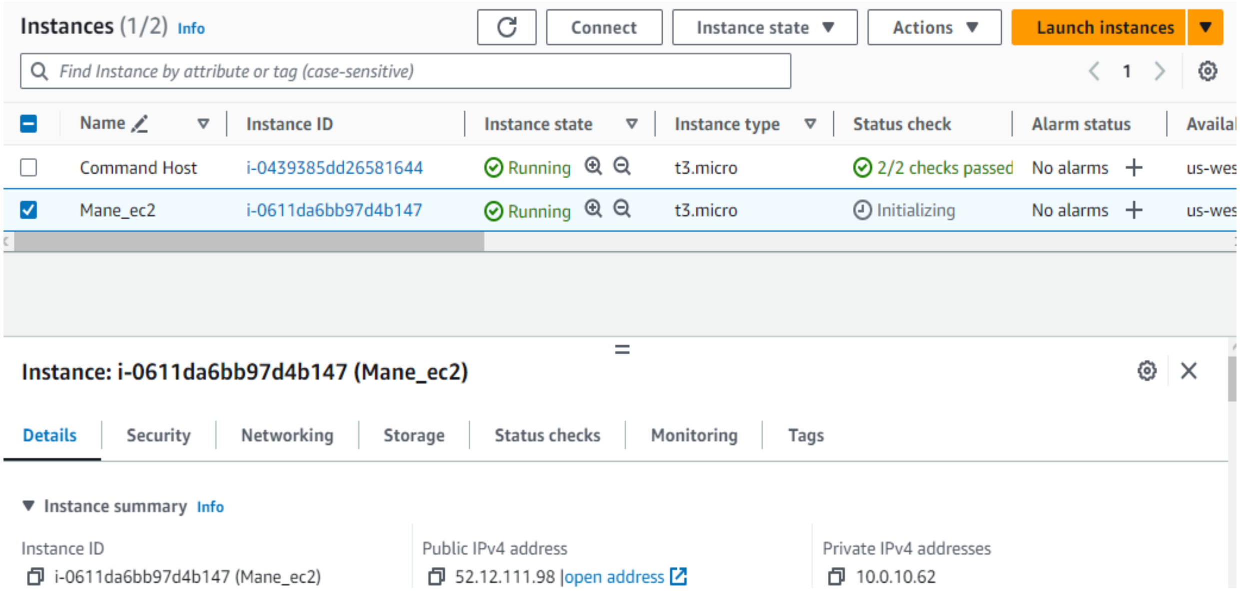


□	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv
□	Command Host	i-0439385dd26581644	✓ Running	t3.micro	✓ 2/2 checks passed	No alarms +	us-west-2a	ec2-54-20
□	Mane_ec2	i-0611da6bb97d4b147	✓ Running	t3.micro	Initializing	No alarms +	us-west-2a	ec2-52-12

23. Select the 🟦 box next to your **Web Server**. The **Details** tab displays detailed information about your instance.

💬 To view more information in the **Details** tab, drag the window divider upward.

Review the information displayed in the **Details, Security** and **Networking** tabs.



☐	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availal
☐	Command Host	i-0439385dd26581644	✓ Running	t3.micro	✓ 2/2 checks passed	No alarms +	us-wes
☑	Mane_ec2	i-0611da6bb97d4b147	✓ Running	t3.micro	Initializing	No alarms +	us-wes

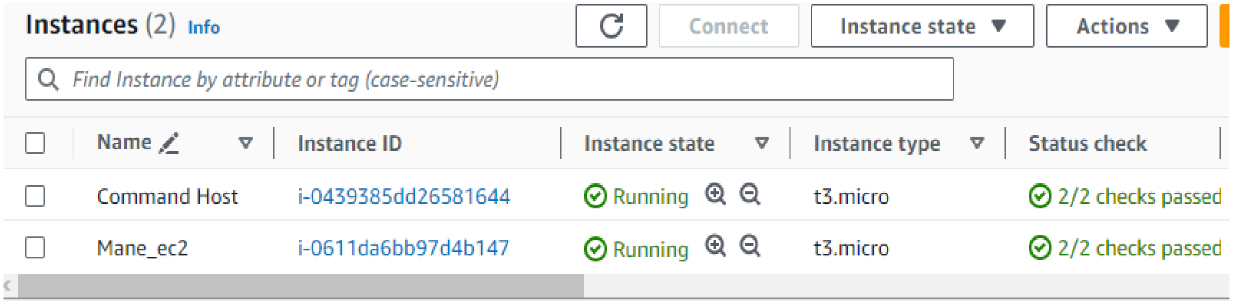
Instance: i-0611da6bb97d4b147 (Mane_ec2)

Instance ID	Public IPv4 address	Private IPv4 addresses
i-0611da6bb97d4b147 (Mane_ec2)	52.12.111.98 |open address	10.0.10.62

24. Wait for your instance to display the following:

Note: Refresh if needed.

- **Instance State:** ● Running
- **Status Checks:** ✓ 2/2 checks passed



☐	Name	Instance ID	Instance state	Instance type	Status check
☐	Command Host	i-0439385dd26581644	✓ Running	t3.micro	✓ 2/2 checks passed
☐	Mane_ec2	i-0611da6bb97d4b147	✓ Running	t3.micro	✓ 2/2 checks passed

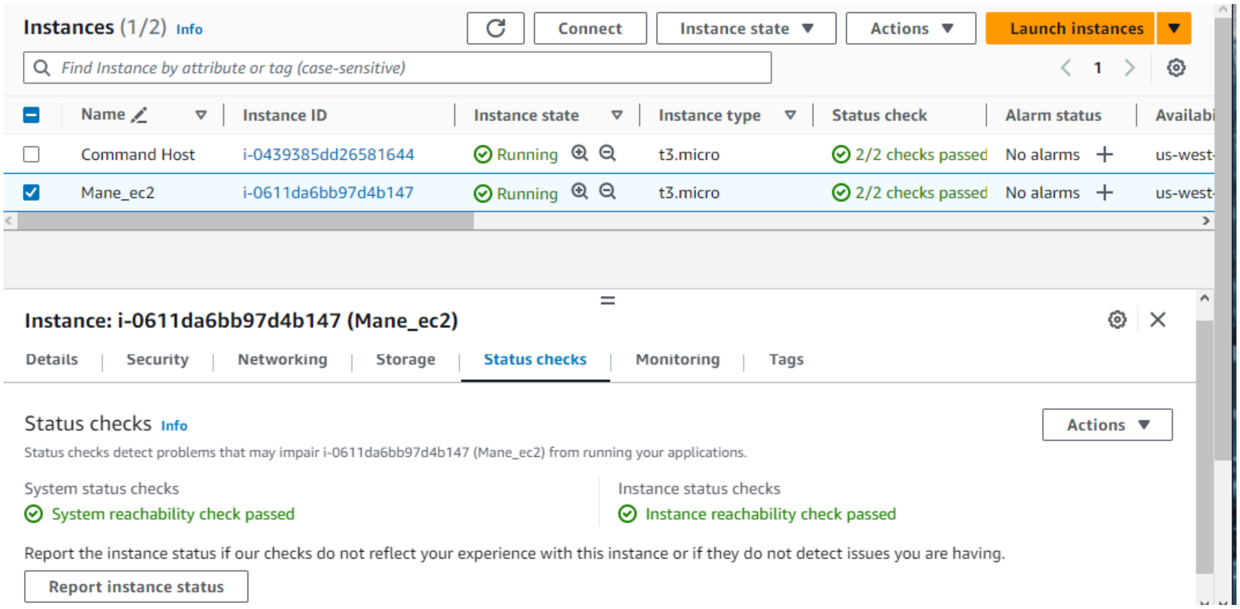
Task 2: Monitor Your Instance

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.

25. Select the instance by checking the box next to the instance and navigate to the bottom of the screen to the **Status checks** tab.

    ℹ 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.



☐	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availabi
☐	Command Host	i-0439385dd26581644	✓ Running	t3.micro	✓ 2/2 checks passed	No alarms +	us-west-
☑	Mane_ec2	i-0611da6bb97d4b147	✓ Running	t3.micro	✓ 2/2 checks passed	No alarms +	us-west-

Instance: i-0611da6bb97d4b147 (Mane_ec2)

Status checks Info

Status checks detect problems that may impair i-0611da6bb97d4b147 (Mane_ec2) from running your applications.

System status checks
✓ System reachability check passed

Instance status checks
✓ Instance reachability check passed

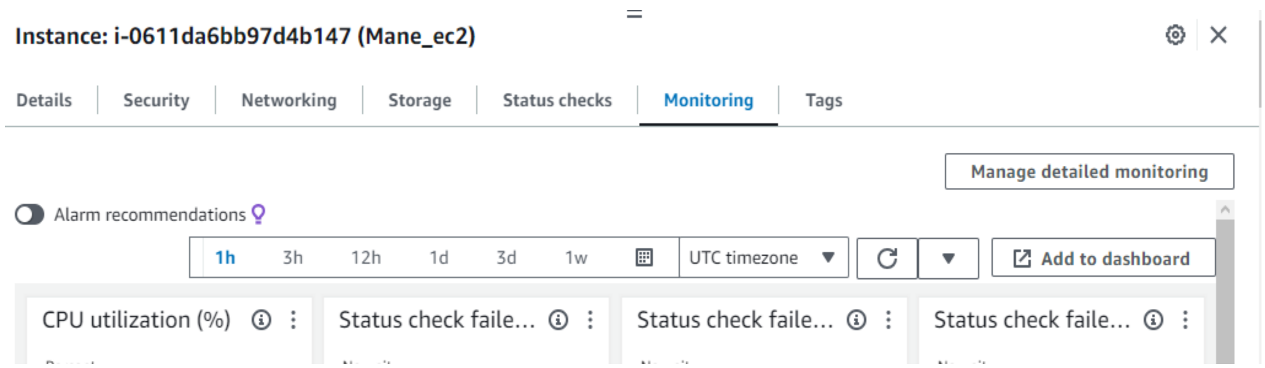
Report the instance status if our checks do not reflect your experience with this instance or if they do not detect issues you are having.

26. Select 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 a graph to see an expanded view.

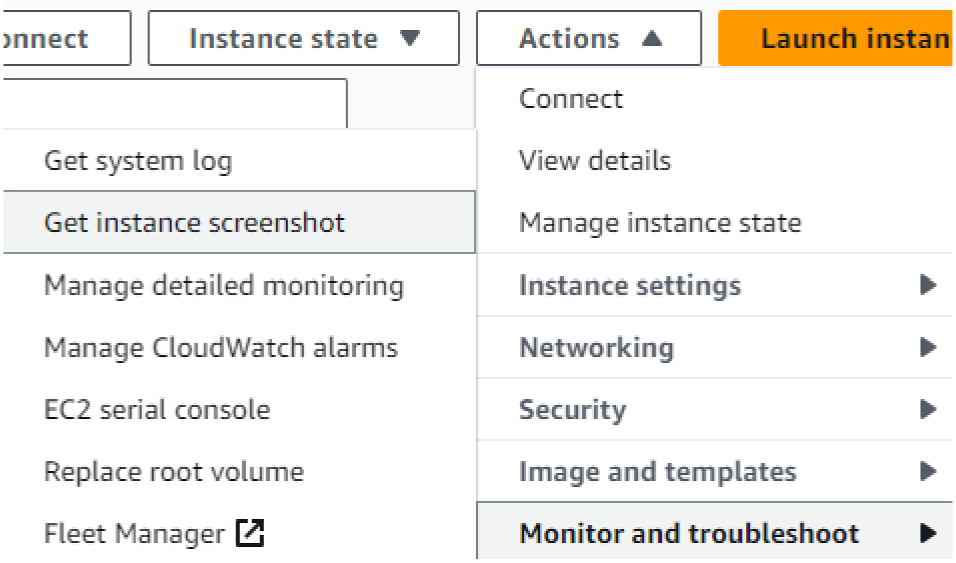
Amazon EC2 sends metrics to Amazon CloudWatch for your EC2 instances. Basic (five-minute) monitoring is enabled by default. You can enable detailed (one-minute) monitoring.



Instance: i-0611da6bb97d4b147 (Mane_ec2)

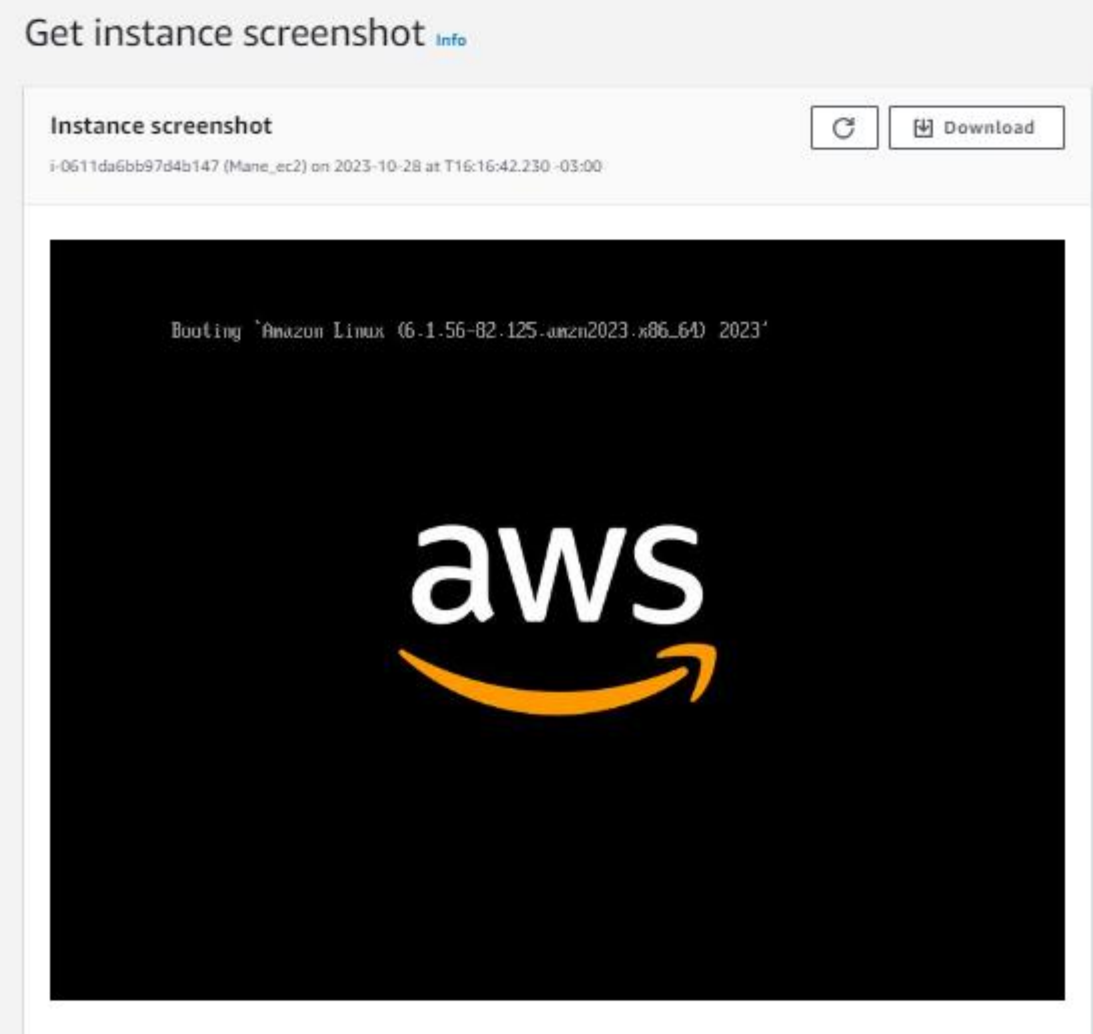
27. In the Actions menu, select **Monitor and troubleshoot Get Instance Screenshot**.This shows you what your Amazon EC2 instance console would look like if a screen were attached to it.

 If you are unable to reach your instance via SSH or RDP, you can capture a screenshot of your instance and view it as an image. This provides visibility as to the status of the instance, and allows for quicker troubleshooting.



28. Select Cancel located at the bottom of the instance screenshot.

Congratulations! You have explored several ways to monitor your instance.



Get instance screenshot

Instance screenshot

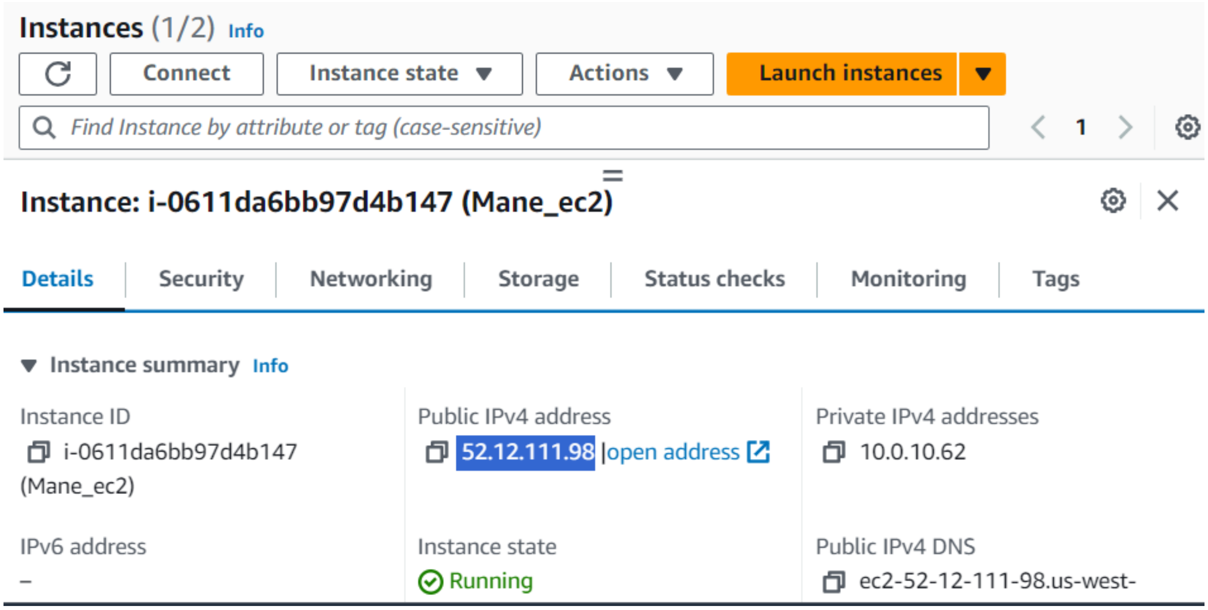
i-0611da6bb97d4b147 (Mane_ec2) on 2023-10-28 at T16:16:42.230 -03:00

```
Booting `Amazon Linux (6.1.56-82.125.amzn2023.x86_64) 2023'
```

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

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

29. Select the instance by checking the box and select the **Details** tab.
30. Copy the **Public IPv4 address** of your instance to your clipboard.



Instance: i-0611da6bb97d4b147 (Mane_ec2)

Instance ID
i-0611da6bb97d4b147 (Mane_ec2)

Public IPv4 address
52.12.111.98

Private IPv4 addresses
10.0.10.62

IPv6 address
–

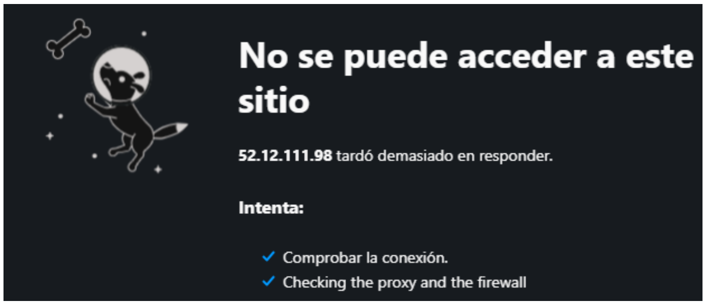
Instance state
Running

Public IPv4 DNS
ec2-52-12-111-98.us-west-

31. 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.



No se puede acceder a este sitio

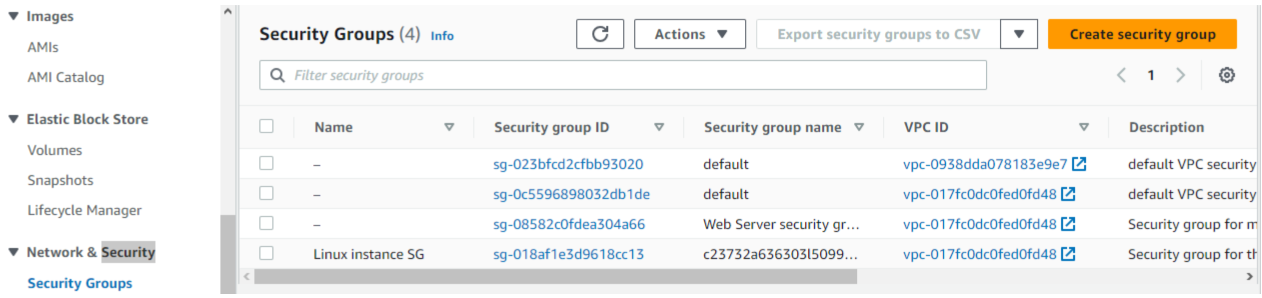
52.12.111.98 tardó demasiado en responder.

Intenta:

✓ Comprobar la conexión.
✓ Checking the proxy and the firewall

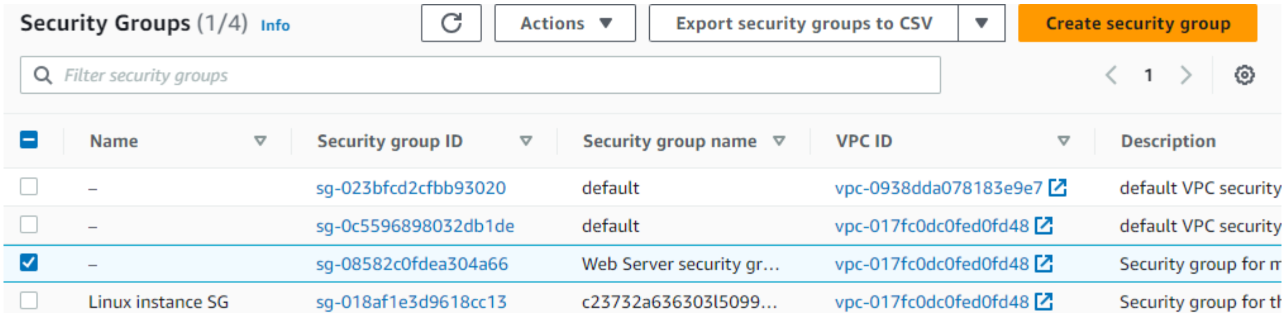
To correct this, you will now update the security group to permit web traffic on port 80.

32. Keep the browser tab open, but return to the **EC2 Management Console** tab.
33. In the left navigation pane, select **Security Groups** located under **Network & Security**.



□	Name	Security group ID	Security group name	VPC ID	Description
□	–	sg-023bfcd2cfbb93020	default	vpc-0938dda078183e9e7	default VPC security
□	–	sg-0c5596898032db1de	default	vpc-017fc0dc0fed0fd48	default VPC security
□	–	sg-08582c0fdea304a66	Web Server security gr…	vpc-017fc0dc0fed0fd48	Security group for m
□	Linux instance SG	sg-018af1e3d9618cc13	c23732a6363031509…	vpc-017fc0dc0fed0fd48	Security group for th

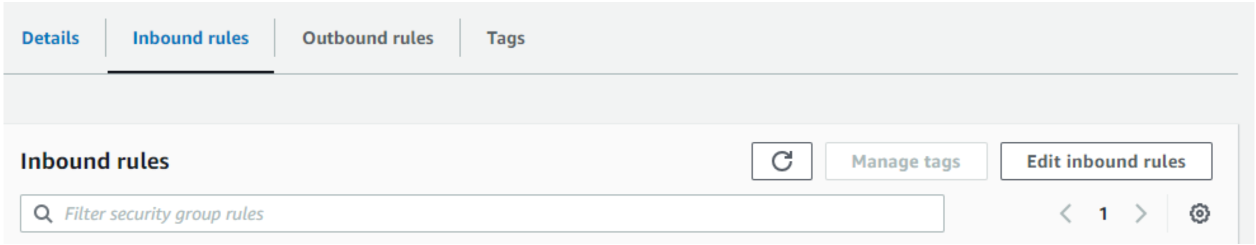
34. Select 🟦 **Web Server security group**.



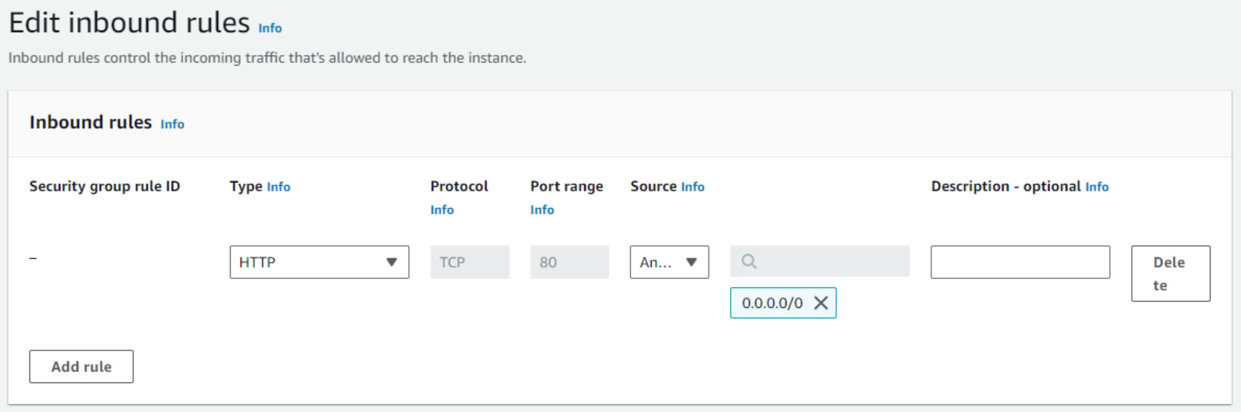
☐	Name	Security group ID	Security group name	VPC ID	Description
□	–	sg-023bfcd2cfbb93020	default	vpc-0938dda078183e9e7	default VPC security
□	–	sg-0c5596898032db1de	default	vpc-017fc0dc0fed0fd48	default VPC security
☑	–	sg-08582c0fdea304a66	Web Server security gr…	vpc-017fc0dc0fed0fd48	Security group for m
□	Linux instance SG	sg-018af1e3d9618cc13	c23732a6363031509…	vpc-017fc0dc0fed0fd48	Security group for th

35. Select the **Inbound rules** tab.

The security group currently has no rules.



36. Select Edit inbound rules then select Add rule and configure the rule with the following settings:
    - **Type:** *HTTP*
    - **Source:** *Anywhere-IPv4*
    - Select Save rules



Edit inbound rules Info

Inbound rules control the incoming traffic that's allowed to reach the instance.

Inbound rules Info

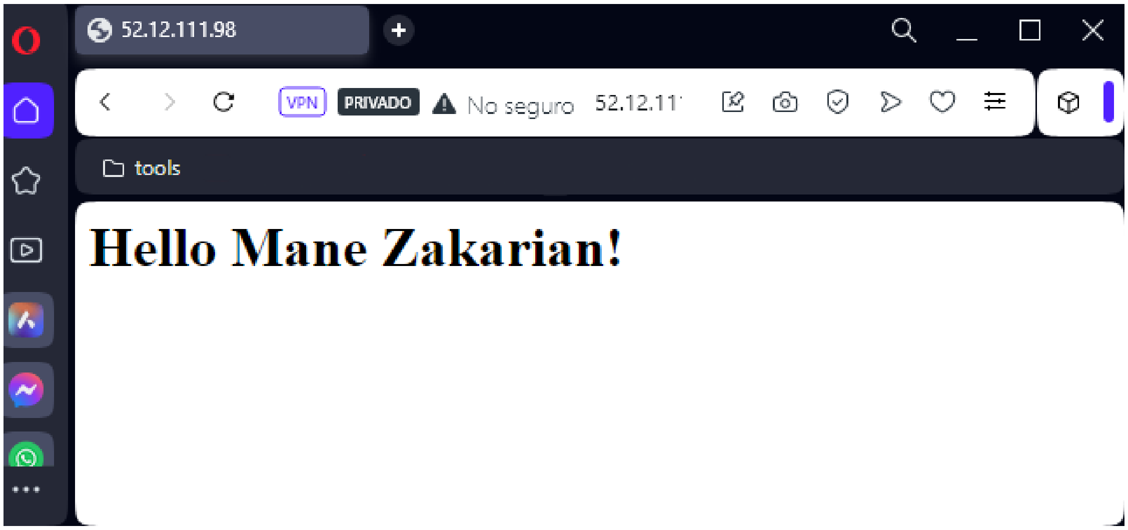
Security group rule ID	Type Info	Protocol Info	Port range Info	Source Info		Description - optional Info	
–	HTTP ▼	TCP	80	An... ▼	0.0.0.0/0 ✕		Delete

Add rule

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

    You should see the message *Hello [Your name]!*

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



Hello Mane Zakarian!

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 *t3.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.

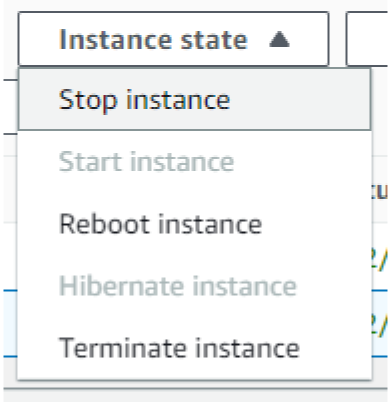
When you stop an instance, it is shut down. There is no charge for a stopped EC2 instance, but the storage charge for attached Amazon EBS volumes remains.

38. On the **EC2 Management Console**, in the left navigation pane, select **Instances**.

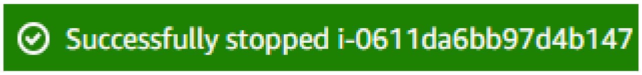
    - **Web Server** should already be selected.

39. Select **Instance state > Stop instance**.
40. Select Stop

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



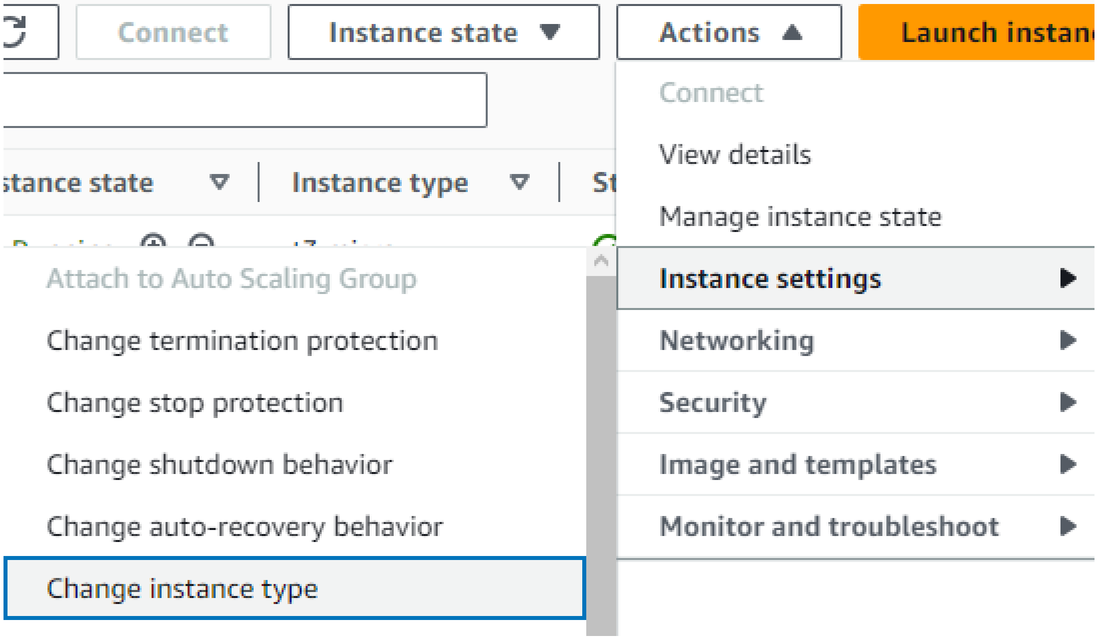
41. Wait for the **Instance State** to display: stopped



Successfully stopped i-0611da6bb97d4b147

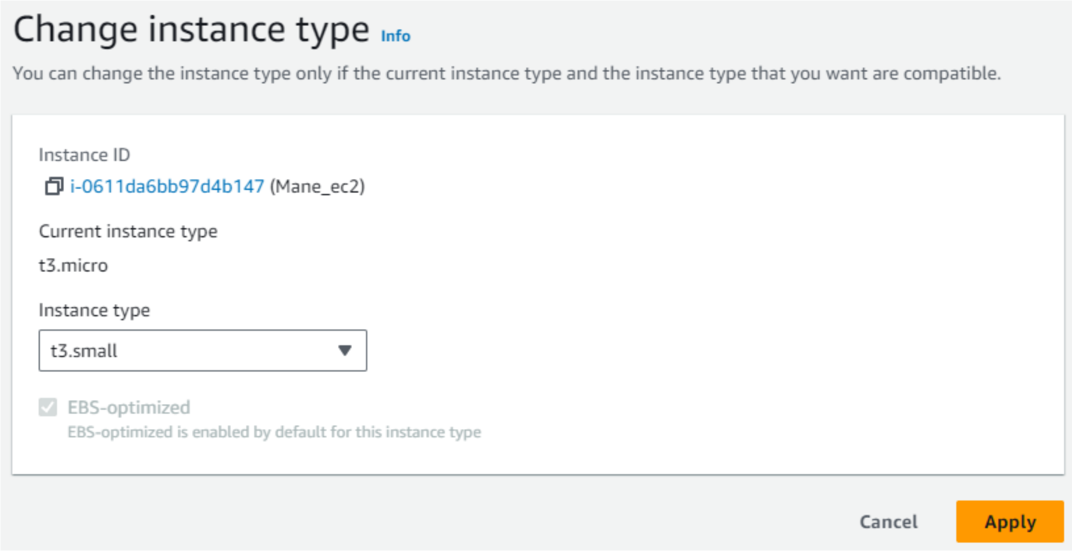
Change The Instance Type

42. In the Actions menu, select **Instance Settings - Change Instance Type**.



Then configure:

- **Instance Type:** *t3.small*
- Select Apply



Change instance type Info

You can change the instance type only if the current instance type and the instance type that you want are compatible.

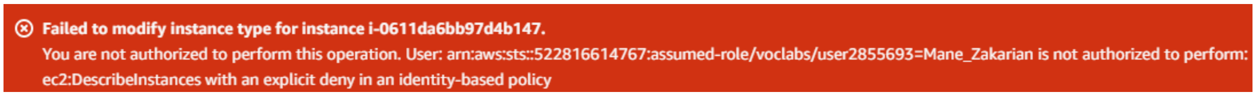
Instance ID
i-0611da6bb97d4b147 (Mane_ec2)

Current instance type
t3.micro

Instance type
t3.small

☑ EBS-optimized
EBS-optimized is enabled by default for this instance type

When the instance is started again it will be a *t3.small*, which has twice as much memory as a *t3.micro* instance. **NOTE**: You may be restricted from using other instance types in this lab.



Failed to modify instance type for instance i-0611da6bb97d4b147.
You are not authorized to perform this operation. User: arn:aws:sts::522816614767:assumed-role/voclabs/user2855693=Mane_Zakarian is not authorized to perform: ec2:DescribeInstances with an explicit deny in an identity-based policy

Resize the EBS Volume

43. In the left navigation menu, select **Volumes** located under **Elastic Block Store**.
44. Select the volume by checking the box, and navigate to 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.

45. Change the size to: `10` **NOTE**: You may be restricted from creating large Amazon EBS volumes in this lab.
46. Select Modify
47. Select Modify to confirm and increase the size of the volume.

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, select **Instances**.
49. Select the **Web Server** instance by checking the box, then navigate to **Instance state > Start instance**.

    Congratulations! You have successfully resized your Amazon EC2 Instance. In this task you changed your instance type from *t3.micro* to *t3.small*. You also modified your root disk volume from 8 GiB to 10 GiB.

Task 5: 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*.

50. In left navigation pane, select **Instances**.
51. Select the **Web Server** instance by checking the box and navigate to the top and select Instance state menu, select **Terminate instance**.

    Note: There is a message that says: *On an EBS-backed instance, the default action is for the root EBS volume to be deleted when the instance is terminated. Storage on any local drives will be lost.* It will ask if you are sure that you want to terminate the instance. You will be able to select the Terminate button.

    Note: You will notice that the instance did not terminate and a red error message pops up at the top that says: *Failed to terminate an instance: The instance may not be terminated.* This is because it has termination protection enabled.

52. In the Actions menu, select **Instance settings Change termination protection**.
53. Uncheck **Enable** followed by Save

    You can now terminate the instance.

54. In the Actions menu, select **Instance State Terminate instance**.
55. Select Terminate

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

Lab Complete

Congratulations! You have completed the lab.

56. Choose **End Lab** at the top of this page, and then select Yes to confirm that you want to end the lab.

    A panel indicates that *DELETE has been initiated... You may close this message box now.*

57. A message *Ended AWS Lab Successfully* is briefly displayed, indicating that the lab has ended.

Summary of the tasks

Task 1 involves launching an EC2 instance with termination protection and deploying a web server.

Task 2 covers monitoring an EC2 instance's status and Amazon CloudWatch metrics.

Task 3 involves modifying security group rules to allow HTTP traffic and accessing the web server.

Task 4 explains how to resize an EC2 instance, change instance types, and adjust EBS volumes.

Task 5 demonstrates the use of termination protection and how to terminate an instance when needed.