

COS20019 - Cloud Computing Architecture

Week 1: ACF Lab 3: Introduction to EC2

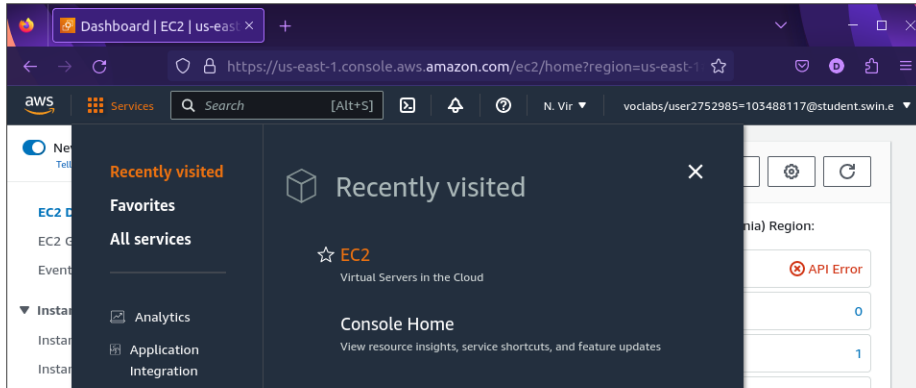
Author: Trac Duc Anh Luong - ID: 103488117

Due Date: 17/09/2023

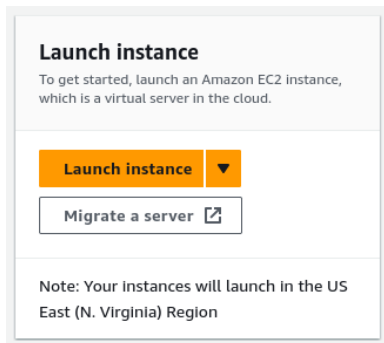
Name: Trac Duc Anh Luong - ID: 103488117

Task 1: Launch Your Amazon EC2 Instance

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

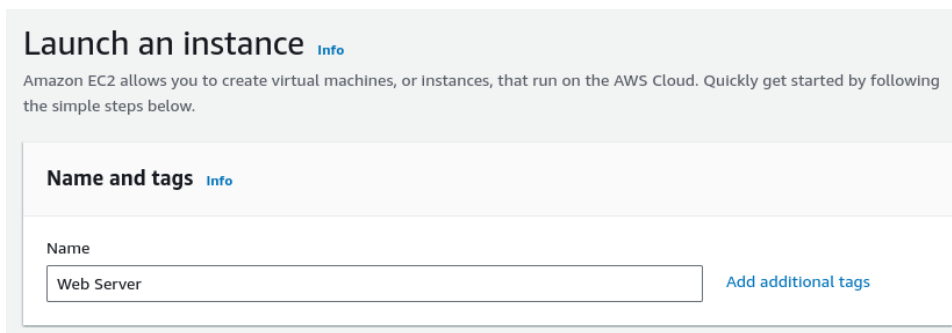


6. Choose the Launch instance menu and select Launch instance.



Step 1: Name and tags

7. Give the instance the name Web Server.



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

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.

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

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

Q

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

Quick Start

Amazon Linux

aws

macOS

Mac

Ubuntu

ubuntu

Windows

Microsoft

Red Hat

Red Hat

SUSE Linux

SUSE

Q

[Browse more AMIs](#)

Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Amazon Linux 2023 AMI

Free tier eligible

ami-01c647eace872fc02 (64-bit (x86)) / ami-0fdcbfc2802f642d3 (64-bit (Arm))

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

Description

Amazon Linux 2023 AMI 2023.1.20230906.1 x86_64 HVM kernel-6.1

Architecture

AMI ID

Verified provider

64-bit (x86)

ami-01c647eace872fc02

Verified provider

Step 3: Instance type

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

▼ **Instance type** [Info](#)

Instance type

t2.micro

Free tier eligible

Family: t2 1 vCPU 1 GiB Memory Current generation: true

On-Demand Windows base pricing: 0.0162 USD per Hour

On-Demand SUSE base pricing: 0.0116 USD per Hour

On-Demand RHEL base pricing: 0.0716 USD per Hour

On-Demand Linux base pricing: 0.0116 USD per Hour

All generations

[Compare instance types](#)

Additional costs apply for AMIs with pre-installed software

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Step 4: Key pair (login)

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

▼ 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*

[Create new key pair](#)

Step 5: Network settings

12. Next to Network settings, choose Edit.

13. For VPC, select Lab VPC.

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

▼ Network settings [Info](#)

VPC - required [Info](#)

[10.0.0.0/16](#) [Create new VPC](#)

Subnet [Info](#)

[Public Subnet 2](#) [Create new subnet](#)

VPC: vpc-0b5f15a5e0324bbbe Owner: 345836255620 Availability Zone: us-east-1b
IP addresses available: 251 CIDR: 10.0.2.0/24

Auto-assign public IP [Info](#)

Firewall (security groups) [Info](#)

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

☒ Create security group ☐ Select existing security group

Security group name - required

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](#)

Inbound Security Group Rules

No security group rules are currently included in this template. Add a new rule to Include it in the launch template.

► **Advanced network configuration**

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Step 6: Configure storage

15. In the Configure storage section, keep the default settings.

▼ **Configure storage** [Info](#) [Advanced](#)

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

Add new volume

0 x File systems [Edit](#)

Step 7: Advanced details

16. Expand Advanced details.

17. For Termination protection, select Enable.

Termination protection [Info](#)

Enable

18. 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
```

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.

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EC2 > Instances > Launch an instance

 **Success**
Successfully initiated launch of instance (i-0cedd401de28af58d)

▼ Launch log

Initializing requests	 Succeeded
Creating security groups	 Succeeded
Launch initiation	 Succeeded


20. 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.

Instance: i-0cedd401de28af58d (Web Server)

Details | Security | Networking | Storage | Status checks | Monitoring | Tags

▼ Instance summary Info



Instance ID i-0cedd401de28af58d (Web Server)	Public IPv4 address 35.170.248.132 open address	Private IPv4 addresses 10.0.2.104
IPv6 address -	Instance state  Running	Public IPv4 DNS ec2-35-170-248-132.compute-1.amazonaws.com open address
Hostname type IP name: ip-10-0-2-104.ec2.internal	Private IP DNS name (IPv4 only) ip-10-0-2-104.ec2.internal	
Answer private resource DNS name -	Instance type t2.micro	Elastic IP addresses -
Auto-assigned IP address	VPC ID	AWS Compute Optimizer finding

21. Wait for your instance to display the following:

- Instance State: Running
- Status Checks: 2/2 checks passed

Instances (1/2) Info

Find instance by attribute or tag (case-sensitive)

	Name	Instance ID	Instance state	Instance type	Status check	Alarm state
<input checked="" type="checkbox"/>	Web Server	i-0cedd401de28af58d	 Running	t2.micro	 2/2 checks passed	No alarm

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Task 2: Monitor Your Instance

22. Choose the Status checks tab.

Instance: i-0cedd401de28af58d (Web Server)

Details

Security

Networking

Storage

Status checks

Monitoring

Tags

Status checks Info

Actions

Status checks detect problems that may impair i-0cedd401de28af58d (Web Server) from running your applications.

System status checks

Instance status checks

✔ System reachability check passed

✔ 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.

Report instance status

23. Choose the Monitoring tab.

Instance: i-0cedd401de28af58d (Web Server)

Details

Security

Networking

Storage

Status checks

Monitoring

Tags

Manage detailed monitoring

1h 3h 12h 1d 3d 1w Custom

Add to dashboard

CPU utilization ...

Percent

9.42

4.71

0

03:25 04:25

Status check fai...

Count

1

0.5

0

03:25 04:25

Status check fai...

Count

1

0.5

0

03:25 04:25

Status check fai...

Count

1

0.5

0

03:25 04:25

Network in (byt...

Network out (b...

Network packet...

Network packet...

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

```
System log
Review system log for instance i-0cedd401de28af58d as of Sat Sep 09 2023 11:31:07 GMT+0700 (Indochina Time)

[ 39.192426] cloud-init[2088]: Complete!
[ 39.278621] cloud-init[2088]: Created symlink /etc/systemd/system/multi-user.target.wants/
[ 39.467310] systemd-sysv-generator[3274]: SysV service '/etc/rc.d/init.d/cfn-hup' lacks a
ci-info: +++++Authorized keys from /home/ec2-user/.ssh/authorized_keys
ci-info: +-----+
ci-info: | Keytype |                               Fingerprint (sha256)
ci-info: +-----+-----+
ci-info: | ssh-rsa | 6c:80:4b:51:de:95:6b:22:77:7a:90:84:bc:71:dd:6c:8f:c5:8f:2a:81:86:bf:d9:
ci-info: +-----+-----+
<14>Sep 9 04:17:16 cloud-init: #####
<14>Sep 9 04:17:16 cloud-init: -----BEGIN SSH HOST KEY FINGERPRINTS-----
<14>Sep 9 04:17:16 cloud-init: 256 SHA256:eeLJGpgj4+DgrCGtnwF87FD4dzkZAXWuoBDeKtF8CS0 root@i
<14>Sep 9 04:17:16 cloud-init: 256 SHA256:OZ/LJ/EOqZvQkTCdWIn5JsmrfghC5fGCdbS+vrjkGc root@i
<14>Sep 9 04:17:16 cloud-init: -----END SSH HOST KEY FINGERPRINTS-----
<14>Sep 9 04:17:16 cloud-init: #####
-----BEGIN SSH HOST KEY KEYS-----
ecdsa-sha2-nistp256 AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBBMrQDofJxJK0v+kG622Qa
ssh-ed25519 AAAAC3NzaC1lZDI1NTE5AAAAIAkioTQd7wJFb7VQ9RoEkAFq3QY/Y45pwwQ0AwQEseGP root@ip-10-0
-----END SSH HOST KEY KEYS-----
[ 40.149776] cloud-init[2088]: Cloud-init v. 22.2.2 finished at Sat, 09 Sep 2023 04:17:16 +0
```

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.

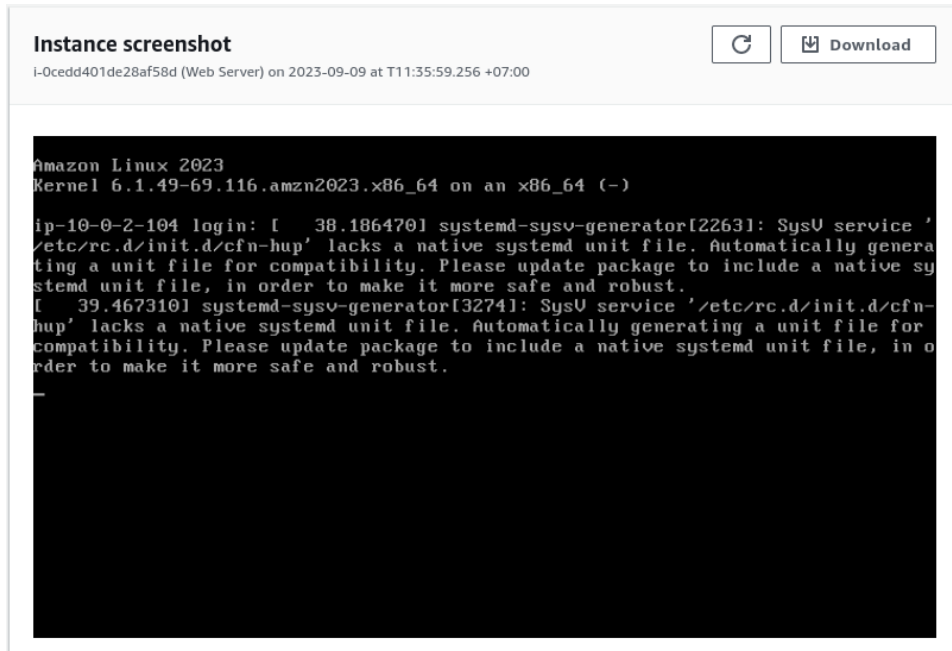
26. Choose Cancel.

```
[ 39.111497] cloud-init[2088]: apr-util-1.6.3-1.amzn2023.0.1.x86_64
[ 39.120694] cloud-init[2088]: apr-util-openssl-1.6.3-1.amzn2023.0.1.x86_64
[ 39.130700] cloud-init[2088]: generic-logos-httpd-18.0.0-12.amzn2023.0.3.noarch
[ 39.136105] cloud-init[2088]: httpd-2.4.56-1.amzn2023.x86_64
[ 39.143997] cloud-init[2088]: httpd-core-2.4.56-1.amzn2023.x86_64
[ 39.150220] cloud-init[2088]: httpd-filesystem-2.4.56-1.amzn2023.noarch
[ 39.158159] cloud-init[2088]: httpd-tools-2.4.56-1.amzn2023.x86_64
[ 39.164362] cloud-init[2088]: libbrotli-1.0.9-4.amzn2023.0.2.x86_64
[ 39.167981] cloud-init[2088]: mailcap-2.1.49-3.amzn2023.0.3.noarch
[ 39.171633] cloud-init[2088]: mod_http2-2.0.11-2.amzn2023.x86_64
[ 39.177938] cloud-init[2088]: mod_lua-2.4.56-1.amzn2023.x86_64
[ 39.192426] cloud-init[2088]: Complete!
[ 39.278621] cloud-init[2088]: Created symlink /etc/systemd/system/multi-user.target.wants/httpd.service & /usr/lib/systemd/system/httpd.service.
[ 39.467310] systemd-sysv-generator[3274]: SysV service '/etc/rc.d/init.d/cfn-hup' lacks a native systemd unit file. Automatically generating a un
ci-info: +++++Authorized keys from /home/ec2-user/.ssh/authorized_keys for user ec2-user+++++
ci-info: +-----+
ci-info: | Keytype |                               Fingerprint (sha256)                               | Options | Comment |
ci-info: +-----+-----+-----+-----+-----+-----+-----+-----+-----+
ci-info: | ssh-rsa | 6c:80:4b:51:de:95:6b:22:77:7a:90:84:bc:71:dd:6c:8f:c5:8f:2a:81:86:bf:d9:d8:83:4a:48:b8:d5:0b:c7 | -       | vockey |
ci-info: +-----+-----+-----+-----+-----+-----+-----+-----+-----+
```


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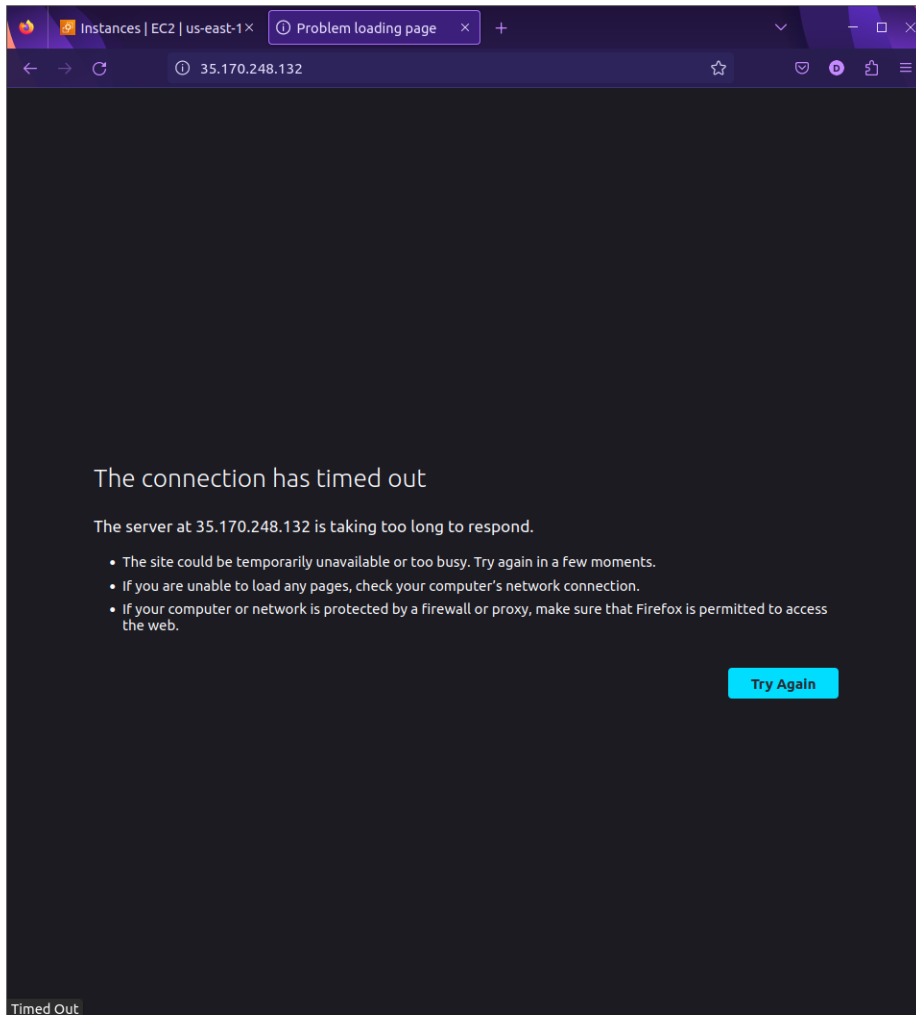
27. Ensure Web Server is still selected. Then, in the Actions menu, select Monitor and troubleshoot > Get instance screenshot.

28. Choose Cancel.



Task 3: Update Your Security Group and Access 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.
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.

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

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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.

35. Choose the Inbound rules tab.

The security group currently has no inbound rules.

The screenshot displays the AWS Management Console interface for the 'Web Server security group' (sg-0bf3f93edf5ab54c9) in the us-east-1 region. The left-hand navigation pane is expanded, showing the 'Network & Security' section with 'Security Groups' selected. The main content area shows the 'Details' tab for the security group, which includes fields for the name, ID, description, VPC ID, owner, and rule counts. Below the details, the 'Inbound rules' tab is active, showing a list of rules with a search bar and pagination controls. The bottom of the console features a footer with links to CloudShell, Feedback, Language, Privacy, Terms, and Cookie preferences, along with a copyright notice for 2023.

EC2 | us-east-1

Problem loading page

https://us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1

aws Services Search [Alt+S] N. Vir voclabs/user2752985=103488117@student.swin.e

New EC2 Experience Tell us what you think

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

▼ Elastic Block Store
Volumes
Snapshots
Lifecycle Manager

▼ Network & Security
Security Groups
Elastic IPs
Placement Groups
Key Pairs
Network Interfaces

EC2 > Security Groups > sg-0bf3f93edf5ab54c9 - Web Server security group

sg-0bf3f93edf5ab54c9 - Web Server security group

Actions

Details

Security group name Web Server security group	Security group ID sg-0bf3f93edf5ab54c9
Description Security group for my web server	VPC ID vpc-0b5f15a5e0324bbbe
Owner 345836255620	Inbound rules count 0 Permission entries
Outbound rules count 1 Permission entry	

Inbound rules | Outbound rules | Tags

Inbound rules

Manage tags Edit inbound rules

Filter security group rules

< 1 > ⚙

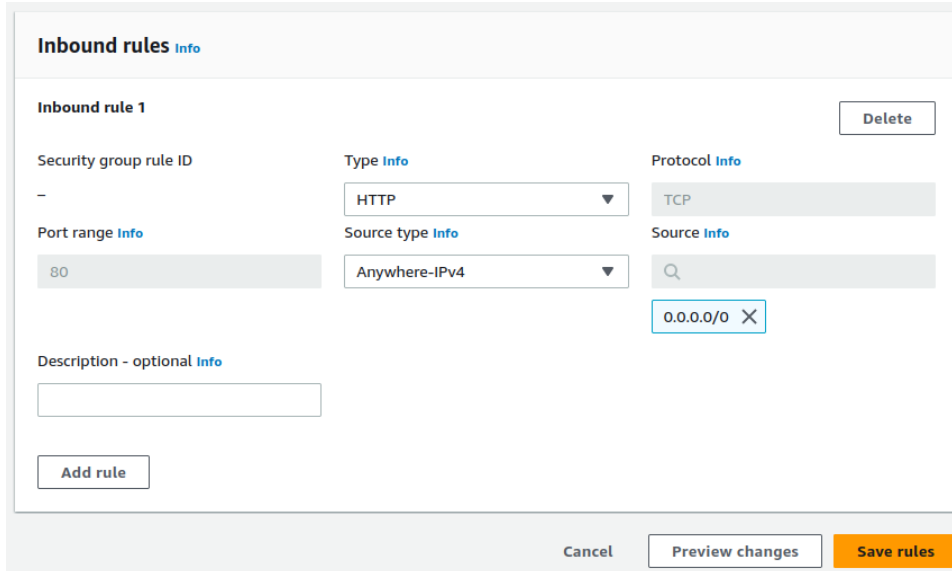
CloudShell Feedback Language Privacy Terms Cookie preferences

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36. Choose Edit inbound rules, select Add rule and then configure:

- Type: HTTP
- Source: Anywhere-IPv4
- Choose Save rules



The screenshot shows the 'Inbound rules' configuration page in the AWS IAM console. The page is titled 'Inbound rules' with an 'Info' link. Below the title, there is a section for 'Inbound rule 1' with a 'Delete' button. The configuration fields are as follows:

- Security group rule ID:** -
- Type:** HTTP (dropdown menu)
- Protocol:** TCP (dropdown menu)
- Port range:** 80
- Source type:** Anywhere-IPv4 (dropdown menu)
- Source:** 0.0.0.0/0 (text input with a search icon and a close button)
- Description - optional:** (text input field)

At the bottom of the configuration section is an 'Add rule' button. At the bottom of the entire page are three buttons: 'Cancel', 'Preview changes', and 'Save 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!



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

Stop Your Instance

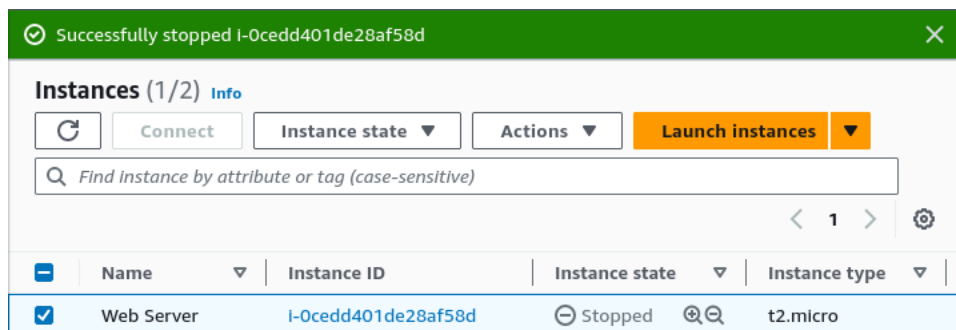
38. On the EC2 Management Console, in the left navigation pane, choose Instances. Web Server should already be selected.

39. In the Instance State menu, select Stop instance.

40. Choose Stop

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

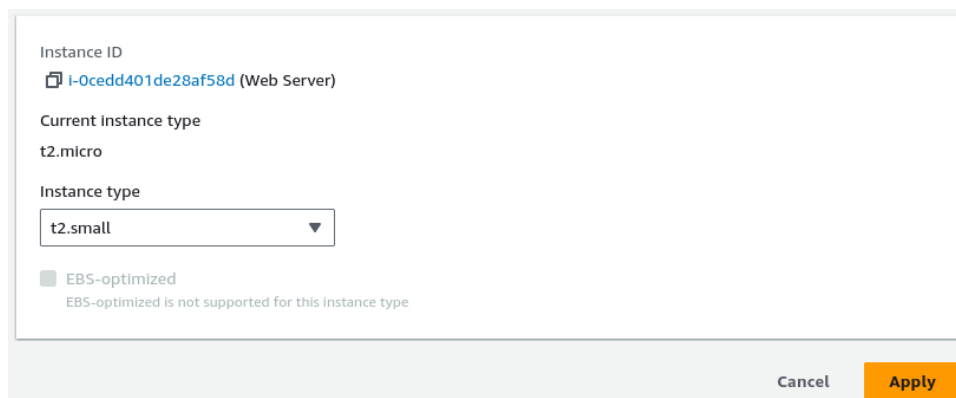
41. Wait for the Instance state to display: Stopped.



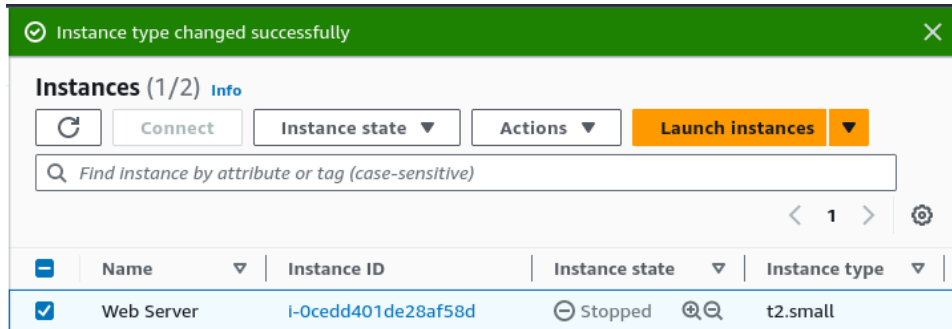
Change The Instance Type

In the Actions menu, select Instance settings Change instance type, then configure:

- Instance Type: t2.small
- Choose Apply

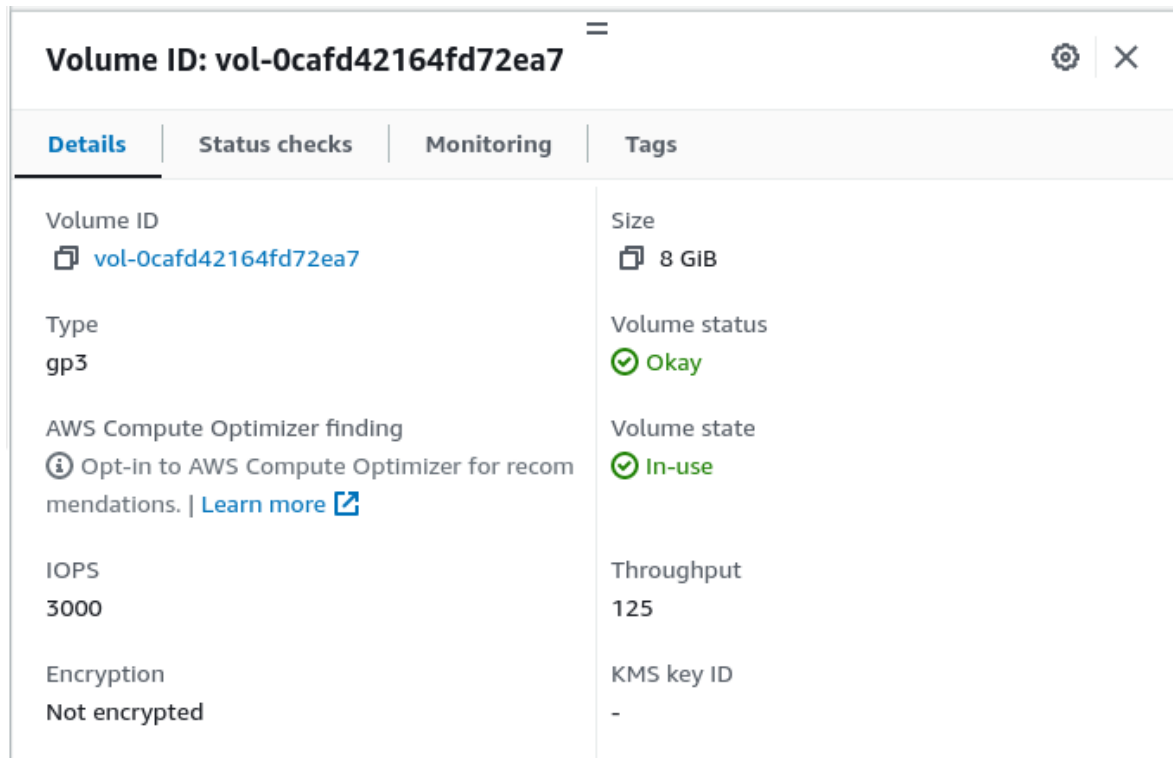


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Resize the EBS Volume

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.



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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.


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

46. Choose Modify

Modify volume [Info](#)

Modify the type, size, and performance of an EBS volume.

Volume details

Volume ID
 `vol-0cafd42164fd72ea7`

Volume type [Info](#)
General Purpose SSD (gp3) ▼

Size (GiB) [Info](#)

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

IOPS [Info](#)

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

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

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

[Cancel](#) [Modify](#)

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

Volumes (1/1) [Info](#)

Actions ▾

Create volume

Search

< 1 >

Volume state ▾	Alarm status	Attached Instances ▾	Volume sta... ▾
<div><div></div>In-use - optimizl</div>	No alarms	<div>+</div> i-0cedd401de28af58d (We...	<div><div></div>Okay</div>

Volume ID: vol-0cafd42164fd72ea7

Details

Status checks

Monitoring

Tags

Volume ID

vol-0cafd42164fd72ea7

Type

gp3

AWS Compute Optimizer finding

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

IOPS

3000

Encryption

Not encrypted

Size

10 GiB

Volume status

Okay

Volume state

In-use - optimizing (0%)

Throughput

125

KMS key ID

-

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Start the Resized Instance

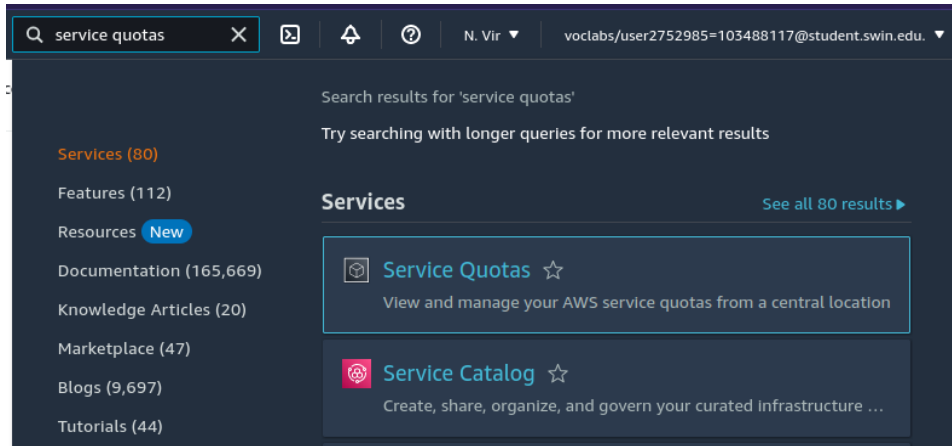
49. In left navigation pane, choose Instances.
50. Select the Web Server instance.
51. In the Instance state menu, select Start instance.

The screenshot displays the AWS Management Console interface for the 'Instances' section. At the top, there are two green notification banners: 'Successfully started i-0cedd401de28af58d' and 'Instance type changed successfully'. Below these is a 'Notifications' bar showing 0 errors, 0 warnings, 2 successes, 0 info, and 0 debug messages. The main heading is 'Instances (1/1)' with an 'Info' link. Below this are buttons for 'Connect', 'Instance state', 'Actions', and 'Launch instances'. A search bar prompts 'Find Instance by attribute or tag (case-sensitive)'. A table lists the instances, with 'Web Server' (ID: i-0cedd401de28af58d) in the 'Running' state, type 't2.small'. The instance details for 'i-0cedd401de28af58d (Web Server)' are expanded, showing tabs for 'Details', 'Security', 'Networking', 'Storage', 'Status checks', 'Monitoring', and 'Tags'. The 'Details' tab is active, showing the 'Instance summary' with the following information:

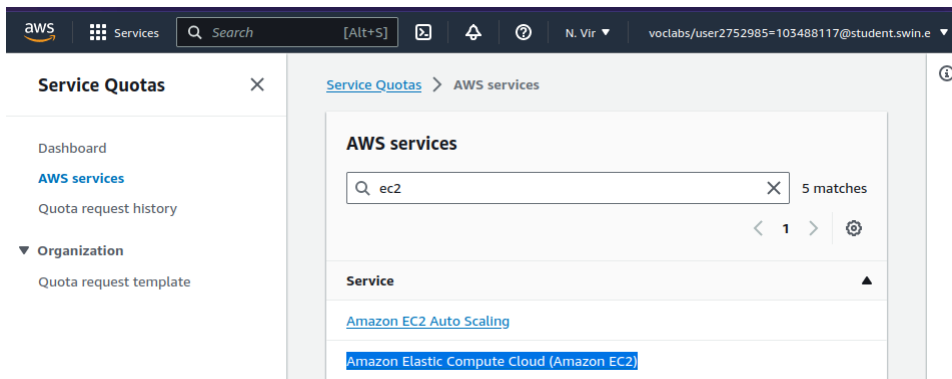
▼ Instance summary Info		
Instance ID i-0cedd401de28af58d (Web Server)	Public IPv4 address 54.174.32.224 open address	Private IPv4 addresses 10.0.2.104
IPv6 address -	Instance state Running	Public IPv4 DNS ec2-54-174-32-224.compute-1.amazonaws.com open address
Hostname type IP name: ip-10-0-2-104.ec2.internal	Private IP DNS name (IPv4 only) ip-10-0-2-104.ec2.internal	

Task 5: Explore EC2 Limits

52. In the AWS Management Console, in the search box next to Services, search for and 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).



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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.

Service quotas [Info](#)

View your applied quota values, default quota values, and request quota increases for quotas.
[Learn more](#)

Request increase at account-level

× 10 matches

< 1 > ⚙

	Quota name ▲	Applied quota value ▼	AWS default quota value ▼	Adjustability ▼
<input type="radio"/>	Running On-Demand DL Instances	96	0	Account-level
<input type="radio"/>	Running On-Demand F Instances	64	0	Account-level

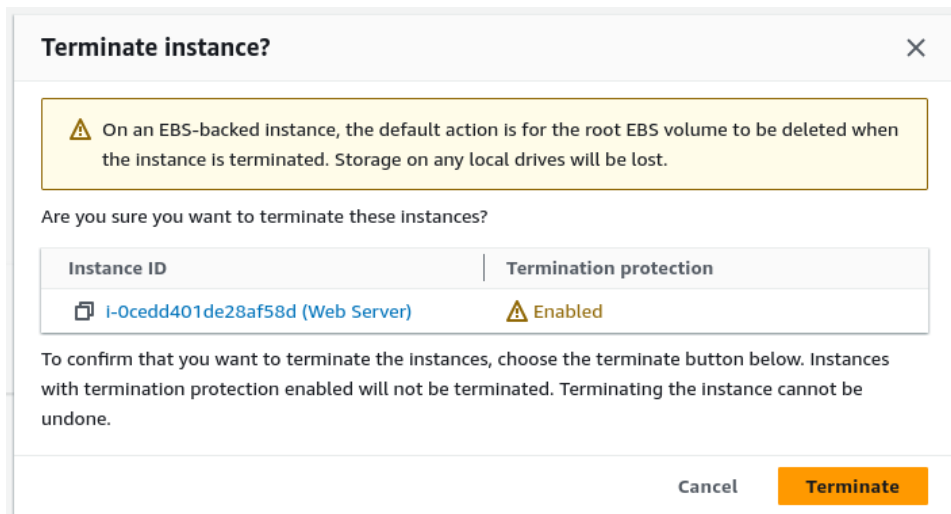
Task 6: Test Termination Protection

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

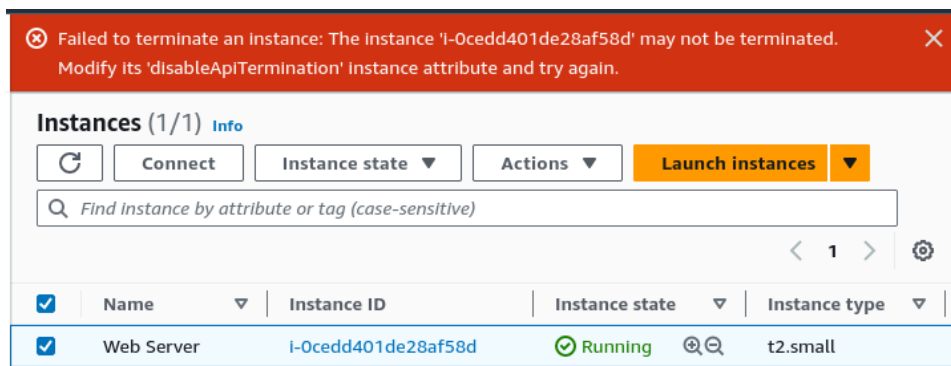
56. In left navigation pane, choose Instances.

57. Select the Web Server instance and in the Instance state menu, select Terminate instance.

58. Then choose Terminate



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.



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59. In the Actions menu, select Instance settings Change termination protection.
Remove the check next to Enable.

61. Choose Save


You can now terminate the instance.

Change termination protection

To prevent your instance from being accidentally terminated, you can enable termination protection for the instance. [Learn more](#)

Instance ID
I-0cedd401de28af58d (Web Server)

Termination protection
☐ Enable

**Termination protection disabled.**
The instance is no longer protected against accidental termination. If the instance is terminated, data stored on ephemeral storage is lost.

Cancel Save

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

63. Choose Terminate

Successfully terminated I-0cedd401de28af58d

Successfully removed termination protection for instance I-0cedd401de28af58d. The instance can be terminated.

Notifications 0 0 2 0 0

Instances (1) Info

Refresh Connect Instance state ▼ Actions ▼ Launch instances ▼

Find Instance by attribute or tag (case-sensitive)

☐

Name ▼

☐

Web Server

☐

Instance ID

☐

I-0cedd401de28af58d

☐

Instance state ▼

☐

Terminated

☐

Instance type ▼

☐

t2.small