

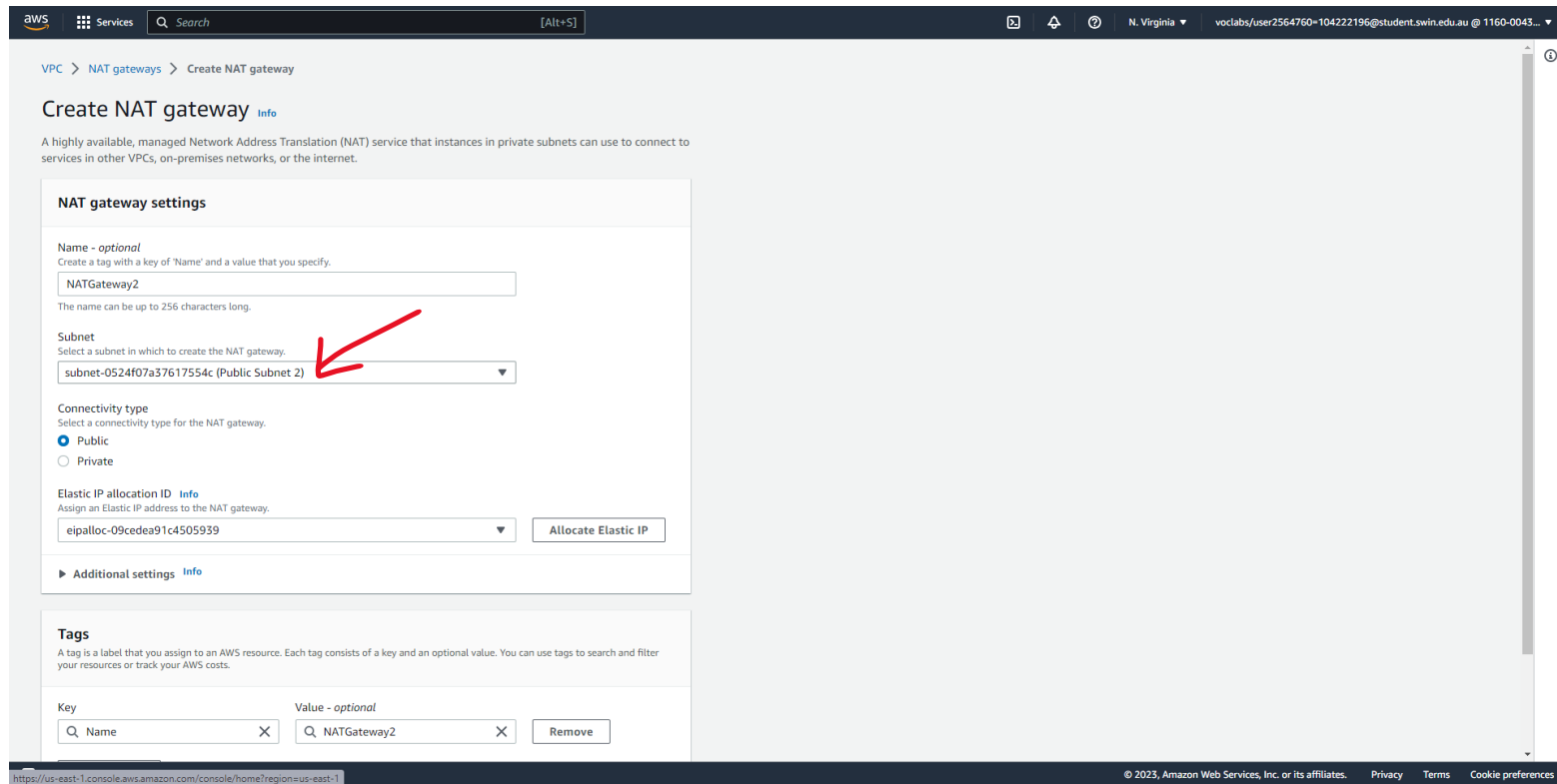
Ta Quang Tung – 104222196

COS20019 – Cloud Computing Architecture - Wk10: ACA Module 9 Challenge Lab - Creating a Scalable and Highly Available Environment for the Café

Task 1 - Inspecting your environment

The initial environment is explored on AWS and related questions are answered on Canvas.

Task 2 - Creating a NAT gateway for the second Availability Zone



The screenshot shows the AWS Management Console interface for creating a NAT gateway. The breadcrumb navigation indicates the path: VPC > NAT gateways > Create NAT gateway. The main heading is 'Create NAT gateway' with an 'info' link. Below this is a descriptive paragraph: 'A highly available, managed Network Address Translation (NAT) service that instances in private subnets can use to connect to services in other VPCs, on-premises networks, or the internet.'

The 'NAT gateway settings' section contains the following fields:

- Name - optional:** A text input field containing 'NATGateway2'. Below it, a note states: 'The name can be up to 256 characters long.'
- Subnet:** A dropdown menu showing 'subnet-0524f07a37617554c (Public Subnet 2)'. A red arrow points to this dropdown.
- Connectivity type:** Two radio buttons are present: 'Public' (selected) and 'Private'.
- Elastic IP allocation ID - info:** A dropdown menu showing 'eipalloc-09cedea91c4505939'. To its right is an 'Allocate Elastic IP' button.

Below the settings section is an 'Additional settings' section with an 'info' link. Under the heading 'Tags', there is a descriptive paragraph: 'A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.'

The 'Tags' section includes a table with two columns: 'Key' and 'Value - optional'. The 'Key' column contains 'Name' with a search icon and a close button. The 'Value - optional' column contains 'NATGateway2' with a search icon and a close button. A 'Remove' button is located to the right of the value field.

The footer of the console shows the URL 'https://us-east-1.console.aws.amazon.com/console/home?region=us-east-1' and the copyright notice '© 2023, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences'.

Create a NAT gateway in Public Subnet 2, which is in the second Availability Zone.

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VPC > Route tables > rtb-02c546d0b11d6a8b8 > Edit routes

Edit routes

Destination	Target	Status	Propagated
10.0.0.0/16	local	Active	No
0.0.0.0/0	nat-051a3e04a9ca57233	-	No

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In the route table of Private Subnet 2, create a route that directs all Internet-bound traffic to the newly created NAT gateway.

Task 3 - Creating a bastion host instance in a public subnet

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
Bastion Host [Add additional tags](#)

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

Recents | My AMIs | **Quick Start**

Amazon Linux macOS Ubuntu Windows Red Hat SUSE Linux Enterprise Server

Amazon Machine Image (AMI)

Amazon Linux 2023 AMI [Free tier eligible](#)

ami-06ca3ca175f37dd66 (64-bit (x86)) / ami-0006abfd85caddf82 (64-bit (Arm))
Virtualization: hvm ENA enabled: true Root device type: ebs

Description
Amazon Linux 2023 AMI 2023.1.20230705.0 x86_64 HVM kernel-6.1

Summary

Number of instances [Info](#)
1

Software Image (AMI)
Amazon Linux 2023 AMI 2023.1.2...[read more](#)
ami-06ca3ca175f37dd66

Virtual server type (instance type)
t2.micro

Firewall (security group)
New security group

Storage (volumes)
1 volume(s) - 8 GiB

Cancel **Launch Instance**
[Review commands](#)

Create a bastion host instance (part 1/3), specifying its name and AMI.

The screenshot displays the AWS Management Console interface for creating a new EC2 instance. The top navigation bar shows the AWS logo, 'Services', a search bar, and the user's account information. The main content area is divided into two columns. The left column contains the configuration steps: 'Instance type', 'Key pair (login)', and 'Network settings'. The 'Instance type' section shows 't2.micro' selected, with details like 'Family: t2', '1 vCPU', and '1 GiB Memory'. The 'Key pair (login)' section shows a dropdown menu with 'vockey' selected. The 'Network settings' section shows 'vpc-06028fedcd445dc46 (Lab VPC)' and 'subnet-008cfcfc00d9a65e4' selected. The right column shows the 'Summary' section, which provides a overview of the configuration: 'Number of instances: 1', 'Software Image (AMI): Amazon Linux 2023 AMI 2023.1.2...', 'Virtual server type (instance type): t2.micro', 'Firewall (security group): New security group', and 'Storage (volumes): 1 volume(s) - 8 GiB'. At the bottom of the right column are buttons for 'Cancel', 'Launch instance', and 'Review commands'. The bottom status bar shows the URL 'https://us-east-1.console.aws.amazon.com/console/home?region=us-east-1' and copyright information.

Create a bastion host instance (part 2/3), specifying its instance type and key pair.

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Network settings

VPC - required [Info](#)
vpc-06028fedcd445dc46 (Lab VPC) 10.0.0.0/16

Subnet [Info](#)
subnet-008cfcfc00d9a65e4 Public Subnet 1
VPC: vpc-06028fedcd445dc46 Owner: 116000434394 Availability Zone: us-east-1a
IP addresses available: 250 CIDR: 10.0.0.0/24 [Create new subnet](#)

Auto-assign public IP [Info](#)
Enable

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
BastionSG
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 Bastion Host.

Inbound Security Group Rules
Security group rule 1 (TCP, 22, 123.16.234.232/32) [Remove](#)

Type Info	Protocol Info	Port range Info
ssh	TCP	22

Source type Info	Name Info	Description - optional Info
My IP	<input type="text" value="Add CIDR, prefix list or security"/>	<input type="text" value="e.g. SSH for admin desktop"/>
	<input type="text" value="123.16.234.232/32"/>	

Summary

Number of instances [Info](#)
1

Software Image (AMI)
Amazon Linux 2023 AMI 2023.1.2...[read more](#)
ami-06ca3ca175f37dd66

Virtual server type (instance type)
t2.micro

Firewall (security group)
New security group

Storage (volumes)
1 volume(s) - 8 GiB

[Cancel](#) [Launch instance](#) [Review commands](#)

Create a bastion host instance (part 3/3), specifying its network settings such as VPC, subnet, IP, and security group. The security group allows only SSH traffic from "My IP".

Task 4 - Creating a launch template

Create launch template

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

Launch template name and description

Launch template name - *required*

CafeServerTemplate

Must be unique to this account. Max 128 chars. No spaces or special characters like '&', '"', '@'.

Template version description

A prod webserver for MyApp

Max 255 chars

Auto Scaling guidance

Select this if you intend to use this template with EC2 Auto Scaling

☒ Provide guidance to help me set up a template that I can use with EC2 Auto Scaling

► Template tags

► Source template

Launch template contents

Specify the details of your launch template below. Leaving a field blank will result in the field not being included in the launch template.

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

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

Summary

Software Image (AMI)

Cafe WebServer Image
ami-0814247fc77004f96

Virtual server type (instance type)

t2.micro

Firewall (security group)

c84296a179548714445646t1w116000434394-CafeSG-1V68PX0BB7SI0

Storage (volumes)

1 volume(s) - 8 GiB

Cancel Create launch template

Create a launch template (part 1/5), specifying its name and enabling “provide guidance for ASG”.

Source template

Launch template contents

Specify the details of your launch template below. Leaving a field blank will result in the field not being included in the launch template.

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

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

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

Recents | **My AMIs** | Quick Start

☒ Owned by me ☐ Shared with me

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

Amazon Machine Image (AMI)

Cafe WebServer Image
ami-0814247fc77004f96
2023-07-18T09:22:00.000Z Virtualization: hvm ENA enabled: true Root device type: ebs

Description
-

Architecture	AMI ID
x86_64	ami-0814247fc77004f96

▼ Instance type [Info](#) [Advanced](#)

▼ Summary

[Software Image \(AMI\)](#)
Cafe WebServer Image
ami-0814247fc77004f96

[Virtual server type \(instance type\)](#)
t2.micro

[Firewall \(security group\)](#)
c84296a179548714445646t1w116000434394-CafeSG-1V68PX0BB7SIO

[Storage \(volumes\)](#)
1 volume(s) - 8 GiB

Cancel [Create launch template](#)

Create a launch template (part 2/5), specifying the correct Cafe WebServer Image AMI.

The screenshot displays the AWS Management Console interface for creating a launch template. The top navigation bar includes the AWS logo, 'Services', a search bar, and the user's account information (N. Virginia, voclabs/user2564760=104222196@student.swin.edu.au @ 1160-0043...).

The main content area is divided into two columns. The left column contains the configuration settings, and the right column shows a summary of the selected options.

Configuration Settings:

- Architecture:** x86_64
- AMI ID:** ami-0814247fc77004f96
- Instance type:** t2.micro (indicated by a red arrow). The dropdown menu shows details: Family: t2, 1 vCPU, 1 GiB Memory, Current generation: true, Free tier eligible. Pricing: On-Demand Windows: 0.0162 USD per Hour, On-Demand SUSE: 0.0116 USD per Hour, On-Demand RHEL: 0.0716 USD per Hour, On-Demand Linux: 0.0116 USD per Hour. A 'Compare instance types' link is also present.
- Key pair (login):** LabKeyPair (indicated by a red arrow). A 'Create new key pair' link is available.
- Network settings:** Subnet is set to 'Don't include in launch template'. A 'Create new subnet' link is available.
- Firewall (security groups):** 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.

Summary (Right Column):

- Software Image (AMI):** Cafe WebServer Image, ami-0814247fc77004f96
- Virtual server type (instance type):** t2.micro
- Firewall (security group):** c84296a179548714445646t1w116000434394-CafeSG-1V68PX0BB7SIO
- Storage (volumes):** 1 volume(s) - 8 GiB

At the bottom of the configuration section, there are two buttons: 'Cancel' and 'Create launch template'.

Create a launch template (part 3/5), specifying its instance type and key pair, which is a new key pair.

aws Services Search [Alt+S]

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
LabKeyPair [Create new key pair](#)

▼ Network settings Info

Subnet Info
Don't include in launch template [Create new subnet](#)

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

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

☒ Select existing security group ☐ Create security group

Security groups Info
Select security groups

c84296a179548714445646t1w116000434394-CafeSG-1V68PX0BB7SIO
sg-0634d44802aba544d [Compare security group rules](#)

▶ Advanced network configuration

▼ Storage (volumes) Info

EBS Volumes [Hide details](#)

▶ Volume 1 (AMI Root) (8 GiB, EBS, General purpose SSD (gp2))
AMI Volumes are not included in the template unless modified

▼ Summary

Software Image (AMI)
Cafe WebServer Image
ami-0814247fc77004f96

Virtual server type (instance type)
t2.micro

Firewall (security group)
c84296a179548714445646t1w116000434394-CafeSG-1V68PX0BB7SIO

Storage (volumes)
1 volume(s) - 8 GiB

Cancel [Create launch template](#)

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Create a launch template (part 4/5), specifying its security group.

The screenshot shows the AWS Management Console interface for creating a launch template. The top navigation bar includes the AWS logo, 'Services', a search bar, and the user's account information. The main content area is divided into two columns. The left column contains the 'Resource tags' and 'Advanced details' sections. The 'Resource tags' section shows a tag with the key 'Name' and the value 'webserver' assigned to the 'Instances' resource type. The 'Advanced details' section includes options for purchasing (Request Spot Instances), IAM instance profile (CafeRole), hostname type (Don't include in launch template), DNS hostname (Enable resource-based IPv4 and IPv6 DNS requests), instance auto-recovery (Don't include in launch template), and shutdown behavior. The right column contains the 'Summary' section, which lists the software image (Cafe WebServer Image), virtual server type (t2.micro), firewall (security group), and storage (1 volume(s) - 8 GiB). At the bottom of the right column are 'Cancel' and 'Create launch template' buttons.

Resource tags [Info](#)

Key [Info](#) Value [Info](#) Resource types [Info](#)

Q Name X Q webserver X Select resource ty... Remove

Instances X

Add new tag

You can add up to 49 more tags.

Advanced details [Info](#)

Purchasing option [Info](#)

☐ Request Spot Instances

If Spot is selected you will not be able to create an Auto Scaling group that spans across multiple pricing options and instance types

IAM instance profile [Info](#)

CafeRole [Create new IAM profile](#)

Hostname type [Info](#)

Don't include in launch template

DNS Hostname [Info](#)

☐ Enable resource-based IPv4 (A record) DNS requests

☐ Enable resource-based IPv6 (AAAA record) DNS requests

Instance auto-recovery [Info](#)

Don't include in launch template

Shutdown behavior [Info](#)

Summary

[Software Image \(AMI\)](#)

Cafe WebServer Image
ami-0814247fc77004f96

[Virtual server type \(instance type\)](#)

t2.micro

[Firewall \(security group\)](#)

c84296a179548714445646t1w116000434394-CafeSG-1V68PX0BB7SIO

[Storage \(volumes\)](#)

1 volume(s) - 8 GiB

Cancel **Create launch template**

Create a launch template (part 5/5), specifying its resource tag and IAM role of CafeRole.

Task 5 - Creating an Auto Scaling group

Step 1
Choose launch template

Choose launch template [Info](#)

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

Name

Auto Scaling group name
Enter a name to identify the group.

CafeServerGroup

Must be unique to this account in the current Region and no more than 255 characters.

Launch template [Info](#)

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

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

CafeServerTemplate

[Create a launch template](#)

Version
Default (1)

[Create a launch template version](#)

Description -	Launch template CafeServerTemplate lt-0e09d9b81d6377386	Instance type t2.micro
AMI ID	Security groups	Request Spot Instances

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Create an auto-scaling group (part 1/4), specifying its name and launch template.

aws

Services

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N. Virginia

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EC2 > Auto Scaling groups > Create Auto Scaling group

Step 1
Choose launch template

Step 2
Choose instance launch options

Step 3 - optional
Configure advanced options

Step 4 - optional
Configure group size and scaling policies

Step 5 - optional
Add notifications

Step 6 - optional
Add tags

Step 7
Review

Choose instance launch options

Choose the VPC network environment that your instances are launched into, and customize the instance types and purchase options.

Network

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

VPC

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

vpc-06028fedcd445dc46 (Lab VPC)
10.0.0.0/16

Create a VPC

Availability Zones and subnets

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

Select Availability Zones and subnets

us-east-1a | subnet-032f64950ba2dc870 (Private Subnet 1)
10.0.2.0/24

us-east-1b | subnet-0f5cd11be34ee8622 (Private Subnet 2)
10.0.3.0/24

Create a subnet

Instance type requirements

You can keep the same instance attributes or instance type from your launch template, or you can choose to override the launch template by specifying different instance attributes or manually adding instance types.

Override launch template

Launch template	Version	Description
-----------------	---------	-------------

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Create an auto-scaling group (part 2/4), specifying its VPC and subnets.

aws

Services

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N. Virginia

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EC2 > Auto Scaling groups > Create Auto Scaling group

Step 1
Choose launch template

Step 2
Choose instance launch options

Step 3 - optional
Configure advanced options

Step 4 - optional
Configure group size and scaling policies

Step 5 - optional
Add notifications

Step 6 - optional
Add tags

Step 7
Review

Configure group size and scaling policies - optional

Set the desired, minimum, and maximum capacity of your Auto Scaling group. You can optionally add a scaling policy to dynamically scale the number of instances in the group.

Group size - optional

Specify the size of the Auto Scaling group by changing the desired capacity. You can also specify minimum and maximum capacity limits. Your desired capacity must be within the limit range.

Desired capacity

2

Minimum capacity

2

Maximum capacity

6

Scaling policies - optional

Choose whether to use a scaling policy to dynamically resize your Auto Scaling group to meet changes in demand.

Target tracking scaling policy

Choose a desired outcome and leave it to the scaling policy to add and remove capacity as needed to achieve that outcome.

None

Scaling policy name

Target Tracking Policy

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Create an auto-scaling group (part 3/4), specifying its group size.

aws

Services

Search

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Step 1

Review

Scaling policies - optional

Choose whether to use a scaling policy to dynamically resize your Auto Scaling group to meet changes in demand. [Info](#)

☒ Target tracking scaling policy

Choose a desired outcome and leave it to the scaling policy to add and remove capacity as needed to achieve that outcome.

☐ None

Scaling policy name

Target Tracking Policy

Metric type

Average CPU utilization

Target value

25

Instances need

60

seconds warm up before including in metric

☐ Disable scale in to create only a scale-out policy

Instance scale-in protection - optional

Instance scale-in protection

If protect from scale in is enabled, newly launched instances will be protected from scale in by default.

☐ Enable instance scale-in protection

Cancel

Skip to review

Previous

Next

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

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Create an auto-scaling group (part 4/4), specifying its scaling policy.

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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
Scheduled Instances
Capacity Reservations

▼ Images
AMIs
AMI Catalog

▼ Elastic Block Store
Volumes
Snapshots
Lifecycle Manager

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

Instances (4) Info

Find instance by attribute or tag (case-sensitive)

<input type="checkbox"/>	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP
<input type="checkbox"/>	Bastion Host	i-0dbe1322e5994f3b6	Running	t2.micro	2/2 checks passed	User: arn:aws: us-east-1a	us-east-1a	ec2-54-205-137-65.co...	54.205.137.65	-
<input type="checkbox"/>	webserver	i-02390edb9475eea12	Running	t2.micro	2/2 checks passed	User: arn:aws: us-east-1b	us-east-1b	-	-	-
<input type="checkbox"/>	webserver	i-09374318be11041fe	Running	t2.micro	2/2 checks passed	User: arn:aws: us-east-1a	us-east-1a	-	-	-
<input type="checkbox"/>	CafeWebApp...	i-05432daa043e6a2e3	Running	t2.micro	2/2 checks passed	User: arn:aws: us-east-1a	us-east-1a	ec2-3-86-29-121.comp...	3.86.29.121	-

Select an instance

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After the ASG has been successfully created, two instances are automatically created.

Task 6 - Creating a load balancer

EC2 > Security Groups > Create security group

Create security group [Info](#)

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

Basic details

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

Description [Info](#)
Security group for load balancer.

VPC [Info](#)
vpc-06028fedcd445dc46

Inbound rules [Info](#)

Type Info	Protocol Info	Port range Info	Source Info	Description - optional Info
HTTP	TCP	80	Anywhere-I... 0.0.0.0/0	

[Add rule](#) [Delete](#)

Outbound rules [Info](#)

Type Info	Protocol Info	Port range Info	Destination Info	Description - optional Info
All traffic	All	All	Custom	

[Delete](#)

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Create a security group for the load balancer that allows inbound HTTP traffic from anywhere.

aws Services Search [Alt+S]

Settings in this section can only be changed once the target group is created.

Choose a target type

- ☒ **Instances**
 - Supports load balancing to instances within a specific VPC.
 - Facilitates the use of [Amazon EC2 Auto Scaling](#) to manage and scale your EC2 capacity.
- ☐ **IP addresses**
 - Supports load balancing to VPC and on-premises resources.
 - Facilitates routing to multiple IP addresses and network interfaces on the same instance.
 - Offers flexibility with microservice based architectures, simplifying inter-application communication.
 - Supports IPv6 targets, enabling end-to-end IPv6 communication, and IPv4-to-IPv6 NAT.
- ☐ **Lambda function**
 - Facilitates routing to a single Lambda function.
 - Accessible to Application Load Balancers only.
- ☐ **Application Load Balancer**
 - Offers the flexibility for a Network Load Balancer to accept and route TCP requests within a specific VPC.
 - Facilitates using static IP addresses and PrivateLink with an Application Load Balancer.

Target group name

CafeServerTargetGroup

A maximum of 32 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen.

Protocol Port

HTTP : 80

1-65535

VPC

Select the VPC with the instances that you want to include in the target group.

Lab VPC

vpc-06028fedcd445dc46

IPv4: 10.0.0.0/16

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Create a target group for the load balancer in the Lab VPC.

aws Services Search [Alt+S]

EC2 > Load balancers > Create Application Load Balancer

Create Application Load Balancer [Info](#)

The Application Load Balancer distributes incoming HTTP and HTTPS traffic across multiple targets such as Amazon EC2 instances, microservices, and containers, based on request attributes. When the load balancer receives a connection request, it evaluates the listener rules in priority order to determine which rule to apply, and if applicable, it selects a target from the target group for the rule action.

► How Elastic Load Balancing works

Basic configuration

Load balancer name [Info](#)
Name must be unique within your AWS account and can't be changed after the load balancer is created.

CafeServerLB

A maximum of 32 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen.

Scheme [Info](#)
Scheme can't be changed after the load balancer is created.

☒ Internet-facing [Learn more](#) [Info](#)
An internet-facing load balancer routes requests from clients over the internet to targets. Requires a public subnet.

☐ Internal
An internal load balancer routes requests from clients to targets using private IP addresses.

IP address type [Info](#)
Select the type of IP addresses that your subnets use.

☒ IPv4
Recommended for internal load balancers.

☐ Dualstack
Includes IPv4 and IPv6 addresses.

Network mapping [Info](#)

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

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Create an Application Load Balancer (part 1/3), specifying its name and selecting the Internet-facing scheme.

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☐ Dualstack
Includes IPv4 and IPv6 addresses.

Network mapping [Info](#)

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

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

Lab VPC
vpc-06028fedcd445dc46
IPv4: 10.0.0.0/16

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

☒ **us-east-1a (use1-az2)**

Subnet
subnet-008cfcfc00d9a65e4 Public Subnet 1

IPv4 address
Assigned by AWS

☒ **us-east-1b (use1-az4)**

Subnet
subnet-0524f07a37617554c Public Subnet 2

IPv4 address
Assigned by AWS

☐ **us-east-1c (use1-az6)**

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Create an Application Load Balancer (part 2/3), specifying the Lab VPC and the two public subnets under network mapping.

Security groups [Info](#)

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

Security groups

Select up to 5 security groups

CafeServerLB SG sg-07bacb30d4ea7de64 X 


VPC: vpc-06028fedcd445dc46

Listeners and routing [Info](#)

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

▼ Listener HTTP:80 [Remove](#)

Protocol Port Default action [Info](#)

HTTP : 80 Forward to CafeServerTargetGroup HTTP 

1-65535 Target type: Instance, IPv4

[Create target group](#)

Listener tags - optional

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

[Add listener tag](#)

You can add up to 50 more tags.

[Add listener](#)

▼ **Add-on services - optional**

Create an Application Load Balancer (part 3/3), selecting the security group and target group created earlier.

aws Services Search [Alt+S] N. Virginia voclabs/user2564760=104222196@student.swin.edu.au @ 1160-0043...

Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances
Dedicated Hosts
Scheduled Instances
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

▼ Load Balancing
Load Balancers
Target Groups

▼ Auto Scaling
Auto Scaling Groups

EC2 > Auto Scaling groups > CafeServerGroup

Edit CafeServerGroup Info

Load balancing - optional

Load balancers

☒ Application, Network or Gateway Load Balancer target groups
Only instance target groups that belong to the same VPC as your Auto Scaling group are available for selection.

Select target groups

CafeServerTargetGroup | HTTP X
Application Load Balancer: CafeServerLB

☐ Classic Load Balancers

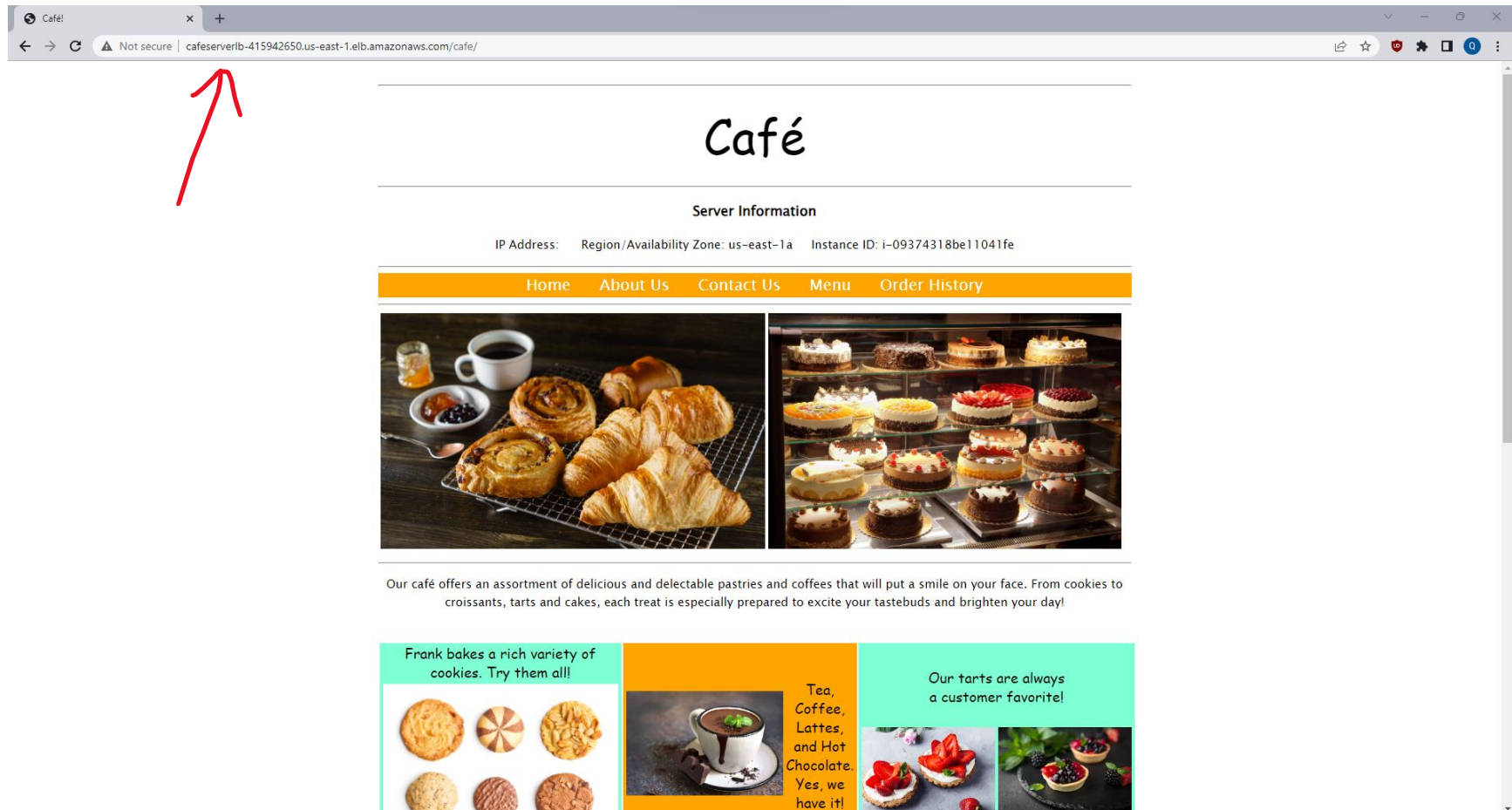
Create and attach new load balancers

Add a new load balancer

Cancel Update

Attach the auto-scaling group to the load balancer by adding the target group.

Task 7 - Testing the web application



The webpage is now viewable through the load balancer DNS name.

Task 8 - Testing automatic scaling under load

The screenshot shows the AWS Management Console interface for editing inbound rules on a security group. The breadcrumb trail indicates the path: EC2 > Security Groups > sg-0634d44802aba544d - c84296a179548714445646t1w116000434394-CafeSG-1V68PX0BB7SIO > Edit inbound rules. The page title is 'Edit inbound rules' with an 'Info' link. A subtitle states: 'Inbound rules control the incoming traffic that's allowed to reach the instance.'

The 'Inbound rules' section contains a table with the following columns: Security group rule ID, Type, Protocol, Port range, Source, and Description - optional. There are two existing rules:

Security group rule ID	Type	Protocol	Port range	Source	Description - optional
sgr-0deb0e5e51c227fe0	HTTP	TCP	80	Custom	
-	SSH	TCP	22	Custom	Allows SSH traffic from Bastion Host.

Below the table is an 'Add rule' button. At the bottom right are 'Cancel', 'Preview changes', and 'Save rules' buttons. Two red arrows are drawn on the screen: one points to the 'SSH' rule's 'Type' dropdown, and the other points to the 'Source' input field where the security group ID 'sg-0acbae2ef00e5af06' is being entered.

Add an additional rule to the security group used by the web server instances so they can be SSH-ed into by the bastion host.

```
ec2-user@ip-10-0-3-251:~  
=====
```

```
Install 1 Package  
  
Total download size: 39 k  
Installed size: 94 k  
Downloading packages:  
warning: /var/cache/yum/x86_64/2/epel/packages/stress-1.0.4-16.el7.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID 352c64e5: NOKEY  
Public key for stress-1.0.4-16.el7.x86_64.rpm is not installed  
stress-1.0.4-16.el7.x86_64.rpm | 39 kB 00:00  
Retrieving key from file:///etc/pki/rpm-gpg/RPM-GPG-KEY-EPEL-7  
Importing GPG key 0x352C64E5:  
  Userid : "Fedora EPEL (7) <epel@fedoraproject.org>"  
  Fingerprint: 91e9 7d7c 4a5e 96f1 7f3e 888f 6a2f aea2 352c 64e5  
  Package : epel-release-7-14.noarch (installed)  
  From : /etc/pki/rpm-gpg/RPM-GPG-KEY-EPEL-7  
Running transaction check  
Running transaction test  
Transaction test succeeded  
Running transaction  
  Installing : stress-1.0.4-16.el7.x86_64 1/1  
  Verifying : stress-1.0.4-16.el7.x86_64 1/1  
  
Installed:  
  stress.x86_64 0:1.0.4-16.el7  
  
Complete!  
[ec2-user@ip-10-0-3-251 ~]$ stress --cpu 1 --timeout 600  
stress: info: [30283] dispatching hogs: 1 cpu, 0 io, 0 vm, 0 hdd  
^C  
[ec2-user@ip-10-0-3-251 ~]$ stress --cpu 1 --timeout 600  
stress: info: [30347] dispatching hogs: 1 cpu, 0 io, 0 vm, 0 hdd  
^C  
[ec2-user@ip-10-0-3-251 ~]$
```

After SSH-ing into the bastion host through Putty, SSH into one of the private web servers (with agent-forwarding allowed) and run the code needed to increase the load on the web server.

aws Services Search [Alt+S] N. Virginia voclabs/user2564760=104222196@student.swin.edu.au @ 1160-0043...

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
Scheduled Instances
Capacity Reservations

▼ Images
AMIs
AMI Catalog

▼ Elastic Block Store
Volumes
Snapshots
Lifecycle Manager

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

Instances (8) Info

Find instance by attribute or tag (case-sensitive)

Connect Instance state Actions Launch instances

<input type="checkbox"/>	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP	IF
<input type="checkbox"/>	webserver	i-03e5936723b177a0c	Running	t2.micro	⌚ Initializing	⊗ User: arn:aws: us-east-1b	-	-	-	-	-
<input type="checkbox"/>	webserver	i-06b3932d5348a0a38	Running	t2.micro	⌚ Initializing	⊗ User: arn:aws: us-east-1a	-	-	-	-	-
<input type="checkbox"/>	Bastion Host	i-0dbe1322e5994f3b6	Running	t2.micro	✓ 2/2 checks passed	⊗ User: arn:aws: us-east-1a	ec2-54-205-137-65.co...	54.205.137.65	-	-	-
<input type="checkbox"/>	webserver	i-02390edb9475eea12	Running	t2.micro	✓ 2/2 checks passed	⊗ User: arn:aws: us-east-1b	-	-	-	-	-
<input type="checkbox"/>	webserver	i-02e947a521f0eb066	Running	t2.micro	⌚ Initializing	⊗ User: arn:aws: us-east-1b	-	-	-	-	-
<input type="checkbox"/>	webserver	i-0a374318be11041fe	Running	t2.micro	✓ 2/2 checks passed	⊗ User: arn:aws: us-east-1a	-	-	-	-	-
<input type="checkbox"/>	CafeWebAppS...	i-05432daa043e6a2e3	Running	t2.micro	✓ 2/2 checks passed	⊗ User: arn:aws: us-east-1a	ec2-3-86-29-121.comp...	3.86.29.121	-	-	-
<input type="checkbox"/>	webserver	i-0fbee97cd8a029390	Running	t2.micro	⌚ Initializing	⊗ User: arn:aws: us-east-1a	-	-	-	-	-

Select an instance

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Additional instances have been automatically launched by the ASG to accommodate the increased load on the web server.