Module 9 – Guided Lab: Creating a Highly Available Environment

Lab overview and objectives

Critical business systems should be deployed as *highly available applications*—that is, applications remain operational even when some components fail. To achieve high availability in Amazon Web Services (AWS), we recommend that you *run services across multiple Availability Zones*.

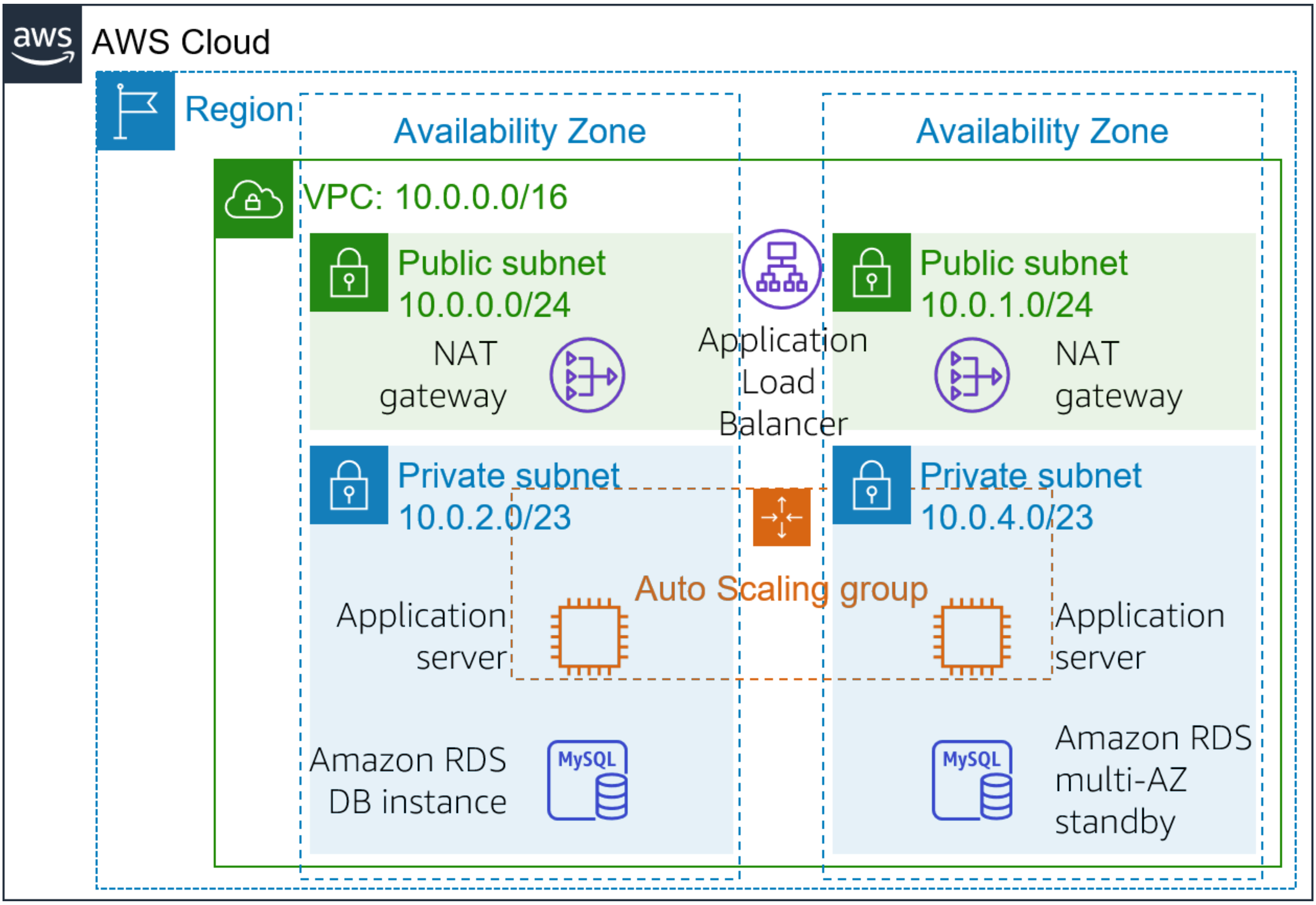
Many AWS services are inherently highly available, such as load balancers. Many AWS services can also be configured for high availability, such as deploying Amazon Elastic Compute Cloud (Amazon EC2) instances in multiple Availability Zones.

In this lab, you will start with an application that runs on a single EC2 instance. You will then make the application highly available.

After completing this lab, you should be able to:

- Inspect a provided virtual private cloud (VPC)
- Create an Application Load Balancer
- Create an Auto Scaling group
- Test the application for *high availability*

At the **end** of this lab, your architecture will look like the following example:



Duration

The lab requires approximately **40 minutes** to complete.

AWS service restrictions

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

Accessing the AWS Management Console

1. At the top of these instructions, choose Start Lab to launch your lab.

   A **Start Lab** panel opens, and it displays the lab status.

   Tip: If you need more time to complete the lab, restart the timer for the environment by choosing the Start Lab button again.

2. Wait until the **Start Lab** panel displays the message *Lab status: ready*, then close the panel by choosing the **X**.

3. At the top of these instructions, choose AWS.

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

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

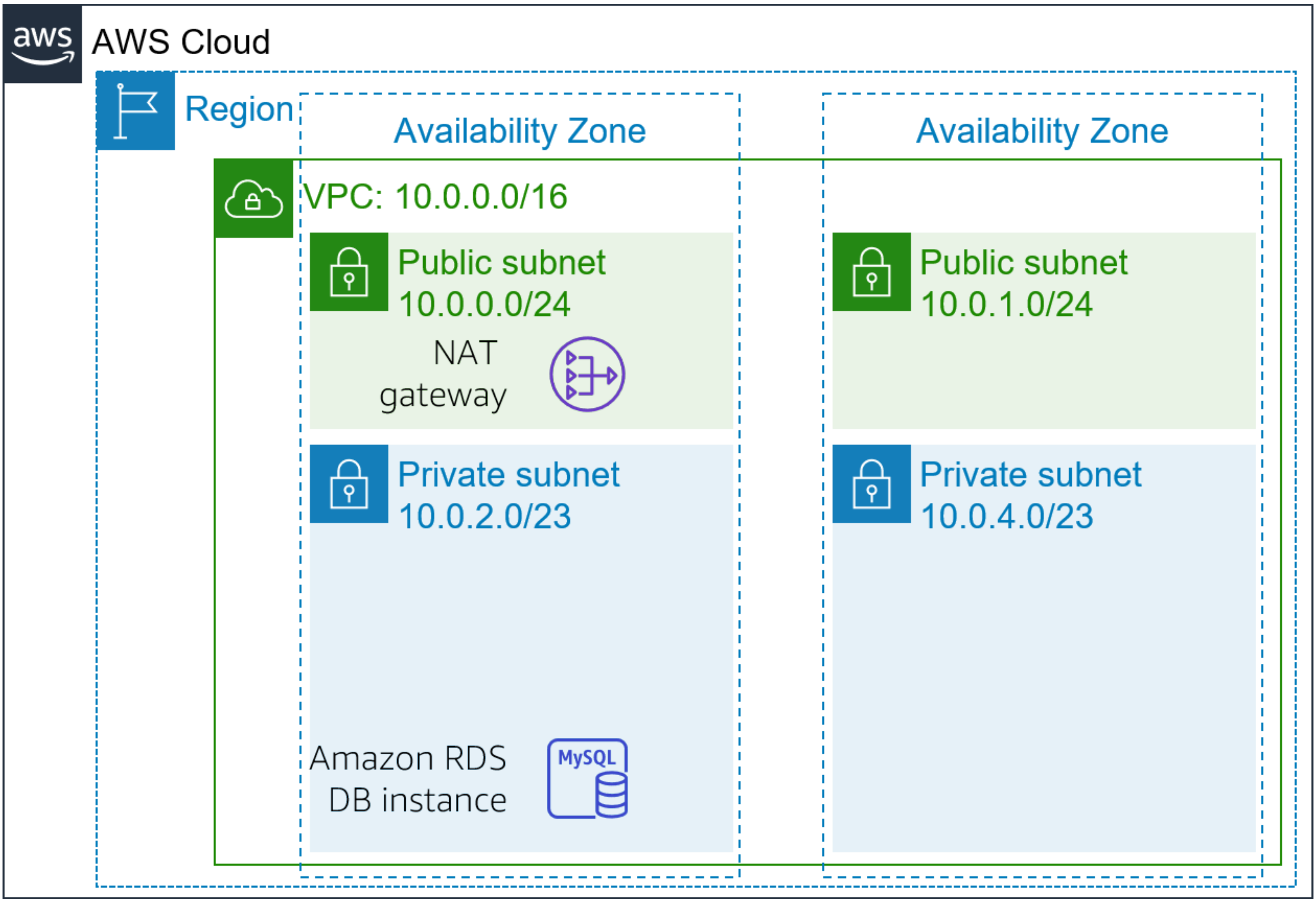
4. Arrange the **AWS Management Console** tab so that it displays alongside these instructions. Ideally, you will have both browser tabs open at the same time so that you can follow the lab steps more easily.

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

Task 1: Inspecting your VPC

This lab begins with an environment that is already deployed via AWS CloudFormation. It includes:

- A VPC
- Public and private subnets in two Availability Zones
- An internet gateway (not shown) that is associated with the public subnets
- A Network Address Translation (NAT) gateway in one of the public subnets
- An Amazon Relational Database Service (Amazon RDS) instance in one of the private subnets



In this task, you will review the configuration of the VPC that was created for this lab.

5. On the **AWS Management Console**, on the **Services** menu, choose **VPC**.

6. In the left navigation pane, under **Filter by VPC**, choose the **Select a VPC** box and select **Lab VPC**.

   This setting will limit the console to only show resources that are associated with the *Lab VPC*.

7. In the left navigation pane, choose **Your VPCs**.

   Here, you can access information about the **Lab VPC** that was created for you.

   The **IPv4 CIDR** column has a value of *10.0.0.0/16*, which means that this VPC includes all IP addresses that start with *10.0.x.x*.

8. In the left navigation pane, choose **Subnets**.

   Here, you can access information about **Public Subnet 1:**

   - The **VPC** column shows that this subnet exists inside of *Lab VPC*.
   - The **IPv4 CIDR** column has a value of *10.0.0.0/24*, which means that this subnet includes the 256 IP addresses between *10.0.0.0* and *10.0.0.255*. Five of these addresses are reserved and unusable.
   - The **Availability Zone** column lists the Availability Zone where this subnet resides.

9. To reveal more details at the bottom of the page, select **Public Subnet 1**.

   Tip: To adjust the size of the lower window pane, you can drag the divider.

10. In the lower half of the page, choose the **Route table** tab.

    This tab includes details about the routing for this subnet:

    - The first entry specifies that traffic destined within the Classless Inter-Domain Routing (CIDR) range for the VPC (*10.0.0.0/16*) will be routed within the VPC (*local*).
    - The second entry specifies that any traffic destined for the internet (*0.0.0.0/0*) is routed to the internet gateway (*igw-*). This setting makes the subnet a *public subnet*.

This tab has information about the network access control list (network ACL) that is associated with the subnet. The rules currently permit *all traffic* to flow in and out of the subnet, but the rules can be further restricted by using security groups.

12. In the left navigation pane, choose **Internet Gateways**.

    Notice that an internet gateway is already associated with **Lab VPC**.

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

14. Select **Inventory-DB**.

    This security group controls incoming traffic to the database.

15. In the lower half of the page, choose the **Inbound rules** tab.

    These rules permit inbound MySQL or Aurora traffic (port 3306) from anywhere in the VPC (*10.0.0.0/16*). You will later modify this setting so it only accepts traffic from the application servers.

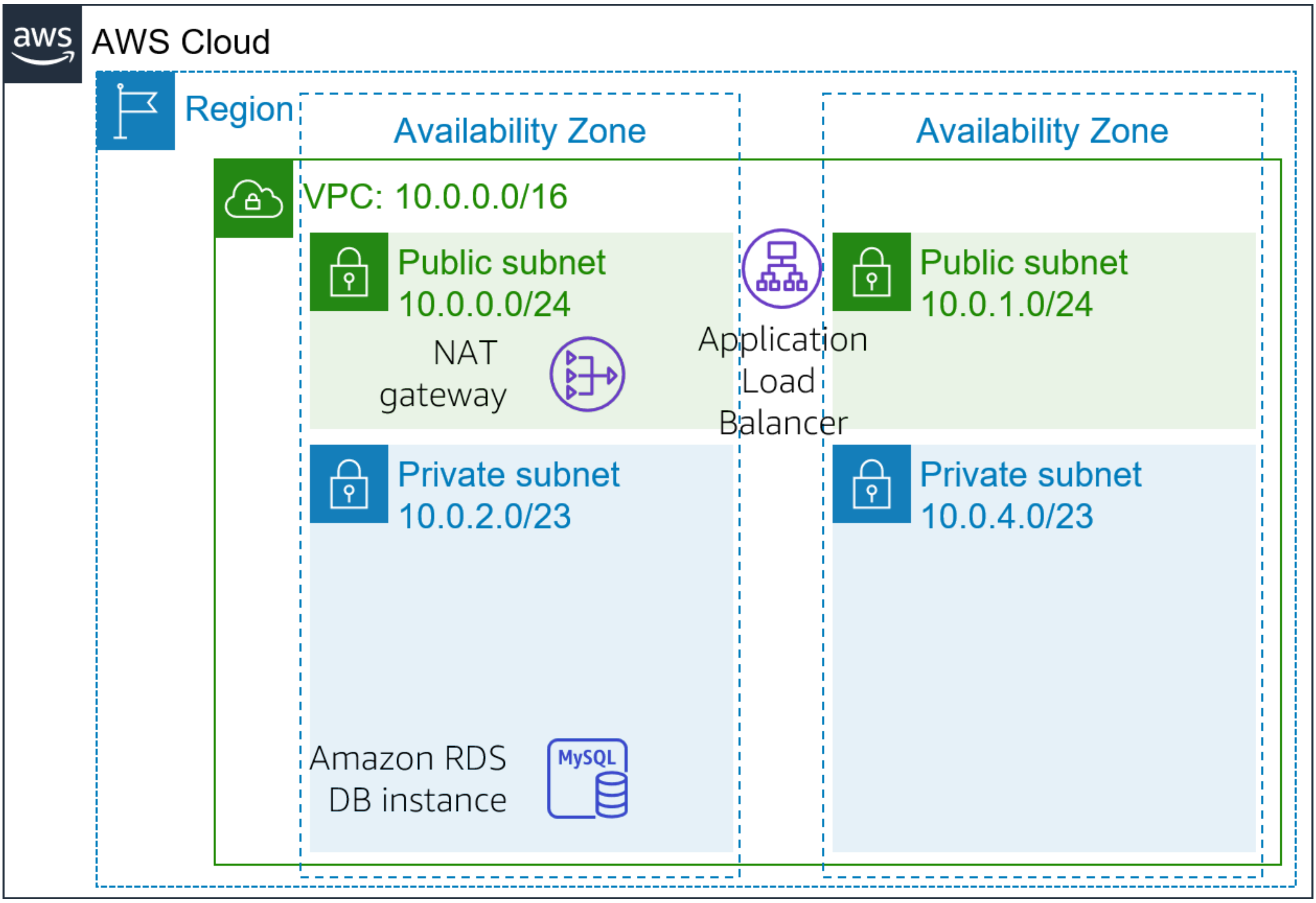
16. Choose the **Outbound rules** tab.

    By default, security groups allow all outbound traffic. However, this setting can be modified as needed.

Task 2: Creating an Application Load Balancer

To build a highly available application, it is a best practice to launch resources in *multiple Availability Zones*. Availability Zones are physically separate data centers (or groups of data centers) in the same Region. If you run your applications across multiple Availability Zones, you can provide greater *availability* if a data center experiences a failure.

Because the application runs on multiple application servers, you will need a way to distribute traffic amongst those servers. You can accomplish this goal by using a *load balancer*. This load balancer will also perform health checks on instances and only send requests to healthy instances.



17. On the Services menu, choose **EC2**.

18. In the left navigation pane, choose **Load Balancers** (you might need to scroll down to find it).

19. Choose Create Load Balancer

    Several types of load balancers are displayed. Read the descriptions of each type to understand their capabilities.

20. Under **Application Load Balancer**, choose **Create**.

21. For **Load balancer name**, enter: `Inventory-LB`

22. Scroll down to the **Network mapping** section, then for **VPC**, select **Lab VPC**.

    Important: Be sure to choose **Lab VPC**. It is likely not the default selection.

    You will now specify which *subnets* the load balancer should use. It will be a public load balancer, so you will select both public subnets.

23. Under **Mappings**, choose the **first** Availability Zone, then choose the **Public Subnet** that displays.

24. Choose the **second** Availability Zone, then choose the **Public Subnet** that displays.

    You should now have selected two subnets: **Public Subnet 1** and **Public Subnet 2**. (If not, go back and try the configuration again.)

25. In the **Security groups** section, select **Create new security group**, then configure:
    - **Security group name:** `Inventory-LB`
    - **Description:** `Enable web access to load balancer`
    - **VPC**: Remove the default VPC by choosing the X to the right of it. Then select **Lab VPC**.

26. Under **Inbound rules**, choose **Add rule** and configure as described:
    - **Type:** *HTTP*
    - **Source:** *Anywhere-IPv4*

27. Still under **Inbound rules**, choose **Add rule** again and configure:
    - **Type:** *HTTPS*
    - **Source:** *Anywhere-IPv4*

28. Choose **Create security group**.

29. Assign the security group to the load balancer:
    - Return to the browser tab where you are still configuring the load balancer.
    - Scroll down to the **Security groups** area and choose the refresh icon.
    - For **Security groups**, select the **Inventory-LB** security group.
    - Next, below the **Security groups** dropdown menu, select the **X** next to the *default* security group so that the Inventory-LB is now the only security group chosen.

30. In the **Listeners and routing** section, choose **Create target group**.

    Analysis: *Target groups* define where to *send* traffic that comes into the load balancer. The Application Load Balancer can send traffic to multiple target groups based upon the URL of the incoming request, such as having requests from mobile apps going to a different set of servers. Your web application will use only one target group.

31. A new browser tab will open. Configure the target group as described here:
    - **Choose a target type:** *Instances*
    - **Target group name:** `Inventory-App`
    - **VPC:** Ensure that *Lab VPC* is chosen.
    - Scroll down and expand **Advanced health check settings**.

      Note: The Application Load Balancer automatically performs *health checks* on all instances to ensure that they are responding to requests.

- **Healthy threshold:** 2
- **Interval:** 10 (seconds)

  This means that the health check will be performed every 10 seconds, and if the instance responds correctly twice in a row, it will be considered healthy.
- Choose **Next**. The *Register targets* screen appears.

  Note: *Targets* are the individual instances that will respond to requests from the load balancer.

  You do not have any web application instances yet, so you can skip this step.
- Review the settings and choose **Create target group**.

32. Return to the browser tab where you already started defining the load balancer.

33. In the **Listeners and routing** section, choose the refresh icon.

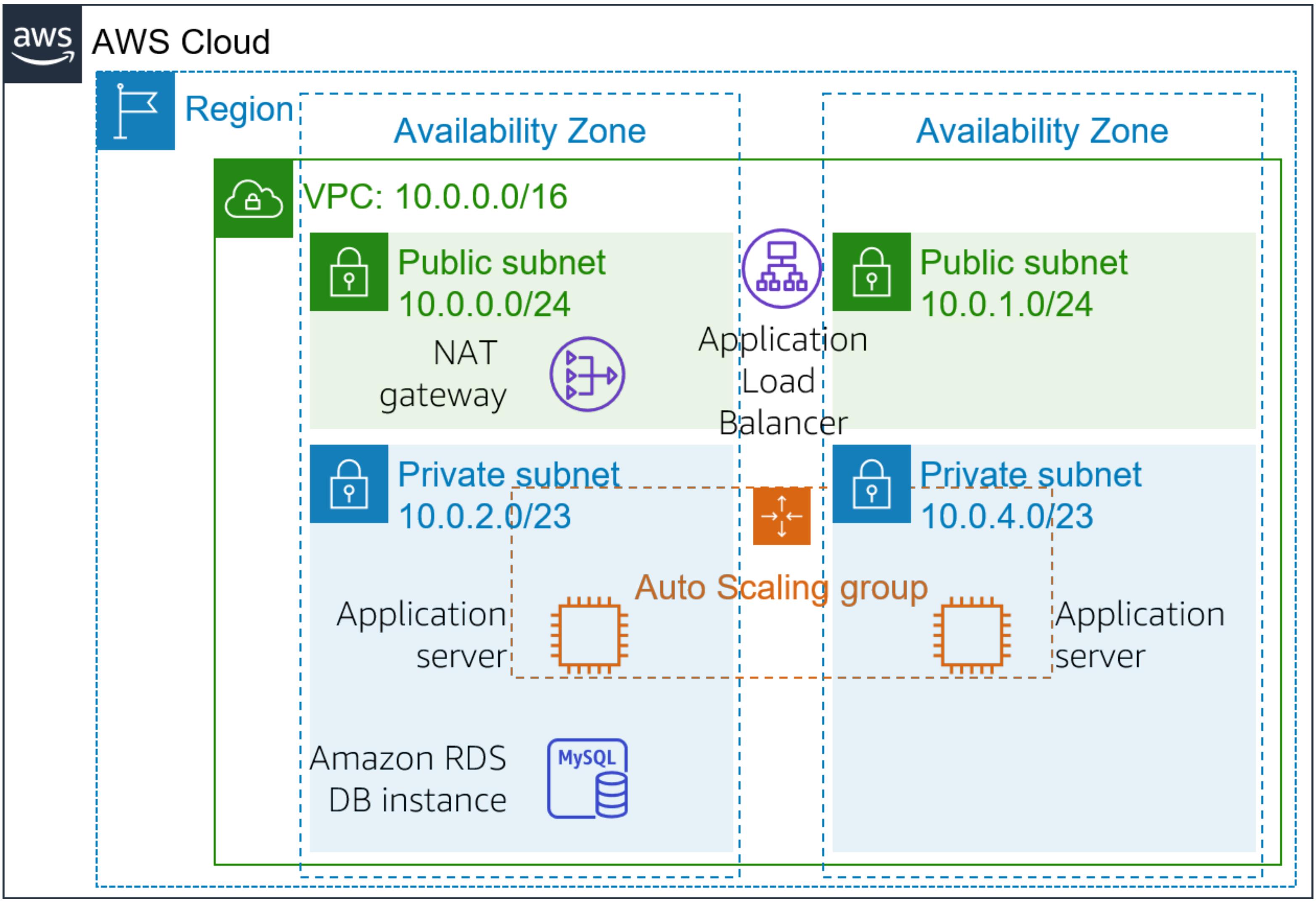
34. For the **Listener HTTP:80** row, set the **Default action** to forward to **Inventory-app**.

35. Scroll to the bottom of the page, and choose **Create load balancer**.
    - The load balancer is successfully created.
    - Choose **View load balancer**.

Task 3: Creating an Auto Scaling group

Amazon EC2 Auto Scaling is a service designed to *launch* or *terminate* Amazon EC2 instances automatically based on user-defined policies, schedules, and health checks. It also *automatically distributes instances across multiple Availability Zones* to make applications *highly available*.

In this task, you will create an Auto Scaling group that deploys EC2 instances across your *private subnets*, which is a security best practice for application deployment. Instances in a private subnet cannot be accessed from the internet. Instead, users send requests to the load balancer, which forwards the requests to EC2 instances in the private subnets.



Create an AMI for Auto Scaling

You will create an Amazon Machine Image (AMI) from the existing *Web Server 1*. This will save the contents of the boot disk so that new instances can be launched with identical content.

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

37. In the left navigation pane, choose **Instances**.

    First, you will confirm that the instance created for you in this lab is running.

38. Wait until the **Status check** for **Web Server 1** displays *2/2 checks passed*. Choose refresh to update.

    You will now create an AMI based upon this instance.

39. Select **Web Server 1**.

40. In the **Actions** menu, choose **Image and templates** > **Create image**, then configure:

    - **Image name:** Web Server AMI
    - **Image description:** Lab AMI for Web Server

41. Choose **Create image**

    A banner at the top of the screen displays the **AMI ID** for your new AMI.

    You will use this AMI when launching the Auto Scaling group later in the lab.

Create a launch configuration and an Auto Scaling group

You will first create a *launch configuration*, which defines the type of instances that Amazon EC2 Auto Scaling should launch. The interface looks similar to when you launch an EC2 instance. However, instead of launching an instance, it *stores* the configuration for later use.

42. In the left navigation pane, choose **Launch Configurations**.

43. Choose **Create launch configuration**

44. Configure these settings:

    - **Launch configuration name:** Inventory-LC
    - **Amazon machine image (AMI):** *Web Server AMI*
    - **Instance type:**
        - Select **Choose instance type**
        - Select *t3.micro*
        - Select **Choose**

      Note: If you have launched the lab in the us-east-1 Region, select the **t2.micro** instance type. To find the Region, look in the upper-right corner of the Amazon EC2 console.

      Note: If you receive the error message *Something went wrong. Please refresh and try again*, you may ignore it and continue with the exercise.

    - **Additional configuration:**
        - **IAM instance profile**: *Inventory-App-Role*
    - **Monitoring:** Select *Enable EC2 instance detailed monitoring within CloudWatch*

      This allows Auto Scaling to react quickly to changing utilization.

45. Expand **Advanced details**. Under **User data**, copy and paste this script:

```
#!/bin/bash
# Install Apache Web Server and PHP
yum install -y httpd mysql
amazon-linux-extras install -y php7.2
# Download Lab files
wget https://aws-tc-largeobjects.s3-us-west-2.amazonaws.com/ILT-TF-200-ACACAD-20-EN/mod9-guided/scripts/inventory-app.zip
unzip inventory-app.zip -d /var/www/html/
# Download and install the AWS SDK for PHP
wget https://github.com/aws/aws-sdk-php/releases/download/3.62.3/aws.zip
unzip aws -d /var/www/html
# Turn on web server
chkconfig httpd on
service httpd start
```

46. Under **Security groups**, for **Select an existing security group**, choose *Inventory-App*.

You will receive a warning that *You will not able to connect to the instance*. You can ignore this warning because you will not need connect to the instance. All configuration is done via the user data script.

47. Under **Key pair (login)**:
    - **Key pair options:** *Proceed without a key pair*
    - Select *I acknowledge that...*

48. Choose **Create launch configuration**

    The *launch configuration* defined *what to launch*, but the *Auto Scaling group* defines *where to launch* the resources.

49. In the **Launch configurations** table, select *Inventory-LC*.

50. From the Actions menu, choose *Create Auto Scaling group*.

51. For **Auto Scaling group name**, enter: `Inventory-ASG` (*ASG* stands for *Auto Scaling group*)

52. Choose **Next**

53. On the **Network** page, configure as described below:
    - **VPC:** *Lab VPC*
    - **Subnet:** Select *Private Subnet 1* **and** *Private Subnet 2*

      This will launch EC2 instances in private subnets across both Availability Zones.

54. Choose **Next**

55. Under **Load balancing**, configure:
    - Select **Attach to an existing load balancing**
    - **Existing load balancer target groups:** Select *Inventory-App*

      These settings tell the Auto Scaling group to register new EC2 instances as part of the *Inventory-App* target group that you created earlier. The load balancer will send traffic to instances that are in this target group.

56. Under **Health checks**, configure:
    - **Health check type:** Select **ELB**
    - **Health check grace period:** `90`

57. Under **Additional settings**, select **Enable group metrics collection within CloudWatch**.

58. Choose **Next**

59. Under **Group size**, configure:
   - **Desired capacity:** 2
   - **Minimum capacity:** 2
   - **Maximum capacity:** 2

60. Under **Scaling policies**, choose *None*.

    For this lab, you will *maintain two instances at all times* to ensure *high availability*. If the application is expected to receive varying loads of traffic, you can also create *scaling policies* that define when to launch or terminate instances. However, you do not need to create scaling policies for the Inventory application in this lab.

61. Choose **Next**

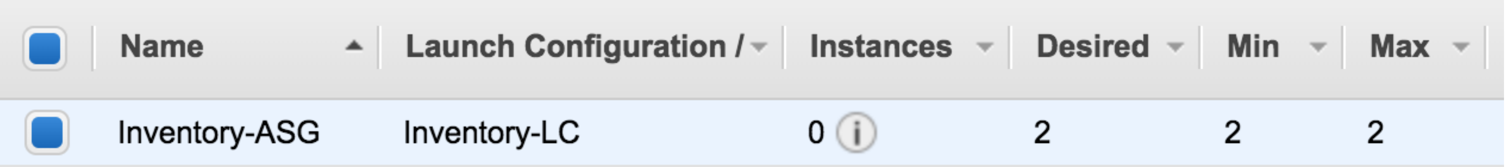
62. On the **Add notifications** page, choose **Next**. You do not need to configure any of these settings.

63. On the **Add tags** page, choose Add tag and configure:
   - **Key:** Name
   - **Value:** Inventory-App
   - Select **Next**

    These settings will *tag* the Auto Scaling group with a *Name*, which will also appear on the EC2 instances that are launched by the Auto Scaling group. You can use tags to identify which Amazon EC2 instances are associated with which application. You could also add tags such as *Cost Center* to assign application costs in the billing files.

64. On the **Review page**, choose **Create Auto Scaling group**

    The *Inventory-ASG* will appear in the console:



■	Name	Launch Configuration /	Instances	Desired	Min	Max
■	Inventory-ASG	Inventory-LC	0 ⓘ	2	2	2

The review shows that:

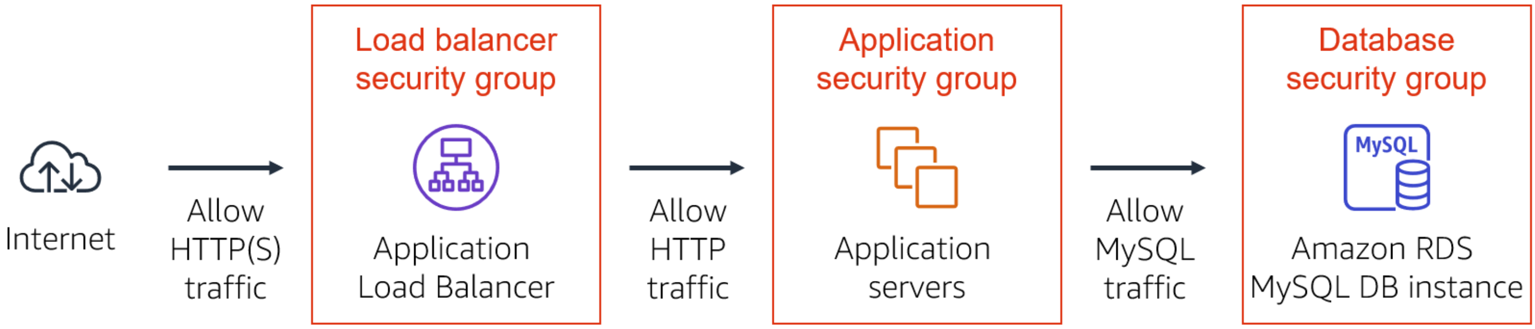
- The group currently has *no instances*, but the **Status** column indicates *Updating capacity*.
- The **Desired** quantity is *2 instances*. Amazon EC2 Auto Scaling will attempt to launch two instances to reach the desired quantity.
- The **Min** and **Max** are also set to *2 instances*. Amazon EC2 Auto Scaling will try to always provide two instances, even if failure occurs.

  Your application will soon run across two Availability Zones. Amazon EC2 Auto Scaling will maintain that configuration even if an instance or Availability Zone fails.

  After a minute, choose the refresh icon to update the display. It should show that *2 instances* are running.

Task 4: Updating security groups

The application you deployed is a *three-tier architecture*. You will now configure the security groups to enforce these tiers:



Load balancer security group

You already configured the *load balancer security group* when you created the load balancer. It accepts all incoming *HTTP* and *HTTPS* traffic.

The load balancer has been configured to forward incoming requests to a *target group*. When Auto Scaling launches new instances, it will automatically add those instances to the target group.

Application security group

The *application security group* was provided as part of the lab setup. You will now configure it to only accept incoming traffic from the load balancer.

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

68. Select **Inventory-App**.

69. In the lower half of the page, choose the **Inbound rules** tab.

The security group is currently empty. You will now add a rule to accept incoming *HTTP* traffic from the load balancer. You do not need to configure *HTTPS* traffic because the load balancer was configured to forward HTTPS requests via HTTP. This practice offloads security to the load balancer, reducing the amount of work that is required by the individual application servers.

70. Choose **Edit inbound rules**.

71. On the **Edit inbound rules** page, choose **Add rule** and configure these settings:

- **Type:** *HTTP*
- **Source:**
  - Choose the search box to the right of **Custom**
  - Delete the current contents
  - Enter `sg`
  - From the list that appears, select **Inventory-LB**
- **Description:** `Traffic from load balancer`
- Choose **Save rules**

The application servers can now receive traffic from the load balancer. This includes *health checks* that the load balancer performs automatically.

Database security group

You will now configure the *database security group* to only accept incoming traffic from the application servers.

72. In the **Security groups** list, choose **Inventory-DB** (and make sure that no other security groups are selected).

    The existing rule permits traffic on port 3306 (used by MySQL) from any IP address within the VPC. This is a good rule, but security can be restricted further.

73. In the **Inbound rules** tab, choose **Edit inbound rules** and configure these settings:

    - **Delete** the existing rule.
    - Choose **Add rule**.
    - For **Type**, choose **MYSQL/Aurora**
    - Choose the search box to the right of **Custom**
    - Enter `sg`
    - From the list that appears, select **Inventory-App**
    - **Description:** `Traffic from application servers`
    - Choose **Save rules**

    You have now configured *three-tier security*. Each element in the tier only accepts traffic from the tier above.

    In addition, the use of private subnets means that you have two security barriers between the internet and your application resources. This architecture follows the best practice of applying multiple layers of security.

Task 5: Testing the application

Your application is now ready for testing.

In this task, you will confirm that your web application is running. You will also test that it is highly available.

74. In the left navigation pane, choose **Target Groups**.

75. Select **Inventory-app**.

75. In the lower half of the page, choose the **Targets** tab.

    This tab should show two *registered targets*. The **Status** column shows the results of the load balancer health check that is performed against the instances.

76. In the **Registered targets** area, occasionally choose the refresh icon until the **Status** for both instances appears as *healthy*.

    If the status does not eventually change to *healthy*, ask your educator for help with diagnosing the configuration.

    You will test the application by connecting to the load balancer, which will then send your request to one of the EC2 instances. You will first need to retrieve the Domain Name System (DNS) name of the load balancer.

77. In the left navigation pane, choose **Load Balancers**.

78. In the **Description** tab in the lower half of the window, copy the **DNS name** to your clipboard.

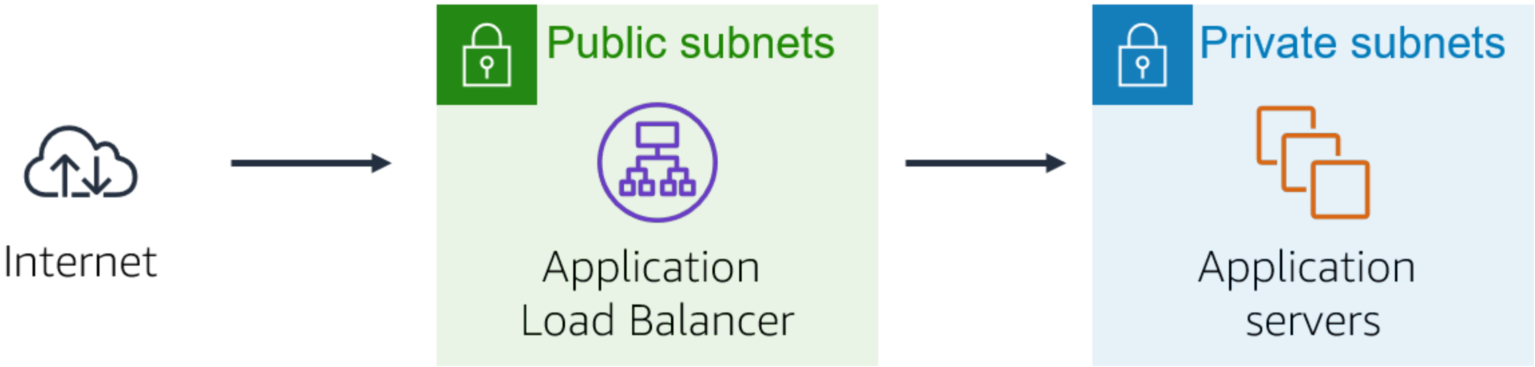
    It should be similar to: *inventory-LB-xxxx.elb.amazonaws.com*

79. Open a new web browser tab, paste the DNS name from your clipboard and press ENTER.

    The load balancer forwarded your request to one of the EC2 instances. The instance ID and Availability Zone are shown at the bottom of the webpage.

80. Reload the page in your web browser. You should notice that the instance ID and Availability Zone sometimes change between the two instances.

    When this web application displays, the flow of information is:



- You sent the request to the *load balancer*, which resides in the *public subnets* that are connected to the internet.
- The load balancer chose one of the *EC2 instances* that reside in the *private subnets* and forwarded the request to it.
- The EC2 instance then returned the webpage to the load balancer, which returned it to your web browser.

Task 6: Testing high availability

Your application was configured to be highly available. You can prove the application's high availability by terminating one of the EC2 instances.

81. Return to the **Amazon EC2 console** tab in your web browser (but do not close the web application tab—you will return to it soon).

82. In the left navigation pane, choose **Instances**.

    You will now terminate one of the web application instances to simulate a failure.

83. Select one of the **Inventory-App** instances (it does not matter which one you select).

84. Choose **Instance State > Terminate instance**.

85. Choose **Terminate**.

    In a short time, the load balancer health checks will notice that the instance is not responding. The load balancer will automatically route all requests to the remaining instance.

86. Return to the web application tab in your web browser and reload the page several times.

    You should notice that the *Availability Zone* that is shown at the bottom of the page stays the same. Though an instance failed, your application remains available.

    After a few minutes, Amazon EC2 Auto Scaling will also notice the instance failure. It was configured to keep two instances running, so Amazon EC2 Auto Scaling will *automatically launch a replacement instance*.

87. Return to the **Amazon EC2 console** tab where you have the instances list displayed. In the top-right area, choose the refresh icon every 30 seconds or so until a new EC2 instance appears.

    After a few minutes, the health check for the new instance should become healthy. The load balancer will resume sending traffic between the two Availability Zones. You can reload your web application tab to see this happen.

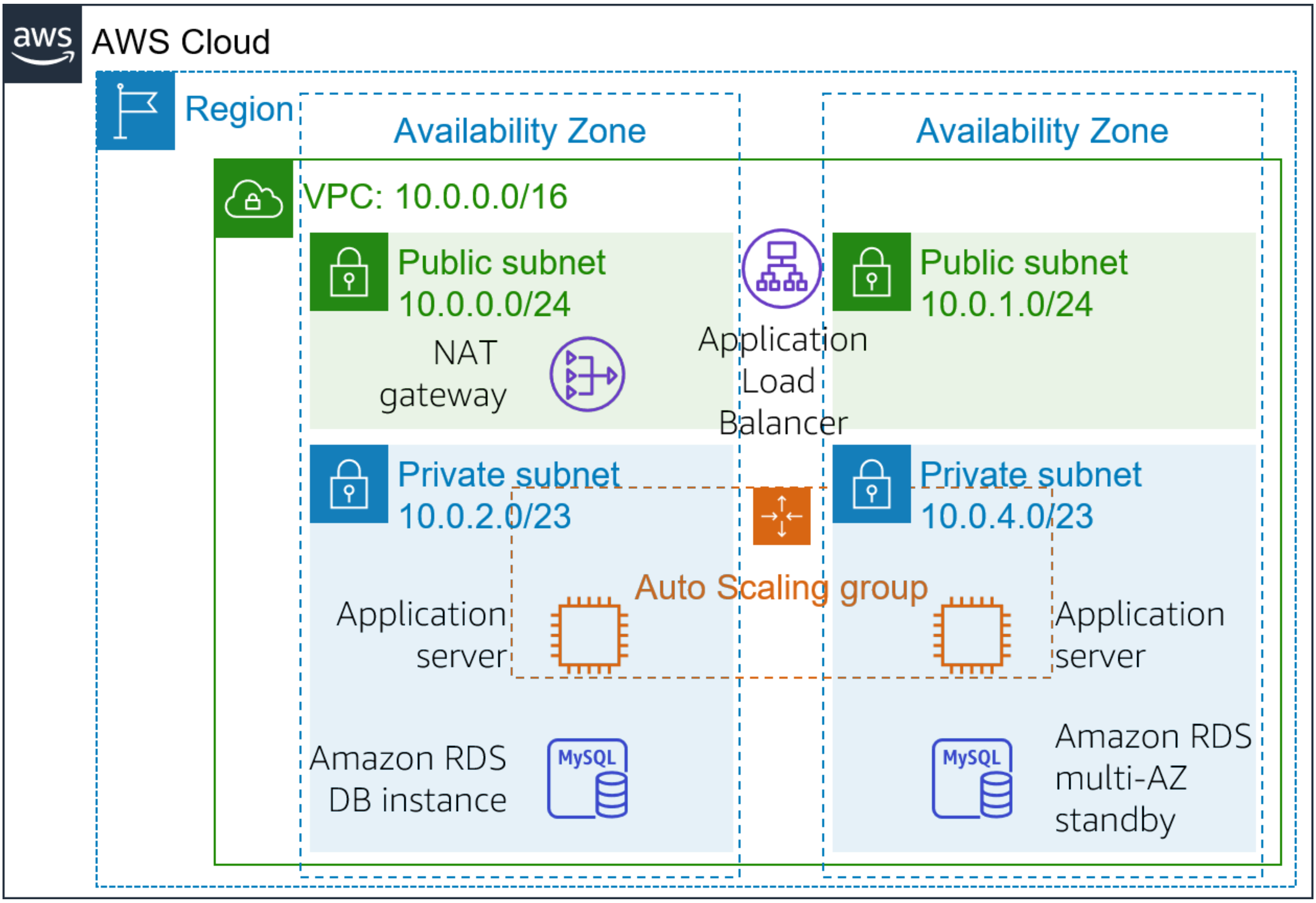
    This task demonstrates that your application is now *highly available*.

Optional task 1: Making the database highly available

*This task is **optional**. You can work on this task if you have remaining lab time.*

The application architecture is now highly available. However, the Amazon RDS database operates from only one database instance.

In this optional task, you will make the database highly available by configuring it to run across multiple Availability Zones (that is, in a *Multi-AZ deployment*).



88. On the Services menu, choose **RDS**.

89. In the left navigation pane, choose **Databases**.

90. Choose the link for the name of the **inventory-db** instance.

    Feel free to explore the information about the database.

91. Choose Modify

92. Scroll down to the **Availability & durability** section. For **Multi-AZ deployment**, select **Create a standby instance**.

    Analysis: You only need to reconfigure this one setting to convert the database to run across multiple data centers (Availability Zones).

    This option does not mean that the database is *distributed* across multiple instances. Instead, one instance is the *primary* instance, which handles all requests. Another instance will be launched as the *standby* instance, which takes over if the primary instance fails. Your application continues to use the same DNS name for the database. However, the connections will automatically redirect to the currently active database server.

    You can scale an EC2 instance by changing attributes, and you can also scale an RDS database this way. You will now scale up the database.

93. Scroll back up and for **DB instance class**, select **db.t3.small**.

    This action doubles the size of the instance.

94. For **Allocated storage**, enter: `10`

    This action doubles the amount of space that is allocated to the database.

    Feel free to explore the other options on the page, but do not change any other settings.

95. At the bottom of the page, choose **Continue**

    Database performance will be impacted by these changes. Therefore, these changes can be scheduled during a defined maintenance window, or they can be run immediately.

96. Under **Scheduling of Modifications**, select **Apply immediately**.

97. Choose **Modify DB instance**

    The database enters a *modifying* state while it applies the changes. You do not need to wait for it to complete.

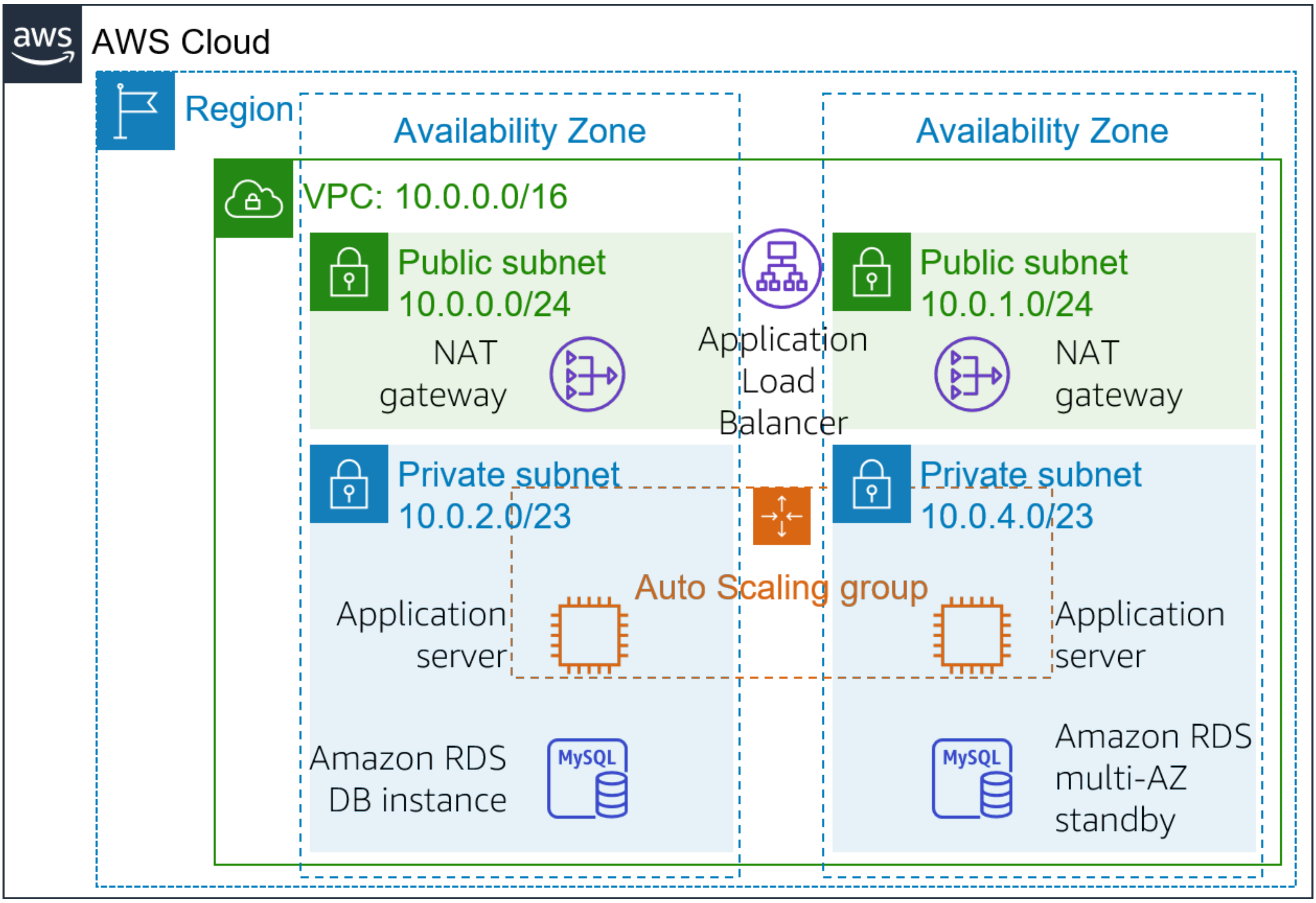
Optional task 2: Configuring a highly available NAT gateway

*This task is **optional**. You can work on this task if you have remaining lab time.*

The application servers run in a private subnet. If the servers must access the internet (for example, to download data), the requests must be redirected through a *Network Address Translation (NAT) gateway*. (The NAT gateway must be located in a public subnet).

The current architecture has only one NAT gateway in *Public Subnet 1*. Thus, if Availability Zone 1 fails, the application servers will not be able to communicate with the internet.

In this optional task, you will make the NAT gateway highly available by launching another NAT gateway in the other Availability Zone. The resulting architecture will be highly available:



98. On the **Services** menu, choose **VPC**.

99. In the left navigation pane, choose **NAT Gateways**.

    The existing NAT gateway displays. You will now create a NAT gateway for the other Availability Zone.

100. Choose **Create NAT gateway** and configure these settings:
    - **Subnet:** *Public Subnet 2*
    - Choose **Allocate Elastic IP**
    - Choose **Create NAT gateway**

      You will now create a new route table for *Private Subnet 2*. This route table will redirect traffic to the new NAT gateway.

101. In the left navigation pane, choose **Route Tables**.

102. Choose **Create route table** and configure these settings:
    - **Name:** `Private Route Table 2`
    - **VPC:** *Lab VPC*
    - Choose **Create route table**.

103. Observe the settings in the **Routes** tab.

     Currently, one route directs all traffic *locally*. You will now add a route to send internet-bound traffic through the new NAT gateway.

104. Choose **Edit routes** and then configure these settings:
    - Choose **Add route**
    - **Destination:** `0.0.0.0/0`
    - **Target:** Select *NAT Gateway*, then select the *nat-* entry that is *not* the entry for *NATGateway1* (which is under the **Details** button above these instructions)

The NAT gateway that is listed under the **Details** button (which is above these instructions) is for *Public Subnet 1*. You are configuring this route table to use the *other* NAT gateway.

105. Choose the **Subnet Associations** tab.

106. Choose **Edit subnet associations**

107. Select **Private Subnet 2**.

108. Choose **Save associations**

This action now sends internet-bound traffic from Private Subnet 2 to the NAT gateway that is in the same Availability Zone.

Your NAT gateways are now highly available. A failure in one Availability Zone will not impact traffic in the other Availability Zone.

Submitting your work

109. At the top of these instructions, choose **Submit** to record your progress and when prompted, choose **Yes**.

110. If the results don't display after a couple of minutes, return to the top of these instructions and choose Grades

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

111. To find detailed feedback on your work, choose Details followed by **View Submission Report**.

Lab complete

Congratulations! You have completed the lab.

112. 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.*

113. Select the **X** in the top right corner to close the panel.

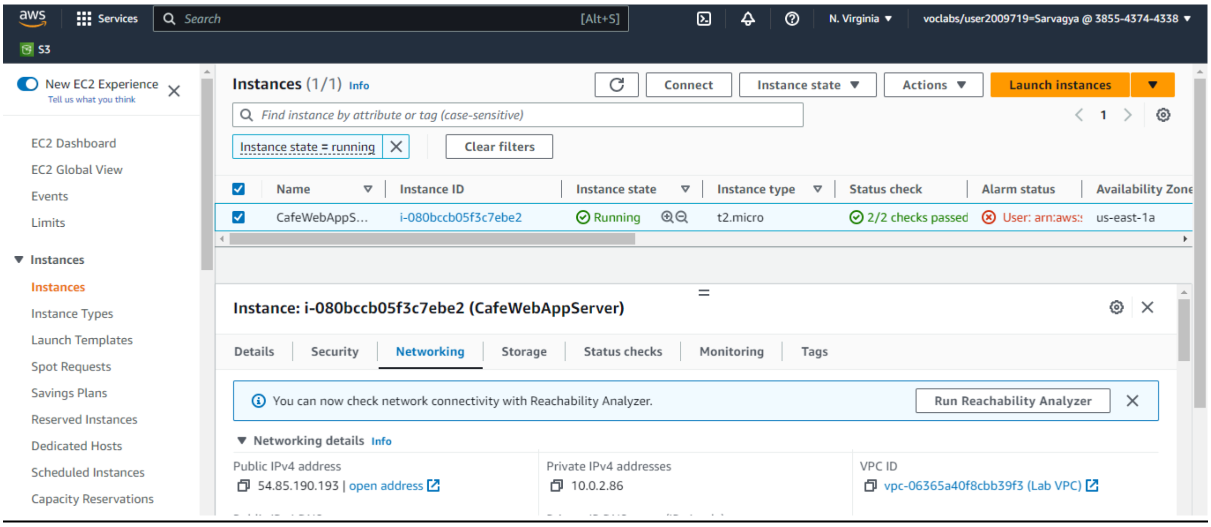
Experiment No. 6

Name : Sarvagya Singh

SAPID : 60009200030 **BATCH : K1**

Screenshots :

Challenge labs:



Instances (1/1) Info

Find instance by attribute or tag (case-sensitive)

Instance state = running

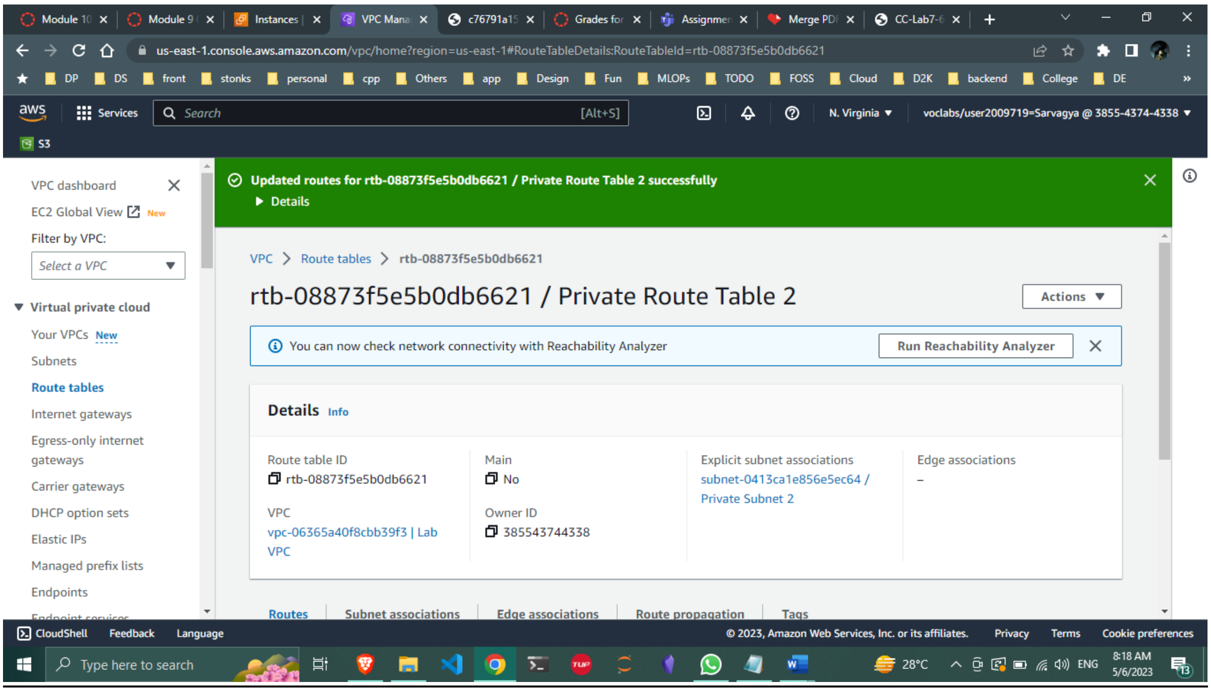
☑	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone
☑	CafeWebAppS...	i-080bccb05f3c7ebe2	✓ Running	t2.micro	✓ 2/2 checks passed	⊗ User: arn:aws:	us-east-1a

Instance: i-080bccb05f3c7ebe2 (CafeWebAppServer)

You can now check network connectivity with Reachability Analyzer.

▼ Networking details Info

Public IPv4 address	Private IPv4 addresses	VPC ID
54.85.190.193 | open address	10.0.2.86	vpc-06365a40f8cbb39f3 (Lab VPC)



Updated routes for rtb-08873f5e5b0db6621 / Private Route Table 2 successfully

▶ Details

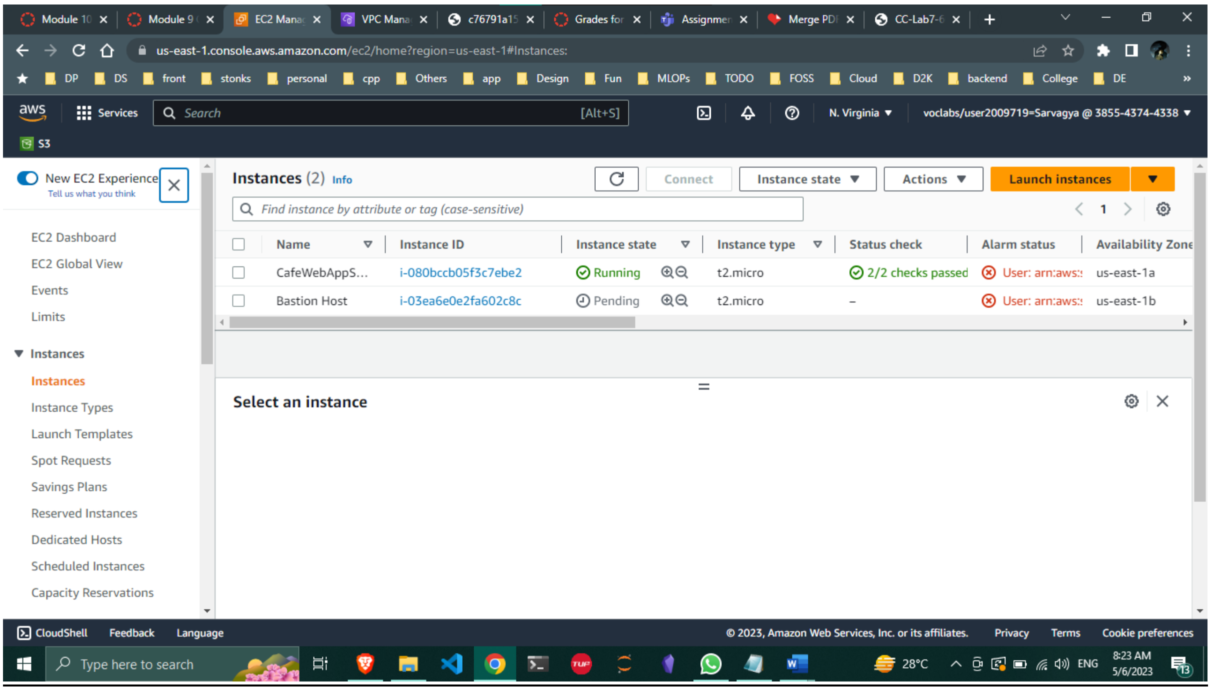
VPC > Route tables > rtb-08873f5e5b0db6621

rtb-08873f5e5b0db6621 / Private Route Table 2

You can now check network connectivity with Reachability Analyzer

Details Info

Route table ID	Main	Explicit subnet associations	Edge associations
rtb-08873f5e5b0db6621	No	subnet-0413ca1e856e5ec64 / Private Subnet 2	–
VPC	Owner ID		
vpc-06365a40f8cbb39f3 | Lab VPC	385543744338		



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

Instances (2) Info

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone
CafeWebAppS...	i-080bccb05f3c7ebe2	Running	t2.micro	2/2 checks passed	User: arn:aws:	us-east-1a
Bastion Host	i-03ea6e0e2fa602c8c	Pending	t2.micro	–	User: arn:aws:	us-east-1b

Select an instance

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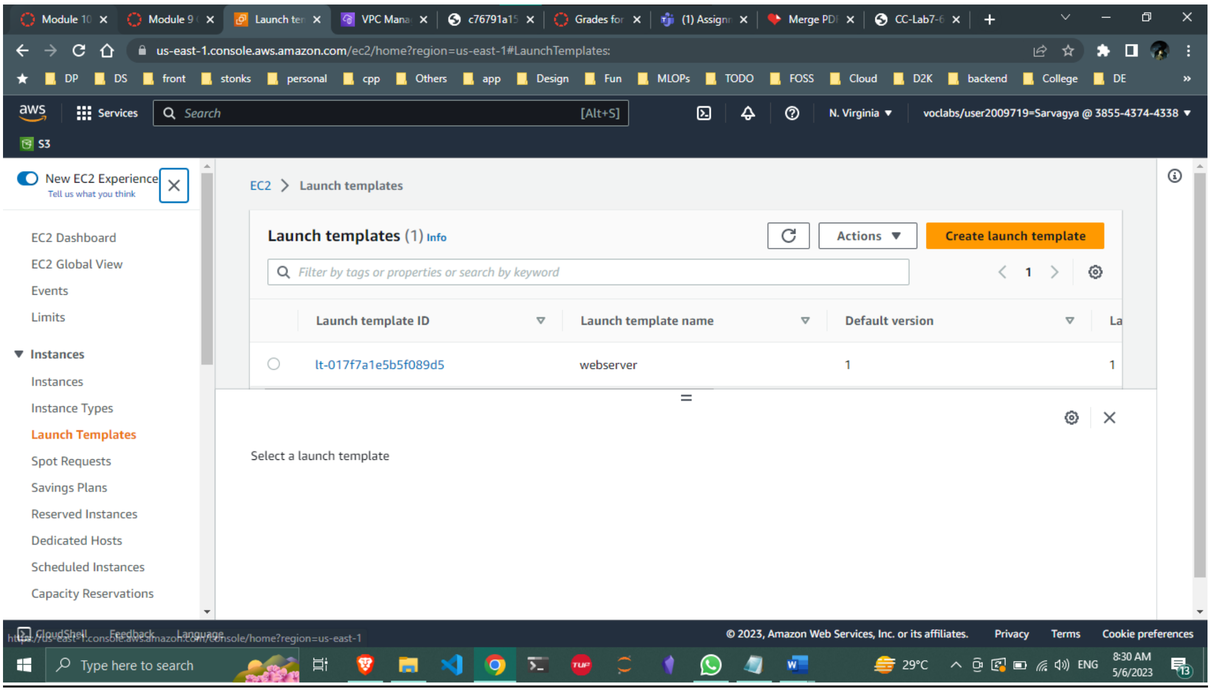

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#LaunchTemplates:

Launch templates (1) Info

Launch template ID	Launch template name	Default version	La
lt-017f7a1e5b5f089d5	webserver	1	1

Select a launch template

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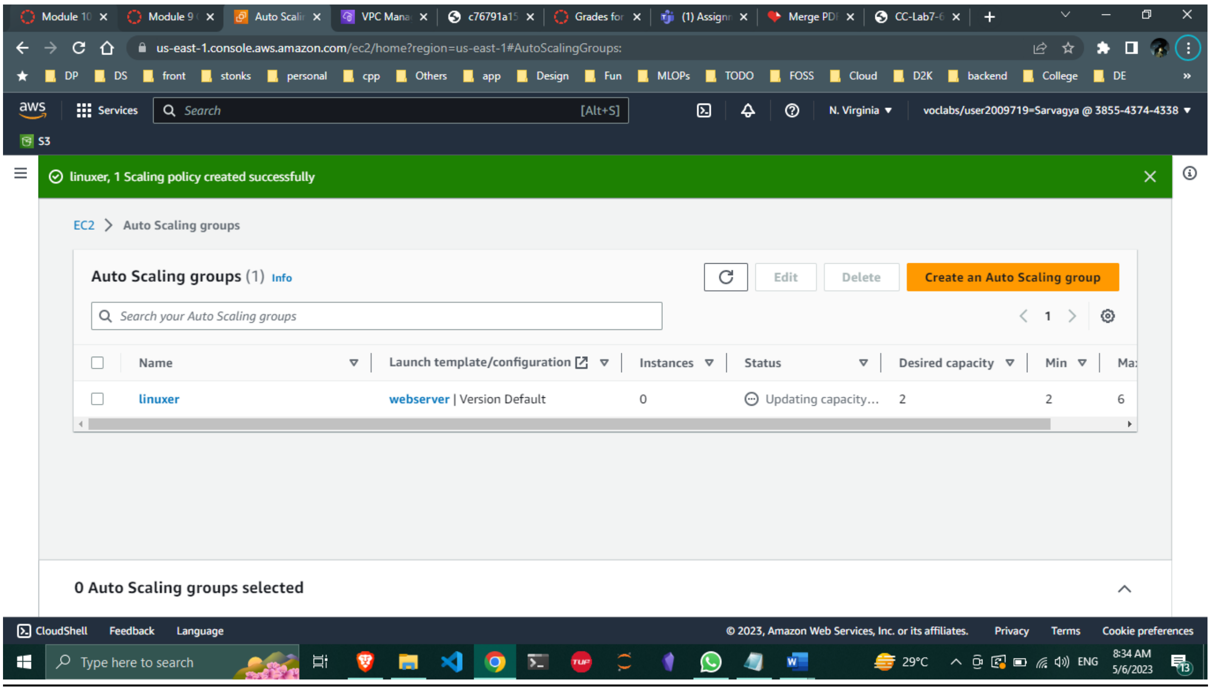

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#AutoScalingGroups:

voclabs/user2009719=Sarvagya @ 3855-4374-4338

linuxer, 1 Scaling policy created successfully

EC2 > Auto Scaling groups

Auto Scaling groups (1) Info

Name	Launch template/configuration	Instances	Status	Desired capacity	Min	Ma:
linuxer	webserver | Version Default	0	Updating capacity...	2	2	6

0 Auto Scaling groups selected

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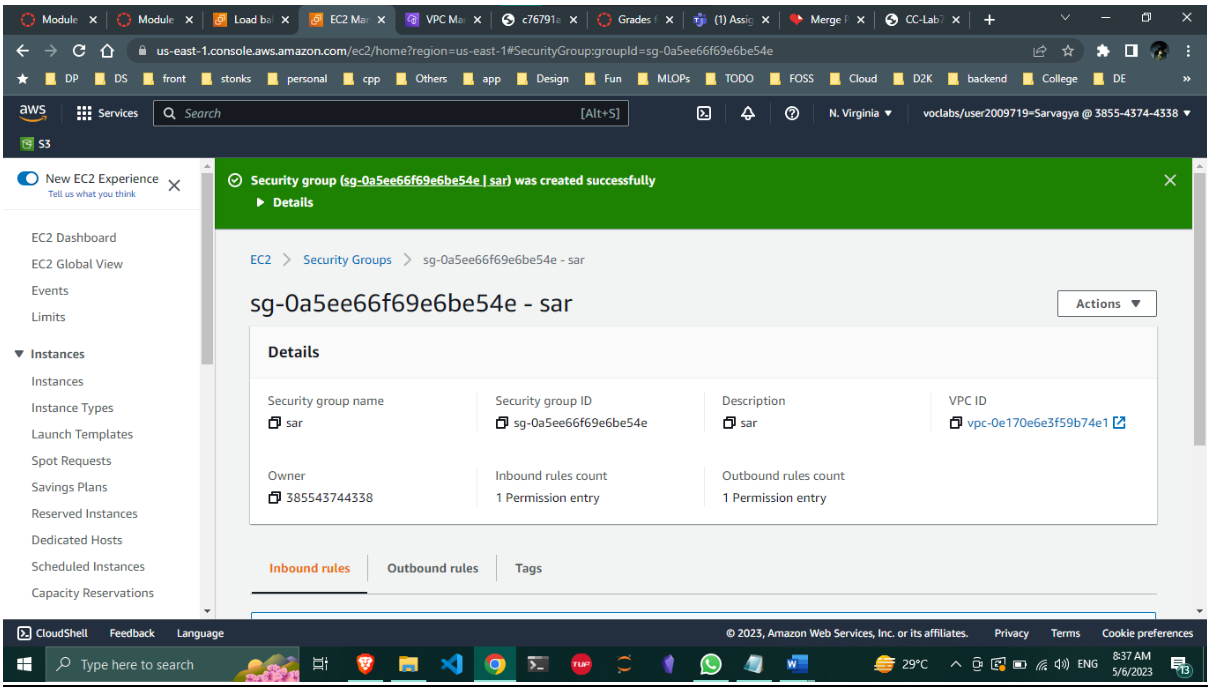

us-east-1.console.aws.amazon.com/ec2/home?region=us-east-1#SecurityGroup:groupId=sg-0a5ee66f69e6be54e

voclabs/user2009719=Sarvagya @ 3855-4374-4338

Security group (sg-0a5ee66f69e6be54e | sar) was created successfully

EC2 > Security Groups > sg-0a5ee66f69e6be54e - sar

sg-0a5ee66f69e6be54e - sar

Details

Security group name: sar

Security group ID: sg-0a5ee66f69e6be54e

Description: sar

VPC ID: vpc-0e170e6e3f59b74e1

Owner: 385543744338

Inbound rules count: 1 Permission entry

Outbound rules count: 1 Permission entry

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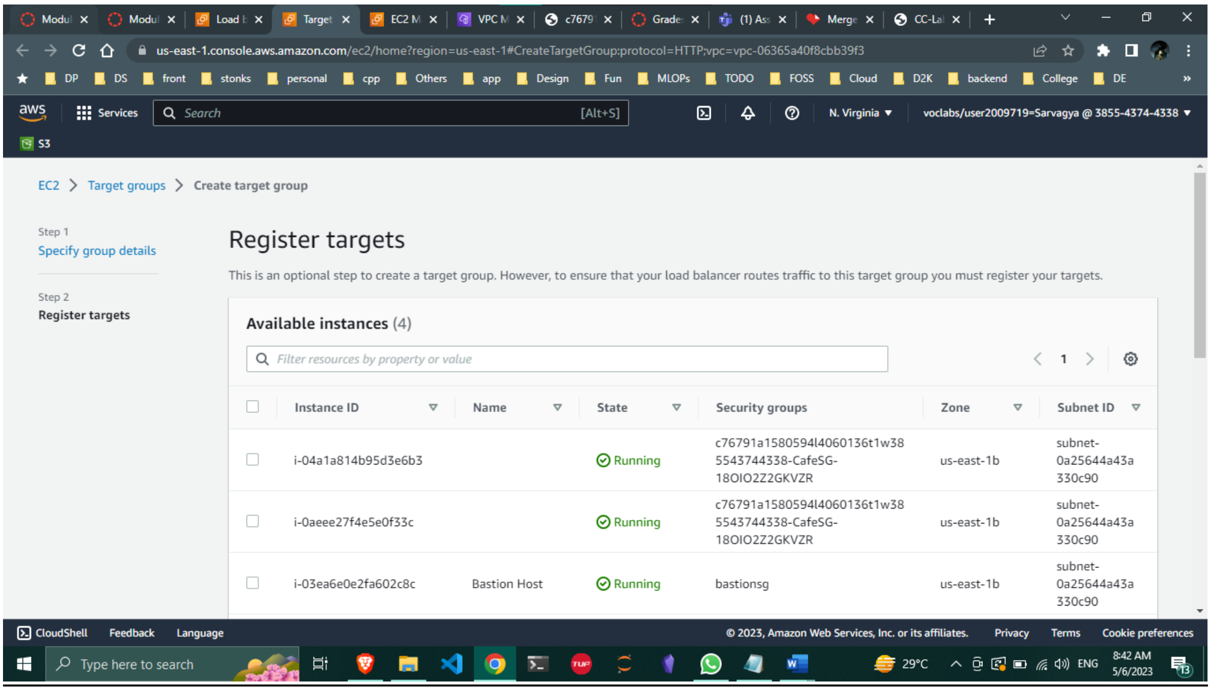

EC2 > Target groups > Create target group

Step 1
Specify group details

Step 2
Register targets

Register targets

This is an optional step to create a target group. However, to ensure that your load balancer routes traffic to this target group you must register your targets.

Available instances (4)

Filter resources by property or value

□	Instance ID	Name	State	Security groups	Zone	Subnet ID
□	i-04a1a814b95d3e6b3		✓ Running	c76791a1580594l4060136t1w38 5543744338-CafeSG-18OlO2Z2GKVZR	us-east-1b	subnet-0a25644a43a330c90
□	i-0aeee27f4e5e0f33c		✓ Running	c76791a1580594l4060136t1w38 5543744338-CafeSG-18OlO2Z2GKVZR	us-east-1b	subnet-0a25644a43a330c90
□	i-03ea6e0e2fa602c8c	Bastion Host	✓ Running	bastionsg	us-east-1b	subnet-0a25644a43a330c90