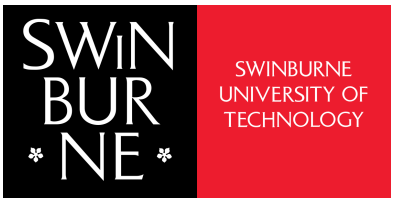

Module 9 Guided Lab - Creating a Highly Available Environment

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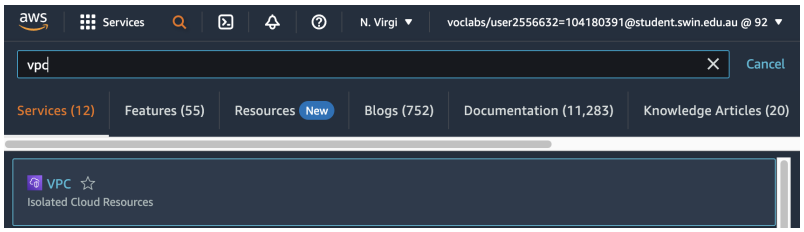
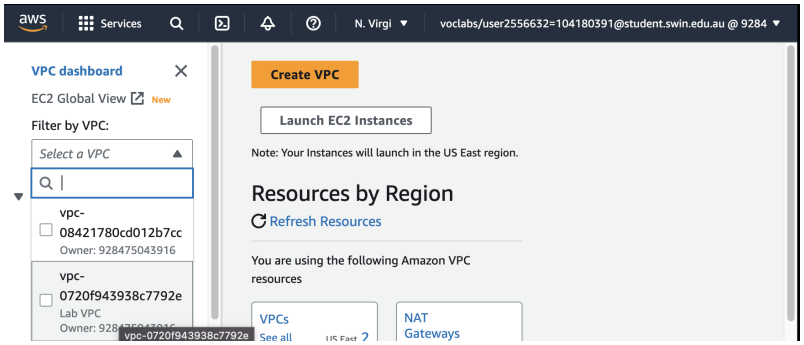
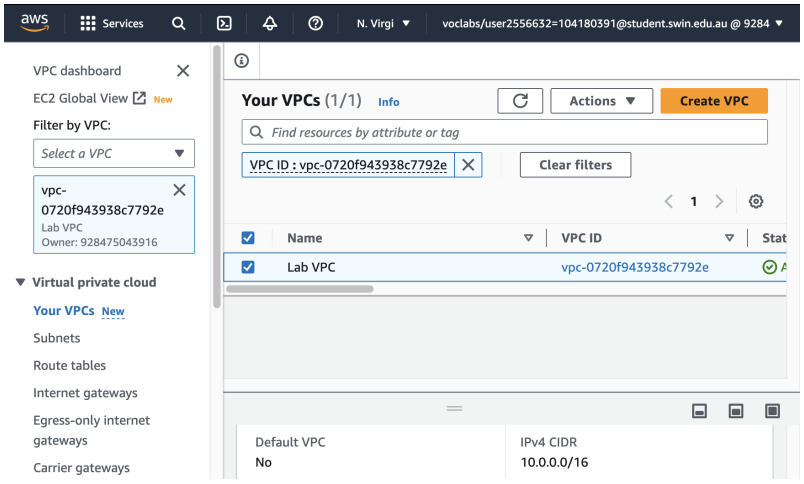
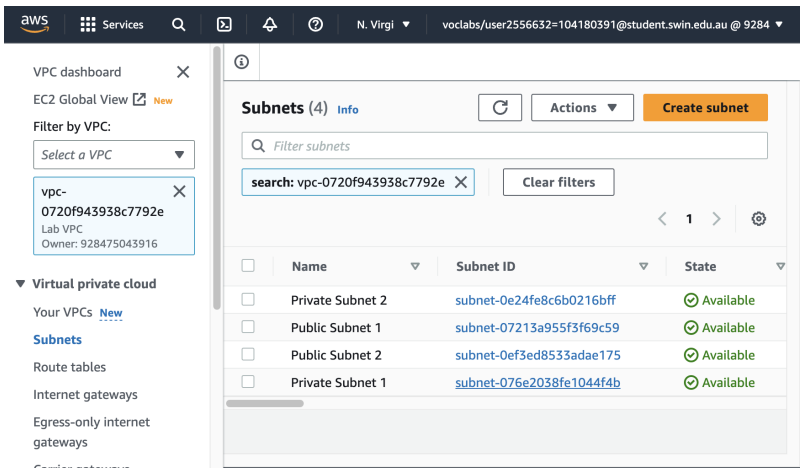
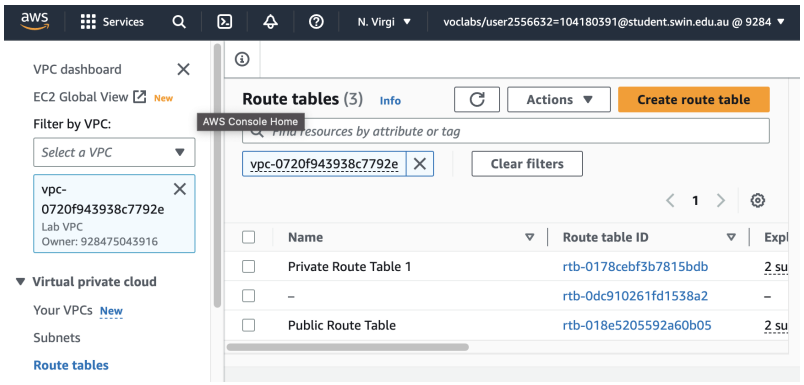
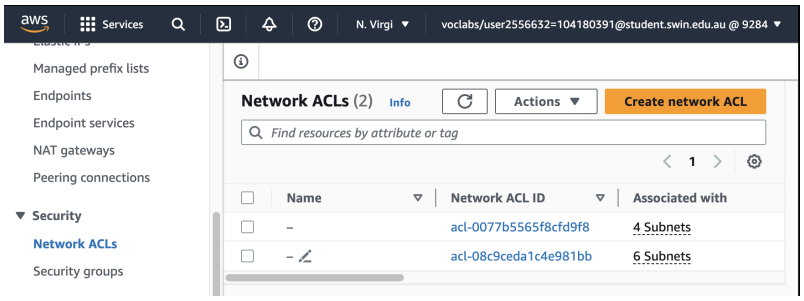
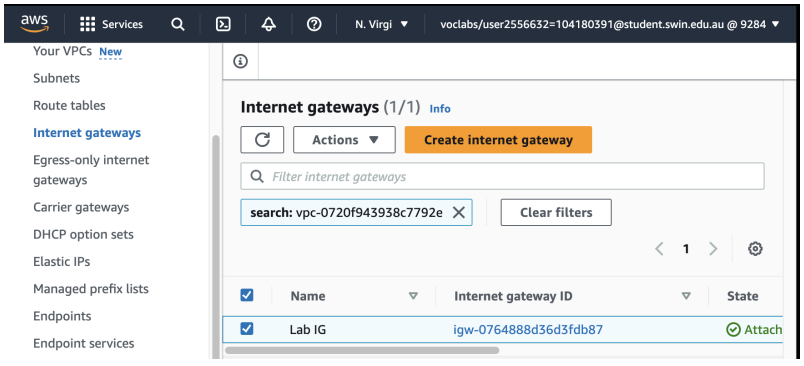
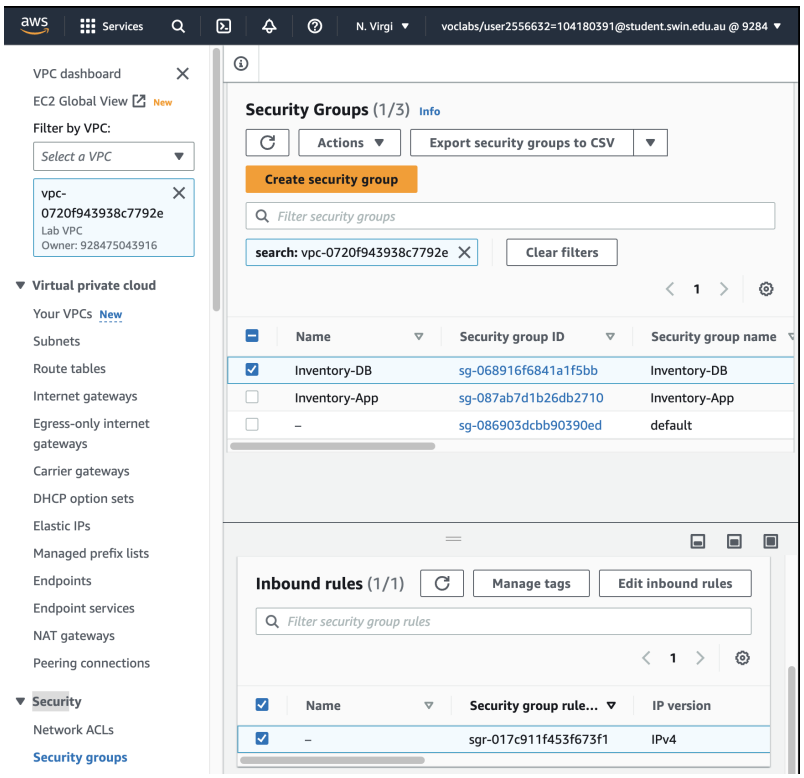
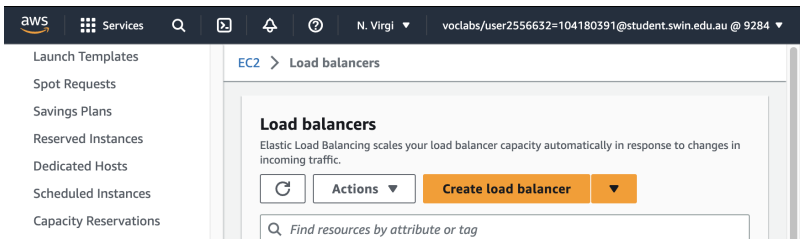
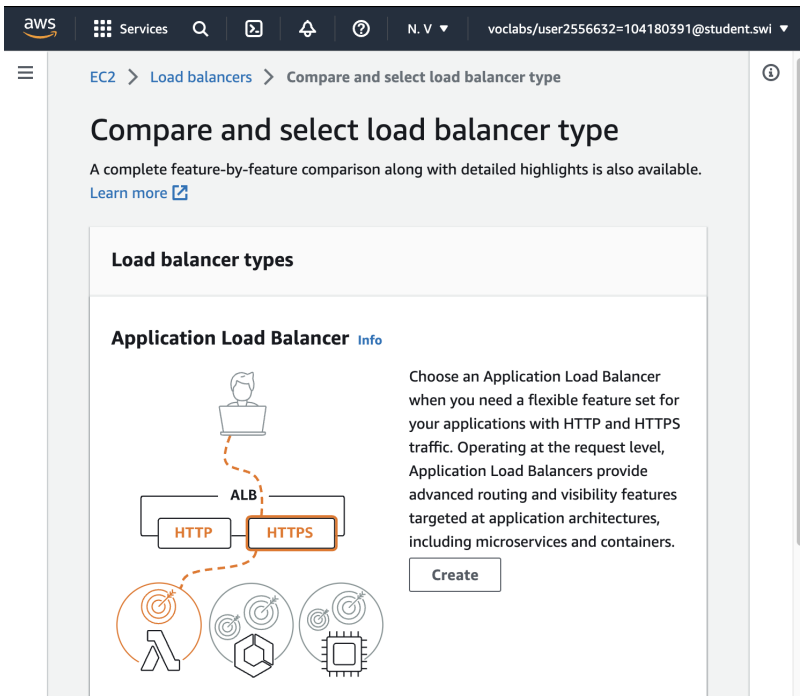
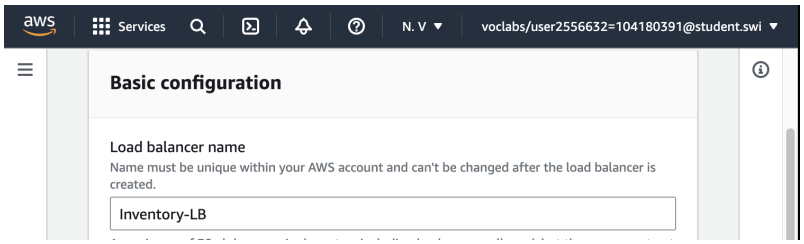
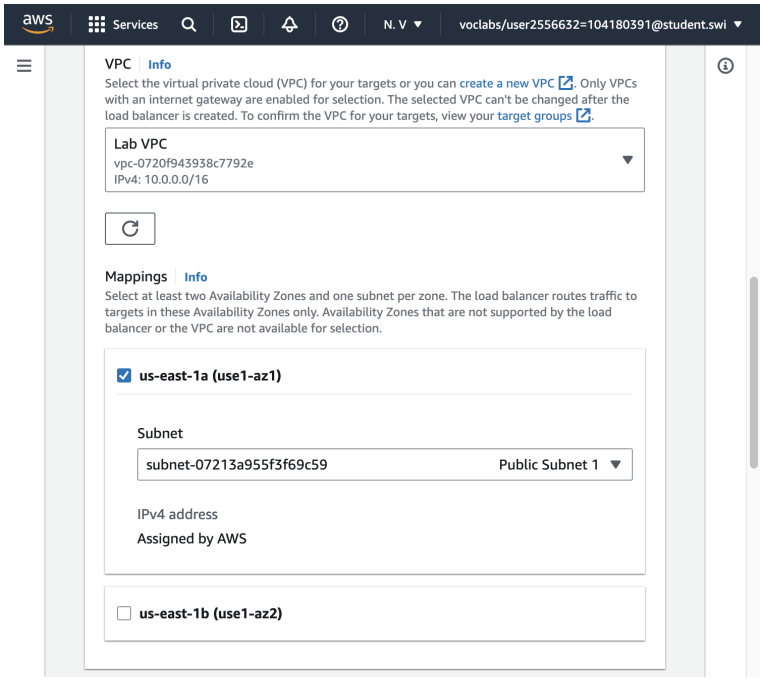
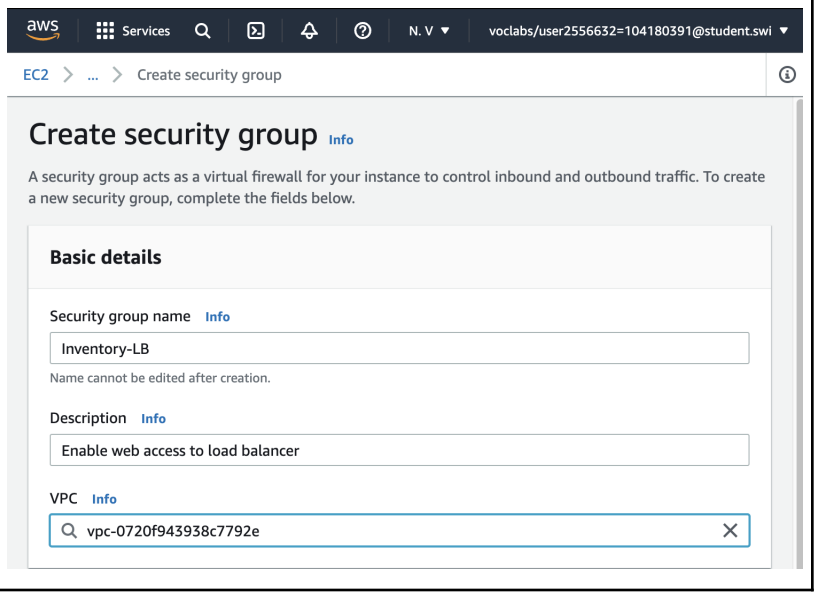
Task 1: Inspecting your VPC		
Step	**Description**	**Screenshot**
1	On the AWS Management Console, on the **Services** menu, choose **VPC**.	
2	In the left navigation pane, under **Filter by VPC**, choose the **Select a VPC** box and select **Lab VPC**.	
3	In the left navigation pane, choose **Your VPCs**. Information about the **Lab VPC** that was created can be accessed. Choose **Lab VPC**.	

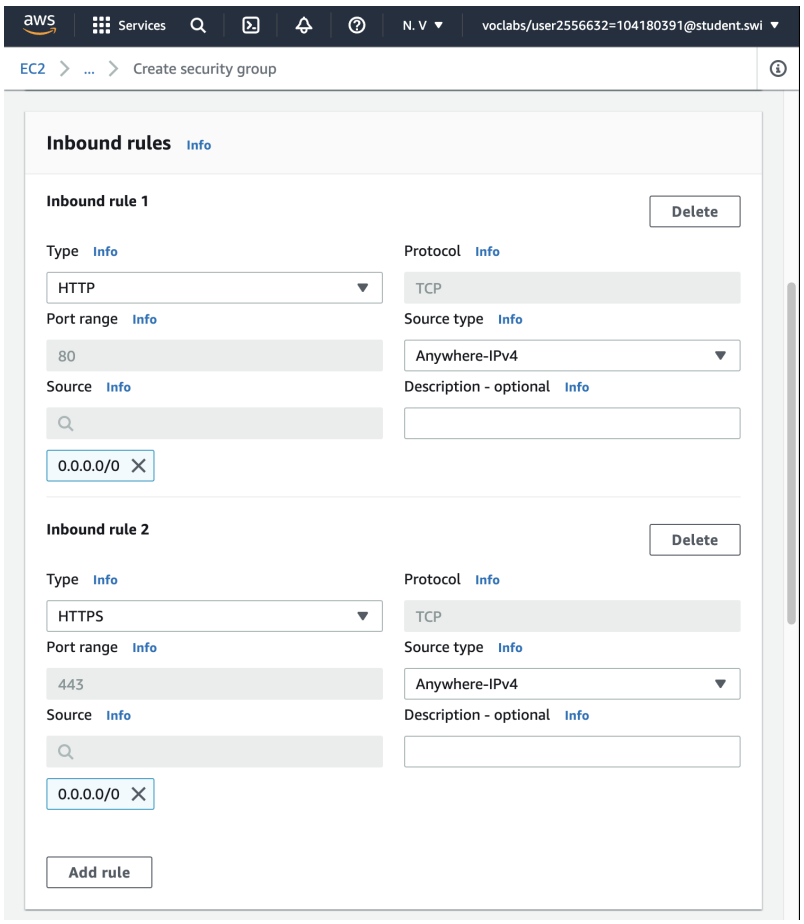
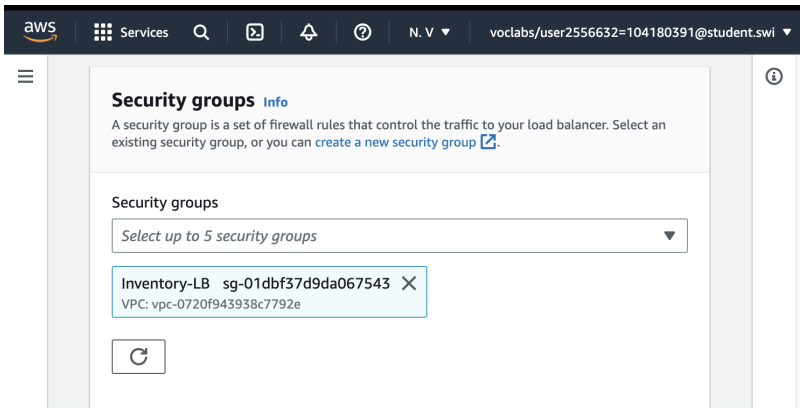
4	In the left navigation pane, choose Subnets. Here, you can access information about Public Subnet 1.	
5	In the lower half of the page, choose the **Route table** tab.	
6	Choose the **Network ACL** tab.	
7	In the left navigation pane, choose **Internet gateways**.	

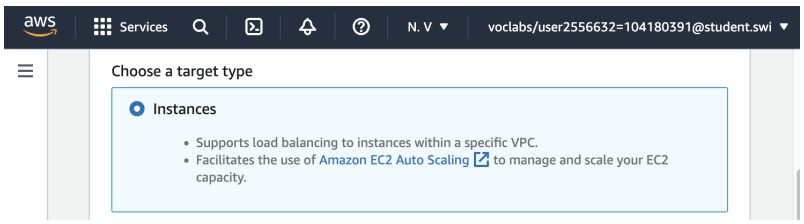
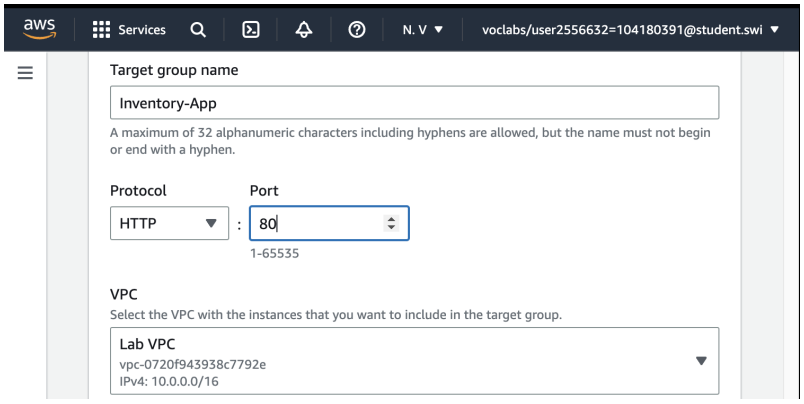
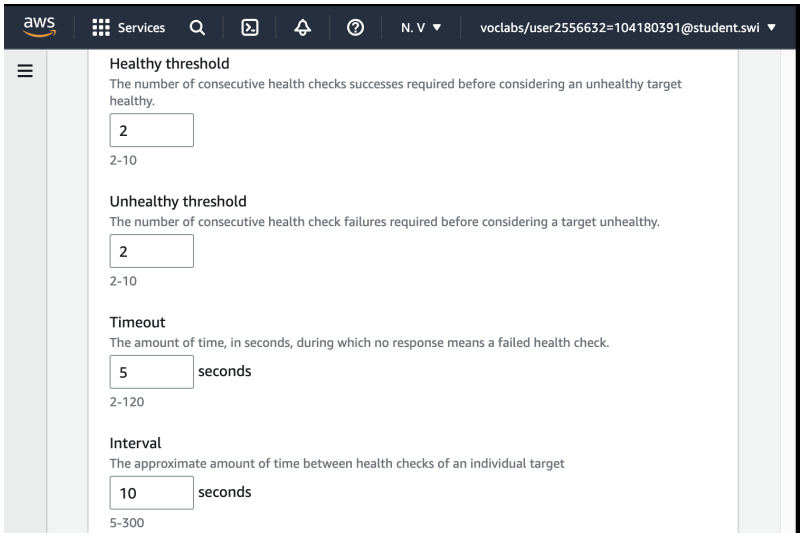
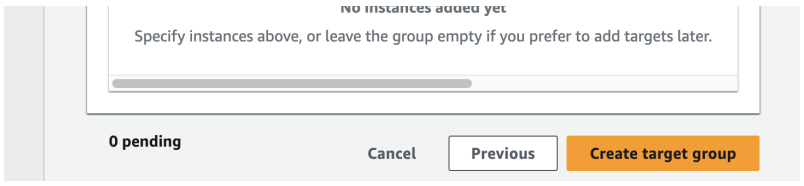
8	In the left navigation pane, choose **Security groups**. Select **Inventory-DB**. This security group controls incoming traffic to the database.	

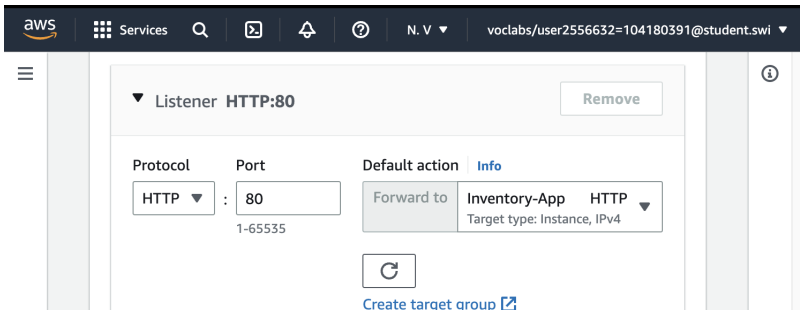
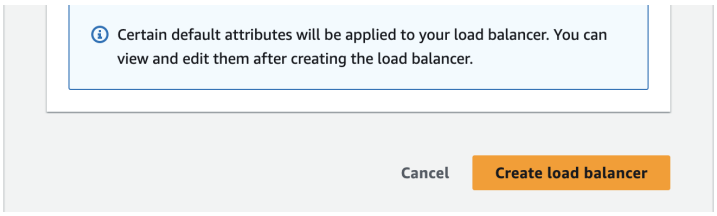
Task 2: Creating an Application Load Balancer		
Step	**Description**	**Screenshot**
1	On the **Services** menu, choose **EC2**. In the left navigation pane, choose **Load Balancers**. Choose **Create load balancer**	

2	Under **Application Load Balancer**, choose **Create**.	
3	For **Load balancer name**, enter: **Inventory-LB**	
4	Scroll down to the **Network mapping** section, then for **VPC**, select **Lab VPC**. Under **Mappings**, choose the **first Availability Zone**, then choose the **Public Subnet** that displays.	

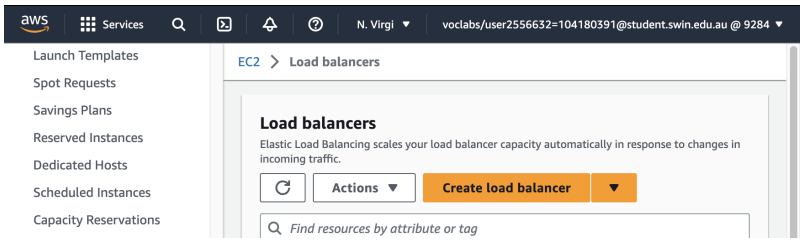
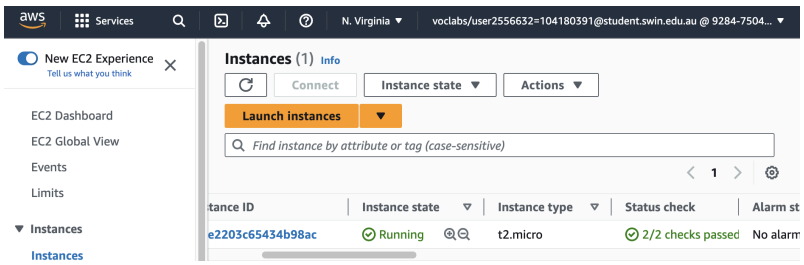
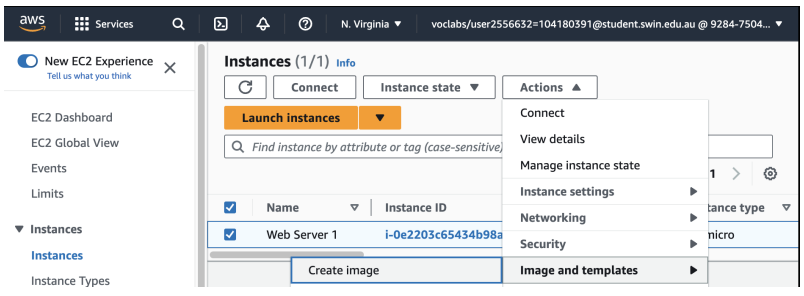
5	Choose the **second Availability Zone**, then choose the **Public Subnet** that displays.	
6	In the **Security groups** section, select the **Create a new security group hyperlink**. This opens a new browser tab. Configure the new security group settings: - **Security group name**: Inventory-LB - **Description**: Enable web access to load balancer - **VPC**: Remove the default VPC by choosing the X to the right of it. Then select Lab VPC.	

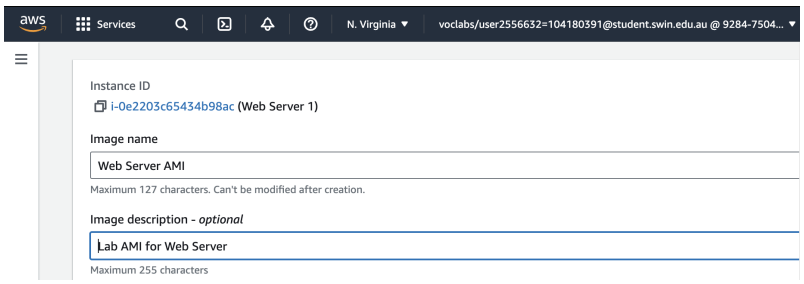
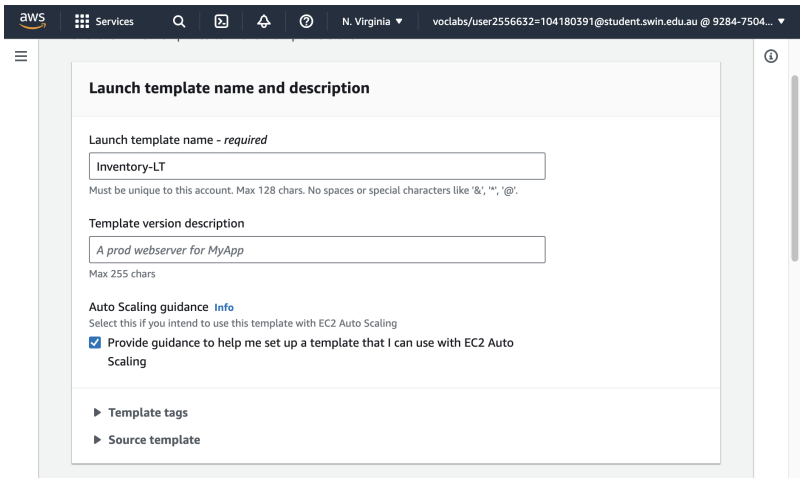
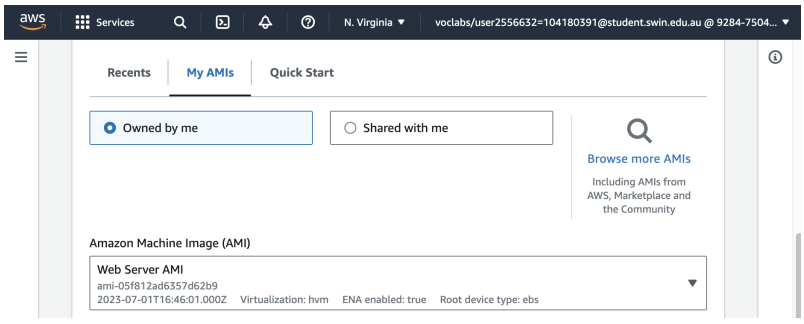
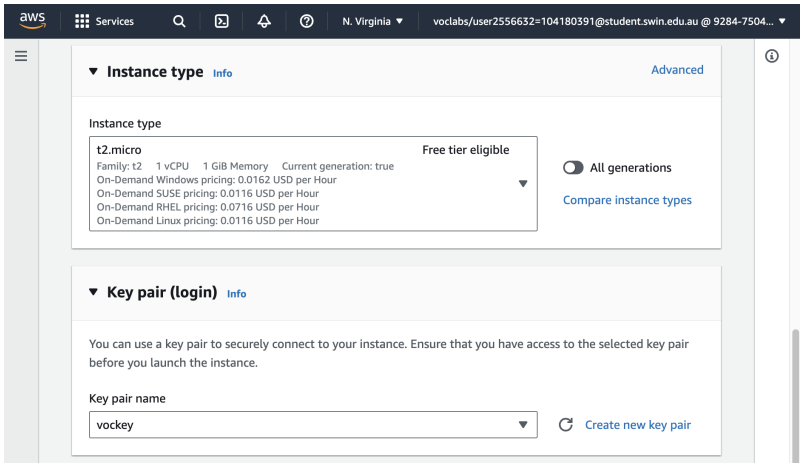
7	Under **Inbound rules**, choose **Add rule** and configure as described: - **Type**: HTTP - **Source**: Anywhere-IPv4 Still under **Inbound rules**, choose **Add rule** again and configure: - **Type**: HTTPS - **Source**: Anywhere-IPv4 Choose **Create security group**.	
8	Assign the security group to the load balancer: - Return to the browser tab where you are still configuring the load balancer. - In the **Security groups** area and choose the refresh icon. - For **Security groups**, select the **Inventory-LB** security group you just created. - Next, below the **Security groups** dropdown menu, select the **X** next to the default security group so that **Inventory-LB** is now the only security group chosen.	

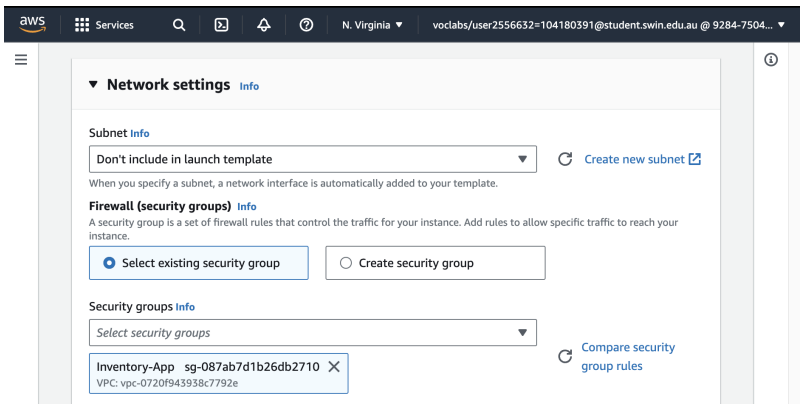
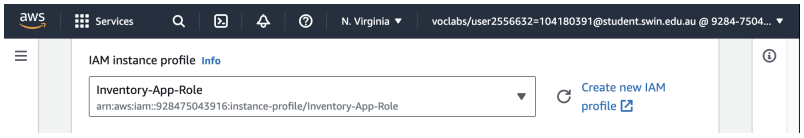
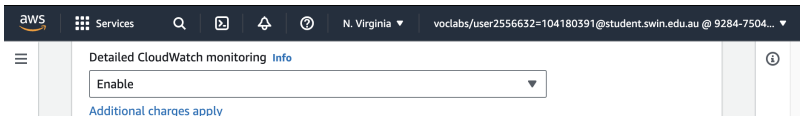
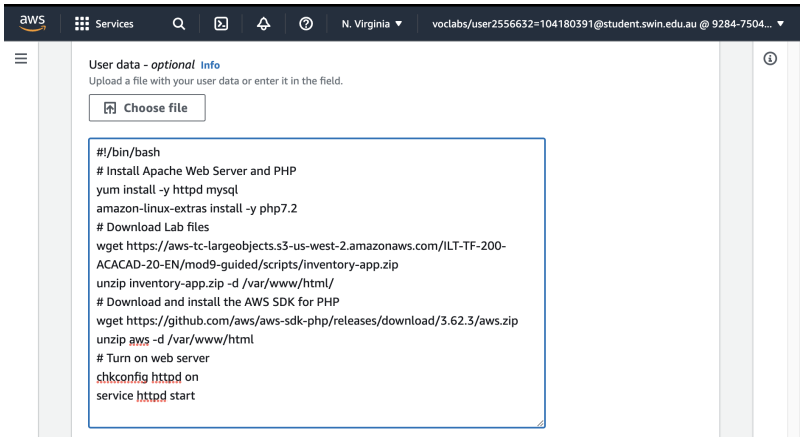
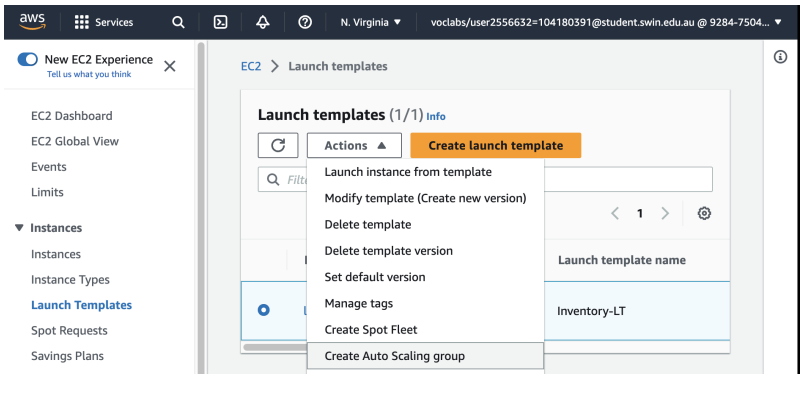
9	In the **Listeners and routing** section, choose **Create target group**. A new browser tab will open. Configure the target group as described here: - **Choose a target type**: Instances	
10	- **Target group name**: Inventory-App - **VPC**: Ensure that Lab VPC is chosen.	
11	- **Healthy threshold**: 2 - **Interval**: 10 (seconds) Choose **Next**	
12	Choose **Create target group**	

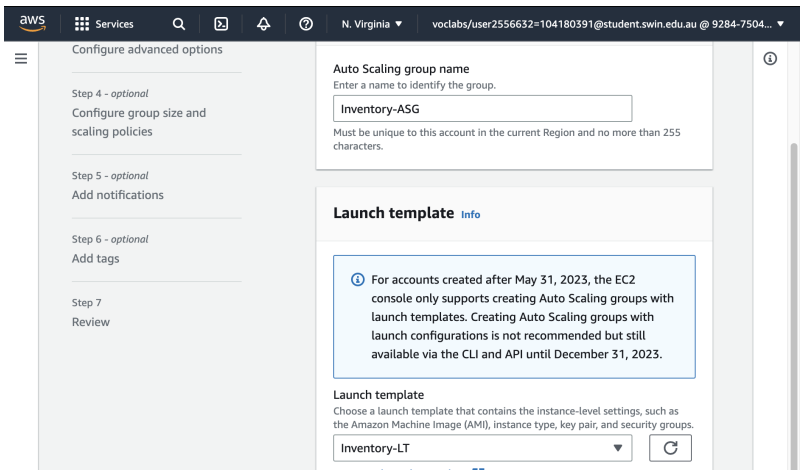
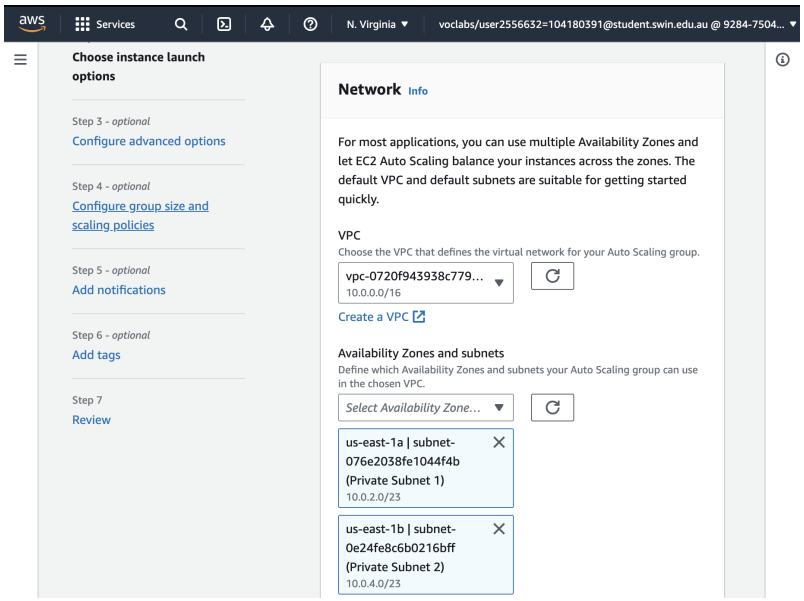
13	For the Listener **HTTP:80** row, set the **Default action** to forward to the **Inventory-App** target group you just created.	
14	Scroll to the bottom of the page, and choose **Create load balancer**.	

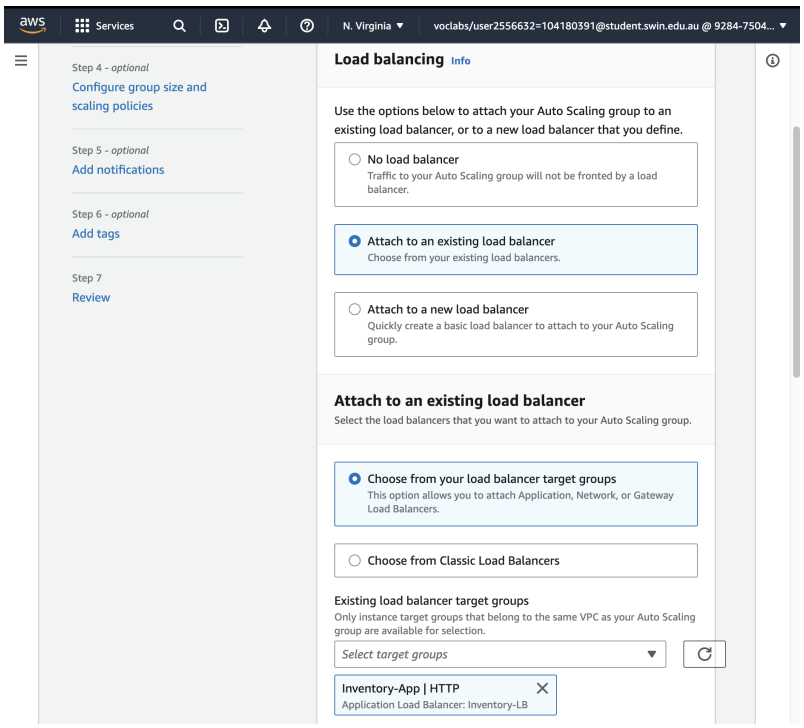
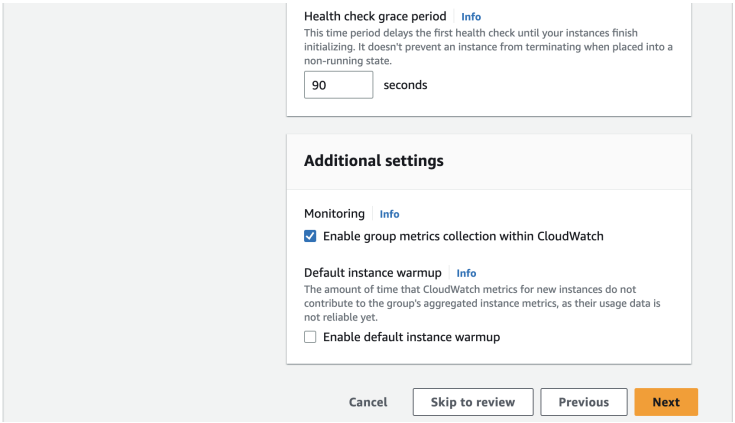
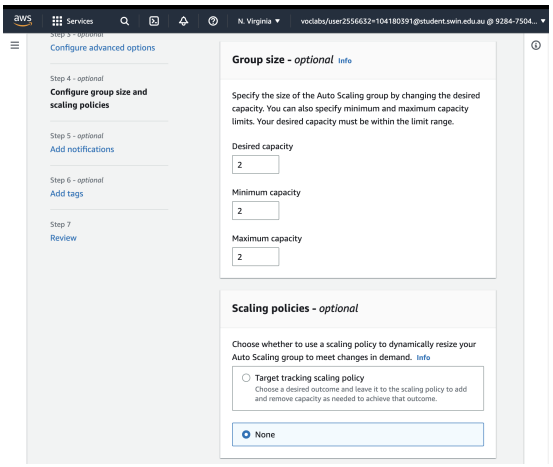
Task 3: Creating an Auto Scaling group

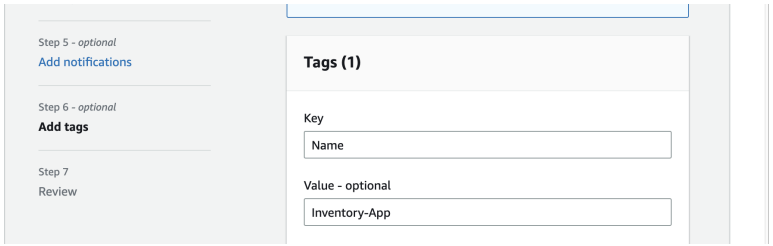
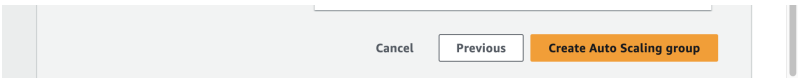
Step	Description	Screenshot
1	In the AWS Management Console, on the **Services** menu, choose **EC2**.	
2	In the left navigation pane, choose **Instances**. Wait until the **Status check** for **Web Server 1** displays **2/2 checks passed** Select **Web Server 1.**	
3	In the **Actions** menu, choose **Image and templates** > **Create image**	

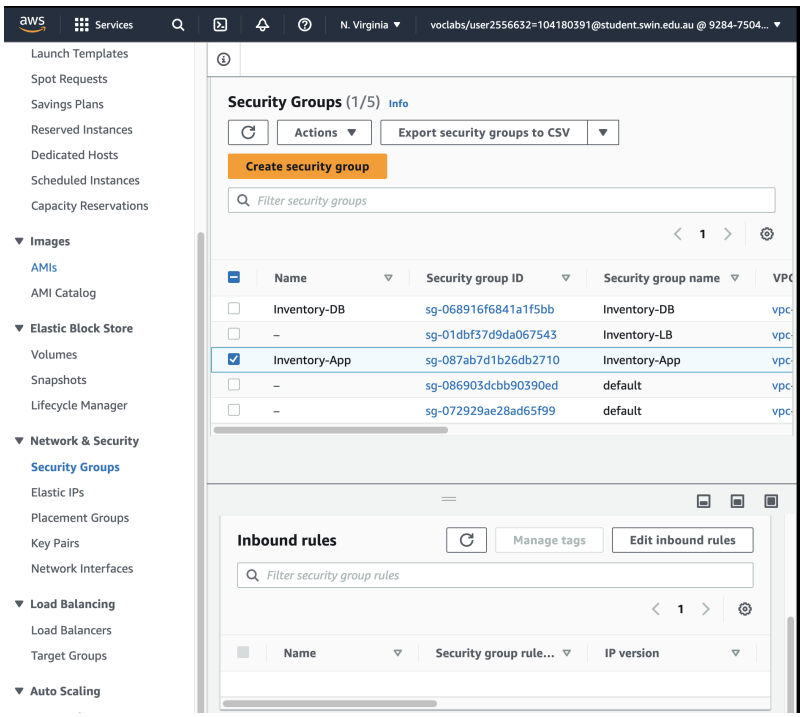
4	Configure: - **Image name**: Web Server AMI - **Image description**: Lab AMI for Web Server Choose **Create image**	
5	In the left navigation pane, choose **Launch Templates**. Choose **Create launch template** Configure the launch template settings and create it: - **Launch template name**: Inventory-LT - Under **Auto Scaling** guidance, select **Provide guidance to help me set up a template that I can use with EC2 Auto Scaling**	
6	- In the **Application and OS Images (Amazon Machine Image)** area, choose **My AMIs**. - **Amazon Machine Image (AMI)**: choose Web Server AMI	
7	- **Instance type**: choose t2.micro - **Key pair name**: choose vockey	

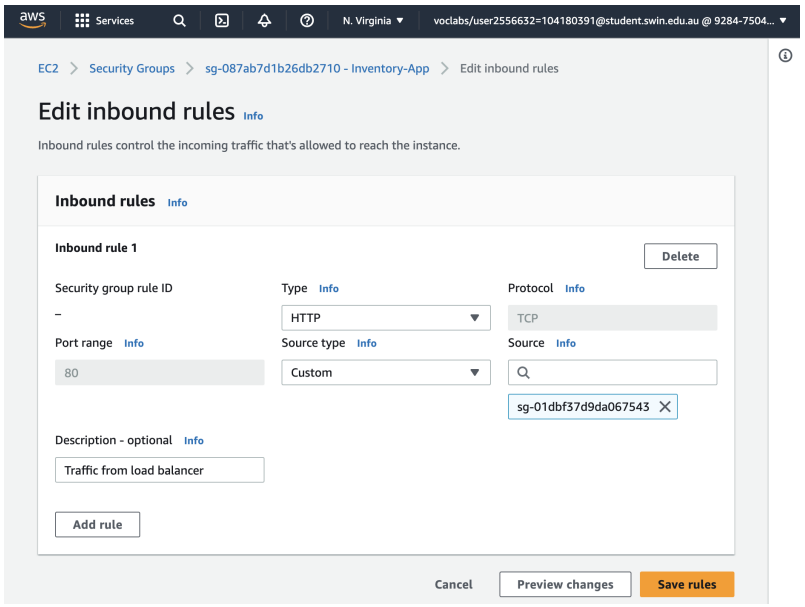
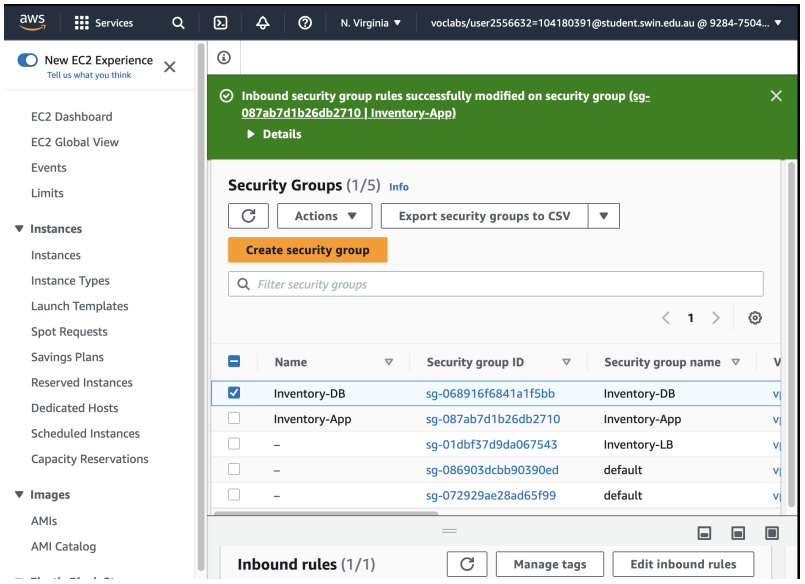
8	- **Firewall (security groups)**: choose Select existing security group - **Security groups**: choose Inventory-App	
9	- **IAM instance profile**: choose Inventory-App-Role	
10	- Scroll down to the **Detailed CloudWatch** monitoring setting. Select **Enable**	
11	- Under **User data**, paste in the script below: Choose **Create launch template**	
12	From the **Actions** menu, choose **Create Auto Scaling group**	

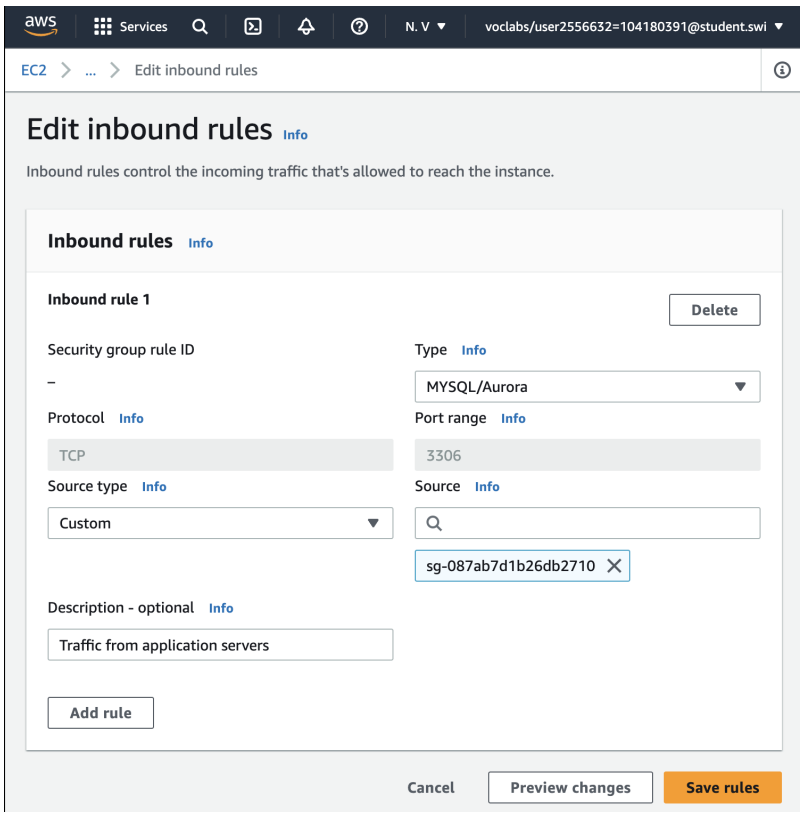
13	Configure the details in Step 1 (Choose launch template or configuration): - **Auto Scaling group name**: Inventory-ASG (ASG stands for Auto Scaling group) - **Launch template**: confirm that the Inventory-LT template you just created is selected.	
14	Configure the details in Step 2 (Choose instance launch options): - **VPC**: choose Lab VPC - **Availability Zones and subnets**: Choose Private Subnet 1 and then choose Private Subnet 2. - This will launch EC2 instances in private subnets across both Availability Zones. Choose **Next**	

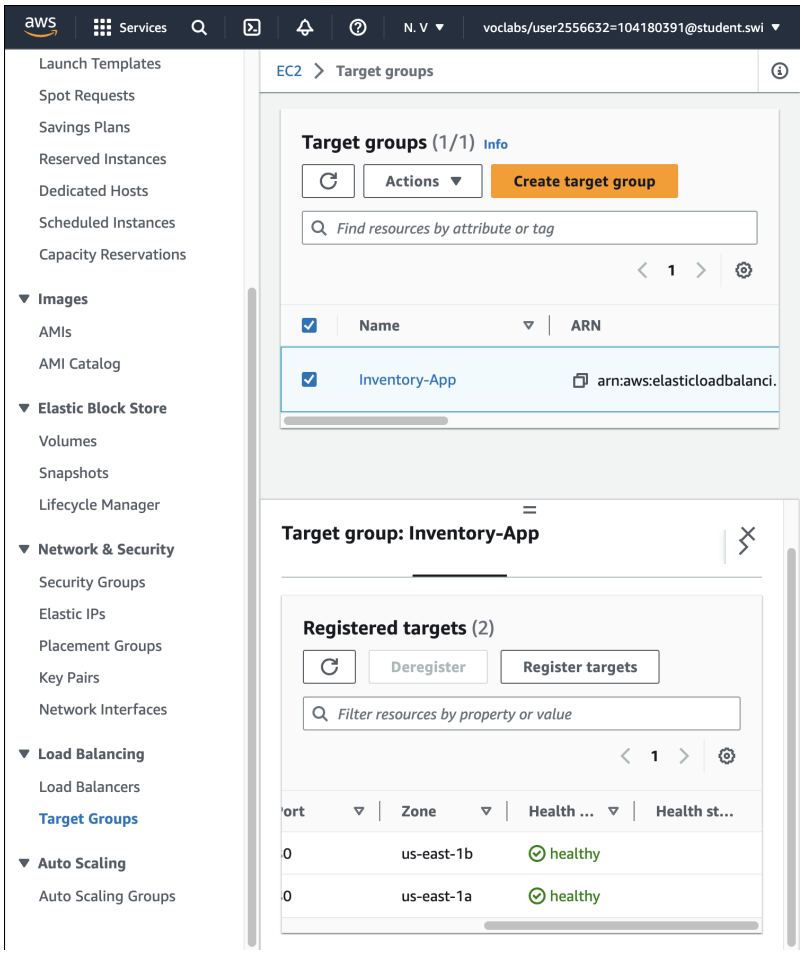
15	Configure the details in Step 3 (Configure advanced options): In the **Load balancing** panel: - Choose **Attach to an existing load balancer** - **Existing load balancer target groups**: select Inventory-App.	
16	In the **Health checks** panel: - **Health check grace period**: 90 seconds In the **Additional settings** panel: - Select **Enable group metrics collection within CloudWatch** Choose **Next**	
17	Configure the details in Step 4 (Configure group size and scaling policies - optional): Under **Group size**, configure: - **Desired capacity**: 2 - **Minimum capacity**: 2 - **Maximum capacity**: 2 Under **Scaling policies**, choose **None**	

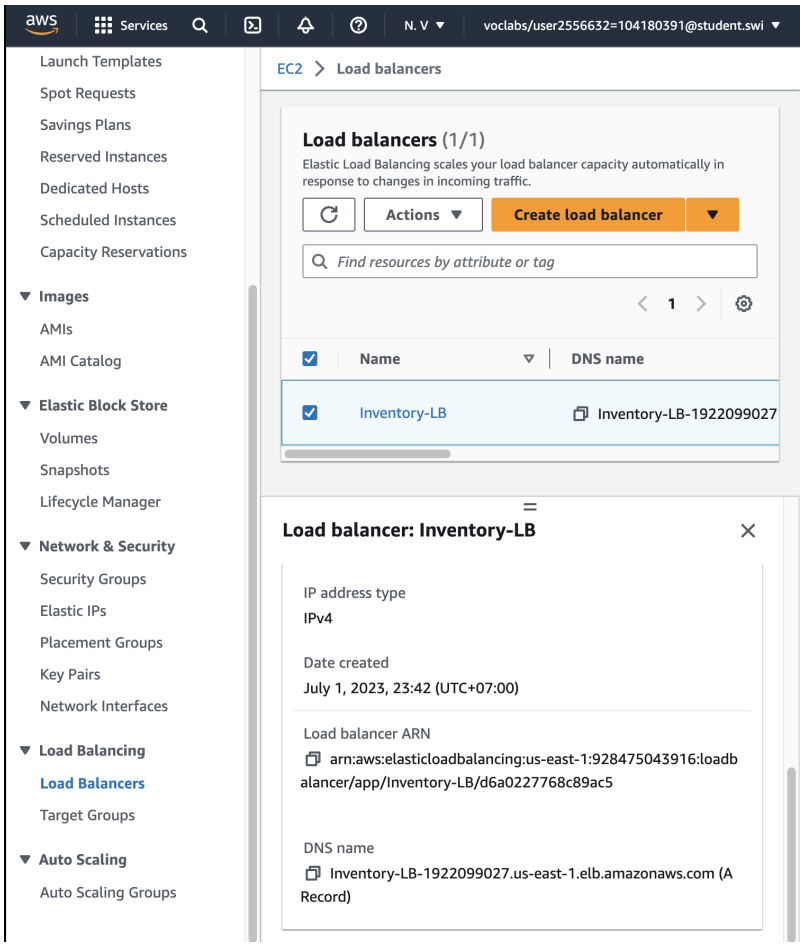
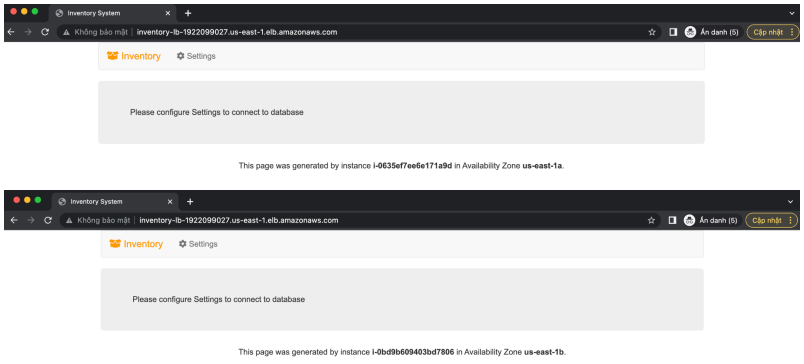
18	Choose Add tag and Configure the following: - **Key**: Name - **Value**: Inventory-App	
19	At the bottom of the page, choose **Create Auto Scaling group**	

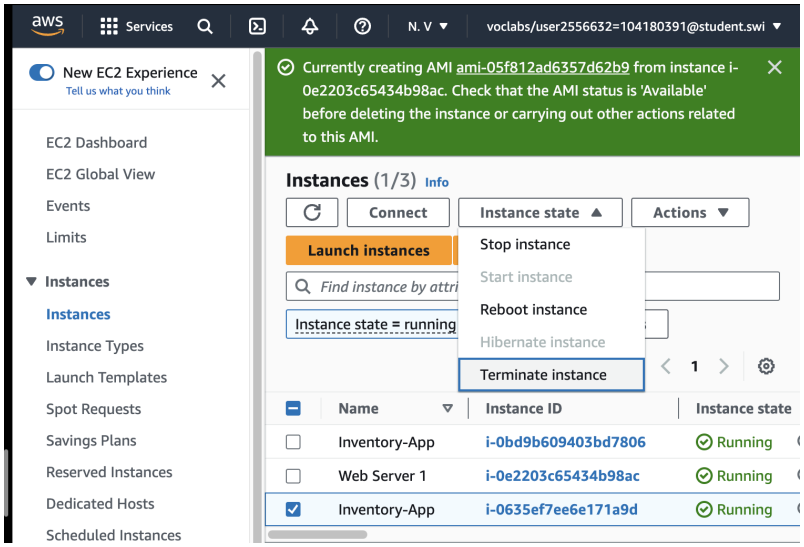
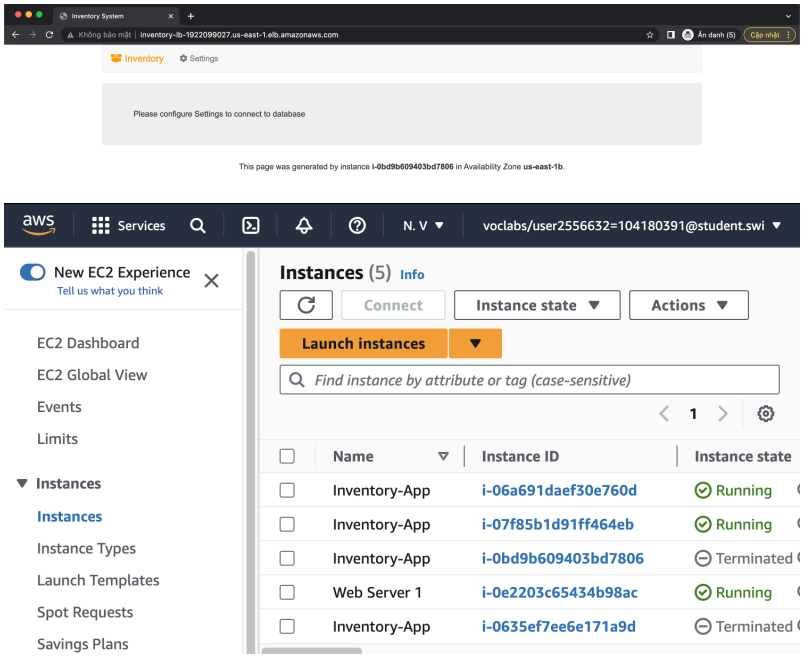
Task 4: Updating security groups		
Step	**Description**	**Screenshot**
1	In the left navigation pane, choose **Security Groups**. Select **Inventory-App**. In the lower half of the page, choose the **Inbound rules** tab. Choose **Edit inbound rules**.	

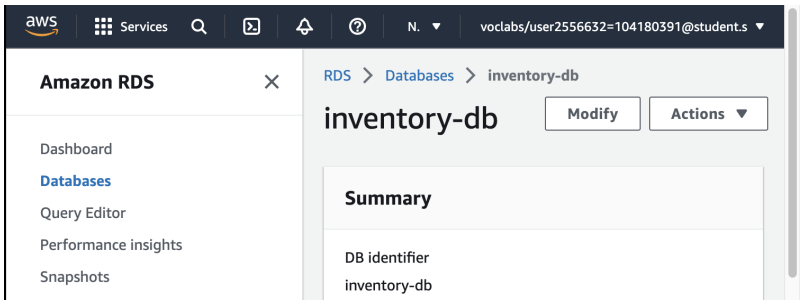
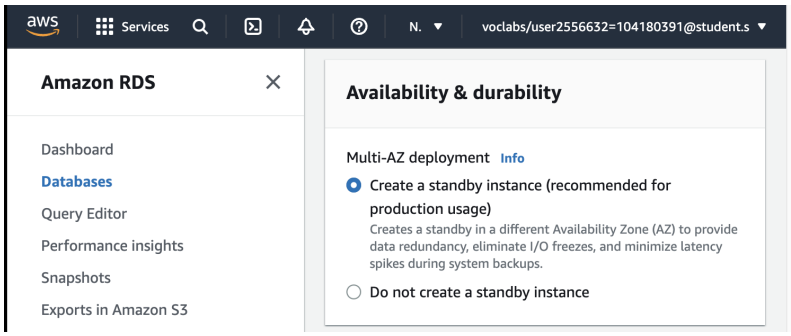
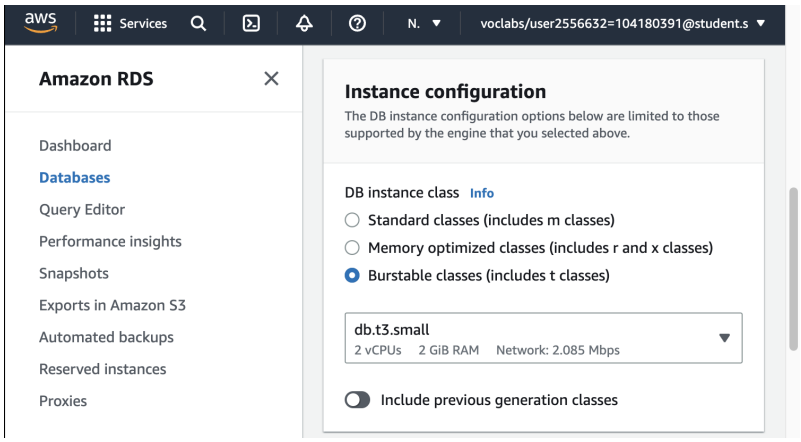
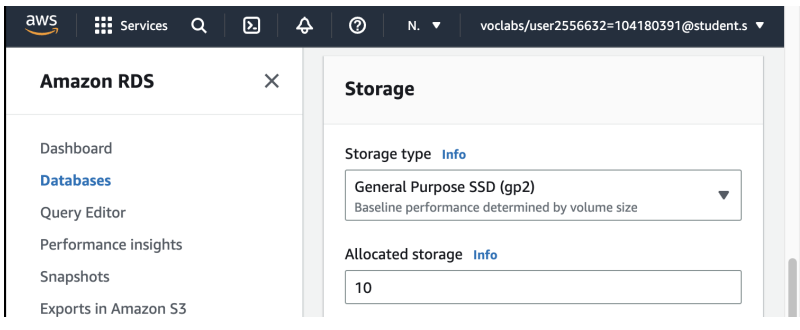
2	On the **Edit inbound rule**s page, choose **Add rule** and configure these settings: Type: **HTTP** Source: - Choose the search box to the right of **Custom** - Delete the current contents - Enter **sg** - From the list that appears, select **Inventory-LB** - **Description**: Traffic from load balancer Choose **Save rules**	
3	In the **Security groups** list, choose **Inventory-DB** (and make sure that no other security groups are selected). Choose **Edit inbound rules**.	

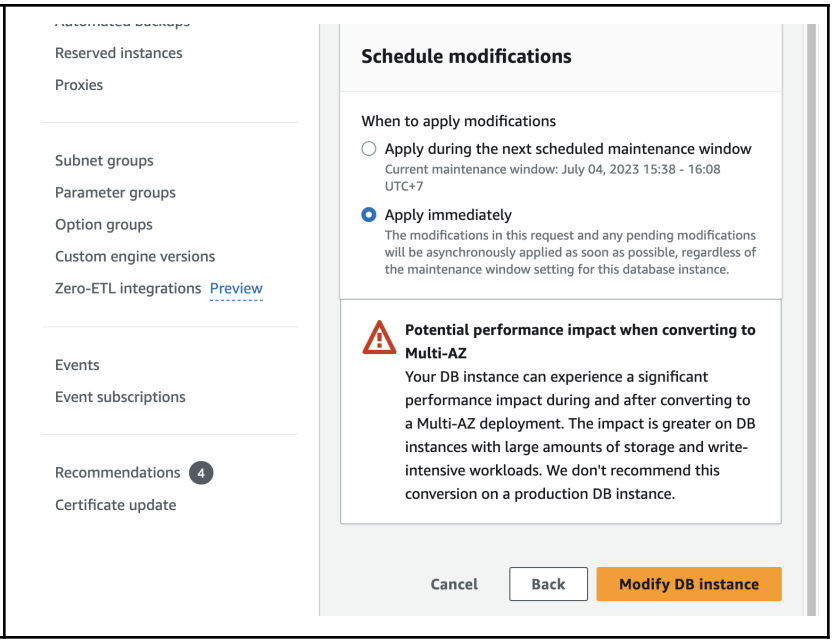
4	In the **Inbound rules** tab, choose **Edit inbound rules** and configure these settings: - Delete the existing rule. - Choose **Add rule**. - For **Type**, choose **MYSQL/Aurora** - Choose the search box to the right of **Custom** - Enter **sg** - From the list that appears, select **Inventory-App** - **Description**: Traffic from application servers Choose **Save rules**	

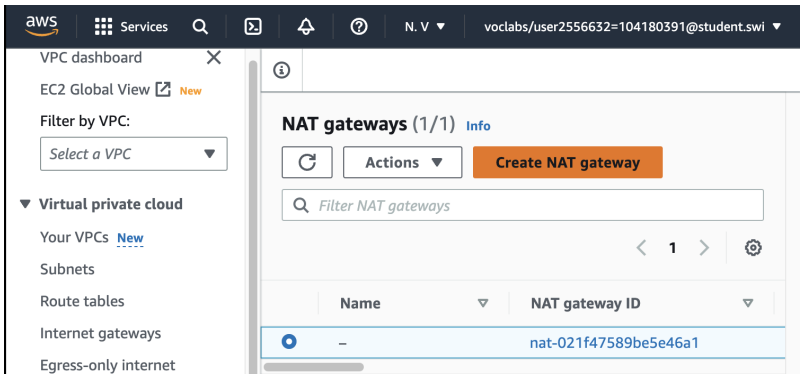
Task 5: Testing the application		
Step	**Description**	**Screenshot**
1	In the left navigation pane, choose **Target Groups**. Select **Inventory-App**. In the lower half of the page, choose the **Targets** tab. In the **Registered targets** area, occasionally choose the refresh icon until the **Status** for both instances appears as healthy.	

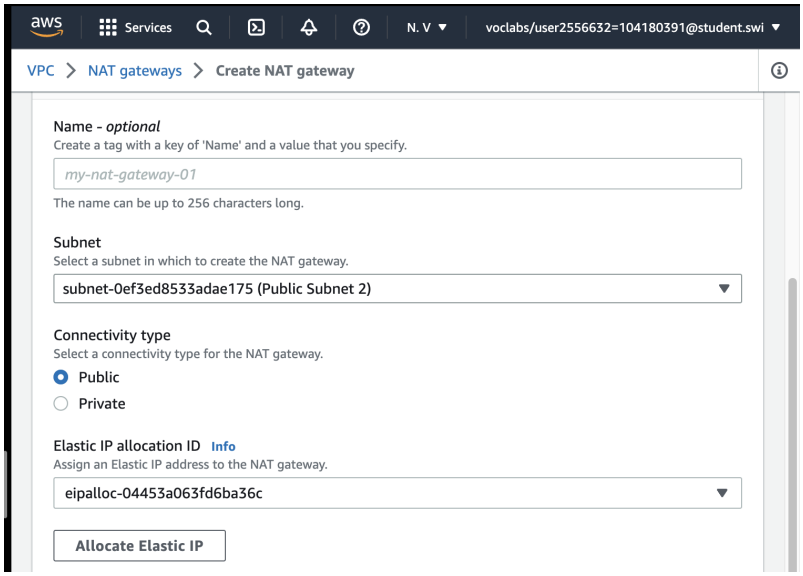
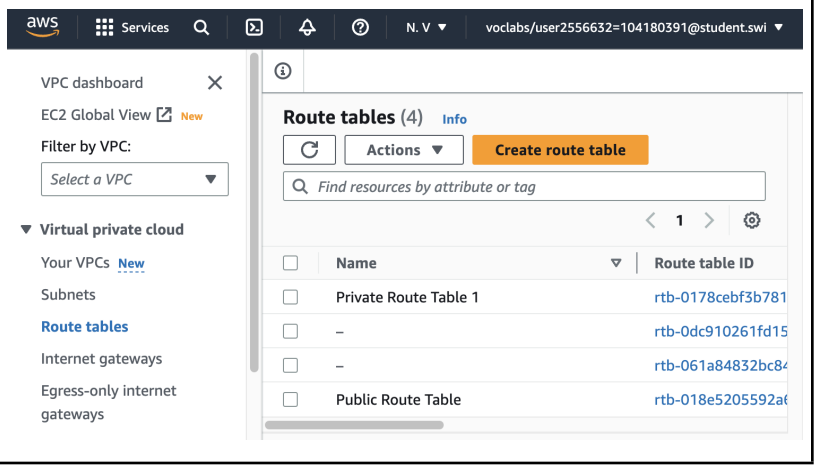
2	In the left navigation pane, choose **Load Balancers** and then choose **Inventory-LB**. In the **Details** tab in the lower half of the window, copy the **DNS** name to your clipboard.	
3	Open a new web browser tab, paste the DNS name from your clipboard and press ENTER. The load balancer forwarded your request to one of the EC2 instances. The instance ID and Availability Zone are shown at the bottom of the webpage. Reload the page in your web browser. You should notice that the instance ID and Availability Zone sometimes toggles between the two instances.	

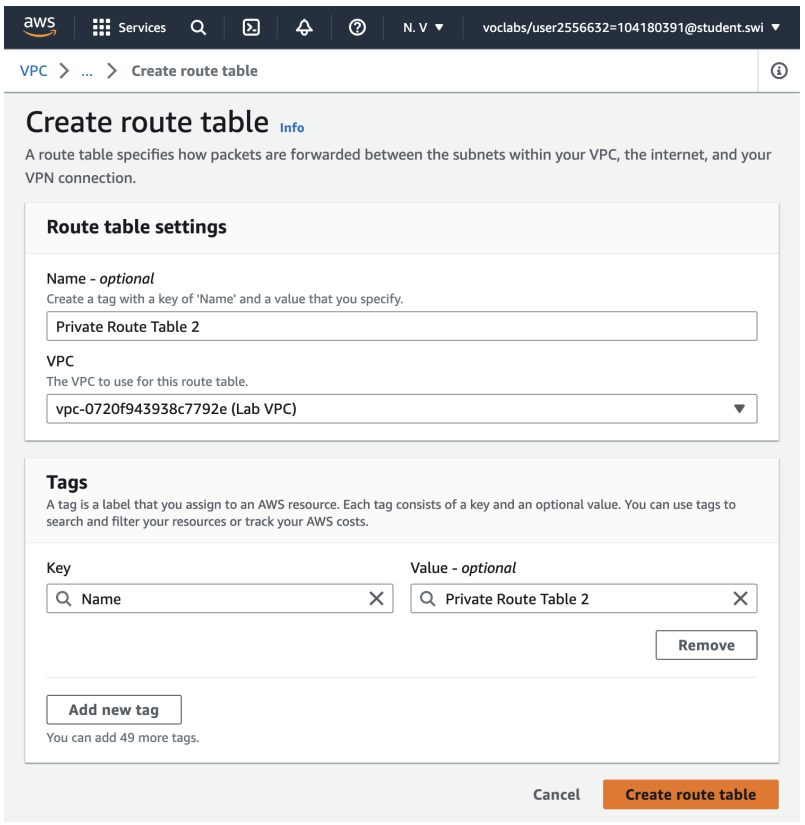
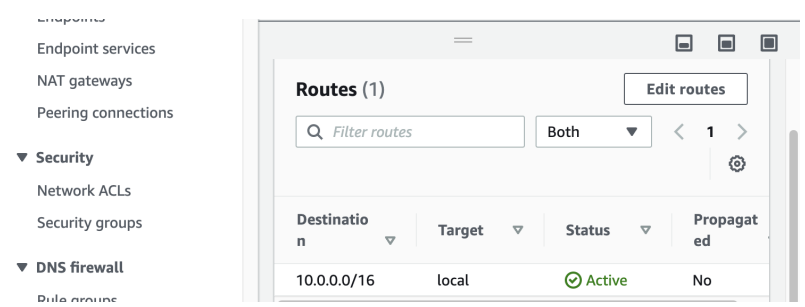
Task 6: Testing high availability		
Step	**Description**	**Screenshot**
1	In the left navigation pane, choose **Instances**. Select one of the **Inventory-App** instances. Choose **Instance State** > **Terminate instance**. Choose **Terminate**.	
2	Return to the web application tab in your web browser 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. Return to the 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.	

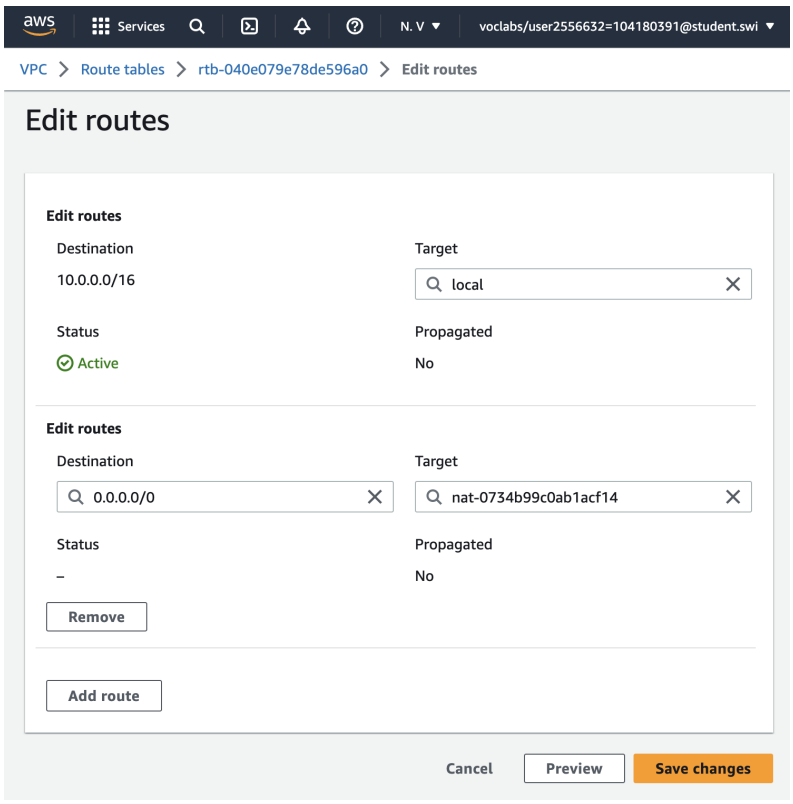
Optional task 1: Making the database highly available		
Step	**Description**	**Screenshot**
1	On the **Services** menu, choose **RDS**. In the left navigation pane, choose **Databases**. Choose the link for the name of the **inventory-db** instance. Choose **Modify**	
2	Scroll down to the **Availability & durability section**. For **Multi-AZ deployment**, select **Create a standby instance**.	
3	Scroll back up and for **DB instance class**, select **db.t3.small**.	
4	For **Allocated storage**, enter: 10	

5	Under **Schedule modifications**, select **Apply immediately**. Choose **Modify DB instance**	

Optional task 2: Configuring a highly available NAT gateway		
Step	**Description**	**Screenshot**
1	On the **Services** menu, choose **VPC**. In the left navigation pane, choose **NAT gateways**.	

2	Choose **Create NAT gateway** and configure these settings: - **Subnet**: Public Subnet 2 - Choose **Allocate Elastic IP** - Choose **Create NAT gateway**	
3	In the left navigation pane, choose **Route tables**.	

4	Choose **Create route table** and configure these settings: - **Name**: Private Route Table 2 - **VPC**: Lab VPC - Choose **Create route table**.	
5	Choose **Edit routes** and then configure these settings	

6	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 - Choose **Save changes**	
7	Choose the **Subnet associations** tab. Choose **Edit subnet associations** Select **Private Subnet 2**. Choose **Save associations**