

Lesson 10 Demo 04

Dynamic Port Integration with Application Load Balancer

Objective: To enable dynamic port mapping in a container

Tools required: AWS account

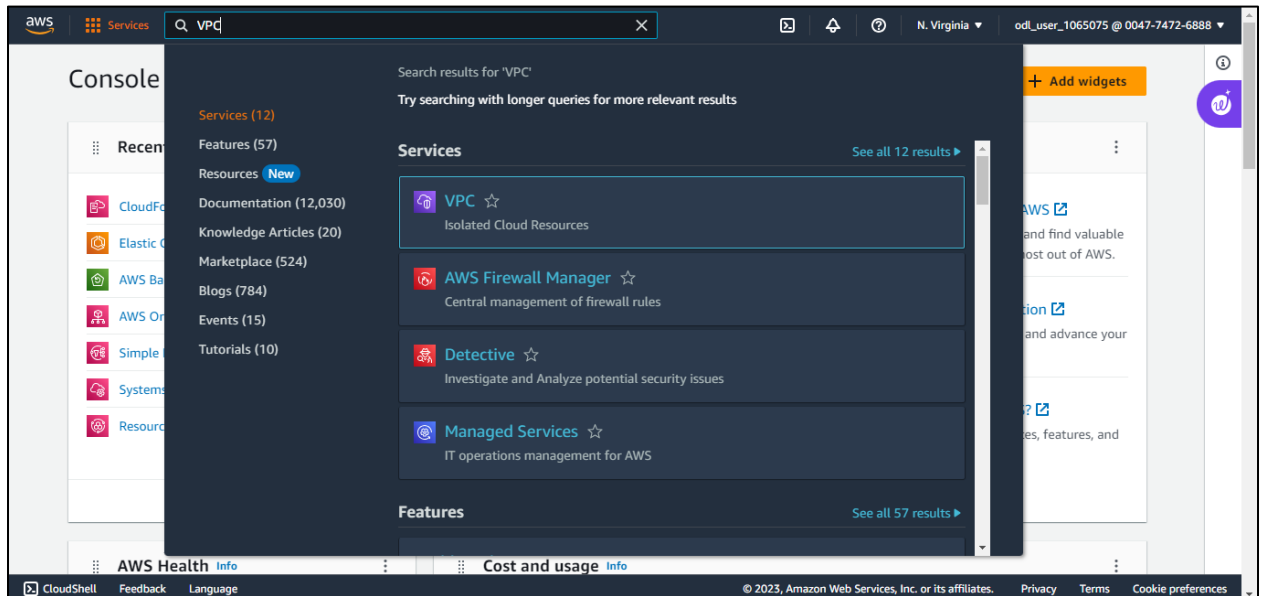
Prerequisites: NA

Steps to be followed:

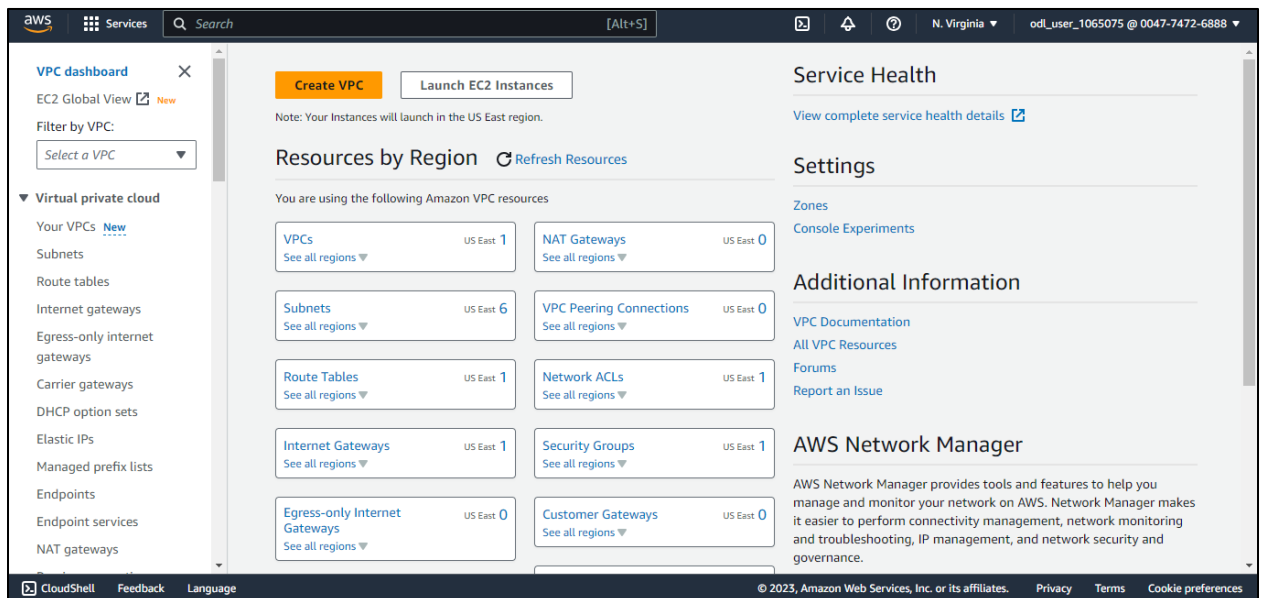
1. Create a custom VPC and enable the DNS hostname
2. Create an Internet Gateway
3. Create three subnets
4. Create a route table and attach it to three subnets
5. Create a cluster
6. Create a task definition
7. Run the service on the cluster

Step 1: Create a custom VPC and enable the DNS hostname

1.1 In the AWS Management Console, search for and click VPC



1.2 In the VPC dashboard, click on Create VPC



1.3 In the **Create VPC** window, perform the following:

- Select **VPC only** under the **Resource to create** section
- Enter an arbitrary name for the VPC under the **Name tag** section
- Enter **10.0.0.0/24** in the **IPv4 CDR** and click on **Create VPC**

Create VPC [Info](#)

A VPC is an isolated portion of the AWS Cloud populated by AWS objects, such as Amazon EC2 instances.

VPC settings

Resources to create [Info](#)
Create only the VPC resource or the VPC and other networking resources.

☒ VPC only ☐ VPC and more

Name tag - optional
Creates a tag with a key of 'Name' and a value that you specify.

SimplilearnVPC

IPv4 CDR block [Info](#)
☒ IPv4 CDR manual input
☐ IPAM-allocated IPv4 CDR block

IPv4 CDR
10.0.0.0/24

IPv6 CDR block [Info](#)

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IPv4 CDR
10.0.0.0/24

IPv6 CDR block [Info](#)
☒ No IPv6 CDR block
☐ IPAM-allocated IPv6 CDR block
☐ Amazon-provided IPv6 CDR block
☐ IPv6 CDR owned by me

Tenancy [Info](#)
Default

Tags
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.

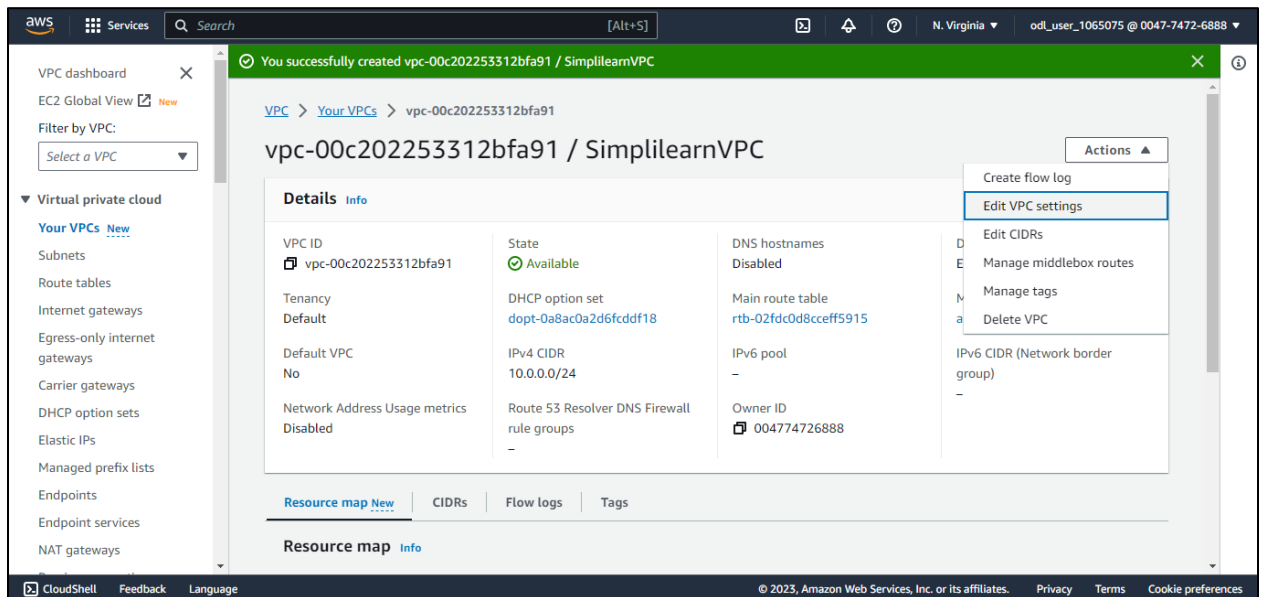
Key Value - optional
Name X SimplilearnVPC X Remove tag

Add tag
You can add 49 more tags

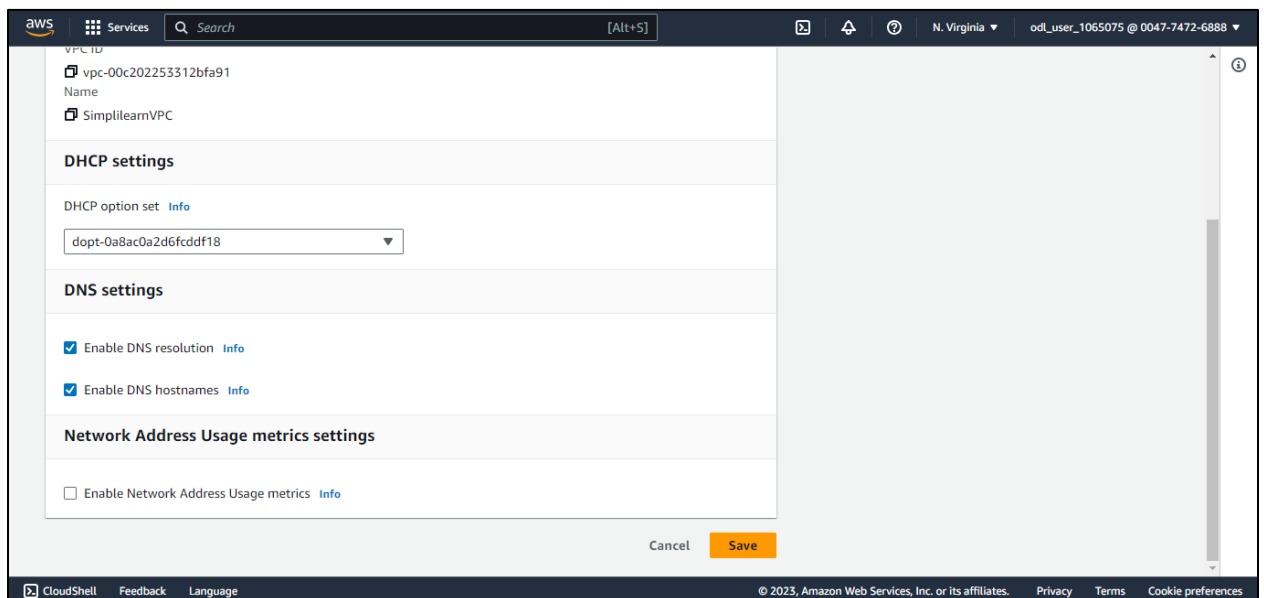
Cancel **Create VPC**

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1.4 In the **VPC dashboard**, click on the **Actions** dropdown menu and select **Edit VPC Settings**

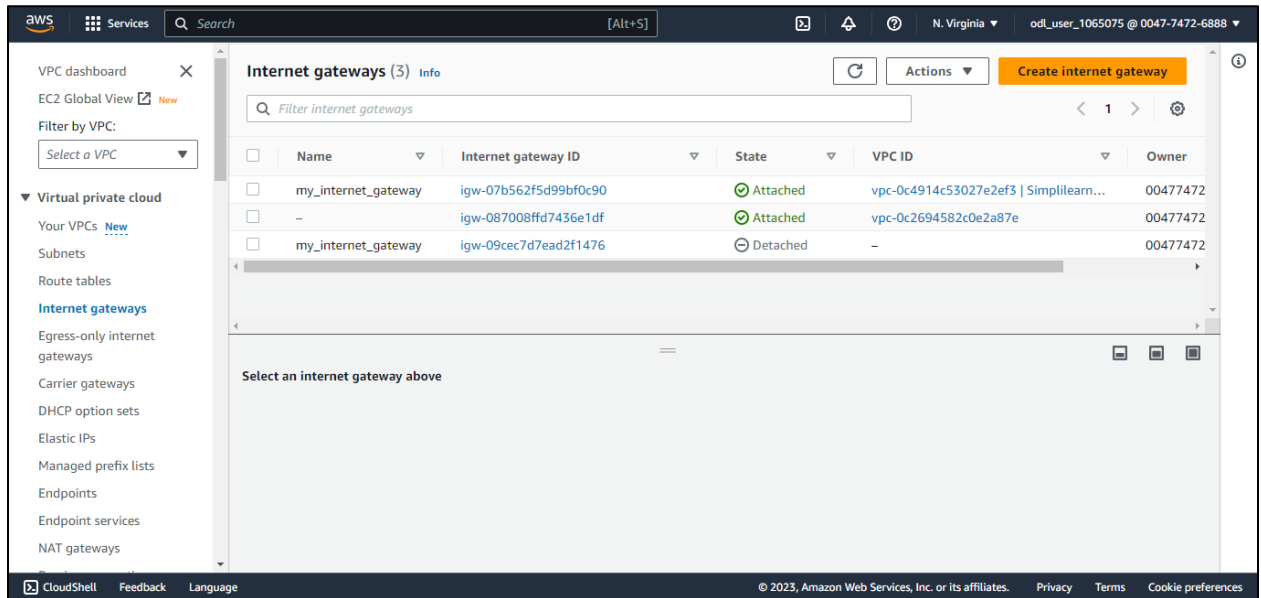


1.5 Check the **Enable DNS hostnames** checkbox and click on **Save**

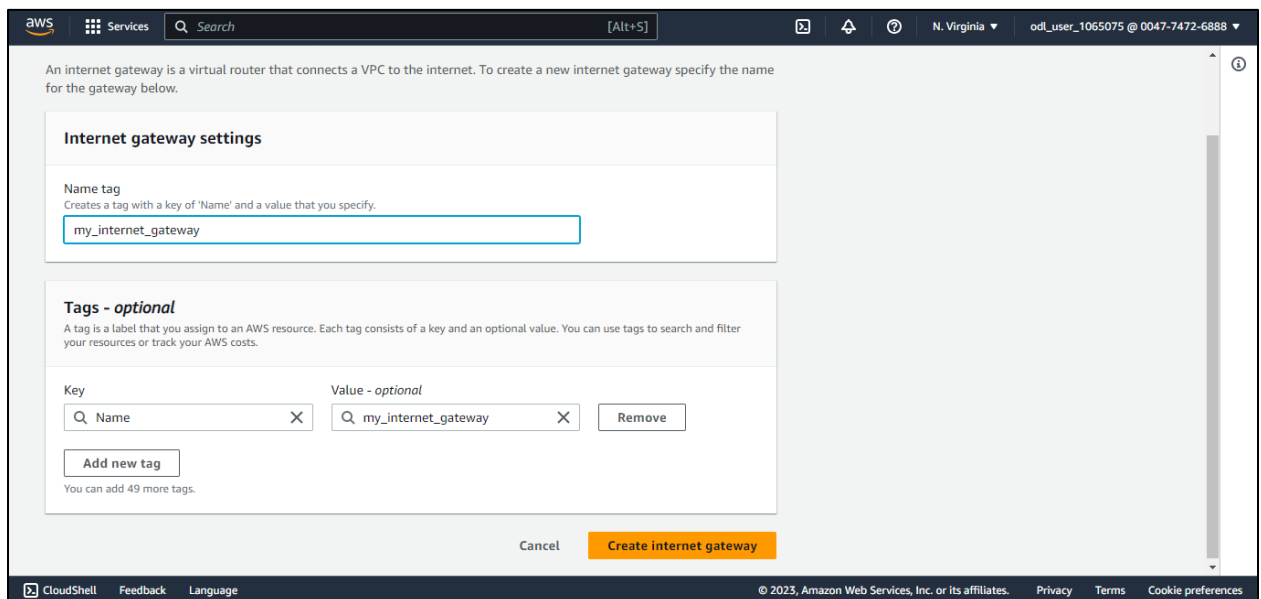


Step 2: Create an Internet gateway

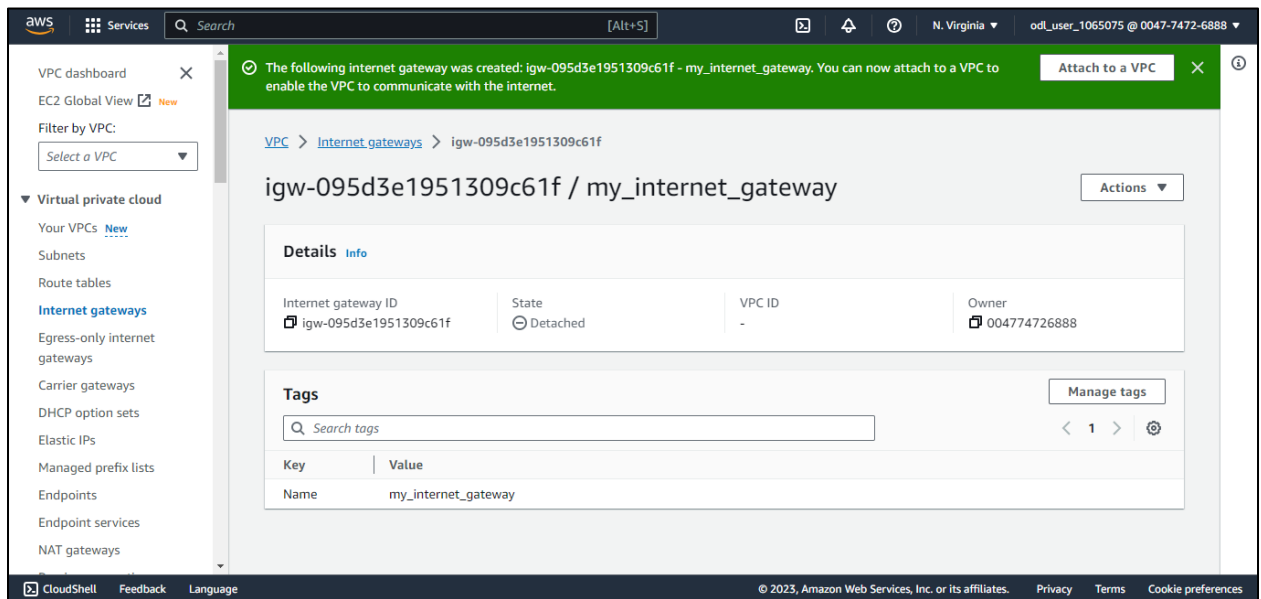
2.1 Open the VPC dashboard and click on Create internet gateway



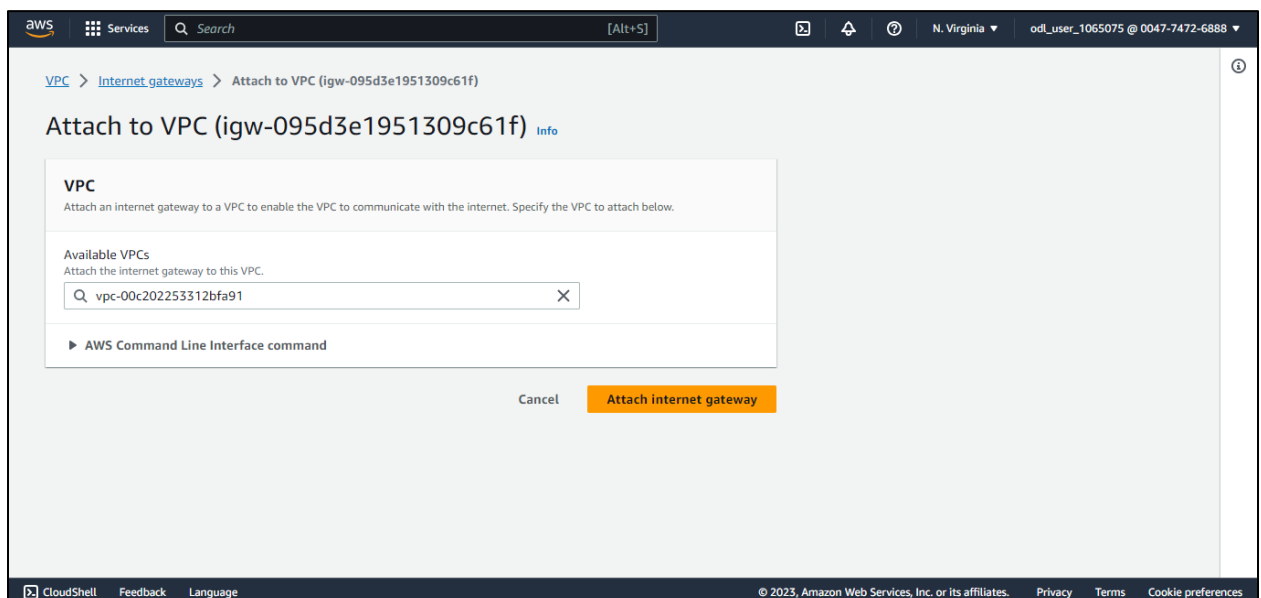
2.2 Enter an arbitrary name for the Internet gateway settings in the Name tag and click on Create internet gateway



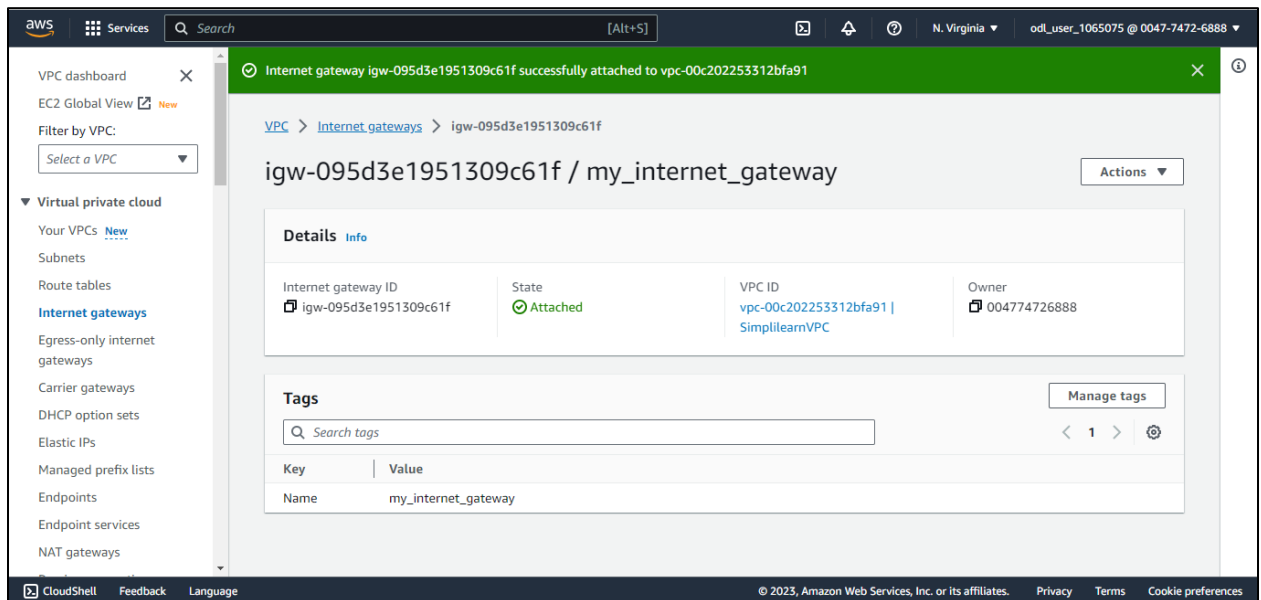
2.3 In the **Internet gateways** dashboard, click on **Attach to a VPC**



2.4 In the **Available VPCs**, select the VPC created in step 1 and click on **Attach internet gateway**

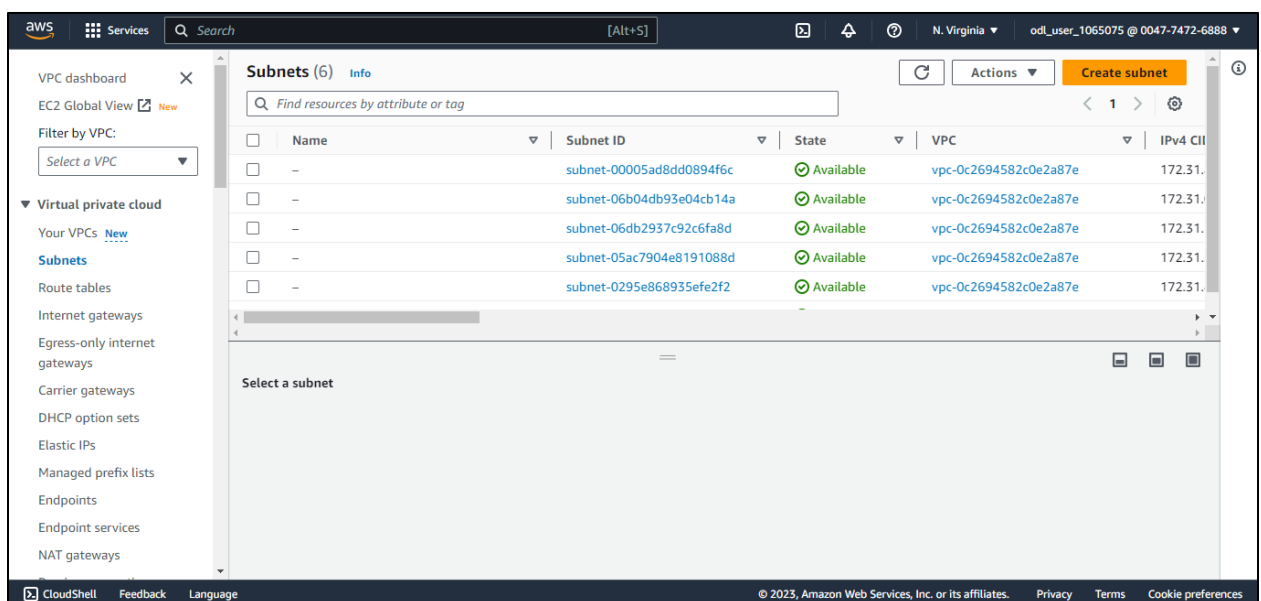


The following screen will appear:

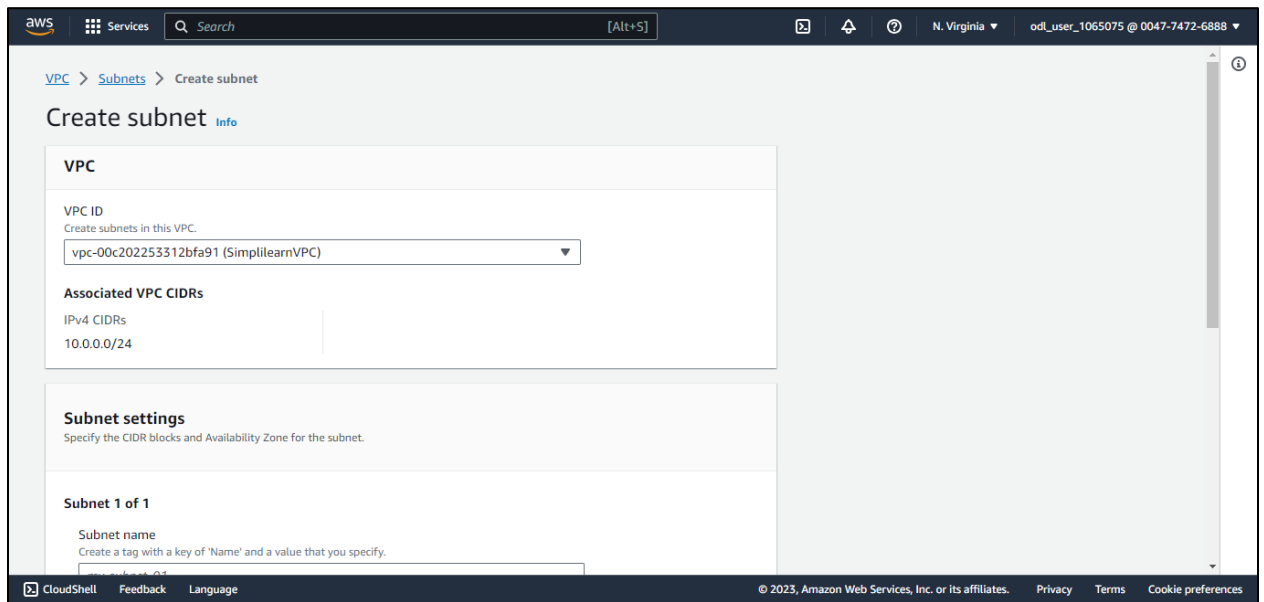


Step 3: Create three subnets

3.1 Click on **Subnets** and click on **Create subnet**



3.2 In the **VPC ID**, enter the VPC created in step 1



aws Services Search [Alt+S] N. Virginia odl_user_1065075 @ 0047-7472-6888

VPC > Subnets > Create subnet

Create subnet [Info](#)

VPC

VPC ID
Create subnets in this VPC.

vpc-00c202253312bfa91 (SimplilearnVPC)

Associated VPC CIDRs

IPv4 CIDRs

10.0.0.0/24

Subnet settings
Specify the CIDR blocks and Availability Zone for the subnet.

Subnet 1 of 1

Subnet name
Create a tag with a key of 'Name' and a value that you specify.

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3.3 In the **Subnet settings** section, repeat steps 3.1 and 3.2 with the following settings:

- Create a subnet in the **us-east-1a** zone and enter **10.0.0.0/28** in the **IPv4 CIDR block**
- Create a subnet in the **us-east-1b** zone and enter **10.0.0.16/28** in the **IPv4 CIDR block**
- Create a subnet in the **us-east-1c** zone and enter **10.0.0.32/28** in the **IPv4 CIDR block**

Subnet 1 of 1

Subnet name
Create a tag with a key of 'Name' and a value that you specify.
Subnet1
The name can be up to 256 characters long.

Availability Zone [Info](#)
Choose the zone in which your subnet will reside, or let Amazon choose one for you.
US East (N. Virginia) / us-east-1a

IPv4 CIDR block [Info](#)
10.0.0.0/28

▼ **Tags - optional**



| Key | Value - optional | |
|------|------------------|--------|
| Name | Subnet1 | Remove |

[Add new tag](#)
You can add 49 more tags.

[Remove](#)

[Add new subnet](#)

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 Services [Alt+S] 

Subnet 2 of 2

Subnet name
Create a tag with a key of 'Name' and a value that you specify.


The name can be up to 256 characters long.

Availability Zone [Info](#)
Choose the zone in which your subnet will reside, or let Amazon choose one for you.

IPv4 CIDR block [Info](#)

▼ **Tags - optional**

| Key | Value - optional | |
|---|--------------------------------------|---------------------------------------|
| <input type="text" value="Name"/> | <input type="text" value="Subnet2"/> | <input type="button" value="Remove"/> |
| <input type="button" value="Add new tag"/> | | |
| You can add 49 more tags. | | |
| <input type="button" value="Remove"/> | | |
| <input type="button" value="Add new subnet"/> | | |

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Subnet 3 of 3

Subnet name
Create a tag with a key of 'Name' and a value that you specify.
Subnet3
The name can be up to 256 characters long.

Availability Zone [Info](#)
Choose the zone in which your subnet will reside, or let Amazon choose one for you.
US East (N. Virginia) / us-east-1c

IPv4 CIDR block [Info](#)
10.0.0.32/28

Tags - optional

| Key | Value - optional | |
|------|------------------|--------|
| Name | Subnet3 | Remove |

[Add new tag](#)
You can add 49 more tags.

[Remove](#)

[Add new subnet](#)

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The below screen will appear after you click on **Create subnet**:

You have successfully created 3 subnets: subnet-02a00c8149899f1ab, subnet-0e82612a1ba70a07d, subnet-06d603627e9951a01

Subnets (3) [Info](#)

[Find resources by attribute or tag](#)

Subnet ID = subnet-02a00c8149899f1ab Subnet ID = subnet-0e82612a1ba70a07d Subnet ID = subnet-06d603627e9951a01

[Clear filters](#)

| Name | Subnet ID | State | VPC | IPv4 CIDR |
|-----------------|-----------|-------|-----|-----------|
| Select a subnet | | | | |

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3.4 In the **Subnets** dashboards, click on **Actions** and select **Edit subnet settings**

The screenshot shows the AWS Management Console interface for the Subnets dashboard. A green notification banner at the top states: "You have successfully created 3 subnets: subnet-02a00c8149899f1ab, subnet-0e82612a1ba70a07d, subnet-06d603627e9951a01". The left sidebar contains navigation links for VPC dashboard, EC2 Global View, and various VPC resources. The main content area displays a table of subnets with columns for Name, Subnet ID, State, and VPC. Three subnets are listed: Subnet1, Subnet3, and Subnet2, all in an 'Available' state. The 'Subnet1' row is selected. An 'Actions' dropdown menu is open for the selected subnet, showing options like 'View details', 'Create flow log', 'Edit subnet settings' (which is highlighted), 'Edit IPv6 CIDRs', 'Edit network ACL association', 'Edit route table association', 'Edit CIDR reservations', 'Share subnet', 'Manage tags', and 'Delete subnet'. Below the table, the details for 'subnet-02a00c8149899f1ab / Subnet1' are visible.

| Name | Subnet ID | State | VPC |
|---|--------------------------|-----------|------|
| <input checked="" type="checkbox"/> Subnet1 | subnet-02a00c8149899f1ab | Available | vpc- |
| <input type="checkbox"/> Subnet3 | subnet-06d603627e9951a01 | Available | vpc- |
| <input type="checkbox"/> Subnet2 | subnet-0e82612a1ba70a07d | Available | vpc- |

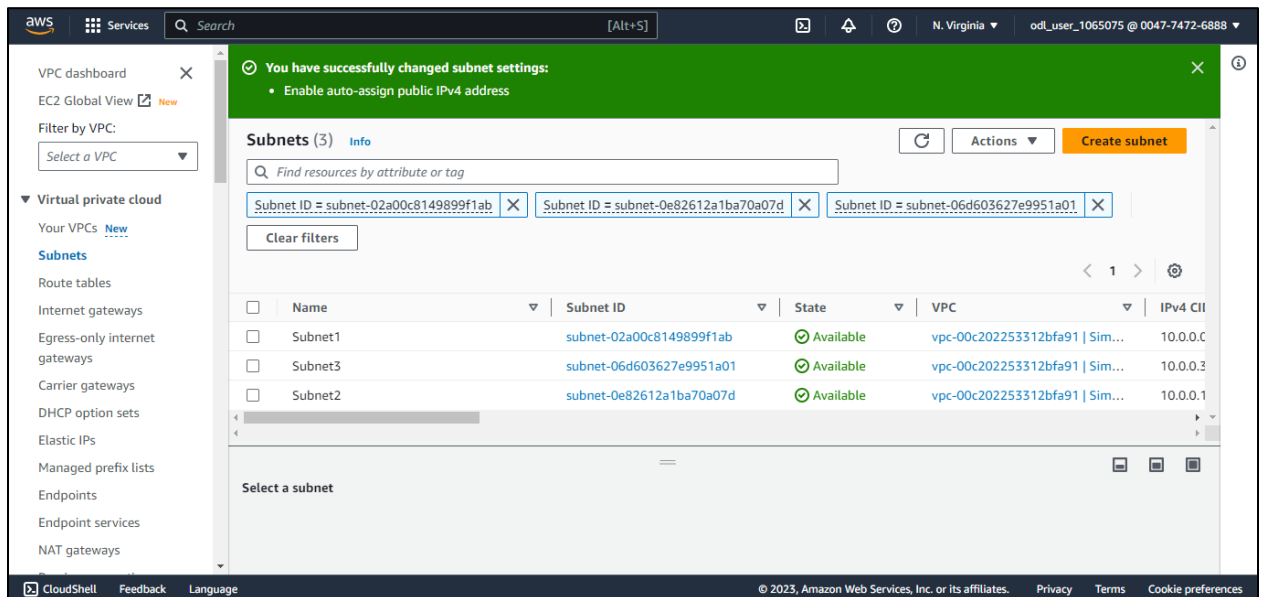
3.5 Click on **Enable auto-assign public IPv4 address** and click on **Save**

The screenshot shows the AWS console interface for configuring a subnet. The top navigation bar includes the AWS logo, a 'Services' menu, a search bar, and a keyboard shortcut '[Alt+S]'. The main content area is divided into three sections:

- IP Addressing:** Contains two checkboxes. The first, 'Enable auto-assign public IPv4 address', is checked and has an 'Info' link. The second, 'Enable auto-assign customer-owned IPv4 address', is disabled with a message: 'Option disabled because no customer owned pools found.' It also has an 'Info' link.
- Resource-based name (RBN) settings:** Has a subtitle 'Specify the hostname type for EC2 instances in this subnet and optional RBN DNS query settings.' It contains two disabled checkboxes: 'Enable resource name DNS A record on launch' and 'Enable resource name DNS AAAA record on launch', both with 'Info' links. Below these is a 'Hostname type' section with two radio buttons: 'Resource name' and 'IP name'. The 'IP name' option is selected.
- DNS64 settings:** Has a subtitle 'Enable DNS64 to allow IPv6-only services in Amazon VPC to communicate with IPv4-only services and networks.' It contains one disabled checkbox: 'Enable DNS64', with an 'Info' link.

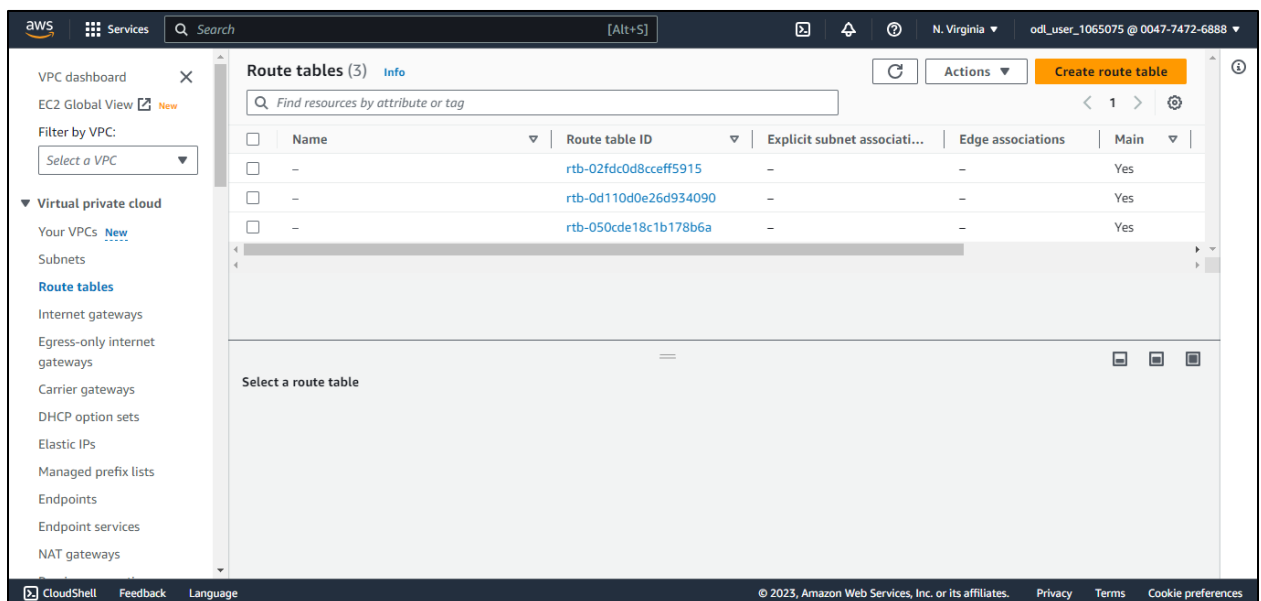
At the bottom right of the main content area, there are two buttons: 'Cancel' and 'Save'. The 'Save' button is highlighted in orange. The bottom footer bar includes 'CloudShell', 'Feedback', 'Language', and a copyright notice '© 2023, Amazon'.

The below screen will appear after you change the subnet settings:



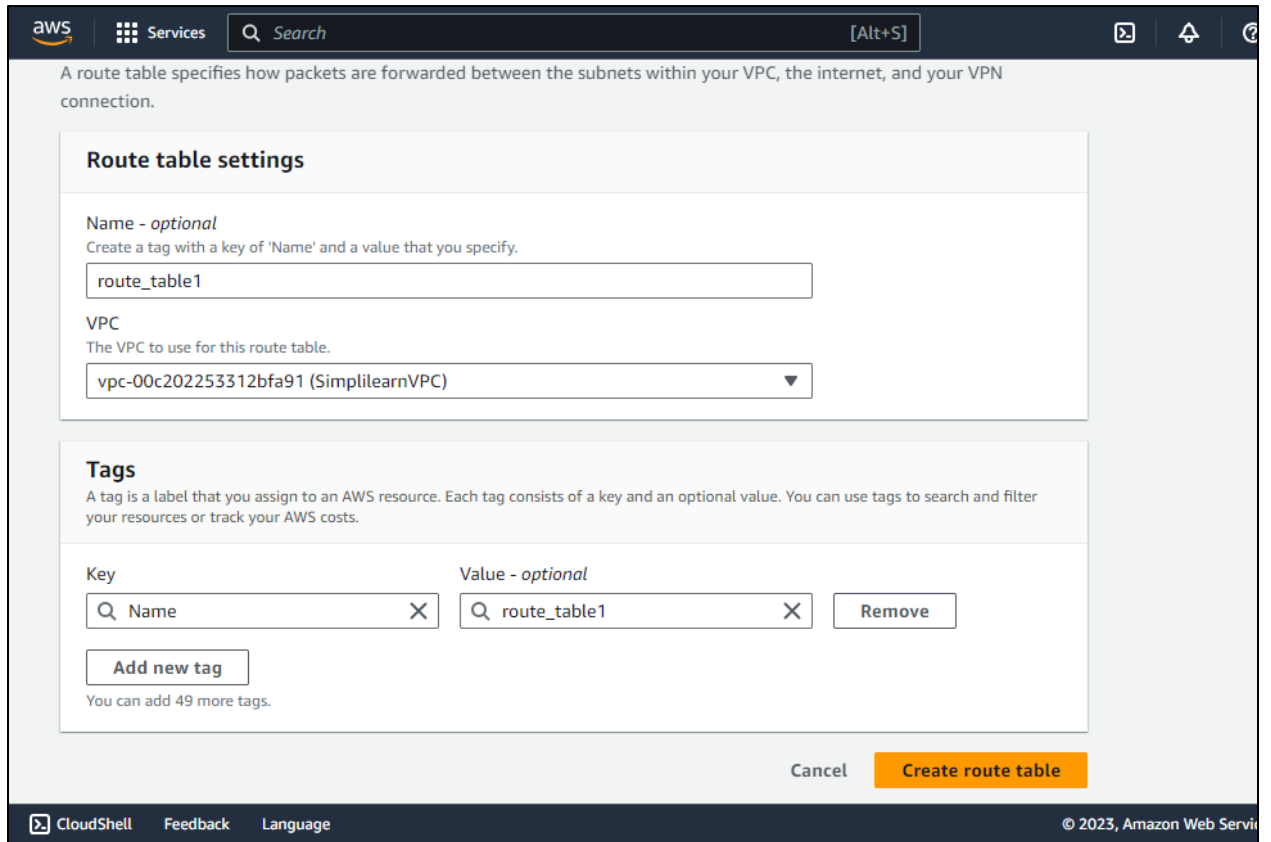
Step 4: Create a Route table and attach it to three subnets

4.1 Navigate to the Route tables dashboard and click on Create route table



4.2 In the create route table window, perform the following:

- Enter an arbitrary name for the route table
- Add the VPC created in Step 1 in the VPC section
- Click on **Create route table**



aws Services Search [Alt+S]

A route table specifies how packets are forwarded between the subnets within your VPC, the internet, and your VPN connection.

Route table settings

Name - optional
Create a tag with a key of 'Name' and a value that you specify.

route_table1

VPC
The VPC to use for this route table.

vpc-00c202253312bfa91 (SimplilearnVPC)

Tags

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.

Key **Value - optional**

Name route_table1 Remove

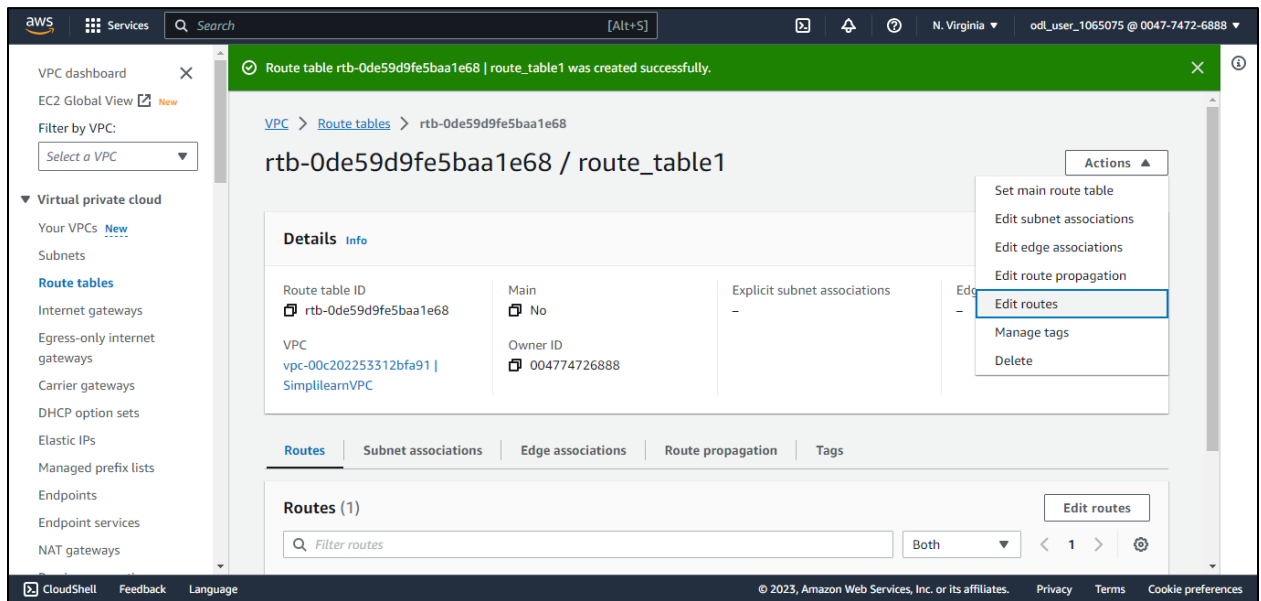
Add new tag

You can add 49 more tags.

Cancel Create route table

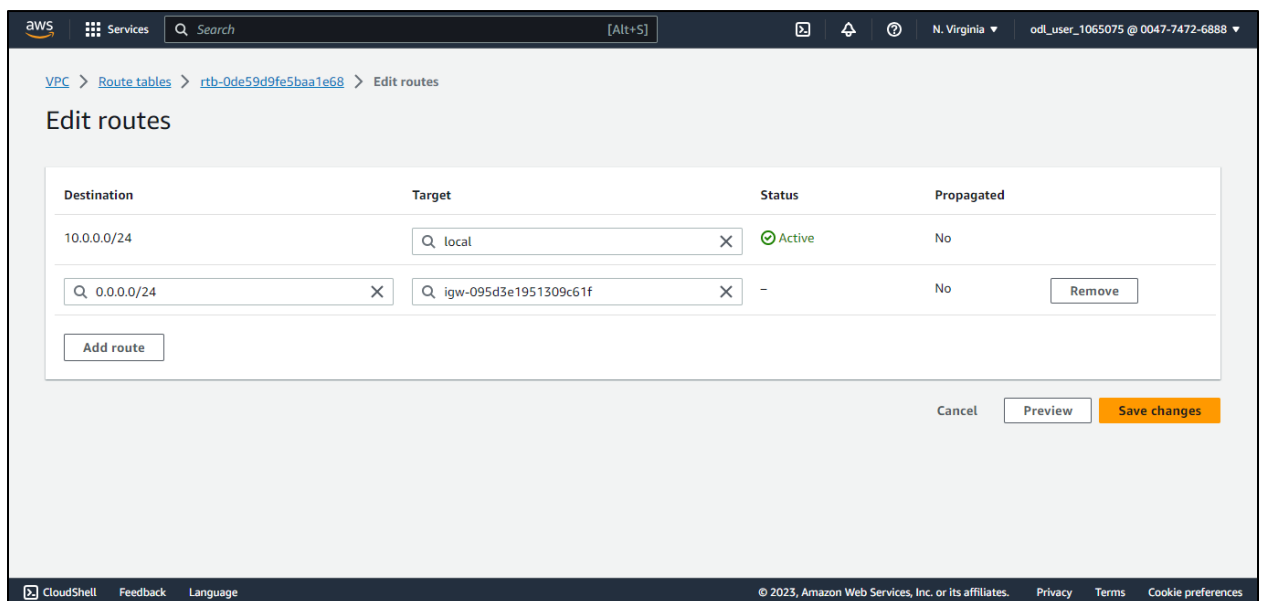
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4.3 In the route table dashboard, select the route table, go to the **Actions** tab, and click on **Edit routes**



4.4 In the Edit routes window, perform the following:

- Select **Internet gateway (igw)** from the drop-down
- Click on **Save changes**



4.5 In the route table dashboard, select the route table, go to the **Actions** tab, and click on **Edit subnet associations**

VPC > Route tables > rtb-0c0d55e9bd21e14ac

rtb-0c0d55e9bd21e14ac / routeTable1

Actions

- Set main route table
- Edit subnet associations**
- Edit edge associations
- Edit route propagation
- Edit routes
- Manage tags
- Delete

Details Info

| | | | |
|---|--------------------------|-----------------------------------|------------------------|
| Route table ID rtb-0c0d55e9bd21e14ac | Main No | Explicit subnet associations - | Edge associations - |
| VPC vpc-07f9f60ddf252aa37 SLVPC | Owner ID 646672863546 | | |

Routes Subnet associations Edge associations Route propagation Tags

Routes (2) Edit routes

Filter routes Both < 1 > ⚙️

| Destination | Target | Status | Propagated |
|-------------|--------|--------|------------|
| | | | |

4.6 Select all three subnets and click on **Save associations**

aws Services Search [Alt+S] N. Virginia odl_user_1065075 @ 0047-7472-6888

VPC > Route tables > rtb-0de59d9fe5baa1e68 > Edit subnet associations

Edit subnet associations

Change which subnets are associated with this route table.

Available subnets (3/3) Filter subnet associations < 1 > ⚙️

| <input checked="" type="checkbox"/> | Name | Subnet ID | IPv4 CIDR | IPv6 CIDR | Route table ID |
|-------------------------------------|---------|--------------------------|--------------|-----------|------------------------------|
| <input checked="" type="checkbox"/> | Subnet1 | subnet-02a00c8149899f1ab | 10.0.0.0/28 | - | Main (rtb-02fdc0d8c9eff5915) |
| <input checked="" type="checkbox"/> | Subnet3 | subnet-06d603627e9951a01 | 10.0.0.32/28 | - | Main (rtb-02fdc0d8c9eff5915) |
| <input checked="" type="checkbox"/> | Subnet2 | subnet-0e82612a1ba70a07d | 10.0.0.16/28 | - | Main (rtb-02fdc0d8c9eff5915) |

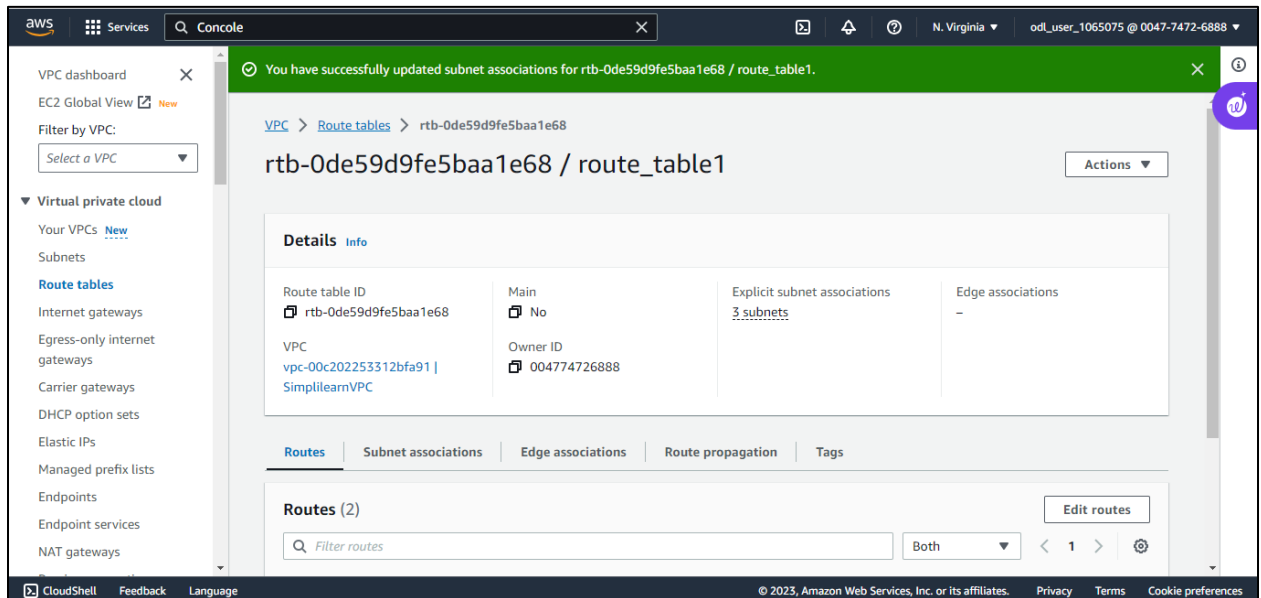
Selected subnets

subnet-02a00c8149899f1ab / Subnet1 ✕ subnet-06d603627e9951a01 / Subnet3 ✕ subnet-0e82612a1ba70a07d / Subnet2 ✕

Cancel Save associations

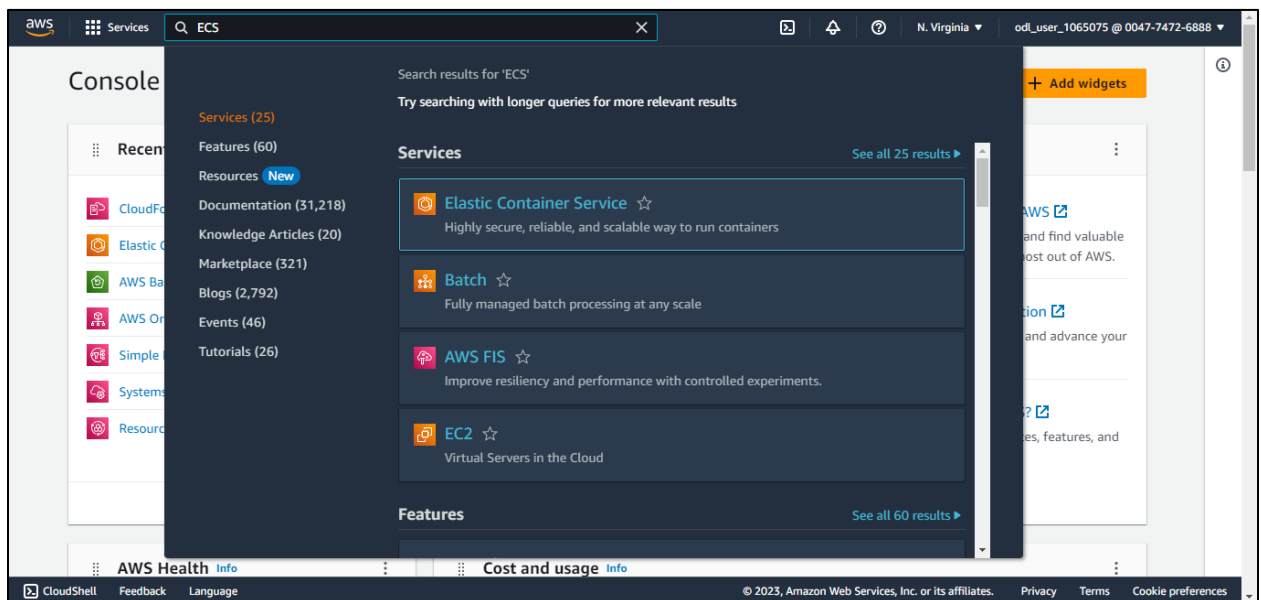
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The following screen will appear:

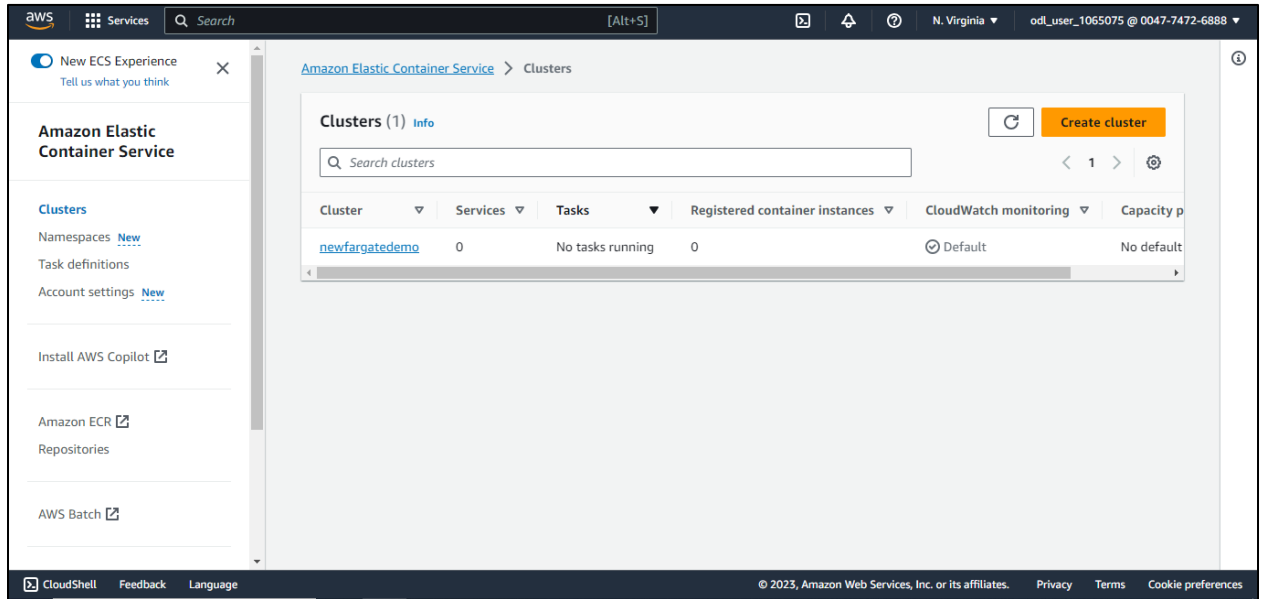


Step 7: Create a Fargate cluster

7.1 In the AWS Management Console, search for ECS and select Elastic Container Service



7.2 On the left panel of the ECS console, click on **Clusters** and **Create cluster**



7.3 In the Cluster configuration, perform the following:

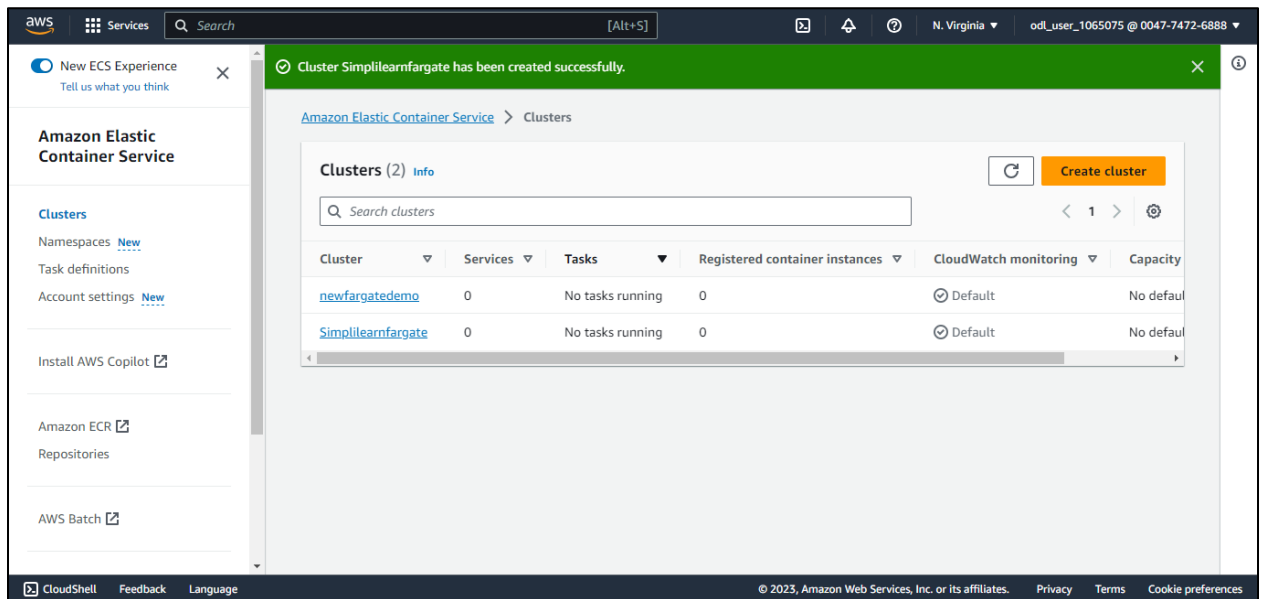
- Enter an arbitrary name for Cluster under the **Cluster name**
- In the infrastructure, specify **AWS Fargate (serverless)**
- Let the other settings stay at default settings and click on **Create**

The screenshot shows the 'Cluster configuration' page in the AWS Management Console. The left sidebar contains the 'Amazon Elastic Container Service' navigation menu. The main content area is titled 'Cluster configuration' and includes the following sections:

- Cluster name:** A text input field containing 'Simplilearnfargate'. Below it, a note states: 'There can be a maximum of 255 characters. The valid characters are letters (uppercase and lowercase), numbers, hyphens, and underscores.'
- Default namespace - optional:** A dropdown menu showing 'Simplilearnfargate'. A note says: 'Select the namespace to specify a group of services that make up your application. You can overwrite this value at the service level.'
- Infrastructure:** A section with a 'Serverless' button and a list of options:
 - ☒ **AWS Fargate (serverless)**: Pay as you go. Use if you have tiny, batch, or burst workloads or for zero maintenance overhead. The cluster has Fargate and Fargate Spot capacity providers by default.
 - ☐ **Amazon EC2 instances**: Manual configurations. Use for large workloads with consistent resource demands.
 - ☐ **External instances using ECS Anywhere**: Manual configurations. Use to add data center compute.

The screenshot shows the 'Monitoring' and 'Tags' sections of the cluster configuration page. The 'Monitoring' section includes a note: 'Container Insights is off by default. When you use Container Insights, there is a cost associated with it.' The 'Tags' section includes a note: 'Tags help you to identify and organize your clusters.' At the bottom right, there are 'Cancel' and 'Create' buttons. The 'Create' button is highlighted in orange.

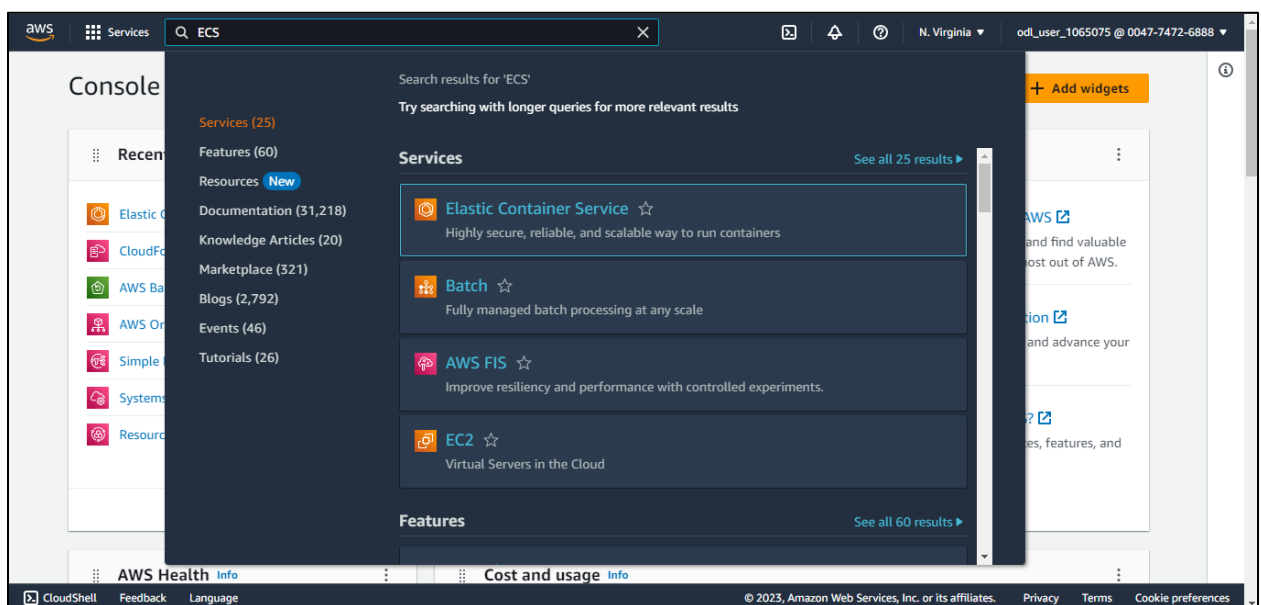
7.4 Verify the cluster creation as shown below:



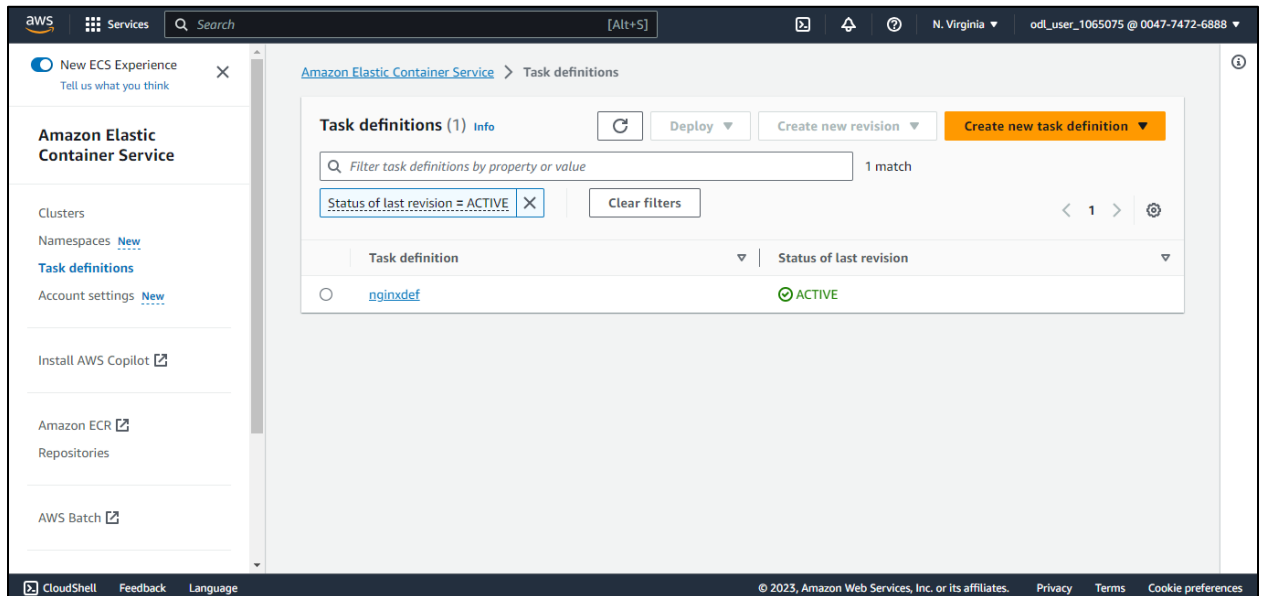
Note: Do not close the above tab. It will be necessary for reference.

Step 8: Create Task definition

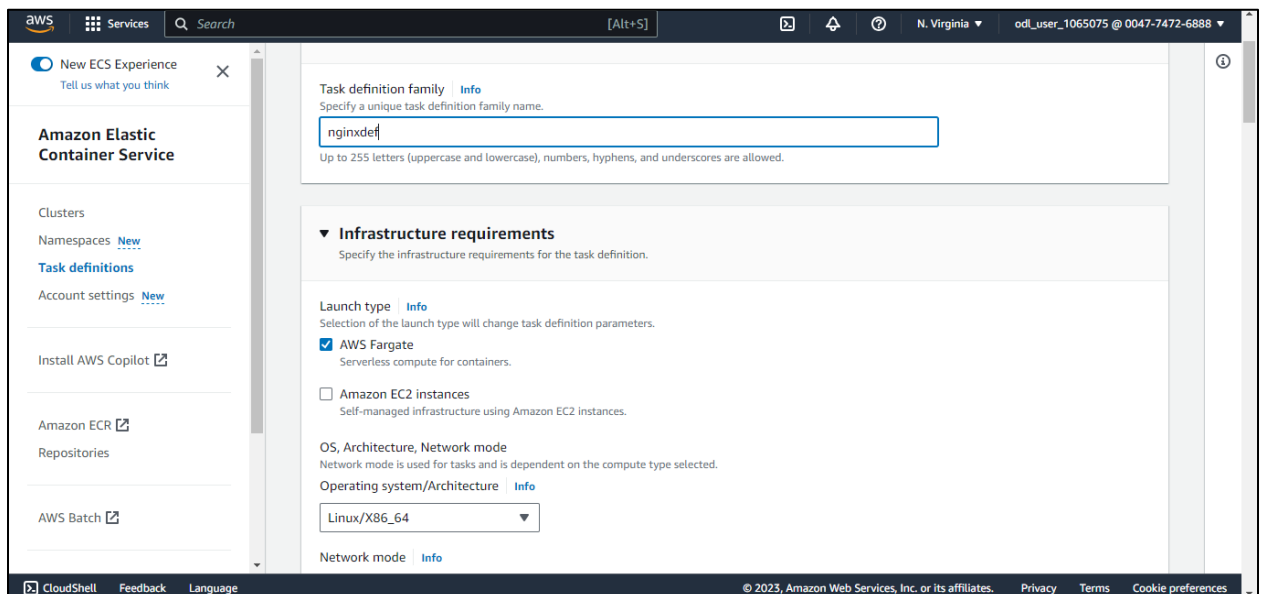
8.1 In the AWS Management Console, search for ECS and select Elastic Container Service



8.2 On the left panel of the ECS console, click on **Task definitions** and on **Create new task definition**



8.3 In the task definition configuration page, specify task definition family = **nginxdef**, Launch type = **AWS Fargate**, CPU = **0.25 vCPU**, and Memory = **0.5 GB**



8.4 For container 1 details, enter Name = **nginx** and Image URI = **public.ecr.aws/nginx/nginx:1.25**

8.5 Leave other options default and click **Create**

Amazon Elastic Container Service

Clusters
Namespaces [New](#)
Task definitions
Account settings [New](#)

Install AWS Copilot [🔗](#)

Amazon ECR [🔗](#)
Repositories

AWS Batch [🔗](#)

To specify a custom amount of ephemeral storage, specify a value between 21 GiB up to a maximum of 200 GiB.

Volumes [Info](#)
Add one or more data volumes for your task to provide additional storage for the containers in the task. For each data volume, you should add a mount point to specify where to mount the data volume in the container.

[Add volume](#)

Volumes from [Info](#)
Mount data volumes from another container.

[Add volume from](#)

► **Monitoring - optional**
Configure your application trace and metric collection settings using the AWS Distro for OpenTelemetry integration.

► **Tags - optional** [Info](#)
Tags help you to identify and organize your task definitions.

[Cancel](#) [Create](#)

Task definition successfully created:

Task definition successfully created
nginxdef:2 has been successfully created. You can use this task definition to deploy a service or run a task.

[Deploy](#) [X](#)

[Amazon Elastic Container Service](#) > [Task definitions](#) > [nginxdef](#) > [Revision 2](#) > Containers

nginxdef:2 [Deploy](#) [Actions](#) [Create new revision](#)

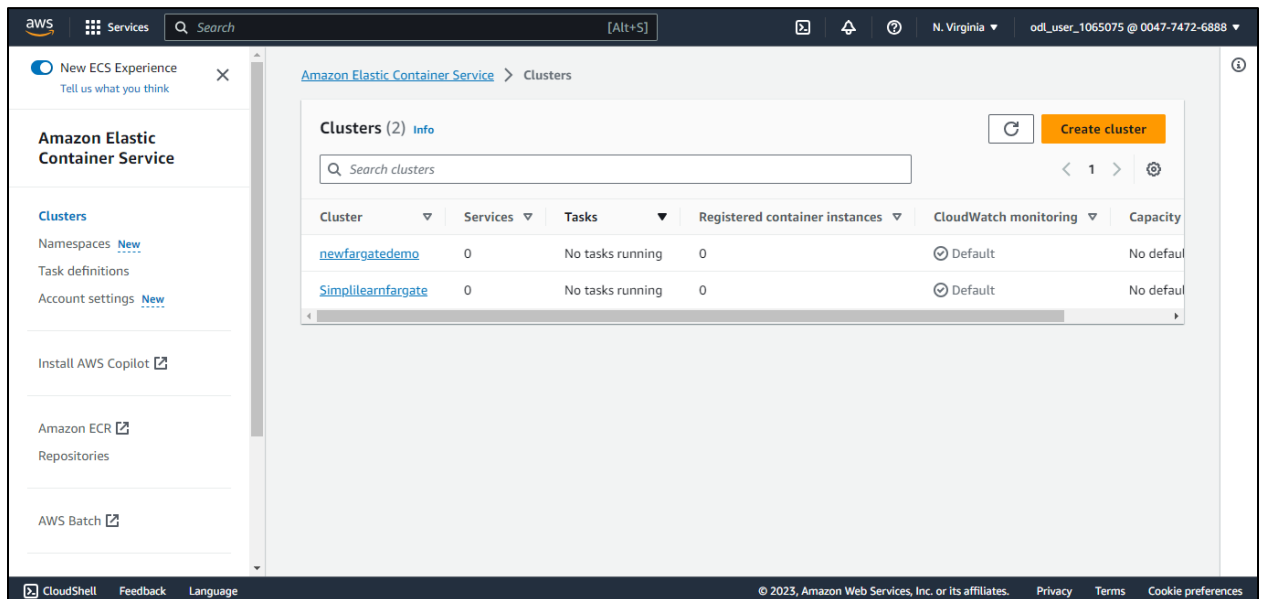
Overview [Info](#)

| | | | |
|---|---|---|----------------------------|
| ARN arn:aws:ecs:us-east-1:004774-726888:task-definition/nginxdef:2 | Status ✔ ACTIVE | Time created 2023-09-13T11:23:15.462Z | App environment FARGATE |
| Task role - | Task execution role ecsTaskExecutionRole | Operating system/Architecture Linux/X86_64 | Network mode awsvpc |

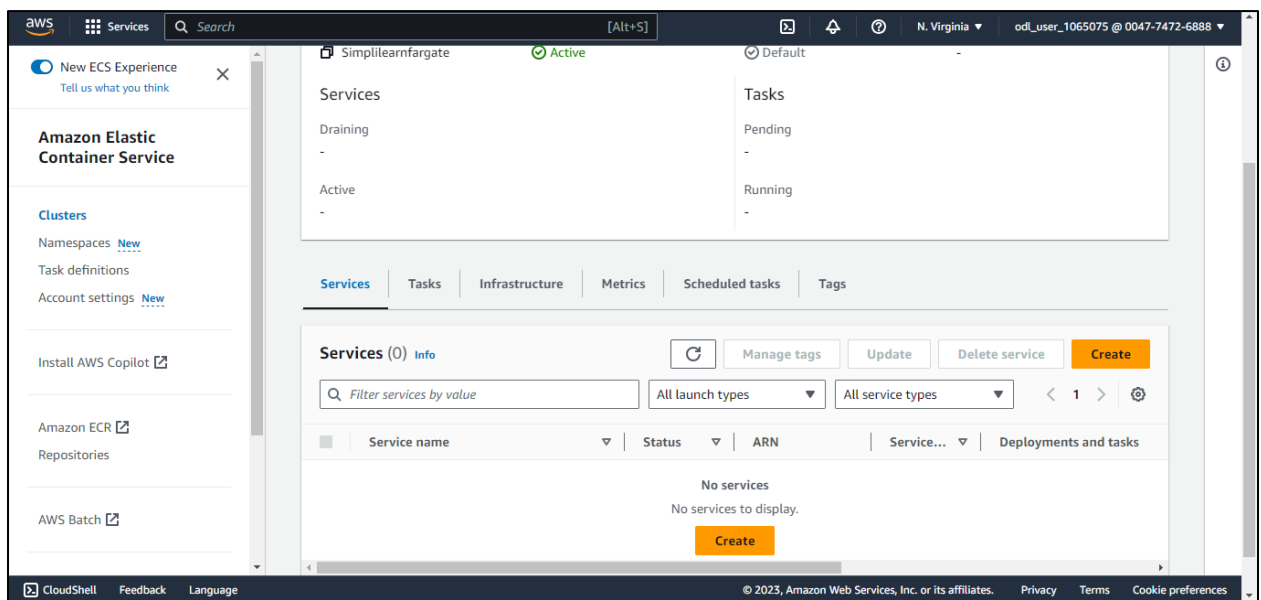
[Containers](#) [JSON](#) [Storage](#) [Tags](#)

Step 9: Run its Service

9.1 Return to the ECS home page, and open the newly created cluster from **Clusters**



9.2 Click on **Create** under **Services**



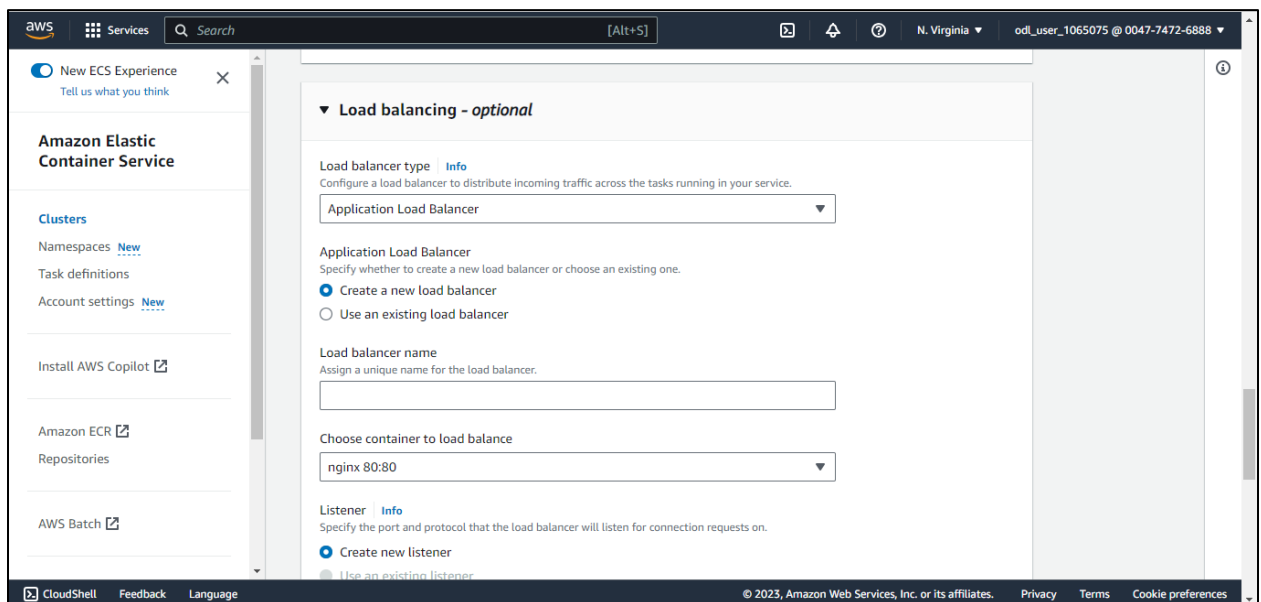
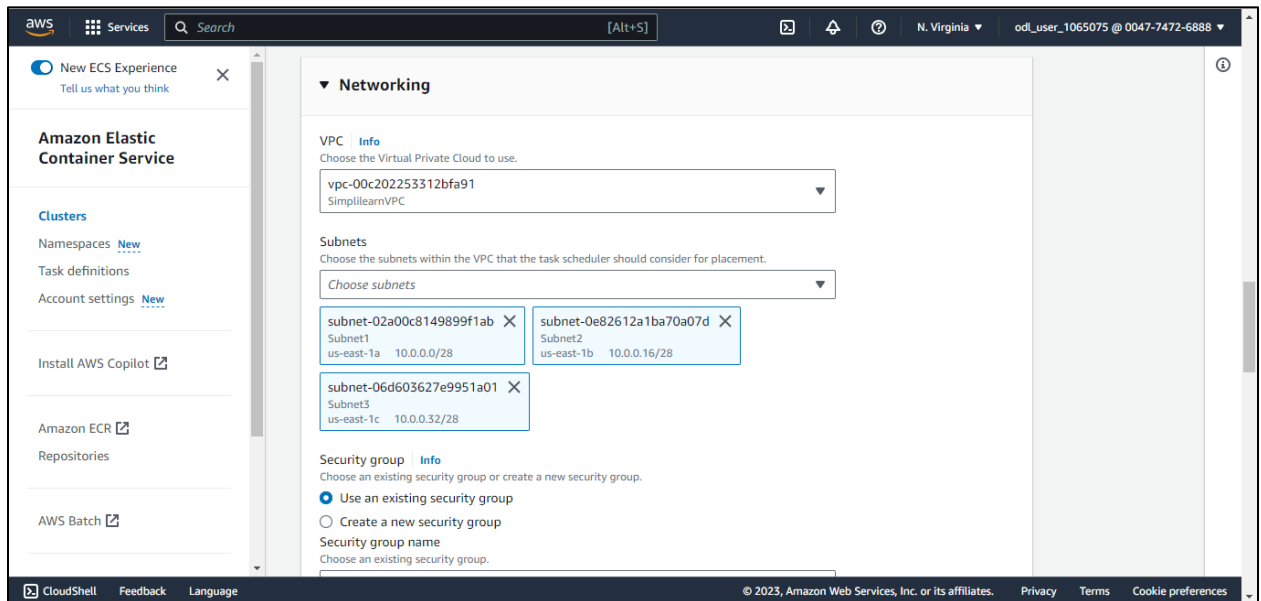
9.3 Choose **FARGATE** under Launch Type. Choose platform version as **LATEST** and application type as **Service**

The screenshot shows the AWS Management Console interface for configuring an Amazon ECS Service. The left sidebar contains navigation links for 'New ECS Experience', 'Amazon Elastic Container Service', 'Clusters', 'Namespaces', 'Task definitions', 'Account settings', 'Install AWS Copilot', 'Amazon ECR', 'Repositories', and 'AWS Batch'. The main content area is divided into sections: 'Capacity provider strategy' (with a radio button for 'Launch type'), 'Launch type' (with a dropdown menu set to 'FARGATE'), 'Platform version' (with a dropdown menu set to 'LATEST'), and 'Deployment configuration' (with a radio button for 'Service'). The 'Service' option is selected, indicating the application type.

9.4 Choose family = **nginxdef** (created earlier), revision = **1 (LATEST)**, service name = **nginx**, and Replica = **1**

The screenshot shows the AWS Management Console interface for configuring an Amazon ECS Service. The left sidebar contains navigation links for 'Task definition', 'Specify the revision manually', 'Family', 'Revision', 'Service name', 'Service type', 'Replica', 'Daemon', 'Desired tasks', and 'Deployment options'. The main content area is divided into sections: 'Task definition' (with a dropdown menu set to 'nginxdef'), 'Revision' (with a dropdown menu set to '1 (LATEST)'), 'Service name' (with a text input field containing 'nginx'), 'Service type' (with a radio button for 'Replica'), 'Replica' (with a radio button for 'Daemon'), and 'Desired tasks' (with a text input field containing '1'). The 'Replica' option is selected, indicating the service type.

9.5 In the **Networking** section, select the previously created VPC. For Load balancing, choose **Application Load Balancer** from the drop-down options.



9.6 Enter Load balancer name = **alb1**, choose container to load balance = **nginx 80:80**, Listener = **Create new listener**, port = **80**, target group = **create new target group**, and target group name = **target1**

The screenshot shows the 'Load balancing - optional' configuration page in the AWS Management Console. The left sidebar displays the 'Amazon Elastic Container Service' navigation menu. The main content area is titled 'Load balancing - optional' and includes the following sections:

- Load balancer type**: A dropdown menu set to 'Application Load Balancer'.
- Application Load Balancer**: A section with two radio buttons: 'Create a new load balancer' (selected) and 'Use an existing load balancer'.
- Load balancer name**: A text input field containing 'alb1'.
- Choose container to load balance**: A dropdown menu set to 'nginx 80:80'.
- Listener**: A section with two radio buttons: 'Create new listener' (selected) and 'Use an existing listener'.

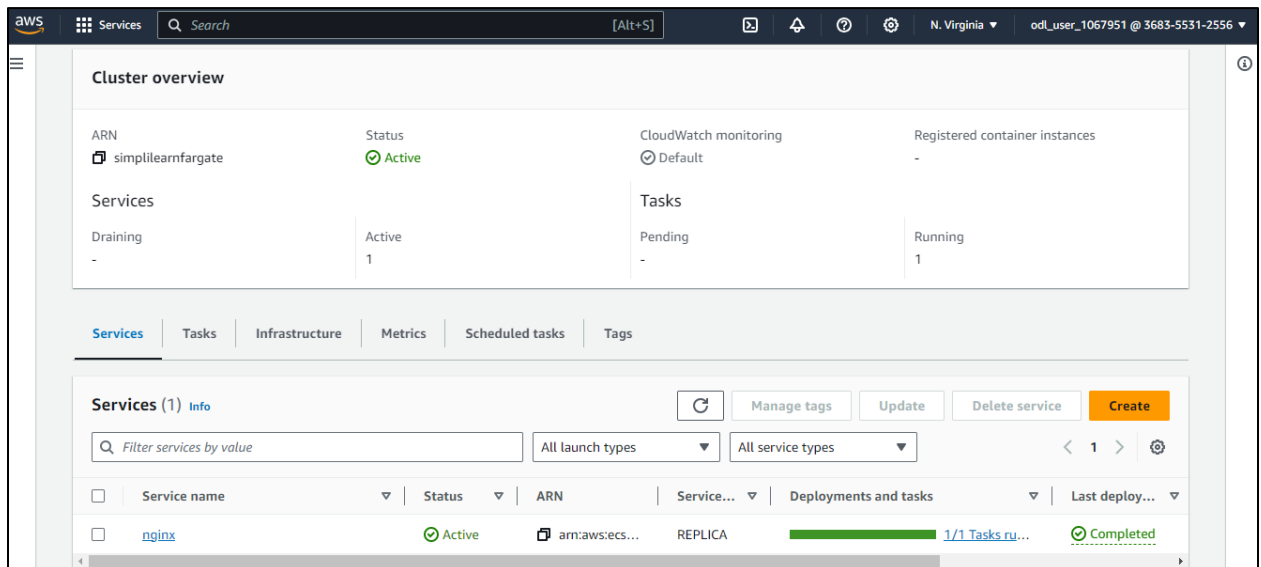
The bottom of the page shows the footer with '© 2023, Amazon Web Services, Inc. or its affiliates.' and links for 'Privacy', 'Terms', and 'Cookie preferences'.

The screenshot shows the 'Create new listener' configuration page in the AWS Management Console. The left sidebar displays the 'Amazon Elastic Container Service' navigation menu. The main content area is titled 'Create new listener' and includes the following sections:

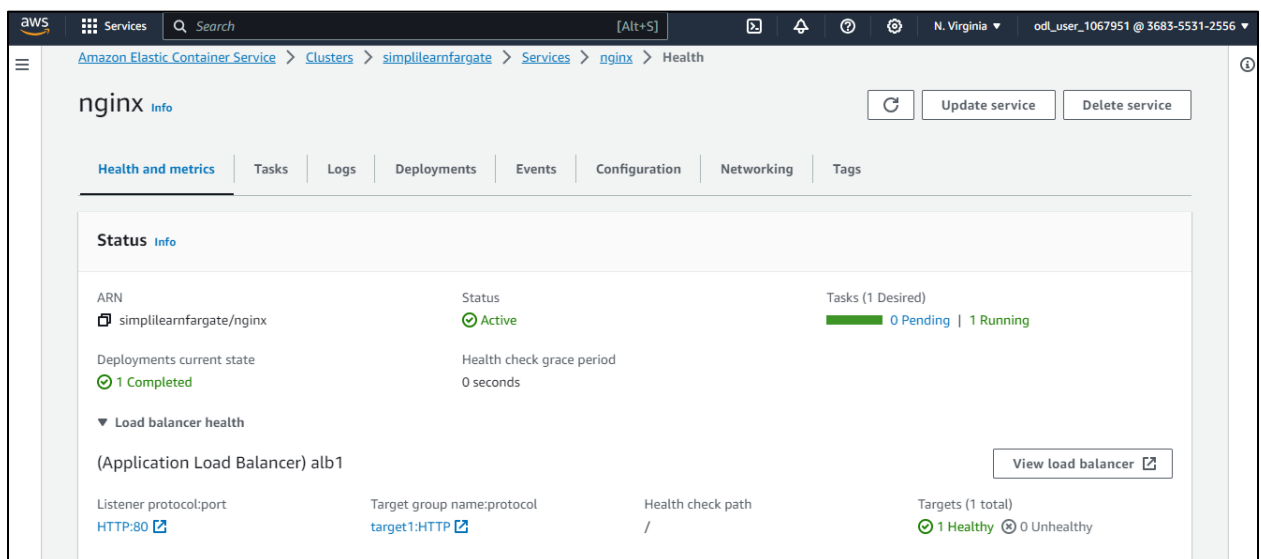
- Target group name**: A text input field containing 'target1'.
- Protocol**: A dropdown menu set to 'HTTP'.
- Health check path**: A text input field containing '/'.
- Health check protocol**: A dropdown menu set to 'HTTP'.
- Health check grace period**: A text input field containing '0'.

Below these fields, there are two optional sections: 'Service auto scaling - optional' and 'Tags - optional'. At the bottom right, there are 'Cancel' and 'Create' buttons. The footer shows '© 2023, Amazon Web Services, Inc. or its affiliates.' and links for 'Privacy', 'Terms', and 'Cookie preferences'.

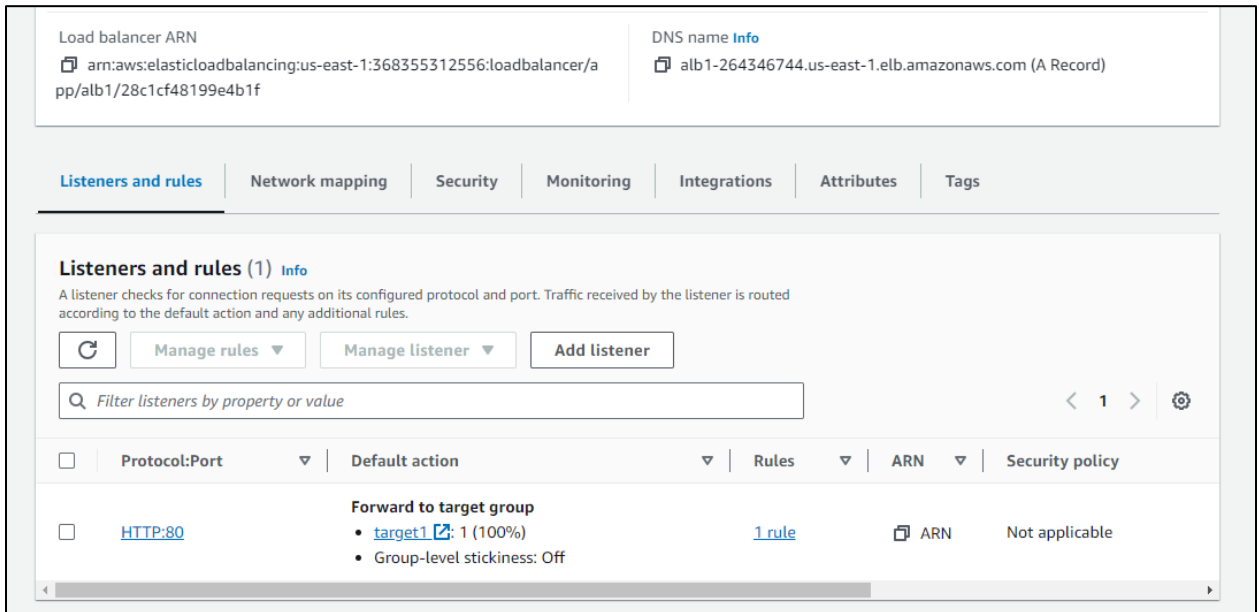
9.7 Leaving other options default, click **Create**. Wait until service creation has been completed and 1/1 tasks are shown as active and running.



9.8 Once the service is running successfully, click on **nginx** in the above screen and view the service details below. Click on **View load balancer** to get the load balancer URL, which will help in accessing the application running on the ECS cluster with the container:



9.9 Copy the DNS name and open it in a new browser



The screenshot shows the AWS Management Console interface for an Elastic Load Balancing (ELB) resource. At the top, there are two tabs: "Load balancer ARN" and "DNS name". The "Load balancer ARN" tab is active, displaying the ARN: `arn:aws:elasticloadbalancing:us-east-1:368355312556:loadbalancer/app/alb1/28c1cf48199e4b1f`. The "DNS name" tab shows the DNS name: `alb1-264346744.us-east-1.elb.amazonaws.com (A Record)`.

Below the tabs, there are several tabs for configuration: "Listeners and rules", "Network mapping", "Security", "Monitoring", "Integrations", "Attributes", and "Tags". The "Listeners and rules" tab is selected.

The "Listeners and rules" section shows a list of listeners. There is one listener configured with the following details:

| Protocol:Port | Default action | Rules | ARN | Security policy |
|-------------------------|---|------------------------|-----|-----------------|
| HTTP:80 | Forward to target group <ul style="list-style-type: none"> target1: 1 (100%) Group-level stickiness: Off | 1 rule | ARN | Not applicable |

9.10 Open the URL in a new browser. You will find the nginx page loading as shown below:



The screenshot shows a web browser displaying the nginx welcome page. The address bar shows the URL: `alb1-966415958.us-east-1.elb.amazonaws.com`.

The main content of the page is as follows:

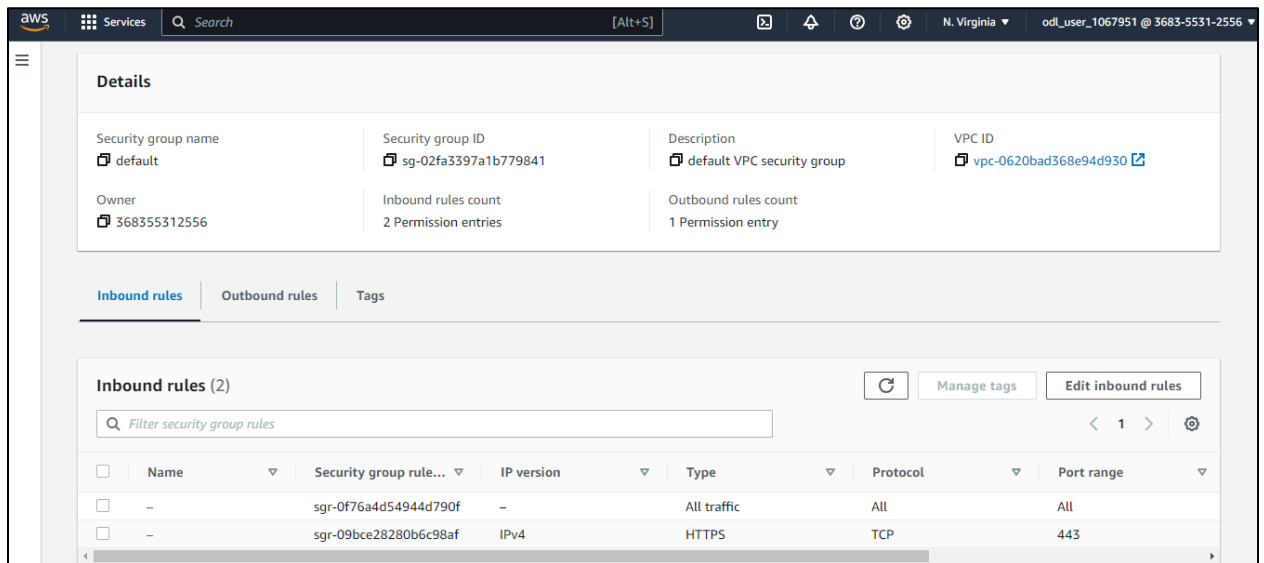
Welcome to nginx!

If you see this page, the nginx web server is successfully installed and working. Further configuration is required.

For online documentation and support please refer to nginx.org.
Commercial support is available at nginx.com.

Thank you for using nginx.

Note: In case, the web page doesn't load, go to **Load balancer > Security > Open security group**, and select the security group being used to ensure the port 80 inbound rule is accessible from anywhere as shown below:



Hence, you have successfully mapped the port with ALB.