Container Security

Securing AWS Fargate on Qualys Private Cloud Platform (PCP)

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About this Guide

Welcome to Qualys Container Security! Container Security enables you to secure AWS Fargate by performing vulnerability and compliance scans on container images whenever an AWS ECS Fargate task is launched.
This document provides guidelines for setting up the connectivity between AWS and your Private Cloud Platform hosting Qualys Container Security servers.

About Qualys

Qualys, Inc. (NASDAQ: QLYS) is a pioneer and leading provider of cloud-based security and compliance solutions. The Qualys Cloud Platform and its integrated apps help businesses simplify security operations and lower the cost of compliance by delivering critical security intelligence on demand and automating the full spectrum of auditing, compliance and protection for IT systems and web applications.

Founded in 1999, Qualys has established strategic partnerships with leading managed service providers and consulting organizations including Accenture, BT, Cognizant Technology Solutions, Deutsche Telekom, Fujitsu, HCL, HP Enterprise, IBM, Infosys, NTT, Optiv, SecureWorks, Tata Communications, Verizon and Wipro. The company is also founding member of the Cloud Security Alliance (CSA). For more information, please visit www.qualys.com

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Getting Started

Qualys Container Security can now be used to secure AWS Fargate for Qualys Private Cloud Platform. In AWS Fargate, we use 'AWS CloudFormation' and a 'Qualys Lambda' function to trigger scanning automatically when the tasks come into the **Running** state. For AWS to communicate from Lambda and Codebuild functions with your Private Cloud platform, the network connectivity needs to be configured.

The following are the suggested guidelines for establishing connectivity between AWS Lambda and CodeBuild functions, and your Private Cloud Platform that hosts Qualys Container Security servers. While these guidelines are recommended, you can use alternative methods to set up connectivity. Regardless of the method used, it is mandatory to follow steps 2, 3, and 4 to ensure successful connectivity.

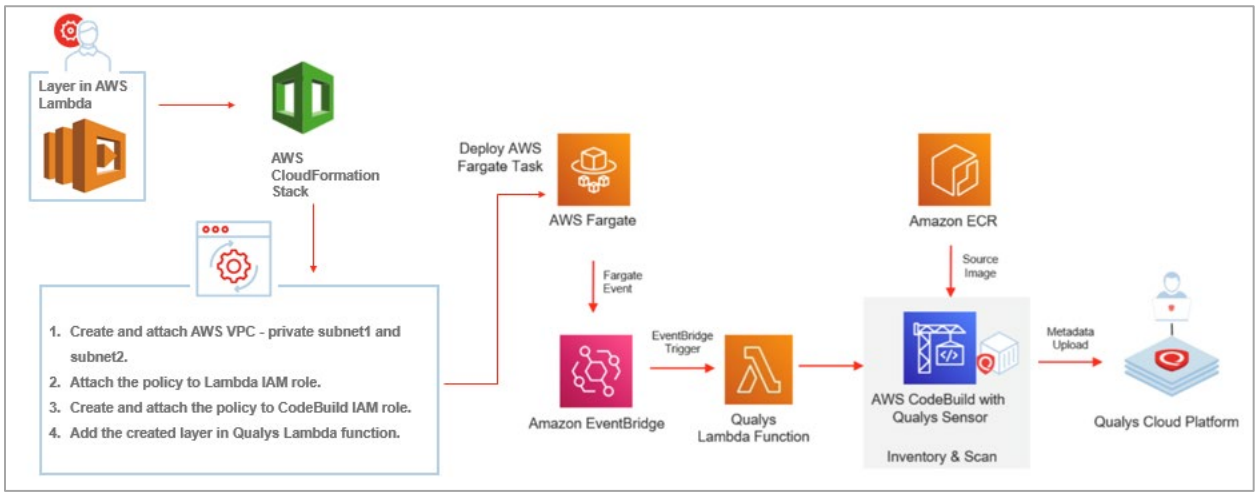
1. Create the lambda and CodeBuild VPC.
2. Create an IAM Policy for CodeBuild.
3. Create a Lambda Layer for custom Root CA Certification.
4. Attach the VPCs and appropriate policies after the stack creation.

Create VPC and Subnets for Lambda and Codebuild

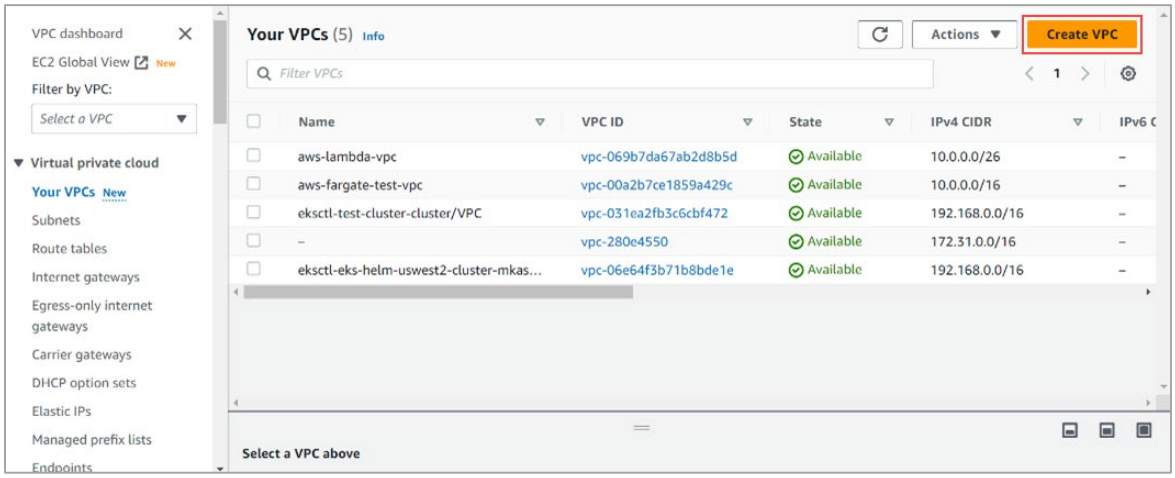
The Amazon Virtual Private Cloud (VPC) allows you to launch AWS resources into a virtual network that you have defined. A subnet is a range of IP addresses in your VPC that enables you to deploy AWS resources in your VPC.

If you are using Qualys Private Cloud Platform, you can create a VPC and private and public subnets in the VPC. This VPC and subnets can be used to communicate with the Lambda and Codebuild functions launched after the stack deployment.

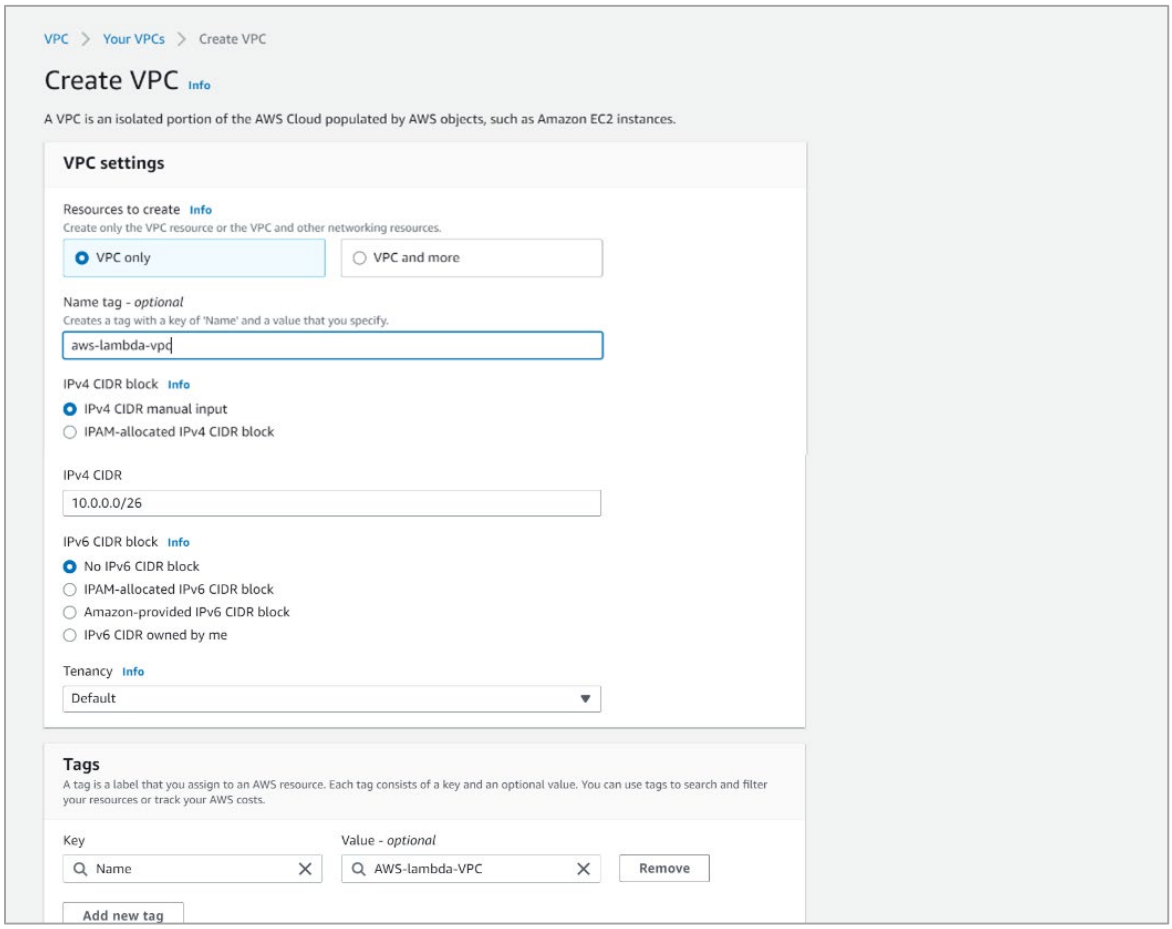
Refer to the VPC application and Other Settings for Lambda and Codebuild after Stack Deployment section for this.



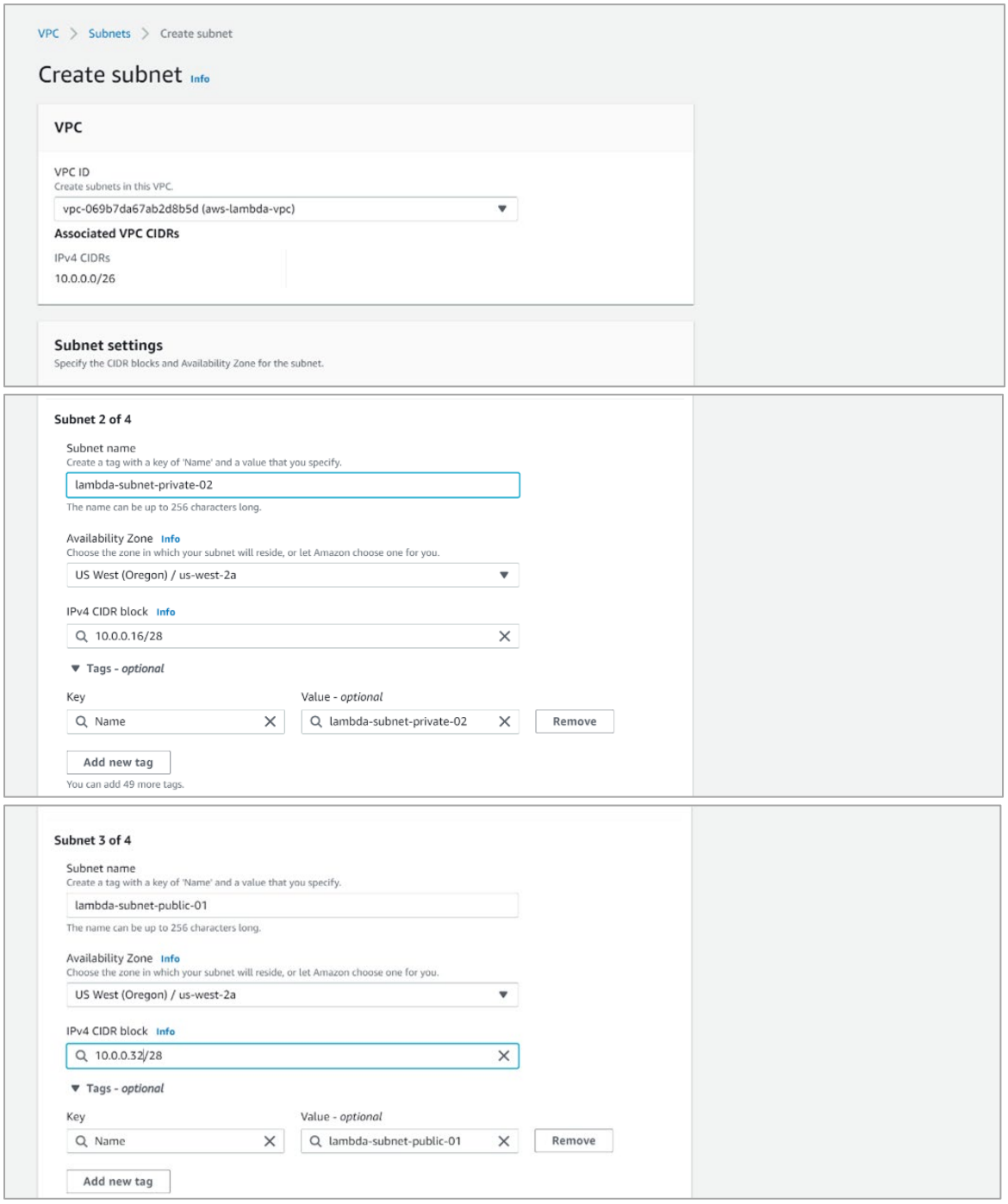
1. Navigate to **AWS VPC service > Your VPCs** and click **Create VPC**.

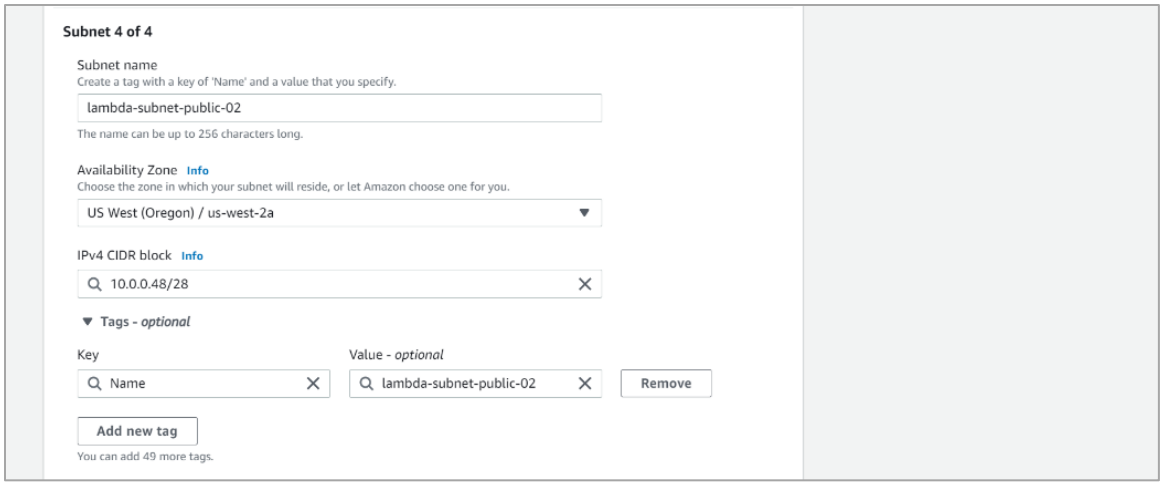


2. Provide the following details for VPC creation: VPC name, CIDR block and Tenancy.



3. Navigate to **Subnets** and click **Create Subnet** to create subnets for the above created VPC. Provide the following details: Name tag, VPC, Availability zone, and CIDR block.





Notes:

- Create four subnets for the VPC: two private and two public subnets.
- The Availability zone for each subnet should be the same.

4. Navigate to **Route tables** and filter tables using the VPC ID. Rename the main route table associated with the VPC to "Public-RT".

5. Create another route table and name it for private subnet and attach the created VPC to them.

6. Attach the private subnets to private route table and public subnet to the public (main) route table:
   a. Open the private/public route table, click **Subnet associations**, and then **Edit subnet associations**.
   b. Add the two private/public subnets created and save the association.

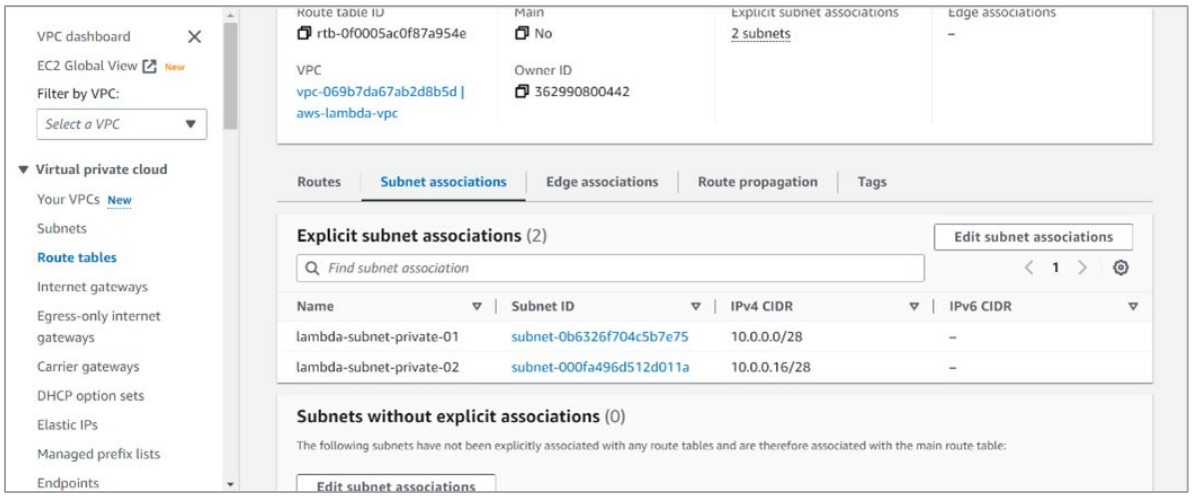


Figure 1 Private Route Table

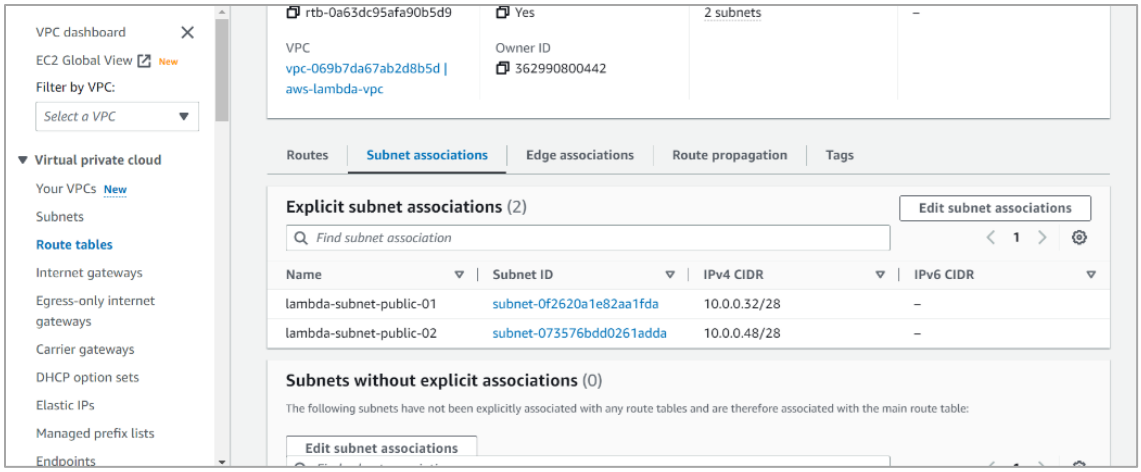
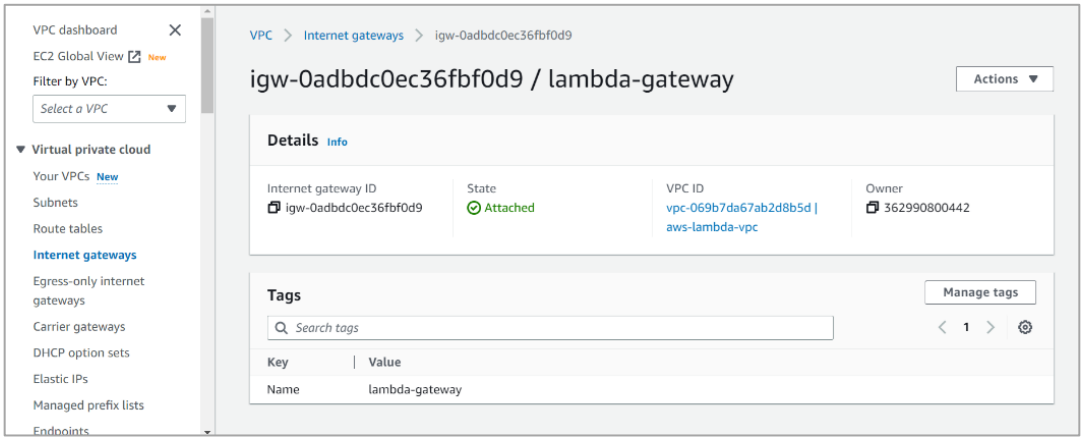
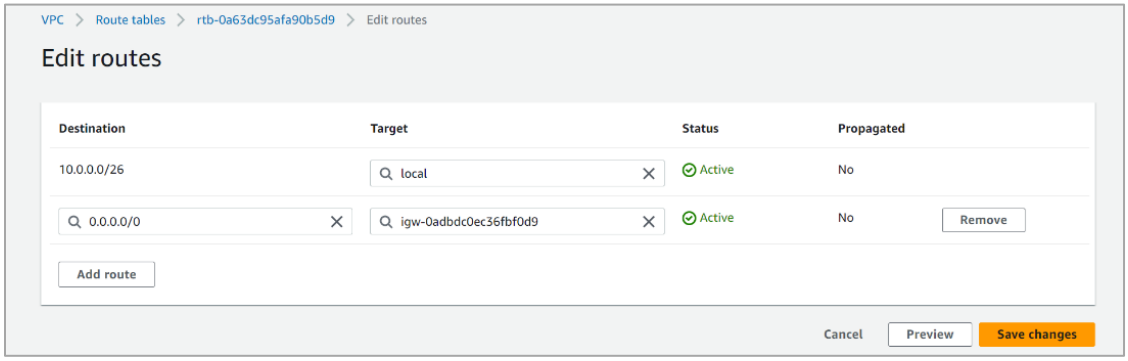


Figure 2 Public Route Table

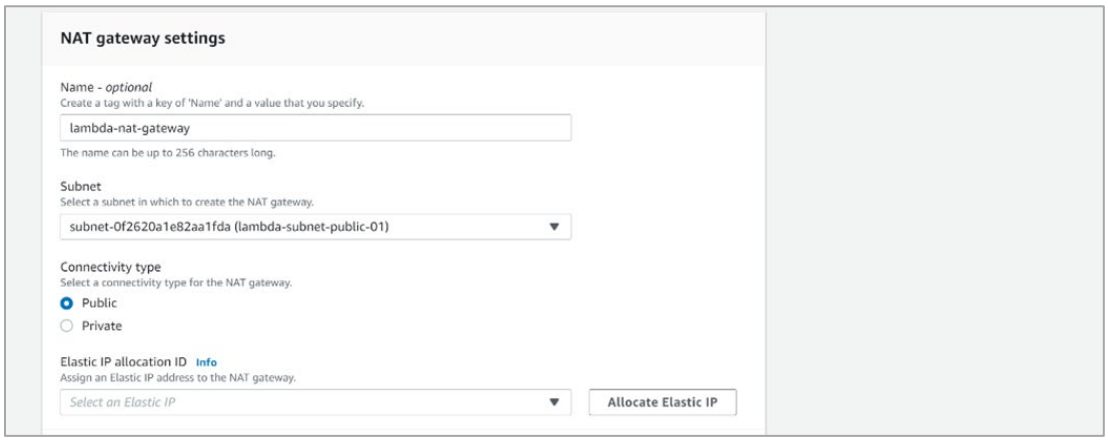
7. Create a new Internet gateway and attach it to the VPC.
   a. Click **Internet gateways** in the left pane and create a gateway by giving it an appropriate name.
   b. Click the internet gateway, select **Actions > Attach to VPC** and select the VPC.



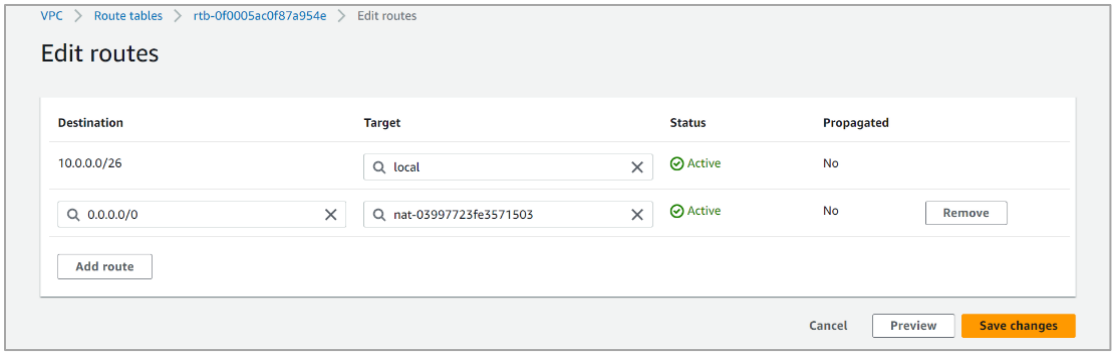
8. Navigate to the public route table, edit and add new routes with the following value:
   - **Destination**: 0.0.0.0/0
   - **Target**: The above created Internet gateway



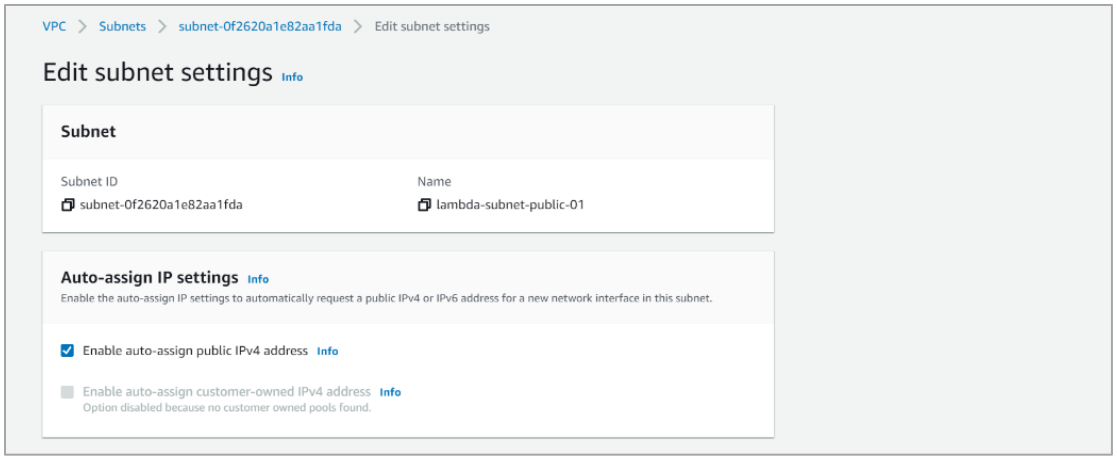
9. From the left-hand pane, create a new NAT gateway by choosing one of the public subnets. In **NAT gateway settings**, under **Elastic IP allocation ID**, click **Allocate Elastic IP**.
Note: You must add this elastic IP address in the trusted/permitted list in order to communicate from the AWS cloud to Qualys Container Security service running on your private cloud platform.



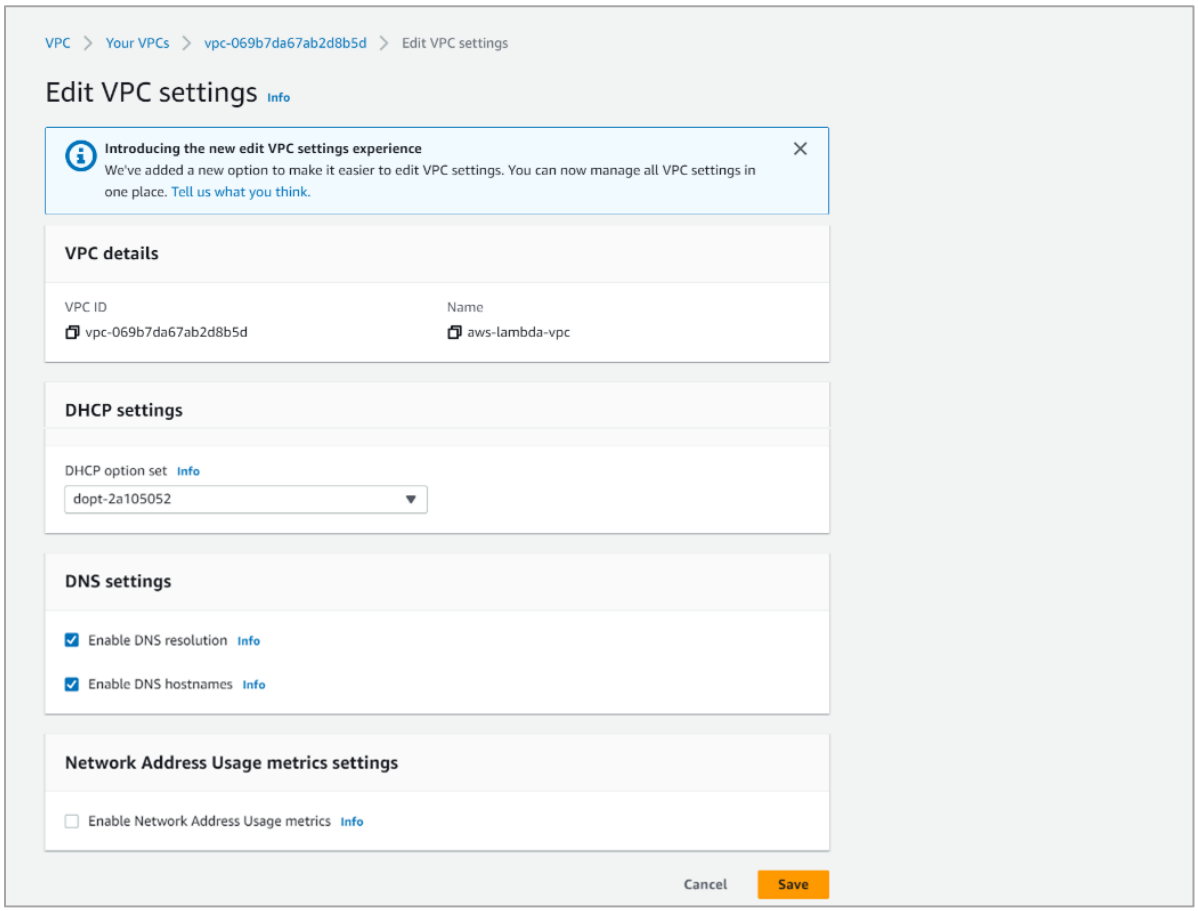
10. Navigate to **Route Tables.** Click the private route and then **Edit routes** and add the following values:
    - **Destination**: 0.0.0.0/0
    - **Target**: NAT gateway



11. Navigate to **Subnets**. In the created public subnets, click **Edit subnet settings** and select the **Enable auto-assign public IPv4 address** check box.



12. Navigate to the created VPC. Click **Edit VPC settings** and select the **Enable DNS resolution** and **Enable DNS hostnames** check boxes.



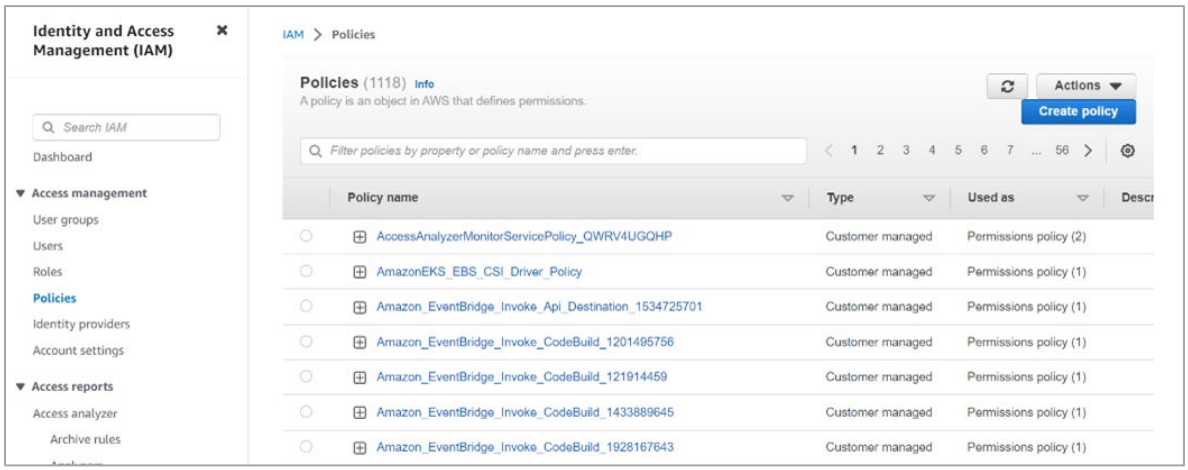
13. Note down the details of the VPC and the created subnets.

Create a Policy for CodeBuild IAM Role

Create a policy to attach to the CodeBuild IAM role created after stack deployment.

Refer to the VPC Application and Other Settings to Lambda and Codebuild after Stack Deployment section for this.

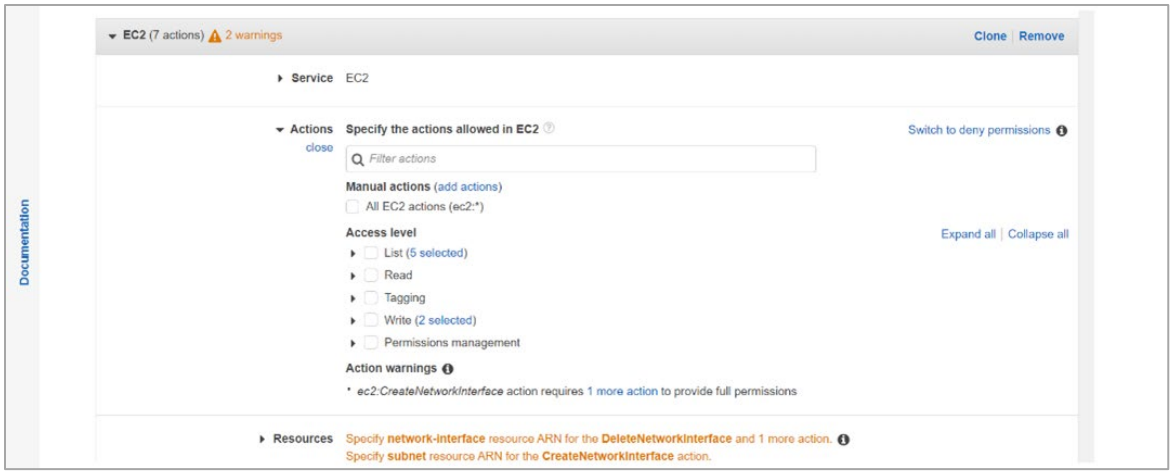
1. Navigate to **Identity and Access Management (IAM)** service > **Policies** and click **Create policy**.



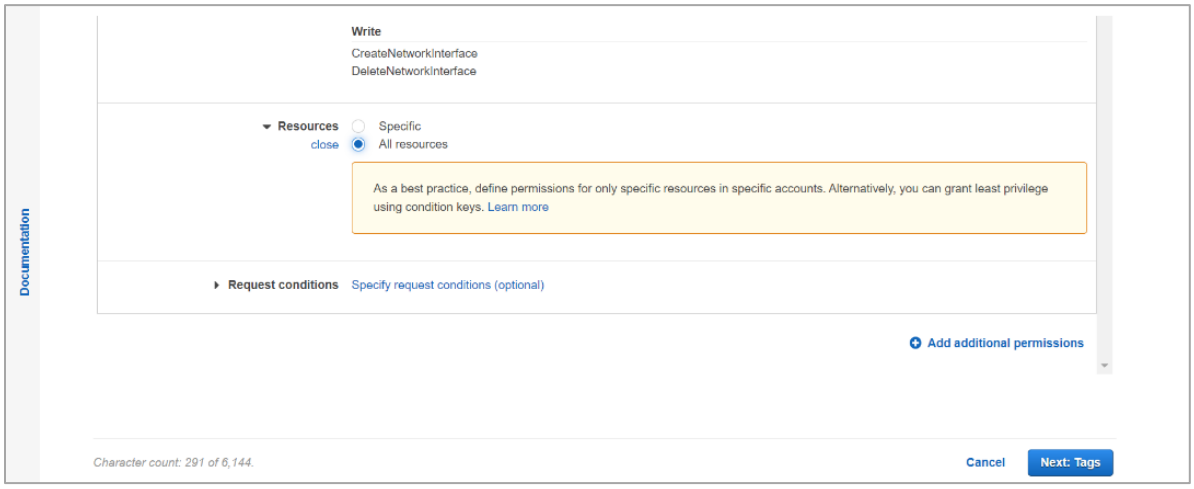
2. In **Service**, select **EC2**.

3. In **Actions**, add the following filters:
   - CreateNetworkInterface
   - DescribeNetworkInterfaces
   - DescribeVpcs
   - DeleteNetworkInterface
   - DescribeDhcpOptions
   - DescribeSubnets
   - DescribeSecurityGroups

   Five actions have the **List** access and two actions have the **Write** access.



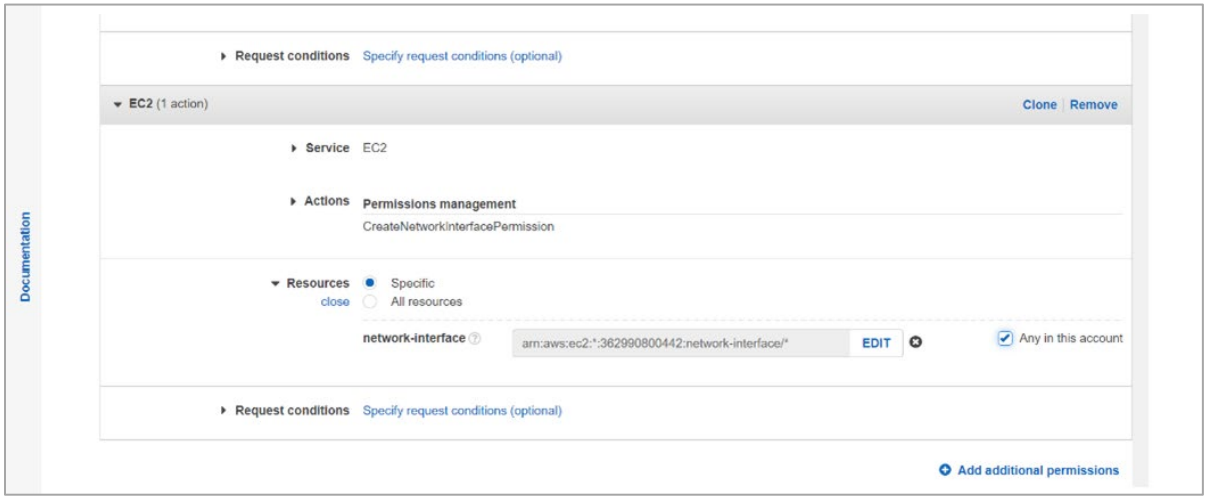
4. Under **Resources**, select the **All resources** option.



5. Click **Add additional permissions** and select the service as EC2.

6. Add the following filter in **Actions**: CreateNetworkInterfacePermission

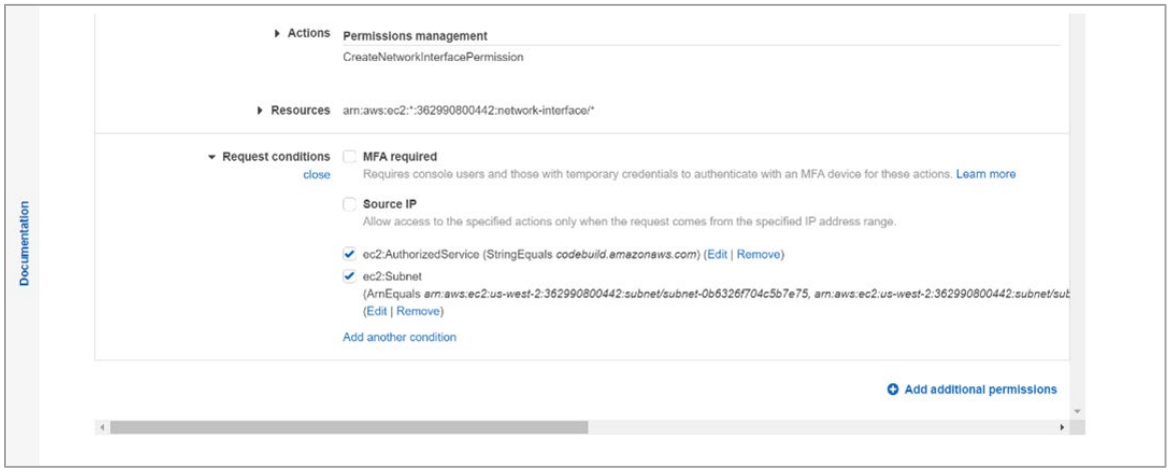
7. Under **Resources**, select **Specific** and for **network-interface**, select the **Any in this account** check box.
   It adds the following resource: "Resource": "arn:aws:ec2:*:<AWS-account-id>:network-interface/*".



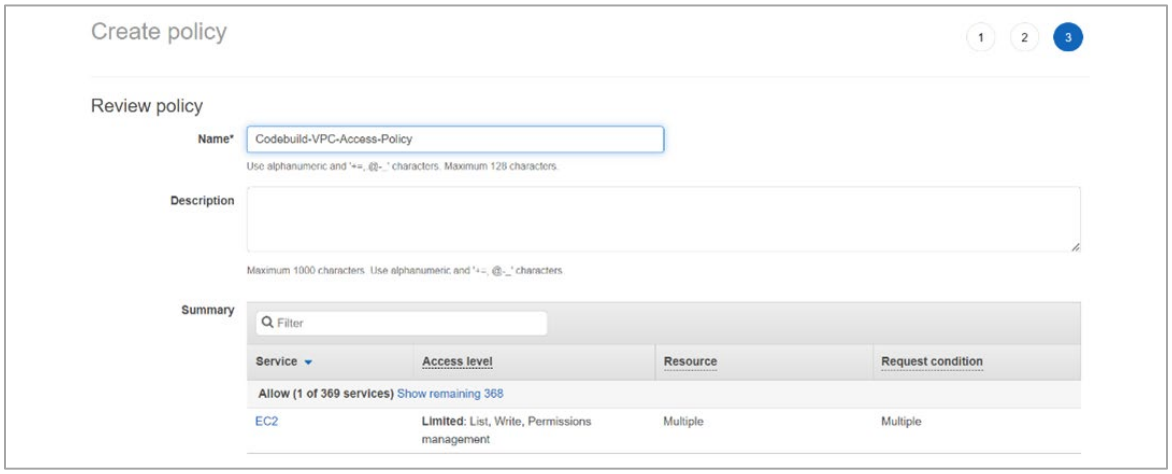
8. Under **Request conditions**, click **Add Condition** and specify the following details:
   - **Condition key**: ec2:AuthorizedService
   - **Qualifier**: Default
   - **Operator**: StringEquals
   - **Value**: codebuild.amazonaws.com

9. Click **Add another condition** and add the following details in the condition:
   - **Condition key**: ec2:Subnet
   - **Qualifier**: Default

- **Operator**: ArnEquals
- **Value**: *<Values of ARN of all four subnets created for Codebuild and lambda>*



10. Keep on clicking **Next** until the **Review policy** page, specify appropriate name to the policy, and click **Create policy**.



Create AWS Lambda Layer to Make Custom Root CA Certificate for Lambda Function

Do you need an AWS lambda layer for Fargate scanning? If your answer to any of the following questions is NO, you can skip this Lambda layer creation step.

- Are you using Qualys Private Cloud platform (https://www.qualys.com/private-cloud/)?
- Is your Qualys PCP server certificate signed using custom Root CA?
  How to check if server certificates are signed using custom Root CA?
  Check with your operations team or validate yourself using the following steps:
  a. Navigate to the Qualys private cloud platform URL.
  b. Click the padlock icon in the browser address bar to view the website's SSL/TLS certificate.
  c. Look for the **Issuer** field in the certificate details.
     If the issuer is a well-known CA, such as DigiCert, Let's Encrypt, or GoDaddy, then the certificate is signed by a well-known root CA.
     If the issuer is not a well-known CA, you can check if the certificate is signed by a custom root CA by looking at the **Certificate Authority** or **Chain of Trust** section in the certificate details. If there is a custom root CA in the chain of trust, then the certificate is signed by a custom root CA.

What is AWS lambda layer?

AWS Lambda layers are a distribution mechanism for libraries, custom runtimes, and other function dependencies. You can use layers to package and share libraries or other code that can be used across multiple functions.

A Lambda layer is a ZIP archive that contains libraries, a custom runtime, or other dependencies. When you create a Lambda function, you can reference one or more layers that are then included in the function's deployment package. This allows you to keep your function code separate from its dependencies, making it easier to manage and update your code and dependencies independently.

One important note from the AWS documentation is “Lambda extracts the layer contents into the /opt directory when setting up the execution environment for the function”. This means the content of zip file added in the layer is extracted and made available in the /opt directory for AWS lambda functions at the time of execution.

For more information, see:
Using layers with your Lambda function
Creating and sharing Lambda layers

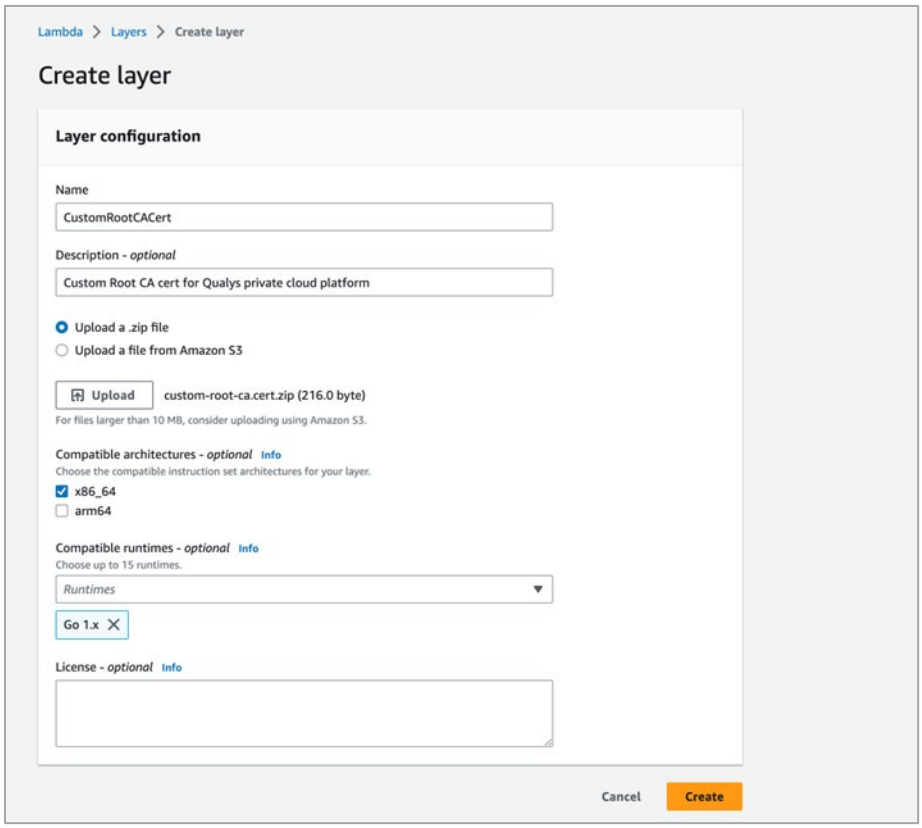
Create AWS Lambda Layer using AWS Console

1. Get the custom root CA certificate for your Qualys private cloud platform. For example, custom-root-ca.cert.

2. Compress the above file to a zip file. For example, custom-root-ca.cert.zip.

3. Create a new lambda layer on AWS console.
   a. Navigate to **Lambda Service > Layers** (on the left-hand side) and click **Create layer**.
   b. Specify name and description for the AWS lambda layer.
   c. Upload the created zip file.
   d. (Optional) Select the architecture as **x86_64**.
   e. From **Compatible runtimes**, select **Go 1.x**.

   Note: You do not need to provide license information.



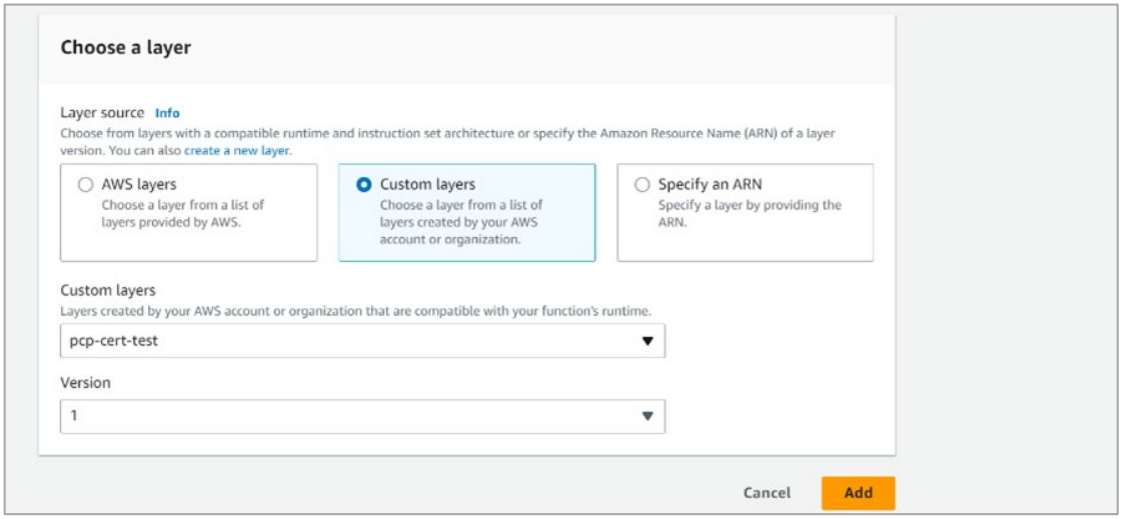
4. Note down the ARN or the name of the AWS lambda layer created to use later during the AWS Fargate scanning stack deployment.

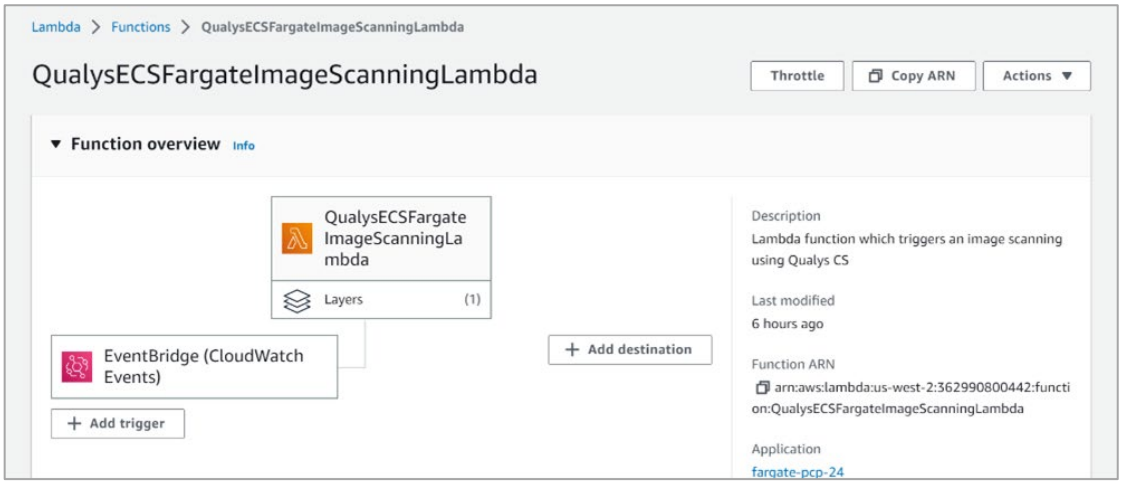
5. Deploy AWS Fargate scanning stack using AWS console.

   While deploying the stack, specify the **QualysPodCustomRootCertPath** parameter value as **/opt/<custom certificate path in the zip file uploaded in layer>**.

For example, for the layer created in the above section, the **QualysPodCustomRootCertPath** parameter value is: **QualysPodCustomRootCertPath = /opt/custom-root-ca.cert**.

6. After the stack is deployed, add the created layer to the Lambda function.
   a. Navigate to Lambda Function: "QualysECSFargateImageScanningLambda" function.
   b. Under **Function overview**, select **layers** and click **Add a layer**.
   c. In **Layer source**, select **Custom layers**.
   d. Select the custom layer and version.

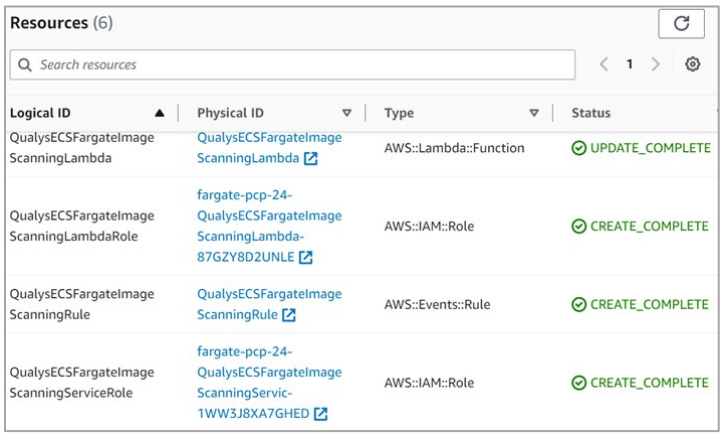


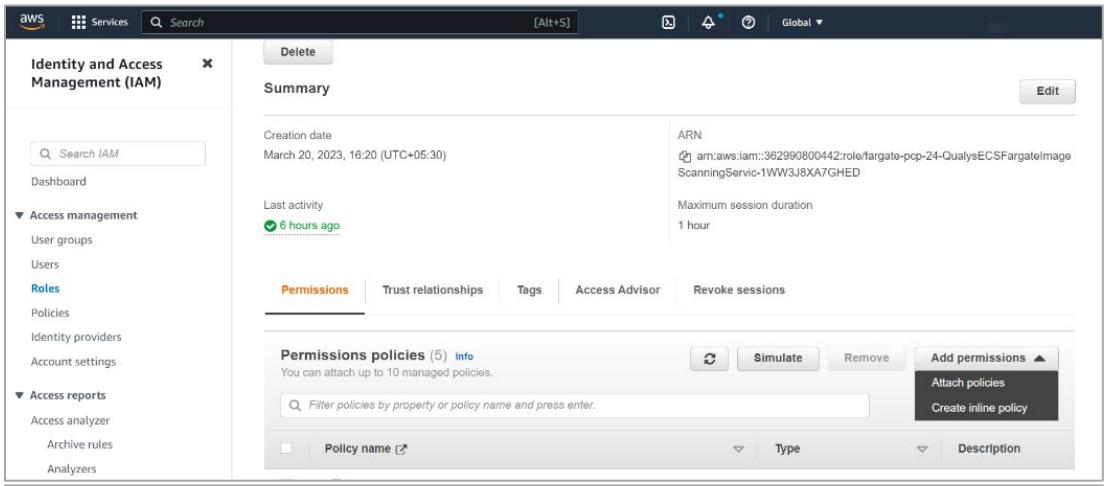


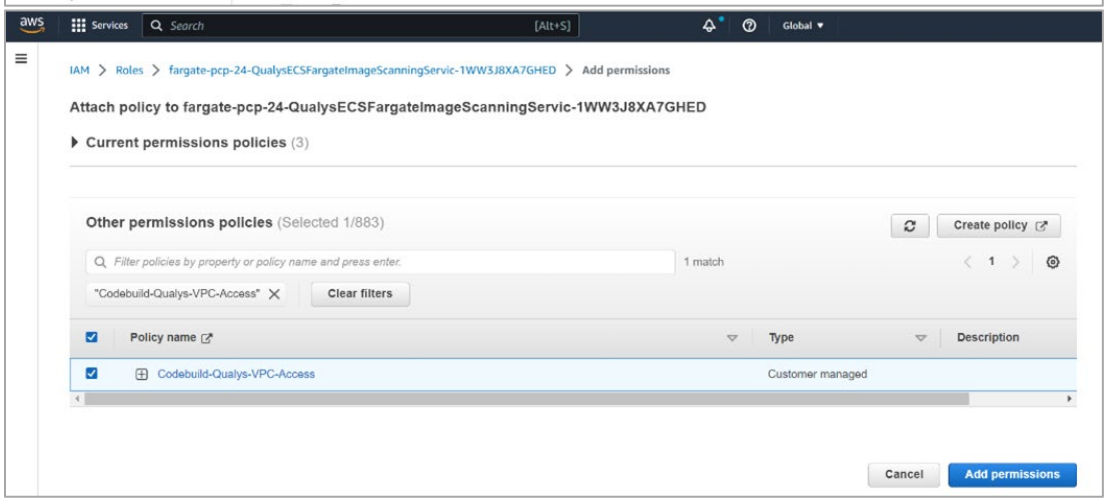
VPC Application and Other Settings for Lambda and Codebuild after Stack Deployment

Deploy the stack using the provided CloudFormation template. Once the stack is deployed or updated, navigate to the **Resources** tab in the stack.

1. Click the "QualysECSFargateImageScanningServiceRole" IAM service role. Select **Add permissions > Attach policies** and select **Codebuild-Qualys-VPC-Access**.

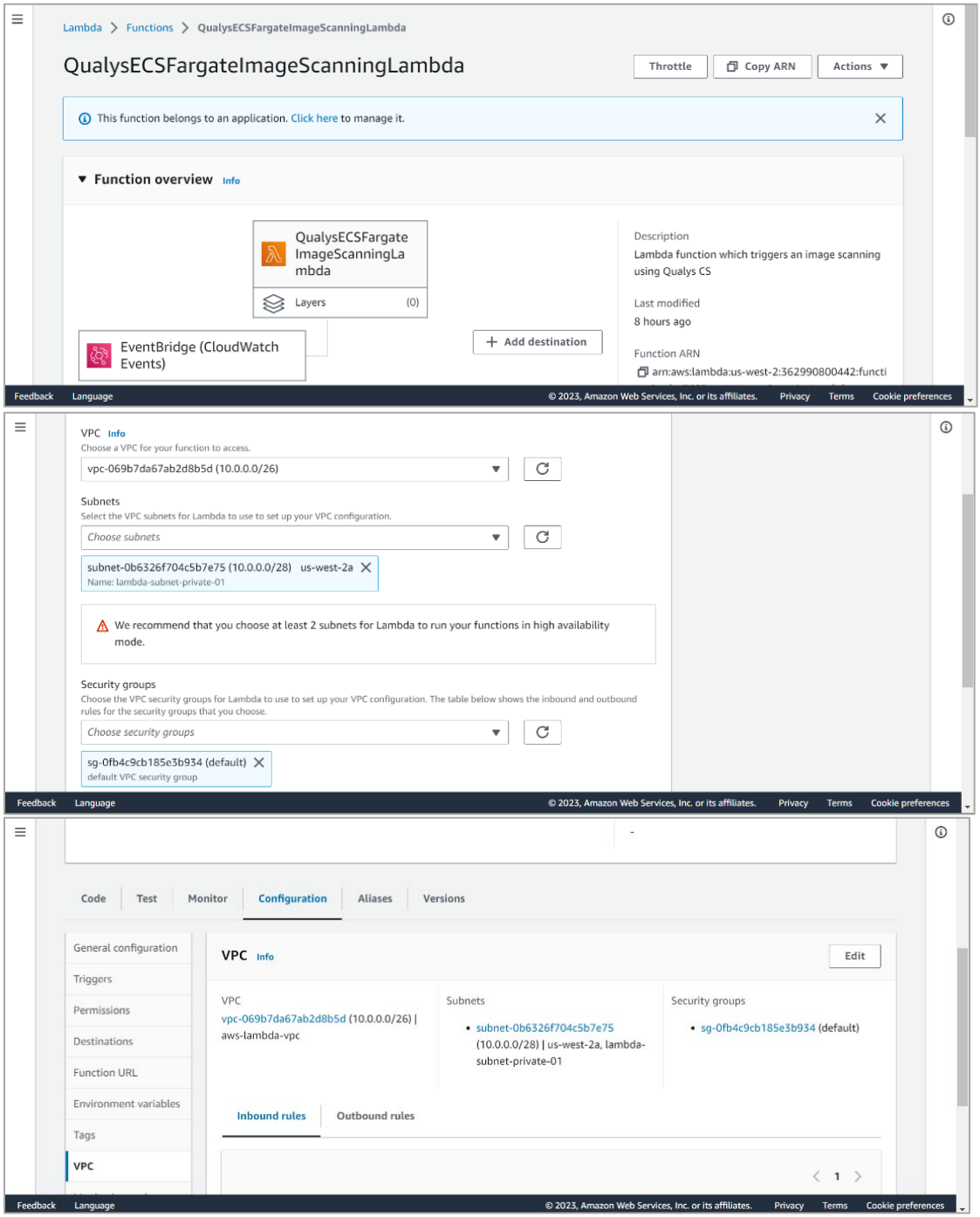




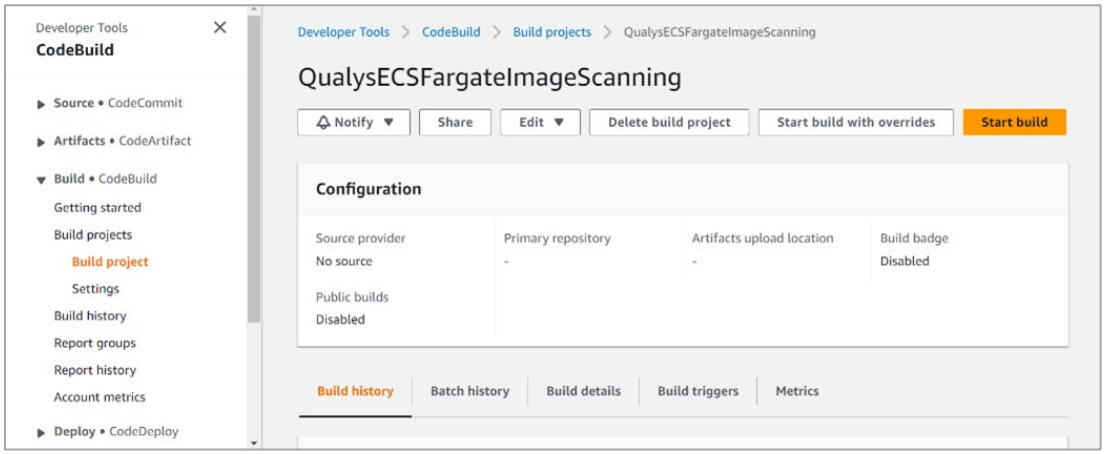


2. Click “QualysECSFargateImageScanningLambdaRole” IAM service role. Select **Add permissions > Attach policies** and select AWSLambdaVPCAccessExecutionRole.

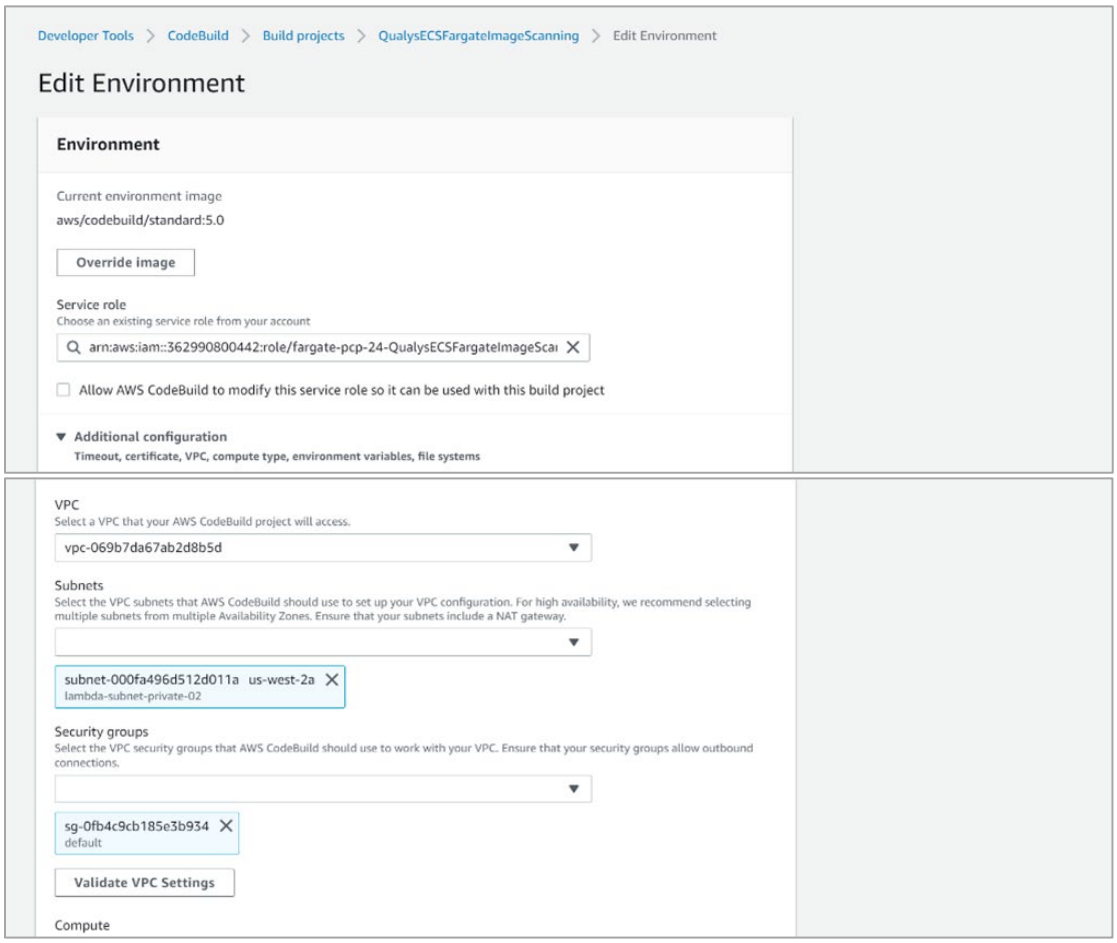
3. Navigate to the “QualysECSFargateImageScanningLambda” Lambda function. In the **Configuration** tab, under **VPC**, click **Edit** and add the created VPC, the first private subnet, and the default security group.



4. Navigate to **CodeBuild** service **> Build projects > "QualysECSFargateImageScanning" project**.



Select **Edit > Environment**. Under Additional configuration, add the created VPC, the second private Subnet, the default security group. Clear the **Allow AWS CodeBuild to modify this service role so it can be used with this build project** check box.



Your stack is now ready to use. You can now launch an AWS task for scanning.