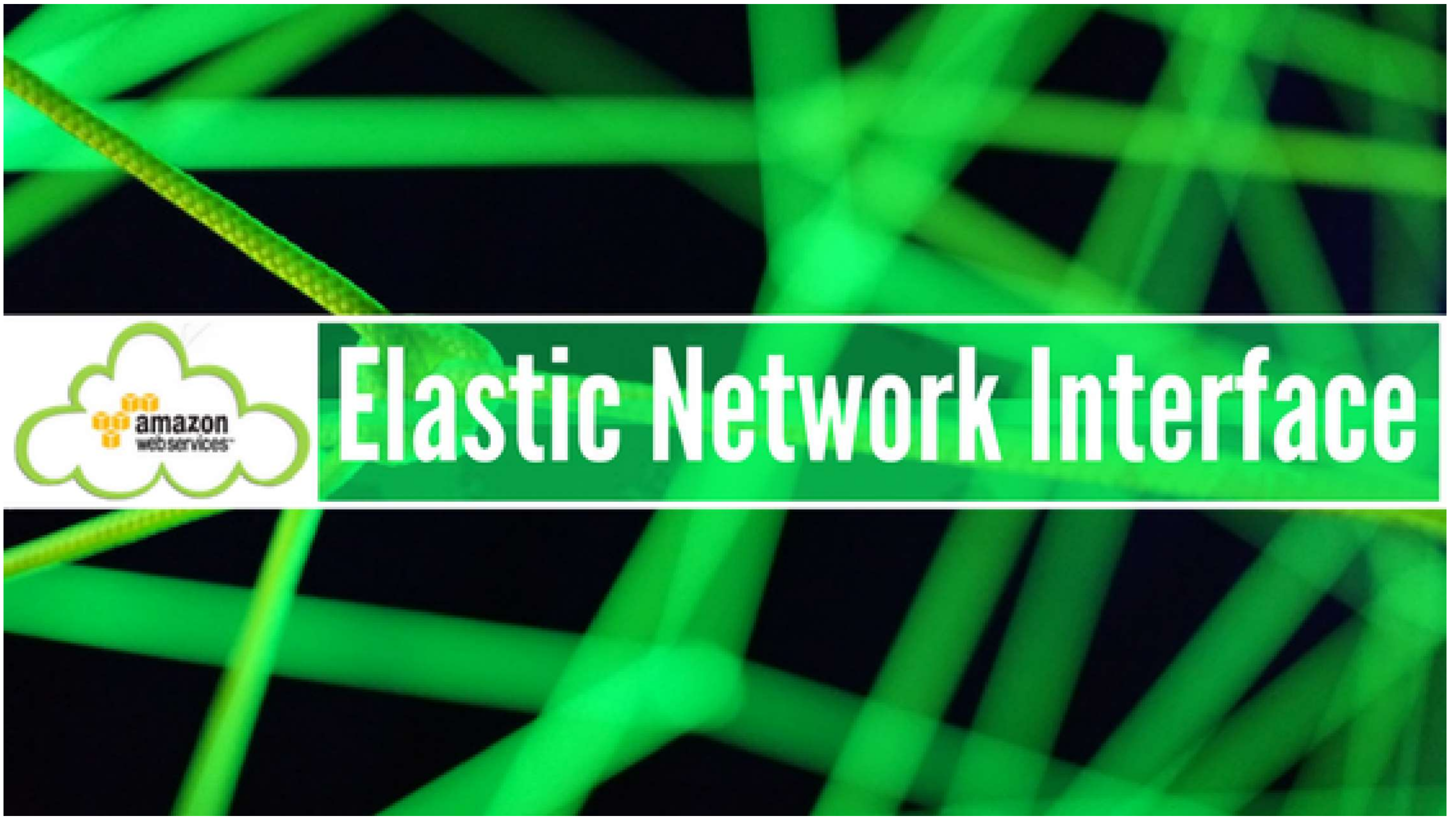


Introduction to Elastic Network Interface

By **Neeru Jain** - December 11, 2017

> Recently, we have covered a topic on Implementation of to NAT Gateway. In this article, let's understand the implementation of Elastic Network Interface.

Exam Objective

The topic "Elastic Network Interface" addresses the Design and Implementation of AWS Networks topic as highlighted in the AWS Blueprint for the exam guide

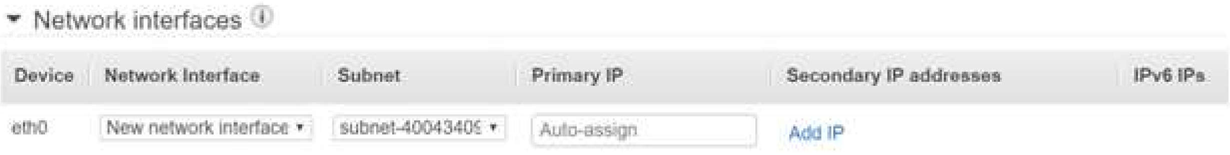
https://d1.awsstatic.com/training-and-certification/docs-advnetworking-spec/AWS_Certified_Advanced_Networking_Blueprint.pdf

What is Elastic Network Interface?

AWS Elastic Network Interface is simply a virtual interface that can be attached to an instance in a Virtual Private Cloud (VPC). Followings are the attributes of a network interface:

- A primary private IPv4 address
- One Elastic IP address (IPv4) per private IPv4 address
- One or more secondary private IPv4 addresses
- One public IPv4 address
- One or more security groups
- One or more IPv6 addresses
- A source/destination check flag
- A MAC address
- A description

By default, each instance will have a primary network interface. This can be seen while the instance is being created.



▾ Network interfaces

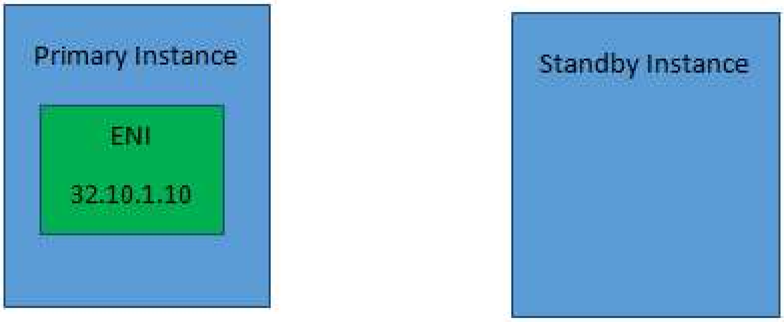
Device	Network Interface	Subnet	Primary IP	Secondary IP addresses	IPv6 IPs
eth0	New network interface ▾	subnet-40043409 ▾	Auto-assign	Add IP	

This IP will get a Private IP address. It will also get a public IP address if the setting has been enabled for the Subnet in which the instance is located in. You can also add Secondary IP addresses to an Elastic Network Interface.

You can also add Secondary Network Interfaces to an Instance.

In our Implement example, we will see how to swap network interfaces between 2 instances. This can be done for implementing fault tolerance for an application.

Let’s say we have 2 Instances, one is a primary instance which hosts a web application. This has been assigned a secondary network interface. This interface has an Elastic IP assigned which is accessed by external Users. Let’s say that you have a standby instance which has the same web server installed but is in the non-active state. Only if the primary instance fails for any reason, then a failover happens to the secondary instance.



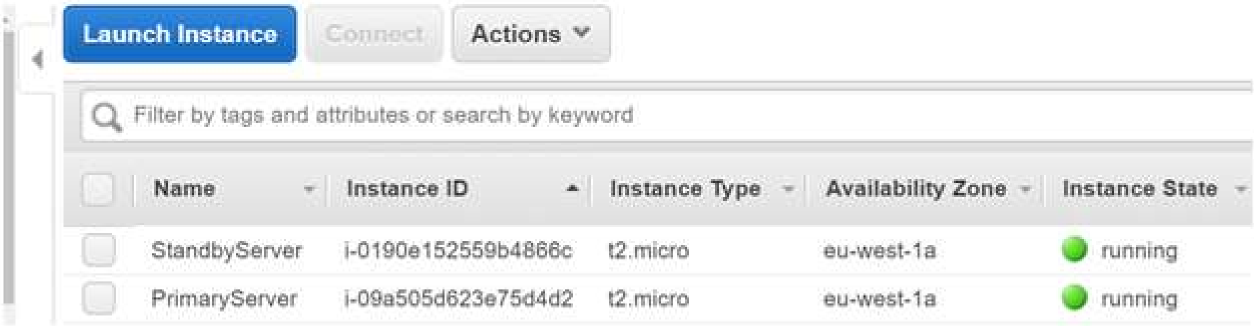
So now to ensure that the failover happens from the primary to secondary instance seamlessly so that the same Elastic IP address can be used for standby instance, the ENI can be shifted to the secondary Instance. It needs to be ensured that the subnets for the instances belong to the same availability zone.

So now let's look at the implementation of this.

Implementation of Failover using the Elastic Network Interface

Followings are the steps to implement Elastic Network Interface:

Step 1) Firstly we will create 2 Instances of the type Amazon Machine Image. These Instances will be created in the subnet of the same availability zone



	Name	Instance ID	Instance Type	Availability Zone	Instance State
□	StandbyServer	i-0190e152559b4866c	t2.micro	eu-west-1a	● running
□	PrimaryServer	i-09a505d623e75d4d2	t2.micro	eu-west-1a	● running

Here the Servers have been named as Primary and Standby Server. Each of these servers only has the primary network interface

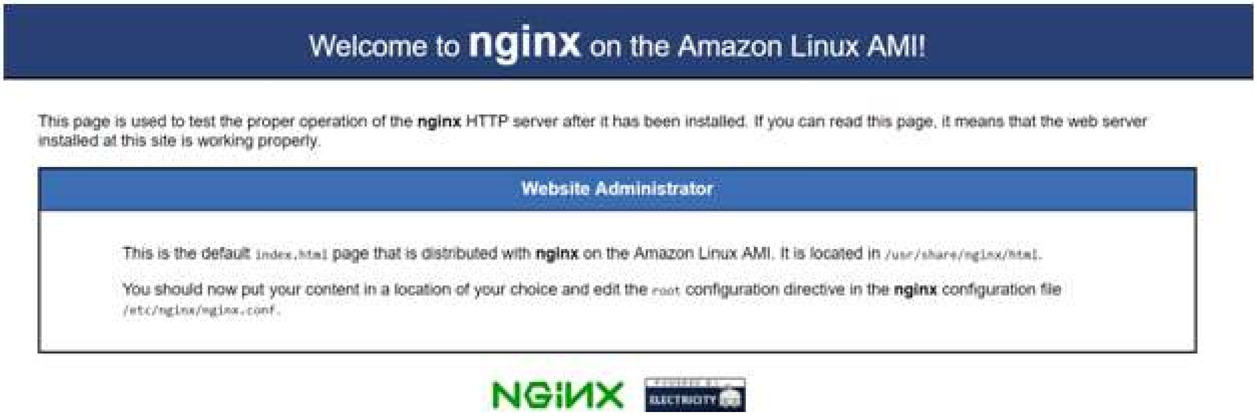
Step 2) On the PrimaryServer and Standby Server, we are going to install a Web server known as nginx via the following commands

sudo yum update

sudo yum install nginx

Once done, we need to start the nginx service on the primary server sudo service nginx start

When you go to the Public IP of the Primary Server, you should get the following page. Ensure that the Security Group of the PrimaryServer allows traffic on port 80.



Welcome to **nginx** on the Amazon Linux AMI!

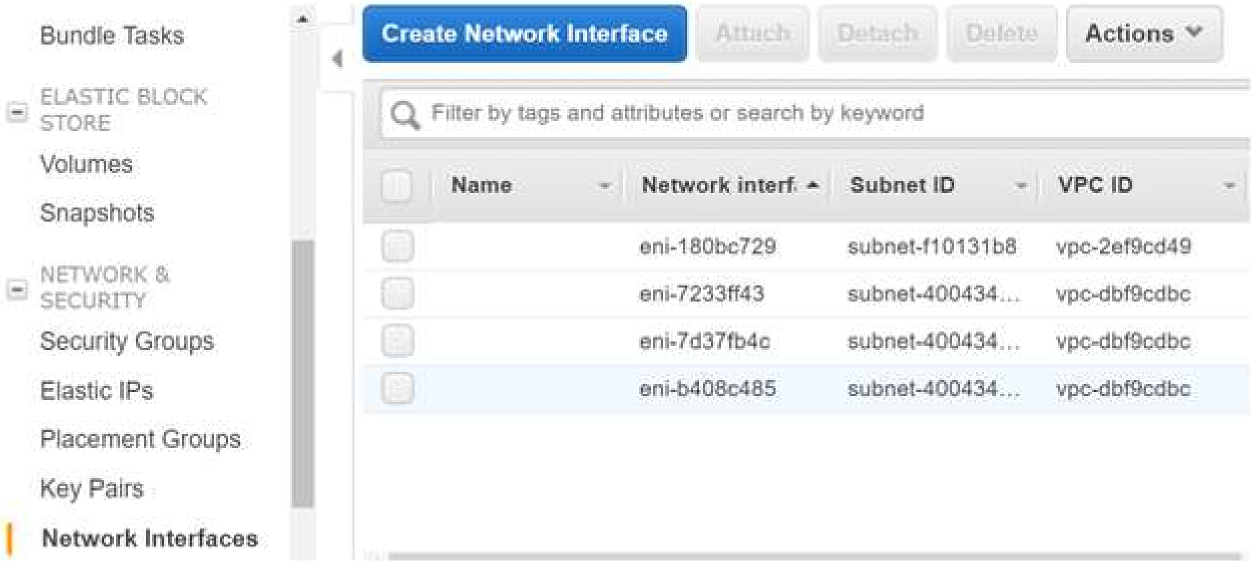
This page is used to test the proper operation of the **nginx** HTTP server after it has been installed. If you can read this page, it means that the web server installed at this site is working properly.

Website Administrator

This is the default `index.html` page that is distributed with **nginx** on the Amazon Linux AMI. It is located in `/usr/share/nginx/html`.

You should now put your content in a location of your choice and edit the `root` configuration directive in the **nginx** configuration file `/etc/nginx/nginx.conf`.

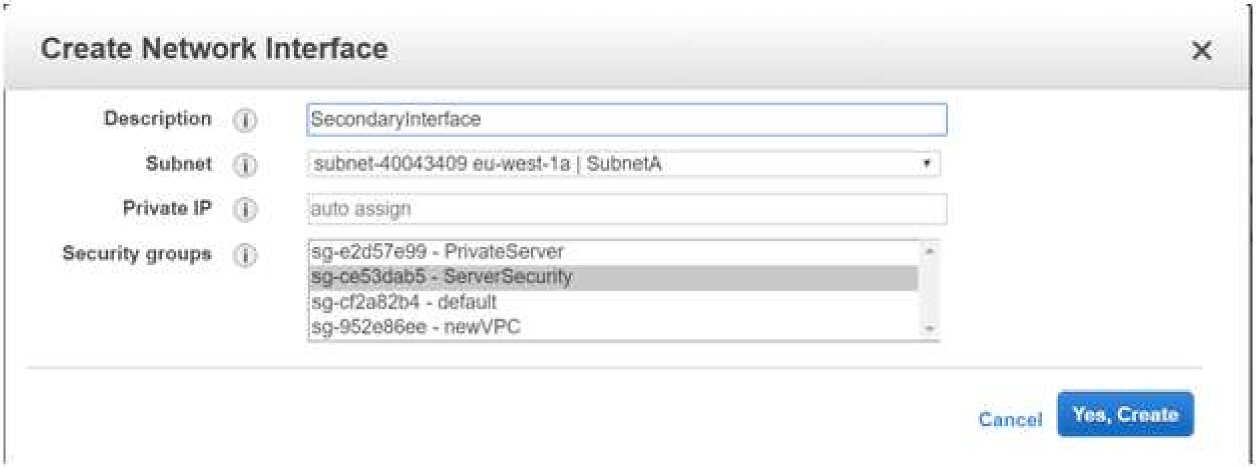
Step 3) Now let's create a Secondary Network Interface. This will be attached to the Primary Server. In the EC2 Dashboard, click on Create Network Interface



	Name	Network interf.	Subnet ID	VPC ID
□		eni-180bc729	subnet-f10131b8	vpc-2ef9cd49
□		eni-7233ff43	subnet-400434...	vpc-dbf9cdbc
□		eni-7d37fb4c	subnet-400434...	vpc-dbf9cdbc
□		eni-b408c485	subnet-400434...	vpc-dbf9cdbc

Give a description of the new network interface. Create it in Subnet A, because that is where the PrimaryServer resides. Attach the Security Group of the Primary Server to the Elastic Network Interface.

Then Create the Interface.



Create Network Interface

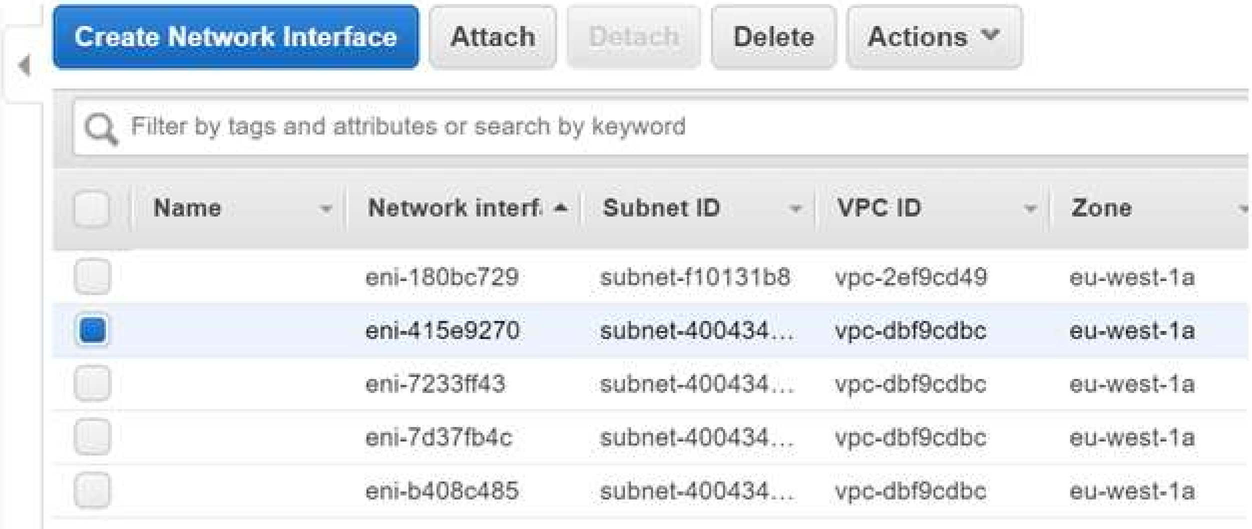
Description: SecondaryInterface

Subnet: subnet-40043409 eu-west-1a | SubnetA

Private IP: auto assign

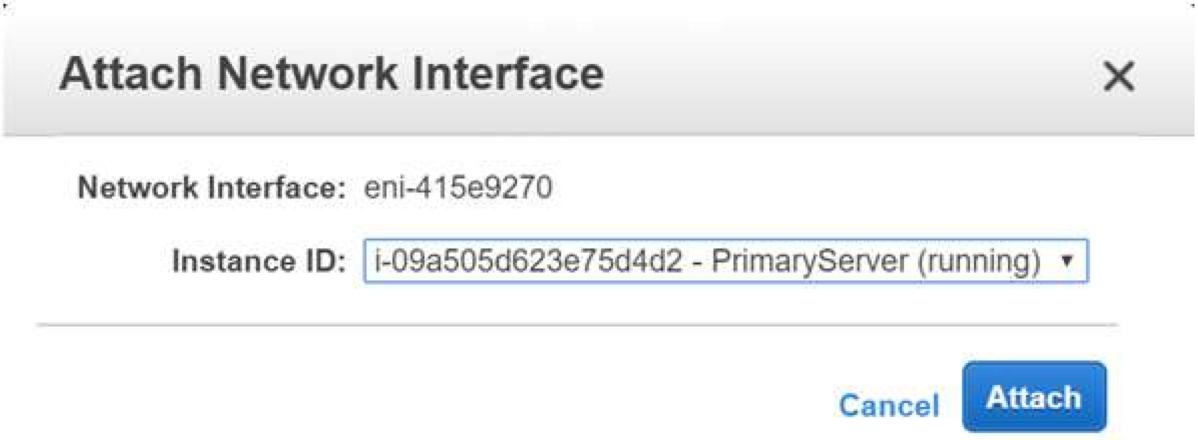
Security groups:
- sg-e2d57e99 - PrivateServer
- sg-ce53dab5 - ServerSecurity
- sg-cf2a82b4 - default
- sg-952e86ee - newVPC

Once the Interface has been created, click the Interface and click on Attach



☐	Name	Network interf.	Subnet ID	VPC ID	Zone
☐		eni-180bc729	subnet-f10131b8	vpc-2ef9cd49	eu-west-1a
☑		eni-415e9270	subnet-400434...	vpc-dbf9cdbc	eu-west-1a
☐		eni-7233ff43	subnet-400434...	vpc-dbf9cdbc	eu-west-1a
☐		eni-7d37fb4c	subnet-400434...	vpc-dbf9cdbc	eu-west-1a
☐		eni-b408c485	subnet-400434...	vpc-dbf9cdbc	eu-west-1a

Attach it to the Primary Server



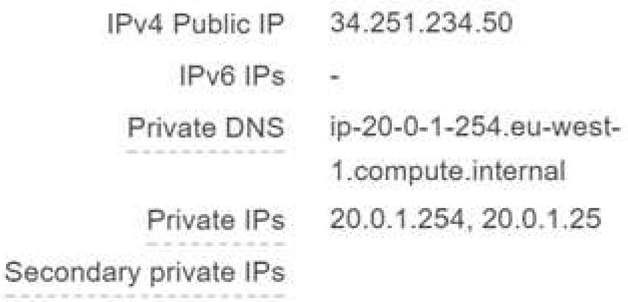
Attach Network Interface

Network Interface: eni-415e9270

Instance ID: i-09a505d623e75d4d2 - PrimaryServer (running)

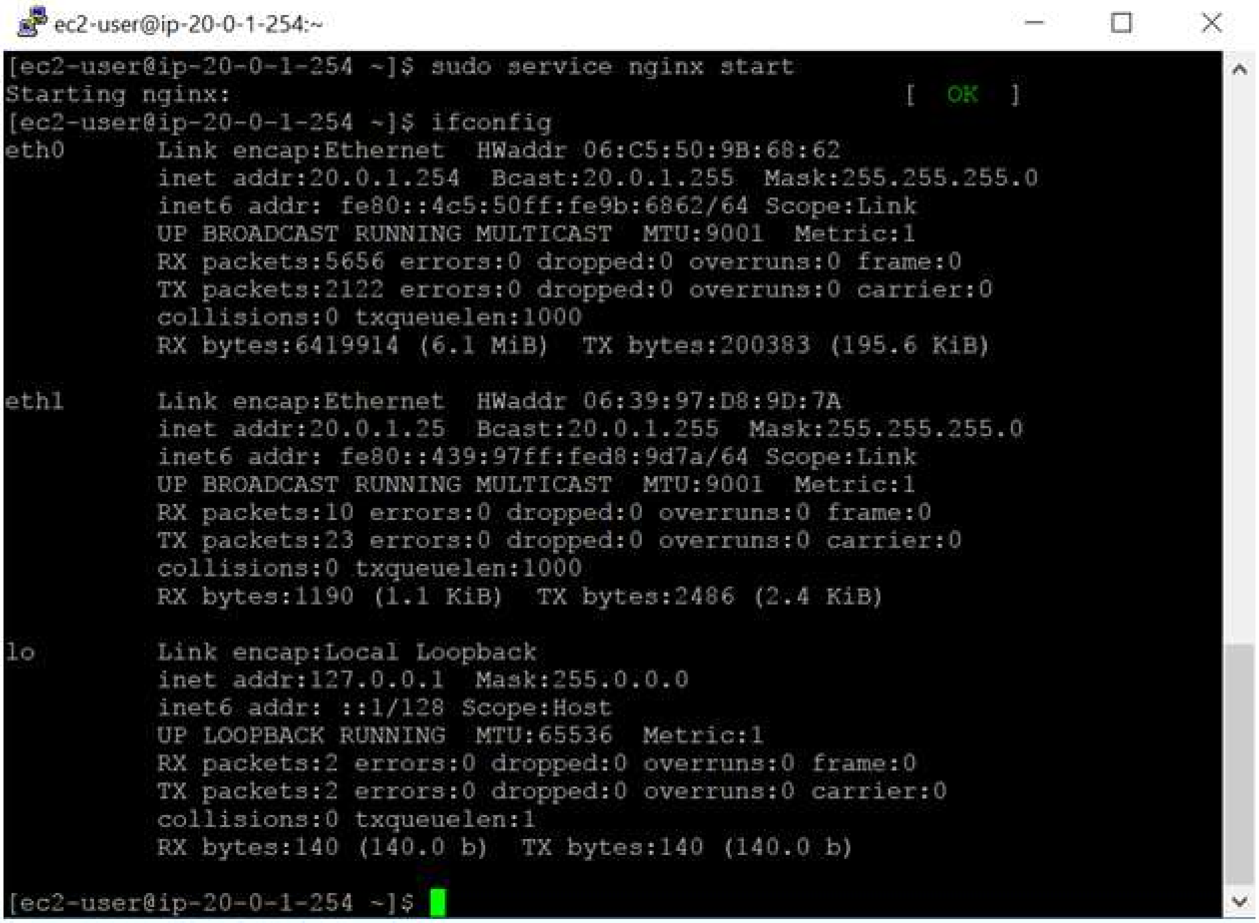
Once the network interface has been attached, this will reflect in the Instance configuration.

In the EC2 dashboard, for the Primary Server, you will see 2 Private IP's now.



IPv4 Public IP	34.251.234.50
IPv6 IPs	-
Private DNS	ip-20-0-1-254.eu-west-1.compute.internal
Private IPs	20.0.1.254, 20.0.1.25
Secondary private IPs	

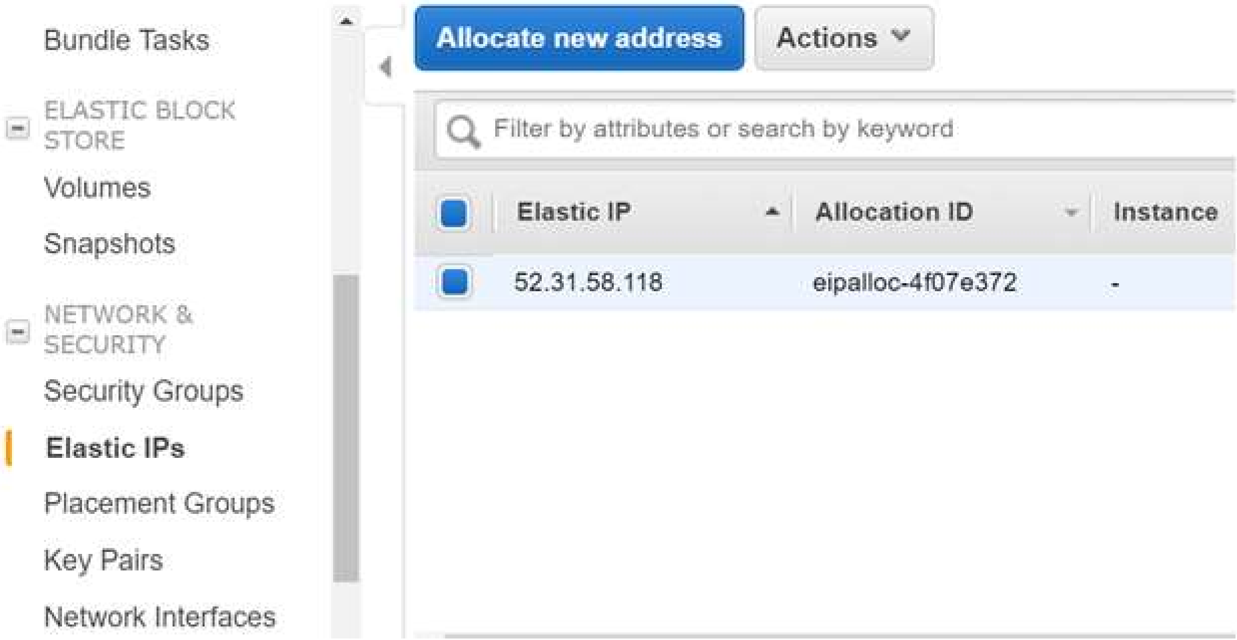
Note that we chose the Amazon Machine Image because the configuration happens automatically for this AMI. If you choose another Linux Instance like Ubuntu, you need to do the configuration manually for the secondary network interface.



```
[ec2-user@ip-20-0-1-254 ~]$ sudo service nginx start
Starting nginx:                                            [  OK  ]
[ec2-user@ip-20-0-1-254 ~]$ ifconfig
eth0      Link encap:Ethernet  HWaddr 06:C5:50:9B:68:62
          inet addr:20.0.1.254  Bcast:20.0.1.255  Mask:255.255.255.0
          inet6 addr: fe80::4c5:50ff:fe9b:6862/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:9001  Metric:1
          RX packets:5656 errors:0 dropped:0 overruns:0 frame:0
          TX packets:2122 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:6419914 (6.1 MiB)  TX bytes:200383 (195.6 KiB)

eth1      Link encap:Ethernet  HWaddr 06:39:97:D8:9D:7A
          inet addr:20.0.1.25  Bcast:20.0.1.255  Mask:255.255.255.0
          inet6 addr: fe80::439:97ff:fed8:9d7a/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:9001  Metric:1
          RX packets:10 errors:0 dropped:0 overruns:0 frame:0
          TX packets:23 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:1190 (1.1 KiB)  TX bytes:2486 (2.4 KiB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:2 errors:0 dropped:0 overruns:0 frame:0
          TX packets:2 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:140 (140.0 b)  TX bytes:140 (140.0 b)

[ec2-user@ip-20-0-1-254 ~]$
```

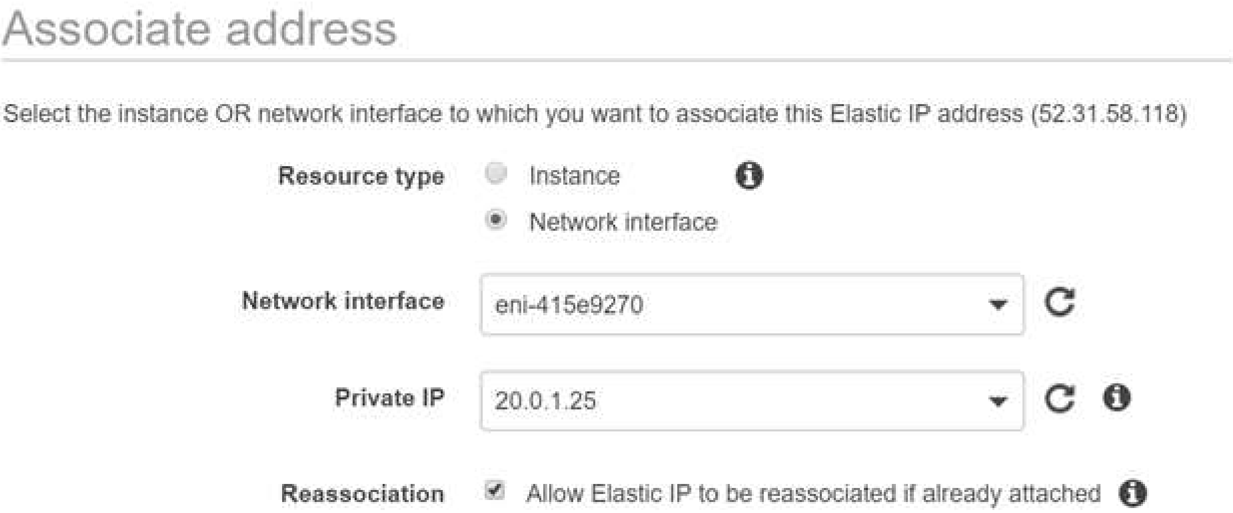
Step 4) Now let's attach an Elastic IP to the Secondary ENI which we have attached to the primary instance.

Go to the Elastic IP section. Allocate a new Elastic IP address if one is not present.



Elastic IP	Allocation ID	Instance
52.31.58.118	eipalloc-4f07e372	-

Let’s now associate it to the Secondary Private IP on the PrimaryServer



Associate address

Select the instance OR network interface to which you want to associate this Elastic IP address (52.31.58.118)

Resource type ○ Instance ● Network interface

Network interface: eni-415e9270

Private IP: 20.0.1.25

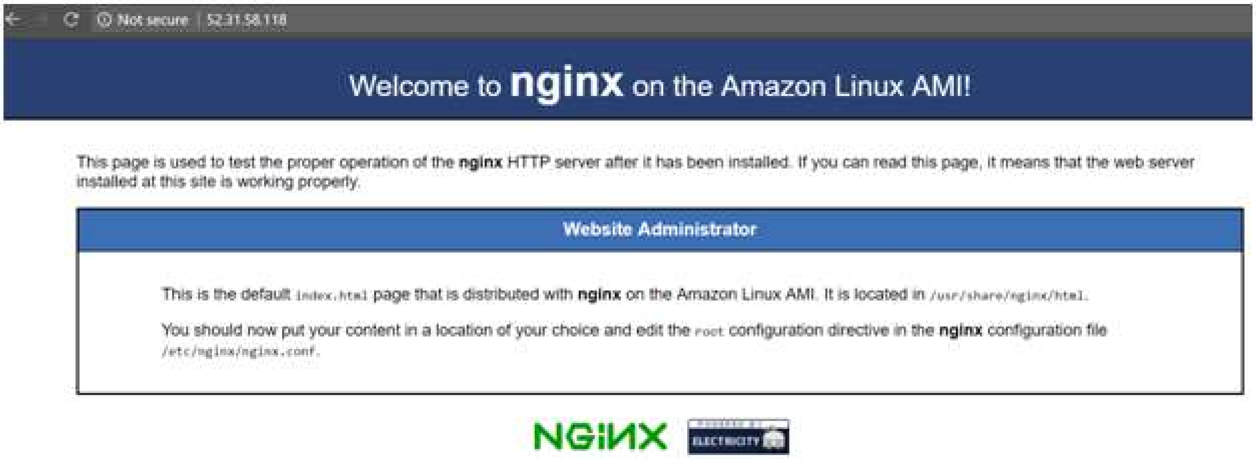
Reassociation ☑ Allow Elastic IP to be reassociated if already attached

Step 5) To ensure the web server is running on the Elastic IP of the primary server, you need to ensure the Secondary private IP is entered in the configuration file for the Web server. For nginx, this setting will be in the /etc/nginx/nginx.conf file. First, stop the nginx server, change the Private IP and port number to the below. This IP is the private IP of the secondary ENI attached to the primary server.

```
server {

    listen      20.0.1.25:80;

    listen      [::]:80 default_server;

    server_name  localhost;
```

```
root/usr/share/nginx/html;
```

Then start the nginx server to confirm it is running, now on the Elastic IP



Welcome to **nginx** on the Amazon Linux AMI!

This page is used to test the proper operation of the **nginx** HTTP server after it has been installed. If you can read this page, it means that the web server installed at this site is working properly.

Website Administrator

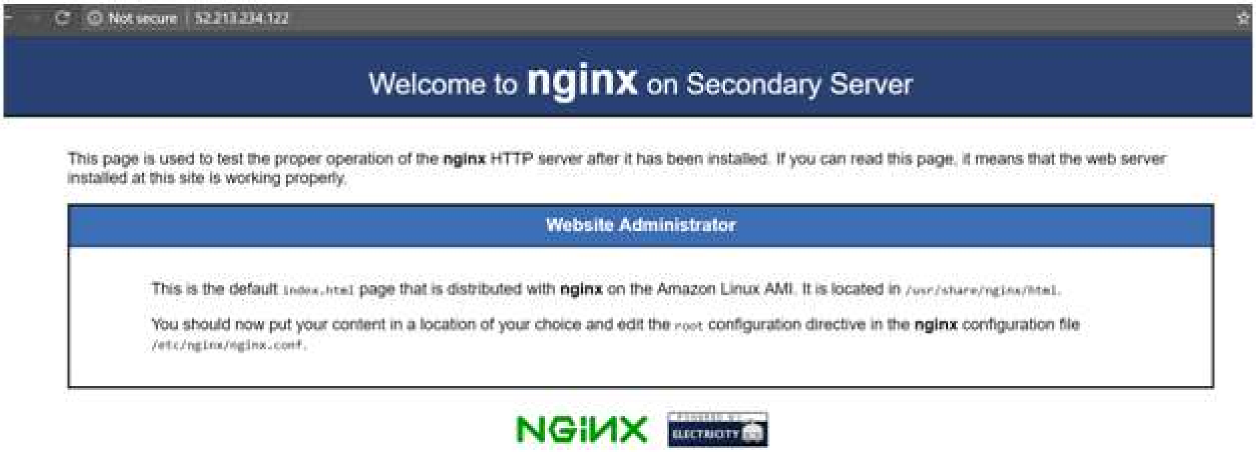
This is the default `index.html` page that is distributed with **nginx** on the Amazon Linux AMI. It is located in `/usr/share/nginx/html`.

You should now put your content in a location of your choice and edit the `root` configuration directive in the **nginx** configuration file `/etc/nginx/nginx.conf`.

Step 6) Now to initiate a proper failover we need to perform the following

1. Install nginx on the SecondaryServer
2. Now we are going to modify the home page displayed by nginx just to understand that when we browse to this server, it is reflecting the page on this server

We need to go to the /usr/share/nginx/html folder and modify the index.html file. So if you browse to the home page of the web server on the Secondary Server, it would look like the below



Welcome to **nginx** on Secondary Server

This page is used to test the proper operation of the **nginx** HTTP server after it has been installed. If you can read this page, it means that the web server installed at this site is working properly.

Website Administrator

This is the default `index.html` page that is distributed with **nginx** on the Amazon Linux AMI. It is located in `/usr/share/nginx/html`.

You should now put your content in a location of your choice and edit the `root` configuration directive in the **nginx** configuration file `/etc/nginx/nginx.conf`.

Here the Welcome to message says “Welcome to nginx on Secondary Server”

1. Next, we need to ensure to modify the nginx.conf file on this server as well to ensure it listens to the private IP as shown below. This is so that when the switch happens, the Elastic IP would anyway point to the below private IP and that would point to the web server on the secondary server.

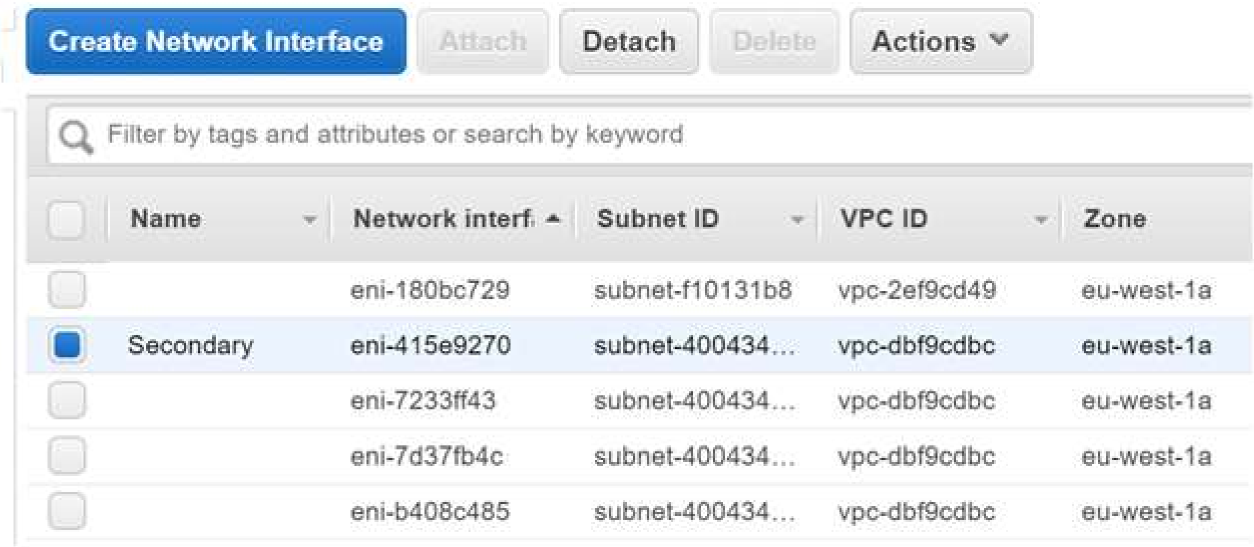
```
server {
```

```
listen       20.0.1.25:80;

listen       [::]:80 default_server;

server_name  localhost;

root         /usr/share/nginx/html;
```

-

Step 7) Now let’s swap the Secondary ENI from the primary to the standby server

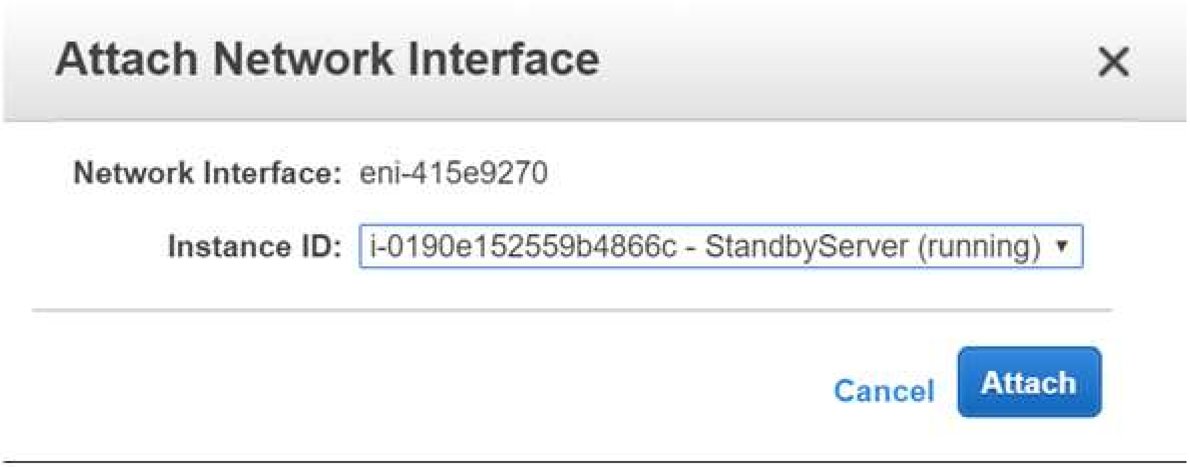
First Detach the Secondary Network Interface



□	Name	Network interf.	Subnet ID	VPC ID	Zone
□		eni-180bc729	subnet-f10131b8	vpc-2ef9cd49	eu-west-1a
■	Secondary	eni-415e9270	subnet-400434...	vpc-dbf9cdbc	eu-west-1a
□		eni-7233ff43	subnet-400434...	vpc-dbf9cdbc	eu-west-1a
□		eni-7d37fb4c	subnet-400434...	vpc-dbf9cdbc	eu-west-1a
□		eni-b408c485	subnet-400434...	vpc-dbf9cdbc	eu-west-1a

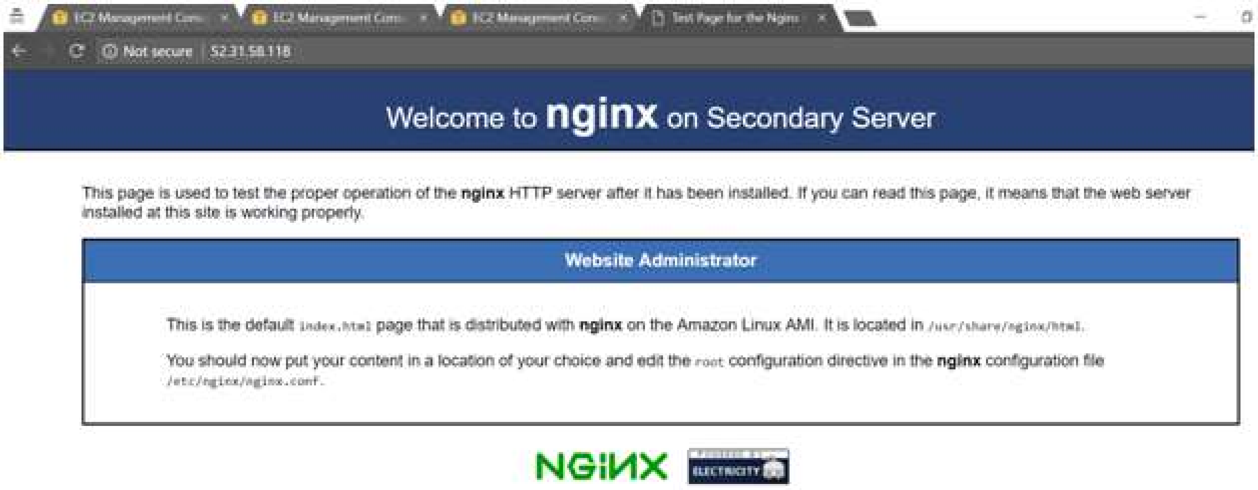
Once detached, attach it to the Standby Server

Now when you browse to the Elastic IP, you will get the home page of the Standby Server


Attach Network Interface

Network Interface: eni-415e9270

Instance ID: i-0190e152559b4866c - StandbyServer (running)



Welcome to **nginx** on Secondary Server

This page is used to test the proper operation of the **nginx** HTTP server after it has been installed. If you can read this page, it means that the web server installed at this site is working properly.

Website Administrator

This is the default `index.html` page that is distributed with **nginx** on the Amazon Linux AMI. It is located in `/usr/share/nginx/html`.

You should now put your content in a location of your choice and edit the `root` configuration directive in the **nginx** configuration file `/etc/nginx/nginx.conf`.

Important Points About Elastic Network Interface

- You can attach a network interface in one subnet to an instance in another subnet in the same VPC; however, both the network interface and the instance must reside in the same Availability Zone.
- You may require to bring up the second interface manually for the hot or warm attach of the additional network interface. So, it is advised to first configure the private IPv4 address, and then modify the route table according to that.
- The procedure of the attachment of another network interface to an existing instance (for example, a NIC teaming configuration) cannot be used to increase the network bandwidth to or from the dual-homed instance.
- If two or more network interfaces from the same subnet are attached to an instance, you may encounter networking issues such as asymmetric routing. It is recommended to use a secondary private IPv4 address on the primary network interface, if possible.

The aim of Whizlabs is to help the individuals in their journey of preparing and passing AWS Certified Advanced Networking Specialty certification exam. We deliver the best and high-quality preparation material to evolve professional career. Whizlabs content is prepared by the industry experts who have a great knowledge and passion for cloud computing. We are continuously growing our cloud expert's community.

> Preparing for AWS Certified Advanced Networking Speciality Certification? Pass in 1st Attempt. Start with Whizlabs Free and Practice Tests Now!

About the Author | More from Author

About Neeru Jain

Technology Scientist by Mind and Passionate Writer by Heart!! With an enthusiasm for technological research and learning, Neeru turned out to be a technology expert. Her Belief: “Words are powerful enough to change Mind, Life, and the World; only the writer should have a real passion for Writing!!”

Spread the love