Lab1: Providing Internet access for EC2 instance with Internet Gateway
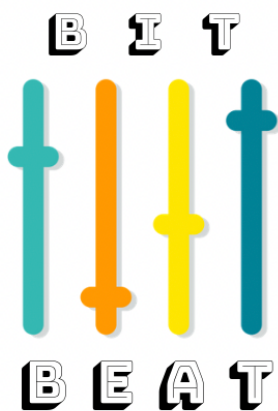
READ ME

World Domination One Beat At A Time

BitBeat is a new startup that is planning to take the record industry and the world by storm with its new product **BitBanger**, a web-based music mixer app. As a new member of the **BitBeat** infrastructure team, you will need a variety of skills to assist in the growth of the startup. As the startup grows, they will be creating a larger web presence.

As a team member you have to create an internet gateway to provide internet access in an EC2 instance of a private subnet. An internet gateway serves two purposes: to provide a target in your VPC route tables for internet-routable traffic, and to perform network address translation (NAT) for instances that have been assigned public IPv4 addresses.

That's where you come in. **BitBeat** has hired you to setup their infrastructure, you've already gathered their requirements and are ready to get started.

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Task Overview:

To enable access to or from the internet for an EC2 instances in a private subnet of a VPC, you must do the following tasks.
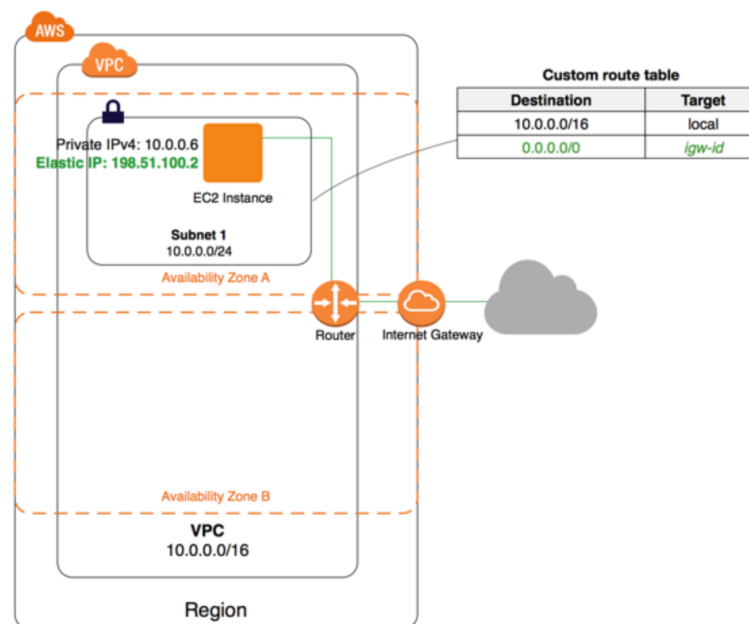
Task objectives:

- Creating VPC
- Creating a Subnet
- Creating and Attaching Internet Gateway
- Creating Custom Route Table
- Creating Security Group for Internet Access
- Creating an EC2 instance
- Adding Elastic IP Address
- Detaching Internet Gateway from your VPC
- Deleting Internet Gateway and Route Table
- Deleting EC2 instance

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Let's Get Started!

DID YOU KNOW

If a subnet is associated with a route table that has a route to an internet gateway, it's known as a public subnet. If a subnet is associated with a route table that does not have a route to an internet gateway, it's known as a private subnet.

When you create a subnet, it automatically gets associated with the main route table for the VPC. By default, the main route table doesn't contain a route to an internet gateway.

Tasks-

1. **Creating a VPC**
   a. Open AWS console and select **VPC** service.
   b.
   c. Click on **VPC create** and fill the required details as follows.
      - Provide the name as **VPC-gtway** in **Name tag.**
      - Provide 10.0.0.0/16 in IPv4 block.
   d. Click on **Create VPC** button.

2. **Creating a subnet**
   a. Open AWS **VPC console** and in navigation pane choose **subnets**, create subnet.
   b. Choose the created VPC **VPC-gtway** from dropdown list.
   c. Specify subnet details as needed.
      - **Name tag**- provide name for this subnet
      - Choose **Availability zone** as US East (N. Virginia)
      - **IPv4 CIDR block**: Specify an IPv4 CIDR block for your subnet, for example, 10.0.1.0/24.
   d. Click on **create**.

> **Important info**
>
> If you assigned a public IPv4 address to your instance during launch, then your instance is reachable from the internet, and you do not need to assign it an Elastic IP address.

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3. **Creating and attaching Internet Gateway**
   a. In the navigation pane, choose **Internet Gateways**, and then choose **Create internet gateway**.
   b. Name your Internet Gateway **BitGateway** and click on **Create internet gateway**.
   c. Select the internet gateway that you just created, and then choose **Actions, Attach to VPC**.
   d. Select your **VPC-gtway** VPC from the list, and then choose **Attach internet gateway**.

4. **Creating a custom route table**
   a. In the navigation pane, choose **Route Tables**, and then choose **Create Route Table**.
   b. In the **Create Route Table** dialog box, optionally name your route table as **BitRoute**, then select your VPC, and then click on **Create**.
   c. Select the custom route table that you just created.
   d. On the **Routes** tab, choose **Edit routes**, **Add route**, and add the following routes as necessary. Choose **Save** when you're done.
      ▪ For IPv4 traffic, specify 0.0.0.0/0 in the **Destination** box, and select the internet gateway ID in the **Target** list.
      ▪ For IPv6 traffic, specify ::/0 in the **Destination** box, and select the internet gateway ID in the **Target** list.
   e. On the **Subnet Associations** tab, choose **Edit Subnet Associations**, select the **Associate** check box for this subnet, and then choose **Save**.

5. **Creating Security Group for Internet Access**
   a. In the navigation pane, choose **Security Groups**, and then choose **Create Security Group**.
   b. In the **Create Security Group** dialog box, specify a name **SG-igway** for the security group and a description. Select the ID of your VPC from the **VPC** list, and then choose **Yes, Create**.
   c. On the **Inbound Rules** tab, choose **Edit Inbound rules**. Choose **Add Rule** and complete the required information. For example, select **HTTP, HTTPS** from the **Type** list,

DID YOU KNOW

An internet gateway supports IPv4 and IPv6 traffic. It does not cause availability risks or bandwidth constraints on your network traffic. When we create a VPC, we must specify a range of IPv4 addresses for the VPC in the form of a Classless Inter-Domain Routing (CIDR) block; for example, 10.0.0.0/16. This is the primary CIDR block for our VPC.

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and enter the **Source** as 0.0.0.0/0 for IPv4 traffic, or ::/0 for IPv6 traffic. Similarly, choose **SSH** and select **Anywhere** from **Source**. Choose **Save** when you're done.

6.   **Creating an EC2 instance**
    a. Open EC2 console and navigate pane and create EC2 instance.
    b. Choose the AMI as **Amazon Linux 2** click on **Next** then choose the type as a **t2.micro** and click on **Next: Configure Instance**. Select the created VPC **VPC-gtway** from **Network** and keep **Auto-assign Public IP** as Disabled and click on **Next**.
    c. Provide the **Key** as **Name** and **Value** as **Bit-EC2**.
    d. Select the created Security Group **SG-igway** and click on **Next**.
    e. Select the existing key /create a new key and provide permission with below command.

<p align="center" style="color:orange">chmod 400 Desktop/My_SSH_Key.pem</p>

7. **Adding Elastic IP Address**
    a. Open VPC console and in the navigation pane, choose **Elastic IPs**.
    b. Choose **Allocate new address** then Choose **Allocate**.
    c. Select the Elastic IP address from the list, choose **Actions**, and then choose **Associate Elastic IP address**.
    d. Choose **Instance**, and then select the **Bit-EC2** instance. Select the private IP address with which to associate the Elastic IP address, and then choose **Associate**.

> **Important info**
> If a VPC does not have an Internet Gateway, then the resources in the
> VPC cannot be accessed from the Internet (unless the traffic flows via a corporate network and VPN/Direct Connect).

Wait for your new EC2 Instance State to display as **running**

Test

Now the instance is created, and Elastic IP is associated so follow the below steps to test this.

MAC/Linux Users follow the below steps to login with SSH in EC2 instance and Windows users follow the SSH login steps provided in **Secure Shell (SSH) into Amazon EC2 (PC)** Activity.

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1.   In the terminal window, enter the following command in the Terminal command prompt:
ssh -i Desktop/My_SSH_Key.pem ec2-user@xxx.xxx.xxx.xxx (Elastic IP)

You will see the following message in your Terminal window:

```
warning.png
lalitakumawat@Lalitas-MacBook-Air AWS % ssh -i lkmyedu.pem ec2-user@3.209.137.50
The authenticity of host '3.209.137.50 (3.209.137.50)' can't be established.
ECDSA key fingerprint is SHA256:tL5ZyhhTIyCot3Di5oY6B+pRsipoDsH3PZ7pTLOoghI.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '3.209.137.50' (ECDSA) to the list of known hosts.

      __|  __|_  )
      _|  (     /   Amazon Linux 2 AMI
     ___|\___|___|

https://aws.amazon.com/amazon-linux-2/
```

2.   Now to test internet access type below commands in this EC2 instance's terminal.

sudo ping google.com

you will see below messages.

```
[ec2-user@ip-10-0-1-77 ~]$ sudo ping google.com
PING google.com (172.217.8.14) 56(84) bytes of data.
64 bytes from iad23s59-in-f14.1e100.net (172.217.8.14): icmp_seq=1 ttl=113 time=1.59 ms
64 bytes from iad23s59-in-f14.1e100.net (172.217.8.14): icmp_seq=2 ttl=113 time=1.59 ms
64 bytes from iad23s59-in-f14.1e100.net (172.217.8.14): icmp_seq=3 ttl=113 time=1.64 ms
^C
--- google.com ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
```

sudo yum install httpd

Now you should be able to download the packages from internet.

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Another task

If you no longer need internet access for instances that you launch into a nondefault VPC, you can detach an internet gateway from a VPC. You can't detach an internet gateway if the VPC has resources with associated public IP addresses or Elastic IP addresses.

1. **Detaching Internet Gateway from your VPC**
   o Open VPC console and in the navigation pane, choose **Elastic IPs** and select the Elastic IP address.
   o Choose **Actions**, **Disassociate address**. Choose **Disassociate address** and now again choose **Actions, Release Elastic IP Address**.
   o Choose **Internet Gateways** from the navigation pane. And select the internet gateway and choose **Actions, Detach from VPC**.
   o In the **Detach from VPC** dialog box, choose **Detach internet gateway**.

2. **Deleting Internet Gateway**
   o Choose **Internet Gateways** from VPC navigation pane.
   o Select the internet gateway and choose **Actions**, **Delete internet gateway**.
   o In the **Delete internet gateway** dialog box, enter delete, and choose **Delete internet gateway**.
   o Choose **Route Table** from Navigate pane. Select created route table and click on **Edit Subnet Associations** uncheck the select subnet ID and save.
   o Now, choose **Actions, Delete Route Table**.

3. **Delete EC2 instance**
   o Choose EC2 from EC2 navigation pane.
   o Select the above created EC2 instance and click on **instance state**, choose **terminate instance**.

DID YOU KNOW

By default, a VPC security group allows all outbound traffic. You can create a new security group and add rules that allow inbound traffic from the internet. You can then associate the security group with instances in the public subnet.

An Elastic IP *address* is a static, public IPv4 address designed for dynamic cloud computing. You can associate an Elastic IP address with any instance or network interface in any VPC in your account. With an Elastic IP address, you can mask the failure of an instance by rapidly remapping the address to another instance in your VPC.

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Great job!

Let's review

You have completed the activity and have successfully created Internet Gateway for an instance which is created in a VPC subnet for internet access.

In this activity you:

- Created VPC, subnet
- Internet Gateway, Route Table
- Created Elastic IP and Security Group
- Launched EC2 instance

Test your knowledge

1. What are two main purpose of Internet Gateway? _____
2. Why do you use Elastic IP address? _____
3. What are the other ways to access resources in VPC from internet except Internet Gateway?
4. What is the primary CIDR for VPC created in this activity? _____
5. When you create a subnet, it automatically gets associated with _____ route table for the VPC.
6. In route table, what do we specify in the **Destination** box For IPv6 traffic? _____
7. Write True or False for below statements
   a. A VPC security group allows all inbound traffic.
   b. An Elastic IP *address* is a static, public IPv4 address.
   c. By default, the main route table doesn't contain a route to an internet gateway.
   d. An internet gateway supports only IPv4 traffic.

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