Internet Protocols - Static and Dynamic Addresses

Scenario

Your role is a cloud support engineer at Amazon Web Services (AWS). During your shift, a customer from a Fortune 500 company requests assistance regarding a networking issue within their AWS infrastructure. The email and an attachment of their architecture is below:

Ticket from your customer

> Hello Cloud Support!
>
> We are having issues with one of our EC2 instances. The IP changes every time we start and stop this instance called Public Instance. This causes everything to break since it needs a static IP address. We are not sure why the IP changes on this instance to a random IP every time. Can you please investigate? Attached is our architecture. Please let me know if you have any questions.
>
> Thanks!
> Bob, Cloud Admin

Architecture diagram
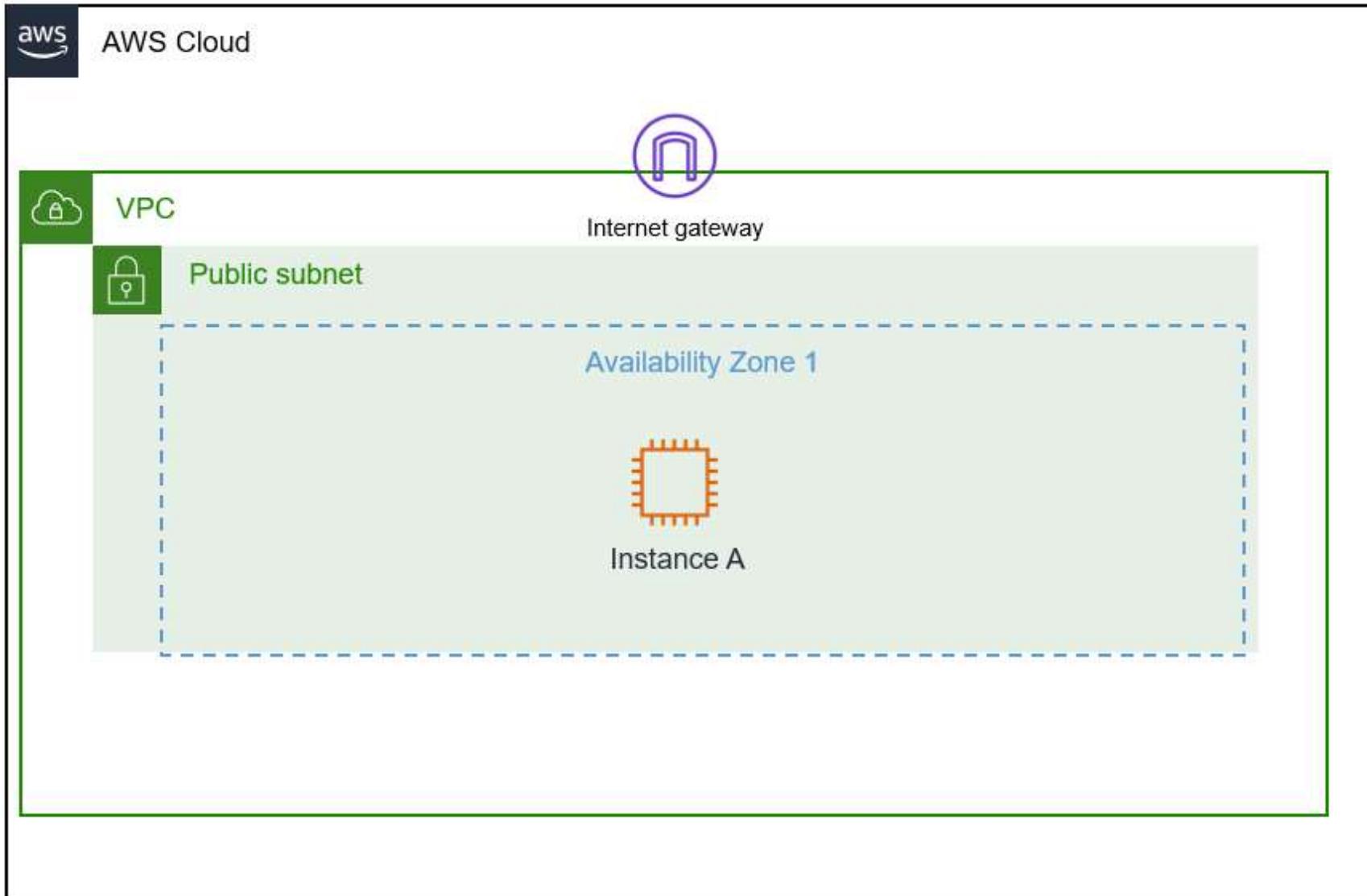
Figure: Customer VPC architecture, which includes one public subnet and one EC2 instance

Objectives

In this lab, you will:

- Summarize the customer scenario
- Analyze the difference between a statically and dynamically assigned IP addresses using EC2 instances
- Assign a persistent (static) IP to an EC2 instance

- Develop a solution to the customers issue found within this lab; after developing a solution, summarize and describe your findings

Duration

This lab total duration is 60 minutes.

AWS service restrictions

In this lab environment, access to AWS services and service actions might be restricted to the ones that are needed to complete the lab instructions. You might encounter errors if you attempt to access other services or perform actions beyond the ones that are described in this lab.

Accessing the AWS Management Console

1. At the top of these instructions, choose | Start Lab | to launch your lab.
   A **Start Lab** panel opens, and it displays the lab status.

   > **Tip**: If you need more time to complete the lab, choose the Start Lab button again to restart the timer for the environment.

2. Wait until you see the message *Lab status: ready*, then close the **Start Lab** panel by choosing the **X**.

3. At the top of these instructions, choose | AWS |.
   This opens the AWS Management Console in a new browser tab. The system will automatically log you in.

   > **Tip**: If a new browser tab does not open, a banner or icon is usually at the top of your browser with a message that your browser is preventing the site from opening pop-up windows. Choose the banner or icon and then choose **Allow pop ups**.

4. Arrange the AWS Management Console tab so that it displays along side these instructions. Ideally, you will be able to see both browser tabs at the same time so that you can follow the lab steps more easily.

Task 1: Investigate the customer's environment

Recall what you've learned about static and dynamic IP addresses. Which type of IP address do you think Bob assigned his EC2 instance if it constantly changes when it is stopped and started again? You will test this theory by launching one EC2 instance in the AWS lab environment. You will start with how the customer has his configured and troubleshoot the issue from there.

For task 2, you will understand the customer's environment and replicate their issue.

In the scenario, Bob, who is the customer requesting assistance, is having issues with his EC2 instance constantly changing IP addresses every time he stops and starts his instance. He cannot leave his instance on because it is very expensive for him to do so, and he requires this IP address to be set at a static IP address or else it breaks his other resources attached to it.

5. At the upper-right of these instructions, choose **AWS**. The AWS Management Console opens in a new tab.

6. Once you are in the AWS console, type and search for **EC2** in the search bar on the top-left corner. Select EC2 from the list.

    Tip: Alternatively, You can also find EC2 under **Services - Compute** in the top left corner
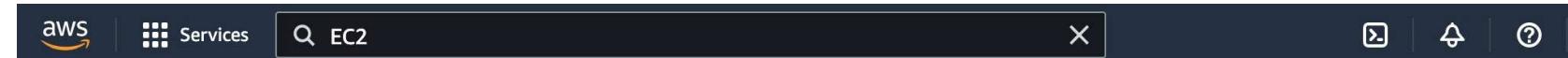
Figure: AWS Management Console search bar.

7. You are now in the Amazon EC2 dashboard. In the left navigation menu, choose **Instances**. This option takes you to your current EC2 instances. You should currently see one EC2 instance, which you can ignore for now. We will not use that instance since we will launch our own for **task 1**.
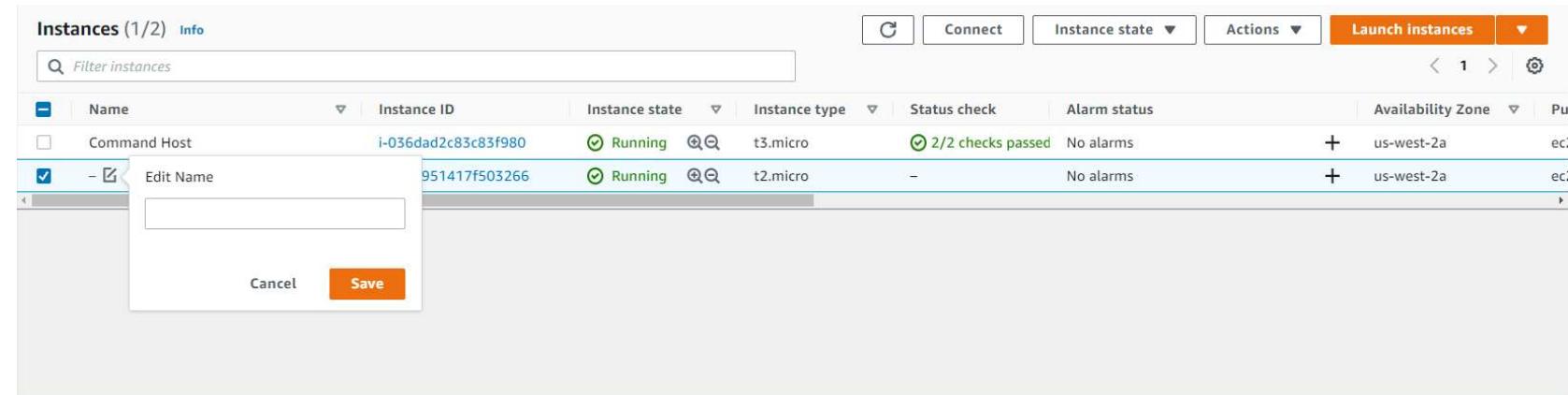

Figure: This is the EC2 dashboard where you can create instances and see an overall snapshot of current instances.

8. From the top right corner, select **Launch instances**. This is how you will launch EC2 instances from the console.

Figure: Launch EC2 instances by selecting the button at the top right corner.

9. Follow the steps below to complete the creation of an Amazon EC2 instance:

    o **Step 1: Choose an Amazon Machine Image (AMI)**:

        ▪ Select the first entry for **Amazon Linux 2 AMI (HVM)**
          An AMI is a template that contains the OS and configuration of the EC2 instance.

    o **Step 2: Choose an Instance Type**:

- Select **t3.micro** and navigate to the bottom of the window and click the button **Next: Configure Instance Details**
  - **Step 3: Configure Instance Details**:
    - Network: Choose vpc-xxxxxxxx | Lab VPC
    - Subnet: Choose subnet-xxxxxx | Public Subnet 1
    - Auto-assign Public IP: Set to enable
      Leave everything else as default and select **Next: Add Storage** Add Storage in the bottom right corner.
  - **Step 4: Add Storage**: Leave as default and navigate to the bottom right of the window and select **Next: Add Tags**.
  - **Step 5: Add Tags**:
    - Select Add Tag and under **Key** enter `Name` and under **Value** enter `test instance`
    - Navigate to the bottom right of the window and select **Next: Configure Security Group**
  - **Step 6: Configure Security Group**:
    - Under **Assign a security group**, select the **Select an existing security group** radio button and select the security group with the name **Linux Instance SG**. Then navigate to the bottom of the window and hit **Review and Launch**.
  - **Step 7: Review Instance Launch**:
    - Navigate to the bottom of the window and hit **Launch**.
  - A pop-up window asks you to select an existing key pair or create a new key pair.
    - In the first drop down, keep **Choose an existing key pair**.
    - In the second drop down, select the key pair **vockey | RSA**.
    - Check the box underneath the second drop down. Once checked, select **Launch Instances**.
10. Once complete, you will return to the EC2 dashboard and see the EC2 instance that was just created. Select **test instance**. Under the Instance state, you will see **Initializing**. Wait until it says **2/2** before continuing.

☐	Name	▽	Instance ID	Instance state	▽	Instance type	▽	Status check	Alarm status	
☐	Command Host		i-0d527c915aa59d48f	⊘ Running	⊕⊖	t3.micro		⊘ 2/2 checks passed	No alarms	+
☑	test instance		i-0ca0c56f1f4250fdb	⊘ Running	⊕⊖	t3.micro		🕐 Initializing	No alarms	+

Figure: Instances go through states, just like when a computer is booting up. When it is ready to use, the state will say "running" and you will be able to use it for services like SSH.

11. Select the checkbox of your **test instance**. At the bottom, select the **Networking** tab. In this tab, observe and note the Public IPv4 address and the Private IPv4 address. Once noted, navigate to the top right of the window, select the **Instance state** drop-down button, and select **Stop instance**. Once the **Instance state** changes to **Stopped**, navigate back down to the tabs and observe the Public and Private IPv4 address.

Figure: This is the networking tab for instances. This shows any networking configurations related to the instance such as public and private IPv4 addresses and public and private IPv4 DNS.

Figure: To start, stop, or terminate an instance, navigate to the top of the EC2 dashboard and select the "Instance state" button.

12. Now restart the **test instance** by navigating to the top window and selecting the **Instance state** and **Start instance**. Wait until the **Instance state** changes to **Running**. Take note of the Public and Private IPv4 addresses. What did you notice between the public and private IP addresses when you stopped and started the EC2 instance? Would you consider this the Public IP a static or dynamic IP address? What would you consider the Private IP address for the EC2 instance? Do you think we have replicated the customer's issue?

Instance: i-0ca0c56f1f4250fdb (test instance) ⚙ ✕

Details	Security	**Networking**	Storage	Status checks	Monitoring	Tags

▼ Networking details Info

Public IPv4 address	Private IPv4 addresses	VPC ID
⧉ 34.222.10.106 | open address ↗	⧉ 10.0.10.113	⧉ vpc-0655084746fc56cad (Lab VPC) ↗
Public IPv4 DNS	Private IP DNS name (IPv4 only)	
⧉ ec2-34-222-10-106.us-west-2.compute.amazonaws.com | open address ↗	⧉ ip-10-0-10-113.us-west-2.compute.internal	
Subnet ID	IPV6 addresses	Secondary private IPv4 addresses
⧉ subnet-0901a56b5123d56bd (Public Subnet 1) ↗	–	–

Figure: By starting the instance, you can see the details populate in the Networking tab.

13. We still haven't solved the customer's issue. Bob needs a permanent Public IP address that doesn't change when he stops and restarts his instance. AWS does have a solution that allocates a persistent public IP address to an EC2 instance, called an Elastic IP (EIP).

From the EC2 dashboard, navigate to **Network and Security** on the left navigation and select **Elastic IPs**. Notice that there are no EIPs. Create one by selecting the button **Allocate Elastic IP address** in the top right. Keep everything as default and hit **Allocate**. Take note of the EIP address.

Figure: Within the EC2 dashboard, under "Network and Security" in the left navigation, select "Elastic IPs".

Figure: Allocate an EIP by selecting the Allocate Elastic IP address button.

14. Select the EIP you just created by selecting the checkbox. Now attach this permanent, public IP address to the **dynamic instance** by navigating to the top right and navigating to **Actions** and **Associate Elastic IP address**.

Figure: The EIP created will now be associated to the EC2 instance by going to the actions menu and selecting "Associate Elastic IP address".

15. Leave the resource type as Instance, and select **test instance** from the **Choose an Instance** drop down menu. Under **Private IP address**, select the empty box. The Private IP associated with that instance is selected. Click the **Associate** button.

Associate Elastic IP address

Choose the instance or network interface to associate to this Elastic IP address (54.244.33.245)

Elastic IP address: 54.244.33.245

Resource type
Choose the type of resource with which to associate the Elastic IP address.

- ● Instance
- ○ Network interface

⚠ If you associate an Elastic IP address to an instance that already has an Elastic IP address associated, this previously associated Elastic IP address will be disassociated but still allocated to your account. Learn more↗

Instance

🔍 Choose an instance   ↻

i-036dad2c83c83f980 (Command Host) - running

i-059e951417f503266 (test instance) - running

🔍 Choose a private IP address

Reassociation
Specify whether the Elastic IP address can be reassociated with a different resource if it already associated with a resource.

☐ Allow this Elastic IP address to be reassociated

Cancel   **Associate**

Figure: Associate the EIP to the test instance.

16. Navigate back to the **Instances** page using the left navigation pane. Select the checkbox for the **test instance** and navigate to the **Networking** tab. Take note of the Public IPv4 address. Did you notice that the EIP address is now the Public IP address? Now stop and start the instance and observe the differences. What did you observe? Is this a static or dynamic IP address? Did you solve the customer's issue? Why or why not?

Task 2: Send the Response to the customer (Group Activity)

Within your group, submit your findings.

Person 1 will act as Bob the customer, while Person 2 will act as the Cloud Support Engineer. Person 2 will talk over their findings to Person 1.

> **Note**
>
> This task should only take 5-10 minutes. Walk through your findings to the class.

Lab Complete 🎓

🏁 Congratulations! You have completed the lab.

17. Select ⬚End Lab⬚ at the top of this page and then select ⬚Yes⬚ to confirm that you want to end the lab.
    A panel will appear, indicating that "DELETE has been initiated... You may close this message box now."
18. Select the **X** in the top right corner to close the panel.

Recap

In this lab, you have investigated the customer's environment and applied troubleshooting techniques that allowed you to resolve the customers' issue. Within the scenario, you discovered that the customer Amazon EC2 instance (public instance) had a dynamic IP address which caused it to constantly change IPs when the instance was stopped and started. In order to fix this issue, you suggested attaching an EIP in order for the IP to become persistent (static). This was tested by SSHing into the test instance and starting and stopping it with a dynamic IP address.

Additional Resources

Amazon EC2 Instance public IP addressing

EIP

For more information about AWS Training and Certification, see https://aws.amazon.com/training/.

Your feedback is welcome and appreciated.
If you would like to share any suggestions or corrections, please provide the details in our AWS Training and Certification Contact Form.