Assignment: Exploring Google Cloud Services

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GitHub

Table of Contents

Introduction

This assignment focuses on exploring key services provided by **Google Cloud Platform (GCP)**, specifically in the areas of virtual machines, cloud storage, and networking. The primary objective is to gain practical experience with setting up and managing cloud resources, including the creation of a Virtual Machine (VM) instance, configuring a web server, utilizing cloud storage, and establishing networking through Virtual Private Cloud (VPC).

By completing this assignment, students will develop skills in:

- Deploying and configuring cloud-based virtual machines.
- Installing and running web servers on cloud infrastructure.
- Managing cloud storage buckets and setting lifecycle rules.
- Setting up and securing network configurations for virtual machines using VPC and firewall rules.

The assignment provides hands-on experience with cloud technologies that are essential for managing scalable and efficient cloud-based applications and infrastructure.

1. Virtual Machines in Google Cloud

VM Creation:

To create a Virtual Machine (VM) in Google Cloud, I went to the **Compute Engine** section and clicked on **VM instances**. Then, I clicked **Create Instance** and chose the machine type. I selected a small, basic machine type to keep it simple and picked **Ubuntu** as the operating system. In the firewall section, I checked the box to allow **SSH** traffic so that I could connect to the VM. After everything was set, I clicked **Create** to launch the VM.

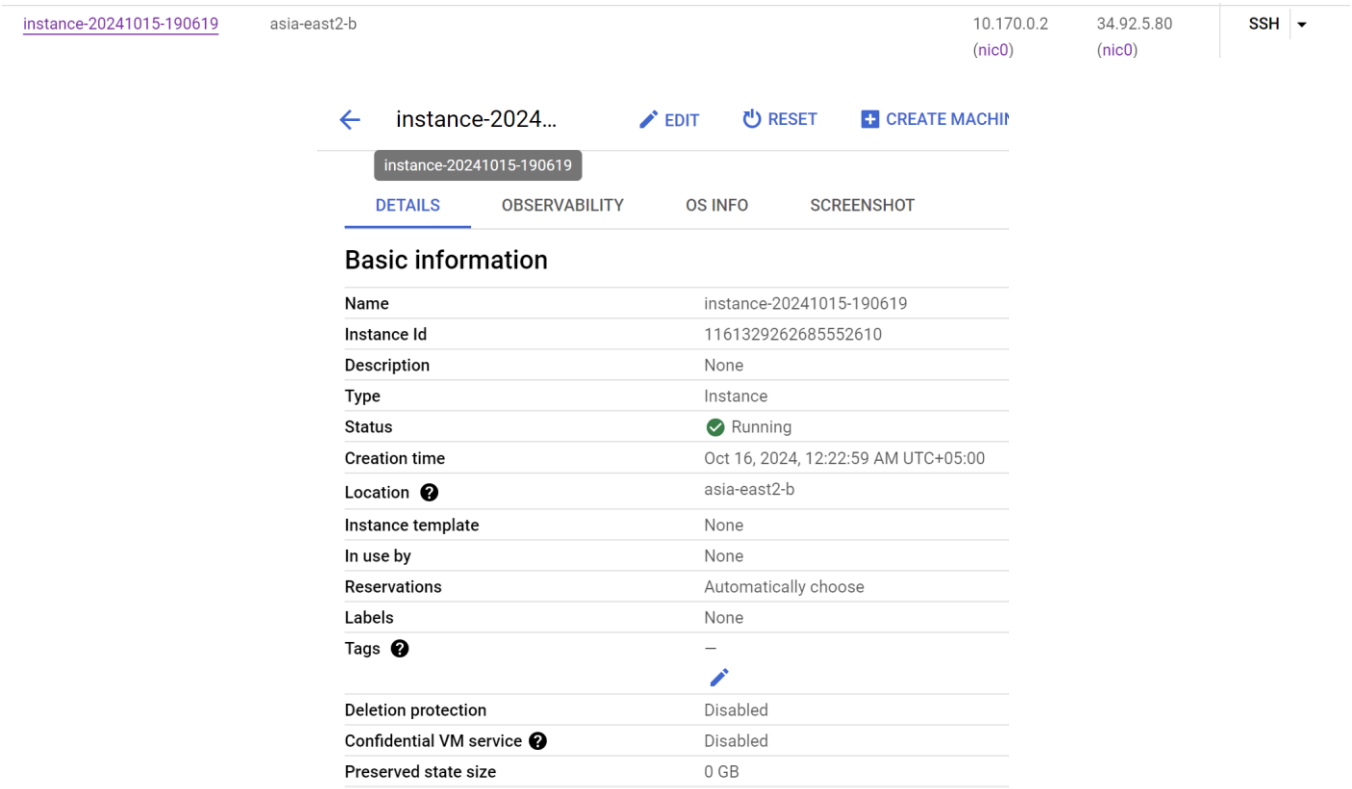


Fig 1. Basic information about created VM

Connection:

Once the VM was running, I connected to it by clicking the **SSH** button next to the instance name. This opened a terminal in my browser. From there, I installed a web server. I first updated the package list using the command:

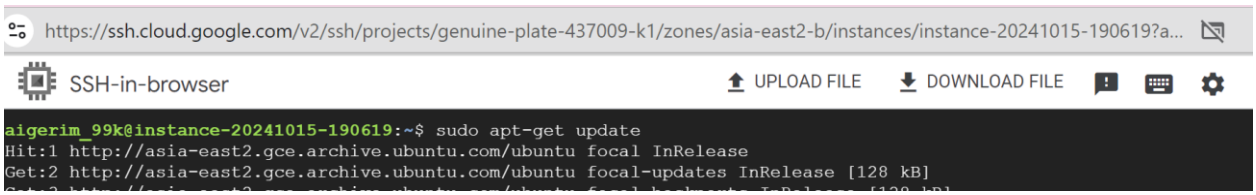


Fig 2. Command for updating the package list

Then, I installed Apache by running:

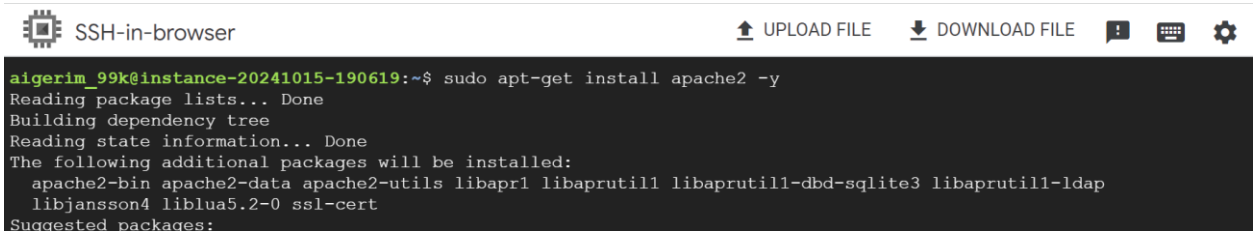
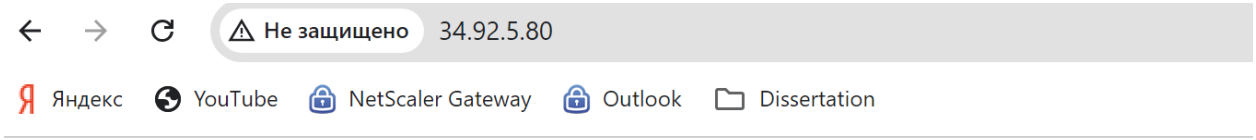


Fig 3. Command for Apache installation

After that, I created a simple HTML file to test the web server. I used this command to create a test page:

Fig 4. Command for creating a HTML page



Hello, Google Cloud!

Fig 5. Test HTML page

Findings:

Everything worked fine, and I could access the test page by typing my VM's external IP into a browser. The page showed "Hello, Google Cloud!" as expected. One small challenge I faced was the error with the exclamation mark when creating the HTML file, but I quickly fixed it by using single quotes around the text. Overall, the process was straightforward, and I learned how to set up and connect to a VM, as well as install a web server.

2. Storage Solutions in Google Cloud

Bucket Creation:

To create a storage bucket in Google Cloud, I first went to the **Storage** section by clicking on **Buckets** under the **Storage** tab in the Google Cloud Console. I clicked **Create Bucket** and chose a unique name **bucket-aassignment2** for my bucket. I then selected the **location** (I picked a multiple regions in Asia) and the **storage class** as **Standard** because it's suitable for frequently accessed data. For access controls, I decided to make the bucket **private**, as I didn't want the files to be publicly accessible.

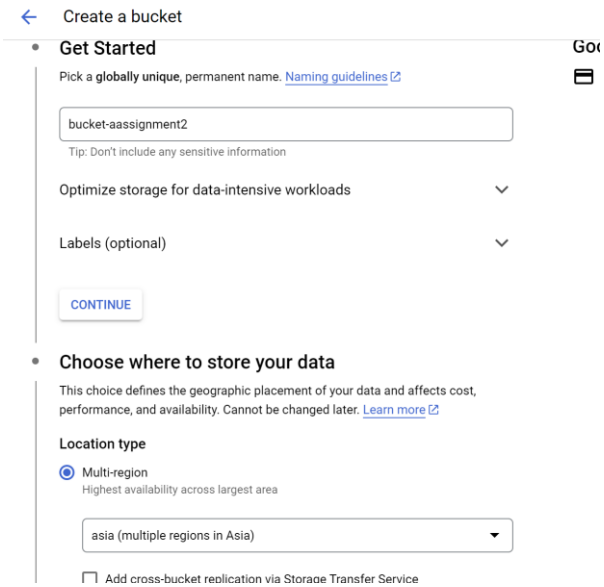


Fig 6. Creating a bucket

Upload a Sample File:

After creating the bucket, I clicked on it and used the **Upload Files** button to add a sample file (I chose an image). Once the file was uploaded, it appeared in the bucket and was ready to be accessed based on the access control settings I had chosen earlier.

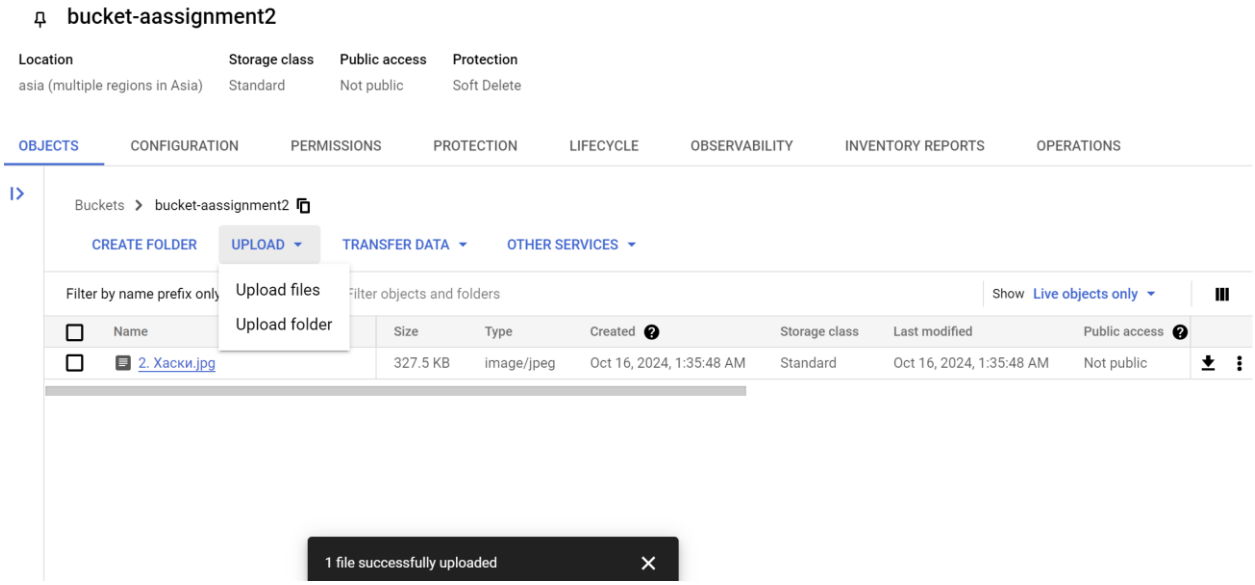


Fig 7. Uploading image

Object Lifecycle Management:

Next, I set up **Lifecycle Management** for the bucket. This feature automatically manages the lifecycle of objects in the bucket, such as deleting them after a certain period. To set this up, I went to the **Bucket Settings** and under **Lifecycle Management**, I added a rule to **delete objects after 30 days**. This means that any file I upload to the bucket will be automatically deleted after 30 days.

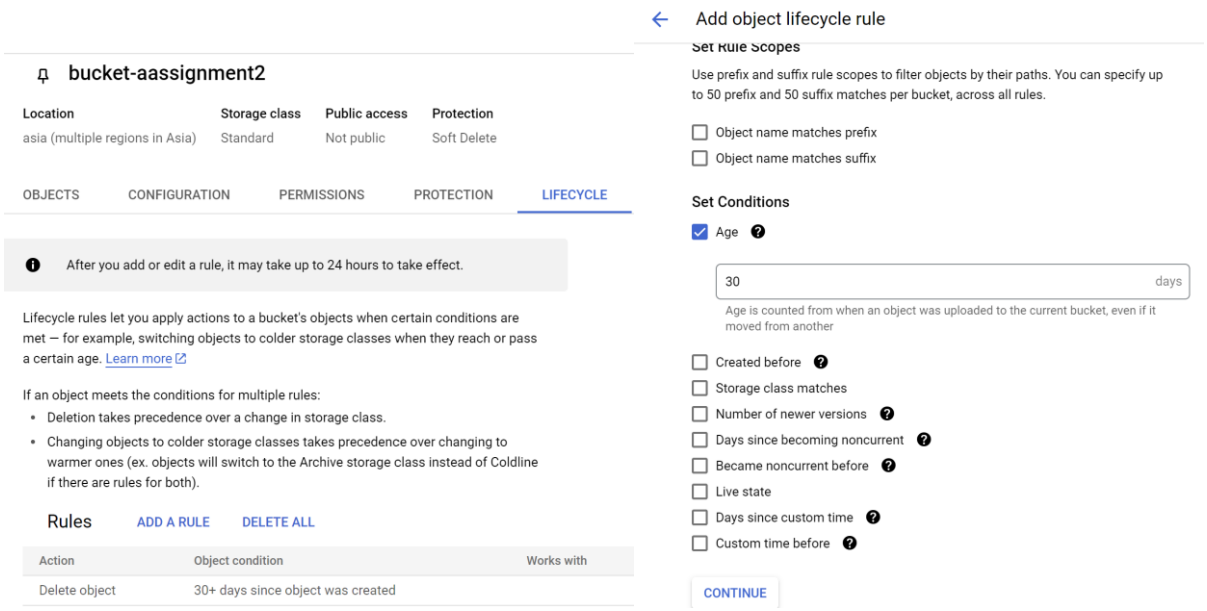


Fig 8-9. A rule to delete objects after 30 days

Findings: Creating the cloud storage bucket was simple, and I learned that it's a flexible and secure way to store data. The lifecycle rules are really helpful because they can automatically delete old files, which saves space and keeps everything organized. This experience showed me how easy it is to manage cloud storage and how useful it can be for future projects.

3. Networking in Google Cloud

VPC Setup: To create a Virtual Private Cloud, I started by logging into the Google Cloud Console. I went to the "VPC network" section and clicked on "Create VPC Network." (Fig 10) I gave my VPC name (vpc-ass2) and chose a region (asia-east2) where it would be located. Then, I created subnet by defining IP address ranges, 10.1.0.0/24 (Fig 11) I also set up firewall rules to control the traffic in and out of the VPC (Fig 12-14) This process allowed me to create a secure environment for my virtual machines (VMs).

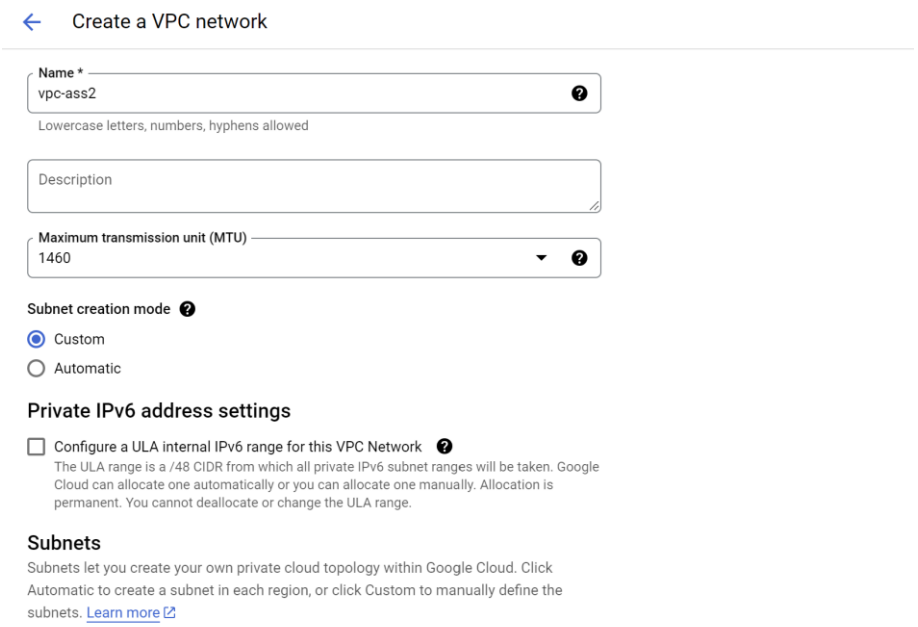


Fig 10. VCP creation

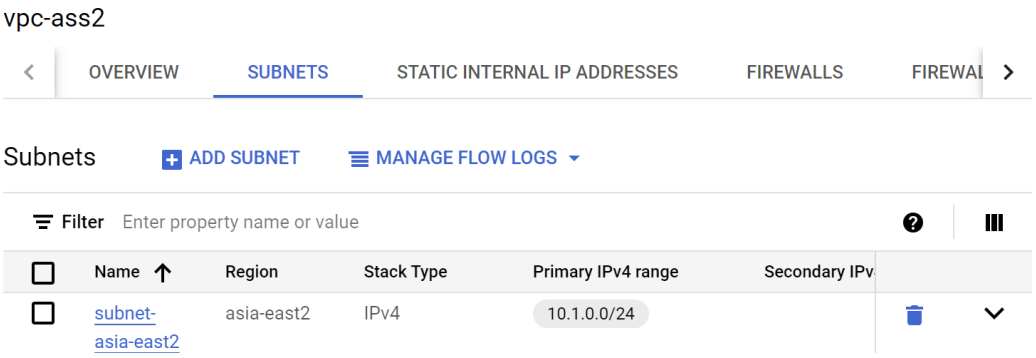


Fig 11. Subnet and IP range

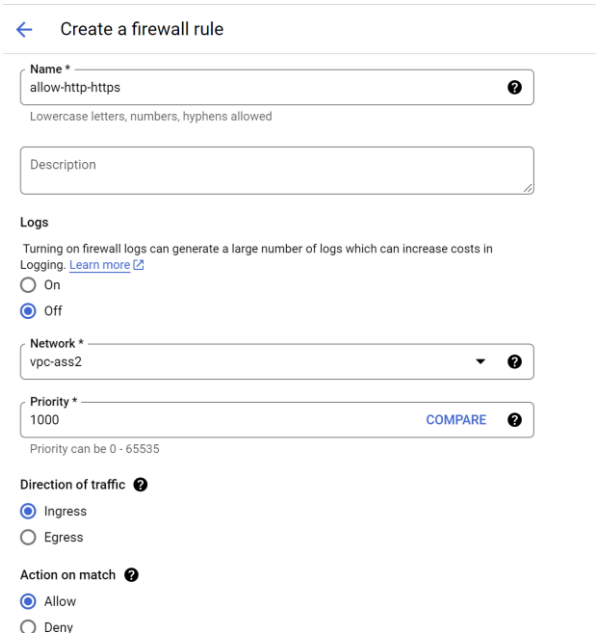


Fig 12. Firewall Configuration

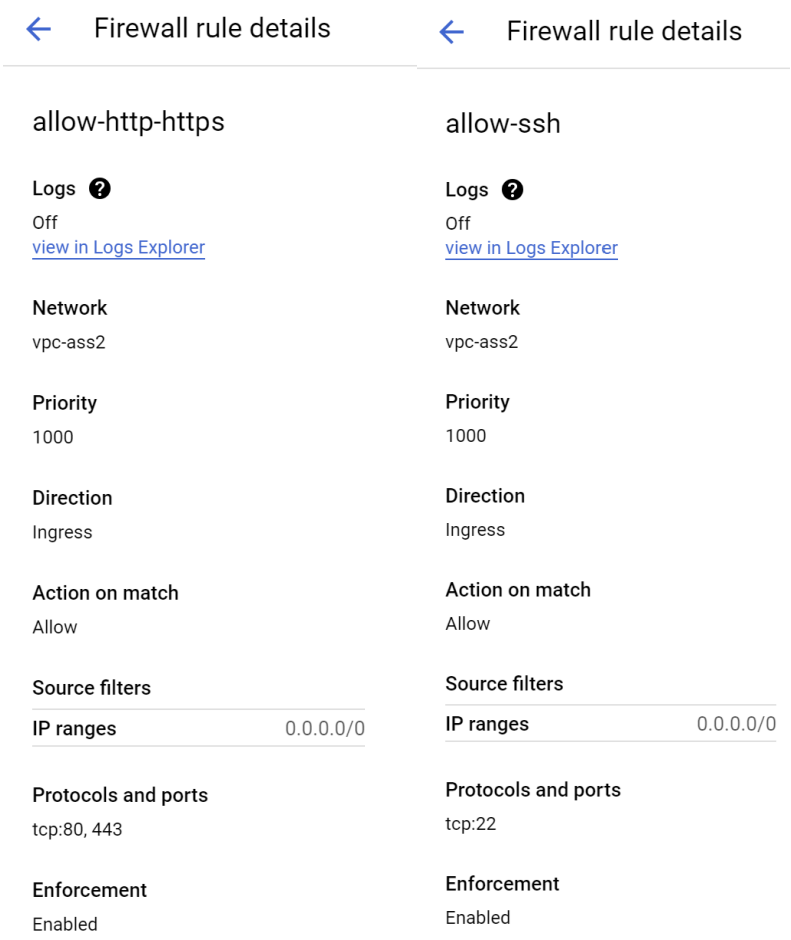
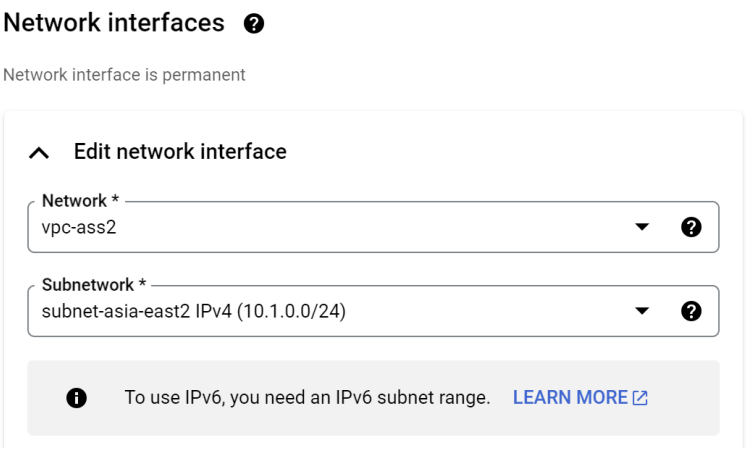


Fig 13-14. Firewall Rules that allows HTTP,HTTPS,SHH traffic

Connectivity: To make sure my VM could connect to the internet, I assigned it an external IP address. Then, I checked the firewall rules to ensure they allowed incoming traffic on necessary ports, such as port 22 for SSH, and ports 80 and 443 for web traffic. After confirming the settings, I tested the connection by trying to ping an external server and accessing my VM via SSH. This confirmed that my VM was able to communicate with the internet properly.

```
Last login: Tue Oct 15 19:41:49 2024 from 35.235.243.97
aigerim_99k@instance-20241015-190619:~$ ping google.com
PING google.com (142.250.76.238) 56(84) bytes of data.
64 bytes from nchkga-ad-in-f14.1e100.net (142.250.76.238): icmp_seq=1 ttl=122 time=3.32 ms
64 bytes from nchkga-ad-in-f14.1e100.net (142.250.76.238): icmp_seq=2 ttl=122 time=0.899 ms
64 bytes from nchkga-ad-in-f14.1e100.net (142.250.76.238): icmp_seq=3 ttl=122 time=0.932 ms
64 bytes from nchkga-ad-in-f14.1e100.net (142.250.76.238): icmp_seq=4 ttl=122 time=0.874 ms
64 bytes from nchkga-ad-in-f14.1e100.net (142.250.76.238): icmp_seq=5 ttl=122 time=0.869 ms
64 bytes from nchkga-ad-in-f14.1e100.net (142.250.76.238): icmp_seq=6 ttl=122 time=0.829 ms
64 bytes from nchkga-ad-in-f14.1e100.net (142.250.76.238): icmp_seq=7 ttl=122 time=0.871 ms
64 bytes from nchkga-ad-in-f14.1e100.net (142.250.76.238): icmp_seq=8 ttl=122 time=0.825 ms
64 bytes from nchkga-ad-in-f14.1e100.net (142.250.76.238): icmp_seq=9 ttl=122 time=0.865 ms
```

Fig 15. Connectivity Test with ping command



Findings: Setting up networking in the cloud is important because it lets me control how my resources are organized and secured. A VPC gives me an isolated environment, and firewall rules protect my VMs by allowing only the traffic I need. Cloud networking is essential for making sure everything works smoothly and safely, especially when connecting VMs to the internet.

Conclusion

In this assignment, I learned how to use different Google Cloud services like Virtual Machines, Cloud Storage, and Virtual Private Cloud (VPC). I learned how to create and manage a virtual machine, set up a storage bucket to save files, and create a private network to control how my resources connect to the internet. The process showed me how cloud services can help organize and secure data and make it easier to manage applications.

These Google Cloud services are useful for many things, like hosting websites, storing files safely, and managing networks. They allow businesses to work more efficiently and securely, without needing physical servers or hardware. I can see how these tools could be used for building apps, storing large amounts of data, or creating secure networks for businesses.

References

1. Google Cloud documentation: https://cloud.google.com/docs
2. Google Cloud tutorials for Compute Engine and Cloud Storage setup
3. Various online resources and guides on networking and cloud infrastructure