Assignment 2

Cloud Computing

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Github link for this Assignment:https://github.com/piiiiiiiiiiiiiiiipp/Cloud-Coputing-ASS

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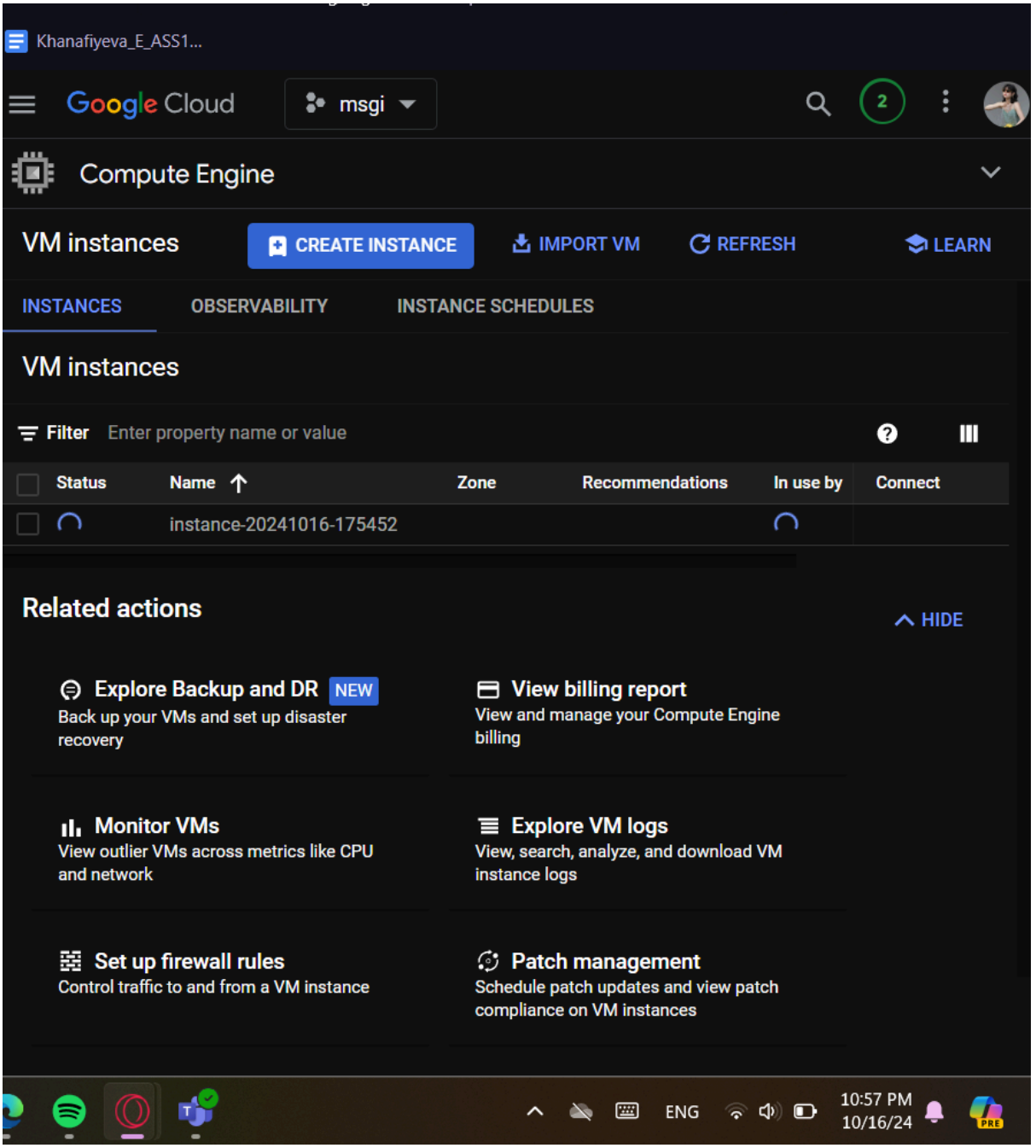
Introduction

This assignment is aimed at giving students real experience with a number of Google Cloud services including managing virtual machines, cloud storage, and networking. Students will learn how to create and set up a virtual machine (VM), install important services like the web server and learn how to secure that, by creating firewall rules. They will upload files to a Cloud Storage bucket, create Automatic Rules in the bucket to manage these files, and more. In addition, students will launch a Virtual Private Cloud (VPC) to manage the resources and enable free traffic flow between the VM and the Internet. The completion of this assignment will enable students to get some idea of how these cloud services work together to provide a flexible and secure infrastructure.

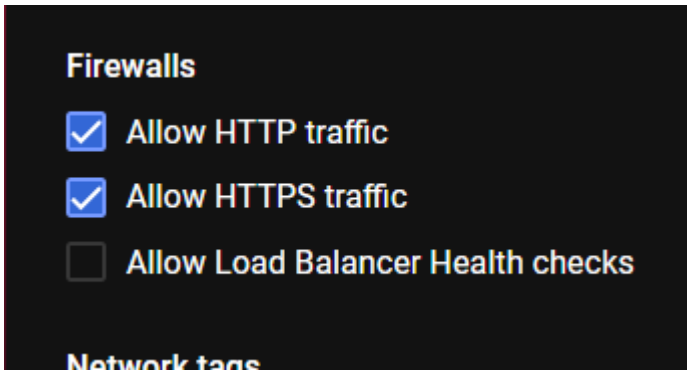
Exercise 1. Virtual Machines in Google Cloud

- Create a Virtual Machine (VM) Instance
- Use the Google Cloud Console to create a VM instance.

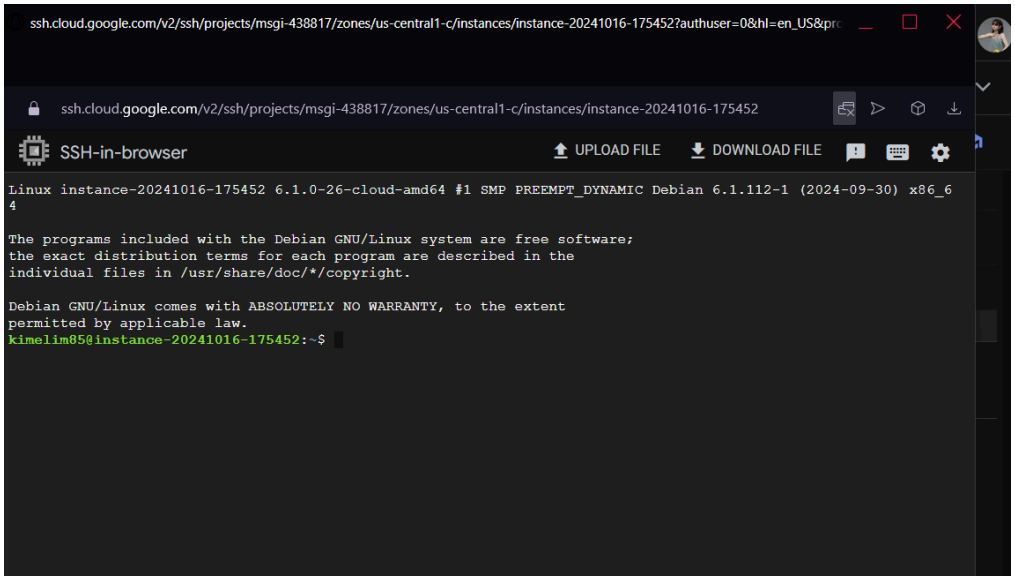


  - Select an appropriate machine type, operating system, and region.

- Configure the firewall to allow SSH traffic.

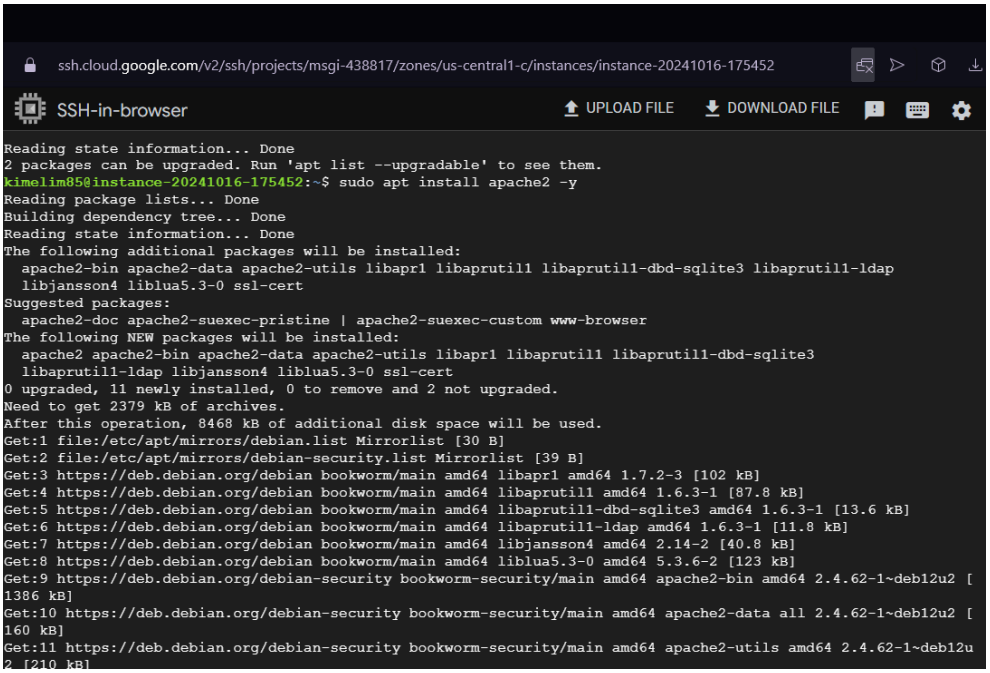
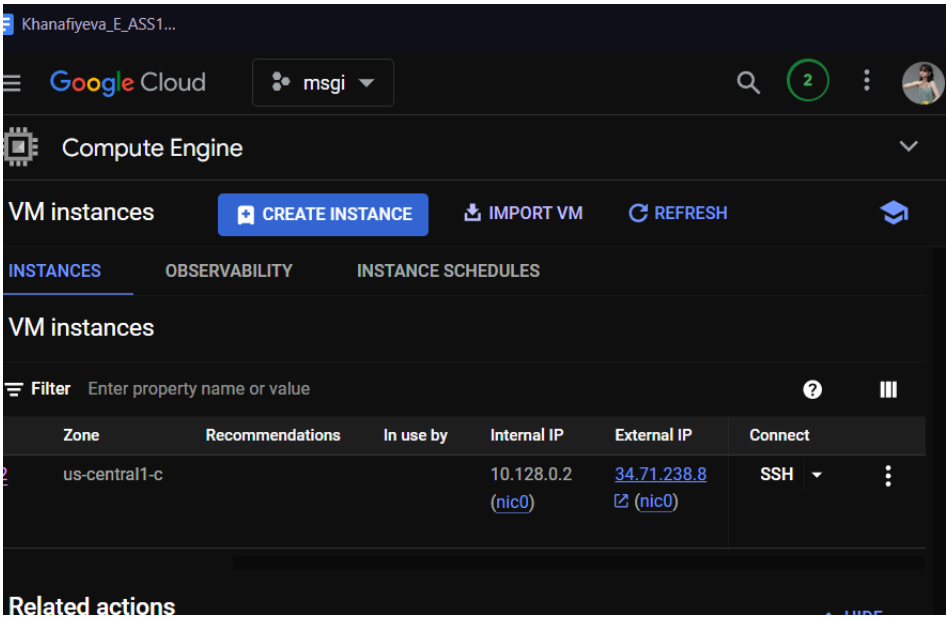


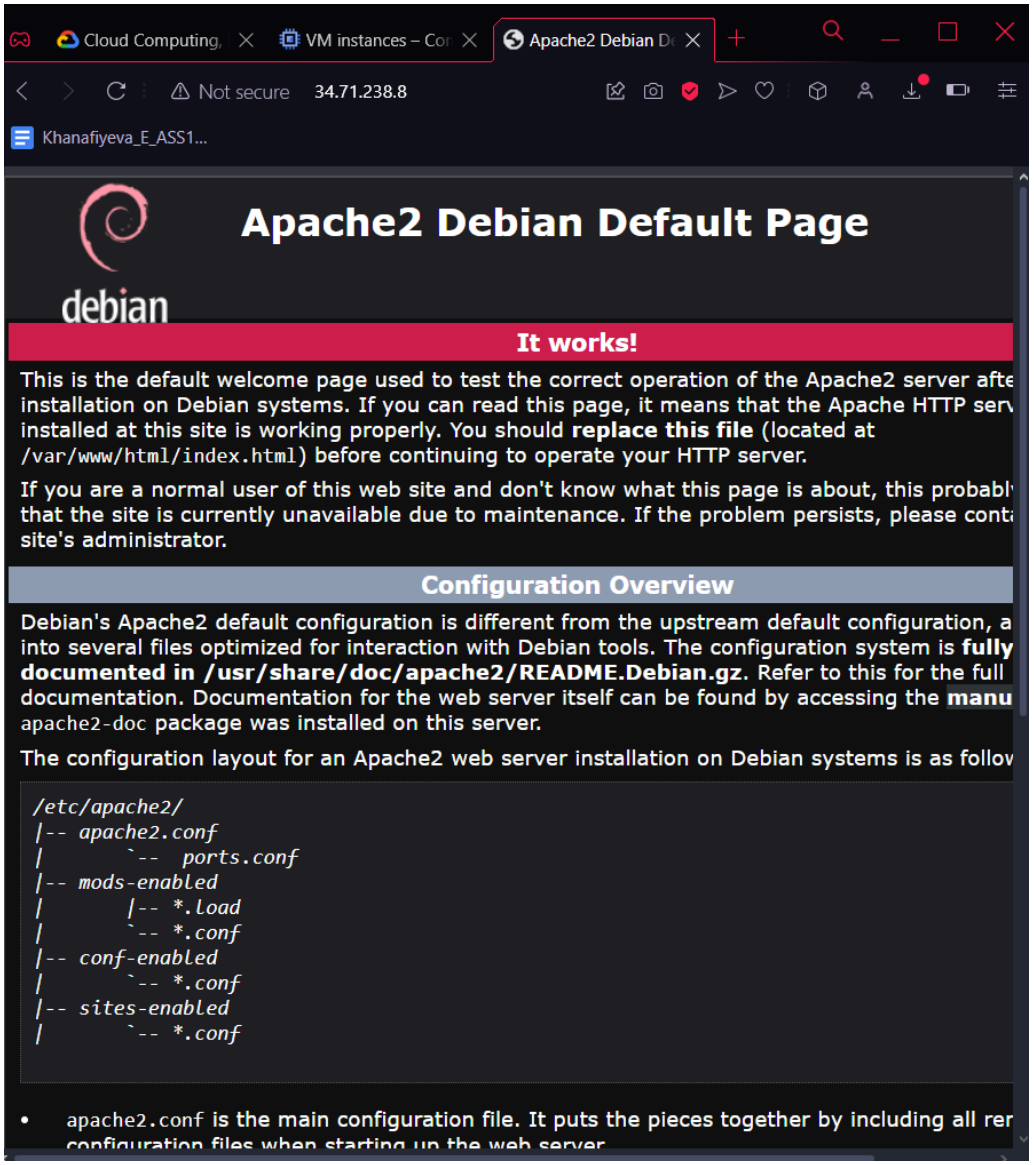
- **Connect to the VM**
  - Use the SSH option from the Cloud Console to connect to your VM.

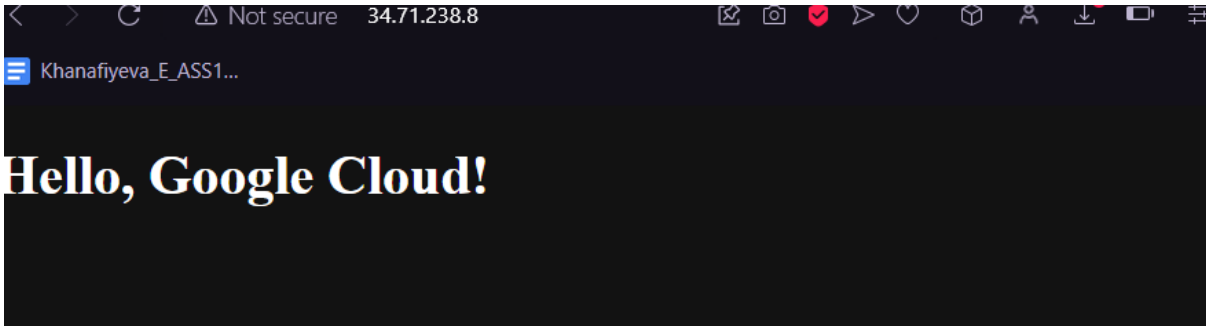


  - Install a web server (e.g., Apache or Nginx) on the VM.

```
sudo apt update

sudo apt install apache2 -y


sudo systemctl enable apache2

sudo systemctl start apache2
```

- 
ssh.cloud.google.com/v2/ssh/projects/msgi-438817/zones/us-central1-c/instances/instance-20241016-175452
SSH-in-browser
UPLOAD FILE
DOWNLOAD FILE
Reading state information... Done
2 packages can be upgraded. Run 'apt list --upgradable' to see them.
kimelim85@instance-20241016-175452:~$ sudo apt install apache2 -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
apache2-bin apache2-data apache2-utils libapr1 libaprutil1 libaprutil1-dbd-sqlite3 libaprutil1-ldap
libjansson4 liblua5.3-0 ssl-cert
Suggested packages:
apache2-doc apache2-suexec-pristine | apache2-suexec-custom www-browser
The following NEW packages will be installed:
apache2 apache2-bin apache2-data apache2-utils libapr1 libaprutil1 libaprutil1-dbd-sqlite3
libaprutil1-ldap libjansson4 liblua5.3-0 ssl-cert
0 upgraded, 11 newly installed, 0 to remove and 2 not upgraded.
Need to get 2379 kB of archives.
After this operation, 8468 kB of additional disk space will be used.
Get:1 file:/etc/apt/mirrors/debian.list Mirrorlist [30 B]
Get:2 file:/etc/apt/mirrors/debian-security.list Mirrorlist [39 B]
Get:3 https://deb.debian.org/debian bookworm/main amd64 libapr1 amd64 1.7.2-3 [102 kB]
Get:4 https://deb.debian.org/debian bookworm/main amd64 libaprutil1 amd64 1.6.3-1 [87.8 kB]
Get:5 https://deb.debian.org/debian bookworm/main amd64 libaprutil1-dbd-sqlite3 amd64 1.6.3-1 [13.6 kB]
Get:6 https://deb.debian.org/debian bookworm/main amd64 libaprutil1-ldap amd64 1.6.3-1 [11.8 kB]
Get:7 https://deb.debian.org/debian bookworm/main amd64 libjansson4 amd64 2.14-2 [40.8 kB]
Get:8 https://deb.debian.org/debian bookworm/main amd64 liblua5.3-0 amd64 5.3.6-2 [123 kB]
Get:9 https://deb.debian.org/debian-security bookworm-security/main amd64 apache2-bin amd64 2.4.62-1~deb12u2 [
1386 kB]
Get:10 https://deb.debian.org/debian-security bookworm-security/main amd64 apache2-data all 2.4.62-1~deb12u2 [
160 kB]
Get:11 https://deb.debian.org/debian-security bookworm-security/main amd64 apache2-utils amd64 2.4.62-1~deb12u
2 [210 kB]
- 
Khanafiyeva_E_ASS1...
Google Cloud
msgi
2
Compute Engine
VM instances
CREATE INSTANCE
IMPORT VM
REFRESH
INSTANCES
OBSERVABILITY
INSTANCE SCHEDULES
VM instances
Filter
Enter property name or value
Zone
Recommendations
In use by
Internal IP
External IP
Connect
us-central1-c
10.128.0.2 (nic0)
34.71.238.8 (nic0)
SSH
Related actions

- 

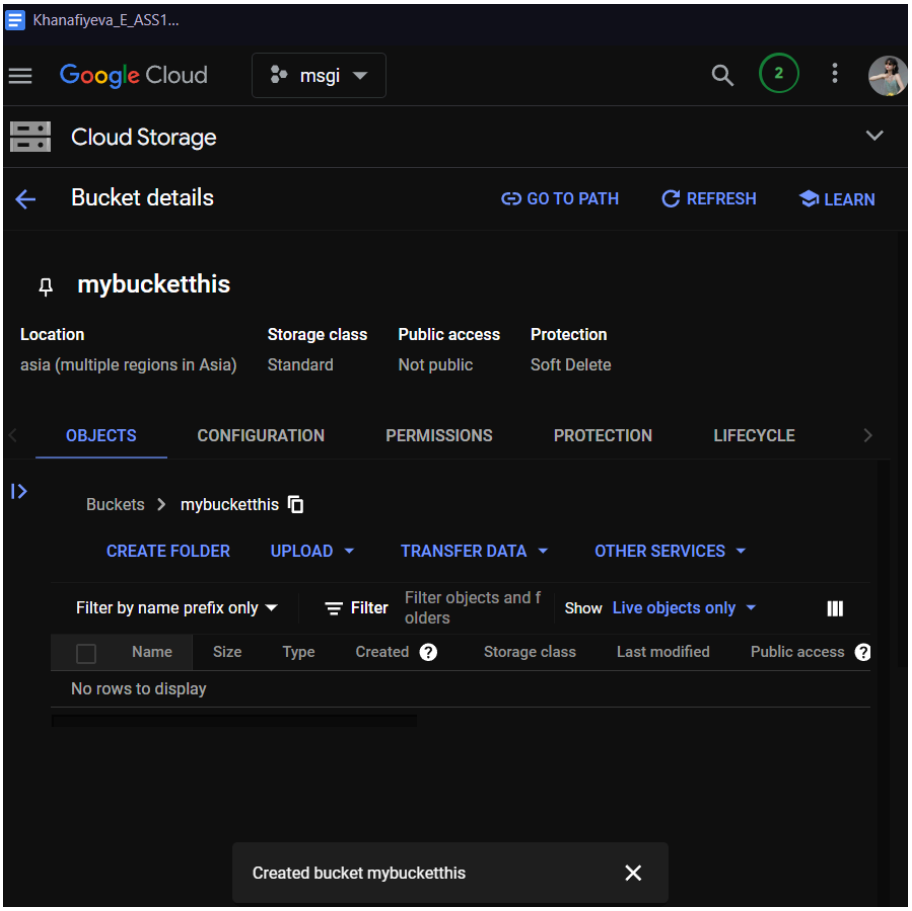
  - Create a simple HTML page to serve as a test.


- **Document the Process**
  - Take screenshots of each step: instance creation, connection, and web server setup.
  - Write a brief explanation of the choices made during setup.

I chose Debian(LINUX) because I am familiar with it. The apache server is the easiest one to install. Other settings, the type of the VM is the basic setting of the console.

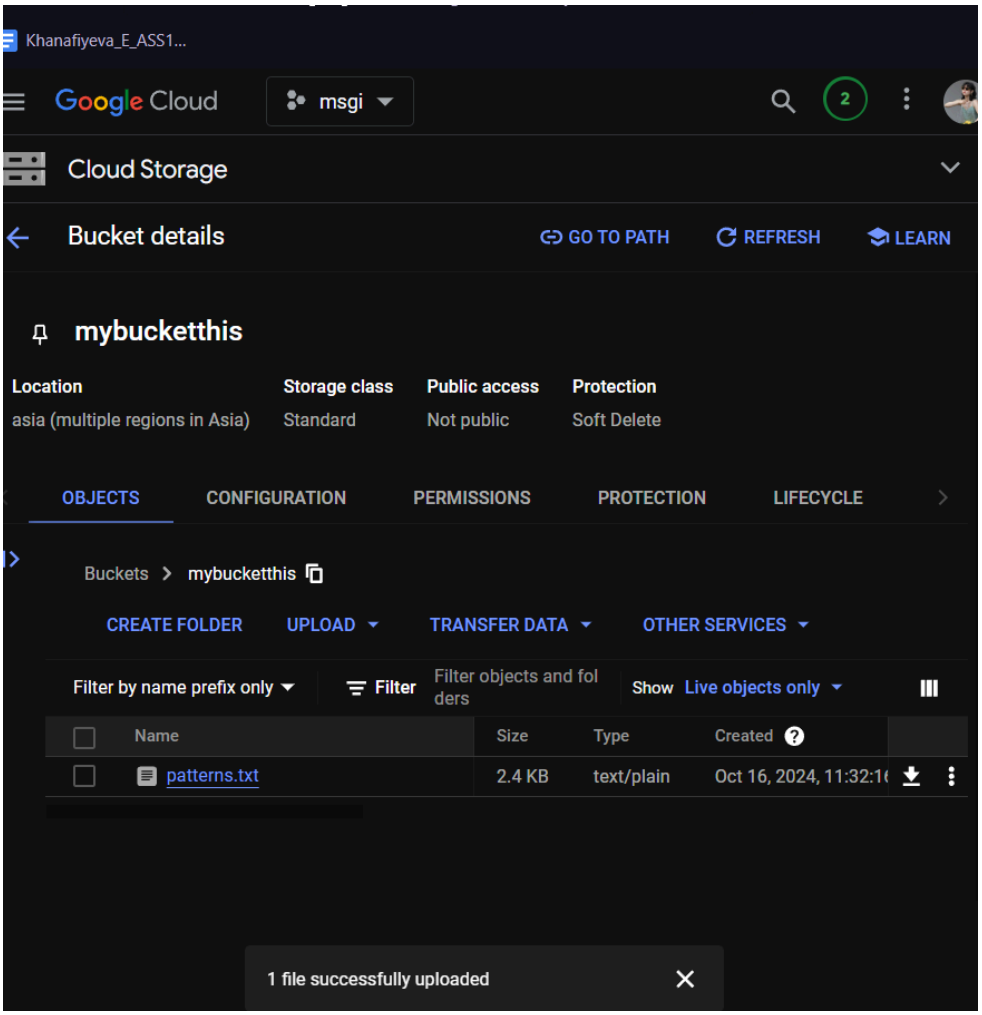
Exercise 2. Storage Solutions in Google Cloud

- **Create a Cloud Storage Bucket**
  - Use the Google Cloud Console to create a Cloud Storage bucket.



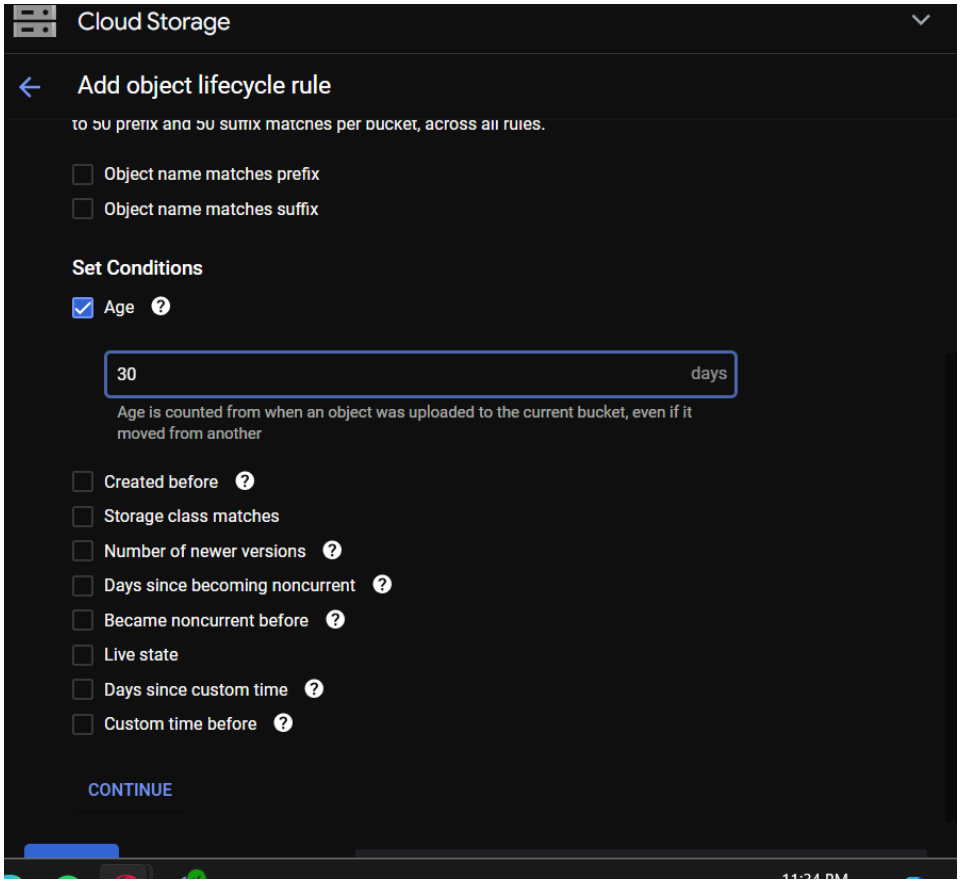
  - Set the bucket's access controls (public/private). **I chose Public**

- Upload a sample file (e.g., image or document) to the bucket.



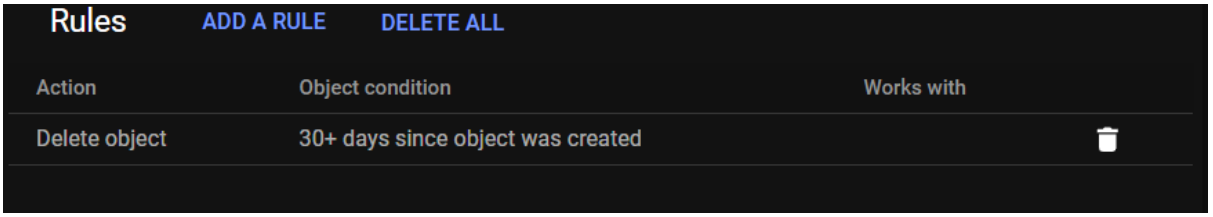
- **Implement Object Lifecycle Management**

- Set up a lifecycle rule for your bucket to automatically delete objects after a certain period (e.g., 30 days).



- **Document the Process**
  - Take screenshots of the bucket creation, file upload, and lifecycle rule setup.
  - Explain the use cases for Cloud Storage and the benefits of lifecycle management.

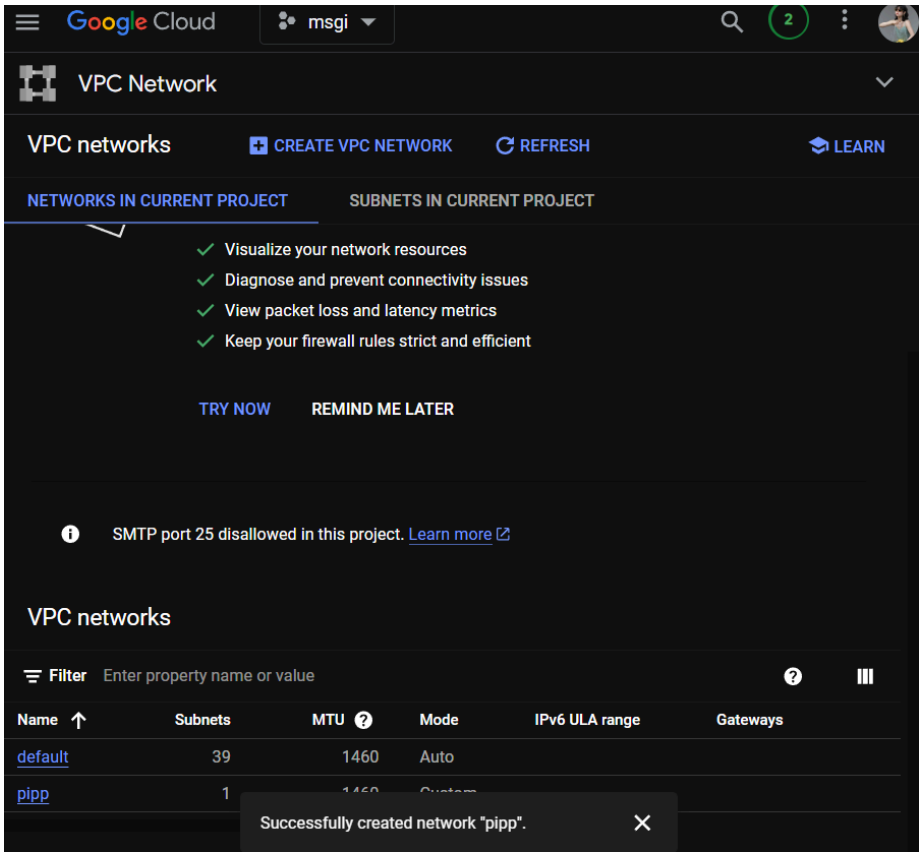
Q This Storage could be used for cold storage of static data, for backup, as a Data Lake and for disaster recovery processes as a backup.



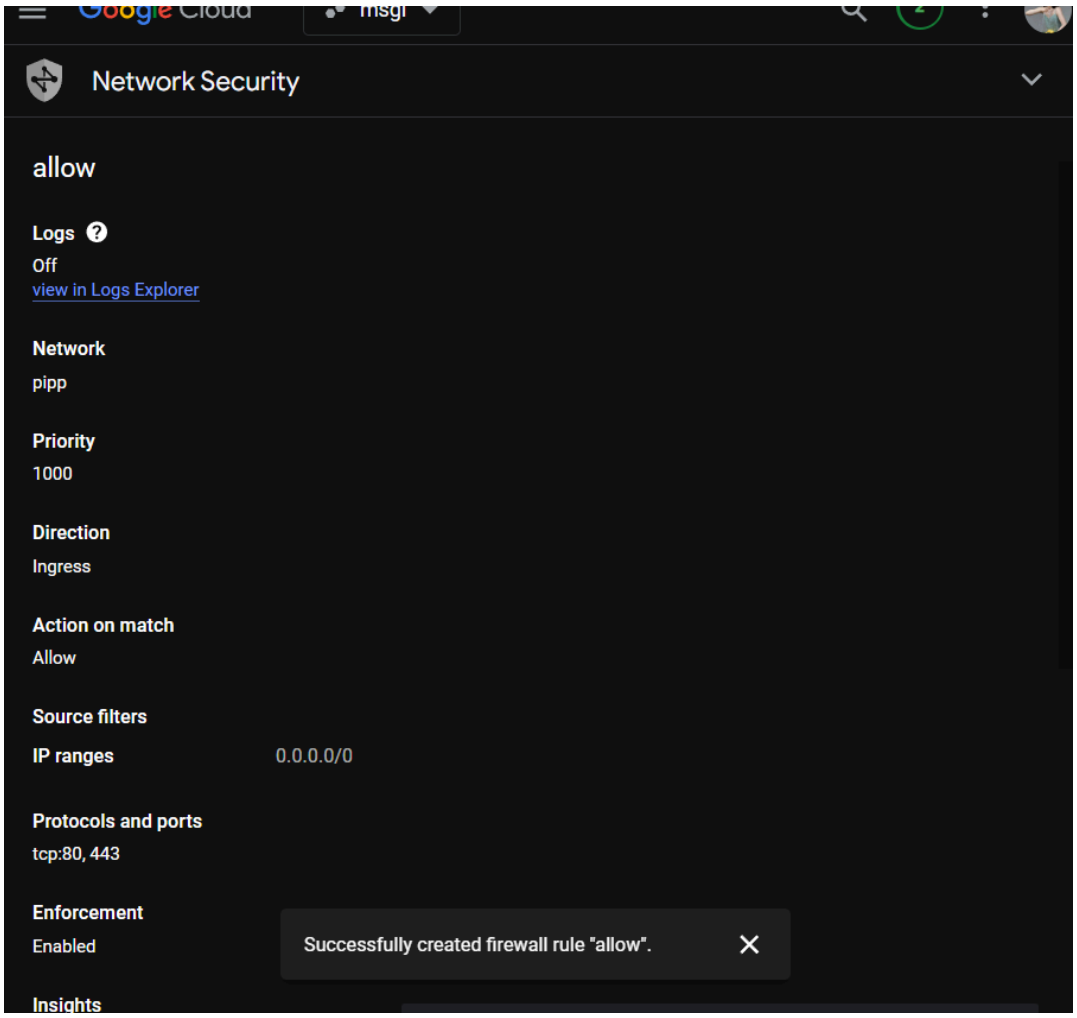
Q Lifecycle management could help benefiting in cost optimization, you can control the data storage implied by the rules of the policies, and get the automated maintenance.

Exercise 3. Networking in Google Cloud

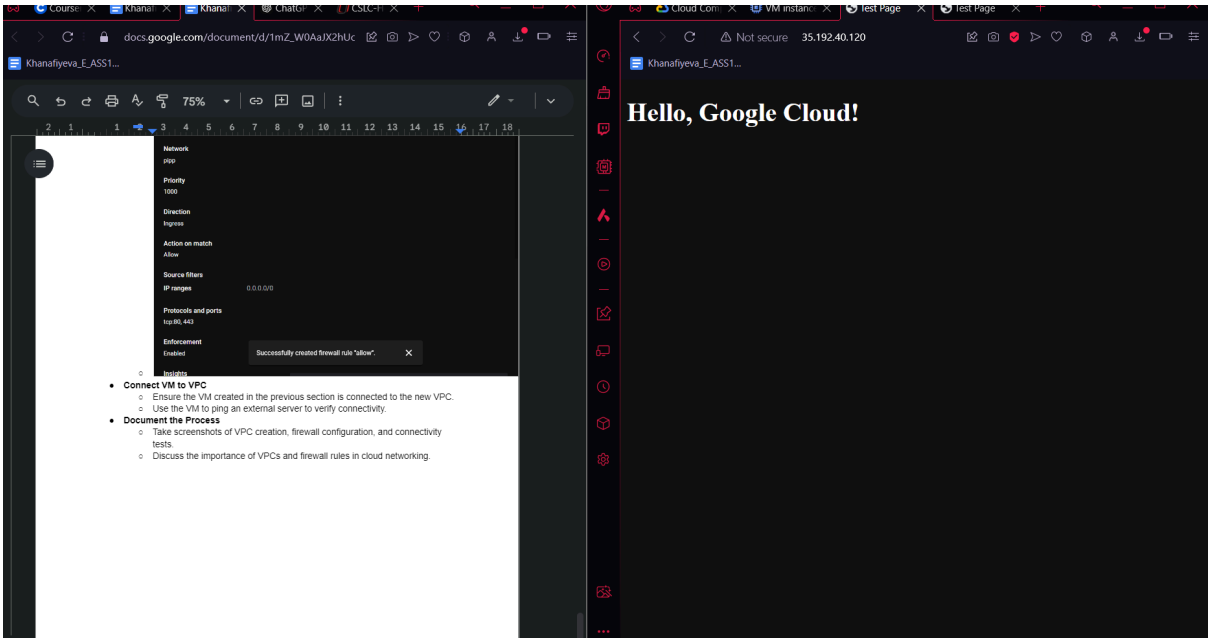
- **Set Up a Virtual Private Cloud (VPC)**
  - Create a new VPC network with subnets.



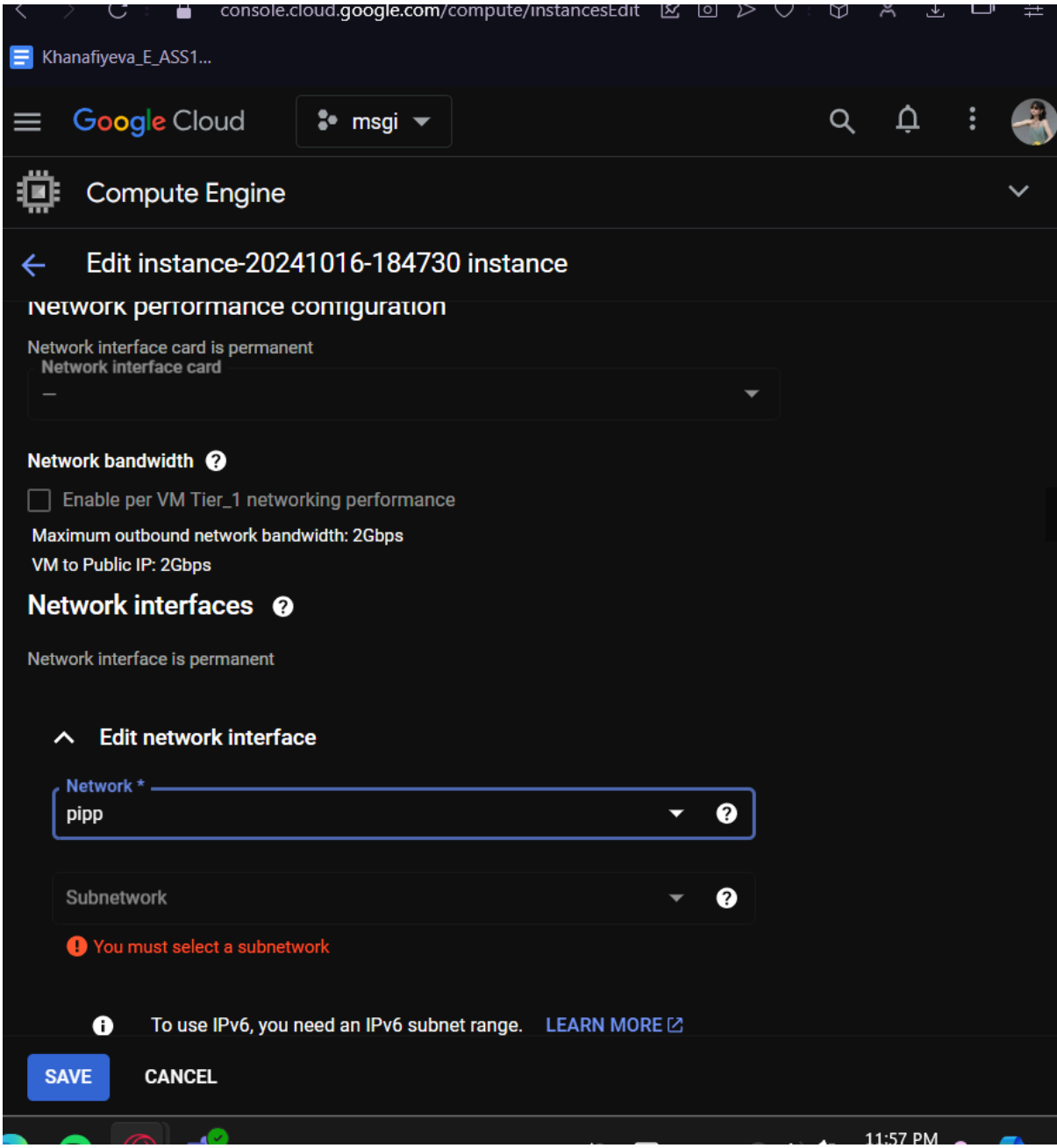
  - Configure firewall rules to allow traffic between your VM and the internet.

- 

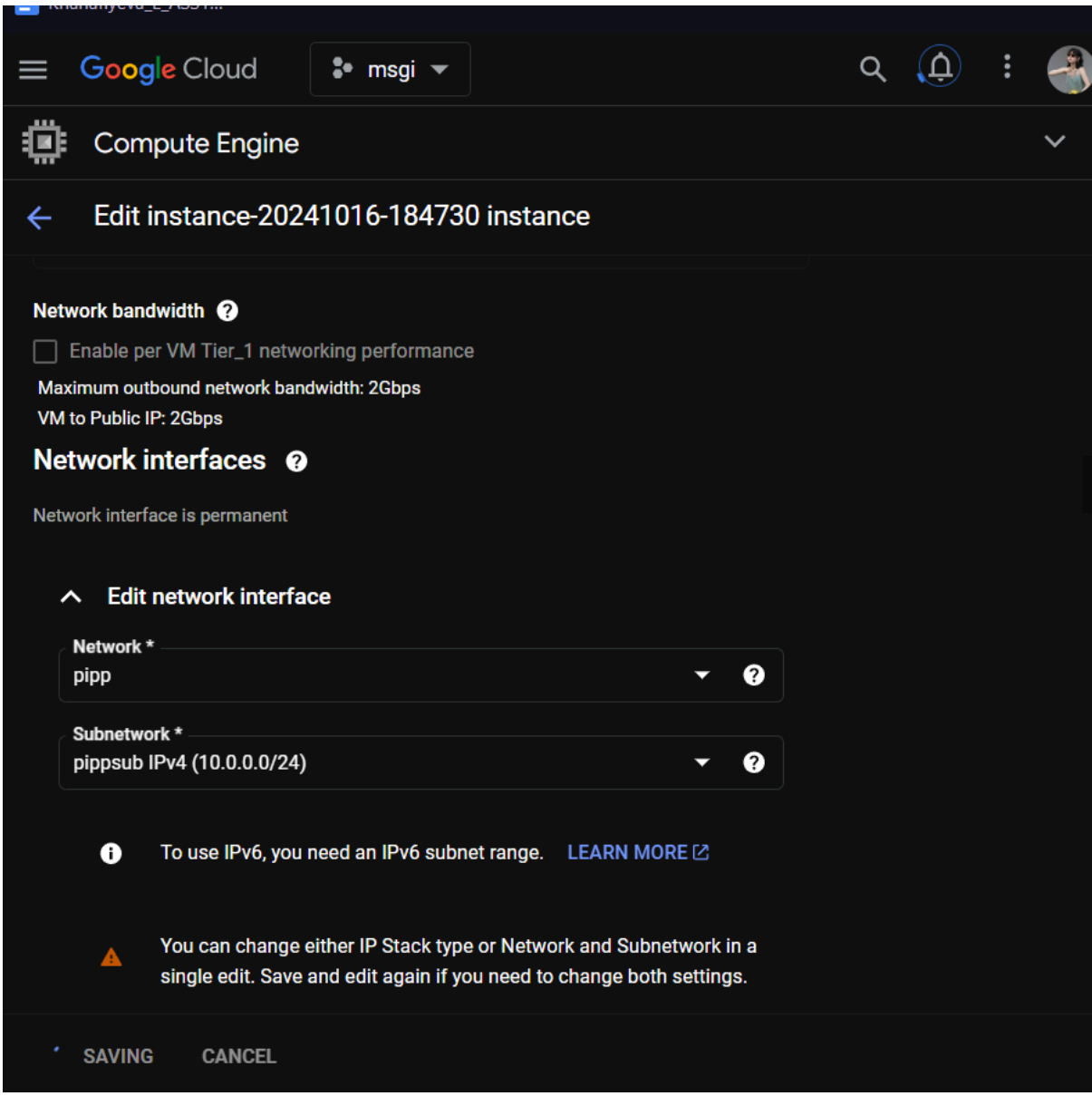
- **Connect VM to VPC**

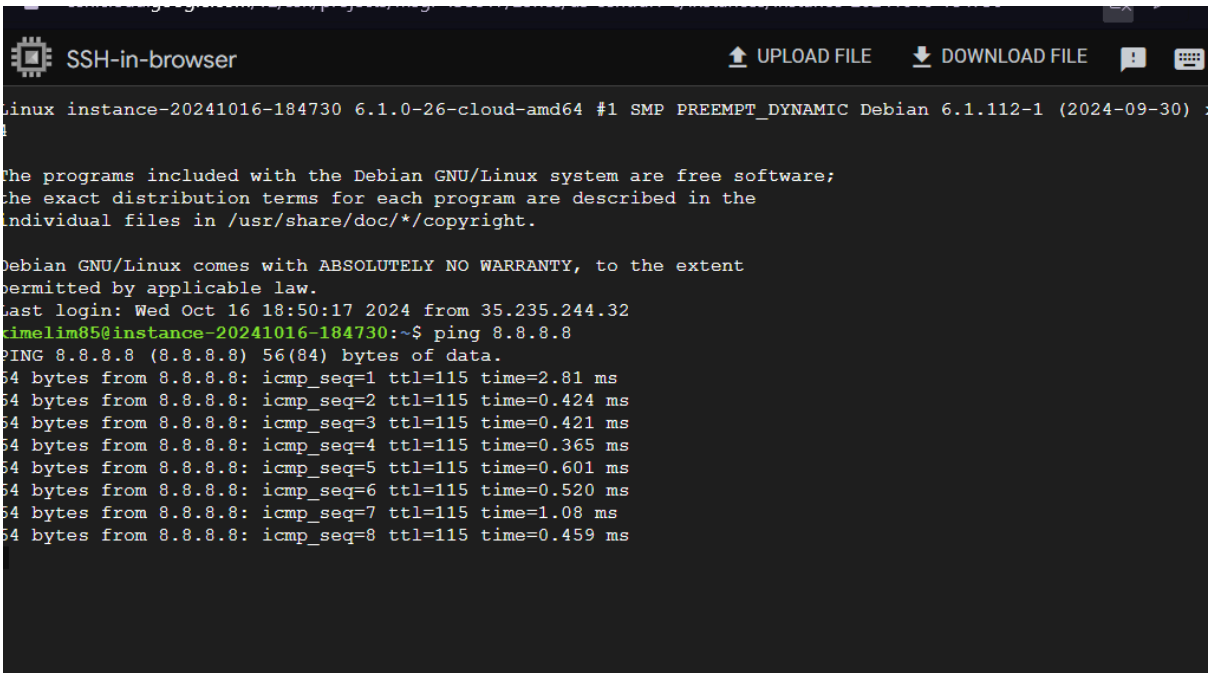


- Ensure the VM created in the previous section is connected to the new VPC.



- Use the VM to ping an external server to verify connectivity.

- 
Google Cloud
msgi
Compute Engine
Edit instance-20241016-184730 instance
Network bandwidth
Enable per VM Tier_1 networking performance
Maximum outbound network bandwidth: 2Gbps
VM to Public IP: 2Gbps
Network interfaces
Network interface is permanent
Edit network interface
Network *
pipp
Subnetwork *
pippsub IPv4 (10.0.0.0/24)
To use IPv6, you need an IPv6 subnet range.
LEARN MORE
You can change either IP Stack type or Network and Subnetwork in a single edit. Save and edit again if you need to change both settings.
SAVING
CANCEL



- **Document the Process**
    - Take screenshots of VPC creation, firewall configuration, and connectivity tests.
    - Discuss the importance of VPCs and firewall rules in cloud networking.

Vpc Network allows you to create an isolated network which is useful for cloud resources control and enabling for group, customization, VCPS are global.

Firewall rules insures that traffic flow between external internet and your application is secured and controlled, insures security, fine-graded control over traffic.

Conclusion

Overall, this assignment gave me good practical experience with Google Cloud, dealing with virtual machines, cloud storage and networking. Using a virtual machine we learnt that the first thing we need to secure access to our thing is by creating firewall rules and installing important services, such as a web server. Cloud Storage enabled us to examine data management and lifecycle policies, but also understand the value in automated file handling. Specifically, configuring of a Virtual Private Cloud (VPC) provided added emphasis on network isolation and traffic management.
In conclusion, the practice of using Google Cloud services in this lesson has provided us the knowledge and the skills to exploit cloud technology for real world applications.

Reference

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