Assignment 2

GCP Cloud Computing Assignment: VM Auto-Scaling and Security

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Course: Cloud Computing
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1. Introduction

In this assignment, we set up a virtual machine (VM) in Google Cloud Platform (GCP), configured auto-scaling to manage workload efficiently, and applied security measures to protect the setup. This document walks through each step in a simple and easy-to-follow way.

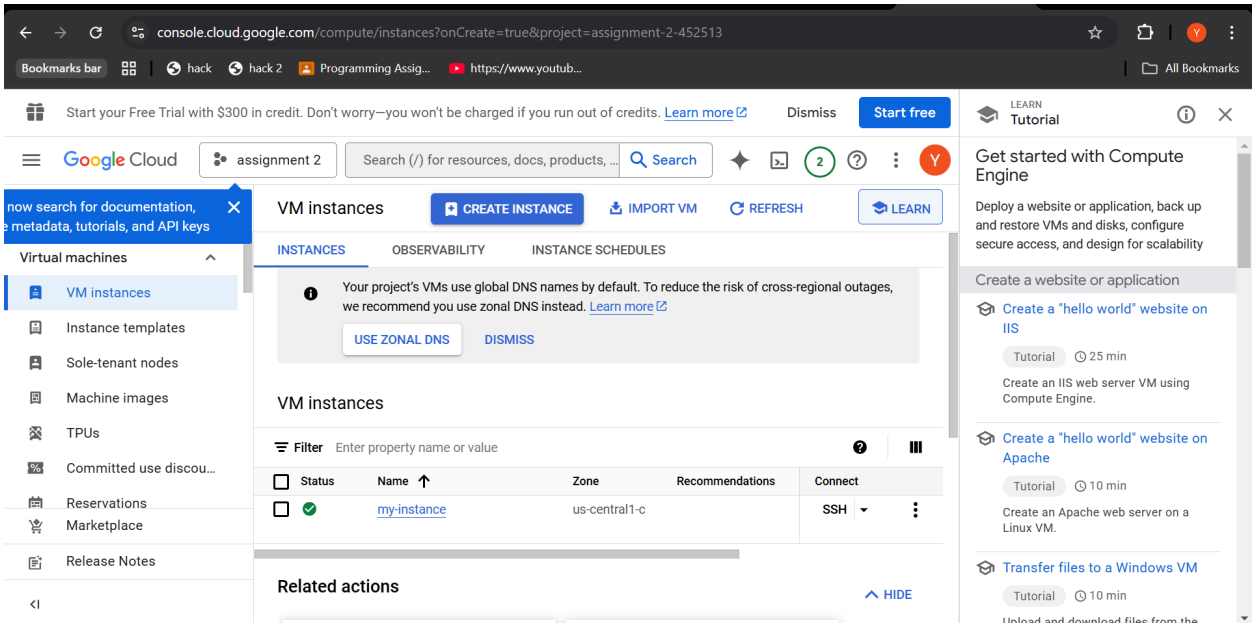
2. Creating a VM in GCP

Steps to Create a VM Instance:

First, we created a VM instance to serve as the base for our setup. Here's how we did it:

1. Open Google Cloud Console.
2. Go to **Compute Engine > VM Instances**.
3. Click **Create Instance**.
4. We configured the VM with the following settings:
    - **Name:** `my-instance`
    - **Machine Type:** `e2-micro` (free-tier eligible)
    - **Boot Disk:** `Ubuntu 20.04`
    - **Network Settings:** Allowed HTTP and HTTPS traffic.

5. Finally, we clicked **Create**, and our VM was ready.



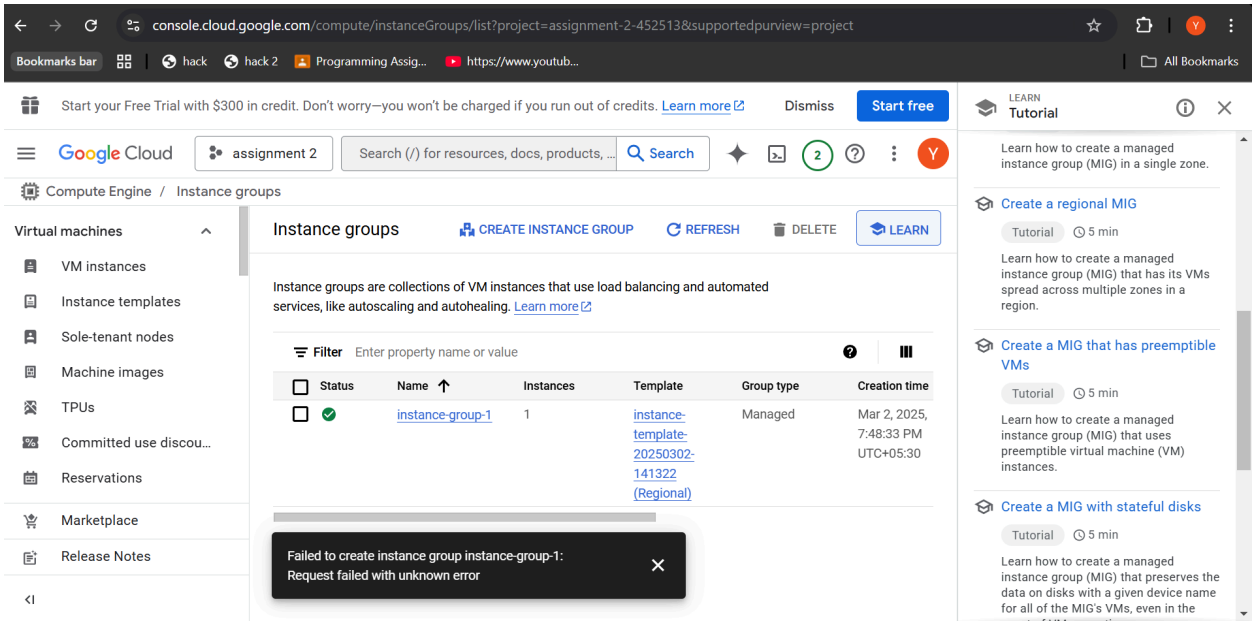
3. Setting Up Auto-Scaling

Next, we enabled auto-scaling to automatically adjust the number of instances based on CPU usage.

Steps to Enable Auto-Scaling:

1. Went to **Compute Engine > Instance Templates**.
2. Clicked **Create Instance Template** and set it up using the same settings as our VM.
3. Then, we navigated to **Instance Groups** and clicked **Create Instance Group**.
4. We selected **Managed Instance Group (MIG)** and chose our instance template.
5. Enabled **Auto-Scaling** with these settings:
    - **CPU Utilization Target:** 70%
    - **Minimum Instances:** 1
    - **Maximum Instances:** 3

6. Clicked **Create**, and auto-scaling was successfully configured.



4. Implementing Security Measures

To secure our setup, we configured IAM roles and firewall rules.

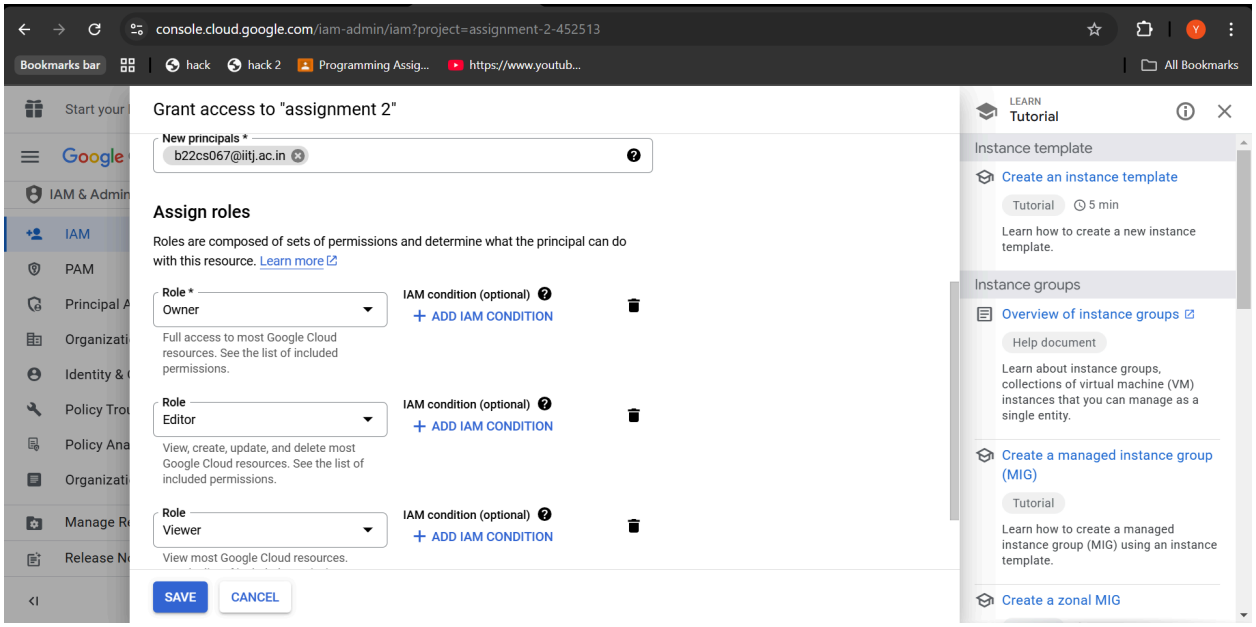
(a) Setting Up IAM Roles

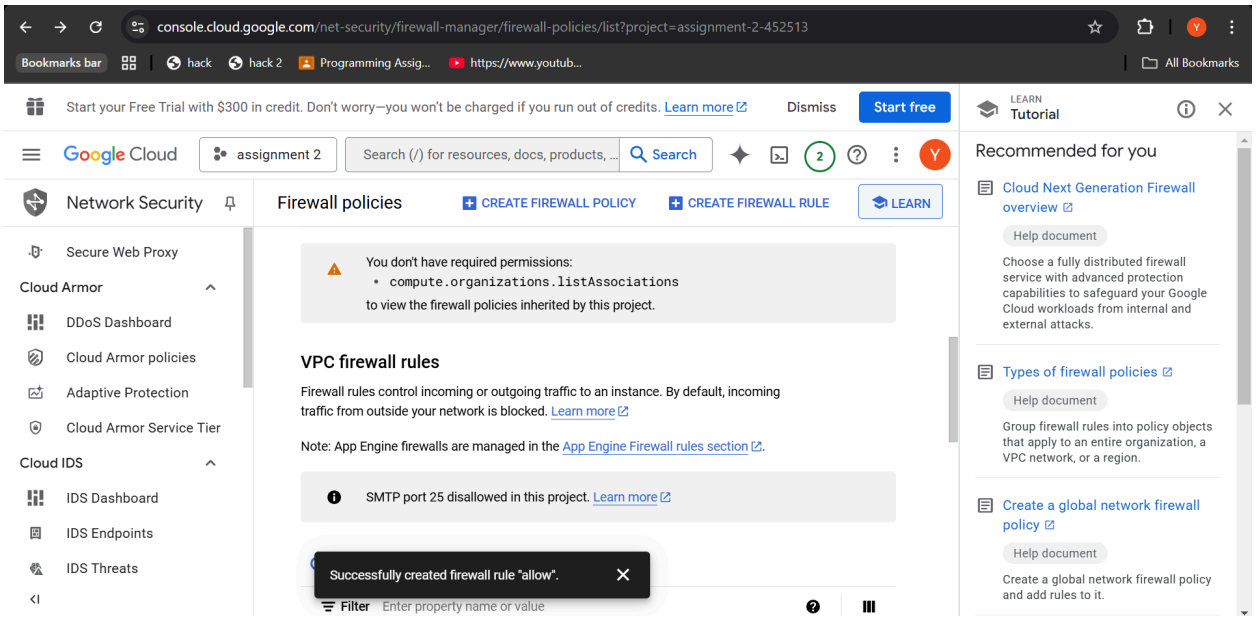
1. Went to **IAM & Admin > IAM**.
2. Clicked **Add** and assigned these roles:
    - **Viewer:** Can only view resources.
    - **Editor:** Can make changes but with limited permissions.
    - **Owner:** Has full control.

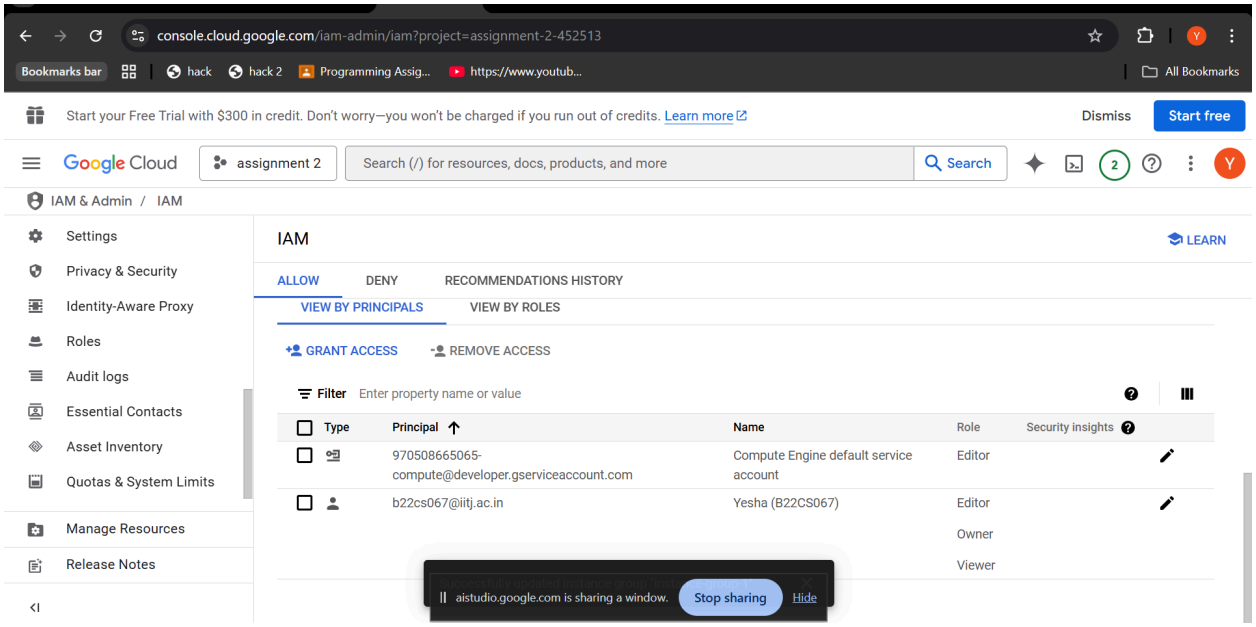
(b) Configuring Firewall Rules

1. Went to **VPC Network > Firewall**.
2. Clicked **Create Rule** and set up these rules:

- Allowed **HTTP (80)** & **HTTPS (443)** traffic.
- Restricted **SSH access** so only our IP address could connect.

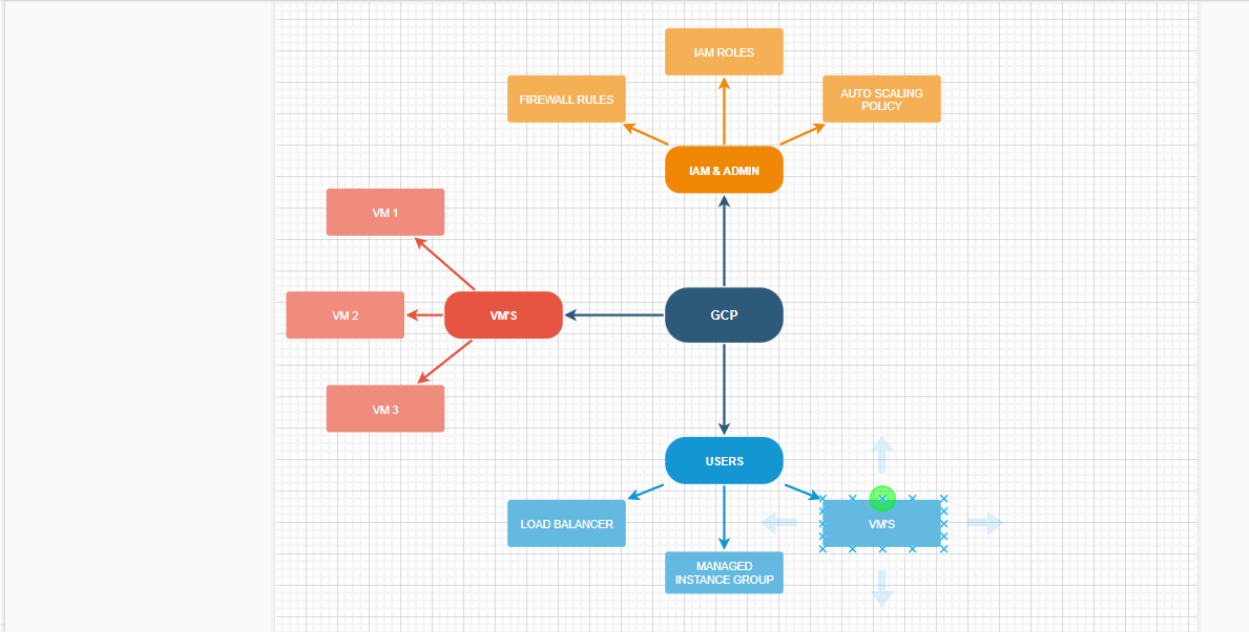






5. Architecture Design Diagram

We created an architecture diagram to visually represent our setup, including the VM, auto-scaling configuration, and security policies.



DESIGN DIAGRAM

6. GitHub Repository

All deployment scripts and configuration files are stored in our GitHub repository: 🔗 **GitHub Repository Link** *(Replace with actual link)*

7. Video Demonstration

A recorded video demonstrating our setup is available here

8. Conclusion

In this assignment, we successfully created a VM, set up auto-scaling to optimize resources, and implemented security best practices. These steps ensure better performance and security in a cloud environment.