CLOUD

Development Platform Report

Report
Cloud Platform Development (BSI8124)

Sheraz Hussain (10592123)
Lecturer: Derek Mizak

EXERCISE 01

Cloud Provider Comparison and Recommendatior

Overview

This part of the assignment focuses on comparing the pricing and features of three major ud service providers — **AWS**, **Azure**, and **Google Cloud Platform (GCP)** — to determine tl ıost cost-effective and suitable platform for hosting a set of virtual machines (VMs) with specit requirements.

VM Configuration Requirements

The configuration provided in the assignment includes:

- 6 virtual machines
- 2 vCPUs and 8 GB RAM each
- 250 GB of SSD disk per VM
- Web server functionality (with a load balancer)
- At least 2 TB of monthly data transfer
- Production-level support

Pricing Comparison Table

COMPONENTS	AWS	AZURE	GOOGLE CLOUD
6 VM's (2 vCPU, 8GB RAM)	$1,100.70	~$960.00 (est.)	~$849.00
6 x 250GB SSD Storage	Included in EC2	~$135.00	~$112.00
Load Balancer	$42.71	~$18.00	~$16.00
2TB Data	Included	~$120.00	~$95.00

Support (Production Level)	~$100.00	~$120.00	~$100.00
Monthly Total	**$1,143.41**	**~$1,353.00**	**~$1,172.00**

Functionality Comparison Table

FEATURE	AWS	AZURE	GOOGLE CLOUD
Global Availability Zones	Included	Included	Included
Load Balancing Options	ALB/NLB	Standard + Front Door	Global HTTP(S) LB
Auto-scaling Support	Included	Included	Included
Free Tier Options	12 months	12 months	$300 credit for 90 days
Firewall & VPC Control	Strong	Strong	Strong
Custom VM Options	fixed types	predefined sizes	fully customizable
Pricing Transparency	Medium	Medium	High
Dashboard & CLI Usability	Moderate	Easy to navigate	Very user-friendly

Analysis and Recommendation

All three platforms are capable of meeting the requirements, but there are differences in cost structure and flexibility.

- **AWS** is a strong and mature cloud provider, but the pricing is relatively higher in this case because the quote used Windows Server. For Linux users, AWS would be more cost-competitive.
- **Azure** comes with a slightly higher cost compared to GCP and doesn’t provide as much flexibility in VM customization.
- **Google Cloud** stands out for this setup. It offers **custom VM sizing**, excellent **networking and pricing transparency**, and is the **most affordable option** if fully optimized using Linux machines and sustained use discounts.

Recommendation:

Google Cloud Platform (GCP) is recommended as the most cost-efficient and scalable option for this project. It offers the lowest monthly cost, flexibility in VM configurations, and solid production support.

EXERCISE 02

Automating VM Deployment on GCP with Python

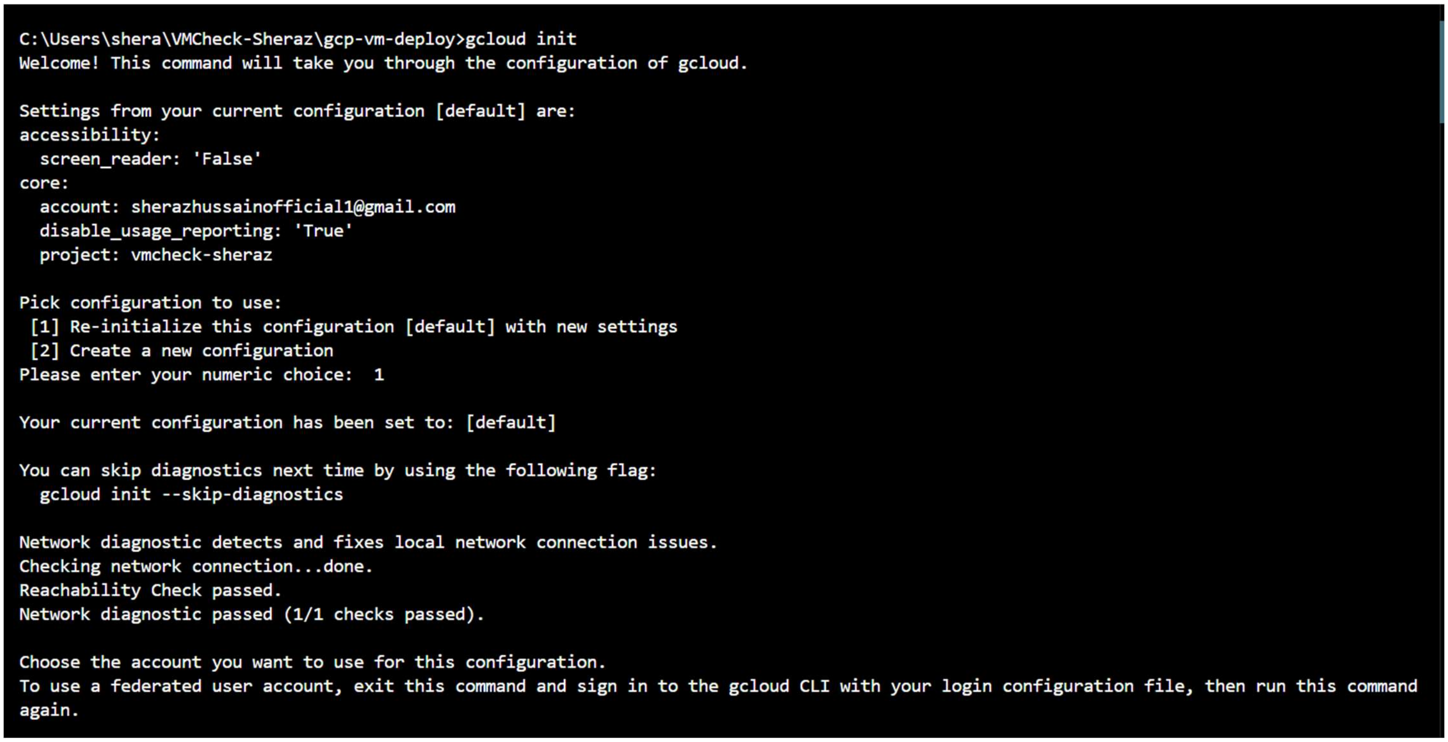
Overview

In this part of the assignment, a Python script was written to automatically deploy a virtual machine on Google Cloud Platform (GCP). The VM is configured to install Apache and serve a “Hello World” page on startup, making it suitable for a simple web server setup. The goal was to automate the deployment process and verify web and SSH accessibility.

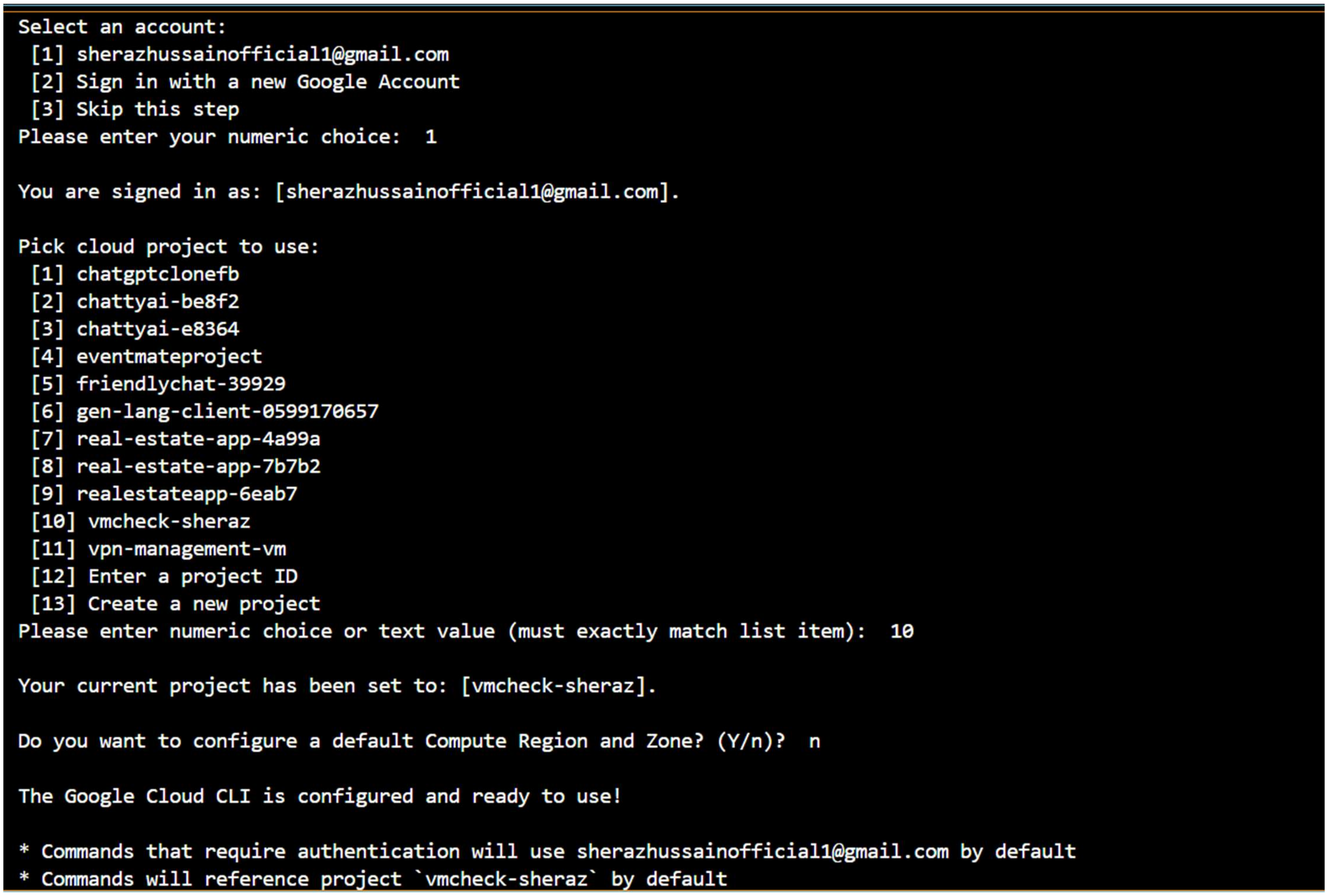
Environment Setup

The Google Cloud SDK was installed and configured using the following steps:

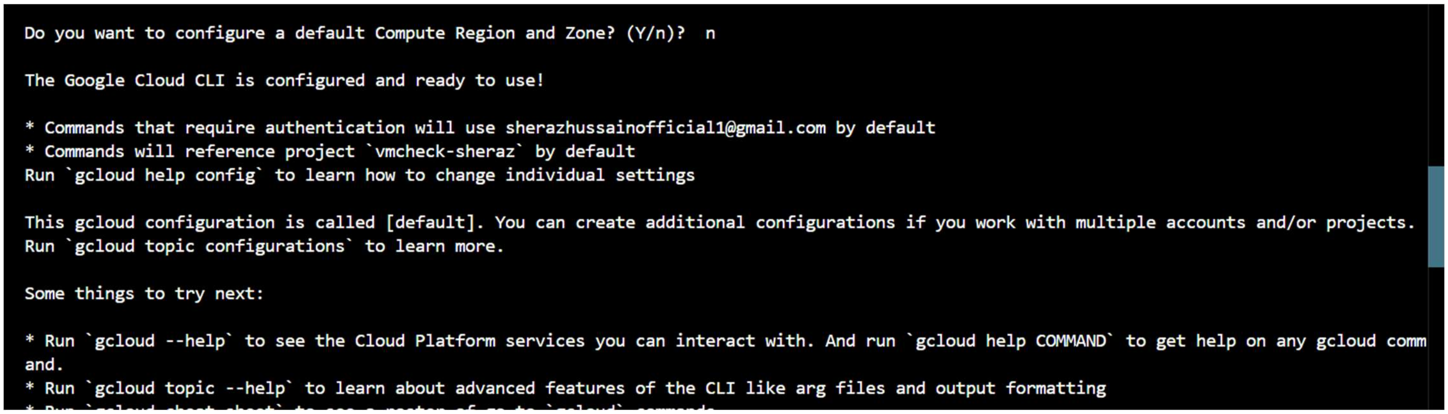
- Authenticated using the Google account
- Set the active project (vmcheck-sheraz)



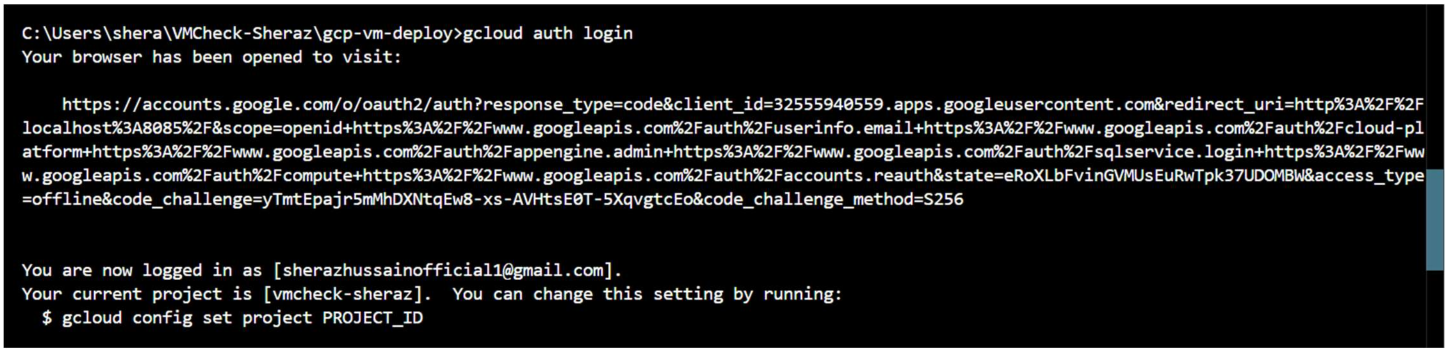
```
C:\Users\shera\VMCheck-Sheraz\gcp-vm-deploy>gcloud init
Welcome! This command will take you through the configuration of gcloud.

Settings from your current configuration [default] are:
accessibility:
  screen_reader: 'False'
core:
  account: sherazhussainofficial1@gmail.com
  disable_usage_reporting: 'True'
  project: vmcheck-sheraz

Pick configuration to use:
 [1] Re-initialize this configuration [default] with new settings
 [2] Create a new configuration
Please enter your numeric choice:  1

Your current configuration has been set to: [default]

You can skip diagnostics next time by using the following flag:
  gcloud init --skip-diagnostics

Network diagnostic detects and fixes local network connection issues.
Checking network connection...done.
Reachability Check passed.
Network diagnostic passed (1/1 checks passed).

Choose the account you want to use for this configuration.
To use a federated user account, exit this command and sign in to the gcloud CLI with your login configuration file, then run this command
again.
```



```
Select an account:
 [1] sherazhussainofficial1@gmail.com
 [2] Sign in with a new Google Account
 [3] Skip this step
Please enter your numeric choice:  1

You are signed in as: [sherazhussainofficial1@gmail.com].

Pick cloud project to use:
 [1] chatgptclonefb
 [2] chattyai-be8f2
 [3] chattyai-e8364
 [4] eventmateproject
 [5] friendlychat-39929
 [6] gen-lang-client-0599170657
 [7] real-estate-app-4a99a
 [8] real-estate-app-7b7b2
 [9] realestateapp-6eab7
 [10] vmcheck-sheraz
 [11] vpn-management-vm
 [12] Enter a project ID
 [13] Create a new project
Please enter numeric choice or text value (must exactly match list item):  10

Your current project has been set to: [vmcheck-sheraz].

Do you want to configure a default Compute Region and Zone? (Y/n)?  n

The Google Cloud CLI is configured and ready to use!

* Commands that require authentication will use sherazhussainofficial1@gmail.com by default
* Commands will reference project `vmcheck-sheraz` by default
```

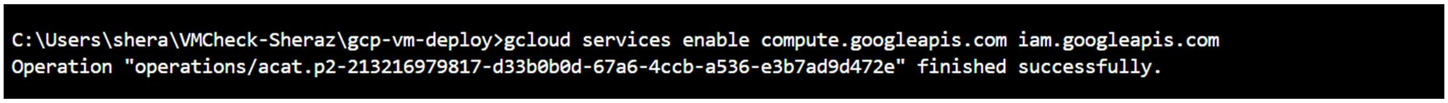


```
Do you want to configure a default Compute Region and Zone? (Y/n)?  n

The Google Cloud CLI is configured and ready to use!

* Commands that require authentication will use sherazhussainofficial1@gmail.com by default
* Commands will reference project `vmcheck-sheraz` by default
Run `gcloud help config` to learn how to change individual settings

This gcloud configuration is called [default]. You can create additional configurations if you work with multiple accounts and/or projects.
Run `gcloud topic configurations` to learn more.

Some things to try next:

* Run `gcloud --help` to see the Cloud Platform services you can interact with. And run `gcloud help COMMAND` to get help on any gcloud comm
and.
* Run `gcloud topic --help` to learn about advanced features of the CLI like arg files and output formatting
* Run `gcloud cheat-sheet` to see a roster of go-to `gcloud` commands
```



```
C:\Users\shera\VMCheck-Sheraz\gcp-vm-deploy>gcloud auth login
Your browser has been opened to visit:

    https://accounts.google.com/o/oauth2/auth?response_type=code&client_id=32555940559.apps.googleusercontent.com&redirect_uri=http%3A%2F%2F
localhost%3A8085%2F&scope=openid+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fuserinfo.email+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fcloud-pl
atform+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fappengine.admin+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fsqlservice.login+https%3A%2F%2Fww
w.googleapis.com%2Fauth%2Fcompute+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Faccounts.reauth&state=eRoXLbFvinGVMUsEuRwTpk37UDOMBW&access_type
=offline&code_challenge=yTmtEpajr5mMhDXNtqEw8-xs-AVHtsE0T-5XqvgtcEo&code_challenge_method=S256


You are now logged in as [sherazhussainofficial1@gmail.com].
Your current project is [vmcheck-sheraz].  You can change this setting by running:
  $ gcloud config set project PROJECT_ID
```

- Enabled Compute and IAM APIs

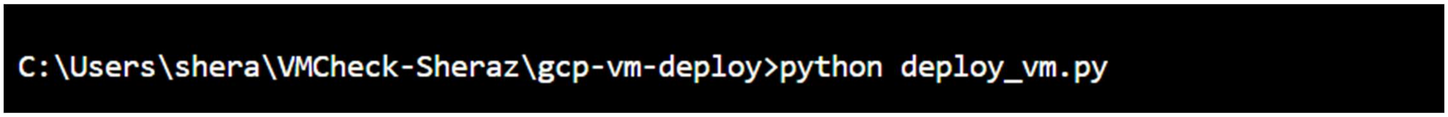


```
C:\Users\shera\VMCheck-Sheraz\gcp-vm-deploy>gcloud services enable compute.googleapis.com iam.googleapis.com
Operation "operations/acat.p2-213216979817-d33b0b0d-67a6-4ccb-a536-e3b7ad9d472e" finished successfully.
```

Python Script Functionality

The Python script (**deploy_vm.py**) does the following:

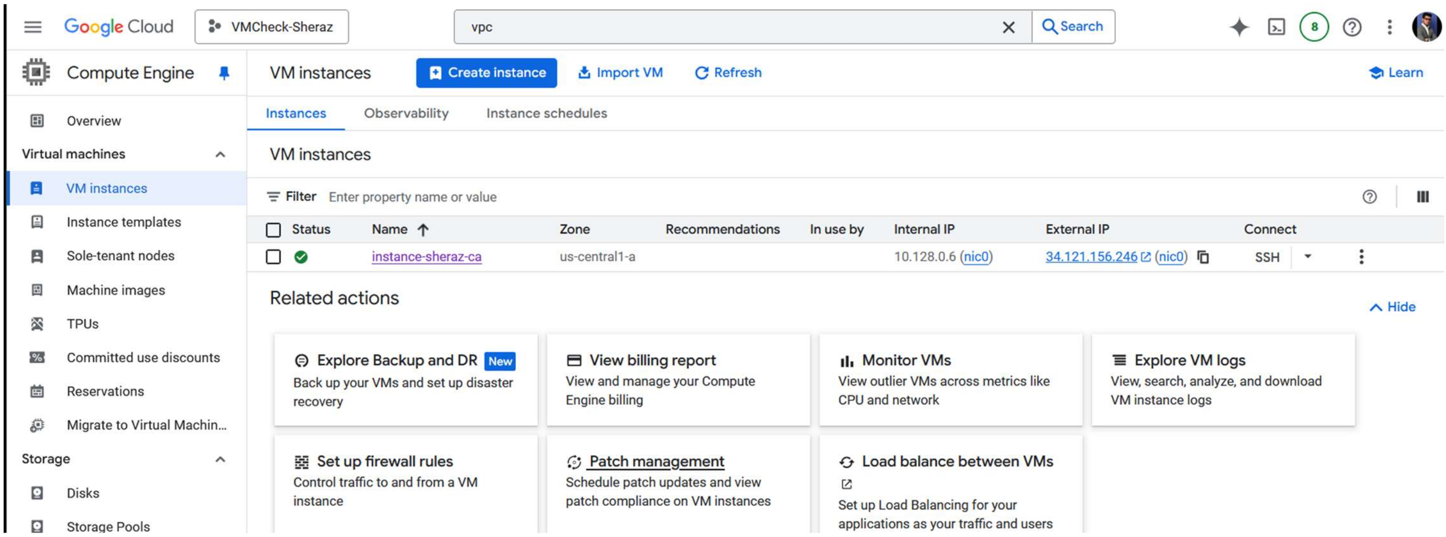
- Connects to the Compute Engine API
- Defines the VM configuration:
  - Zone: **us-central1-a**
  - Machine type: **e2-standard-2 (2 vCPU, 8 GB RAM)**
  - Boot image: **Ubuntu 20.04 LTS**
  - Startup script to install and launch Apache
  - Firewall tags for **HTTP/SSH** access
- Sends a request to deploy the VM



```
C:\Users\shera\VMCheck-Sheraz\gcp-vm-deploy>python deploy_vm.py
```

VM Verification and Output

After deployment, the VM appeared in the Compute Engine dashboard as **Running**. The external IP was accessible in the browser, showing the expected message:



Status	Name ↑	Zone	Recommendations	In use by	Internal IP	External IP	Connect
✓	instance-sheraz-ca	us-central1-a			10.128.0.6 (nic0)	34.121.156.246 (nic0)	SSH

Related actions

Explore Backup and DR New
Back up your VMs and set up disaster recovery

View billing report
View and manage your Compute Engine billing

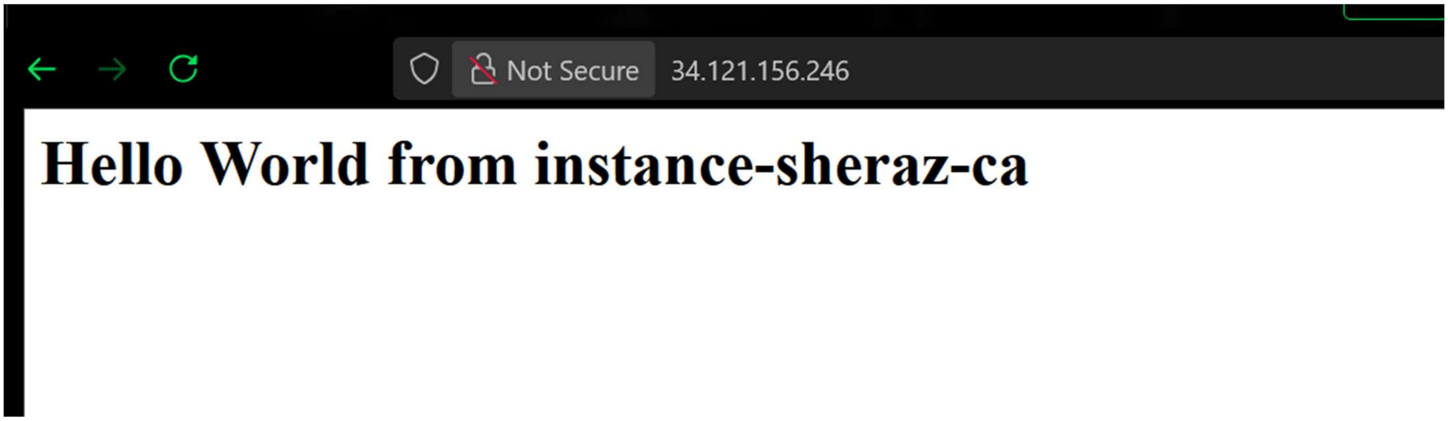
Monitor VMs
View outlier VMs across metrics like CPU and network

Explore VM logs
View, search, analyze, and download VM instance logs

Set up firewall rules
Control traffic to and from a VM instance

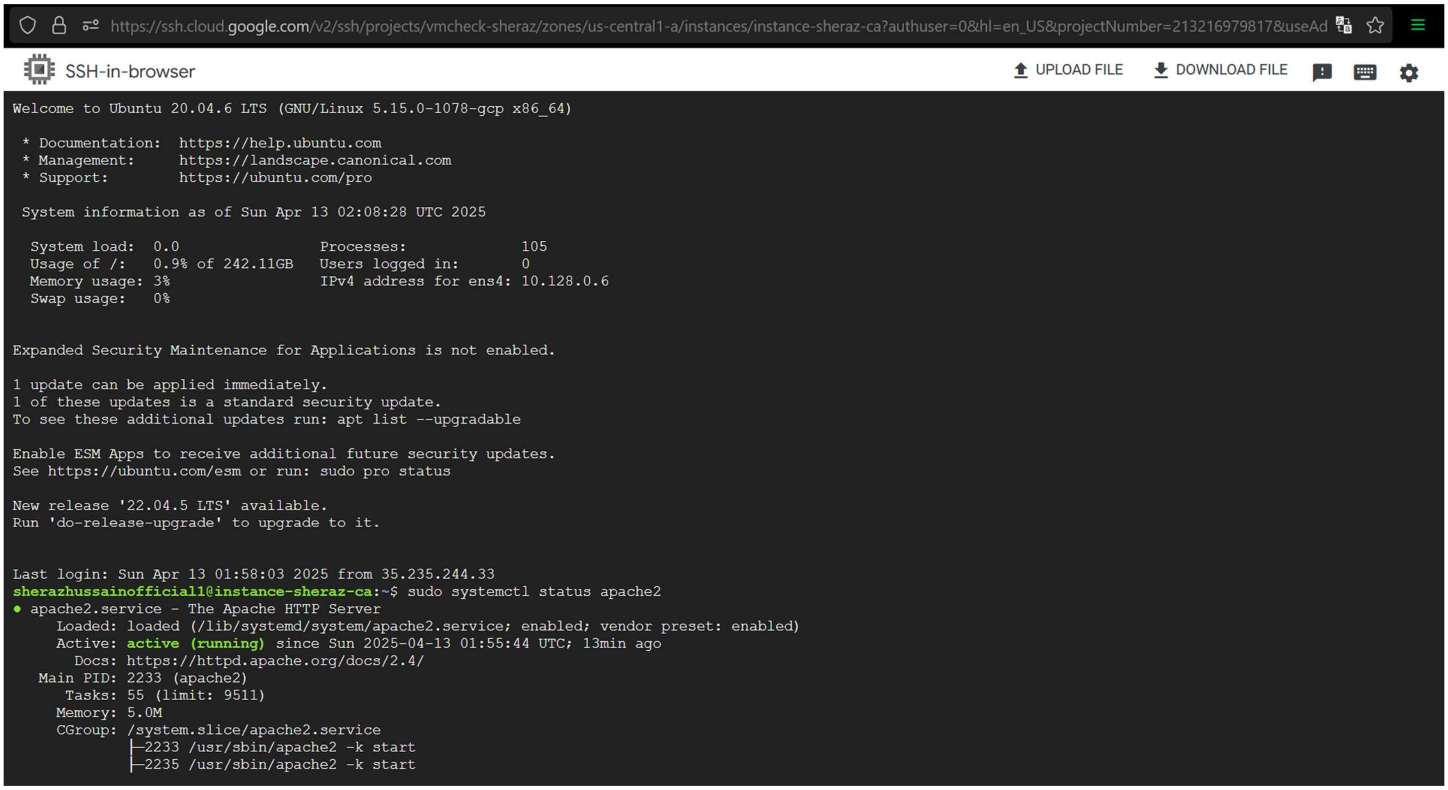
Patch management
Schedule patch updates and view patch compliance on VM instances

Load balance between VMs
Set up Load Balancing for your applications as your traffic and users



Hello World from instance-sheraz-ca

SSH access from the browser was also successful, and Apache was confirmed running via:

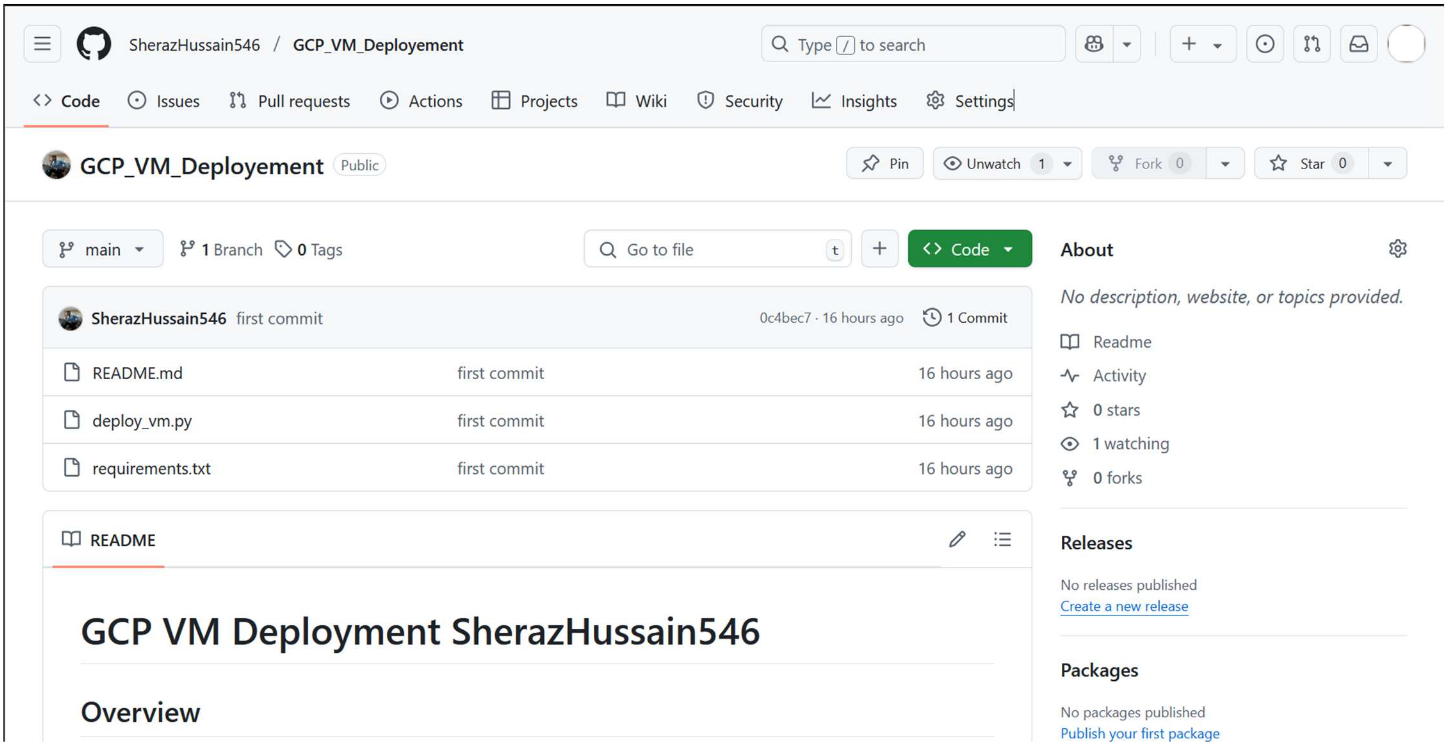


https://ssh.cloud.google.com/v2/ssh/projects/vmcheck-sheraz/zones/us-central1-a/instances/instance-sheraz-ca?authuser=0&hl=en_US&projectNumber=213216979817&useAd
SSH-in-browser
UPLOAD FILE
DOWNLOAD FILE

```
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.0-1078-gcp x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro

 System information as of Sun Apr 13 02:08:28 UTC 2025

  System load:  0.0               Processes:             105
  Usage of /:   0.9% of 242.11GB  Users logged in:       0
  Memory usage: 3%                IPv4 address for ens4: 10.128.0.6
  Swap usage:   0%


Expanded Security Maintenance for Applications is not enabled.

1 update can be applied immediately.
1 of these updates is a standard security update.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

New release '22.04.5 LTS' available.
Run 'do-release-upgrade' to upgrade to it.


Last login: Sun Apr 13 01:58:03 2025 from 35.235.244.33
sherazhussainofficial1@instance-sheraz-ca:~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
     Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor preset: enabled)
     Active: active (running) since Sun 2025-04-13 01:55:44 UTC; 13min ago
       Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 2233 (apache2)
      Tasks: 55 (limit: 9511)
     Memory: 5.0M
     CGroup: /system.slice/apache2.service
             ├─2233 /usr/sbin/apache2 -k start
             ├─2235 /usr/sbin/apache2 -k start
```

GitHub Submission

The full project (script and README) was pushed to GitHub: https://github.com/SherazHussain546/GCP_VM_Deployement. The README includes setup instructions, script explanation, and expected output.



SherazHussain546 first commit 0c4bec7 · 16 hours ago 1 Commit

README.md	first commit	16 hours ago
deploy_vm.py	first commit	16 hours ago
requirements.txt	first commit	16 hours ago

GCP VM Deployment SherazHussain546

Overview

About

No description, website, or topics provided.

Readme
Activity
0 stars
1 watching
0 forks

Releases

No releases published
Create a new release

Packages

No packages published
Publish your first package

Conclusion

This exercise demonstrates how cloud infrastructure can be provisioned programmatically using Python and the Google Cloud API. The automation makes deployments repeatable, fast, and easy to maintain.
Using this approach, any organization could spin up multiple servers with minimal manual input — ideal for scaling and managing cloud workloads efficiently.

References

- Amazon Web Services (2025) *AWS Pricing Calculator*. Available at: https://calculator.aws.amazon.com (Accessed: 12 April 2025).
- Microsoft Azure (2025) *Azure Pricing Calculator*. Available at: https://azure.microsoft.com/en-us/pricing/calculator/ (Accessed: 12 April 2025).
- Google Cloud (2025) *GCP Pricing Calculator*. Available at: https://cloud.google.com/products/calculator (Accessed: 12 April 2025).