K. J. Somaiya College of Engineering, Mumbai-77

(A Constituent College of Somaiya Vidyavihar University)

Department of Computer Engineering

Batch: CC-9	**Roll No.: 16010122323**
Experiment No. 5	
Grade: AA / AB / BB / BC / CC / CD /DD	

Title: Creating a Virtual Machine on GCP using Google Cloud Skills Boost

Objective:

- Understand the fundamentals of **Google Cloud Platform (GCP)** and its **Compute Engine** service.
- Learn how to **create, configure, and manage** a Virtual Machine (VM) instance on GCP.

Expected Outcome of Experiment:

CO	Outcome
CO4	Build cloud services and applications

Books/ Journals/ Websites referred:

- **Google Cloud Documentation: https://cloud.google.com/docs**
- **Google Cloud Skills Boost: https://www.cloudskillsboost.google**
- **Various online cloud computing resources**

Abstract:-

Cloud computing has transformed the way organizations deploy and manage applications. Google Cloud Platform (GCP) provides **Compute Engine**, a powerful infrastructure-as-a-service (IaaS) solution that enables users to create and manage virtual machines (VMs) with ease. This experiment focuses on leveraging **Google Cloud Skills Boost** to create and configure a VM instance in GCP. By following a hands-on approach, users will learn how to deploy VMs, configure networking settings, enable security features, and manage cloud resources efficiently. This experiment demonstrates the advantages of cloud-based virtual machines, including scalability, reliability, and cost-effectiveness, making it an essential skill in cloud computing.

Related Theory: -

1. Introduction to Google Cloud Platform (GCP)

Google Cloud Platform (GCP) is a suite of cloud computing services that runs on the same infrastructure that Google uses for its end-user products, such as Google Search, Gmail, and YouTube. GCP offers services in computing, storage, networking, machine learning, and security, allowing businesses and individuals to deploy and scale applications efficiently.

2. Understanding Virtual Machines (VMs) in GCP

A Virtual Machine (VM) is a software-based emulation of a physical computer. Instead of requiring physical hardware, a VM runs on a cloud-based infrastructure. GCP provides VMs through its Compute Engine, which enables users to deploy and manage virtualized workloads.

Features of GCP Compute Engine:

- Predefined and custom machine types – Users can select from various VM configurations.
- Persistent Disk storage – Supports SSD and HDD options.

- Networking and firewall settings – Allows secure access control and IP configurations.
- Autoscaling and load balancing – Optimizes performance and cost.
- Integration with other GCP services – Such as Cloud Storage, AI/ML, and Kubernetes.

3. Google Cloud Skills Boost

Google Cloud Skills Boost is an interactive training platform that provides hands-on labs, challenges, and real-world scenarios for learning cloud computing. It enables users to create and manage cloud resources in a sandboxed GCP environment.

4. Steps to Create a Virtual Machine in GCP

1. Login to Google Cloud Console – Access https://console.cloud.google.com.
2. Enable Compute Engine API – Ensure that the required APIs are activated.
3. Create a VM Instance – Choose a machine type, operating system, and storage options.
4. Configure Networking & Security – Set up firewall rules, SSH keys, and authentication settings.
5. Deploy and Access the VM – Start the VM and connect via SSH.
6. Monitor and Manage the VM – Optimize resources, monitor logs, and scale as needed.

5. Cloud Service Models and GCP

GCP provides multiple cloud computing models:

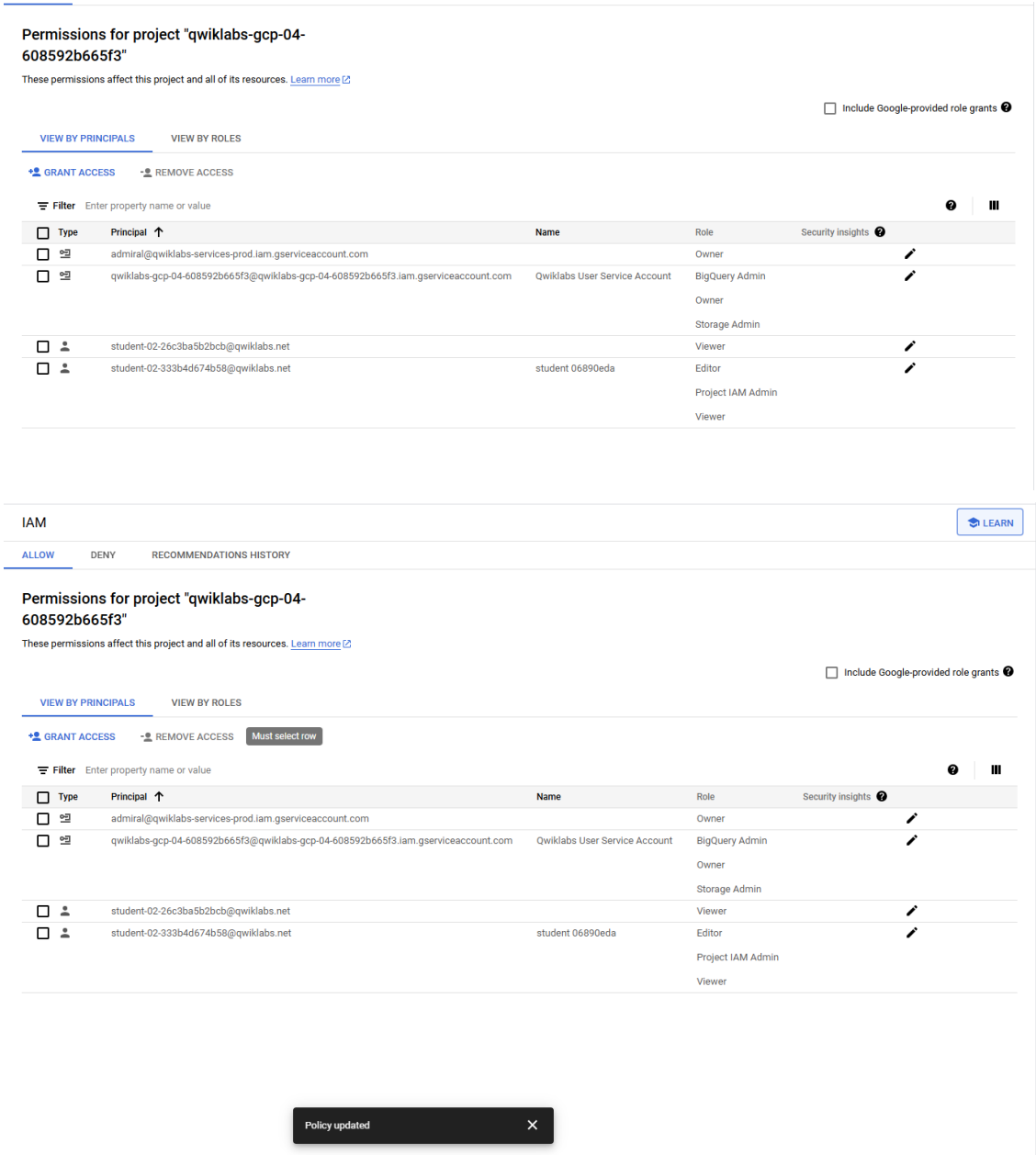
- Infrastructure as a Service (IaaS): Compute Engine (VMs) – Users manage the OS, applications, and networking.
- Platform as a Service (PaaS): App Engine – Google manages the underlying infrastructure.

- Software as a Service (SaaS): Google Workspace – Fully managed software applications.

6. Benefits of Using GCP for Virtual Machines

- Scalability: Easily scale resources up or down based on demand.
- Security: Advanced IAM (Identity and Access Management) and firewall settings.
- Cost Efficiency: Pay-as-you-go pricing model to optimize costs.
- High Availability: Global network infrastructure ensures minimal downtime.
- Automation & Integration: Supports Terraform, Kubernetes, and Cloud Functions for automation.

Implementation Details:


Permissions for project "qwiklabs-gcp-04-608592b665f3"
These permissions affect this project and all of its resources. Learn more
Include Google-provided role grants
VIEW BY PRINCIPALS
VIEW BY ROLES
GRANT ACCESS
REMOVE ACCESS
Filter
Enter property name or value
Type
Principal
Name
Role
Security insights
admiral@qwiklabs-services-prod.iam.gserviceaccount.com
Owner
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Qwiklabs User Service Account
BigQuery Admin
Owner
Storage Admin
student-02-26c3ba5b2bcb@qwiklabs.net
Viewer
student-02-333b4d674b58@qwiklabs.net
student 06890eda
Editor
Project IAM Admin
Viewer
IAM
LEARN
ALLOW
DENY
RECOMMENDATIONS HISTORY
Permissions for project "qwiklabs-gcp-04-608592b665f3"
These permissions affect this project and all of its resources. Learn more
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VIEW BY PRINCIPALS
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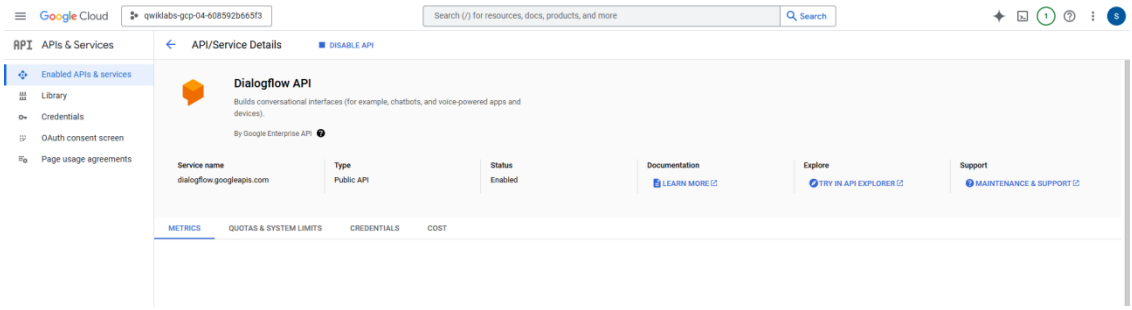
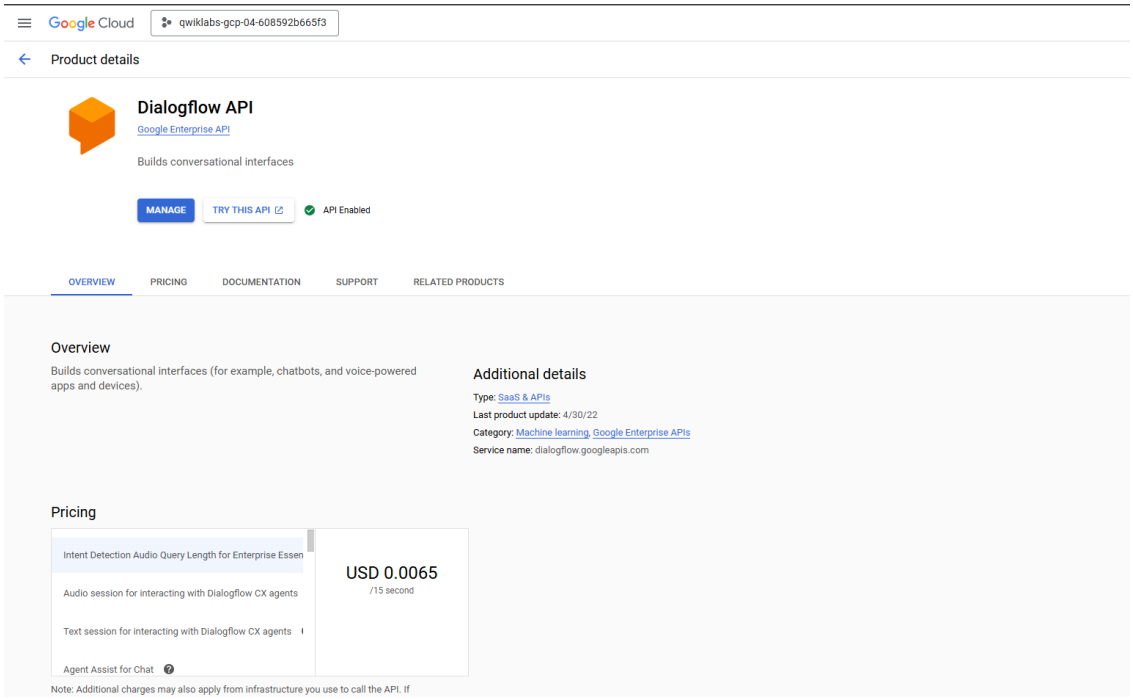
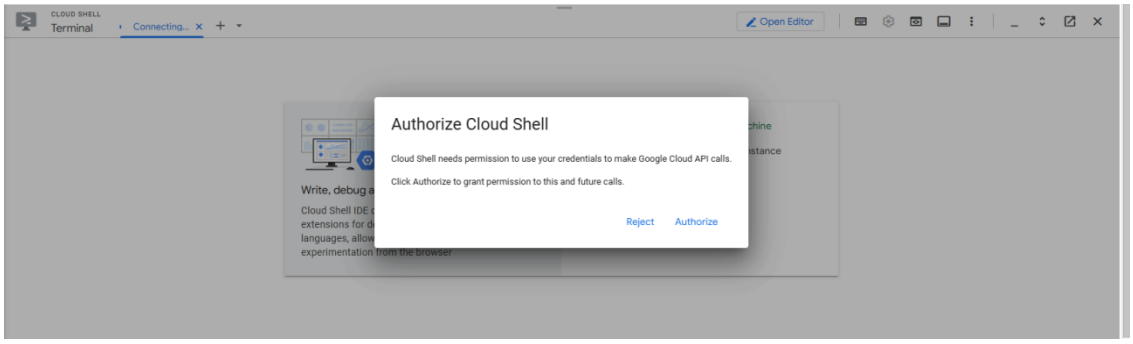
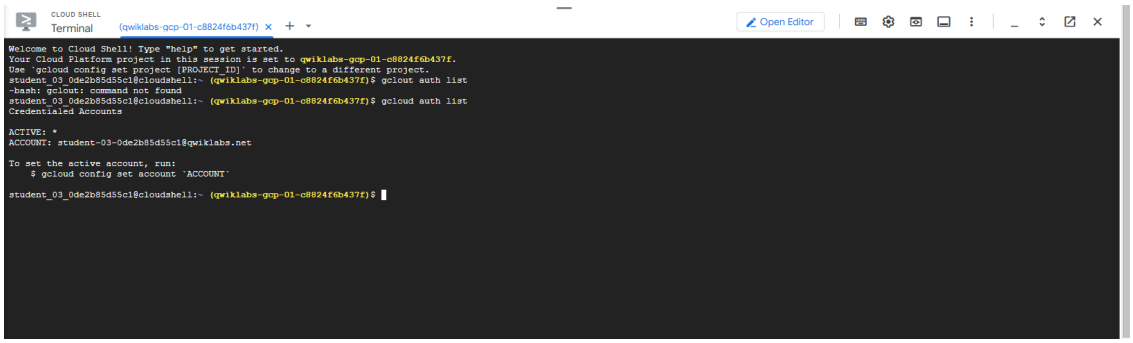
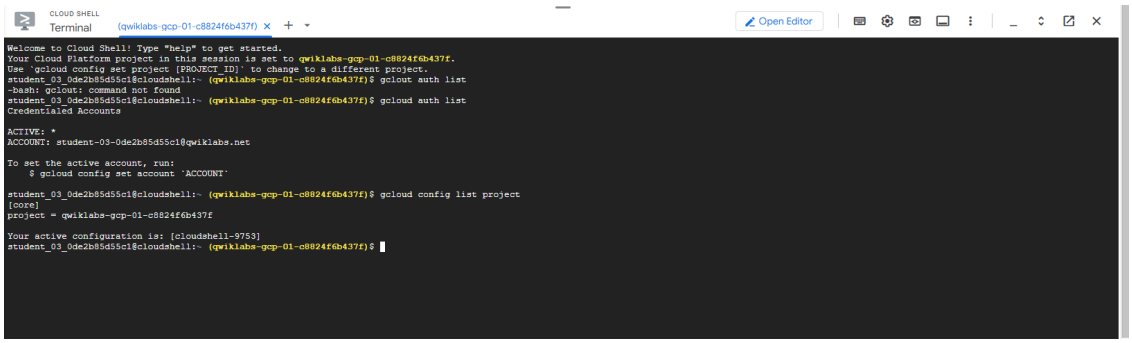
GRANT ACCESS
REMOVE ACCESS
Must select row
Filter
Enter property name or value
Type
Principal
Name
Role
Security insights
admiral@qwiklabs-services-prod.iam.gserviceaccount.com
Owner
qwiklabs-gcp-04-608592b665f3@qwiklabs-gcp-04-608592b665f3.iam.gserviceaccount.com
Qwiklabs User Service Account
BigQuery Admin
Owner
Storage Admin
student-02-26c3ba5b2bcb@qwiklabs.net
Viewer
student-02-333b4d674b58@qwiklabs.net
student 06890eda
Editor
Project IAM Admin
Viewer
Policy updated


Google Cloud
qwiklabs-gcp-04-608592b665f3
Search (/) for resources, docs, products, and more
Search
APIs & Services
Enabled APIs & services
Library
Credentials
OAuth consent screen
Page usage agreements
API/Service Details
DISABLE API
Dialogflow API
Builds conversational interfaces (for example, chatbots, and voice-powered apps and devices).
By Google Enterprise API
Service name
dialogflow.googleapis.com
Type
Public API
Status
Enabled
Documentation
LEARN MORE
Explore
TRY IN API EXPLORER
Support
MAINTENANCE & SUPPORT
METRICS
QUOTAS & SYSTEM LIMITS
CREDENTIALS
COST


Google Cloud
qwiklabs-gcp-04-608592b665f3
Product details
Dialogflow API
Google Enterprise API
Builds conversational interfaces
MANAGE
TRY THIS API
API Enabled
OVERVIEW
PRICING
DOCUMENTATION
SUPPORT
RELATED PRODUCTS
Overview
Builds conversational interfaces (for example, chatbots, and voice-powered apps and devices).
Additional details
Type: SaaS & APIs
Last product update: 4/30/22
Category: Machine learning, Google Enterprise APIs
Service name: dialogflow.googleapis.com
Pricing
Intent Detection Audio Query Length for Enterprise Essen
Audio session for interacting with Dialogflow CX agents
Text session for interacting with Dialogflow CX agents
Agent Assist for Chat
USD 0.0065
/15 second
Note: Additional charges may also apply from infrastructure you use to call the API. If

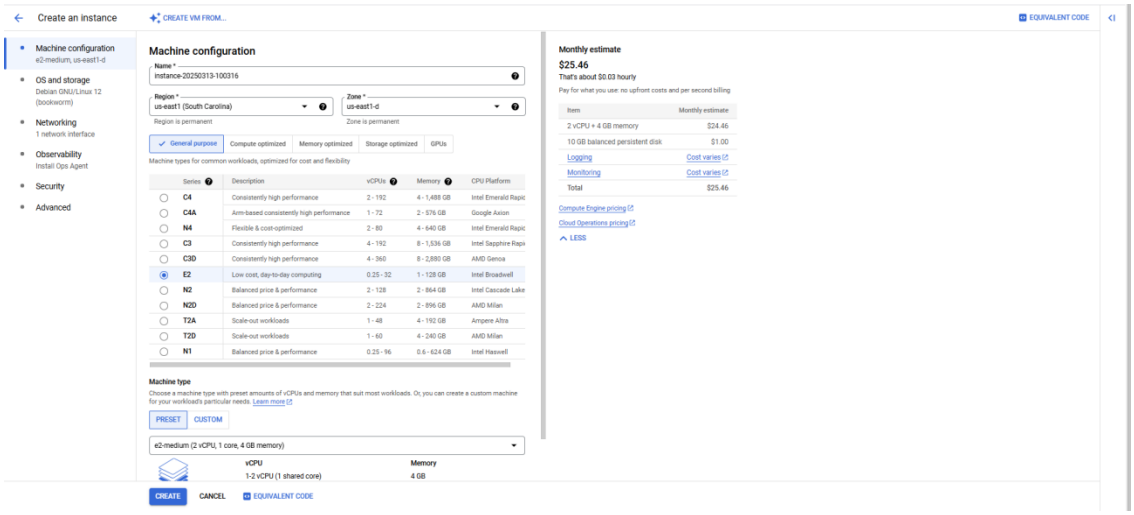

CLOUD SHELL
Terminal
Connecting...
Open Editor
Authorize Cloud Shell
Cloud Shell needs permission to use your credentials to make Google Cloud API calls.
Click Authorize to grant permission to this and future calls.
Reject
Authorize

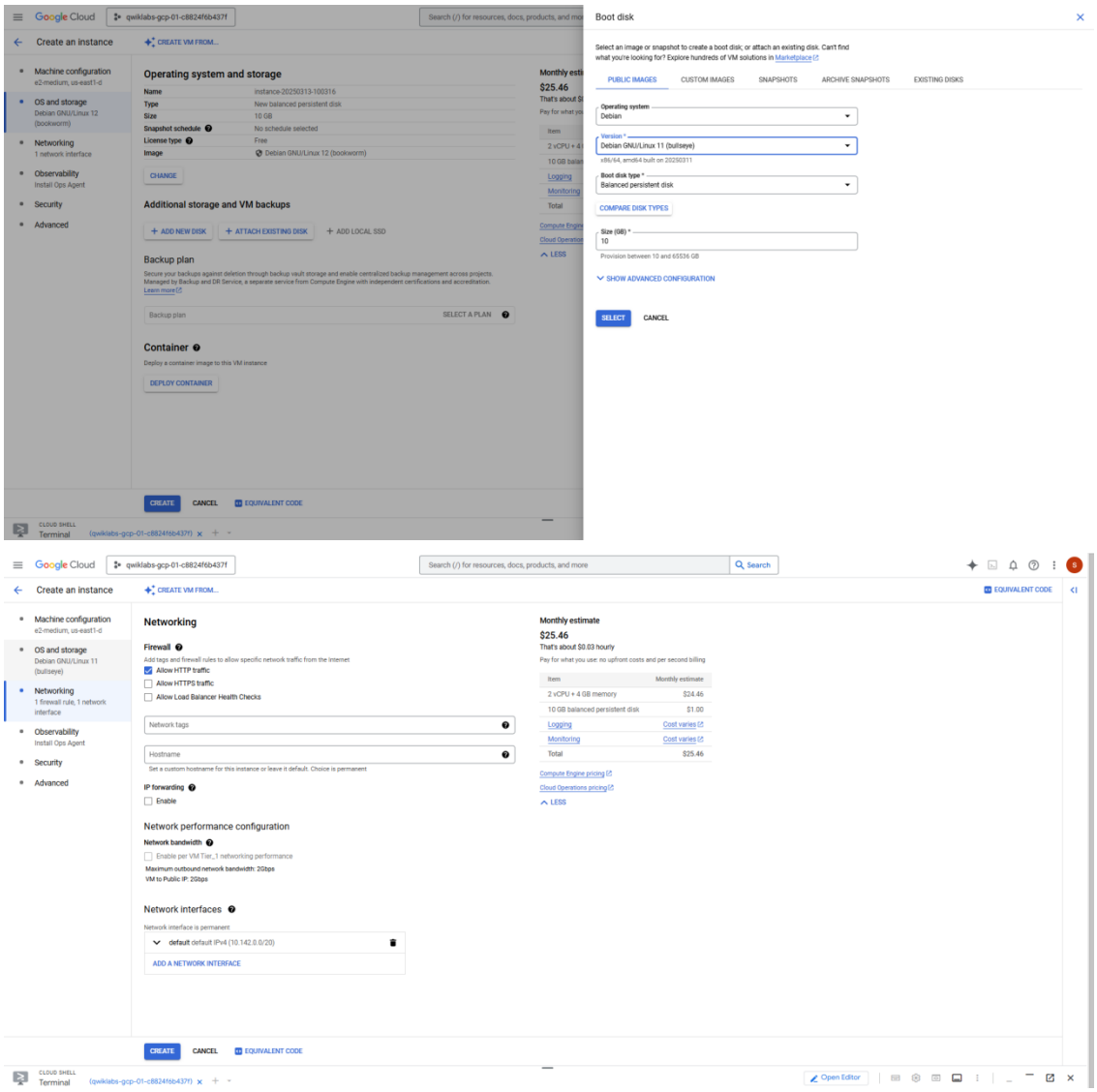


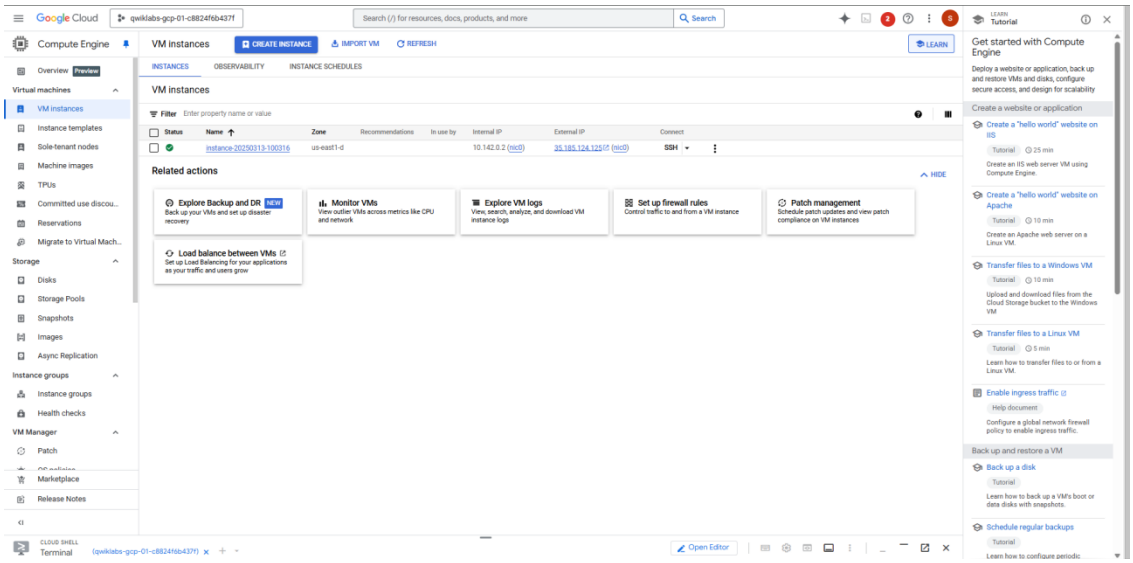


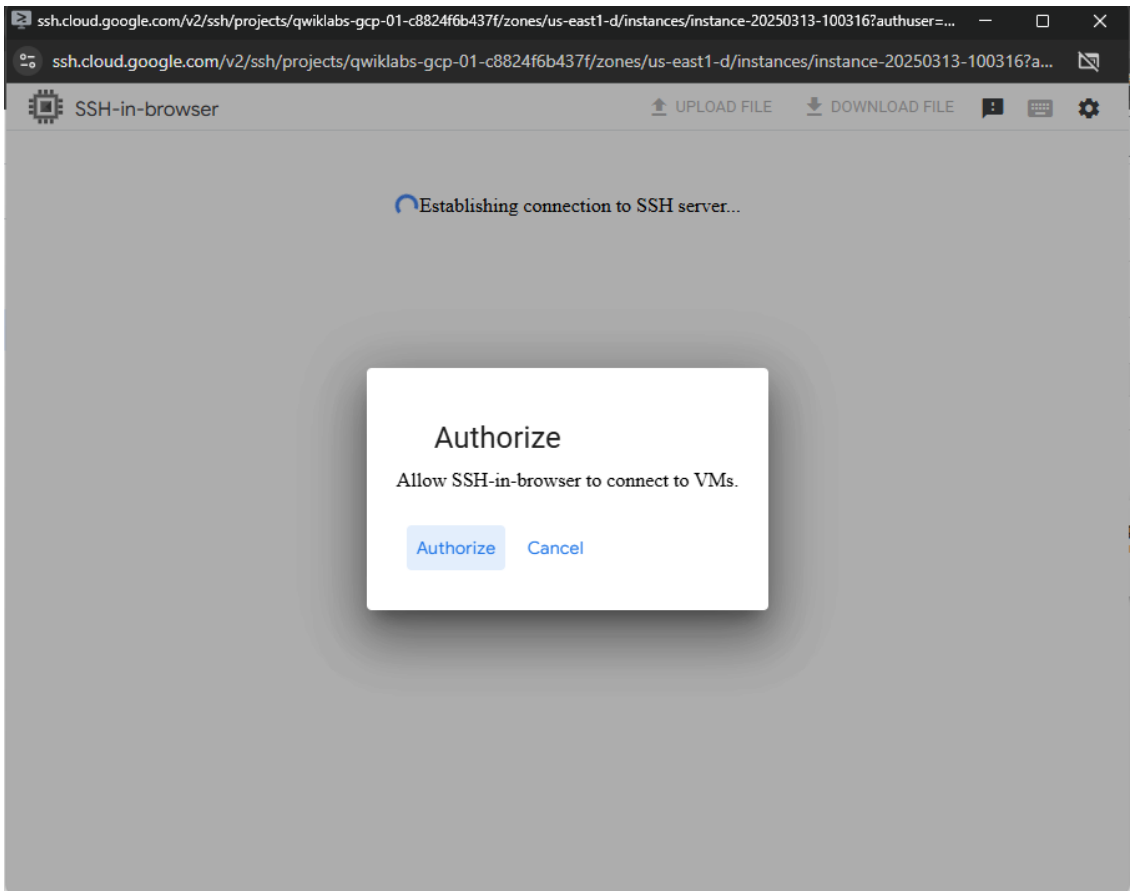

```
student_03_0de2b85d55c1@cloudshell:~ (qwiklabs-gcp-01-c8824f6b437f)$ gcloud config set compute/region us-east1
WARNING: Property validation for compute/region was skipped.
Updated property [compute/region].
student_03_0de2b85d55c1@cloudshell:~ (qwiklabs-gcp-01-c8824f6b437f)$
```

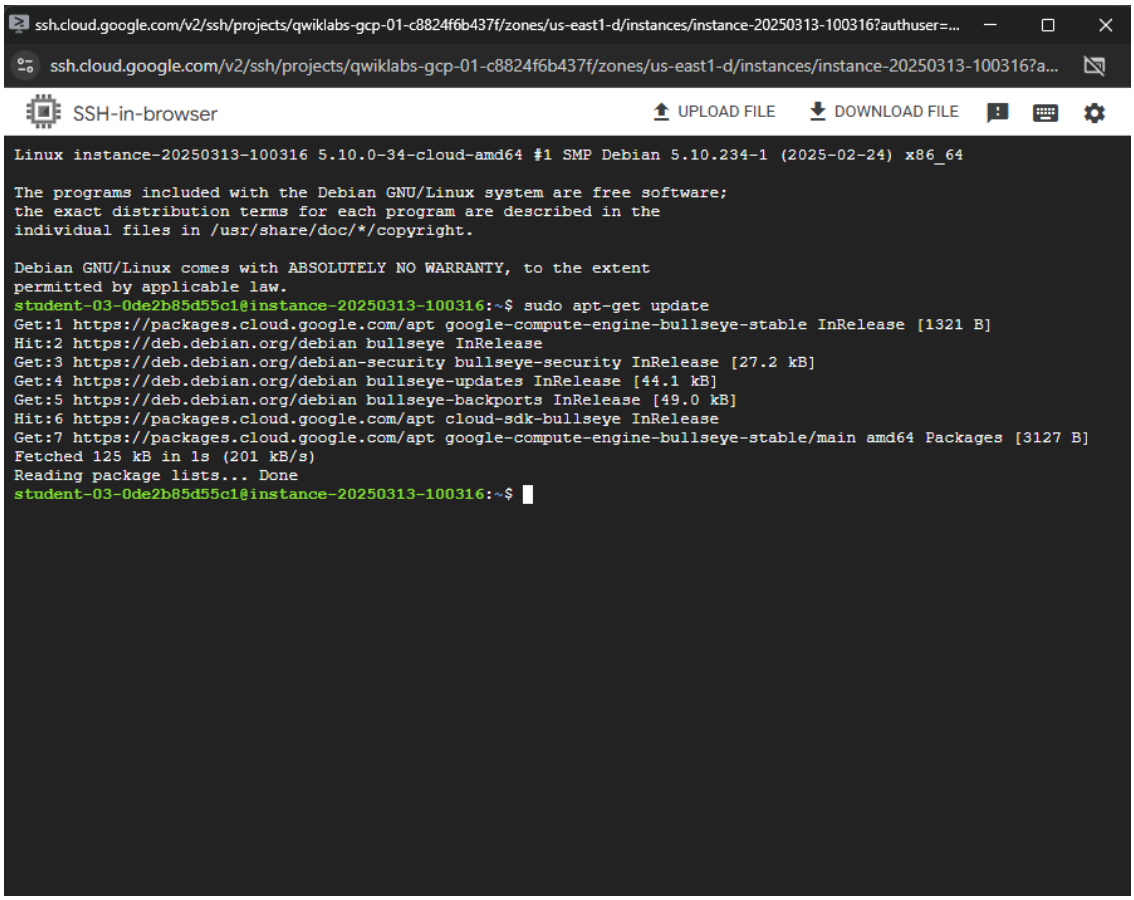
```
student_03_0de2b85d55c1@cloudshell:~ (qwiklabs-gcp-01-c8824f6b437f)$ export REGION=us-east1
student_03_0de2b85d55c1@cloudshell:~ (qwiklabs-gcp-01-c8824f6b437f)$ export ZONE=us-east1-d
student_03_0de2b85d55c1@cloudshell:~ (qwiklabs-gcp-01-c8824f6b437f)$
```

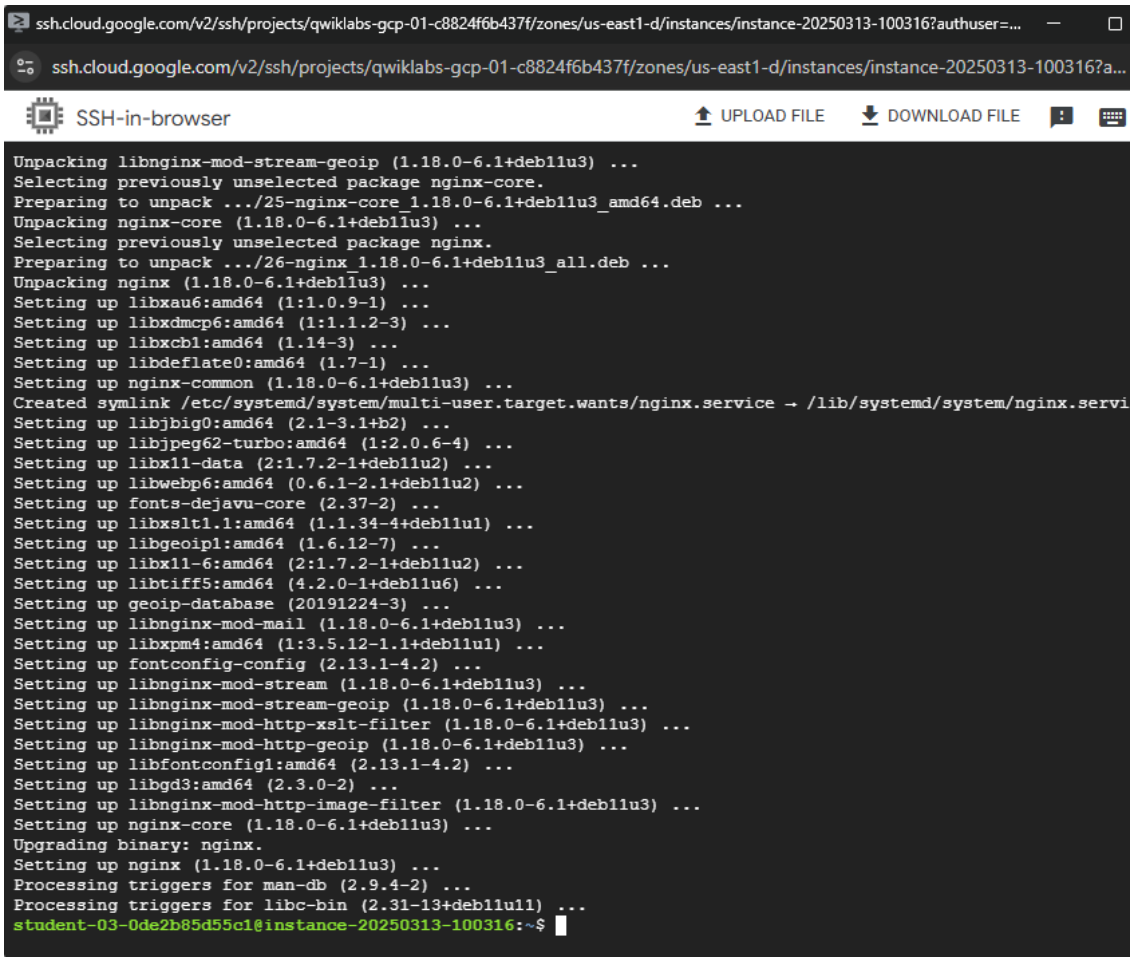



Google Cloud
Create an instance
Machine configuration
OS and storage
Networking
Observability
Security
Advanced
Operating system and storage
Additional storage and VM backups
Backup plan
Container
CREATE
CANCEL
EQUIVALENT CODE
Boot disk
PUBLIC IMAGES
CUSTOM IMAGES
SNAPSHOTS
ARCHIVE SNAPSHOTS
EXISTING DISKS
Operating system
Debian
Debian GNU/Linux 11 (bullseye)
Balanced persistent disk
SELECT
CANCEL
Networking
Firewall
Allow HTTP traffic
Allow HTTPS traffic
Allow Load Balancer Health Checks
Network performance configuration
Network interfaces
Monthly estimate
$25.46
CREATE
CANCEL
EQUIVALENT CODE

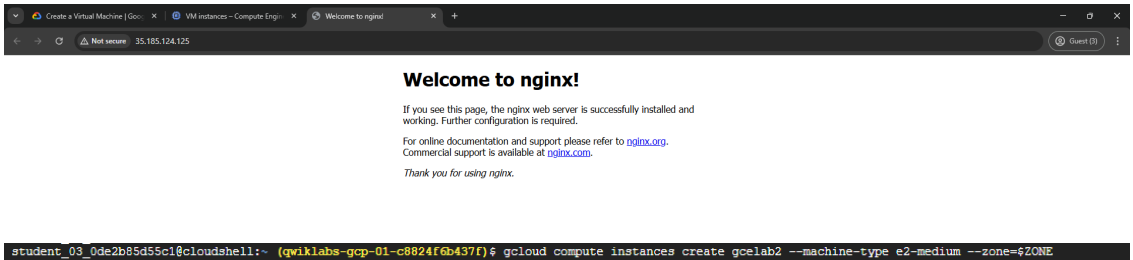

Google Cloud
Compute Engine
VM instances
CREATE INSTANCE
IMPORT VM
REFRESH
LEARN
INSTANCES
OBSERVABILITY
INSTANCE SCHEDULES
VM instances
Related actions
Explore Backup and DR
Monitor VMs
Explore VM logs
Set up firewall rules
Patch management
Load balance between VMs
Get started with Compute Engine
Create a "hello world" website on IIS
Create a "hello world" website on Apache
Transfer files to a Windows VM
Transfer files to a Linux VM
Enable ingress traffic
Back up and restore a VM
Back up a disk
Schedule regular backups
Terminal


ssh.cloud.google.com/v2/ssh/projects/qwiklabs-gcp-01-c8824f6b437f/zones/us-east1-d/instances/instance-20250313-100316?authuser=...
SSH-in-browser
UPLOAD FILE
DOWNLOAD FILE
Establishing connection to SSH server...
Authorize
Allow SSH-in-browser to connect to VMs.
Authorize
Cancel

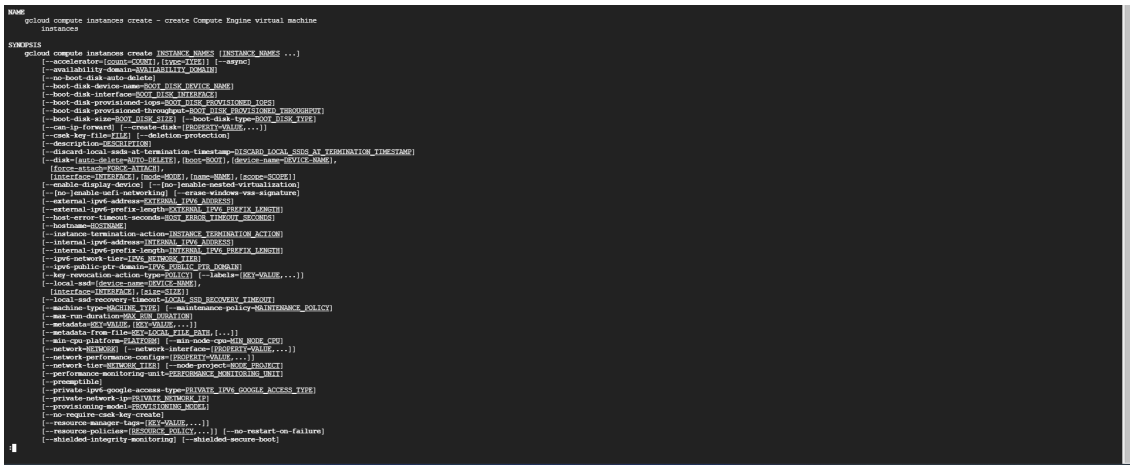

ssh.cloud.google.com/v2/ssh/projects/qwiklabs-gcp-01-c8824f6b437f/zones/us-east1-d/instances/instance-20250313-100316?authuser=...
ssh.cloud.google.com/v2/ssh/projects/qwiklabs-gcp-01-c8824f6b437f/zones/us-east1-d/instances/instance-20250313-100316?a...
SSH-in-browser
UPLOAD FILE
DOWNLOAD FILE
Linux instance-20250313-100316 5.10.0-34-cloud-amd64 #1 SMP Debian 5.10.234-1 (2025-02-24) x86_64
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
student-03-0de2b85d55c1@instance-20250313-100316:~$ sudo apt-get update
Get:1 https://packages.cloud.google.com/apt google-compute-engine-bullseye-stable InRelease [1321 B]
Hit:2 https://deb.debian.org/debian bullseye InRelease
Get:3 https://deb.debian.org/debian-security bullseye-security InRelease [27.2 kB]
Get:4 https://deb.debian.org/debian bullseye-updates InRelease [44.1 kB]
Get:5 https://deb.debian.org/debian bullseye-backports InRelease [49.0 kB]
Hit:6 https://packages.cloud.google.com/apt cloud-sdk-bullseye InRelease
Get:7 https://packages.cloud.google.com/apt google-compute-engine-bullseye-stable/main amd64 Packages [3127 B]
Fetched 125 kB in 1s (201 kB/s)
Reading package lists... Done
student-03-0de2b85d55c1@instance-20250313-100316:~$

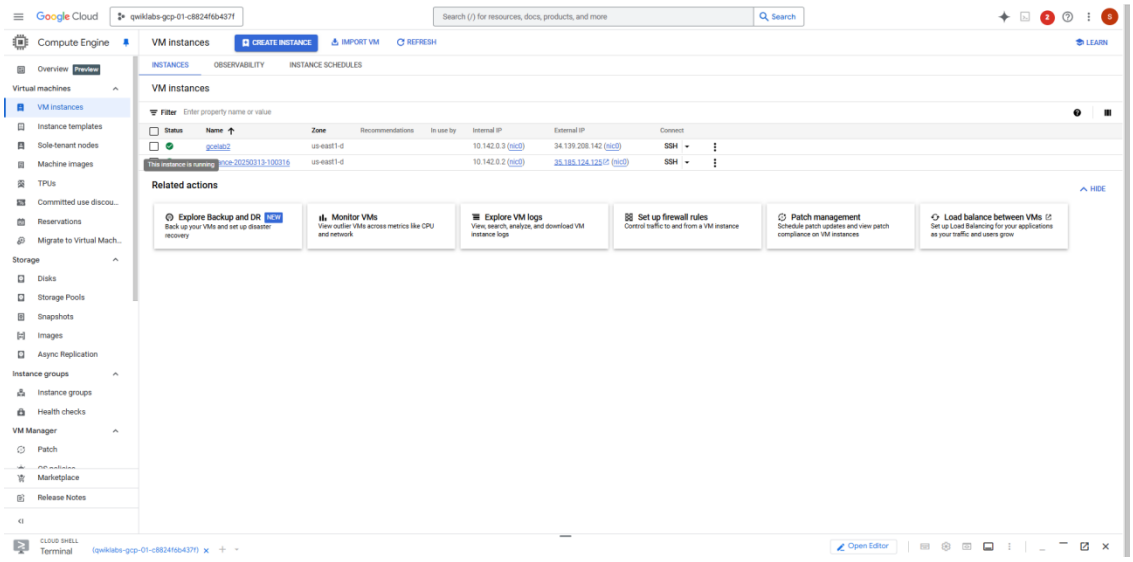


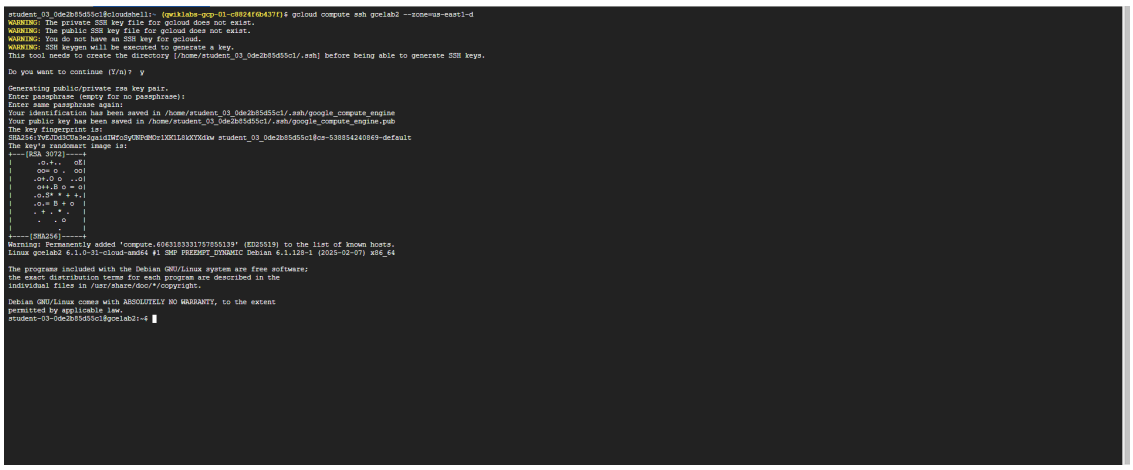

```
student-03-0de2b85d55c1@instance-20250313-100316:~$ ps auwx | grep nginx
root        2153  0.0  0.2  56384 11396 ?        S    10:08   0:00 nginx: master process /usr/sbin/nginx -g daem
on on; master_process on;
www-data    2155  0.0  0.2  68036 10848 ?        S    10:08   0:00 nginx: worker process
www-data    2156  0.0  0.2  68036 10796 ?        S    10:08   0:00 nginx: worker process
student+    2183  0.0  0.0   5132   700 pts/0    S+   10:09   0:00 grep nginx
student-03-0de2b85d55c1@instance-20250313-100316:~$
```

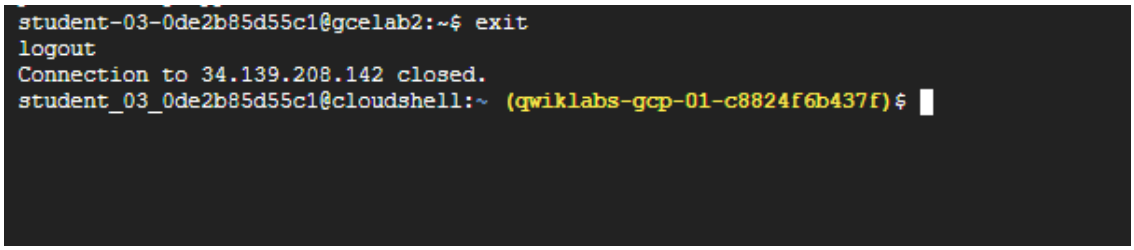


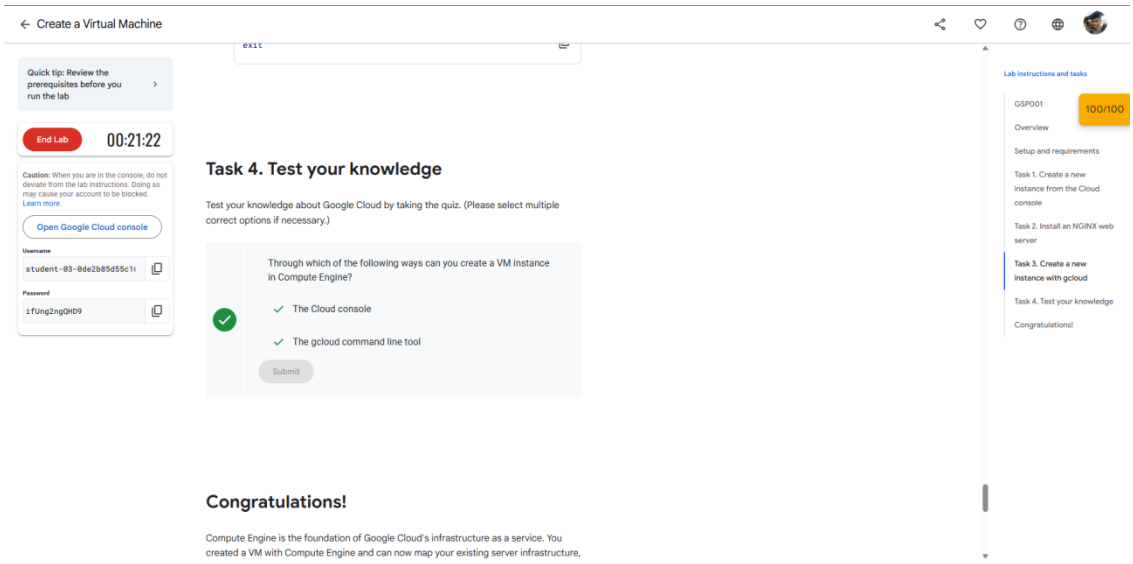

```
student_03_0de2b85d55c1@cloudshell:~ (qwiklabs-gcp-01-c8824f6b437f)$ gcloud compute instances create gcelab2 --machine-type e2-medium --zone=$ZONE
Created [https://www.googleapis.com/compute/v1/projects/qwiklabs-gcp-01-c8824f6b437f/zones/us-east1-d/instances/gcelab2].
NAME: gcelab2
ZONE: us-east1-d
MACHINE_TYPE: e2-medium
PREEMPTIBLE:
INTERNAL_IP: 10.142.0.3
EXTERNAL_IP: 34.139.208.142
STATUS: RUNNING
student_03_0de2b85d55c1@cloudshell:~ (qwiklabs-gcp-01-c8824f6b437f)$
```


NAME
gcloud compute instances create - create Compute Engine virtual machine instances
SYNOPSIS
gcloud compute instances create INSTANCE_NAMES [INSTANCE_NAMES ...]


Google Cloud
Compute Engine
VM instances
CREATE INSTANCE
IMPORT VM
REFRESH
Related actions
Terminal


WARNING: The private SSH key file for gcloud does not exist.
WARNING: The public SSH key file for gcloud does not exist.
WARNING: You do not have an SSH key for gcloud.
WARNING: SSH keygen will be executed to generate a key.
Do you want to continue (Y/n)? y
Generating public/private rsa key pair.
Warning: Permanently added 'compute.6063183331757855139' (ED25519) to the list of known hosts.
Linux gcelab2 6.1.0-31-cloud-amd64 #1 SMP PREEMPT_DYNAMIC Debian 6.1.128-1 (2025-02-07) x86_64





Conclusion:- In this experiment, we successfully created and managed a **Virtual Machine (VM)** on **Google Cloud Platform (GCP)** using **Google Cloud Skills Boost**. We learned how to configure networking, security, and storage while understanding the benefits of **scalability, cost efficiency, and cloud-based virtualization**. This hands-on experience enhances our knowledge of **cloud computing and infrastructure management.**