

Access to Google Cloud for VM practice

- Use your NetId and password to connect to GCP to access resources associated to our project (name/account: csci-ga-3003-085-fall23-9f6d). Can log in to the web console to the project: <https://console.cloud.google.com/welcome?project=csci-ga-3003-085-fall23-9f6d>
- Optional: install the Google Cloud SDK, which provides the gcloud cli for interacting with GCP. Instructions for installing the SDK can be found: <https://cloud.google.com/sdk/docs/install-sdk>
 - When exercise, or doing homework, project, please release/delete resource right after your work/exercise is done. There is limited fund for each student, **\$40 worth**.
 - If need discuss an operational problem, use screen capture (e.g. snipping tool in windows) to show the problem.
 - Do let us know if your quota is reached


Terms


- Compute Engine:
 - VM: VM instances, TPUs, Migrate
 - Storage: Disks, Snapshots, Images, Async Rep
 - Instance groups
 - VM Manager
 - Bare Metal Solution: server, network, volume, NFS shares
 - Network: CIDR notation (e.g.: 10.0.0.0/29 → 10.0.0.0 – 10.0.0.7), [examples](#)
 - Network: ICMP (ping), RDP (MS remote desk), SSH (port 22)


Massive Product/Service Offerings


→ ↻ 🔒 https://console.cloud.google.com/welcome/new?project=csci-ga-3003-085-fall23-9f6d


Google Cloud csci-ga-3003-085-fall23 Search (/) for resources, docs, products, and more Search


 **Create a VM**
Compute Engine


 **Create a database**
Cloud SQL


 **Analyze and manage data**
BigQuery


 **Create a storage bucket**
Cloud Storage


 **Run containerized apps**
Cloud Run

 **Create a containerized app**
Kubernetes Engine

 **Embed maps**
Google Maps Platform


 **Distribute network traffic**
Cloud Load Balancing


 **Convert text to speech**
Text-to-Speech API


 **Convert speech to text**
Speech-to-Text API


[View all products](#) [View all APIs](#) [Compare with AWS and Azure](#)


Interactive tutorials


 **Building a custom website with Google...**
15 min


 **Get started with Compute Engine**
5-60 min


 **Create a MySQL instance by using Cloud SQL**
15 min

 **Query a public dataset with the Google Cloud...**
5 min

 **Get started with BigQuery - query, load,...**
10 min

 **Get started with Cloud Storage**
10 min

 **Deploy a containerized web application with GKE**
10 min

 **Getting started with Speech-to-Text**
10 min

 **Edit code online with Cloud Shell**
Edit code online and in a development

 **Write applications with Cloud Code**
Write, debug, and run cloud-native

 **Manage resources with Cloud SDK**
Manage resources and applications

 **Build reference architecture**
Explore deployable solution architectures or create your own

LEARN Tutorial

[Back to Learn panel for Compute V...](#)

Transfer files to Linux VMs



Learn how to transfer files to or from a Linux VM.

Estimated time:
🕒 5 minutes

Before you begin

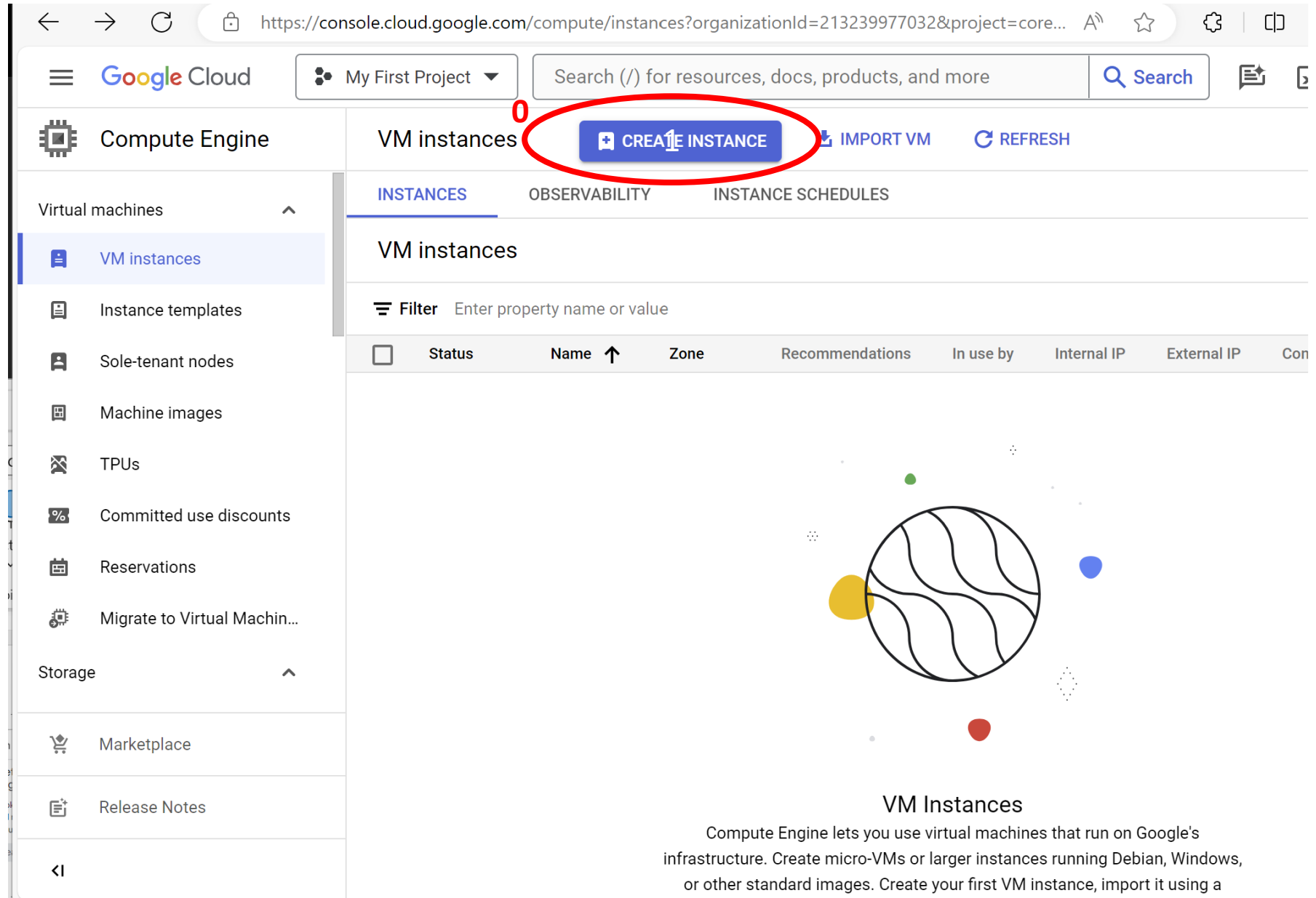
- [Create a VM instance](#)
- Optionally [attach a persistent disk](#) to the VM instance. If you don't attach a persistent disk, you can only transfer files to the boot disk.

When you're ready to get started, click **Start**.

START

Create a VM instance

0. Start VM creation



The screenshot shows the Google Cloud Console interface for the 'My First Project'. The left sidebar contains the 'Compute Engine' section with a list of resources: Virtual machines, VM instances (selected), Instance templates, Sole-tenant nodes, Machine images, TPUs, Committed use discounts, Reservations, and Migrate to Virtual Machin... Below this is the 'Storage' section with Marketplace and Release Notes. The main content area is titled 'VM instances' and has tabs for INSTANCES, OBSERVABILITY, and INSTANCE SCHEDULES. The 'INSTANCES' tab is active, showing a table with columns: Status, Name, Zone, Recommendations, In use by, Internal IP, External IP, and Con. Below the table is a large graphic of a globe with several colored dots (green, blue, red, yellow) around it. At the bottom, there is a section titled 'VM Instances' with a description: 'Compute Engine lets you use virtual machines that run on Google's infrastructure. Create micro-VMs or larger instances running Debian, Windows, or other standard images. Create your first VM instance, import it using a'.

Google Cloud

My First Project

Search (/) for resources, docs, products, and more

Search

Compute Engine

VM instances

CREATE INSTANCE

IMPORT VM

REFRESH

Virtual machines

VM instances

Instance templates

Sole-tenant nodes

Machine images

TPUs

Committed use discounts

Reservations

Migrate to Virtual Machin...

Storage

Marketplace

Release Notes

Filter Enter property name or value

Status	Name	Zone	Recommendations	In use by	Internal IP	External IP	Con
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VM Instances

Compute Engine lets you use virtual machines that run on Google's infrastructure. Create micro-VMs or larger instances running Debian, Windows, or other standard images. Create your first VM instance, import it using a

Create a VM instance

← Create an instance

EQUIVALENT CODE

HELP ASSISTANT

◀

To create a VM instance, select one of the options:

+

New VM instance

Create a single VM instance from scratch

+

New VM instance from template

Create a single VM instance from an existing template

+

New VM instance from machine image

Create a single VM instance from an existing machine image

+

Marketplace

Deploy a ready-to-go solution onto a VM instance

Name *

hy-nyu-f2i-test-vm-1

?

MANAGE TAGS AND LABELS

Region *

Zone *

northamerica-northeast1 (Montréal)

Low CO2

northamerica-northeast2 (Toronto)

Low CO2

southamerica-east1 (São Paulo)

Low CO2

southamerica-west1 (Santiago)

Low CO2

us-central1 (Iowa)

Low CO2

us-east1 (South Carolina)

us-east4 (Northern Virginia)

us-east5 (Columbus)

Machine type

Choose a machine type with preset amounts of vCPUs and memory that suit most workloads. Or, you can create a custom machine for your workload's particular needs. [Learn more](#)

PRESET

CUSTOM

e2-medium (2 vCPU, 1 core, 4 GB memory)

vCPU

memory

1-2 vCPU (1 shared core)

4 GB

ADVANCED CONFIGURATIONS

Monthly estimate

\$25.46

That's about \$0.03 hourly

Pay for what you use: no upfront costs and per second billing

Item	Monthly estimate
2 vCPU + 4 GB memory	\$24.46
10 GB balanced persistent disk	\$1.00
Total	\$25.46

[Compute Engine pricing](#)

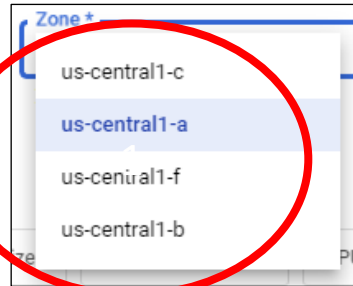
LESS

1. VM name
2. Region and Zone
3. CPU and DRAM

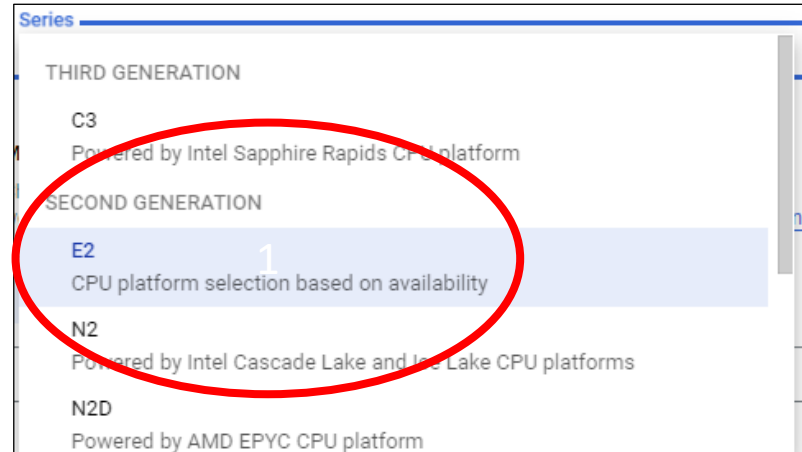
Create a VM instance

5. Zone (multiple zones per region)
6. Machine type (new CPU?)
7. Accounting
8. Rent a GPU?
9. You got Phished
10. Container runtime ready

4

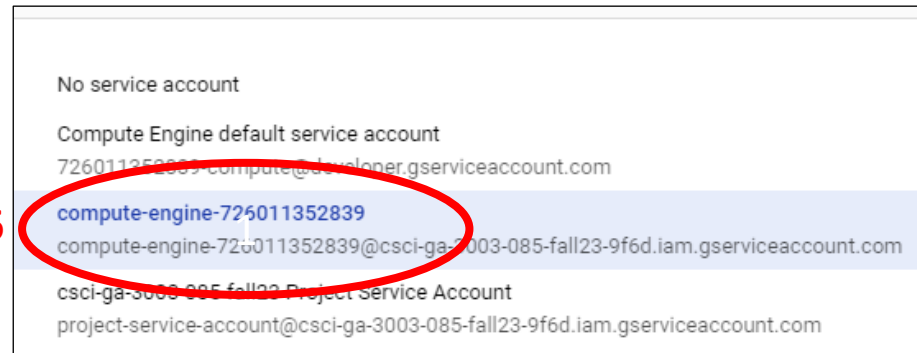


5



1

6



Machine configuration

General purpose Compute optimized Memory optimized **GPUs**

Graphics processing units (GPUs) accelerate specific workloads on your instances such as machine learning and data processing. [Learn More](#)

GPU type

Number of GPUs 1

NVIDIA A100 80GB
NVIDIA A100 40GB
NVIDIA L4
NVIDIA T4
NVIDIA V100
NVIDIA Tesla P4
NVIDIA Tesla P100

GRID)

7

its of vCPUs and memory that suit most
choice for your workload's particular needs. [Learn](#)

8

Confidential VM service ?

Confidential Computing is disabled on this VM instance

ENABLE

9

Container ?

Deploy a container image to this VM instance

DEPLOY CONTAINER

Create a VM instance

10. Select VPC network

11. GPU (V100) is not cheap

Advanced options ^

Networking ^
Hostname and network interfaces

Network tags ?

Hostname ?
Set a custom hostname for this instance or leave it default. Choice is permanent

IP forwarding ?
☐ Enable

Network performance configuration

Network interface card — ▾

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 * ?

Filter Type to filter

csci-ga-3003-085-fall23-net ?

nyu-fall23-vpc-hy-2

10

Monthly estimate

\$1,510.09

That's about \$2.07 hourly

Pay for what you use: no upfront costs and per second billing

Item	Monthly estimate
8 vCPU + 52 GB memory	\$345.44
1 NVIDIA V100	\$1,810.40
10 GB balanced persistent disk	\$1.00
Use discount	-\$646.75
Logging	Cost varies
Monitoring	Cost varies
Total	\$1,510.09

Create a VM instance

- 12. More add-on services
- 13. Secure Boot
- 14. Not to share physical server node with other VMs.
- 15. Advanced network performance

Management

Description, deletion protection, reservations, and automation

Description

Deletion protection ?
☐ Enable deletion protection

Reservations
Application policy —
Automatically use created reservation
Use an existing reservation when creating this VM instance

Automation
Startup script

You can choose to specify a startup script that will run when your instance boots up or restarts. Startup scripts can be used to install software and updates, and to ensure that services are running within the virtual machine. [Learn more](#)

Metadata

You can set custom metadata for an instance or project outside of the server-defined metadata. This is useful for passing in arbitrary values to your project or instance that can be queried by your code on the instance. [Learn more](#)

+ ADD ITEM

Data encryption ?
☒ Google-managed encryption key
No configuration required

Network performance configuration

Network interface card —
—
gVNIC
VirtIO

Disks

Additional disks

+ ADD NEW DISK + ATTACH EXISTING DISK
+ ADD LOCAL SSD

Security

Shielded VM and SSH keys

Shielded VM ?
Turn on all settings for the most secure configuration.
☐ Turn on Secure Boot ?
☒ Turn on vTPM ?
☒ Turn on Integrity Monitoring ?

VM access
Manage how users connect to the VM

☒ By default, when you connect to a VM using this console or gcloud, your SSH keys are generated automatically. [Learn more](#)

Sole-tenancy

Node affinity labels and CPU overcommit

Node affinity labels
BROWSE

CPU overcommit
Sole-tenant nodes with CPU overcommit provides dedicated access to a physical server with the ability to control the overcommit levels of each virtual machine scheduled onto the node. [Learn more](#)
☐ Enable CPU overcommit ?

Create a VM instance

Click the “Create” Button, wait 1 min, you got a VM

Compute Engine

Virtual machines

VM instances

Instance templates

Sole-tenant nodes

Machine images

TPUs

Committed use discounts

Reservations

Migrate to Virtual Machin...

Storage

Disks

VM instances

CREATE INSTANCEIMPORT VMREFRESH

INSTANCESOBSERVABILITYINSTANCE SCHEDULES

VM instances

Filter Enter property name or value

	Status	Name ↑	Zone	Recommendations	In use by	Internal IP	External IP	Connect
<input type="checkbox"/>	✓	hy-nyu-f23-test-vm-1	us-central1-a			192.168.1.2 (nic0)		SSH ▾ ⋮

Related actions

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

Monitor VMs
View outlier VMs across metrics like CPU and network

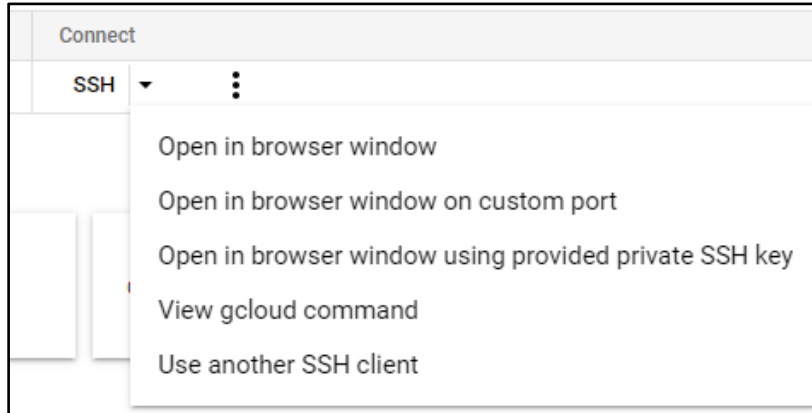
Explore VM logs
View, search, analyze, and download VM instance logs

Set up
Control traffic

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 grow

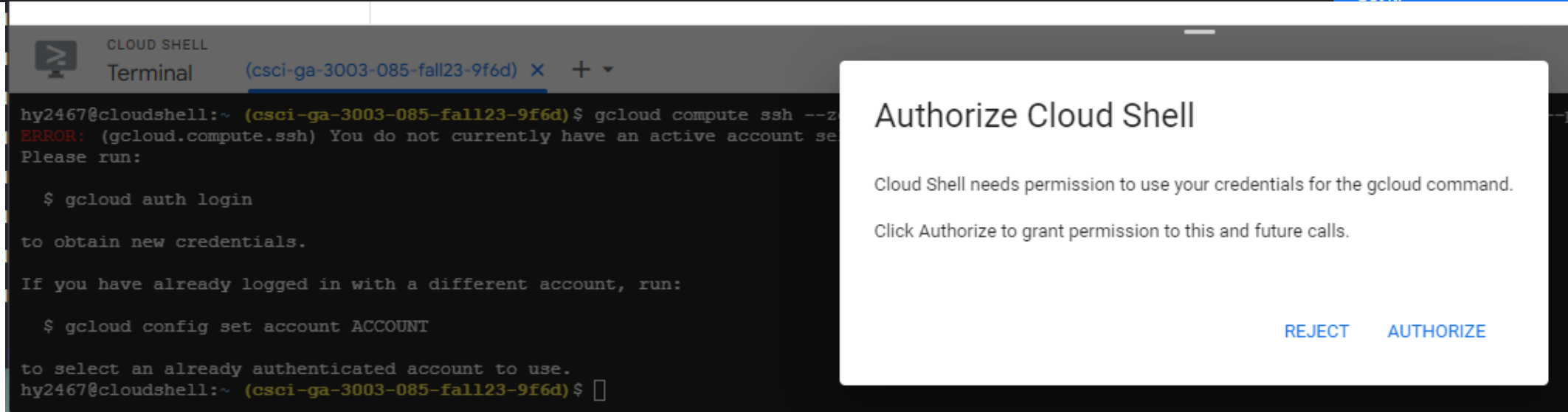
Access the VM instance



gcloud command line

The following gcloud command line can be used to SSH into this instance. [gcloud reference](#)

```
$ gcloud compute ssh --zone "us-central1-a" "hy-nyu-f23-test-vm-1" --tunnel-through-iap --project "csci-ga-3003-085-fall123-9f6d"
```



Access the VM instance via GCP Web Console

```
hy2467@cloudshell:~ (csci-ga-3003-085-fall23-9f6d)$ gcloud compute ssh --zone "us-central1-a" "hy-nyu-f23-test-vm-1" --tunnel-through-iap --project "csci-ga-3003-085-fall23-9f6d"
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.
This tool needs to create the directory [/home/hy2467/.ssh] before being able to generate SSH keys.

Do you want to continue (Y/n)?

Generating public/private rsa key pair.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/hy2467/.ssh/google_compute_engine
Your public key has been saved in /home/hy2467/.ssh/google_compute_engine.pub
The key fingerprint is:
SHA256:PRihf97NlDkJCbLDwtOxYCLotlLIB4mxhSGLx8AJlrk hy2467@cs-1003360986446-default
The key's randomart image is:
+---[RSA 3072]-----+
|X** o o + .      |
|B&.+ + = * . .   |
|=.B.. = B   o    |
|+.E  + = . +    |
|. .      S + *   |
|.      o o + .   |
|      . . o     |
|                |
|                |
+-----[SHA256]-----+
Updating project ssh metadata...working..Updated [https://www.googleapis.com/compute/v1/projects/csci-ga-3003-085-fall23-9f6d].
Updating project ssh metadata...done.
Waiting for SSH key to propagate.
WARNING:

Warning: Permanently added 'compute.6785642881597665119' (ECDSA) to the list of known hosts.
WARNING:

Linux hy-nyu-f23-test-vm-1 5.10.0-24-cloud-amd64 #1 SMP Debian 5.10.179-5 (2023-08-08) 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.
```

Use the VM instance

```
hy2467@hy-nyu-f23-test-vm-1:~$ sudo apt install git
```

```
sudo apt install htop nmon
```

```
cat /etc/os-release
```

```
PRETTY_NAME="Debian GNU/Linux 11 (bullseye)"
```

```
NAME="Debian GNU/Linux"
```

```
VERSION_ID="11"
```

```
VERSION="11 (bullseye)"
```

```
VERSION_CODENAME=bullseye
```

```
ID=debian
```

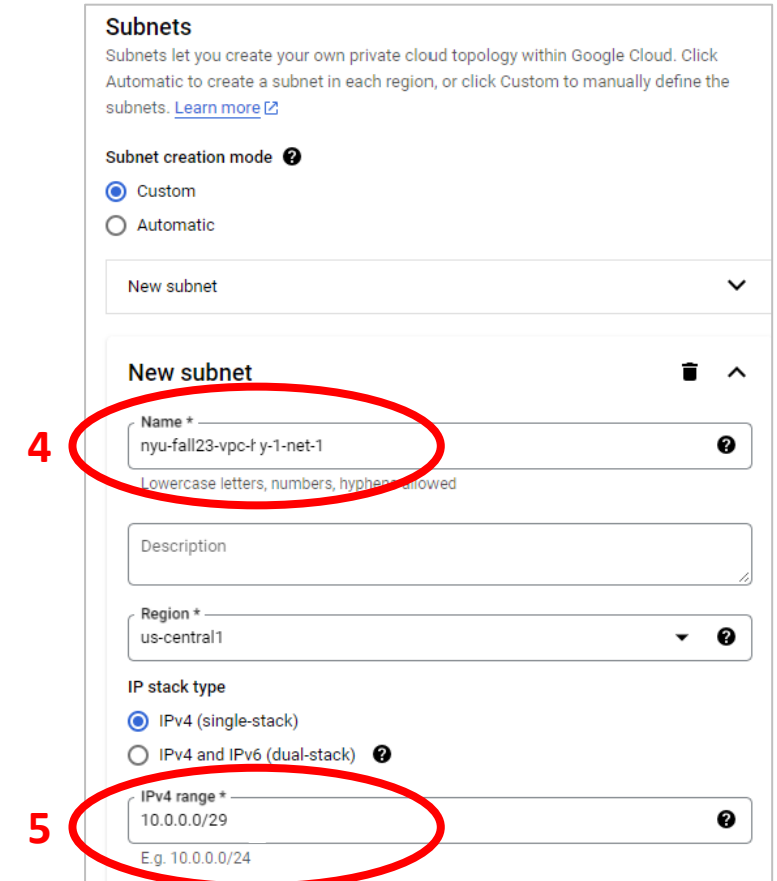
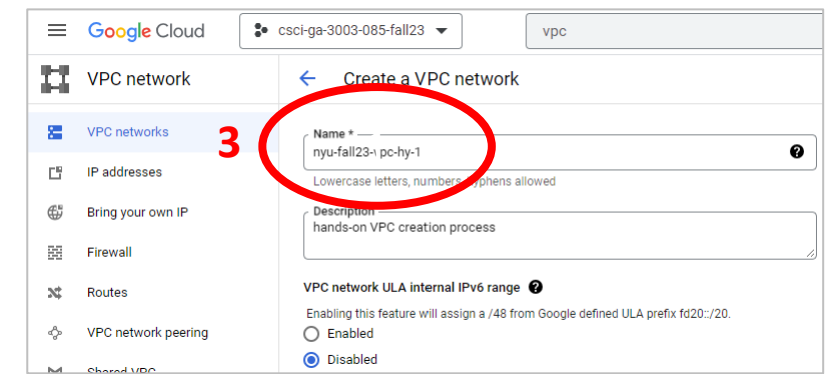
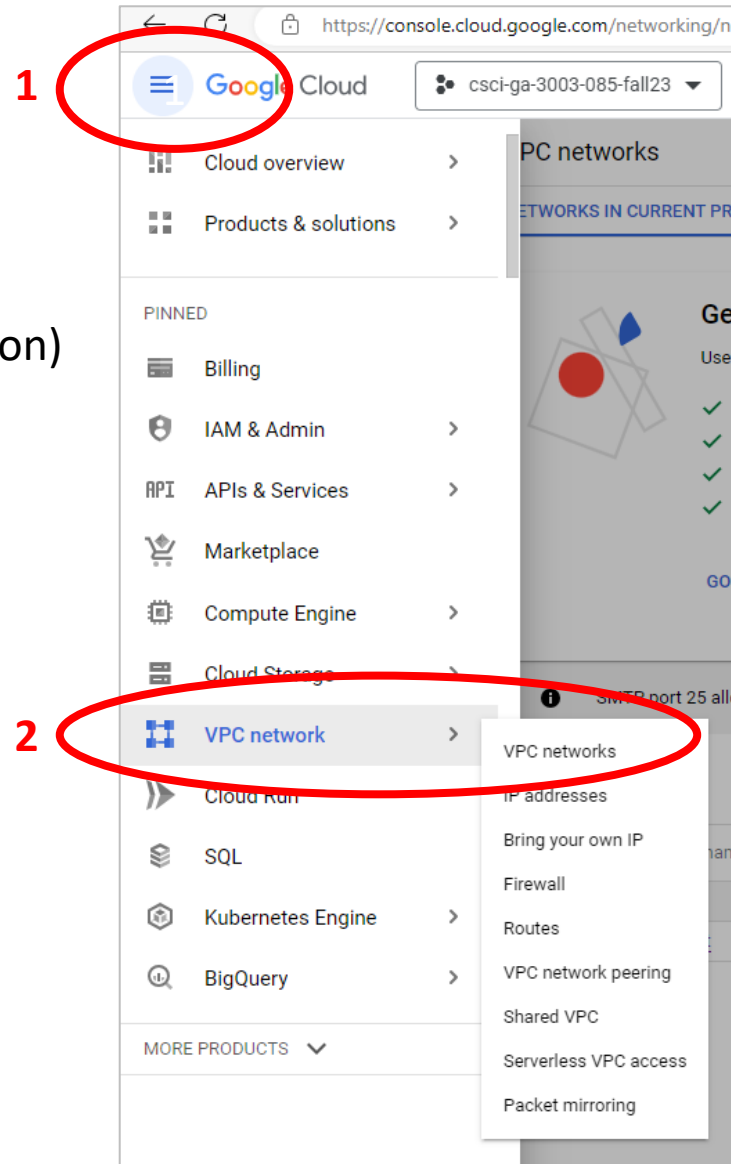
```
HOME_URL="https://www.debian.org/"
```

```
SUPPORT_URL="https://www.debian.org/support"
```

```
BUG_REPORT_URL=https://bugs.debian.org/
```

Create a VPC (Network)

1. Navigation menu
2. VPC (network)
3. VPC name
4. Custom subnet (just in one region)
5. IP range, minimal 8 private IPs



Create a VPC (Network)

6. IPV4 firewall rules (ICMP, SSH)
7. Max. Trans Unit (MTU)
8. VPC network created

6

IPV4 FIREWALL RULES						
	Name	Type	Targets	Filters	Protocols / ports	Action
<input type="checkbox"/>	nyu-fall23-vpc-hy-1-allow-custom ?	Ingress	Apply to all	IP ranges: 10.0.0.0/29	all	Allow
<input checked="" type="checkbox"/>	nyu-fall23-vpc-hy-1-allow-icmp ?	Ingress	Apply to all	IP ranges: 0.0.0.0/0	icmp	Allow
<input type="checkbox"/>	nyu-fall23-vpc-hy-1-allow-rdp ?	Ingress	Apply to all	IP ranges: 0.0.0.0/0	tcp:3389	Allow
<input checked="" type="checkbox"/>	nyu-fall23-vpc-hy-1-allow-ssh ?	Ingress	Apply to all	IP ranges: 0.0.0.0/0	tcp:22	Allow

Maximum transmission unit (MTU)

- 1460
- 1500
- 8896

EQUIVALENT COMMAND LINE

8

VPC networks							
<div><div>Filter</div><div>Enter property name or value</div></div>							
Name ↑	Subnets	MTU ?	Mode	Internal IP ranges	Gateways	Firewall rules	Global dynamic routing
csci-ga-3003-085-fall22-net	3	1460	Custom			8	On
nyu-fall23-vpc-hy-2	1	1460	Custom			2	Off