

CS5284 : Graph Machine Learning

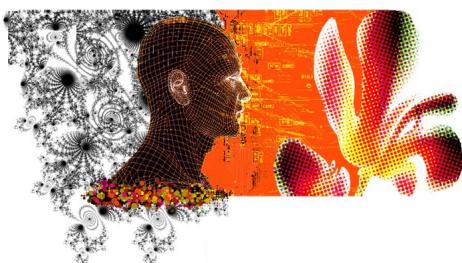
Google Academic GPU

Semester 1 2025/26

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Redeem Coupon

[PENDING] CS5284 is supported by Google Cloud Teaching Program, approved by Google Education Programme.

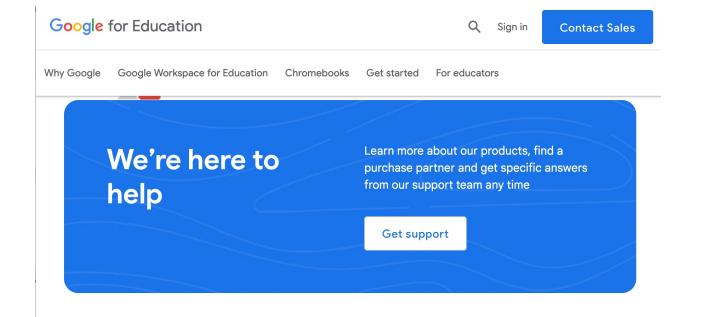
Google offers 50USD ≈ 150GPU-hrs to each student to use during the semester.

Student Coupon Retrieval Link: TO BE ADDED

You will be asked to provide your school email address and name. An email will be sent to you to confirm these details before a coupon is sent to you.

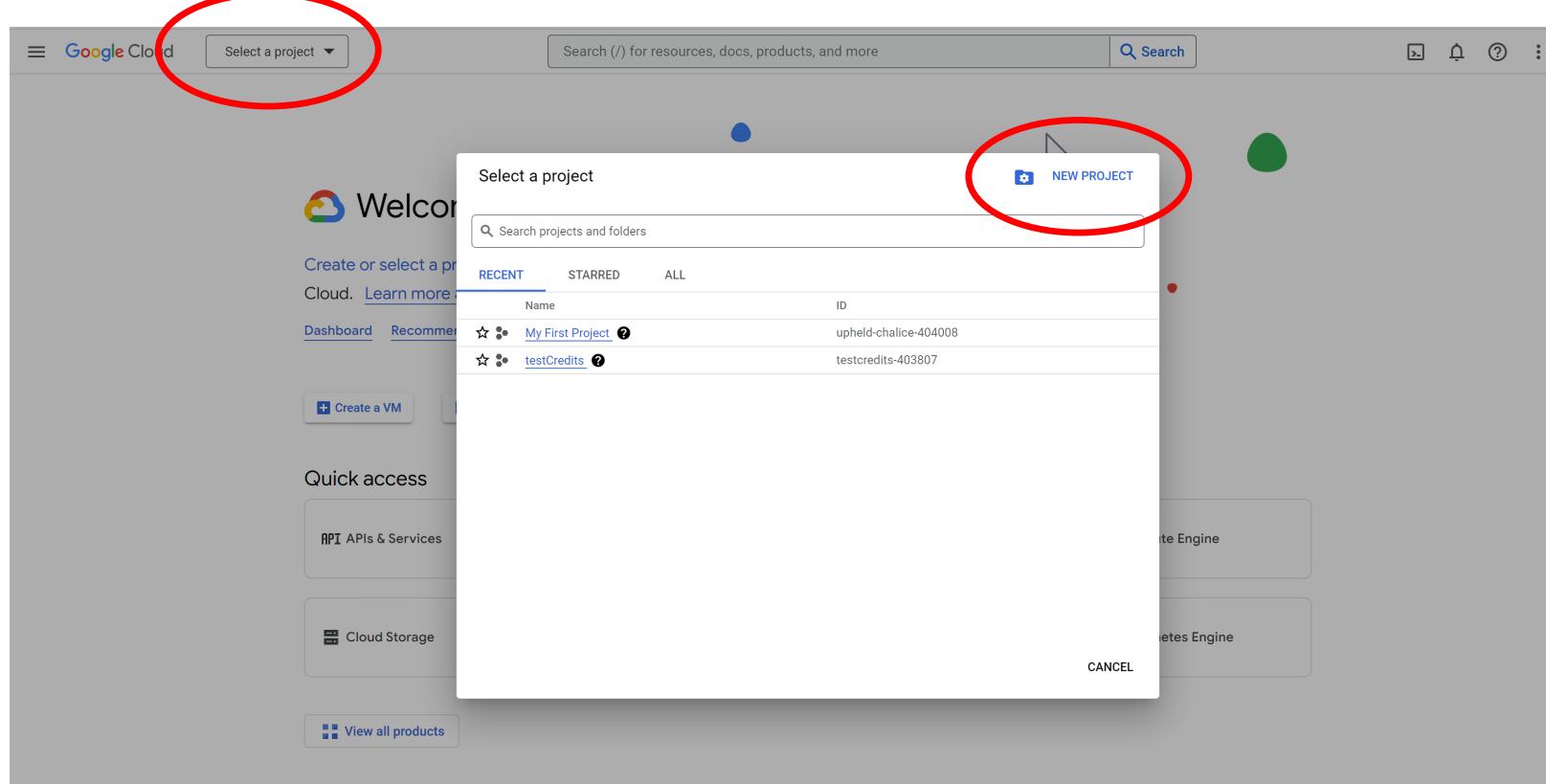
You can request a coupon from the URL and redeem it until: x/x/2025 and Coupon valid through: x/x/2025

You can only request ONE Coupon.

A screenshot of a form titled 'Cloud Platform Education Grants' on the Google Cloud Platform website. The form asks users to provide their first name, last name, and school email. It also includes a note about domain selection and a privacy policy link. A red arrow points from the text 'You will be asked to provide your school email address and name.' in the previous section to the 'School Email' field on this form. The form has a 'Submit' button at the bottom.

Create a Project

- In the main page: <https://console.cloud.google.com>
- Select a Project > Create a Project.



Billing Information

- You can verify that your coupon worked in the main page of the project > Billing >

The screenshot shows the Google Cloud Billing interface. On the left, the main Google Cloud Welcome screen is visible, featuring a 'Billing' button highlighted with a red oval. A red arrow points from this button to the 'Billing' section on the right. The right side displays the 'Billing' dashboard under the 'Overview' tab. At the top, it shows 'Billing account' and 'Billing Account for Education'. Below this, the 'BILLING ACCOUNT OVERVIEW' section includes 'Billing health checks' with three status indicators: 0 errors (red), 1 warning (yellow), and 1 success (green). A green box highlights the 'Credits' section, which shows a circular progress bar at \$50.00, indicating 'Remaining credits' and 'Out of \$50.00'. Below this, it lists 'Remaining credits' for 'CS3244 Machine Learning pt11'.

Change GPU Quotas

- In the free version of Google Cloud, you do not have access to VM with GPUs, you need to ask for an increase of your GPU Quotas. In IAM&Admin>Quotas, look for “GPUS_ALL_REGIONS” using the filter. It should be set at 0. We will ask for an increase.

The screenshot shows the Google Cloud IAM & Admin Quotas interface. On the left, the navigation menu is open, with 'IAM & Admin' selected. Under 'Quotas', 'Quotas' is also selected, highlighted with a red circle. On the right, the main pane displays 'Quotas for project "testCredits"'. A modal window titled 'Set up quota alerts' is open, providing instructions on how to manage quota alerts. Below the modal, a table shows current usage statistics: 'Current usage > 90%' is 0, and 'All quotas' total is 11,463. At the bottom, a filtered list shows a single quota entry for 'Compute Engine API' with a limit of 1, highlighted with a green circle. The table columns include Service, Quota, Dimensions (e.g. location), Limit, Current usage percentage, and Current usage.

Service	Quota	Dimensions (e.g. location)	Limit	Current usage percentage	Current usage
<input type="checkbox"/> Compute Engine API	GPUs (all regions)		1	0%	0

Increase GPU Quota

- Select the quota, click on “Edit Quota”, request a new quota value at 1, and provide a short justification on the fact that you are a student and you use it to complete a homework. This can take several business days to be accepted.

Google Cloud dashboard for project "testCredits". The "QUOTAS" tab is selected. A red circle highlights the "EDIT QUOTAS" button in the top right corner of the main content area.

Quotas for project "testCredits"

QUOTAS INCREASE REQUESTS

Set up quota alerts
Get alerted if a quota is close to reaching its maximum. Click on ⋮ in a row to get started, or click "Learn more" to view documentation.
[LEARN MORE](#)

Current usage > 90%
0
[View quotas](#)

All quotas
11,463

Filter: Metric : compute.googleapis.com/gpus_all_regions Enter property name or value

Service	Quota	Dimensions (e.g. location)	Limit	Current usage percentage	Current usage
<input checked="" type="checkbox"/> Compute Engine API	GPUs (all regions)		1	0%	0

1 quota selected

Quota changes
Expand each service card to change individual quotas.

Edit quota

Compute Engine API

Quota: GPUs (all regions)
Current limit: 1
Enter a new quota limit. A limit above 1 will require approval from your service provider. [?](#)

New limit *

! The requested quota limit cannot be equal to current limit.

Request description *
I am a student in National University of Singapore and I need to create a VM with GPU for a ML coursework class.

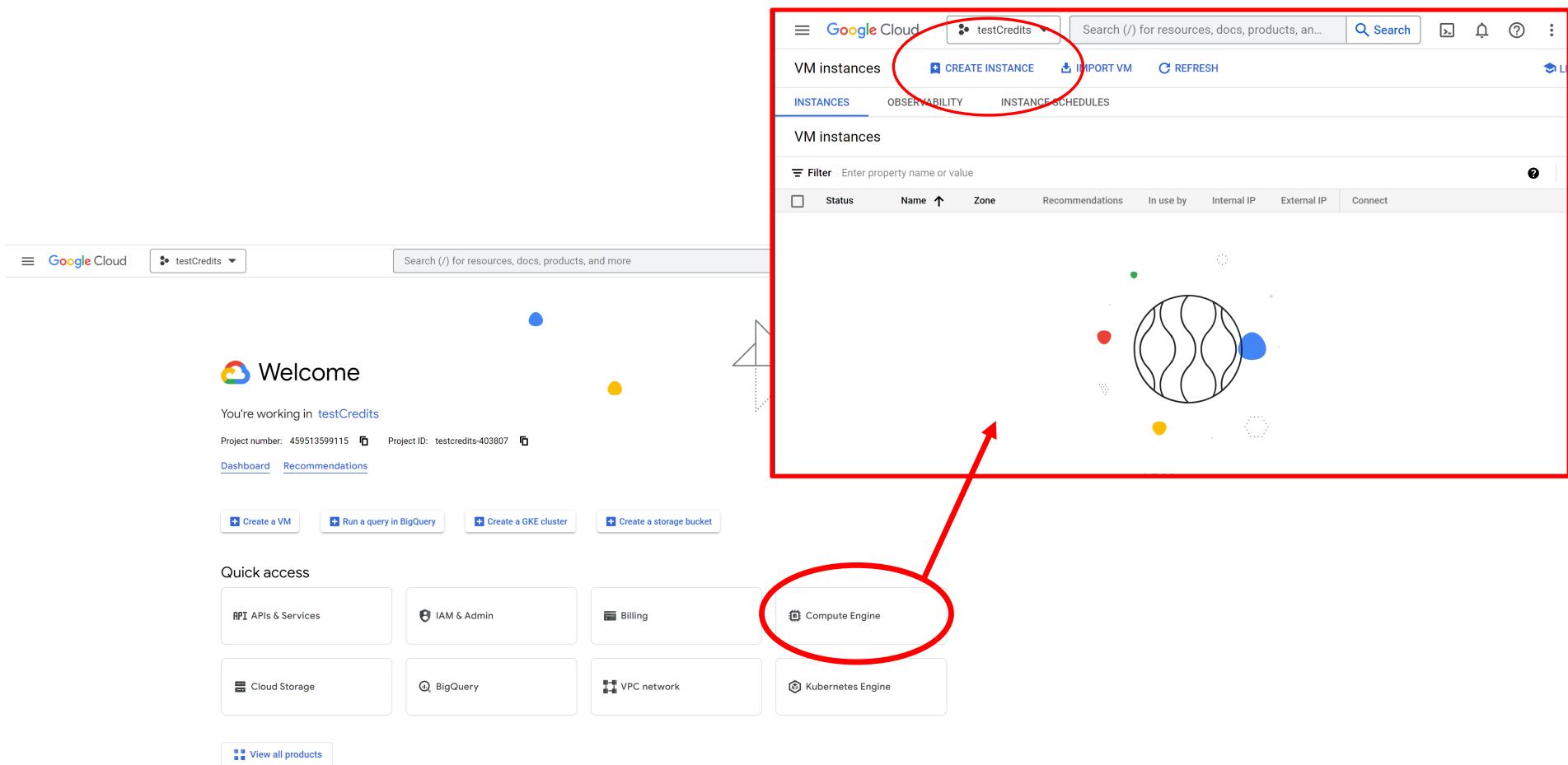
Your description will be sent to your service provider and is used to evaluate your request. It's useful to include the intent of the quota usage, future growth plans, region or zone spread, and any additional requirements or dependencies.

[DONE](#)

[NEXT](#)

Creating VM Instance

- From main screen : Go to Compute Engine > Create VM Instance



Create VM Instance

The screenshot shows the Google Cloud 'Create an instance' page. On the left, a sidebar lists options: 'New VM instance' (selected), 'New VM instance from template', 'New VM instance from machine image', and 'Marketplace'. The main area shows fields for 'Name' (instance-1), 'Region' (asia-southeast1 (Singapore)), 'Zone' (asia-southeast1-b), and 'Machine configuration' (GPU type NVIDIA T4, Number of GPUs 1). A red box highlights the 'Region' field with the note 'Select Singapore server (faster), or Taiwan'. A blue box highlights the 'GPUs' tab in the 'Machine configuration' section with the note 'Select GPUs'. An orange box highlights the 'GPU type' field with the note 'Choose GPU model and number. Choose one that is available. K80 in Taiwan works, and T4 in SG sometimes too.' To the right, a sidebar shows a monthly estimate of US\$220.11 and a note: 'You have 50USD, so around 150h in this case'. Another sidebar shows compute engine pricing details.

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

- New VM instance
- New VM instance from template
- New VM instance from machine image
- Marketplace

Name * instance-1

Region * asia-southeast1 (Singapore)

Zone is permanent

asia-southeast1-b Zone is permanent

Select Singapore server (faster), or Taiwan

Machine configuration

General purpose Compute-optimised Memory-optimised GPUs

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

GPU type NVIDIA T4

Number of GPUs 1

Enable Virtual Workstation (NVIDIA GRID)

Series	Description	vCPUs	Memory	Platform
N1	Balanced price and performance	1 - 96	1.8 - 624 GB	Intel Skylake

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

n1-standard-1 (1 vCPU, 3.75 GB memory)

vCPU Memory

Monthly estimate **US\$220.11**
That's about US\$0.30 hourly
Pay for what you use: No upfront costs and per-second billing

You have 50USD, so around 150h in this case

Compute Engine pricing [Learn More](#)

Monthly estimate US\$42.78

1 NVIDIA T4 US\$270.10

10 GB balanced persistent disk US\$1.10

Use discount -US\$93.86

Total US\$220.11

Create a VM Instance

[Create an instance](#)

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

Boot disk ?

Name: instance-1
Type: New balanced persistent disk
Size: 50 GB
Licence type: Free
Image: Deep Learning VM M112

[CHANGE](#)

Monthly estimate

US\$224.51

That's about US\$0.31 hourly

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

Item	Monthly estimate
1 vCPU + 3.75 GB memory	US\$42.78
1 NVIDIA T4	US\$270.10
50 GB balanced persistent disk	US\$5.50
Use discount	-US\$93.86
Total	US\$224.51

[Compute Engine pricing](#)

[LESS](#)

Boot disk

Select an image or snapshot to create a boot disk, or attach an existing disk. Can't find what you're looking for? Explore hundreds of VM solutions in [Marketplace](#)

[PUBLIC IMAGES](#) [CUSTOM IMAGES](#) [SNAPSHOTS](#) [ARCHIVE SNAPSHOTS](#) [EXISTING DISKS](#)

Operating system: Deep Learning on Linux

Version: Deep Learning VM M112

Debian 10, Python 3.7, Intel MKL. With Intel optimized NumPy, SciPy, and scikit-learn preinstalled.

Boot disk type: Balanced persistent disk

[COMPARE DISK TYPES](#)

Size (GB): 50

Provision between 50 and 65536 GB

[SHOW ADVANCED CONFIGURATION](#)

[SELECT](#)

[CANCEL](#)

Change the OS from Debian to the one adapted for Deep Learning (CUDA and python already installed)

Allow HTTP and HTTPS traffic. This could be useful to install a jupyter server

Firewall ?

Add tags and firewall rules to allow specific network traffic from the Internet

- Allow HTTP traffic
- Allow HTTPS traffic
- Allow load balancer health checks

Advanced options

Networking, disks, security, management, sole-tenancy

[CREATE](#)

[CANCEL](#)

[EQUIVALENT CODE](#)

Stopping the VM

- **/!\ STOP YOUR VM IF YOU ARE NOT USING IT /!**
- You are paying as long as the green icon is present.

The screenshot shows the Google Cloud VM instances page. At the top, there's a navigation bar with 'Google Cloud' and a dropdown for 'testCredits'. A search bar contains the word 'firewa'. There are two notifications indicated by a green circle with the number '2'.

The main header includes 'VM instances', 'CREATE INSTANCE', 'IMPORT VM', and 'REFRESH' buttons. Below this, there are tabs for 'INSTANCES', 'OBSERVABILITY', and 'INSTANCE SCHEDULES'. A message '1 instance selected' is displayed, followed by buttons for 'START / RESUME', 'STOP', 'SUSPEND', 'RESET', 'DELETE', 'LABELS', and 'PERMISSIONS'. The 'STOP' button is circled in red.

A table lists the selected instance: 'instance-2' in 'asia-east1-b' zone, with internal IP '10.140.0.2 (nic0)' and external IP '34.81.122.198 (nic0)'. A green checkmark icon next to the status column is circled in red. To the right of the table is a vertical 'Related actions' sidebar with options: 'Start / Resume', 'Stop' (circled in red), 'Suspend', 'Reset', 'Delete', 'View network details', 'Create new machine image', 'View logs', and 'View monitoring'.

The 'Related actions' section also includes links for 'Explore Backup and DR', 'View billing report', 'Monitor VMs', 'Set up firewall rules', 'Patch management', and 'Load balance between V'.

Connect to the VM instance

- You can directly connect by SSH to the instance. You can then create your python environment, install your packages and launch .py scripts from this console.

The screenshot shows the Google Cloud Platform interface for managing VM instances. The top navigation bar includes the Google Cloud logo, a dropdown for 'testCredits', a search bar, and various user icons. Below the header, the 'VM instances' section is active, with options to 'CREATE INSTANCE', 'IMPORT VM', and 'REFRESH'. A 'LEARN' button is also present. The main area displays a table of VM instances, with one row selected for 'instance-2'. The table columns include Status, Name (sorted), Zone, Recommendations, In use by, Internal IP, External IP, and a 'Connect' button. The 'Connect' button for 'instance-2' is set to 'SSH'. To the right of the table, a terminal window titled 'SSH-in-browser' is open, showing a Debian 10 terminal session. The terminal output includes the welcome message 'Welcome to the Google Deep Learning VM', system information like 'Version: common-cpu.m12', and a note about the Nvidia driver. It also shows the standard GNU/Linux copyright notice and the prompt '(base) mmichelessa@instance-2:~\$'.

Status	Name ↑	Zone	Recommendations	In use by	Internal IP	External IP	Connect
<input type="checkbox"/>	instance-2	asia-east1-b			10.140.0.2 (nic0)	34.81.122.198 (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 billing
- Set up firewall rules
Control traffic to and from a VM instance
- Patch management
Schedule patch updates and view compliance on VM instances

SSH-in-browser

```
ssh.cloud.google.com/v2/ssh/projects/testcredits-403807/zones/asia-east1-b/instances/instance-2?aut...  
ssh.cloud.google.com/v2/ssh/projects/testcredits-403807/zones/asia-east1-b/instances/instance-2?aut...  
=====  
Welcome to the Google Deep Learning VM  
=====  
Version: common-cpu.m12  
Based on: Debian GNU/Linux 10 (buster) (GNU/Linux 4.19.0-25-cloud-amd64 x86_64)  
Resources:  
* Google Deep Learning Platform StackOverflow: https://stackoverflow.com/questions/tagged/google-dl-platform  
* Google Cloud Documentation: https://cloud.google.com/deep-learning-vm  
* Google Group: https://groups.google.com/forum/#!forum/google-dl-platform  
To reinstall Nvidia driver (if needed) run:  
sudo /opt/deeplearning/install-driver.sh  
Linux instance-2 4.19.0-25-cloud-amd64 #1 SMP Debian 4.19.289-2 (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.  
(base) mmichelessa@instance-2:~$
```

Use Notebooks : Configure Jupyter server

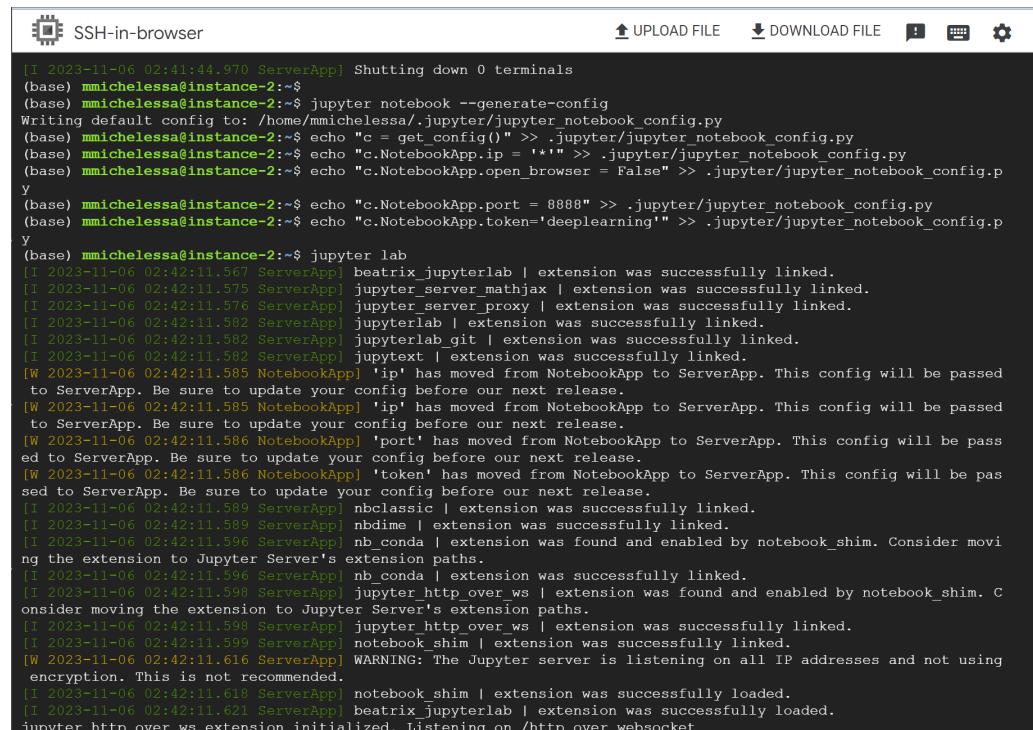
Jupyter lab is already pre-installed.

Type the following commands to configure the jupyter server.

```
jupyter notebook --generate-config  
echo "c = get_config()" >> .jupyter/jupyter_notebook_config.py  
echo "c.NotebookApp.ip = '*' >> .jupyter/jupyter_notebook_config.py  
echo "c.NotebookApp.open_browser = False" >> .jupyter/jupyter_notebook_config.py  
echo "c.NotebookApp.port = 8888" >> .jupyter/jupyter_notebook_config.py  
echo "c.NotebookApp.token='deeplearning'" >> .jupyter/jupyter_notebook_config.py
```

To start the server, type:

```
jupyter lab
```



The screenshot shows an SSH-in-browser interface. At the top, there are buttons for UPLOAD FILE, DOWNLOAD FILE, and various system icons. The main area is a terminal window with the following text:

```
[I 2023-11-06 02:41:44.970 ServerApp] Shutting down 0 terminals  
(base) mmichelessa@instance-2:~$ jupyter notebook --generate-config  
Writing default config to: /home/mmichelessa/.jupyter/jupyter_notebook_config.py  
(base) mmichelessa@instance-2:~$ echo "c = get_config()" >> .jupyter/jupyter_notebook_config.py  
(base) mmichelessa@instance-2:~$ echo "c.NotebookApp.ip = '*' >> .jupyter/jupyter_notebook_config.py  
(base) mmichelessa@instance-2:~$ echo "c.NotebookApp.open_browser = False" >> .jupyter/jupyter_notebook_config.py  
(base) mmichelessa@instance-2:~$ echo "c.NotebookApp.port = 8888" >> .jupyter/jupyter_notebook_config.py  
(base) mmichelessa@instance-2:~$ echo "c.NotebookApp.token='deeplearning'" >> .jupyter/jupyter_notebook_config.py  
(base) mmichelessa@instance-2:~$ jupyter lab  
[I 2023-11-06 02:42:11.567 ServerApp] beatrix_jupyterlab | extension was successfully linked.  
[I 2023-11-06 02:42:11.575 ServerApp] jupyter_server_mathjax | extension was successfully linked.  
[I 2023-11-06 02:42:11.576 ServerApp] jupyter_server_proxy | extension was successfully linked.  
[I 2023-11-06 02:42:11.582 ServerApp] jupyterlab | extension was successfully linked.  
[I 2023-11-06 02:42:11.582 ServerApp] jupyterlab_git | extension was successfully linked.  
[I 2023-11-06 02:42:11.582 ServerApp] jupytertext | extension was successfully linked.  
[W 2023-11-06 02:42:11.585 NotebookApp] 'ip' has moved from NotebookApp to ServerApp. This config will be passed to ServerApp. Be sure to update your config before our next release.  
[W 2023-11-06 02:42:11.585 NotebookApp] 'ip' has moved from NotebookApp to ServerApp. This config will be passed to ServerApp. Be sure to update your config before our next release.  
[W 2023-11-06 02:42:11.586 NotebookApp] 'port' has moved from NotebookApp to ServerApp. This config will be passed to ServerApp. Be sure to update your config before our next release.  
[W 2023-11-06 02:42:11.586 NotebookApp] 'token' has moved from NotebookApp to ServerApp. This config will be passed to ServerApp. Be sure to update your config before our next release.  
[I 2023-11-06 02:42:11.589 ServerApp] nbclassic | extension was successfully linked.  
[I 2023-11-06 02:42:11.589 ServerApp] nbdimx | extension was successfully linked.  
[I 2023-11-06 02:42:11.596 ServerApp] nb_conda | extension was found and enabled by notebook_shim. Consider moving the extension to Jupyter Server's extension paths.  
[I 2023-11-06 02:42:11.596 ServerApp] nb_conda | extension was successfully linked.  
[I 2023-11-06 02:42:11.598 ServerApp] jupyter_http_over_ws | extension was found and enabled by notebook_shim. Consider moving the extension to Jupyter Server's extension paths.  
[I 2023-11-06 02:42:11.598 ServerApp] jupyter_http_over_ws | extension was successfully linked.  
[I 2023-11-06 02:42:11.599 ServerApp] notebook_shim | extension was successfully linked.  
[W 2023-11-06 02:42:11.616 ServerApp] WARNING: The Jupyter server is listening on all IP addresses and not using encryption. This is not recommended.  
[I 2023-11-06 02:42:11.618 ServerApp] notebook_shim | extension was successfully loaded.  
[I 2023-11-06 02:42:11.621 ServerApp] beatrix_jupyterlab | extension was successfully loaded.  
[I 2023-11-06 02:42:11.621 ServerApp] jupyter_http_over_ws extension initialized. Listening on /http_over_websocket
```

Use Notebooks: Create firewall rule

To communicate with the jupyter server from your machine, you need to open the port 8888 from your instance

From the VM instance screen, go to “Set up firewall rules” and click on “Create Firewall Rule”

Google Cloud testCredits

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...

INSTANCE OBSERVABILITY INSTANCE SCHEDULES

VM instances

Filter Enter property name or value

Status	Name	Zone	Recommendations	In use by	Connect
<input type="checkbox"/>	instance-2	asia-east1-b			SSH

Related actions

- Explore Backup and DR NEW
- View billing report
- Monitor VMs
- Explore VM logs
- Set up firewall rules** Control traffic to and from a VM instance
- Patch management

Google Cloud testCredits

Firewall policies CREATE FIREWALL POLICY CREATE FIREWALL RULE

Get real-time analytics with Network Intelligence Center

Use Network Intelligence Center for comprehensive monitoring and troubleshooting. [Learn more](#)

- ✓ Visualize your network resources
- ✓ Diagnose and prevent connectivity issues
- ✓ View packet loss and latency metrics
- ✓ Keep your firewall rules strict and efficient

GO TO NETWORK INTELLIGENCE CENTER REMIND ME LATER

Create Firewall Rule

- In the firewall rule screen, change the following parameters:
 - Target: All instances in the network
 - Source ipv4 range: 0.0.0.0/0
 - Specified Protocols : TCP – Ports: 8888

Google Cloud testCredits firewa

← Create a firewall rule

Targets
All instances in the network

Source filter
IPv4 ranges

Source IPv4 ranges *
0.0.0.0/0

Second source filter
None

Destination filter
None

Protocols and ports ?
 Allow all
 Specified protocols and ports

TCP
Ports
8888
E.g. 20, 50-60

UDP
Ports
E.g. all

Other
Protocols

Use Notebooks : Access Jupyter Server

- You can access Jupyter Lab directly from your browser.

Filter Enter property name or value						
Status	Name ↑	Zone	Recommendations	In use by	Internal IP	External IP
<input checked="" type="checkbox"/>	instance-2	asia-east1-b			10.140.0.2 (nic0)	34.81.122.198 (nic0)

The token is
“deeplearning”

Token authentication is enabled

If no password has been configured, you need to open the server with its login token in the URL, or paste it above. This requirement will be lifted if you [enable a password](#).

The command:

```
jupyter server list
```

will show you the URLs of running servers with their tokens, which you can copy and paste into your browser. For example:

```
Currently running servers:  
http://localhost:8888/?token=c8de56fa... :: /Users/you/noteb
```

or you can paste just the token value into the password field on this page.

See [the documentation on how to enable a password](#) in place of token authentication, if you would like to avoid dealing with random tokens.

Cookies are required for authenticated access to the Jupyter server.

Use Notebooks

- You have now access to Jupyter Lab, you can upload your colab notebooks and data and run your codes.

