

Deep Learning and Applications

Google Cloud Platform (GCP) Tutorial

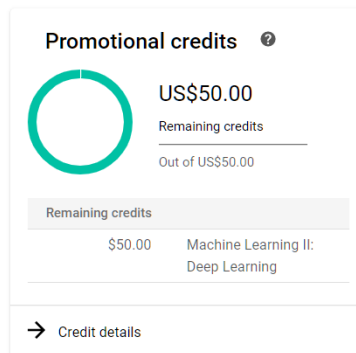
Feb. 2020

1 Activate the Coupon

We have applied some Google Cloud credits for the class projects. To retrieve your coupon,

1. Visit the [student coupon page](#) and enter your institutional email.
2. An email will be sent to your email address. Click **redeem** in the email to activate the coupon in your Google account.

You will find a credit of 50 dollars on the right side of your GCP account.

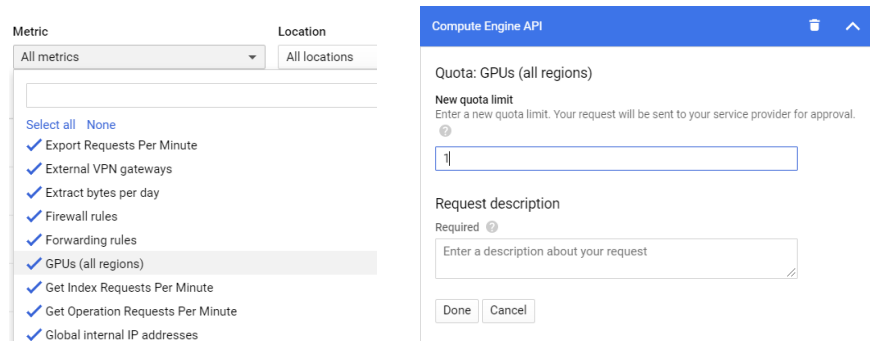


2 Create a Deep Learning Machine

If you have never allocated GPU machines on GCP, you may need to change the setting of GPU limit.

1. In the navigation menu (top-left), select **IAM & Admin** → **Quotas**.
2. Set the metric filter to GPUs. Update your GPU limit to 1 or more.

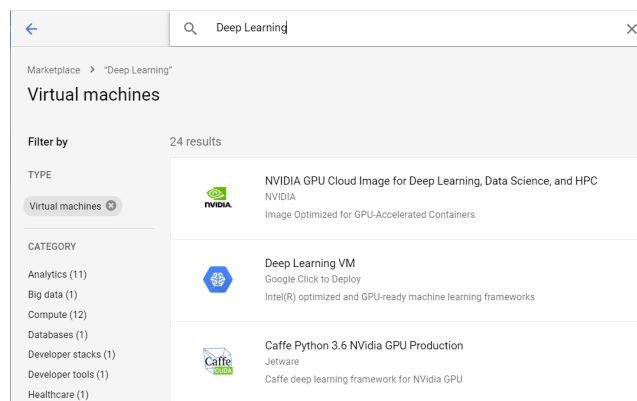
Now we can allocate GPU machines. We first create a project, and then allocate virtual machines (VM) inside the project.



1. Click the project on the banner (top). Create a new project with your favorite name. Remember to select the course coupon for billing.

The image shows the 'Create Project' form in the Google Cloud console. The 'Project name' field contains 'Demo project'. Below it, the 'Project ID' is 'neural-myth-269103'. The 'Billing account' dropdown is set to 'Machine Learning II: Deep Learning'. The 'Location' dropdown is set to 'No organisation'. There are 'CREATE' and 'CANCEL' buttons at the bottom.

2. In the navigation menu (top-left), select **Compute Engine** → **VM instances**. Click **create instance**.
3. On the left side, choose **marketplace**. The marketplace provides many existing solutions for deep learning software. Here we choose **Deep Learning VM**.



- For the configuration of the VM, we recommend to use 4 CPU and 1 T4 GPU, which is close to the machines you used on Colab. Note only some zones support T4 GPU, and you may need to change the zone. Here we pick zone **us-central1-f**. Change the DL framework to your favorite one (e.g., PyTorch). Fill in both check boxes.

Zone
GPU availability is limited to certain zones. [Learn more](#)

us-central1-f

Machine type
4 vCPUs 15 GB memory [Customise](#)

GPUs
The number of GPU dies is linked to the number of CPU cores and memory selected for this instance. For the current configuration, you can select no fewer than 1 GPU die of this type. [Learn more](#)
Number of GPUs: 1 GPU type: NVIDIA Tesla T4
Machines with GPUs cannot migrate on host maintenance

Framework
Choose the primary machine learning framework you will be using. If the library you would like to use is not listed, choose the base image, which provides core packages.
PyTorch 1.3 + fast.ai 1.0 (CUDA 10.0)

GPU
 Install NVIDIA GPU driver automatically on first startup?
I want to use NVIDIA GPUs with this image. Please fetch NVIDIA GPU drivers from a third-party location and install them on my behalf (requires internet access on the VM).

Access to the Jupyter Lab
 Enable access to JupyterLab via URL instead of SSH. (Beta)
Enable this feature to access the running JupyterLab environment through a URL instead of SSH tunneling. Anyone who has been granted the Editor or Owner role in your GCP project can access this URL. This feature is available only in the US, EU and Asia.

- Pay attention to the price if you use a more advanced configuration. The T4 GPU roughly costs \$0.39 per hour, which means you can use it for 5 days.
- Now you can find your VM in the console. Select the VM and start it.

Name	Zone	Recommendation	In use by	Internal IP	External IP
tensorflow-1-vm	us-west1-b			10.138.0.2 (nic0)	104.196.241.127

- Once it is activated, you can login into it via SSH. This will open a Linux terminal in your browser.

Connect

SSH

- Open in browser window
- Open in browser window on custom port
- Open in browser window using provided private SSH key
- View gcloud command
- Use another SSH client

```
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.

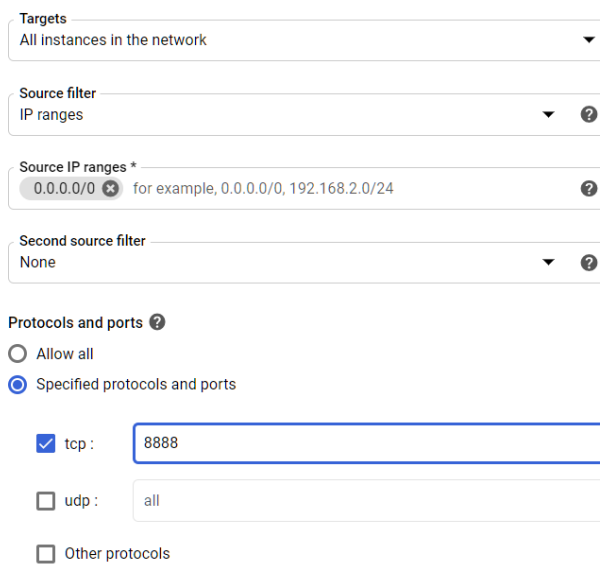
root@tensorflow-1-vm:~#
```

- Remember to **stop your VM in GCP console** if you no longer need to use it. The billing is counted based on the running time of the VM.

3 Jupyter Notebook

To connect a Jupyter notebook launched on GCP, there are a few additional steps.

1. In the navigation menu (top-left), select **VPC Network** → **Firewall rules**. Click **create firewall rule**.
2. Fill in the firewall rule as the figure below. Set targets to **all instances in the network**, and IP filter to **0.0.0.0**. The default port for Jupyter notebook is **8888**.



The screenshot shows the configuration for a GCP Firewall Rule. The 'Targets' dropdown is set to 'All instances in the network'. The 'Source filter' dropdown is set to 'IP ranges'. The 'Source IP ranges' field contains '0.0.0.0/0' with a help icon. The 'Second source filter' dropdown is set to 'None'. Under 'Protocols and ports', the 'Specified protocols and ports' radio button is selected. The 'tcp' checkbox is checked, and the port number '8888' is entered in the adjacent text box. The 'udp' and 'Other protocols' checkboxes are unchecked.

3. In the SSH terminal, run the following command to update the configuration of Jupyter notebook.

```
jupyter notebook --generate-config  
echo "c.NotebookApp.ip = '*' " >> ~/.jupyter/jupyter_notebook_config.py
```

4. Now you can run your Jupyter notebook. To access the notebook, replace the IP address 127.0.0.1 by the external IP address showed in GCP console.

```
To access the notebook, open this file in a browser:  
file:///home/.../.local/share/jupyter/runtime/nbserver-1753-open.html  
Or copy and paste one of these URIs:  
http://tensorflow-1-vm:8888/?token=957039343a6670e54160cc5858fd52aeb09470b3c64d6892  
or http://127.0.0.1:8888/?token=957039343a6670e54160cc5858fd52aeb09470b3c64d6892
```

5. Optionally, you may fix the external IP for your VM. This can be done in **VPC Network** → **External IP addresses**. Change the type from **ephemeral** to **static**.

4 Basic Linux Commands

- **ls**: List all files in the current directory.
- **cd**: Change directory to the given path. Use `..` to refer the parent directory.
e.g. `cd my_directory`, `cd ..`
- **python**: Run a python code. e.g. `python my_code.py`
- **clear**: Clear the screen.