

1. Requirement:

<https://codelabs.developers.google.com/codelabs/cloud-tensorflow-mnist#13>

## 14. Train in the cloud on powerful hardware: AI Platform



You will find a cloud-ready version of the code in the [mlengine folder on GitHub](#), along with instructions for running it on [Google Cloud AI Platform](#). Before you can run this part, you will have to create a Google Cloud account and enable billing. The resources necessary to complete the lab should be less than a couple of dollars (assuming 1h of training time on one GPU). To prepare your account:

1. Create a Google Cloud Platform project ( <http://cloud.google.com/console>).
2. Enable billing.
3. Install the GCP command line tools ( [GCP SDK here](#)).
4. Create a Google Cloud Storage bucket (put in the region `us-central1` ). It will be used to stage the training code and store your trained model.
5. Enable the necessary APIs and request the necessary quotas (run the training command once and you should see error messages telling you what to enable).

Next

**Discussion:** The reference github directory is quite old. So the versions are old also. It took a lot of time to identify the correct version, especially for job creation specific version was required.

2. Install and setup GCP SDK for the account - subarnachowdhury.soma@sjsu.edu

You are now authenticated with the Google Cloud SDK!

Send

The authentication flow has completed

Information about commands

To learn more about gcloud commands

For further information about the commands for Cloud SQL and Cloud DNS (which are

If you are a client application developer, you can use the gcloud command to create a new programming language or framework

Tutorials

Here are some links to help you get started

```
C:\WINDOWS\SYSTEM32\cmd.exe - gcloud init

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).

You must log in to continue. Would you like to log in (Y/n)? Y

Your browser has been opened to visit:
  https://accounts.google.com/o/oauth2/auth?response_type=code&client_id=
  ct_uri=http%3A%2F%2Flocalhost%3A8085%2F&scope=openid+https%3A%2F%2Fwww.
  %2F%2Fwww.googleapis.com%2Fauth%2Fcloud-platform+https%3A%2F%2Fwww.google
  %2F%2Fwww.googleapis.com%2Fauth%2Fcompute+https%3A%2F%2Fwww.googleapis.com%2F
  617FGSV46&access_type=offline&code_challenge=DBa_suZ81cLtbCr8Fgo4GiMIhn

You are logged in as: [subarnachowdhury.soma@sjsu.edu].

Pick cloud project to use:
[1] spheric-arcadia-289503
[2] tpu-pod-cmpe297-49
[3] Create a new project
Please enter numeric choice or text value (must exactly match list item):
```

3. Project created named: subarna-hw1p2

```
You are logged in as: [subarnachowdhury.soma@sjsu.edu].

Pick cloud project to use:
[1] spheric-arcadia-289503
[2] tpu-pod-cmpe297-49
[3] Create a new project
Please enter numeric choice or text value (must exactly match list item): 3

Enter a Project ID. Note that a Project ID CANNOT be changed later.
Project IDs must be 6-30 characters (lowercase ASCII, digits, or hyphens) in length and start with a lowercase letter. subarna-hw1p2
```

```
Enter a Project ID. Note that a Project ID CANNOT be changed later.
Project IDs must be 6-30 characters (lowercase ASCII, digits, or hyphens) in length and start with a lowercase letter. subarna-hw1p2
Waiting for [operations/cp.5368177622337196002] to finish...done.
Your current project has been set to: [subarna-hw1p2].
```

4. Created storage bucket: subarna-hw1p2-bucket1

## ✓ Name your bucket

### • Choose where to store your data

This permanent choice defines the geographic placement of your data and affects cost, performance, and availability. [Learn more](#)

#### Location type

- ☒ Region  
Lowest latency within a single region
- ☐ Dual-region  
High availability and low latency across 2 regions
- ☐ Multi-region  
Highest availability across largest area

#### Location

us-central1 (Iowa) ▼

CONTINUE

Filter Filter buckets				
💡 Bucket sorting and filtering are available in the Storage browser. Now you can filter your buckets by any				
✓	Name ↑	Created	Location type	Location
✓	<a href="#">subarna-hw1p2-bucke...</a>	Feb 9, 2021, 1:44:04 AM	Region	us-centra

## 5. Enabling service API/region

```
C:\Users\subar\AppData\Local\Google\Cloud SDK>gcloud config set compute/region VALUE
Updated property [compute/region].
API [compute.googleapis.com] not enabled on project [485162059223].
Would you like to enable and retry (this will take a few minutes)?
(y/N)? Y

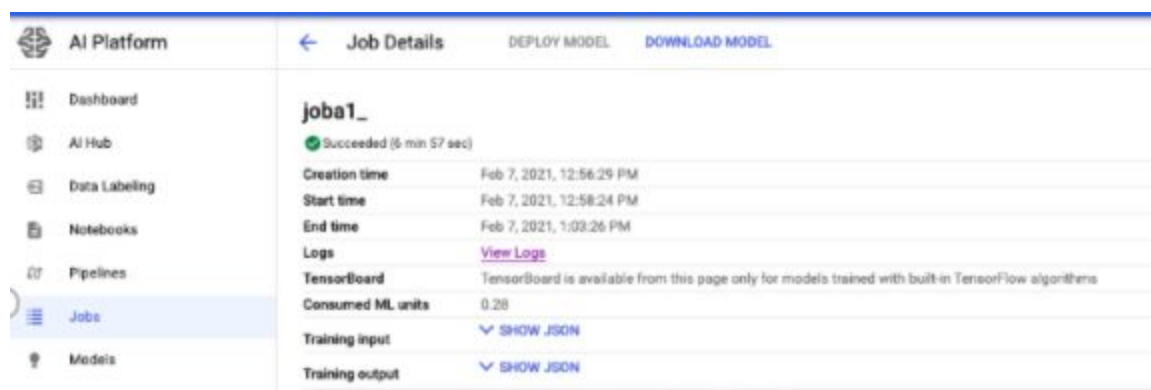
Enabling service [compute.googleapis.com] on project [485162059223]...
```

6. Successfully submit the jobs sample from mlengine tutorial in AI Platform using this command and deployed the model:

```
Ref: gcloud ml-engine jobs submit training jobXXX --job-dir gs://<bucket>/jobs/jobXXX
--project <project> --config config.yaml --module-name trainer.task --package-path
trainer --runtime-version 1.15
```

```
gcloud ml-engine jobs submit training joba1_ --job-dir
gs://subarna-hw1p2-bucket1/jobs/joba1_ --project subarna-hw1p2 --config config.yaml
--module-name trainer.task --package-path trainer --runtime-version 1.15
```

```
C:\Users\subar\AppData\Local\Google\Cloud SDK>gcloud ml-engine jobs submit training joba1_ --job-dir gs://subarna-hw1p2-
bucket1/jobs/joba1_ --project subarna-hw1p2 --config config.yaml --module-name trainer.task --package-path trainer --run
time-version 1.15
WARNING: The `gcloud ml-engine` commands have been renamed and will soon be removed. Please use `gcloud ai-platform` ins
tead.
```



The screenshot shows the Google Cloud AI Platform interface. On the left is a navigation sidebar with icons and labels for Dashboard, AI Hub, Data Labeling, Notebooks, Pipelines, Jobs (highlighted), and Models. The main content area is titled 'Job Details' and shows information for a job named 'joba1\_'. The job status is 'Succeeded (6 min 57 sec)'. Below this, a table lists job details: Creation time (Feb 7, 2021, 12:56:29 PM), Start time (Feb 7, 2021, 12:58:24 PM), End time (Feb 7, 2021, 1:03:26 PM), Logs (with a 'View Logs' link), TensorBoard (with a note about availability), Consumed ML units (0.28), Training input (with a 'SHOW JSON' link), and Training output (with a 'SHOW JSON' link). At the top right of the main area are links for 'DEPLOY MODEL' and 'DOWNLOAD MODEL'.

AI Platform	← Job Details	DEPLOY MODEL	DOWNLOAD MODEL
Dashboard	joba1_		
AI Hub	Succeeded (6 min 57 sec)		
Data Labeling	Creation time	Feb 7, 2021, 12:56:29 PM	
Notebooks	Start time	Feb 7, 2021, 12:58:24 PM	
Pipelines	End time	Feb 7, 2021, 1:03:26 PM	
Jobs	Logs	<a href="#">View Logs</a>	
Models	TensorBoard	TensorBoard is available from this page only for models trained with built-in TensorFlow algorithms	
	Consumed ML units	0.28	
	Training input	<a href="#">SHOW JSON</a>	
	Training output	<a href="#">SHOW JSON</a>	

7. Created Model cnn\_model and training in the cloud and prediction

```

/dev/sda15      126710      8002      118708      7% /boot/efi
tmpfs           6184436      0      6184436      0% /run/user/1000
/dev/sdb        515010816    73756 514920676    1% /mnt/disks/resnet_DIR
subarnachowdhury_soma@resnet-tutorial:~$
subarnachowdhury_soma@resnet-tutorial:~$ export IMAGENET_HOME=/mnt/disks/resnet_DIR
subarnachowdhury_soma@resnet-tutorial:~$ export DATA_DIR=gs://cloud-tpu-test-datasets/fake_imagenet
subarnachowdhury_soma@resnet-tutorial:~$ export PYTHONPATH="/usr/share/models/"
subarnachowdhury_soma@resnet-tutorial:~$ ctpu up --tpu-only \
> --tpu-size=v3-8 \
> --name=resnet-tutorial \
> --zone=europe-west4-a \
> --tf-version=2.3
ctpu will use the following configuration:

Name:          resnet-tutorial
Zone:          europe-west4-a
GCP Project:   tpu-pod-cmpe297-49
TensorFlow Version: 2.3
Cloud TPU:
  Size:        v3-8
  Preemptible: false
  Reserved:    false

OK to create your Cloud TPU resources with the above configuration? [Yn]: y
2020/09/14 04:05:00 Creating TPU resnet-tutorial (this may take a few minutes)...
2020/09/14 04:05:08 TPU operation still running...
2020/09/14 04:05:28 TPU operation still running...
2020/09/14 04:05:49 TPU operation still running...
2020/09/14 04:06:10 TPU operation still running...
2020/09/14 04:06:30 TPU operation still running...
2020/09/14 04:06:50 TPU operation still running...
2020/09/14 04:07:05 Created TPU resnet-tutorial!
2020/09/14 04:07:06 Warning: ctpu encountered an error when adding the TPU's service account to your project's access control lists. Some integ
  you (or your GCP project's owner) adds appropriate permissions (see: https://cloud.google.com/tpu/docs/storage-buckets#storage_access). Pass -
  rror and get a more detailed error message.
Operation success; not ssh-ing to GCE VM due to --tpu-only flag.
subarnachowdhury_soma@resnet-tutorial:~$ export TPU_NAME=resnet-tutorial
subarnachowdhury_soma@resnet-tutorial:~$ sudo pip3 install tensorflow-model-optimization>=0.1.3
WARNING: You are using pip version 20.2; however, version 20.2.3 is available.
You should consider upgrading via the '/usr/bin/python3 -m pip install --upgrade pip' command.
subarnachowdhury_soma@resnet-tutorial:~$

```

```

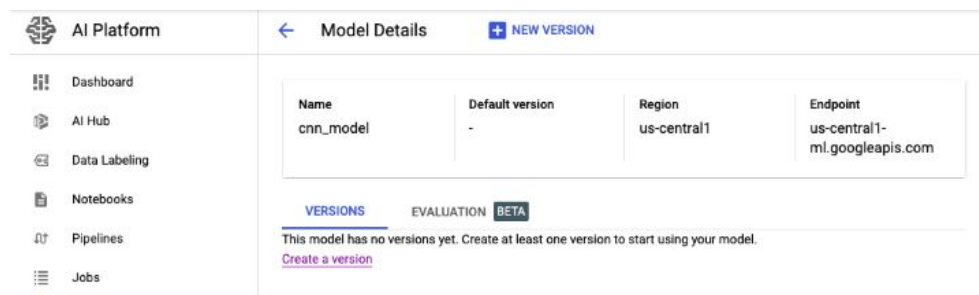
Please specify a region:
[1] global
[2] asia-east1
[3] asia-northeast1
[4] asia-southeast1
[5] australia-southeast1
[6] europe-west1
[7] europe-west2
[8] europe-west3
[9] europe-west4
[10] northamerica-northeast1
[11] us-central1
[12] us-east1
[13] us-east4
[14] us-west1
[15] cancel
Please enter your numeric choice: 11

To make this the default region, run `gcloud config set ai_platform/region us-central1`.

Using endpoint [https://us-central1-ml.googleapis.com/]
Created ai platform model [projects/jocelyn-baduria-hw1p2/models/cnn_model].

```

## 8. Trained Model In GCP platform



The screenshot shows the Google Cloud AI Platform interface. On the left is a sidebar with navigation links: Dashboard, AI Hub, Data Labeling, Notebooks, Pipelines, and Jobs. The main area is titled 'Model Details' with a 'NEW VERSION' button. A table displays the model's metadata:

Name	Default version	Region	Endpoint
cnn_model	-	us-central1	us-central1-ml.googleapis.com

Below the table, there are tabs for 'VERSIONS', 'EVALUATION', and 'BETA'. The 'VERSIONS' tab is active, showing a message: 'This model has no versions yet. Create at least one version to start using your model.' A link 'Create a version' is provided.

Task complete, then disabled billing process for this project:

Select an organization: SJSU.EDU ▼

MY BILLING ACCOUNTS MY PROJECTS

Filter table

Name	ID	Billing account ↑	Billing account ID	Actions ?
My First Project	spheric-arcadia-289503	Billing is disabled	—	⋮
subarna-hw1p2	subarna-hw1p2	Billing is disabled	—	⋮