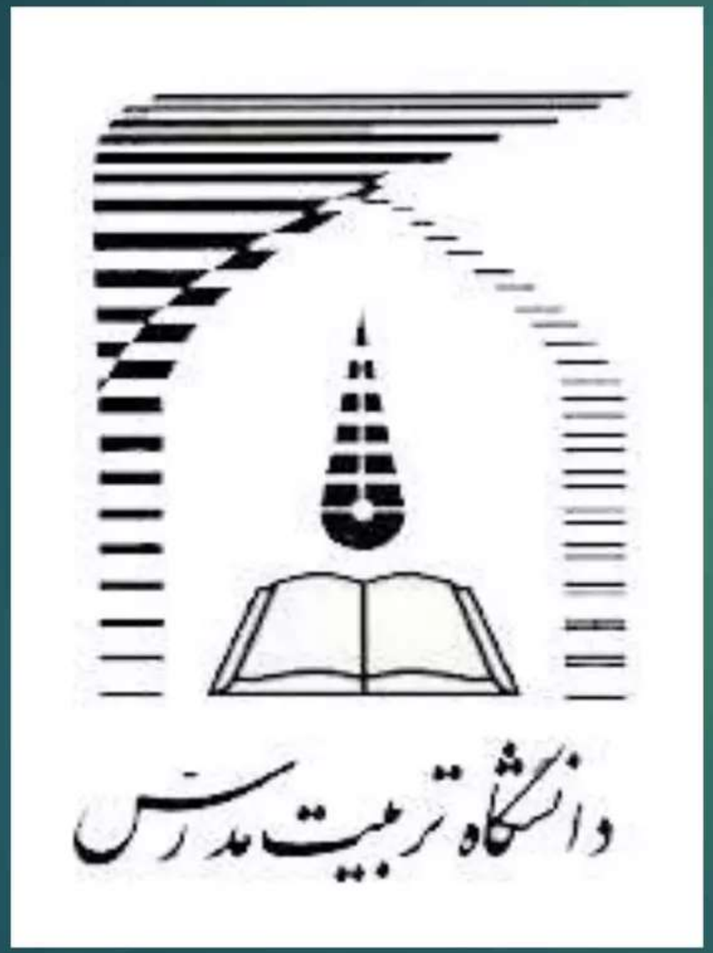
به نام خدا



Google colab

A Classroom presentation on Cloud Computing at Tarbiat Modarres University

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Contents

- Colab
- Drive
- Connect
- Programming
- Possibilities

What is Google Colab?

- Google Colab is a free cloud service and now it supports free GPU!
- improve your **Python** programming language coding skills.
- develop deep learning applications using popular libraries such as **Keras**, **TensorFlow**, **PyTorch,** and **OpenCV**.
- The most important feature that distinguishes Colab from other free cloud services is; **Colab** provides GPU and is totally free.

- Details: https://research.google.com/colaboratory/faq.html

What is Google drive?

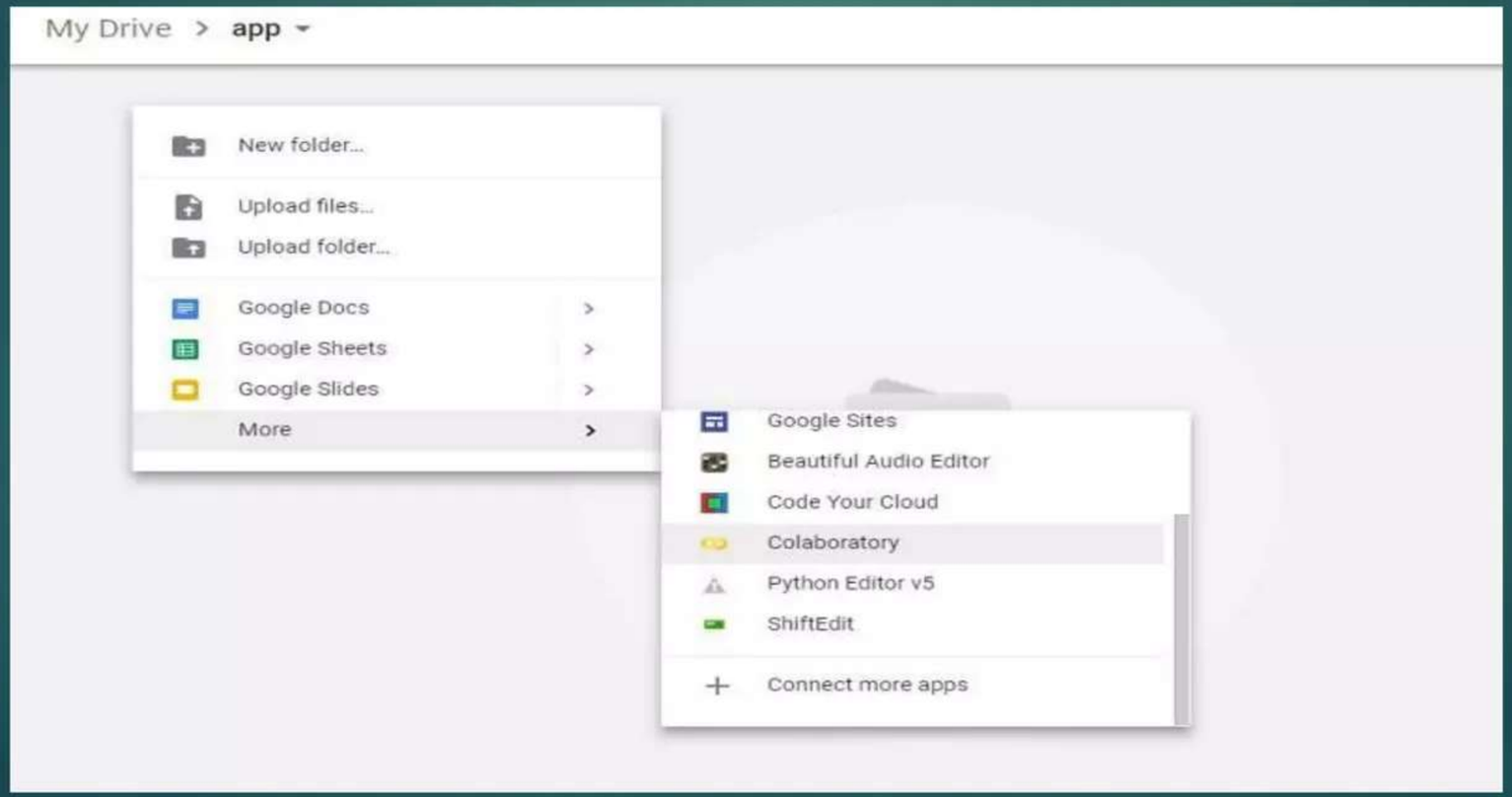
- **Google Drive** is a file storage and synchronization service developed by Google.
- **Google Drive** allows users to store files on their servers, synchronize files across devices, and share files.
- **Google Drive** offers users with 15 gigabytes of free storage through Google One.
- Files uploaded can be up to 5 terabytes in size.

Getting Google Colab Ready to Use

- Since **Colab** is working on your own **Google Drive**, we first need to specify the folder we'll work.
- Of course, you choose the default **Colab Notebooks** folder instead of **app folder**.

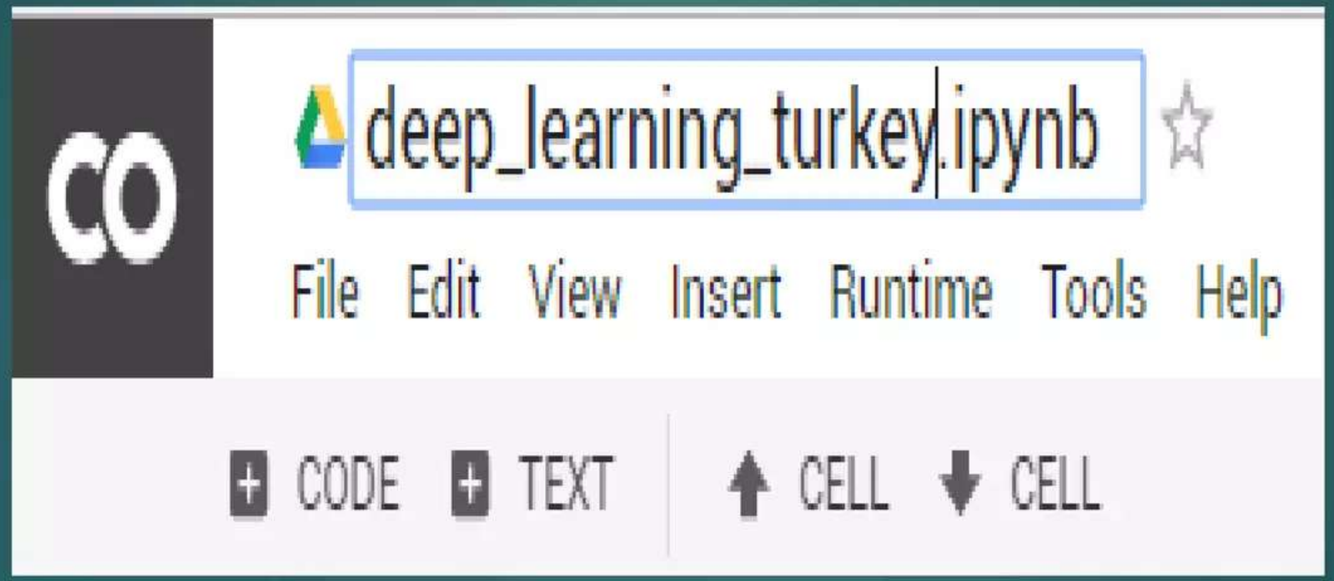
Creating New Colab Notebook

- Create a new notebook via Right click > More > Colaboratory



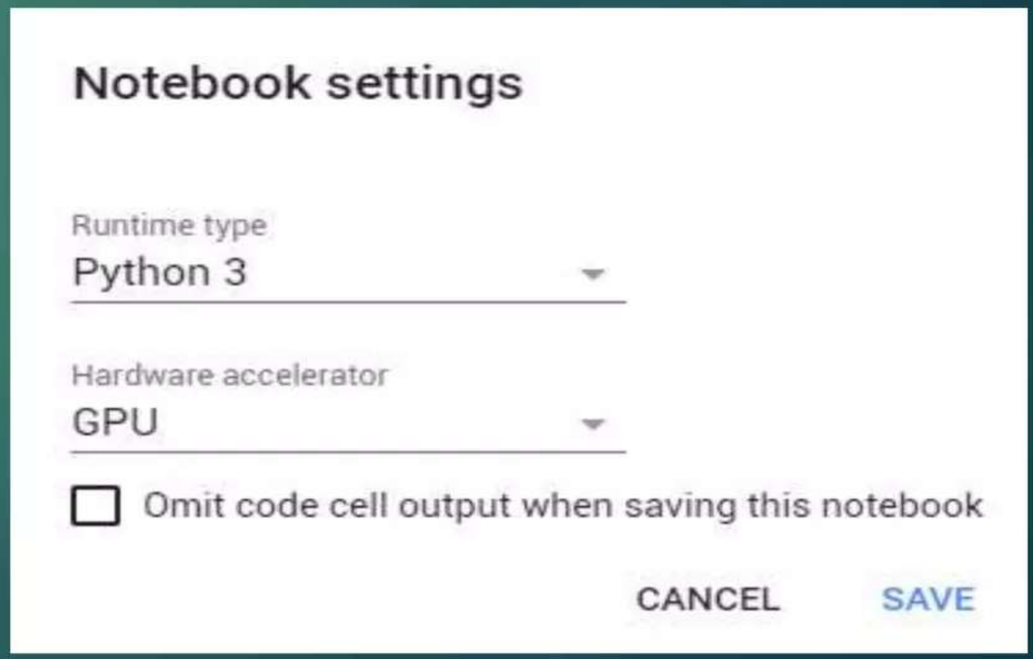
Creating New Colab Notebook

- **Rename** notebook by means of clicking the file name.



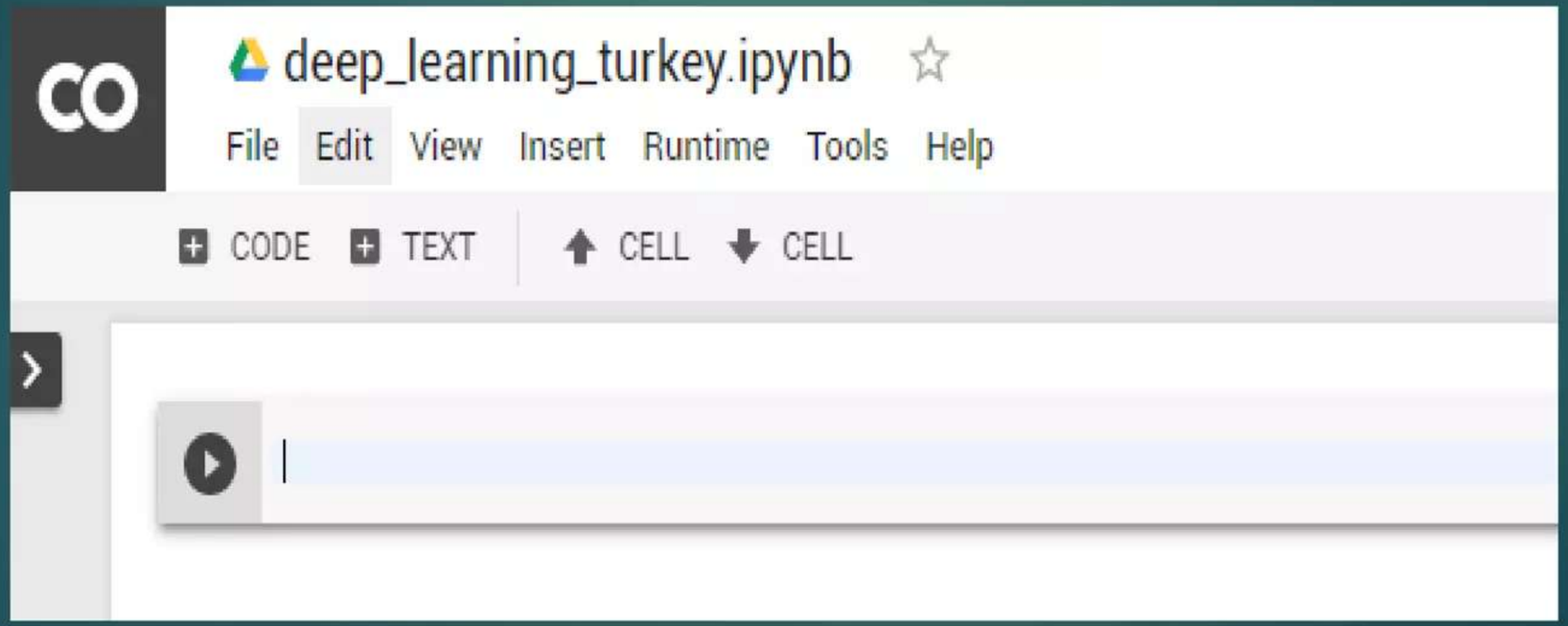
Setting Free GPU

- It is so simple to alter default hardware (CPU to GPU or vice versa); just follow **Edit > Notebook settings** or **Runtime>Change runtime type** and select GPU as **Hardware accelerator**.



Running Basic Python Codes with Google Colab

- Now we can start using **Google Colab**.

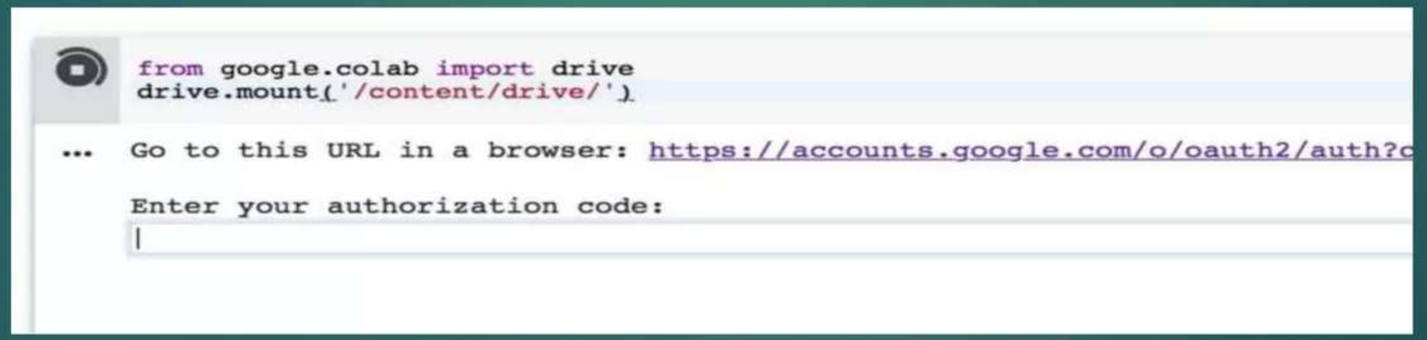


Running or Importing .py Files with Google Colab

- **Run** these codes first in order to install the necessary libraries and perform authorization.

```
from google.colab import drive
drive.mount('/content/drive/')
```

- When you run the code above, you should see a result like this:



- **Click** the link, **copy** verification code and **paste** it to text box.

Running or Importing .py Files with Google Colab

- After completion of the authorization process, you should see this:

- Now you can reach your Google Drive with:

```
!ls "/content/drive/My Drive/"
```

Cloning Github Repo to Google Colab

- It is easy to clone a Github repo with Git.
- **Step 1: Find the Github Repo and Get "Git" Link**

  Find any Github repo to use.

  Clone or download > Copy the link!
- **Step 2: Git Clone**

  Simply run:

  !git clone https://github.com/wxs/keras-mnist-tutorial.git
- **Step 3. Open the Folder in Google Drive**

  Folder has the same with the Github repo of course

Cloning Github Repo to Google Colab

- Step 4. Open The Notebook

  Right Click > Open With > Colaboratory

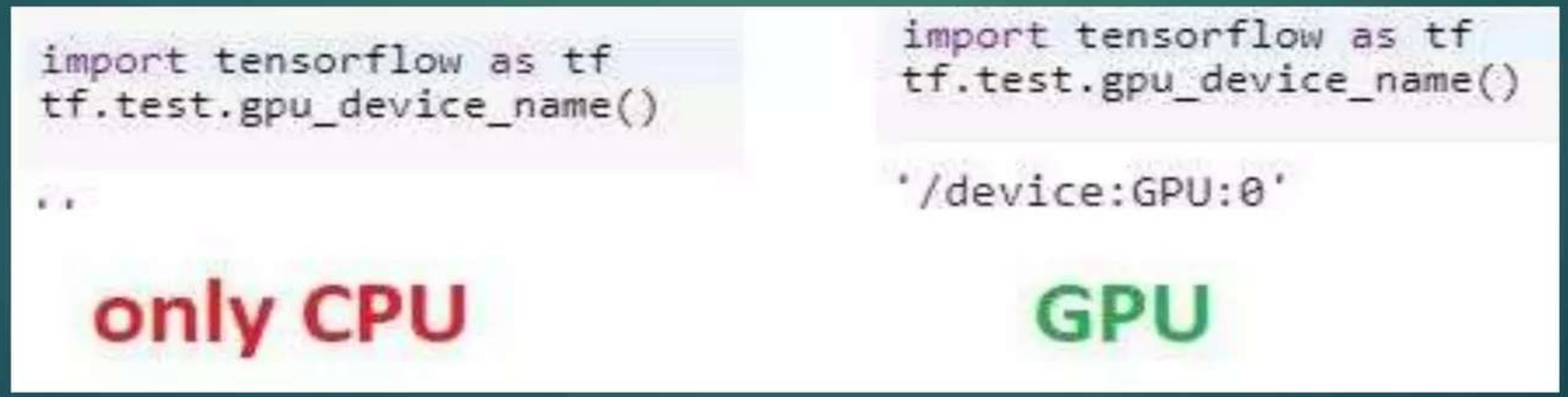
- Step 5. Run

  Now you are able to run Github repo in Google Colab.

Is GPU Working?

- To see if you are currently using the GPU in Colab, you can run the following code in order to cross-check:

```
import tensorflow as tf
tf.test.gpu_device_name()
```



Which GPU Am I Using?

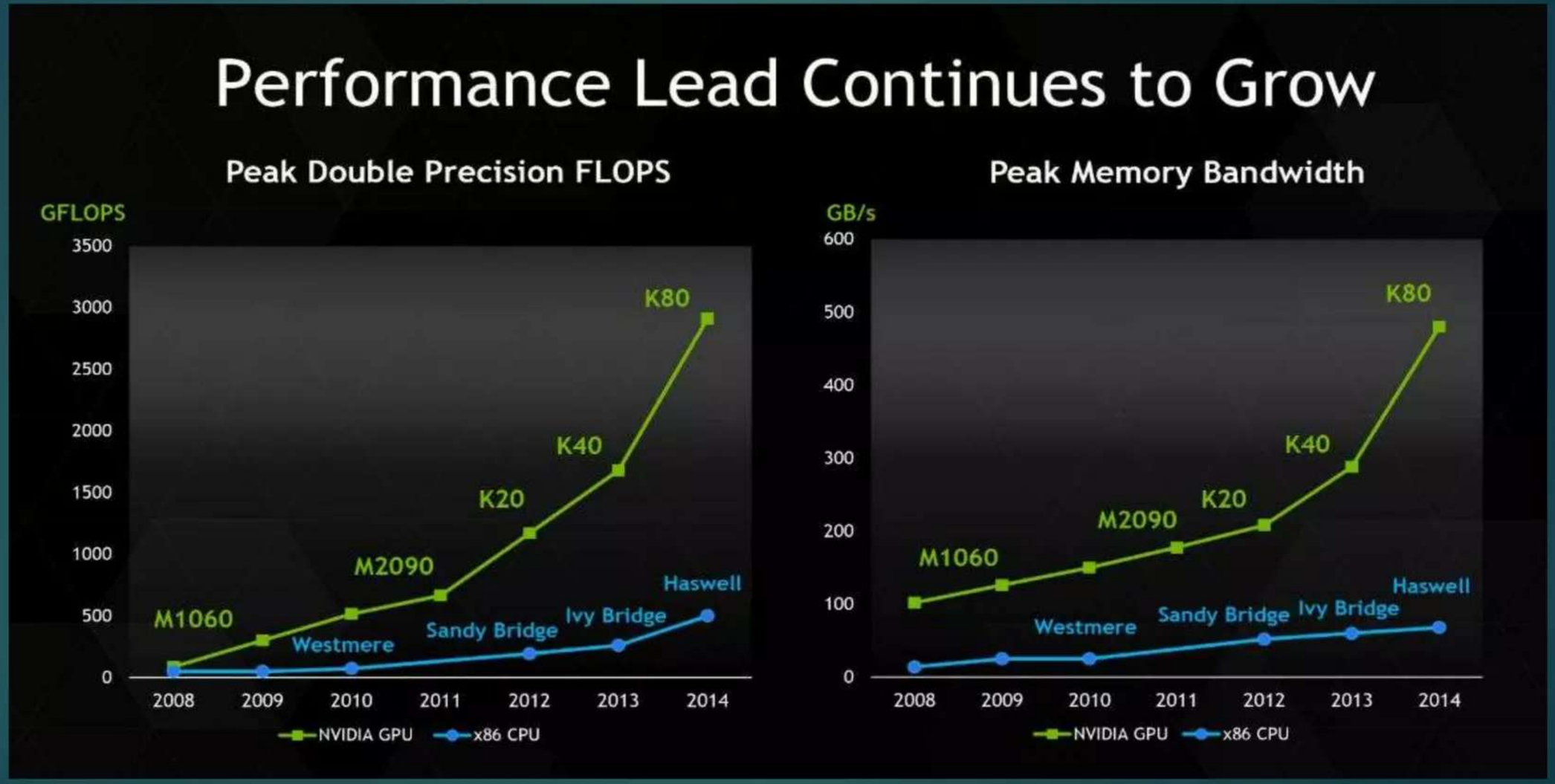
```
from tensorflow.python.client import device_lib
device_lib.list_local_devices()
```

- Currently, Colab only provides Tesla K80.

Tesla k80

NVIDIA Tesla Family Specification Comparison				
	Tesla K80	**Tesla K40**	**Tesla K20X**	**Tesla K20**
Stream Processors	2 x 2496	2880	2688	2496
Core Clock	562MHz	745MHz	732MHz	706MHz
Boost Clock(s)	875MHz	810MHz, 875MHz	N/A	N/A
Memory Clock	5GHz GDDR5	6GHz GDDR5	5.2GHz GDDR5	5.2GHz GDDR5
Memory Bus Width	2 x 384-bit	384-bit	384-bit	320-bit
VRAM	2 x 12GB	12GB	6GB	5GB
Single Precision	8.74 TFLOPS	4.29 TFLOPS	3.95 TFLOPS	3.52 TFLOPS
Double Precision	2.91 TFLOPS (1/3)	1.43 TFLOPS (1/3)	1.31 TFLOPS (1/3)	1.17 TFLOPS (1/3)
Transistor Count	2 x 7.1B(?)	7.1B	7.1B	7.1B
TDP	300W	235W	235W	225W
Cooling	Passive	Active/Passive	Passive	Active/Passive
Manufacturing Process	TSMC 28nm	TSMC 28nm	TSMC 28nm	TSMC 28nm
Architecture	Kepler	Kepler	Kepler	Kepler
Launch Price	$5000	$5499	~$3799	~$3299

Tesla k80


Performance Lead Continues to Grow
Peak Double Precision FLOPS
GFLOPS
3500
3000
2500
2000
1500
1000
500
0
K80
K40
K20
M2090
M1060
Haswell
Ivy Bridge
Sandy Bridge
Westmere
2008
2009
2010
2011
2012
2013
2014
NVIDIA GPU
x86 CPU
Peak Memory Bandwidth
GB/s
600
500
400
300
200
100
0
K80
K40
K20
M2090
M1060
Haswell
Ivy Bridge
Sandy Bridge
Westmere
2008
2009
2010
2011
2012
2013
2014
NVIDIA GPU
x86 CPU

Tesla k80


Titan X
VS
GTX 980
VS
Tesla M40
VS
Tesla K80
TITAN
GEFORCE GTX
GTX 980
TESLA

How to Restart Google Colab?

- In order to restart (or reset) your virtual machine, simply run:

```
!kill  -9  -1
```

How to Send Large Files From Colab To Google Drive?

```
# Which file to send?
file_name = "REPO.tar"

from googleapiclient.http import MediaFileUpload
from googleapiclient.discovery import build

auth.authenticate_user()
drive_service = build('drive', 'v3')

def save_file_to_drive(name, path):
  file_metadata = {'name': name, 'mimeType': 'application/octet-stream'}
  media = MediaFileUpload(path, mimetype='application/octet-stream', resumable=True)
  created = drive_service.files().create(body=file_metadata, media_body=media, fields='id').execut

  return created

save_file_to_drive(file_name, file_name)
```

Refrences:

- https://colab.research.google.com/notebooks/welcome.ipynb#recent=true
- https://www.google.com/drive/
- https://medium.com/deep-learning-turkey/google-colab-free-gpu-tutorial-e113627b9f5d
- https://github.com/wxs/keras-mnist-tutorial
- http://www.snrazavi.ir/google_colab_for_deep_learning/
- https://deeplearning.ir/tag/%D8%A2%D9%85%D9%88%D8%B2%D8%B4-google-colab/
- https://mh-salari.me/google-colab/
- http://blog.class.vision
- http://hadifar.net