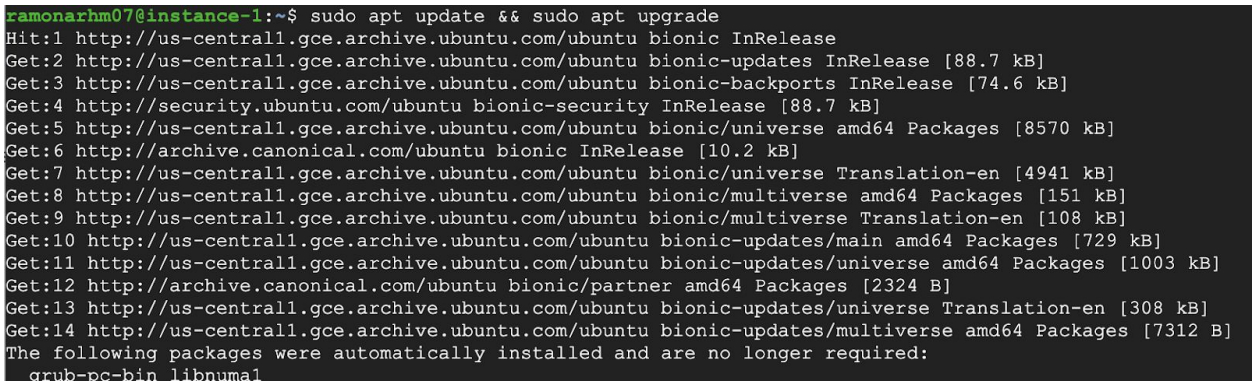
How to use Pytorch on GPU?

Reference:
https://medium.com/udacity-pytorch-challengers/pytorch-on-google-cloud-platform-gcp-66644bfc07eb

- Setup
- Install Cuda
- Install Anaconda
- Install Packages

1. **Install development toolchain and setup VM (copy and paste the following command without comments)**

   `sudo apt update && sudo apt upgrade`



```
The following packages will be upgraded:
  apt apt-utils libapt-inst2.0 libapt-pkg5.0 libexpat1
5 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
Need to get 2349 kB of archives.
After this operation, 44.0 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://us-central1.gce.archive.ubuntu.com/ubuntu bionic-updates/main
]
Get:2 http://us-central1.gce.archive.ubuntu.com/ubuntu bionic-updates/main
kB]
Get:3 http://us-central1.gce.archive.ubuntu.com/ubuntu bionic-updates/main
Get:4 http://us-central1.gce.archive.ubuntu.com/ubuntu bionic-updates/main
Get:5 http://us-central1.gce.archive.ubuntu.com/ubuntu bionic-updates/main
80.5 kB]
Fetched 2349 kB in 1s (2116 kB/s)
(Reading database ... 60204 files and directories currently installed.)
Preparing to unpack .../libapt-pkg5.0_1.6.12_amd64.deb ...
Unpacking libapt-pkg5.0:amd64 (1.6.12) over (1.6.11) ...
Setting up libapt-pkg5.0:amd64 (1.6.12) ...
(Reading database ... 60204 files and directories currently installed.)
Preparing to unpack .../libapt-inst2.0_1.6.12_amd64.deb ...
Unpacking libapt-inst2.0:amd64 (1.6.12) over (1.6.11) ...
Preparing to unpack .../archives/apt_1.6.12_amd64.deb ...
Unpacking apt (1.6.12) over (1.6.11) ...
Setting up apt (1.6.12) ...
(Reading database ... 60210 files and directories currently installed.)
Preparing to unpack .../apt-utils_1.6.12_amd64.deb ...
Unpacking apt-utils (1.6.12) over (1.6.11) ...
Preparing to unpack .../libexpat1_2.2.5-3ubuntu0.2_amd64.deb ...
Unpacking libexpat1:amd64 (2.2.5-3ubuntu0.2) over (2.2.5-3ubuntu0.1) ...
Setting up libapt-inst2.0:amd64 (1.6.12) ...
Setting up libexpat1:amd64 (2.2.5-3ubuntu0.2) ...
Setting up apt-utils (1.6.12) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for libc-bin (2.27-3ubuntu1) ...
ramonarhm07@instance-1:~$
```

```
sudo apt install dkms build-essential linux-headers-$(uname
-r)
```

```
sudo mkdir -p /var/cache/swap/
sudo dd if=/dev/zero of=/var/cache/swap/myswap bs=1M
count=4096
sudo chmod 0600 /var/cache/swap/myswap
sudo mkswap /var/cache/swap/myswap
sudo swapon /var/cache/swap/myswap
```

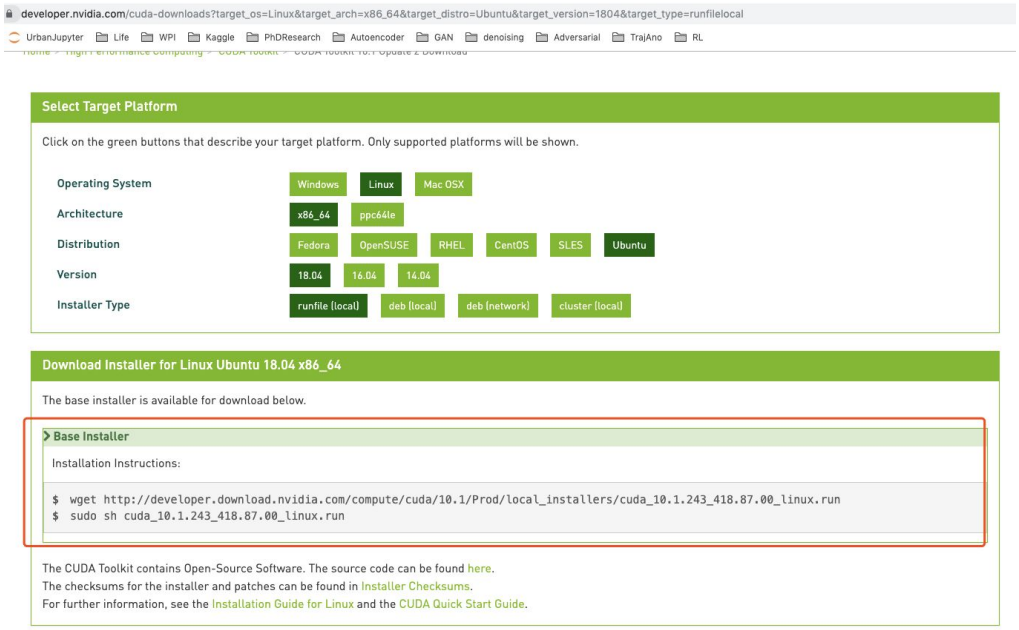
Add the following line to /etc/fstab so that the swap will get loaded upon system startup

```
cd ../../etc/
sudo vi fstab
```
edit the file with root

```
"/var/cache/swap/myswap    none    swap    sw    0    0"
```
(copy paste the above line without quotation marks)

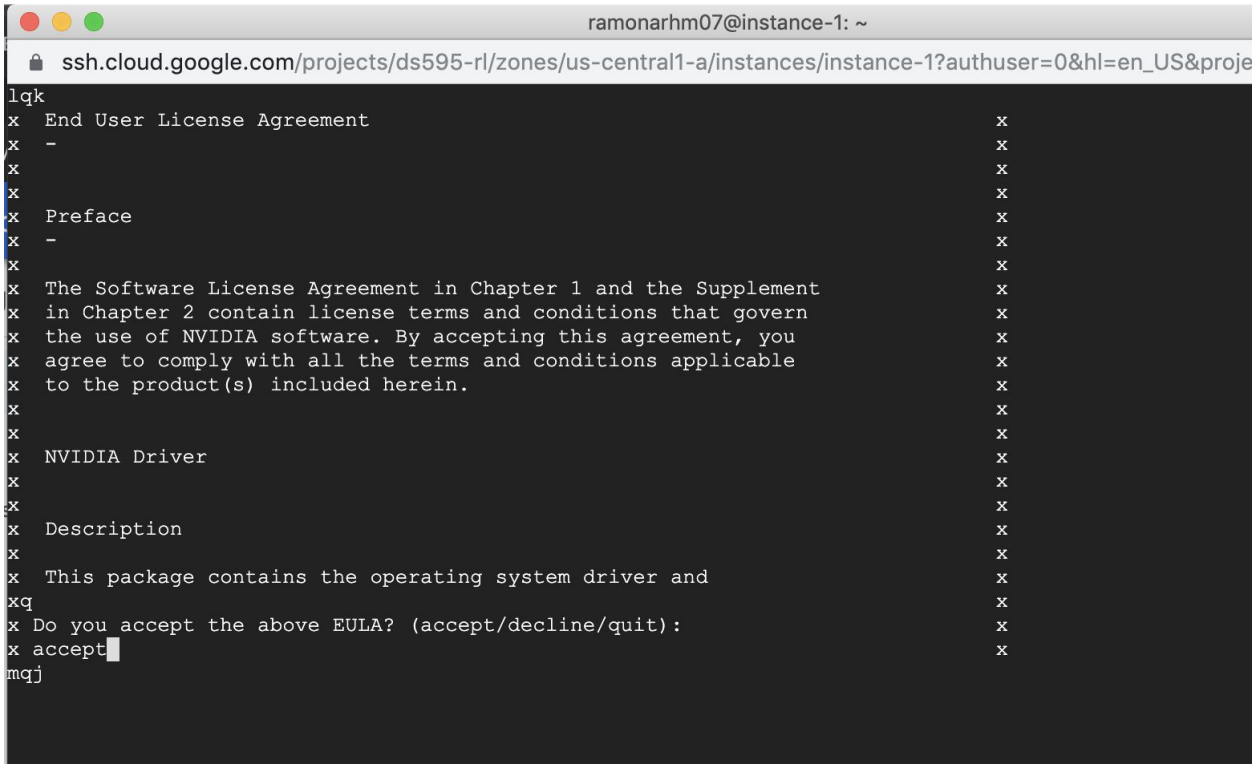
2. **Download and install cuda_10.1**

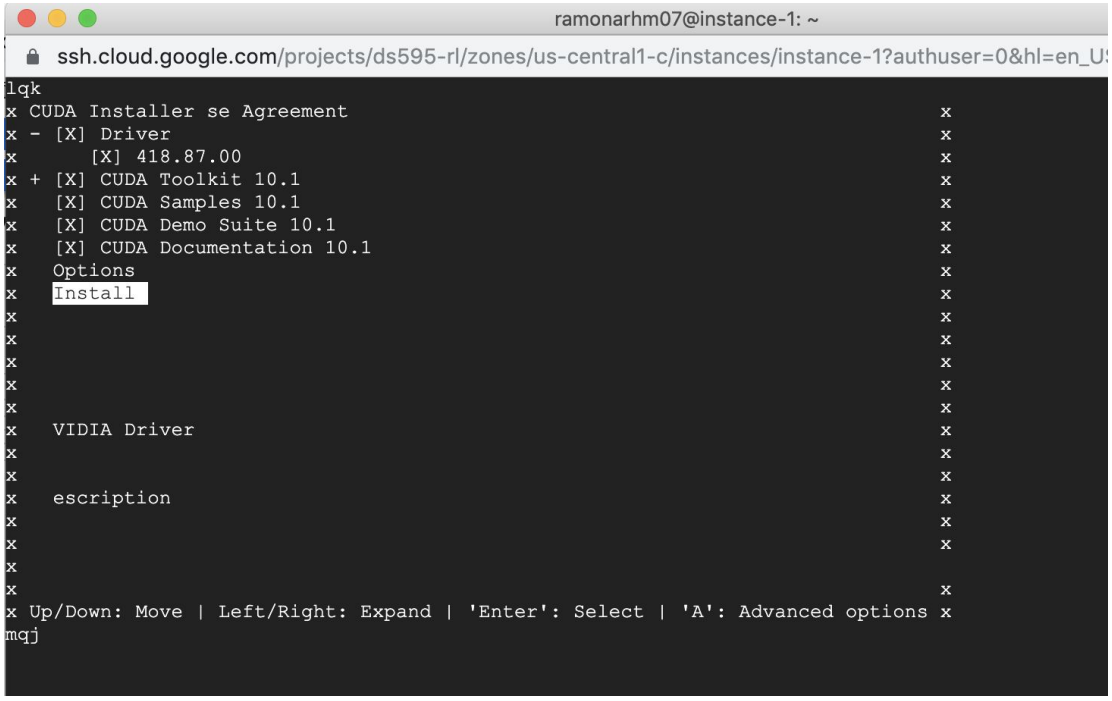
   `cd ~` # go back home directory



wget http://developer.download.nvidia.com/compute/cuda/10.1/Prod/local_installers/cuda_10.1.243_418.87.00_linux.run

sudo sh cuda_10.1.243_418.87.00_linux.run






```
ramonarhm07@instance-1:~$ wget http://developer.download.nvidia.com/compute/cuda/10.1/Prod/local_installers/cuda_10
.1.243_418.87.00_linux.run
--2019-08-21 17:52:17--  http://developer.download.nvidia.com/compute/cuda/10.1/Prod/local_installers/cuda_10.1.243
_418.87.00_linux.run
Resolving developer.download.nvidia.com (developer.download.nvidia.com)... 192.229.211.70, 2606:2800:21f:3aa:dcf:37
b:1ed6:1fb
Connecting to developer.download.nvidia.com (developer.download.nvidia.com)|192.229.211.70|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 2572375299 (2.4G) [application/octet-stream]
Saving to: ‘cuda_10.1.243_418.87.00_linux.run’

cuda_10.1.243_418.87.00_linu 100%[=========================================>]   2.40G   121MB/s    in 12s

2019-08-21 17:52:29 (197 MB/s) - ‘cuda_10.1.243_418.87.00_linux.run’ saved [2572375299/2572375299]

ramonarhm07@instance-1:~$ ls
cuda_10.1.243_418.87.00_linux.run
ramonarhm07@instance-1:~$ sudo sh cuda_10.1.243_418.87.00_linux.run
===========
= Summary =
===========

Driver:   Installed
Toolkit:  Installed in /usr/local/cuda-10.1/
Samples:  Installed in /home/ramonarhm07/, but missing recommended libraries

Please make sure that
 -   PATH includes /usr/local/cuda-10.1/bin
 -   LD_LIBRARY_PATH includes /usr/local/cuda-10.1/lib64, or, add /usr/local/cuda-10.1/lib64 to /etc/ld.so.conf and
 run ldconfig as root

To uninstall the CUDA Toolkit, run cuda-uninstaller in /usr/local/cuda-10.1/bin
To uninstall the NVIDIA Driver, run nvidia-uninstall

Please see CUDA_Installation_Guide_Linux.pdf in /usr/local/cuda-10.1/doc/pdf for detailed information on setting up
 CUDA.
Logfile is /var/log/cuda-installer.log
ramonarhm07@instance-1:~$
```

Test Nvidia

```
cd  ~/NVIDIA_CUDA-10.1_Samples/0_Simple/vectorAdd
```

```
make
./vectorAdd
```

```
ramonarhm07@instance-1:~/NVIDIA_CUDA-10.1_Samples/0_Simple/vectorAdd$ make
/usr/local/cuda/bin/nvcc -ccbin g++ -I../../common/inc  -m64    -gencode arch=compute_30,code=sm_30 -gencode arch=c
ompute_35,code=sm_35 -gencode arch=compute_37,code=sm_37 -gencode arch=compute_50,code=sm_50 -gencode arch=compute_
52,code=sm_52 -gencode arch=compute_60,code=sm_60 -gencode arch=compute_61,code=sm_61 -gencode arch=compute_70,code
=sm_70 -gencode arch=compute_75,code=sm_75 -gencode arch=compute_75,code=compute_75 -o vectorAdd.o -c vectorAdd.cu
/usr/local/cuda/bin/nvcc -ccbin g++   -m64      -gencode arch=compute_30,code=sm_30 -gencode arch=compute_35,code=s
m_35 -gencode arch=compute_37,code=sm_37 -gencode arch=compute_50,code=sm_50 -gencode arch=compute_52,code=sm_52 -g
encode arch=compute_60,code=sm_60 -gencode arch=compute_61,code=sm_61 -gencode arch=compute_70,code=sm_70 -gencode
arch=compute_75,code=sm_75 -gencode arch=compute_75,code=compute_75 -o vectorAdd vectorAdd.o
mkdir -p ../../bin/x86_64/linux/release
cp vectorAdd ../../bin/x86_64/linux/release
ramonarhm07@instance-1:~/NVIDIA_CUDA-10.1_Samples/0_Simple/vectorAdd$ ./vectorAdd
[Vector addition of 50000 elements]
Copy input data from the host memory to the CUDA device
CUDA kernel launch with 196 blocks of 256 threads
Copy output data from the CUDA device to the host memory
Test PASSED
Done
```

3. **Download and install anaconda**

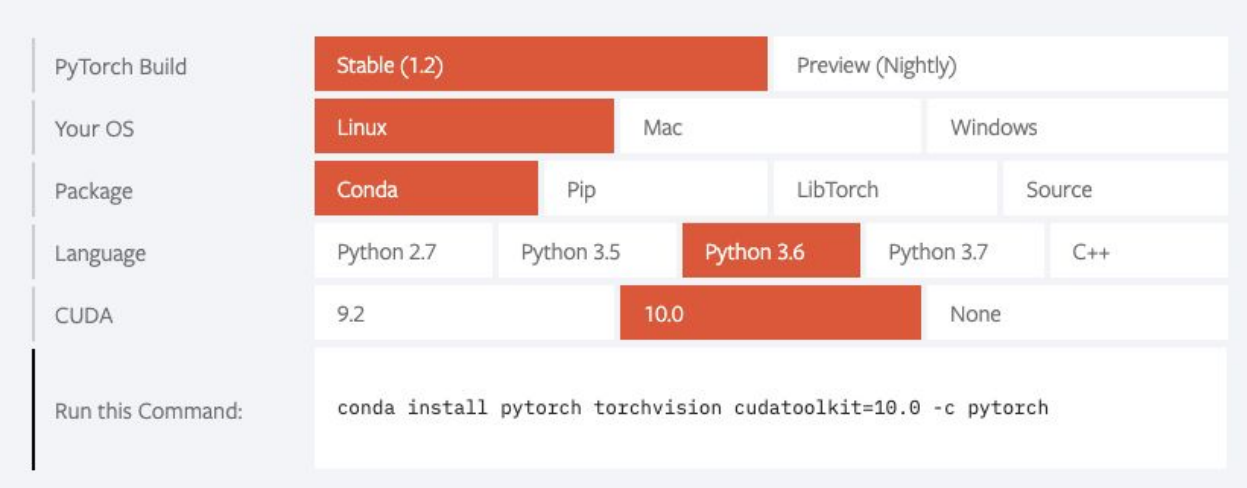
```
cd ~ # go back home directory
wget
https://repo.continuum.io/archive/Anaconda3-2019.07-Linux-x
86_64.sh
bash Anaconda3-2019.07-Linux-x86_64.sh
```

```
ramonarhm07@instance-1:~$ wget https://repo.continuum.io/archive/Anaconda3-2019.07-Linux-x86_64.sh
--2019-08-21 18:05:54--  https://repo.continuum.io/archive/Anaconda3-2019.07-Linux-x86_64.sh
Resolving repo.continuum.io (repo.continuum.io)... 104.18.201.79, 104.18.200.79, 2606:4700::6812:c84f, ...
Connecting to repo.continuum.io (repo.continuum.io)|104.18.201.79|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 541906131 (517M) [application/x-sh]
Saving to: 'Anaconda3-2019.07-Linux-x86_64.sh'

Anaconda3-2019.07-Linux-x86_ 100%[=========================================>] 516.80M   104MB/s    in 5.4s

2019-08-21 18:05:59 (96.3 MB/s) - 'Anaconda3-2019.07-Linux-x86_64.sh' saved [541906131/541906131]

ramonarhm07@instance-1:~$ bash Anaconda3-2019.07-Linux-x86_64.sh

Welcome to Anaconda3 2019.07

In order to continue the installation process, please review the license
agreement.
Please, press ENTER to continue
>>>
```

```
source ~/.bashrc
```

```
ramonarhm07@instance-1:~$ source ~/.bashrc
(base) ramonarhm07@instance-1:~$
```

4. **Install pytorch-gpu**
   https://pytorch.org/

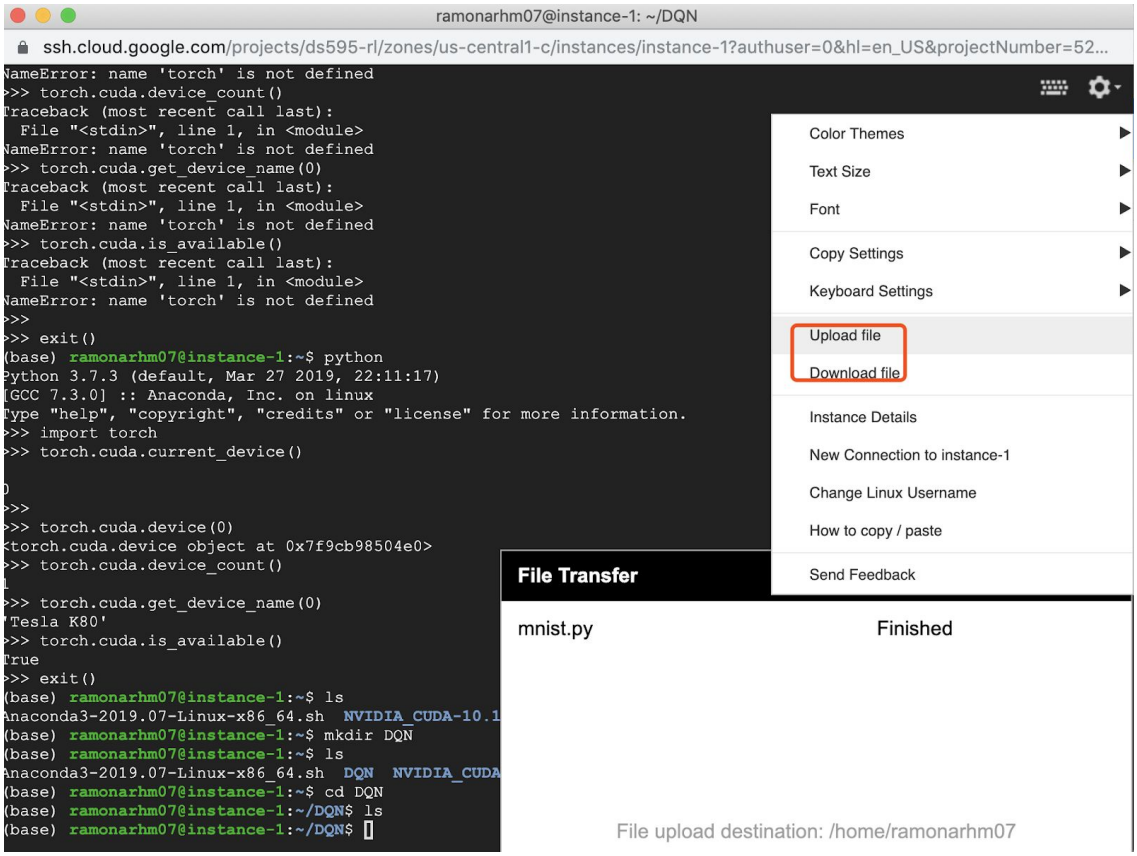


5. **Install pytorch-gpu**

```
python
Import torch
torch.cuda.current_device()
torch.cuda.device(0)
torch.cuda.device_count()
torch.cuda.get_device_name(0)
torch.cuda.is_available()
```

```
(base) ramonarhm07@instance-1:~$ python
Python 3.7.3 (default, Mar 27 2019, 22:11:17)
[GCC 7.3.0] :: Anaconda, Inc. on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> import torch
>>> torch.cuda.current_device()

0
>>>
>>> torch.cuda.device(0)
<torch.cuda.device object at 0x7f9cb98504e0>
>>> torch.cuda.device_count()
1
>>> torch.cuda.get_device_name(0)
'Tesla K80'
>>> torch.cuda.is_available()
True
>>>
```

6. **Upload and download file to GCP**
   https://cloud.google.com/compute/docs/instances/transfer-files



Install Packages

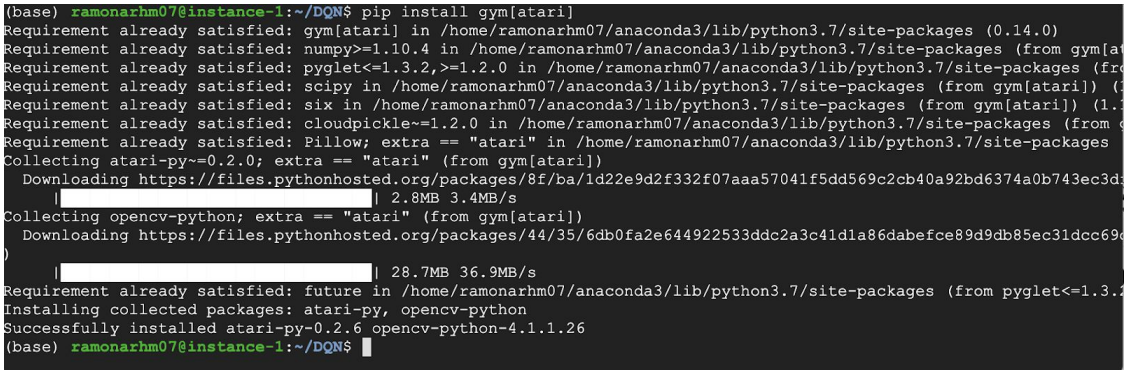
1. Install gym

   ```
   pip install gym==0.10.4
   ```

```
(base) ramonarhm07@instance-1:~/DQN$ pip install gym==0.10.4
Collecting gym==0.10.4
  Downloading https://files.pythonhosted.org/packages/3d/e5/4dae1de6534221f74895c8a95ae4eedc816a5fa003db1d4d608cbdc28b35/gym-0.10.4.tar.gz (1.5MB)
     |████████████████████████████████| 1.5MB 3.5MB/s
Requirement already satisfied: numpy>=1.10.4 in /home/ramonarhm07/anaconda3/lib/python3.7/site-packages (from gym==0.10.4) (1.16.4)
Requirement already satisfied: requests>=2.0 in /home/ramonarhm07/anaconda3/lib/python3.7/site-packages (from gym==0.10.4) (2.22.0)
Requirement already satisfied: six in /home/ramonarhm07/anaconda3/lib/python3.7/site-packages (from gym==0.10.4) (1.12.0)
Requirement already satisfied: pyglet>=1.2.0 in /home/ramonarhm07/anaconda3/lib/python3.7/site-packages (from gym==0.10.4) (1.2.4)
Requirement already satisfied: idna<2.9,>=2.5 in /home/ramonarhm07/anaconda3/lib/python3.7/site-packages (from requests>=2.0->gym==0.10.4) (2.8)
Requirement already satisfied: urllib3!=1.25.0,!=1.25.1,<1.26,>=1.21.1 in /home/ramonarhm07/anaconda3/lib/python3.7/site-packages (from requests>=2.0->gym==0.10.4) (1.24.2)
Requirement already satisfied: certifi>=2017.4.17 in /home/ramonarhm07/anaconda3/lib/python3.7/site-packages (from requests>=2.0->gym==0.10.4) (2019.6.16)
Requirement already satisfied: chardet<3.1.0,>=3.0.2 in /home/ramonarhm07/anaconda3/lib/python3.7/site-packages (from requests>=2.0->gym==0.10.4) (3.0.4)
Building wheels for collected packages: gym
  Building wheel for gym (setup.py) ... done
  Stored in directory: /home/ramonarhm07/.cache/pip/wheels/63/41/49/1581815cc493e09e494ba013c2f6f29108b8e2adf40db4b21d
Successfully built gym
Installing collected packages: gym
  Found existing installation: gym 0.14.0
    Uninstalling gym-0.14.0:
      Successfully uninstalled gym-0.14.0
Successfully installed gym-0.10.4
```

2. Install gym[atari]

```
pip install gym[atari]
```



3. Install opencv-python-headless

```
pip install opencv-python-headless
```