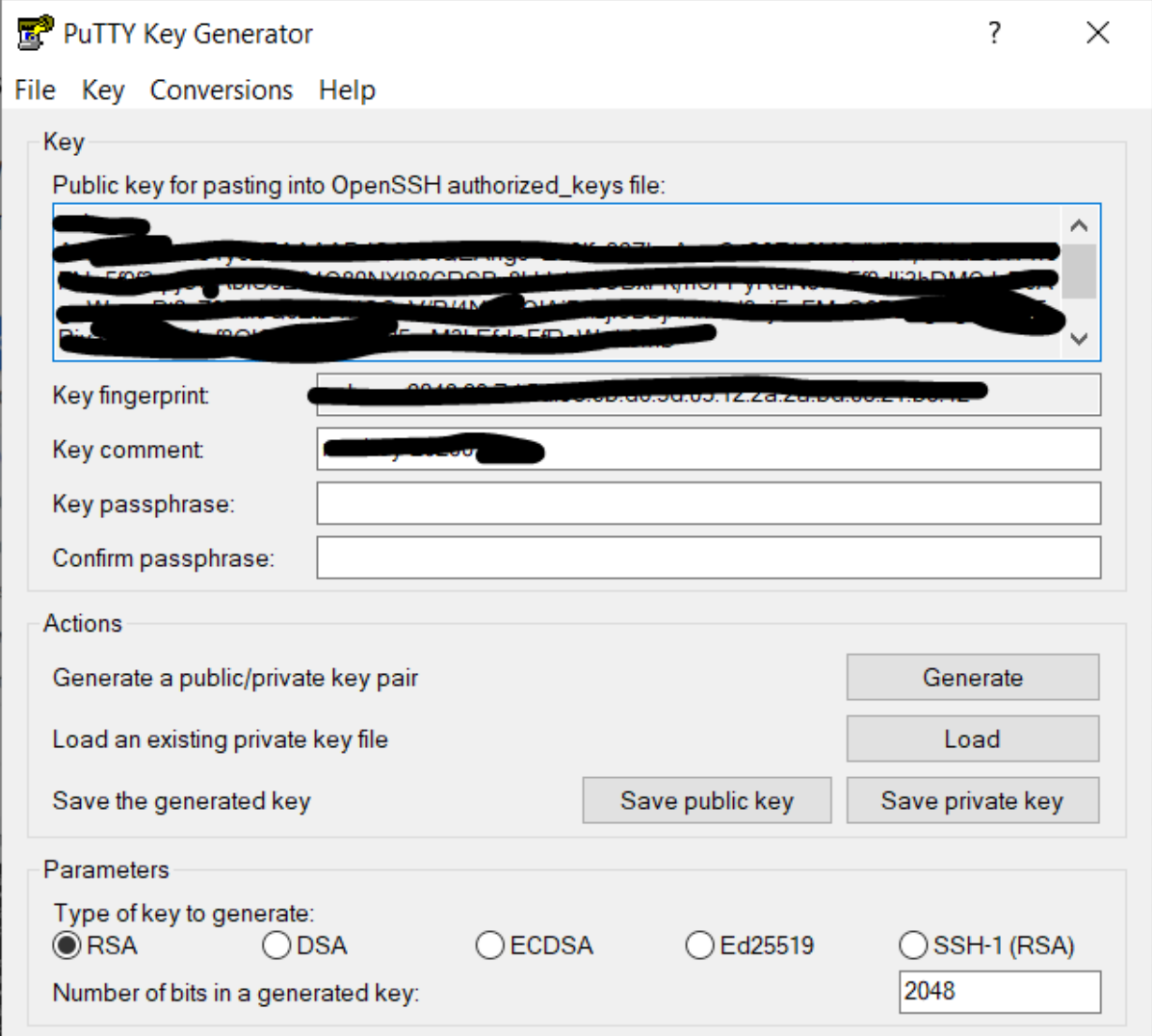


Report – Exercise sheet 10:

Key Generation:



The screenshot shows the PuTTY Key Generator window. The 'Key' section displays the public key for pasting into the OpenSSH authorized_keys file, which is a long string of base64-encoded text. Below this, the key fingerprint is shown as a 40-character hexadecimal string. The key comment field is empty. The key passphrase and confirm passphrase fields are also empty. The 'Actions' section contains four buttons: 'Generate', 'Load', 'Save public key', and 'Save private key'. The 'Parameters' section shows the 'Type of key to generate' set to 'RSA' (selected with a radio button), and the 'Number of bits in a generated key' set to '2048'.

PuTTY Key Generator

File Key Conversions Help

Key

Public key for pasting into OpenSSH authorized_keys file:

Key fingerprint:

Key comment:

Key passphrase:

Confirm passphrase:

Actions

Generate a public/private key pair Generate

Load an existing private key file Load

Save the generated key Save public key Save private key

Parameters

Type of key to generate:

☒ RSA ☐ DSA ☐ ECDSA ☐ Ed25519 ☐ SSH-1 (RSA)

Number of bits in a generated key:

Accessing VM:

VM was accessed and programs were run through SSH option in the UI, rather than the terminal command.

console.cloud.google.com/compute/instances?project=ddalab&instancetype=50

Google Cloud Platform DDAlab Search products and resources

Compute Engine VM instances

Filter VM instances Columns

Name	Zone	Recommendation	In use by	Internal IP	External IP	Connect
instance-1	us-central1-a			10.128.0.3 (nic0)	34.70.239.105	SSH
sekar	us-central1-a			10.128.0.2 (nic0)	34.72.104.162	SSH

Related Actions Dismiss

CLOUD SHELL Terminal (ddalab) Open editor

```
Welcome to Cloud Shell! Type "help" to get started.
Your Cloud Platform project in this session is set to ddalab.
Use "gcloud config set project [PROJECT_ID]" to change to a different project.
sshalini1997@cloudshell:~ (ddalab)$
```

Activate Windows

console.cloud.google.com/compute/instancesDetail/zones/us-central1-a/instances/sekar?project=ddalab&folder&tab=monitoring&duration=PT1H&clou...

Google Cloud Platform DDAlab Search products and resources

Compute Engine VM instance details EDIT RESET

VM instances

% CPU Jul 16, 2020 19:20

by instance name (mean) 10 sec interval (mean)

CPU: 14.87%

CLOUD SHELL Terminal (ddalab) Open editor

The connection to your Google Cloud Shell was lost. Close Reconnect

```
sshalini1997@cloudshell:~ (ddalab)$ pip install torch
*****
python 2 is deprecated. Upgrade to pip3 as soon as possible.
See https://cloud.google.com/python/docs/python2-sunset

To suppress this warning, create an empty ~/.cloudshell/no-pip-warning file.
The command will automatically proceed in 5 seconds or on any key.
*****
Collecting torch
  Downloading https://files.pythonhosted.org/packages/46/ca/306bb933a68b88ab1c20ede0342506b85857635f04fb55a56e53065579b/torch-1.4.0-cp27-cp27mu-manylinux1_x86_64.whl (753.4MB)
52%
```

LEARN Tutorial

For the best experience, view this tutorial on a screen that is (1024 x 768) or larger. Dismiss

connect to instances that have no external IP addresses

To learn how to use IAM roles to manage user access to your Linux instances, see [Managing instance access using OS login](#).

Using Cloud Console

In the list of virtual machine instances, click **SSH** in the row of the instance that you want to connect to.

After you connect, you can use the terminal to run commands on your Linux instance. When you are done, use the **exit** command to disconnect from the instance.

Connecting to Linux instances

You can connect to Linux instances through either the GCP Console or the [gcloud command-line tool](#). Compute Engine generates an SSH key for you and stores it in one of the following locations:

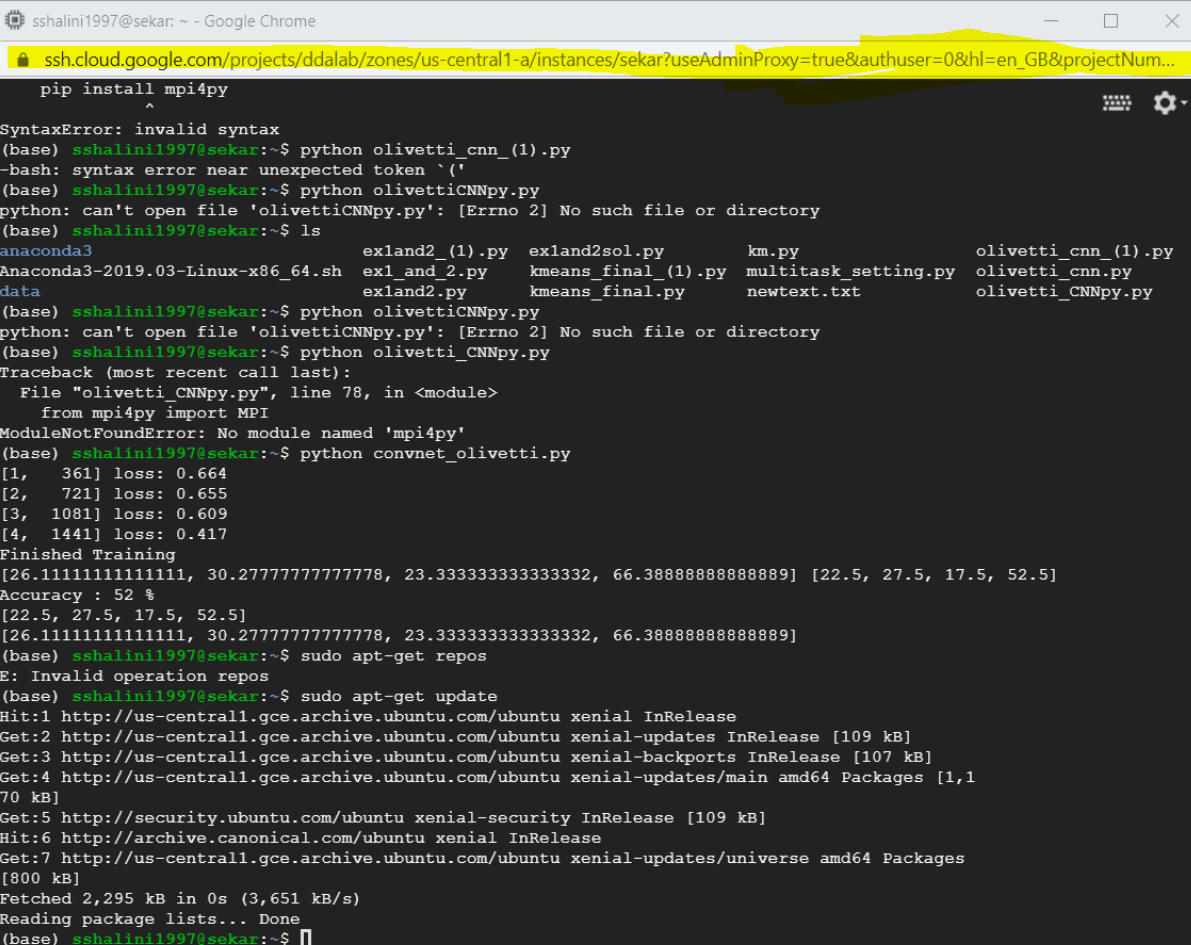
By default, Compute Engine adds the generated key to project or instance [metadata](#).

If your account is configured to use [OS login](#), Compute Engine stores the generated key with your user account.

Go to Settings to activate Windows.

NOTE: I have highlighted parts of the screenshots to denote that the programs were run in the VM instance.

Basic Linux operations:



```
ssh: sshalini1997@sekar: ~ - Google Chrome
ssh.cloud.google.com/projects/ddalab/zones/us-central1-a/instances/sekar?useAdminProxy=true&authuser=0&hl=en_GB&projectNum...

pip install mpi4py
SyntaxError: invalid syntax
(base) sshalini1997@sekar:~$ python olivetti_cnn(1).py
-bash: syntax error near unexpected token `('
(base) sshalini1997@sekar:~$ python olivettiCNNpy.py
python: can't open file 'olivettiCNNpy.py': [Errno 2] No such file or directory
(base) sshalini1997@sekar:~$ ls
anaconda3          exland2_1).py  exland2sol.py      km.py              olivetti_cnn(1).py  P
Anaconda3-2019.03-Linux-x86_64.sh  exl_and_2.py  kmeans_final_1).py multitask_setting.py olivetti_cnn.py     P
data               exland2.py    kmeans_final.py    newtext.txt        olivetti_CNNpy.py  P
(base) sshalini1997@sekar:~$ python olivettiCNNpy.py
python: can't open file 'olivettiCNNpy.py': [Errno 2] No such file or directory
(base) sshalini1997@sekar:~$ python olivetti_CNNpy.py
Traceback (most recent call last):
  File "olivetti_CNNpy.py", line 78, in <module>
    from mpi4py import MPI
ModuleNotFoundError: No module named 'mpi4py'
(base) sshalini1997@sekar:~$ python convnet_olivetti.py
[1, 361] loss: 0.664
[2, 721] loss: 0.655
[3, 1081] loss: 0.609
[4, 1441] loss: 0.417
Finished Training
[26.111111111111, 30.277777777778, 23.333333333333, 66.388888888889] [22.5, 27.5, 17.5, 52.5]
Accuracy : 52 %
[22.5, 27.5, 17.5, 52.5]
[26.111111111111, 30.277777777778, 23.333333333333, 66.388888888889]
(base) sshalini1997@sekar:~$ sudo apt-get repos
E: Invalid operation repos
(base) sshalini1997@sekar:~$ sudo apt-get update
Hit:1 http://us-central1.gce.archive.ubuntu.com/ubuntu xenial InRelease
Get:2 http://us-central1.gce.archive.ubuntu.com/ubuntu xenial-updates InRelease [109 kB]
Get:3 http://us-central1.gce.archive.ubuntu.com/ubuntu xenial-backports InRelease [107 kB]
Get:4 http://us-central1.gce.archive.ubuntu.com/ubuntu xenial-updates/main amd64 Packages [1,170 kB]
Get:5 http://security.ubuntu.com/ubuntu xenial-security InRelease [109 kB]
Hit:6 http://archive.canonical.com/ubuntu xenial InRelease
Get:7 http://us-central1.gce.archive.ubuntu.com/ubuntu xenial-updates/universe amd64 Packages [800 kB]
Fetched 2,295 kB in 0s (3,651 kB/s)
Reading package lists... Done
(base) sshalini1997@sekar:~$
```

 sshalini1997@sekar: ~ - Google Chrome[illegible]

Moving files to VM:

I moved files to VM manually because I was not able to access the VM via terminal. So, I used the upload option in the terminal.

[illegible]

```
ssh@kali:~$ ssh -C -R 8080:localhost:8080 user@ip-addr
Warning: Permanently added host ip-addr (SSH2-00TP).
user@ip-addr:~$ cd /tmp
user@ip-addr:~/tmp$ ls
anaconda3  data  multitask_setting.py  pyspark+tutorial
Anaconda3-2019.03-Linux-x86_64.sh  dda  newtext.txt  pyspark+tut.py
.bash_history  ex1_and_2.py  olivetti_cnn(1).py  .python_history
.bash_logout  exland2.py  olivetti_cnn.py  scikit_learn_data
.bashrc  exland2sol.py  olivetti_CNNpy.py  .ssh
.cache  kmeans_final(1).py  .profile  sss
.config  kmeans_final.py  pyspark_excercise.py

(base) sshalini1997@sekar:~$ cd dda
(base) sshalini1997@sekar:~/dda$ touch newfile.txt
(base) sshalini1997@sekar:~/dda$ nano newfile.txt
(base) sshalini1997@sekar:~/dda$ cd
(base) sshalini1997@sekar:~$
(base) sshalini1997@sekar:~$
(base) sshalini1997@sekar:~$
(base) sshalini1997@sekar:~$
(base) sshalini1997@sekar:~$
(base) sshalini1997@sekar:~$
(base) sshalini1997@sekar:~$
(base) sshalini1997@sekar:~$
(base) sshalini1997@sekar:~$
(base) sshalini1997@sekar:~$
(base) sshalini1997@sekar:~$
(base) sshalini1997@sekar:~$
(base) sshalini1997@sekar:~$
(base) sshalini1997@sekar:~$
(base) sshalini1997@sekar:~$
(base) sshalini1997@sekar:~$
(base) sshalini1997@sekar:~$ wget https://repo.anaconda.com/archive/Anaconda3-2019.03-Linux-x86_64.sh
--2020-07-16 15:27:57-- https://repo.anaconda.com/archive/Anaconda3-2019.03-Linux-x86_64.sh
Resolving repo.anaconda.com (repo.anaconda.com)... 104.16.131.3, 104.16.130.3, 2606:4700::6810:8203, ...
Connecting to repo.anaconda.com (repo.anaconda.com)|104.16.131.3|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 685906562 (654M) [application/x-sh]
Saving to: 'Anaconda3-2019.03-Linux-x86_64.sh.1'

Anaconda3-2019.03-Linux 100%[=====>] 654.13M   236MB/s    in 2.8s

2020-07-16 15:27:59 (236 MB/s) - 'Anaconda3-2019.03-Linux-x86_64.sh.1' saved [685906562/685906562]

(base) sshalini1997@sekar:~$ bash ./Anaconda3-2019.03-Linux-x86_64.sh

Welcome to Anaconda3 2019.03

In order to continue the installation process, please review the license agreement.
Please, press ENTER to continue
>>> ^C
(base) sshalini1997@sekar:~$ source ~/.bashrc
(base) sshalini1997@sekar:~$ source ~/.bashrc
(base) sshalini1997@sekar:~$
```

Running program in the VM instance:

I have chosen to run exercise sheet 9:

Exercise 1 and 2:

```
ssh.cloud.google.com/projects/ddalaby/zones/us-central1-a/instances/sekar?useAdminProxy=true&authuser=0&hl=en_GB&projectNumber=815954082294
Anaconda3-2019.03-Linux-x86_64.sh kmeans_final_1.py pyspark+tutorial_1.py ***
exland2_1.py kmeans_final.py pyspark+tutorial_1.py
exland2_2.py newtext.txt pyspark+tutorial_1.py
(base) sshalini1997@sekar:~$ python kmeans_final_1.py
-bash: syntax error near unexpected token `('
(base) sshalini1997@sekar:~$ python km.py
File "km.py", line 1
    from python3-mp4py import MPI
    ^
SyntaxError: invalid syntax
(base) sshalini1997@sekar:~$ pythonexland2sol.py
pythonexland2sol.py: command not found
(base) sshalini1997@sekar:~$ python exland2sol.py
Traceback (most recent call last):
  File "exland2sol.py", line 17, in <module>
    from torch.utils.data import Dataset, DataLoader
ModuleNotFoundError: No module named 'torch'
(base) sshalini1997@sekar:~$ sudo apt-get install -y torch
Reading package lists... Done
Building dependency tree
Reading state information... Done
E: Unable to locate package torch
(base) sshalini1997@sekar:~$ pip install torch
Collecting torch
  Downloading https://files.pythonhosted.org/packages/44/ce/007b6de316c9f3d4cb315a60c308342cc299e464167f5ebc369e93b5e23a/torch-1.5.1-cp37-cp37m-manylinux1_x86_64.whl (753.2MB)
    100% |#####| 753.2MB 46kB/s
Requirement already satisfied: future in ./anaconda3/lib/python3.7/site-packages (from torch) (0.17.1)
Requirement already satisfied: numpy in ./anaconda3/lib/python3.7/site-packages (from torch) (1.16.2)
Installing collected packages: torch
Successfully installed torch-1.5.1
(base) sshalini1997@sekar:~$ python exland2sol.py
downloading Olivetti faces from https://ndownloader.figshare.com/files/5976027 to /home/sshalini1997/scikit_learn_d
ata
360 360 40 40
epoch 0
epoch 1
epoch 2
epoch 3
epoch 4
Finished Training
Accuracy : 2 %
[5.277777777777778, 3.3333333333333335, 2.5, 4.166666666666667, 2.5] [7.5, 2.5, 2.5, 5.0, 2.5]
epoch 0
epoch 1
epoch 2
epoch 3
epoch 4
Finished Training
Accuracy : 2 %
[2.7777777777777777, 2.7777777777777777, 2.7777777777777777, 2.7777777777777777, 2.7777777777777777] [2.5, 2.5, 2.5, 2.5, 2.5]
(base) sshalini1997@sekar:~$
```

Activate Windows
Go to Settings to activate Windows.

Exercise 4:

```
sshali1997@sekar: ~ - Google Chrome
ssh.cloud.google.com/projects/ddalab/zones/us-central1-a/instances/sekar?useAdminProxy=true&authuser=0&hl=en_GB&projectNumber=815954082294

Requirement already satisfied: future in ./anaconda3/lib/python3.7/site-packages (from torch==1.5.1->torchvision) (0.17.1)
Installing collected packages: torchvision
Successfully installed torchvision-0.6.1
(base) sshali1997@sekar:~$ python multitask_setting.py
Downloading http://yann.lecun.com/exdb/mnist/train-images-idx3-ubyte.gz to ./data/MNIST/raw/train-images-idx3-ubyte.gz
9920512it [00:00, 23261659.95it/s]
Extracting ./data/MNIST/raw/train-images-idx3-ubyte.gz to ./data/MNIST/raw/train-images-idx1-ubyte.gz
9920512it [00:00, 23261659.95it/s]
Extracting ./data/MNIST/raw/train-images-idx1-ubyte.gz to ./data/MNIST/raw/train-images-idx3-ubyte.gz
32768it [00:00, 288125.94it/s]
Extracting ./data/MNIST/raw/train-images-idx3-ubyte.gz to ./data/MNIST/raw/train-images-idx1-ubyte.gz
32768it [00:00, 288125.94it/s]
Extracting ./data/MNIST/raw/train-images-idx1-ubyte.gz to ./data/MNIST/raw/train-images-idx3-ubyte.gz
1654784it [00:00, 5529535.28it/s]
Extracting ./data/MNIST/raw/train-images-idx3-ubyte.gz to ./data/MNIST/raw/train-images-idx1-ubyte.gz
1654784it [00:00, 5529535.28it/s]
Extracting ./data/MNIST/raw/train-images-idx1-ubyte.gz to ./data/MNIST/raw/train-images-idx3-ubyte.gz
8192it [00:00, 86220.08it/s]
Extracting ./data/MNIST/raw/train-images-idx3-ubyte.gz to ./data/MNIST/raw/train-images-idx1-ubyte.gz
8192it [00:00, 86220.08it/s]
Processing...
/pyp/torch/torch/csrc/utils/tensor_numpy.cpp:141: UserWarning: The given NumPy array is not writeable, and PyTorch does not support non-writeable tensors. This means you can write to the underlying (supposedly non-writeable) NumPy array using the tensor. You may want to copy the array to protect its data or make it writeable before converting it to a tensor. This type of warning will be suppressed for the rest of this program.
Done!
60000 10000
9
epoch 0
[1, 2000] loss: 9.898
[1, 4000] loss: 10.233
[1, 6000] loss: 9.965
[1, 8000] loss: 10.882
[1, 10000] loss: 10.911
[1, 12000] loss: 10.634
[1, 14000] loss: 10.991
[1, 16000] loss: 10.729
[1, 18000] loss: 10.703
[1, 20000] loss: 10.833
[1, 22000] loss: 10.476
[1, 24000] loss: 10.965
[1, 26000] loss: 10.926
[1, 28000] loss: 10.697
[1, 30000] loss: 10.722
[1, 32000] loss: 10.515
[1, 34000] loss: 10.381
[1, 36000] loss: 10.652
[1, 38000] loss: 10.698
[1, 40000] loss: 10.744
[1, 42000] loss: 10.726
[1, 44000] loss: 10.883
```

Activate V
Go to Setting

```
sshali1997@sekar: ~ - Google Chrome
ssh.cloud.google.com/projects/ddalab/zones/us-central1-a/instances/sekar?useAdminProxy=true&authuser=0&hl=en_GB&projectNumber=815954082294

[1, 44000] loss: 10.883
[1, 46000] loss: 10.798
[1, 48000] loss: 10.850
[1, 50000] loss: 10.637
[1, 52000] loss: 10.838
[1, 54000] loss: 10.497
[1, 56000] loss: 10.746
[1, 58000] loss: 10.729
[1, 60000] loss: 10.532
epoch 1
[2, 2000] loss: 10.576
[2, 4000] loss: 10.822
[2, 6000] loss: 10.800
[2, 8000] loss: 10.783
[2, 10000] loss: 10.823
[2, 12000] loss: 10.800
[2, 14000] loss: 10.881
[2, 16000] loss: 10.767
[2, 18000] loss: 10.680
[2, 20000] loss: 10.379
[2, 22000] loss: 10.755
[2, 24000] loss: 10.660
[2, 26000] loss: 10.712
[2, 28000] loss: 10.761
[2, 30000] loss: 10.931
[2, 32000] loss: 10.701
[2, 34000] loss: 10.563
[2, 36000] loss: 10.613
[2, 38000] loss: 10.695
[2, 40000] loss: 11.031
[2, 42000] loss: 10.484
[2, 44000] loss: 10.866
[2, 46000] loss: 10.921
[2, 48000] loss: 10.713
[2, 50000] loss: 10.643
[2, 52000] loss: 10.782
[2, 54000] loss: 10.837
[2, 56000] loss: 10.796
[2, 58000] loss: 10.672
[2, 60000] loss: 10.625
epoch 2
[3, 2000] loss: 10.886
[3, 4000] loss: 10.923
[3, 6000] loss: 10.643
[3, 8000] loss: 10.714
[3, 10000] loss: 10.906
[3, 12000] loss: 10.401
[3, 14000] loss: 10.775
[3, 16000] loss: 10.736
[3, 18000] loss: 10.971
[3, 20000] loss: 10.619
[3, 22000] loss: 10.547
[3, 24000] loss: 10.649
```

Activate V
Go to Setting


```
sshcloud.google.com/projects/ddlab/zones/us-central1-a/instances/sekar?useAdminProxy=true&authuser=0&hl=en_GB&projectNumber=815954082294

[2, 36000] loss: 10.613
[2, 38000] loss: 10.695
[2, 40000] loss: 11.031
[2, 42000] loss: 10.484
[2, 44000] loss: 10.866
[2, 46000] loss: 10.921
[2, 48000] loss: 10.713
[2, 50000] loss: 10.643
[2, 52000] loss: 10.782
[2, 54000] loss: 10.837
[2, 56000] loss: 10.796
[2, 58000] loss: 10.672
[2, 60000] loss: 10.625
epoch 2
[3, 2000] loss: 10.886
[3, 4000] loss: 10.923
[3, 6000] loss: 10.643
[3, 8000] loss: 10.714
[3, 10000] loss: 10.906
[3, 12000] loss: 10.401
[3, 14000] loss: 10.775
[3, 16000] loss: 10.736
[3, 18000] loss: 10.971
[3, 20000] loss: 10.619
[3, 22000] loss: 10.547
[3, 24000] loss: 10.649
[3, 26000] loss: 10.884
[3, 28000] loss: 11.002
[3, 30000] loss: 10.915
[3, 32000] loss: 10.566
[3, 34000] loss: 10.656
[3, 36000] loss: 10.763
[3, 38000] loss: 10.780
[3, 40000] loss: 10.603
[3, 42000] loss: 10.737
[3, 44000] loss: 10.651
[3, 46000] loss: 10.656
[3, 48000] loss: 10.717
[3, 50000] loss: 10.854
[3, 52000] loss: 10.811
[3, 54000] loss: 10.900
[3, 56000] loss: 10.496
[3, 58000] loss: 10.501
[3, 60000] loss: 10.767
Finished Training
tensor(2.3016, grad_fn=<DivBackward0>)
tensor(8.4653, grad_fn=<DivBackward0>)
tensor(10.7669, grad_fn=<DivBackward0>)
GroundTruth: 7
tensor([[4.6173]], grad_fn=<AddmmBackward>)
Predicted: 7
Accuracy of the network on the 10000 test images: 10 %
(base) sshalini1997@sekar:~$
```

Exercise 4's last part and Exercise 3:

```
sshcloud.google.com/projects/ddlab/zones/us-central1-a/instances/sekar?useAdminProxy=true&authuser=0&hl=en_GB&projectNumber=815954082294

[3, 34000] loss: 10.656
[3, 36000] loss: 10.763
[3, 38000] loss: 10.780
[3, 40000] loss: 10.603
[3, 42000] loss: 10.737
[3, 44000] loss: 10.651
[3, 46000] loss: 10.656
[3, 48000] loss: 10.717
[3, 50000] loss: 10.854
[3, 52000] loss: 10.811
[3, 54000] loss: 10.900
[3, 56000] loss: 10.496
[3, 58000] loss: 10.501
[3, 60000] loss: 10.767
Finished Training
tensor(2.3016, grad_fn=<DivBackward0>)
tensor(8.4653, grad_fn=<DivBackward0>)
tensor(10.7669, grad_fn=<DivBackward0>)
GroundTruth: 7
tensor([[4.6173]], grad_fn=<AddmmBackward>)
Predicted: 7
Accuracy of the network on the 10000 test images: 10 %
(base) sshalini1997@sekar:~$ python olivetti_cnn.py
File "olivetti_cnn.py", line 76
    pip install mpi4py
    ^
SyntaxError: invalid syntax
(base) sshalini1997@sekar:~$ python olivetti_cnn(1).py
-bash: syntax error near unexpected token `('
(base) sshalini1997@sekar:~$ python olivettiCNNpy.py
python: can't open file 'olivettiCNNpy.py': [Errno 2] No such file or directory
(base) sshalini1997@sekar:~$ ls
anaconda3          exland2(1).py    exland2sol.py    km.py             olivetti_cnn(1).py  pyspark_excercise.py  pyspark+tutorial.py  sss
Anaconda3-2019.03-Linux-x86_64.sh  ex1_and_2.py    kmeans_final(1).py  multitask_setting.py  olivetti_cnn.py    pyspark+tutorial(1).py  pyspark+tut.py
data               exland2.py      kmeans_final.py    newtext.txt       olivetti_CNNpy.py  pyspark+tutorial(1).py  scikit_learn_data
(base) sshalini1997@sekar:~$ python olivettiCNNpy.py
python: can't open file 'olivettiCNNpy.py': [Errno 2] No such file or directory
(base) sshalini1997@sekar:~$ python olivetti_CNNpy.py
Traceback (most recent call last):
  File "olivetti_CNNpy.py", line 78, in <module>
    from mpi4py import MPI
ModuleNotFoundError: No module named 'mpi4py'
(base) sshalini1997@sekar:~$ python convnet_olivetti.py
[1, 361] loss: 0.664
[2, 721] loss: 0.655
[3, 1081] loss: 0.609
[4, 1441] loss: 0.417
Finished Training
[26.111111111111, 30.277777777778, 23.333333333333, 66.388888888889] [22.5, 27.5, 17.5, 52.5]
Accuracy : 52 %
[22.5, 27.5, 17.5, 52.5]
[26.111111111111, 30.277777777778, 23.333333333333, 66.388888888889]
(base) sshalini1997@sekar:~$
```

Thus the programs were run in the VM instance in the cloud.