CO416 – Machine Learning for Imaging

Tutorial 5

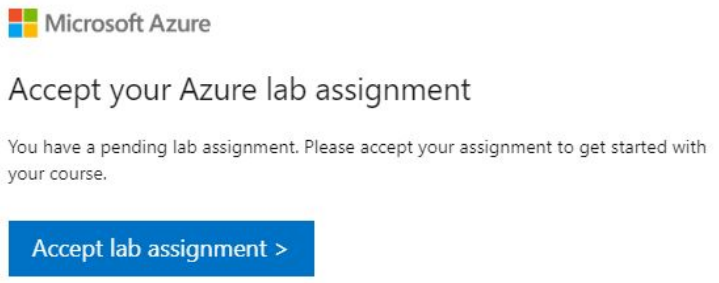
Setting up a GPU Virtual Machine on Azure

This tutorial is about setting up a GPU virtual machine on Microsoft Azure that you will need to for an 3D image segmentation task to be done as part of the second coursework.

This tutorial should be done together with your coursework group members.

Step 1: Log in to Azure

Check your emails for a message with subject “Action required: Accept your Azure lab assignment” and click on “**Accept lab assignment**”.

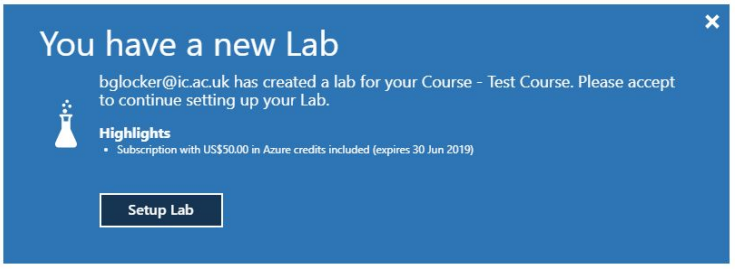


Alternatively, try opening the website:
https://portal.azure.com/#blade/Microsoft_Azure_Education/EducationMenuBlade/quickstart

Log in to Azure using your college credentials. You will have to use your email address in the following format: **<login>@ic.ac.uk**

Step 2: Set up the lab

After you logged in, you should see the following message:

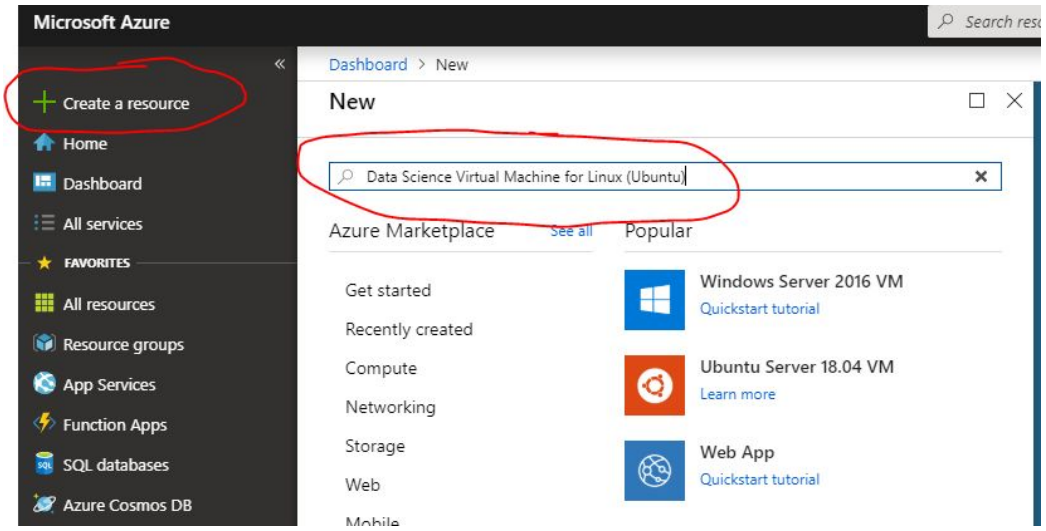


Click on “Setup Lab” and you should see the following message. Wait for it be finished.

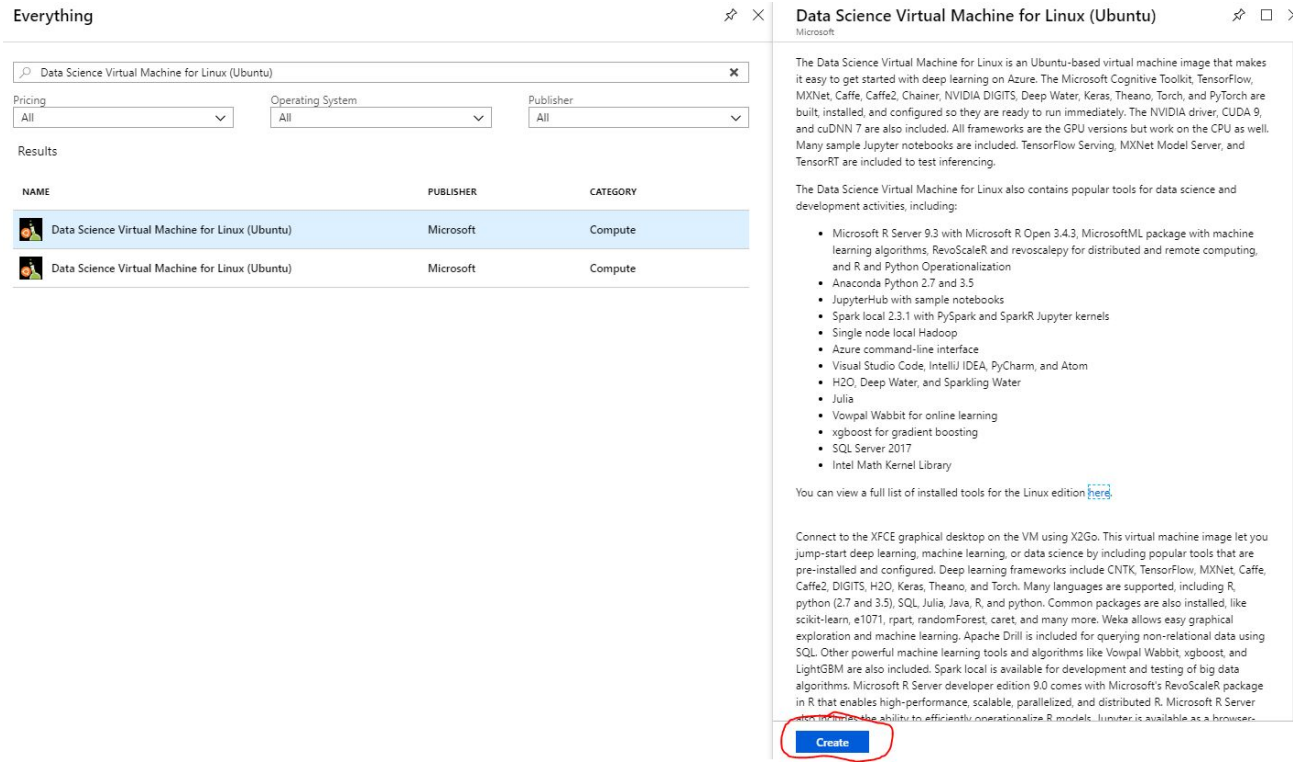
Step 3: Creating a virtual machine

a) On the left-hand side in the menu, click on “Create a resource”:

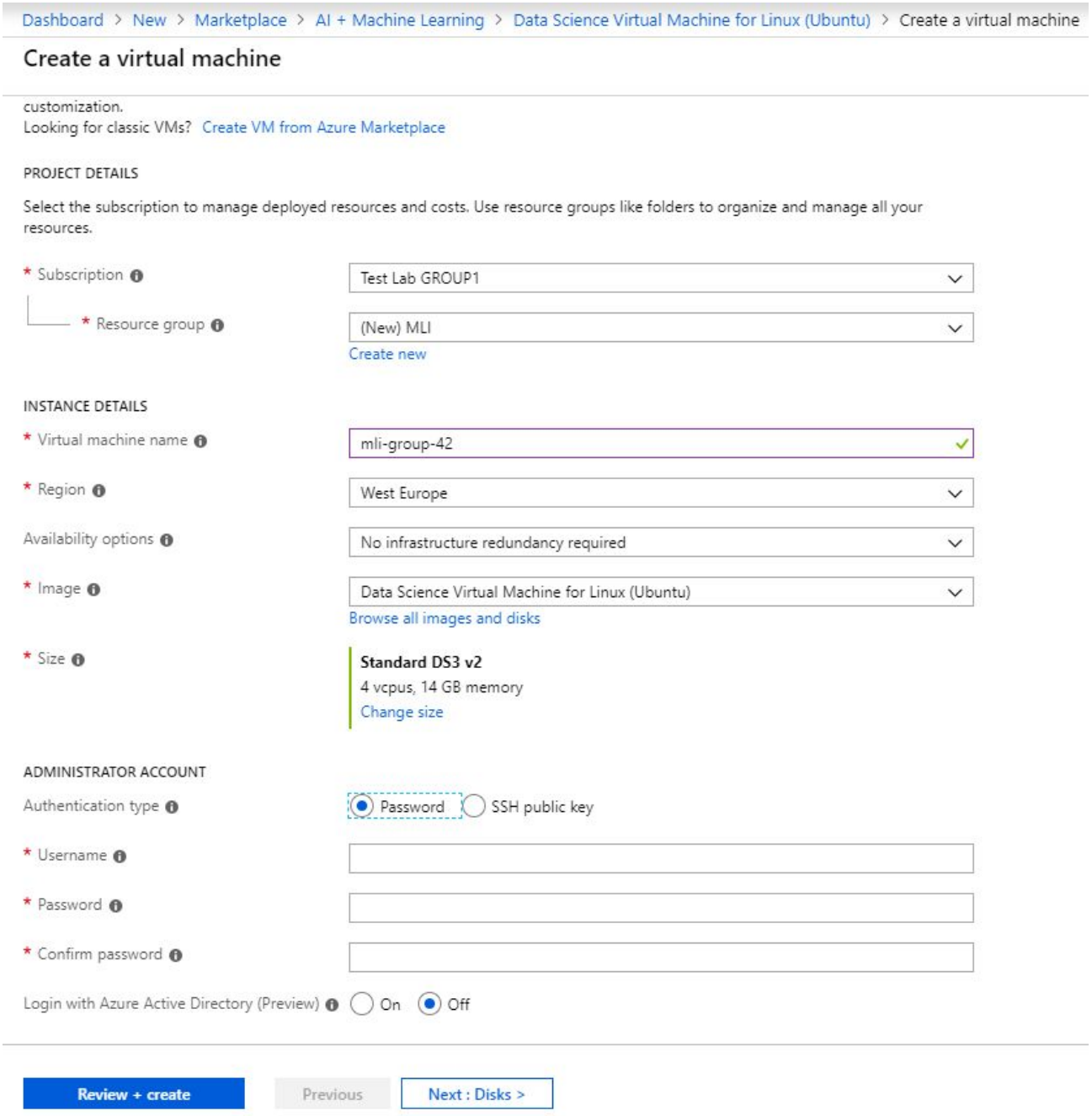
b) In the search box, type “Data Science Virtual Machine for Linux (Ubuntu)”



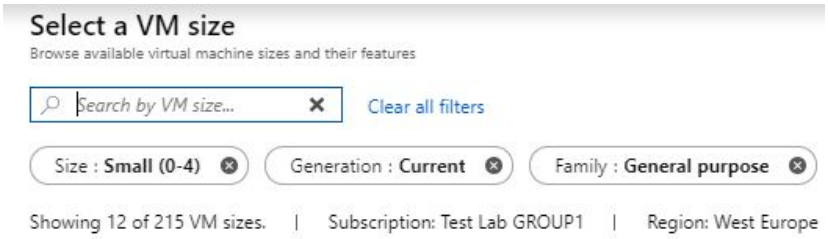
c) Choose the VM and on the right-hand side click on “Create” at the bottom of the description.



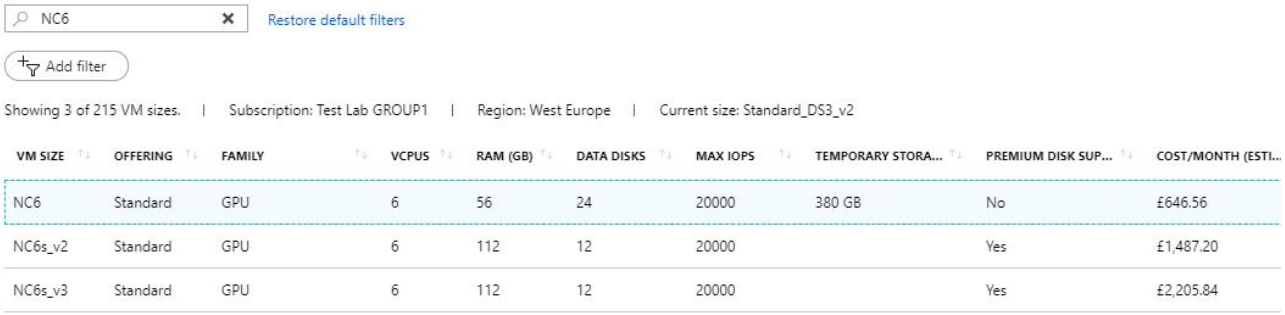
d) You should now see the following:



1. Select your subscription “MLI CW2 Lab GROUP <X>” where <X> is your group number
2. Create a new resource group. You can name it “MLI”
3. Choose a name for your VM, for example, “mli-group-<X>” where <X> is your group number
4. Make sure “Region” is set to “Western Europe”
5. Choose a username, for example, group<x> and a password that you share in your group
6. **IMPORTANT**: Click now on “Change size” under “Size” and you see the following:

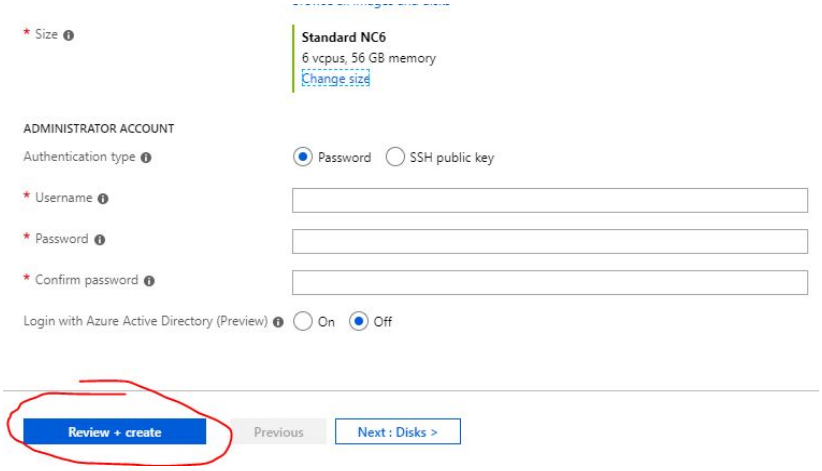


7. Click on “Clear all filters” and type “NC6” into the search box, and you should see:

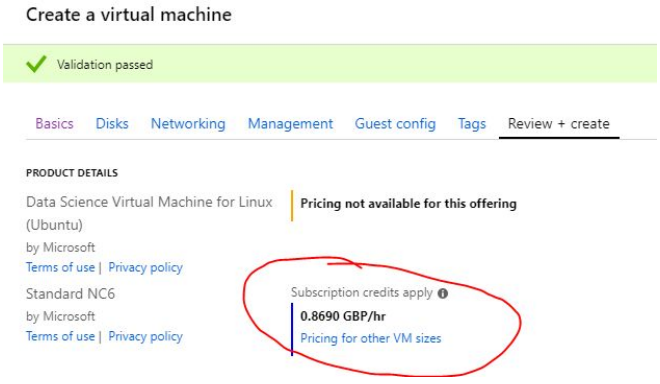


8. Choose “NC6” which is a VM with one Tesla K80 GPU. Click on “Select” at the bottom.

9. Back in the previous window, select “Review + create”.



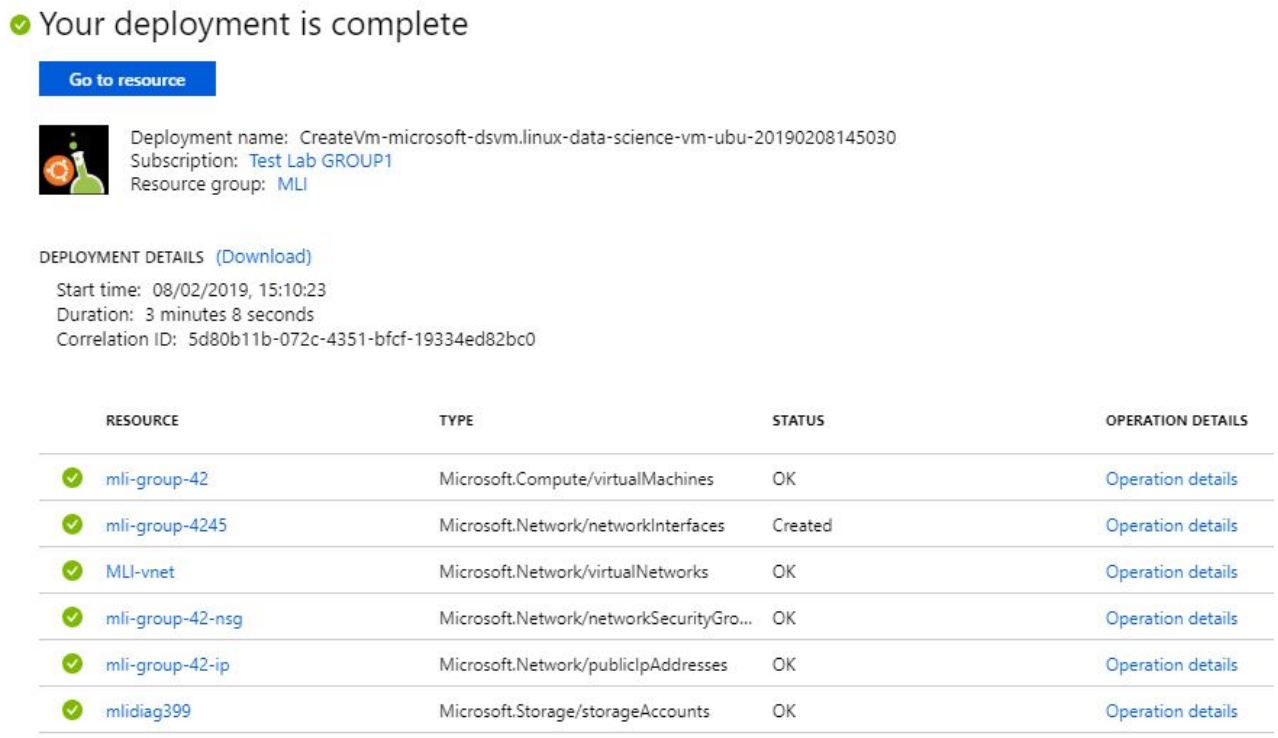
10. After the validation passes, you should see this. Note the price per hour.



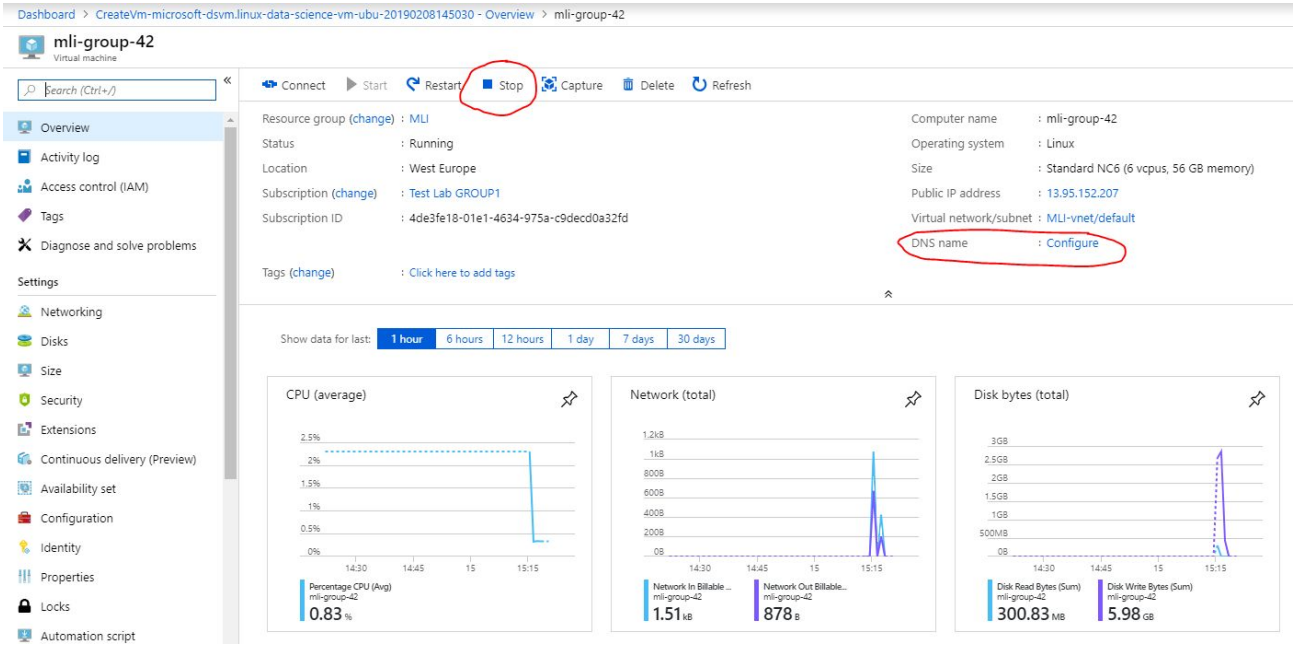
11. Click on “Create” at the bottom and your VM will be set up. This may take a few minutes.

Step 4: Configuring your VM for remote access

When you see this, click on “Go to resource”.

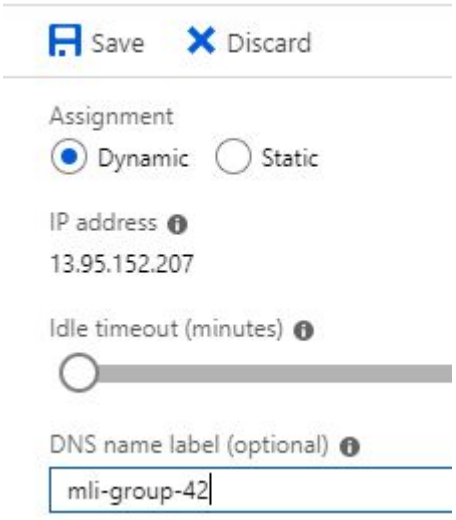


You should then see this:



IMPORTANT: You can “Stop” your VM anytime when it’s not used. A stopped VM will not induce any costs. Only a running VM will be charged to your credits.

Now, set up a DNS name so your VM is conveniently accessible from remote, e.g., via SSH. Click on “Configure” next the DNS name. You should see this:



In this example we chose the name “mli-group-42”. Click on “Save” at the top. This VM would now be accessible via the name “mli-group-42.westeurope.cloudapp.azure.com”.

Try to SSH into your VM with your chosen VM username and password from the terminal via:
`$ ssh <username>@<dns_name>.westeurope.cloudapp.azure.com`

ssh group44@mli-group-44.westeurope.cloudapp.azure.com

Step 5: Installing Python environment on your VM

After successfully SSHing into your VM, you should see something like this:

```
**********************************************************************
* Welcome to the Linux Data Science Virtual Machine on Azure!        *
*                                                                    *
* For more information on available tools and features,              *
* visit http://aka.ms/dsvm/discover.                                 *
**********************************************************************

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

mli@mli-group-42:~$
```

Type “nvidia-smi”, to see if your GPU is up and running. You should see something like this:

```
mli@mli-group-42:~$ nvidia-smi
Fri Feb  8 15:33:01 2019
+-----------------------------------------------------------------------------+
| NVIDIA-SMI 396.44                 Driver Version: 396.44                    |
|-------------------------------+----------------------+----------------------+
| GPU  Name        Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf  Pwr:Usage/Cap|         Memory-Usage | GPU-Util  Compute M. |
|===============================+======================+======================|
|   0  Tesla K80           On   | 00005B25:00:00.0 Off |                    0 |
| N/A   43C    P0    55W / 149W |      0MiB / 11441MiB |      1%      Default |
+-------------------------------+----------------------+----------------------+

+-----------------------------------------------------------------------------+
| Processes:                                                       GPU Memory |
|  GPU       PID   Type   Process name                             Usage      |
|=============================================================================|
|  No running processes found                                                 |
+-----------------------------------------------------------------------------+
mli@mli-group-42:~$
```

Next, we create a Python 3 virtual environment named “mli” using conda and then install all required Python packages. This will take a few minutes. Call the following commands one after each other on the VM’s terminal. Whenever prompted to proceed, answer “y” for yes.

```
$ conda create -n mli python=3.6
$ conda activate mli
$ conda install pytorch torchvision cudatoolkit=9.0 -c pytorch
$ pip install matplotlib jupyter pandas seaborn scikit-learn SimpleITK
```

Step 6: Clone the coursework Git repository

On you VM’s terminal, run the following command

```
$ git clone https://gitlab.doc.ic.ac.uk/bglocker/mli-coursework-2
```

Change to the coursework folder:

```
$ cd mli-coursework2
```

You can download the coursework data to your VM by running the following command:

```
$ wget https://www.doc.ic.ac.uk/~bglocker/teaching/mli/mli-cw2-data.zip
```

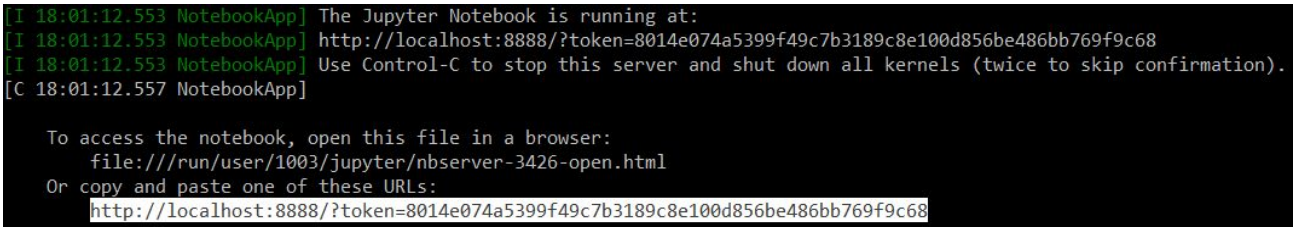
Unzip the archive by running:

```
$ unzip mli-cw2-data.zip
```

Now, start a Jupyter notebook server on your VM:

```
$ jupyter notebook --no-browser --port=8888
```

You should see something like:



Mark and copy the highlighted URL including the full token.

On your local machine’s terminal (e.g., on a lab machine) run (in one line):

```
$ ssh -N -f -L localhost:8888:localhost:8888
        <username>@<dns_name>.westeurope.cloudapp.azure.com
```

Now, open a web browser and paste the URL including the token into the address bar. The Jupyter notebook application should appear.

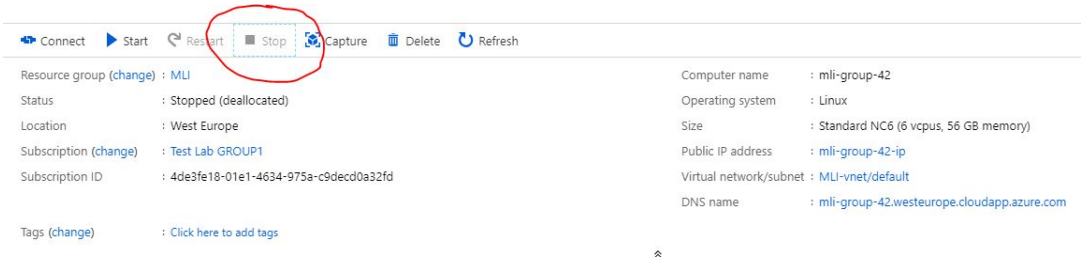
You can now work on your coursework notebooks remotely using your VM for computations. You may want to start with the notebook **`MLI-MIC-Summary.ipynb`**.

ssh -N -f -L localhost:8888:localhost:8888 group44@mli-group-44.westeurope.cloudapp.azure.com

Notes

Remember, you have a **limited budget**. The given Azure credits should be sufficient to have your VM running almost 24/7 for the entire duration of the coursework. However, try to be as cost efficient as possible. You can stop your VM to save costs when it's not in use. Restarting the VM only takes a minute or so. You are free to use any leftover credits for your own projects.

We may assign bonus points based on your credits left after the coursework.



Also remember, everytime you reconnect to your VM you need to activate the Python environment:
`$ conda activate mli`

Have fun!

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