

CS234 Azure GPU Setup Tutorial

BEFORE WE GET STARTED:

**Please remember to stop VM instances if you are not using them!
(by clicking the Stop button at the top of the instance page)**

Azure charges you per hour when the instance is running, no matter if you are using it or not. So you will soon run out of credits if you don't stop them when done.

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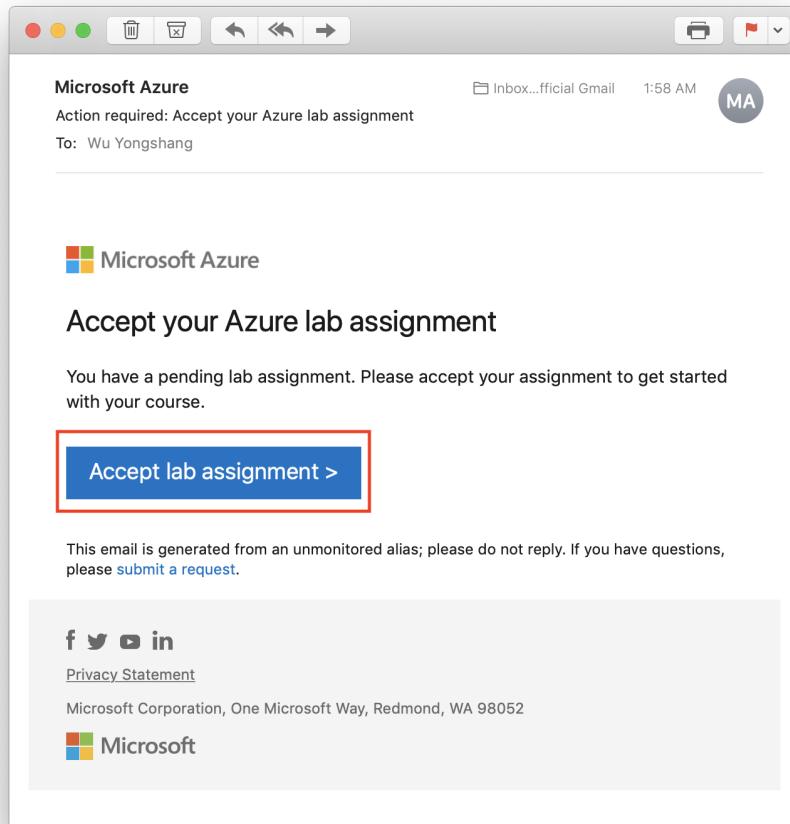
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The whole setup process is expected to take about **1 hour**. Most of the time is spent on downloading and installing libraries such as NVIDIA drivers, CUDA, cuDNN and Tensorflow. Don't worry as we have scripts written to do all the heavy lifting for you.

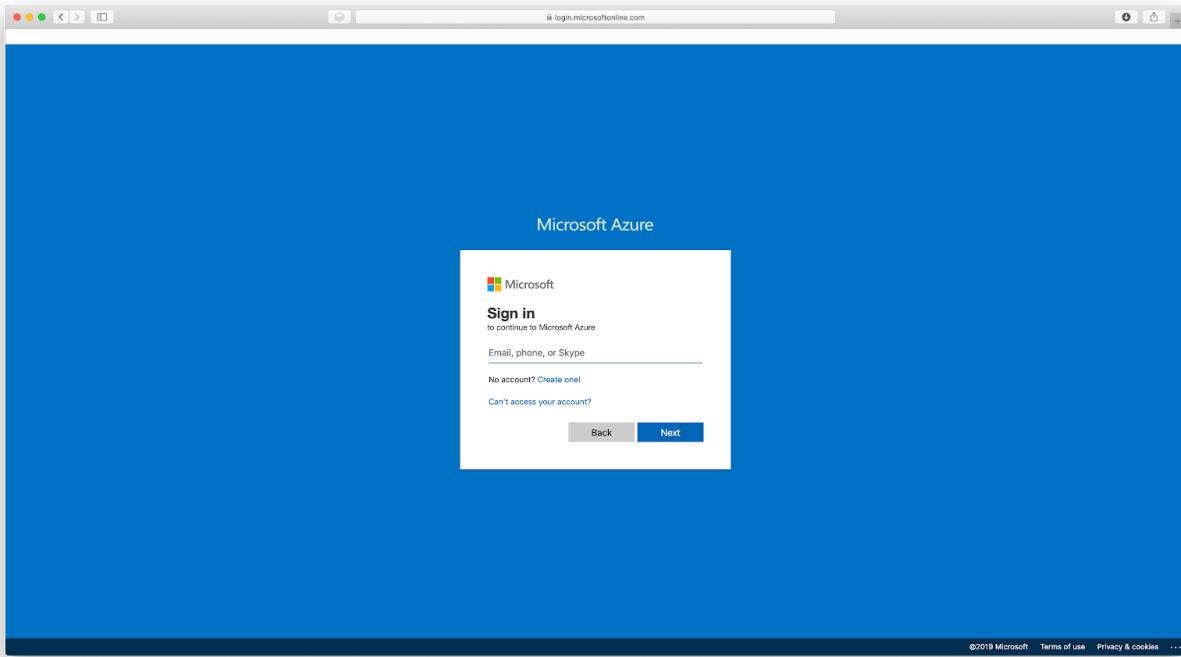
Take a deep breath and be patient :)

1. Accept Invitation and Credits

(1) You should have received an email to your Stanford mailbox, by Wed 23:59 p.m. Jan 23, with an invitation to join the Azure sponsorship subscription with \$50 credits. If not, please reach out to wuy@stanford.edu directly for help, with the title starting with [CS234 Azure]. In the email you get, click “Accept lab assignment”:



(2) Sign in with **the email address that received this invitation** (if you never created an Azure account with this email before, you will need to create one first):



(3) Once logged in, click "Setup Lab"

A screenshot of the Microsoft Azure portal. The left sidebar shows various service icons like Home, Dashboard, All services, and others. The main content area is titled 'Education - Quick Start' and shows a message: 'You have a new Lab' with an email address 'cs234_stanford@outlook.com' and a 'Setup Lab' button. This button is highlighted with a red rectangle. Below this, there are sections for 'Access Courses', 'Labs', 'Resources', and 'Get Notified', each with a brief description and a 'Learn more' link.

Fill out the required information and agree to the terms to continue.

(4) Check your credit balance

To check your credit balance, go to

https://portal.azure.com/#blade/Microsoft_Azure_Education/EducationMenuBlade/classrooms, click course “CS234”:

The screenshot shows the Microsoft Azure portal interface. On the left, the navigation menu includes 'Create a resource', 'Home', 'Dashboard', 'All services', 'FAVORITES' (with 'CS234' listed), 'All resources', 'Resource groups', 'App Services', 'Function Apps', 'SQL databases', 'Azure Cosmos DB', 'Virtual machines', 'Load balancers', 'Storage accounts', 'Virtual networks', 'Azure Active Directory', 'Monitor', 'Advisor', 'Security Center', and 'Cost Management + Billing'. The main content area is titled 'Education - Courses PREVIEW'. It shows an 'Overview' section with a 'Courses' tab selected. A 'Course' card for 'CS234' is displayed, stating: 'lets you easily group students, create cloud computing labs for them, and manage policies'. Below the card, statistics are shown: ALL STUDENTS (6), ADMINISTRATORS (1), PROJECT GROUPS (0), and LABS (1). A search bar and a table with a single row for 'CS234' are also present.

Then you can see the total budget you have and the credit you have consumed:

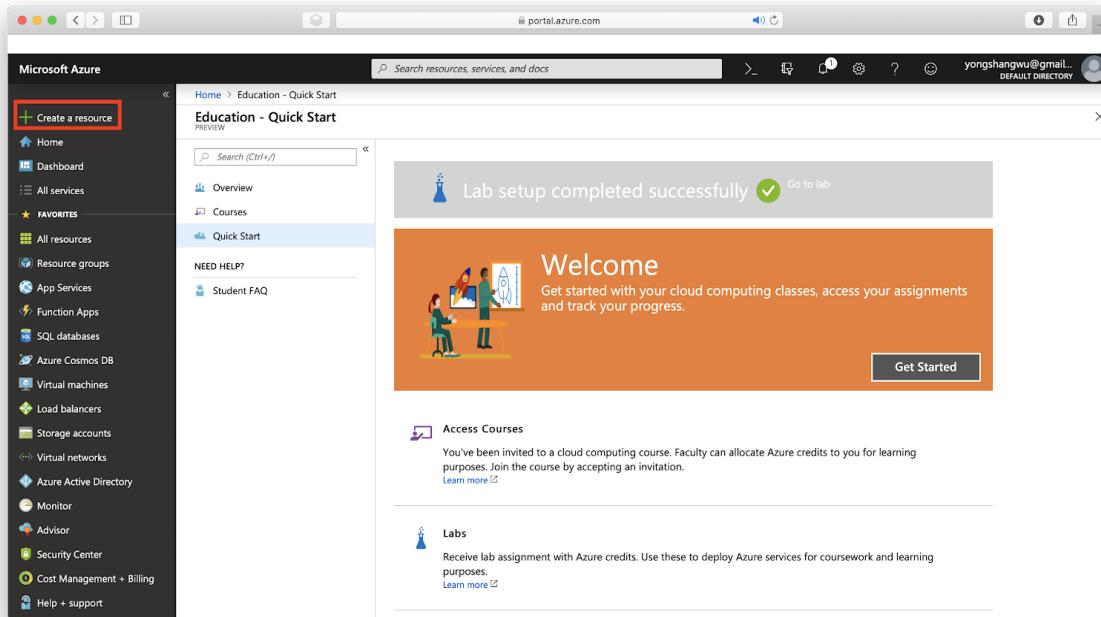
The screenshot shows the 'CS234 - Overview' page. The left sidebar is identical to the previous screenshot. The main content area shows the 'CS234' course name at the top. Below it is a 'Course Roster' section with statistics: 6 Students, 0 Administrators, and 0 Project Groups. Under the 'Labs' section, there is a table for 'Assignment Check':

NAME	BUDGET	CONSUMED	STUDENTS	PROJECT GROUPS
Assignment Check	\$20.00	\$0.23	6	0

A red box highlights the 'CONSUMED' column value '\$0.23'. Below the table is an 'About' section with the message 'No description added'.

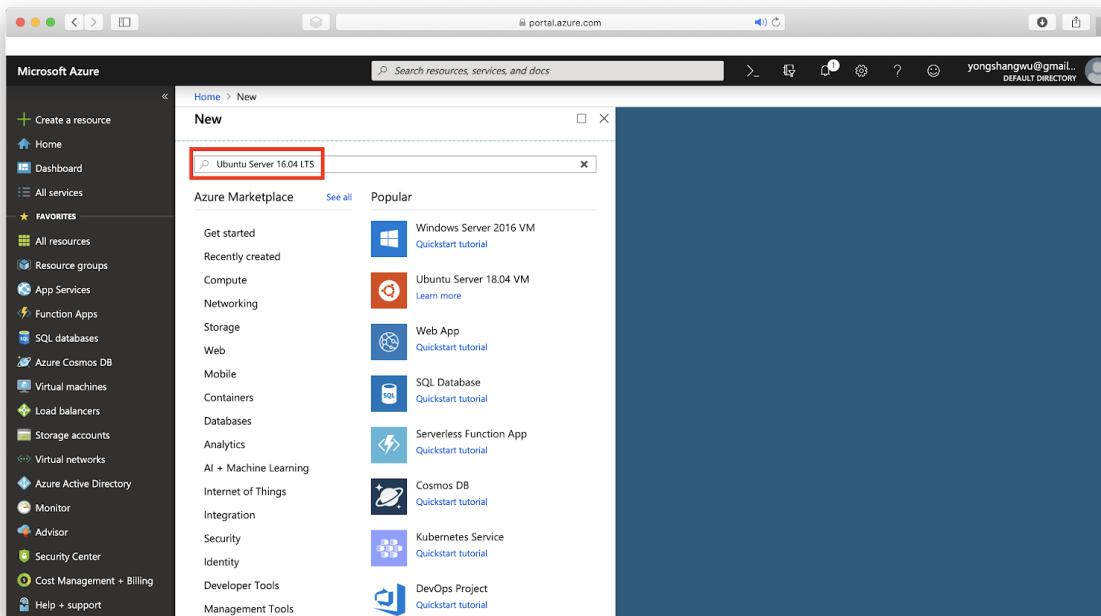
2. Create a VM

(1) After logging in, you should reach [the Azure Portal page](#). Click the “Create a resource” button at the top of side menu.



The screenshot shows the Microsoft Azure portal interface. On the left, there is a dark sidebar with various service icons and a 'Create a resource' button highlighted with a red box. The main content area is titled 'Education - Quick Start' and displays a message 'Lab setup completed successfully' with a green checkmark and a 'Go to lab' link. Below this, there's a large orange 'Welcome' section featuring an illustration of two people working on a computer. A 'Get Started' button is located at the bottom right of this section. Further down, there are sections for 'Access Courses' and 'Labs', each with a brief description and a 'Learn more' link.

(2) Input “Ubuntu Server 16.04 LTS” in the search bar:



The screenshot shows the Microsoft Azure portal with the 'New' blade open. The search bar at the top contains the text 'Ubuntu Server 16.04 LTS'. In the results list, the first item, 'Ubuntu Server 16.04 VM', is highlighted with a red box. The results are categorized into 'Azure Marketplace' and 'Popular' sections. Other visible items include 'Windows Server 2016 VM', 'Ubuntu Server 18.04 VM', 'Web App', 'SQL Database', 'Serverless Function App', 'Cosmos DB', 'Kubernetes Service', and 'DevOps Project'.

Select “Ubuntu Server 16.04 LTS” in the result page:

NAME	PUBLISHER	CATEGORY
Ubuntu Server 16.04 LTS	Canonical	Compute
SQL Server 2017 Standard on Ubuntu Server 16.04 LTS	Microsoft	Compute
SQL Server 2017 Enterprise on Ubuntu Server 16.04 LTS	Microsoft	Compute
SQL Server 2017 Web on Ubuntu Server 16.04 LTS	Microsoft	Compute
Ubuntu Server 16.04 LTS + Azure IoT Edge runtime	Microsoft	Compute
Free SQL Server License: (CTP2.0)SQL Server 2019 Developer on Ubuntu Server 16.04 LTS	Microsoft	Compute
Free SQL Server License: (CTP2.2) SQL Server 2019 Developer on Ubuntu Server 16.04 LTS	Microsoft	Compute
Free SQL Server License: SQL Server 2017 Developer on Ubuntu Server 16.04 LTS	Microsoft	Compute
Free SQL Server License: SQL Server 2017 Express on Ubuntu Server 16.04 LTS	Microsoft	Compute
Hardened Nginx on Ubuntu 16.04 LTS	Cognosys Inc.	Compute
Hardened LAMP on Ubuntu 16.04 LTS	Cognosys Inc.	Compute

Then click “Create”:

Ubuntu Server 16.04 LTS

Canonical

Ubuntu Server 16.04 LTS amd64 Public Azure, Azure China, Azure Germany, Azure Gov. Ubuntu Server is the world's most popular Linux for cloud environments. Updates and patches for Ubuntu 16.04 will be available until April 2021. Ubuntu Server is the perfect virtual machine (VM) platform for all workloads from web applications to NoSQL databases and Hadoop. For more information see [Ubuntu on Azure](#) and using Juju to deploy your workloads.

Legal Terms

By clicking the Create button, I acknowledge that I am getting this software from Canonical and that the [legal terms](#) of Canonical apply to it. Microsoft does not provide rights for third-party software. Also see the [privacy statement](#) from Canonical.

[Save for later](#)

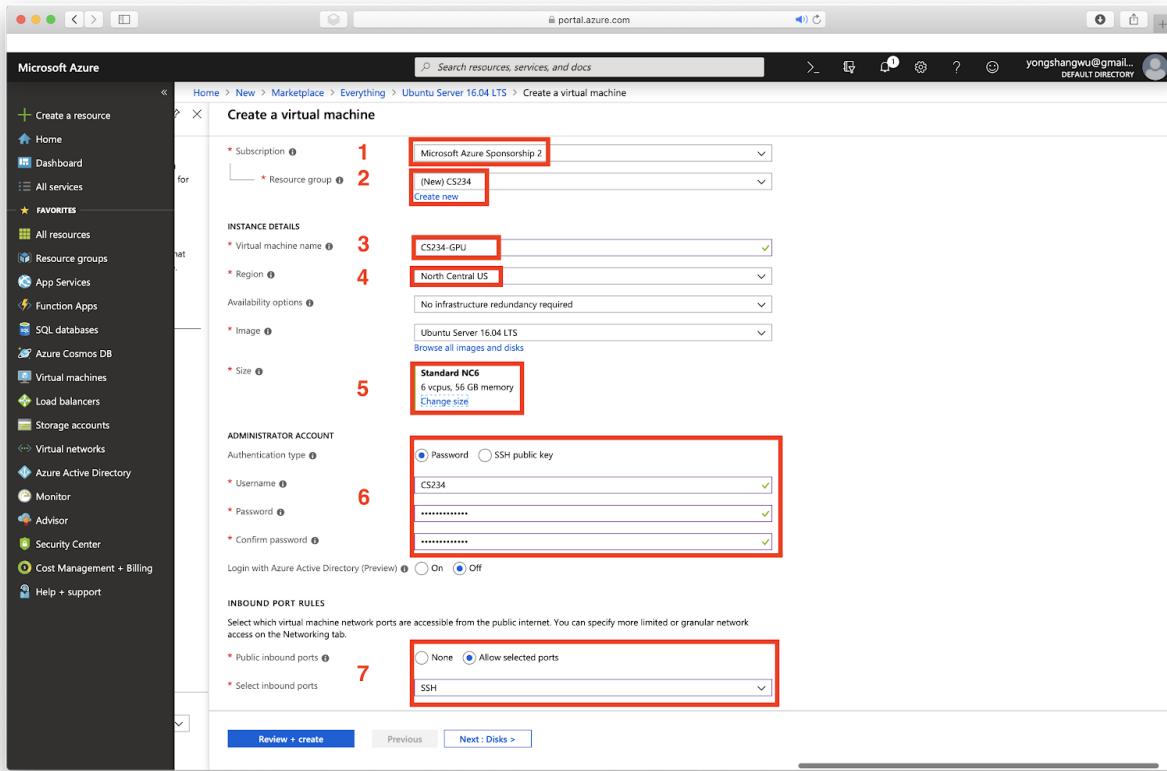
PUBLISHER Canonical

USEFUL LINKS [Linux VM Documentation](#) [Ubuntu Documentation](#) [FAQ](#) [Pricing Details](#)

Select a deployment model [Resource Manager](#)

[Create](#)

(3) In the VM creation page, fill out each field as instructed below:



1. Subscription: select “Microsoft Azure Sponsorship 2”.
2. Resource group: click “Create new” to create a group with any name. Instances within the same resource group share a common set of rules (e.g. network, security, etc.).
3. Virtual machine name: any name you want for this particular VM.
4. **Region**: “North Central US” will be fine. You could choose other regions but **note that not all regions have VMs with GPU**.

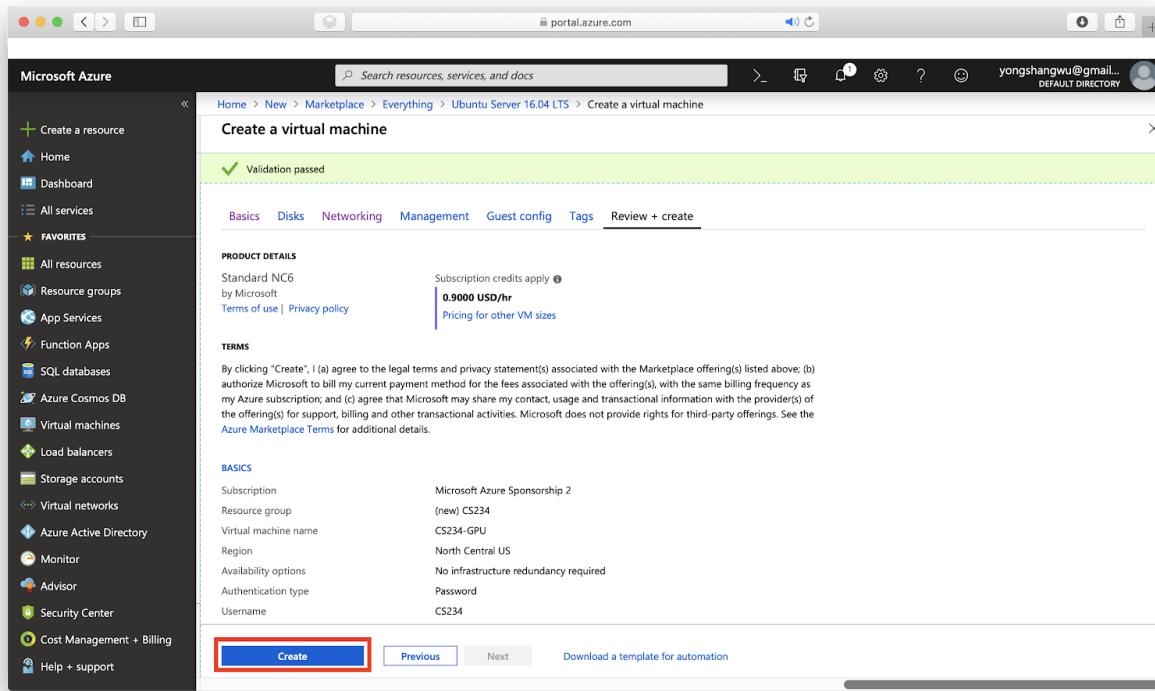
5. **Size:** click “Change size”, in the selection page, click “**Clear all filters**” then input “NC6” in the search bar, click NC6 then “Select”:

VM SIZE	OFFERING	FAMILY	VCPUS	RAM (GB)	DATA DISKS	MAX IOPS	TEMPORARY STORA...	PREMIUM DISK SUP...	COST/MONTH (ESTI...)
NC6	Standard	GPU	6	56	24	20000	380 GB	No	\$669.60
NC6s_v2	Standard	GPU	6	112	12	20000		Yes	\$1,540.08
NC6s_v3	Standard	GPU	6	112	12	20000		Yes	\$2,276.64

NC6 instances are installed with an NVIDIA K80 GPU, which should be sufficient for assignment 2.

6. Administrator Account: use either Password (pick any username and password you want) or [SSH public key](#) to authenticate connection to the VM.
7. **Public inbound ports:** Select “Allow selected ports” and select “SSH” port. If you choose None, you may have trouble connecting to the VM later (in which case, see part 3.(2) of this tutorial for solution).
8. (optional) The VM comes with a 56 GB boot disk, which should be enough for assignment. If you need more disk space, click “Next: Disk” then follow the instructions. You can also [add and attach new disks](#) later if run out of space.

After completing all the fields, click “Review + create” then “Create”:

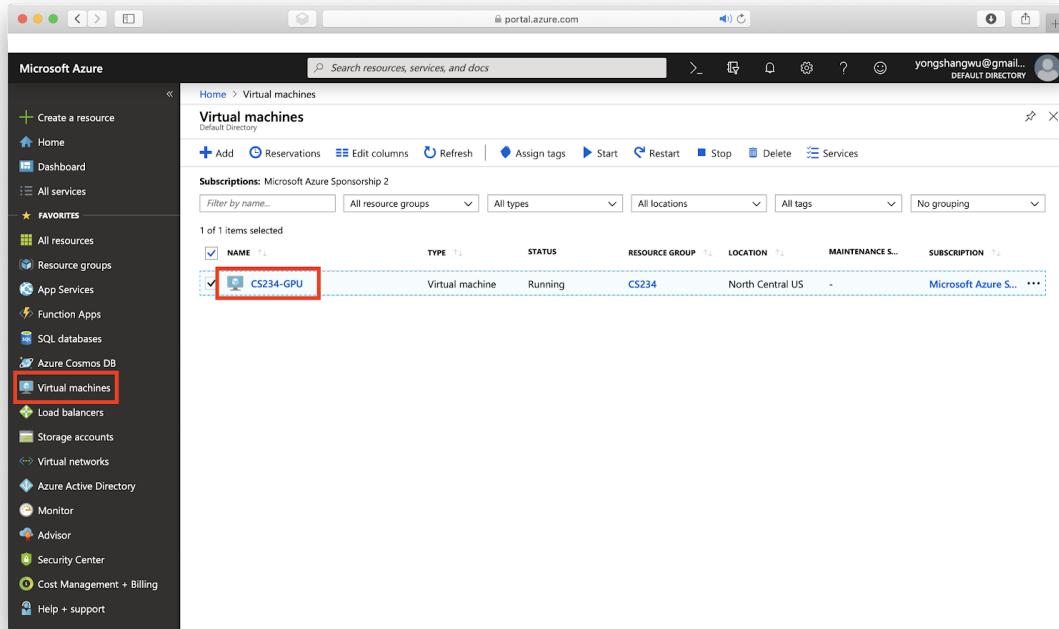


The screenshot shows the Microsoft Azure portal interface for creating a virtual machine. The left sidebar includes options like Home, Dashboard, All services, Favorites, and various Azure services. The main page title is "Create a virtual machine". A green validation message "Validation passed" is displayed. Below it, tabs for Basics, Disks, Networking, Management, Guest config, Tags, and Review + create are visible, with "Review + create" being the active tab. Under "PRODUCT DETAILS", it shows a Standard NC6 VM size from Microsoft, priced at 0.9000 USD/hr. The "TERMS" section contains legal agreement text. The "BASICS" section lists configuration details: Subscription (Microsoft Azure Sponsorship 2), Resource group (new) CS234, Virtual machine name (CS234-GPU), Region (North Central US), Availability options (No infrastructure redundancy required), Authentication type (Password), and Username (CS234). At the bottom, a large blue "Create" button is highlighted with a red box, and other buttons for Previous, Next, and Download a template for automation are shown.

The creation process usually takes 1~5 mins. Once done, we can further configure the VM and start using it.

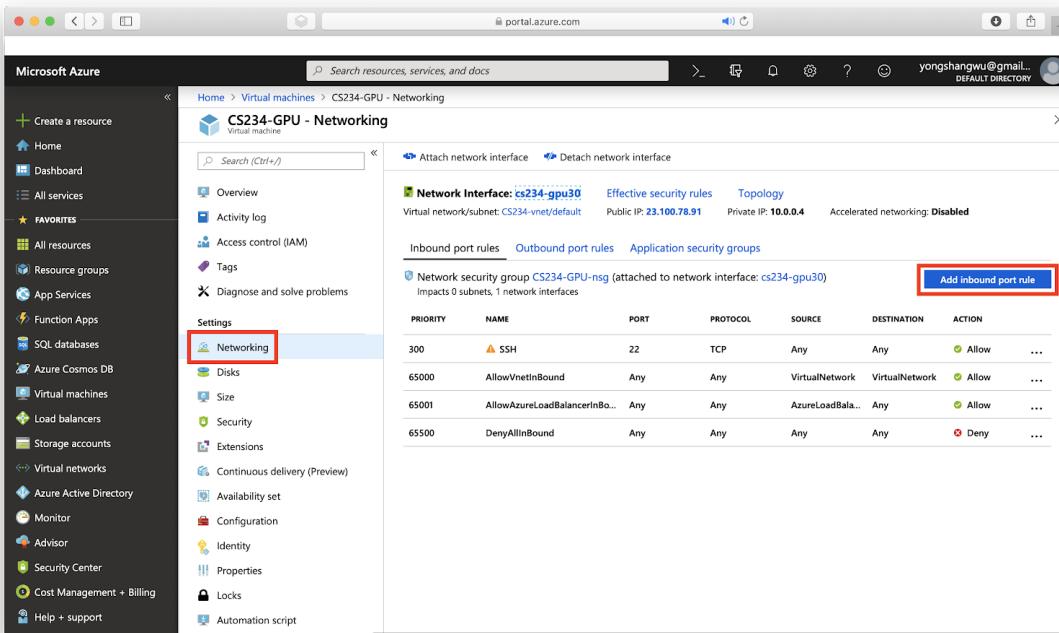
3. Configure and Use the VM

(1) Click “Virtual machines” in the side menu to see your VMs. Click the VM you just created:



The screenshot shows the Microsoft Azure portal interface. The left sidebar has a 'Virtual machines' icon highlighted with a red box. The main content area shows a table of virtual machines. One row for 'CS234-GPU' is selected and highlighted with a red box. The table columns include NAME, TYPE, STATUS, RESOURCE GROUP, LOCATION, MAINTENANCE S..., and SUBSCRIPTION. The 'NAME' column shows 'CS234-GPU', 'TYPE' shows 'Virtual machine', 'STATUS' shows 'Running', 'RESOURCE GROUP' shows 'CS234', 'LOCATION' shows 'North Central US', and 'SUBSCRIPTION' shows 'Microsoft Azure S...'. There are also 'Add', 'Reservations', 'Edit columns', 'Refresh', 'Assign tags', 'Start', 'Restart', 'Stop', 'Delete', and 'Services' buttons at the top of the table.

(2) Click “Networking” under “Settings”, then “Add inbound port rules”



The screenshot shows the Microsoft Azure portal interface. The left sidebar has a 'Networking' icon highlighted with a red box. The main content area shows the 'Networking' settings for the 'CS234-GPU' VM. At the top, it shows 'Network Interface: cs234-gpu30' with 'Effective security rules' and 'Topology' sections. Below that is an 'Inbound port rules' table. The table has columns: PRIORITY, NAME, PORT, PROTOCOL, SOURCE, DESTINATION, and ACTION. It lists several rules: 'SSH' (Priority 300), 'AllowVnetInBound' (Priority 65000), 'AllowAzureLoadBalancerInBo...' (Priority 65001), and 'DenyAllInBound' (Priority 65500). A new rule is being added, indicated by the 'Add inbound port rule' button in the top right of the table area, which is also highlighted with a red box.

Add an inbound port rule with “Destination port range” set to **6006** (the default tensorboard port, you can change this to other port but remember to specify “--port” option when running the tensorboard command) and “Name” to “tensorboard”(or anything you want):

The screenshot shows the Microsoft Azure portal interface. On the left, there's a sidebar with various service icons. The main area is titled 'CS234-GPU - Networking' under 'Virtual machines'. A sub-menu for 'Networking' is open. On the right, a modal window titled 'Add inbound security rule' is displayed. Inside, there are fields for 'Source' (set to 'Any'), 'Source port ranges' (empty), 'Destination' (set to 'Any'), and 'Destination port ranges' (highlighted with a red box and containing '6006'). Other settings like 'Protocol' (TCP selected), 'Action' (Allow selected), and 'Priority' (310) are also visible. The 'Name' field (highlighted with a red box) is set to 'tensorboard'.

Make sure you have the following 2 networking rules (port 22 for SSH and 6006 for tensorboard):

The screenshot shows the Microsoft Azure portal interface. The left sidebar has the 'Networking' icon selected. The main area shows the 'Inbound port rules' section for the 'cs234-gpu30' network interface. There are two rules listed: one for port 22 (SSH) and one for port 6006 (tensorboard). Both rules are highlighted with red boxes. The rule for port 22 has 'PORT' 22, 'PROTOCOL' TCP, 'SOURCE' Any, 'DESTINATION' Any, and 'ACTION' Allow. The rule for port 6006 has 'PORT' 6006, 'PROTOCOL' Any, 'SOURCE' Any, 'DESTINATION' Any, and 'ACTION' Allow. Other rules listed include AllowVnetInBound, AllowAzureLoadBalancerInBound, and DenyAllInBound.

As mentioned in part 2 of this tutorial, if you forgot to allow SSH port when creating the VM, you can add an inbound rule for port 22 here, following similar procedures for the tensorboard port.

(3) Finally, we can start using the VM! In the overview tab of the instance page, you can start/stop/delete the VM by clicking corresponding buttons. **Again, always remember to stop the VM instance if you are not using them.** Azure also offers [an auto-shutdown feature](#) which shuts down the VM at scheduled time. Try it out!

The screenshot shows the Microsoft Azure portal interface. On the left is a dark sidebar with a list of services: Create a resource, Home, Dashboard, All services, FAVORITES, All resources, Resource groups, App Services, Function Apps, SQL databases, Azure Cosmos DB, Virtual machines, Load balancers, Storage accounts, Virtual networks, Azure Active Directory, Monitor, Advisor, Security Center, Cost Management + Billing, Help + support, and Auto-shutdown. The main content area has a title 'Home > Virtual machines > CS234-GPU'. A red box highlights the top toolbar buttons: Connect, Start, Stop, Capture, Delete, and Refresh. To the right of the toolbar is a summary card for the VM 'CS234-GPU' with details: Resource group (change) CS234, Status Running, Location North Central US, Subscription (change) Microsoft Azure Sponsorship 2, Subscription ID 619ea91b-0d1d-470f-a669-39b3f78f6c4d, Computer name CS234-GPU, Operating system Linux, Size Standard NC6 (6 vcpus, 56 GB memory), Public IP address 23.100.78.91, Virtual network/subnet CS234-vnet/default, and DNS name Configure. Below the summary card is a section for Tags (change) with a link 'Click here to add tags'. At the bottom, there are two charts: 'CPU (average)' and 'Network (total)'. The CPU chart shows average usage from 2:45 AM to 3:30 AM. The Network chart shows total traffic from 2:45 AM to 3:30 AM, with a significant spike around 3:15 AM.

When the VM is running, you can click “Connect” to find the SSH command to connect:

The screenshot shows the Microsoft Azure portal interface. On the left, there's a sidebar with various service icons like Home, Dashboard, All services, App Services, Function Apps, SQL databases, Azure Cosmos DB, Virtual machines, Load balancers, Storage accounts, Virtual networks, Azure Active Directory, Monitor, Advisor, Security Center, Cost Management + Billing, and Help + support. The main area shows a virtual machine named "CS234-GPU". Below the VM name, there are tabs for Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Settings, Networking, Disks, Size, Security, Extensions, Continuous delivery (Preview), Availability set, Configuration, Identity, Properties, Locks, Automation script, and Operations. Under the "Operations" tab, there's a chart titled "CPU (average)" showing usage over time. To the right of the VM details, a "Connect to virtual machine" dialog is open. It has two tabs: "RDP" and "SSH", with "SSH" selected. The dialog includes instructions: "To connect to your virtual machine via SSH, select an IP address, optionally change the port number, and use one of the following commands:". It shows an "IP address" dropdown set to "Public IP address (23.100.78.91)", a "port number" input set to "22", and a "Login using VM local account" input field containing "ssh CS234@23.100.78.91". There's also a note about inbound traffic and networking rules.

Run that command in your terminal (or [PuTTY](#) if you are using Windows), you can log into the VM we just created and configured:

```
1. CS234@CS234-GPU: ~ (ssh)
→ /Users/yongshangwu> ssh CS234@23.100.78.91
The authenticity of host '23.100.78.91 (23.100.78.91)' can't be established.
ECDSA key fingerprint is SHA256:uSNFboyHigo0UDzhiuhSemvdlZG6qaqG3x0EhmX7s.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '23.100.78.91' (ECDSA) to the list of known hosts.
CS234@23.100.78.91's password:
Welcome to Ubuntu 16.04.5 LTS (GNU/Linux 4.15.0-1036-azure x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/advantage

Get cloud support with Ubuntu Advantage Cloud Guest:
http://www.ubuntu.com/business/services/cloud

0 packages can be updated.
0 updates are security updates.

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

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

CS234@CS234-GPU:~$
```

4. Install CUDA, Tensorflow & Other dependencies

(1) After logging into the VM, clone the setup repo we created for you:

```
git clone https://github.com/AndyYSWoo/Azure-GPU-Setup.git
```

(2) cd into the cloned repo:

```
cd Azure-GPU-Setup
```

(3) Add execution permission for the setup scripts:

```
chmod +x *.sh
```

(4) Run the first setup script:

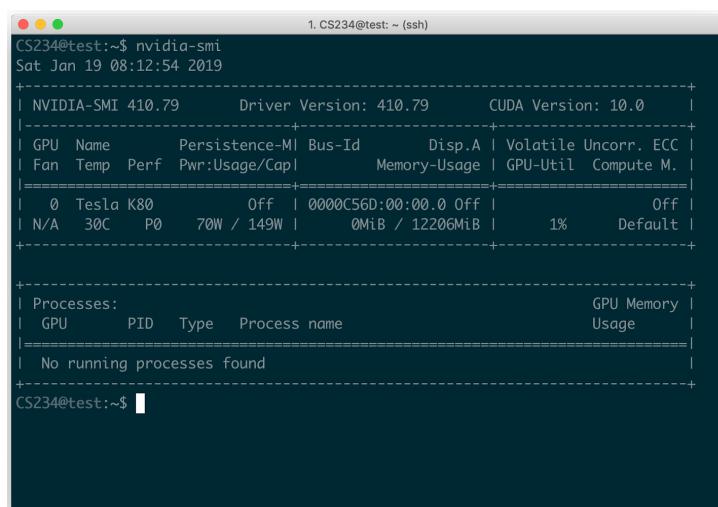
```
./gpu-setup-part1.sh
```

This script takes about **20~30 minutes** to run. Go take a well-deserved break :)

Upon completion, the VM will restart automatically. Refer to part 3.(3) of this tutorial for the command to **SSH into the VM again**. The command might **differ from last time** because the public IP address may (or may not) change after reboot.

(5) After re-logging into the VM, you can use the following command to show GPU information

```
nvidia-smi
```



The screenshot shows a terminal window titled "1. CS234@test: ~ (ssh)". The command "nvidia-smi" was run, displaying GPU information. The output includes:

```
CS234@test:~$ nvidia-smi
Sat Jan 19 08:12:54 2019
+-----+
| NVIDIA-SMI 410.79      Driver Version: 410.79      CUDA Version: 10.0 |
| GPU  Name     Persistence-MI Bus-Id     Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf  Pwr:Usage/Cap| Memory-Usage | GPU-Util  Compute M. |
|=====+=====+=====+=====+=====+=====+=====+=====
| 0  Tesla K80      Off  | 0000C56D:00:00.0 Off |          Off |
| N/A   30C    P0    70W / 149W |      0MiB / 12206MiB |     1%     Default |
+-----+
+-----+
| Processes:                               GPU Memory |
| GPU  PID  Type  Process name        Usage  |
| =====+=====+=====+=====
| No running processes found
+-----+
CS234@test:~$
```

(6)cd into the cloned repo again

```
cd Azure-GPU-Setup
```

(7) Run the second setup script:

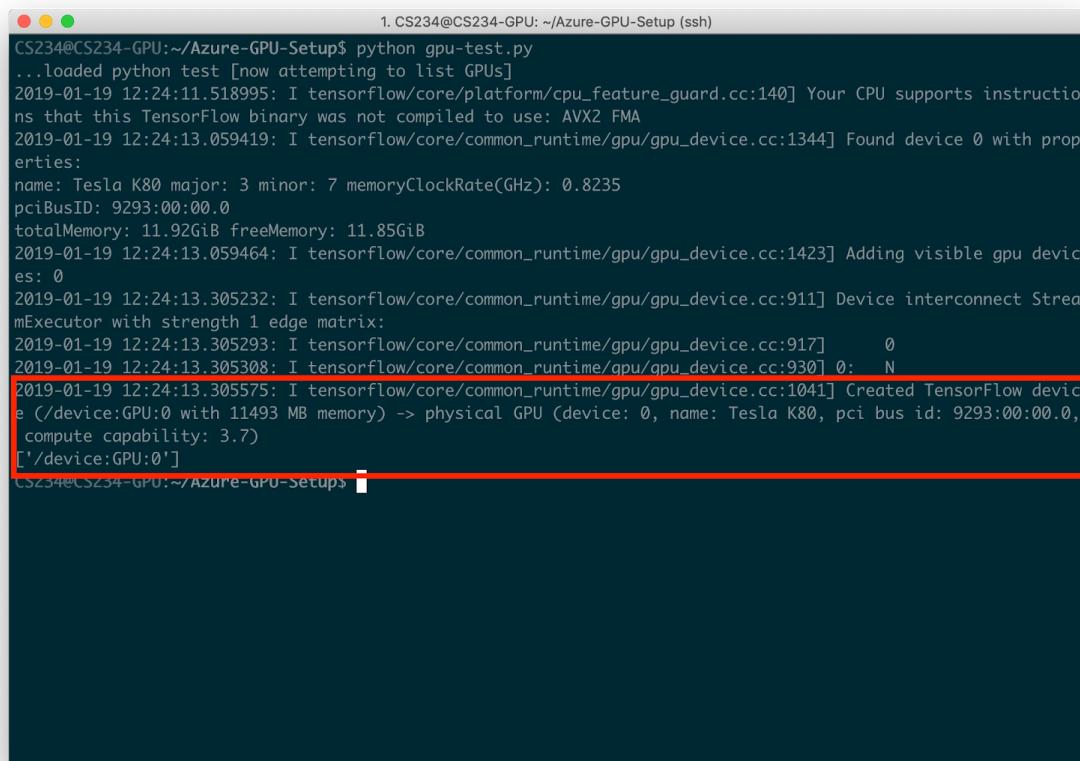
```
./gpu-setup-part2.sh
```

This script takes about **7~10 minutes** to run. Upon completion, you should see “Test passed!”, which means the cuDNN library has been installed successfully.

(8) Run the following command:

```
python gpu-test.py
```

You should see that tensorflow finds the GPU on your VM correctly:



```
1. CS234@CS234-GPU:~/Azure-GPU-Setup (ssh)
CS234@CS234-GPU:~/Azure-GPU-Setup$ python gpu-test.py
...loaded python test [now attempting to list GPUs]
2019-01-19 12:24:11.518995: I tensorflow/core/platform/cpu_feature_guard.cc:140] Your CPU supports instructions that this TensorFlow binary was not compiled to use: AVX2 FMA
2019-01-19 12:24:13.059464: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1344] Found device 0 with properties:
name: Tesla K80 major: 3 minor: 7 memoryClockRate(GHz): 0.8235
pciBusID: 9293:00:00.0
totalMemory: 11.92GiB freeMemory: 11.85GiB
2019-01-19 12:24:13.059464: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1423] Adding visible gpu devices: 0
2019-01-19 12:24:13.305232: I tensorflow/core/common_runtime/gpu/gpu_device.cc:911] Device interconnect StreamExecutor with strength 1 edge matrix:
2019-01-19 12:24:13.305293: I tensorflow/core/common_runtime/gpu/gpu_device.cc:917]      0
2019-01-19 12:24:13.305308: I tensorflow/core/common_runtime/gpu/gpu_device.cc:930] 0: N
2019-01-19 12:24:13.305575: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1041] Created TensorFlow device (/device:GPU:0 with 11493 MB memory) -> physical GPU (device: 0, name: Tesla K80, pci bus id: 9293:00:00.0, compute capability: 3.7)
['/device:GPU:0']
```

Congratulations!!! You have successfully set up the VM with a GPU.

Now burn that GPU up with your amazing models!

6. Transferring Files between VM and Local

To transfer files between the VM and your local machine, you may want to use [the SCP command](#). For example, the following command:

```
scp -r /local/path/to/starter_code user_name@public_ip:~/
```

copies your modified starter code folder to the home directory of your VM, `/local/path/to/starter_code` is the directory of your starter code in your local machine, `user_name` is the username you set when creating the VM in Part 2.(3) Step (6) of this tutorial, `public_ip` is the public IP address of your VM, where you can find at the instance overview page:

The screenshot shows the Microsoft Azure portal interface. On the left, there's a sidebar with various service icons. The main area is titled 'CS234-GPU' and shows the 'Overview' tab selected. Key details visible include:

- Resource group: CS234
- Status: Running
- Location: North Central US
- Subscription: Microsoft Azure Sponsorship 2
- Public IP address: 65.52.10.96 (highlighted with a red box)
- Virtual network/subnet: CS234-vnet/default
- DNS name: Configure

Below these details, there are four performance charts:

- CPU (average): Percentage CPU Avg (CS234-GPU) is 0.09%.
- Network (total): Network In (Sum) CS234-GPU is 8.93 MB and Network Out (Sum) CS234-GPU is 30.48 kB.
- Disk bytes (total): Disk bytes (total) chart.
- Disk operations/sec (average): Disk operations/sec (average) chart.

You can replace `~/` with any path on your VM to specify where you want to put the code.

7. Tensorboard

In assignment 2, you may want to use tensorboard to monitor the training of your models. After logging into the VM, cd in to experiment folder:

```
cd ~/starter_code/results/q5_train_atari_nature
```

Then turn on tensorboard using:

```
tensorboard --logdir=. --port=6006
```

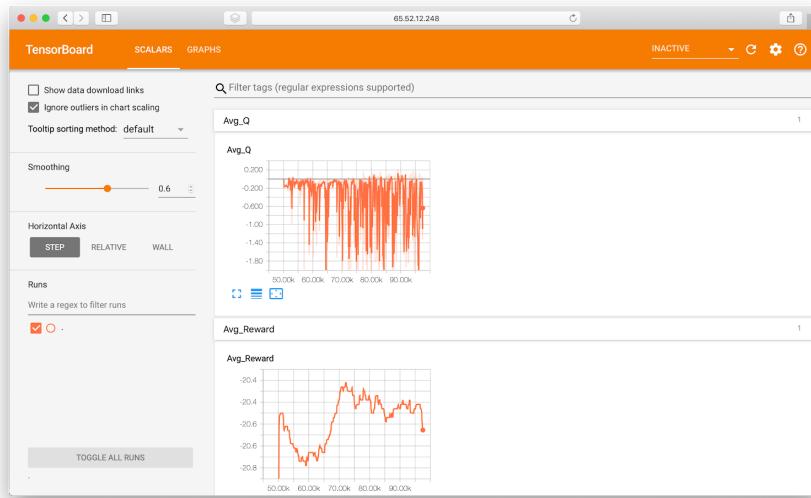
The `--port` option is optional, if you do not specify it, the default port will be 6006. Next, open your web browser and visit

http://public_ip:port

to view the tensorboard, where `public_ip` is the public IP address of your VM and `port` is the tensorboard port you specify when running tensorboard command (default 6006). For example, if your VM's public IP address is 65.52.12.248 and the default tensorboard port is used, visiting

<http://65.52.12.248:6006>

gives you the tensorboard page:



Note: If you choose a different port for tensorboard, say **5678**, remember to add a corresponding inbound port rule for your VM, by following steps in Part 3.(2). of this tutorial.

8. [Optional] Working under Virtual Environment

Sometimes you may want to work in an isolated environment. For example, you may want a separate environment for assignment 2 different from your project. [virtualenv](#) serves that need conveniently. To create an isolated environment for assignment 2, cd into the start code folder, then run the following commands:

```
virtualenv .env -p python3.6  
source .env/bin/activate  
pip install -r requirements.txt
```

Once finished working on it, run `deactivate` to exit the virtualenv.

9. FAQ

- Do not install updates using: `sudo apt-get install --upgrade`
This might break the CUDA driver installation if the kernel is updated. If you did so and the code fails to run with resulting dependencies, starting all over again with a new VM would be the fastest way out.
- What if I failed when running `gpu-setup-part1.sh` or `gpu-setup-part2.sh`?
Rerun the failed script again, and see if you can continue to next steps. If failed again, make a piazza post describing your problem with the error information output. Start your post title with [Azure].
- What if I run out of credits
\$70 should be more than enough to run the whole experiment for 4~5 times. Frequently monitor the tensorboard to detect misbehavior of your model early. Always remember to turn off your VM if not using them. If you still run out of credits, or need more to work on the extra credit, write an email to wuy@stanford.edu with [CS234 Azure] in the title. In the email, state how much you have spent, what you did with these credits and how much more you need.
- Problems connecting (SSH) to the VM
 - 0. Try `ping public_ip`
 - 1. Make sure port 22 is allowed in the networking inbound rules, see Part 3.(2).
 - 2. Restart the VM and make sure you are connecting to the correct public IP address.

Again, make sure your VM instances are STOPPED while not used.
