

Setting up the CNN labs

Joining the lab and starting the machines

Mail - David Abramian - Outlook x +

outlook.office.com/mail/inbox/id/AAQkADU1MjFmYzkyLTliMDUtNDRlZi1iYWQyLTfkNDliNmJlZWE1MQAQADnrxCl545JgYDR0HTUWq4%3D

Linköping University Outlook Search

New message Delete Archive Junk Sweep Move to Categorize Snooze

Favorites Sent Items Drafts Yammer 108 Inbox 1 Add favorite Folders

Inbox 1 Drafts Sent Items Deleted Items 43 Junk Email 69 Archive Conversation Hist... Notes

Register for Lab - Machine learning for industry

Microsoft Azure <azure-noreply@microsoft.com>
Mon 2019-11-25 6:53 PM
David Abramian

Microsoft Azure

David Abramian invited you to the lab:
Machine learning for industry

Register now to access the virtual machines in the lab.

[Register for the lab >](#)

f t y in
[Privacy Statement](#)
Microsoft Corporation, One Microsoft Way, Redmond, WA 98052
Microsoft

Press to
access your
virtual
machine.

Mail - David Abramian - Outlook x My virtual machines - Azure Lab Services x +

labs.azure.com/virtualmachines

Azure Lab Services

My virtual machines

<p>Machine learning for industry</p> <p>0.5 / 10 hour(s) used</p> <p><input type="checkbox"/> Stopped</p>	<p>SmallGPU_Compute</p> <p>1.1 / 10 hour(s) used</p> <p><input type="checkbox"/> Stopped</p>	<p>TBMI02 - Segmentation assi...</p> <p>0.5 / 10 hour(s) used</p> <p><input type="checkbox"/> Stopped</p>
---	--	---

Start the virtual machine.


Mail - David Abramian - Outlook x My virtual machines - Azure Lab Services x +

labs.azure.com/virtualmachines



Azure Lab Services

My virtual machines


Machine learning for industry





0.5 / 10 hour(s) used

☐ Stopped  


SmallGPU_Compute





1.1 / 10 hour(s) used

☐ Stopped  

TBMI02 - Segmentation assi...



0.5 / 10 hour(s) used

☒ Starting...  










It may take a few minutes.

Mail - David Abramian - Outlook x My virtual machines - Azure Labs x +

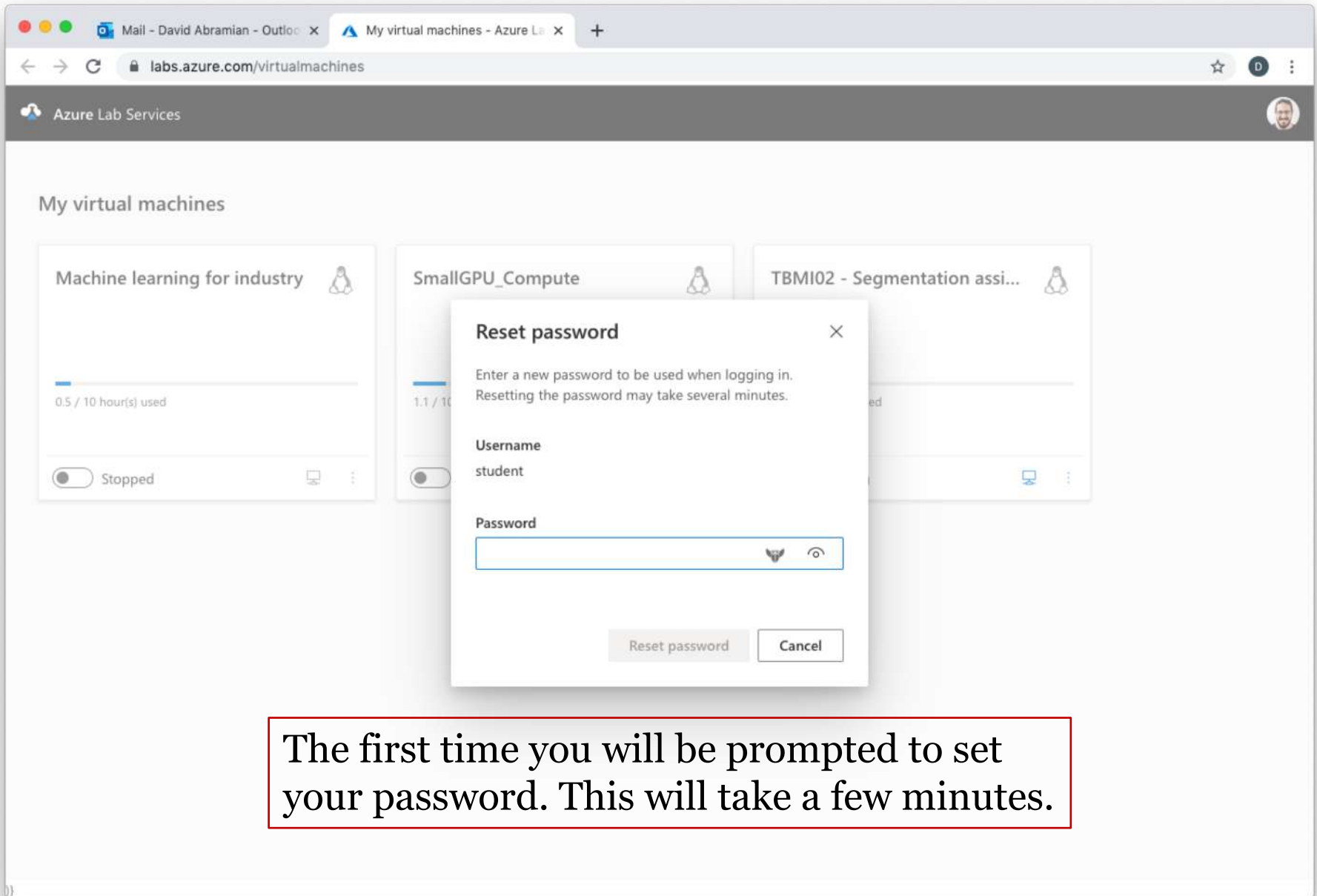
labs.azure.com/virtualmachines

Azure Lab Services

My virtual machines

Machine learning for industry	SmallGPU_Compute	TBMI02 - Segmentation assi...
		
<div><div></div></div> <div>0.5 / 10 hour(s) used</div>	<div><div></div></div> <div>1.1 / 10 hour(s) used</div>	<div><div></div></div> <div>0.5 / 10 hour(s) used</div>
<div><div></div> Stopped</div> <div> </div>	<div><div></div> Stopped</div> <div> </div>	<div><div></div> Running</div> <div> </div>

Once it's running, press to get your login command.



The first time you will be prompted to set your password. This will take a few minutes.

The screenshot shows the 'My virtual machines' page in the Azure Lab Services portal. The page lists three virtual machines: 'Machine learning for industry', 'SmallGPU_Compute', and 'TBMI02 - Segmentation assi...'. A modal dialog titled 'Connect to your virtual machine' is open, providing an SSH command to connect to the 'SmallGPU_Compute' machine. The command is: `ssh -p 64137 student@ml-lab-b58bbb33-1e4a-42bc-8b01-92d3a282fb00.westeurope.cloudapp.azure.com`. The dialog also includes a 'Copy' button and a 'Done' button.

My virtual machines

Machine learning for industry

0.5 / 10 hour(s) used

Stopped

SmallGPU_Compute

TBMI02 - Segmentation assi...

Connect to your virtual machine

To connect to your Linux virtual machine using SSH, use the following command:

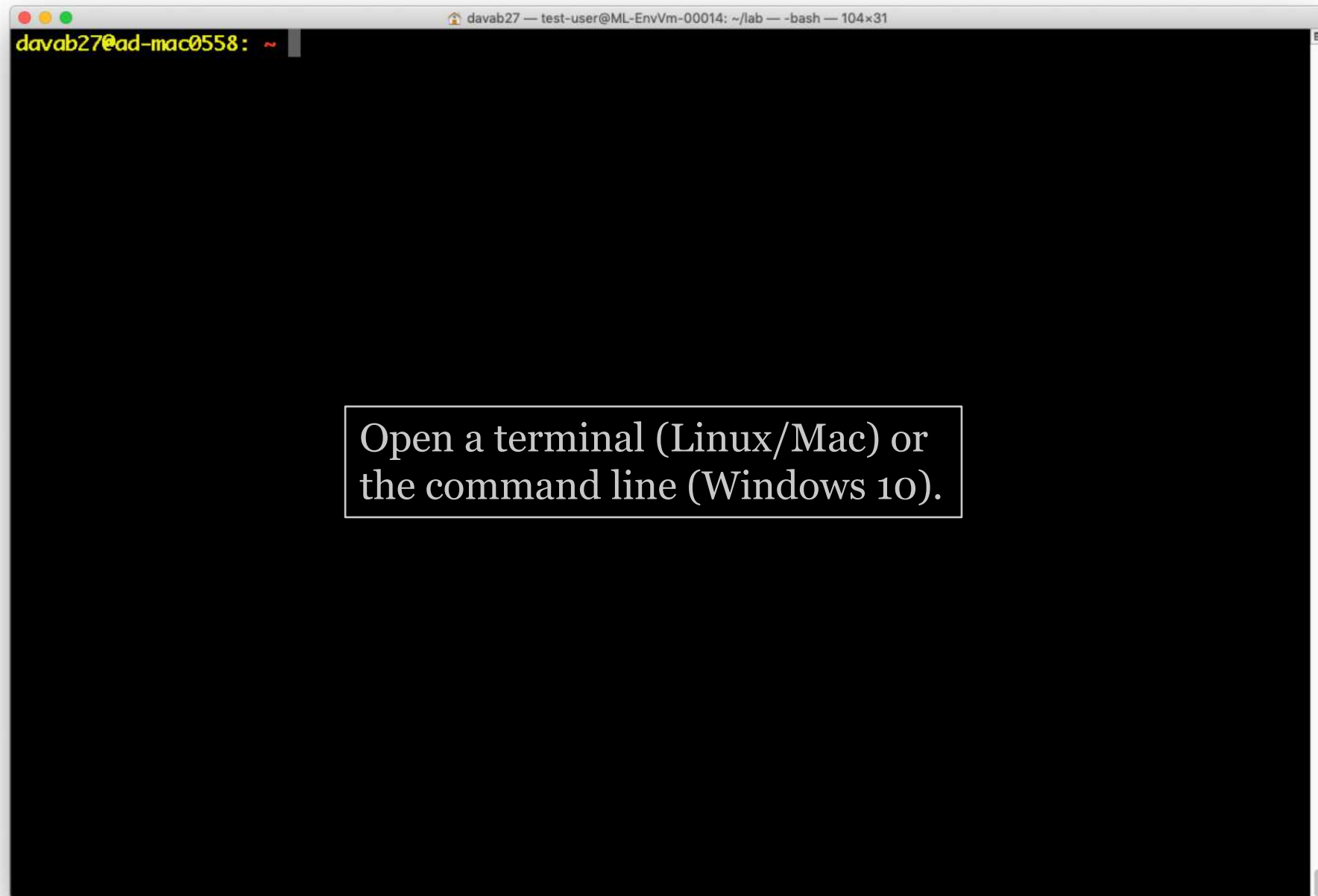
```
ssh -p 64137 student@ml-lab-b58bbb33-1e4a-42bc-8b01-92d3a282fb00.westeurope.cloudapp.azure.com
```

Copy

Done

This is the login command. Note the port number (here 64137) and the address (everything after).

Logging in with Linux/Mac/Windows 10



```
davab27 — bash — 104x31  
davab27@ad-mac0558: ~ ssh -p 60264 -L localhost:1234:localhost:8888 test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com
```

Input the SSH command provided in the lab page. Note the additional code to set up a tunnel! This is essential.

```
davab27 — ssh -p 60264 -L localhost:1234:localhost:8888 test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com — 104x31
davab27@ad-mac0558: ~ ssh -p 60264 -L localhost:1234:localhost:8888 test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com
The authenticity of host '[ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com]:60264 ([40.74.8.162]:60264)' can't be established.
ECDSA key fingerprint is SHA256:kg0bTKKumND0KbkSZV3h4RtsgY0kCbFURkkW20s8EMg.
Are you sure you want to continue connecting (yes/no)? yes
```

You will get a warning about
accessing an unknown host. Say yes.

```
davab27 — ssh -p 60264 -L localhost:1234:localhost:8888 test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com — 104x31
davab27@ad-mac0558: ~ ssh -p 60264 -L localhost:1234:localhost:8888 test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com
The authenticity of host '[ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com]:60264 ([40.74.8.162]):60264)' can't be established.
ECDSA key fingerprint is SHA256:kg0bTKKumND0KbkSZV3h4RtsgY0kCbFURkkW20s8EMg.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '[ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com]:60264,[40.74.8.162]:60264' (ECDSA) to the list of known hosts.
test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com's password: ?
```

You will be prompted for your password. Note that your input will not be printed.

```
davab27 — test-user@ML-EnvVm-00014: ~ — ssh -p 60264 -L localhost:1234:localhost:8888 test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com — 10...
davab27@ad-mac0558: ~ ssh -p 60264 -L localhost:1234:localhost:8888 test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com
The authenticity of host '[ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com]:60264 ([40.74.8.162]):60264)' can't be established.
ECDSA key fingerprint is SHA256:kg0bTKKumND0KbkSZV3h4RtsgY0kCbFURkkW20s8EMg.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '[ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com]:60264,[40.74.8.162]:60264' (ECDSA) to the list of known hosts.
test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com's password:
Welcome to Ubuntu 16.04.6 LTS (GNU/Linux 4.15.0-1055-azure x86_64)

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

New release '18.04.3 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

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

Last login: Tue Dec  3 15:51:06 2019 from 130.236.70.83
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

test-user@ML-EnvVm-00014: ~$
```

You should now be logged in.

Logging in with Windows 7



Download PuTTY

PuTTY is an SSH and telnet client, developed originally by Simon Tatham for the Windows platform. PuTTY is open source software that is available with source code and is developed and supported by a group of volunteers.

You can download PuTTY [here](#).

You will need the PuTTY SSH client.

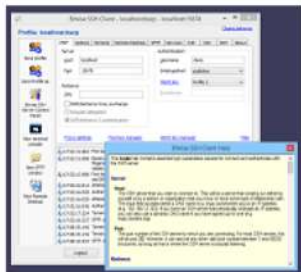
Below suggestions are independent of the authors of PuTTY. They are *not* to be seen as endorsements by the PuTTY project.

Bitvise SSH Client

Bitvise SSH Client is an SSH and SFTP client for Windows. It is developed and supported professionally by Bitvise. The SSH Client is robust, easy to install, easy to use, and supports all features supported by PuTTY, as well as the following:

- graphical SFTP file transfer;
- single-click Remote Desktop tunneling;
- auto-reconnecting capability;
- dynamic port forwarding through an integrated proxy;
- an FTP-to-SFTP protocol bridge.

Bitvise SSH Client is **free to use**. You can [download it here](#).



.tar.gz: [putty-0.73.tar.gz](#) (or by FTP) (signature)

Alternative binary files

The installer packages above will provide versions of all of these (except PuTTYtel), but you can download standalone binaries one by one if you prefer.

(Not sure whether you want the 32-bit or the 64-bit version? Read the [FAQ entry](#).)

putty.exe (the SSH and Telnet client itself)

32-bit: [putty.exe](#) (or by FTP) (signature)

64-bit: [putty.exe](#) (or by FTP) (signature)

pscp.exe (an SCP client, i.e. command-line secure file copy)

32-bit: [pscp.exe](#) (or by FTP) (signature)

64-bit: [pscp.exe](#) (or by FTP) (signature)

psftp.exe (an SFTP client, i.e. general file transfer sessions much like FTP)

32-bit: [psftp.exe](#) (or by FTP) (signature)

64-bit: [psftp.exe](#) (or by FTP) (signature)

puttytel.exe (a Telnet-only client)

32-bit: [puttytel.exe](#) (or by FTP) (signature)

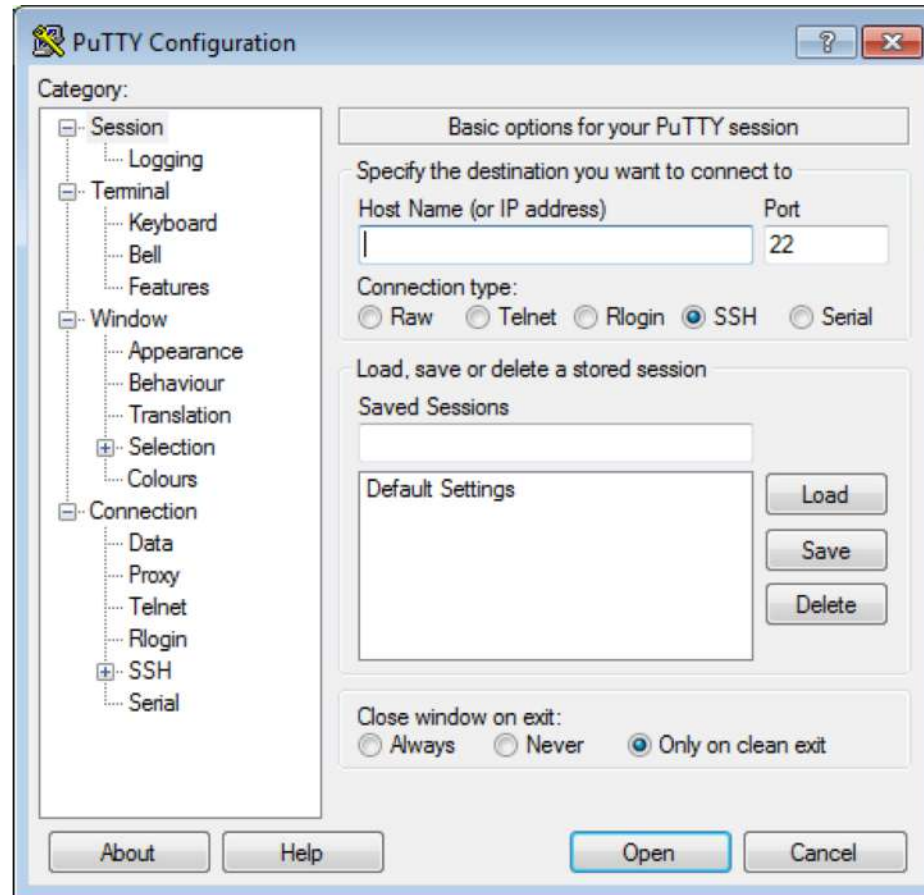
64-bit: [puttytel.exe](#) (or by FTP) (signature)

plink.exe (a command-line interface to the PuTTY back ends)

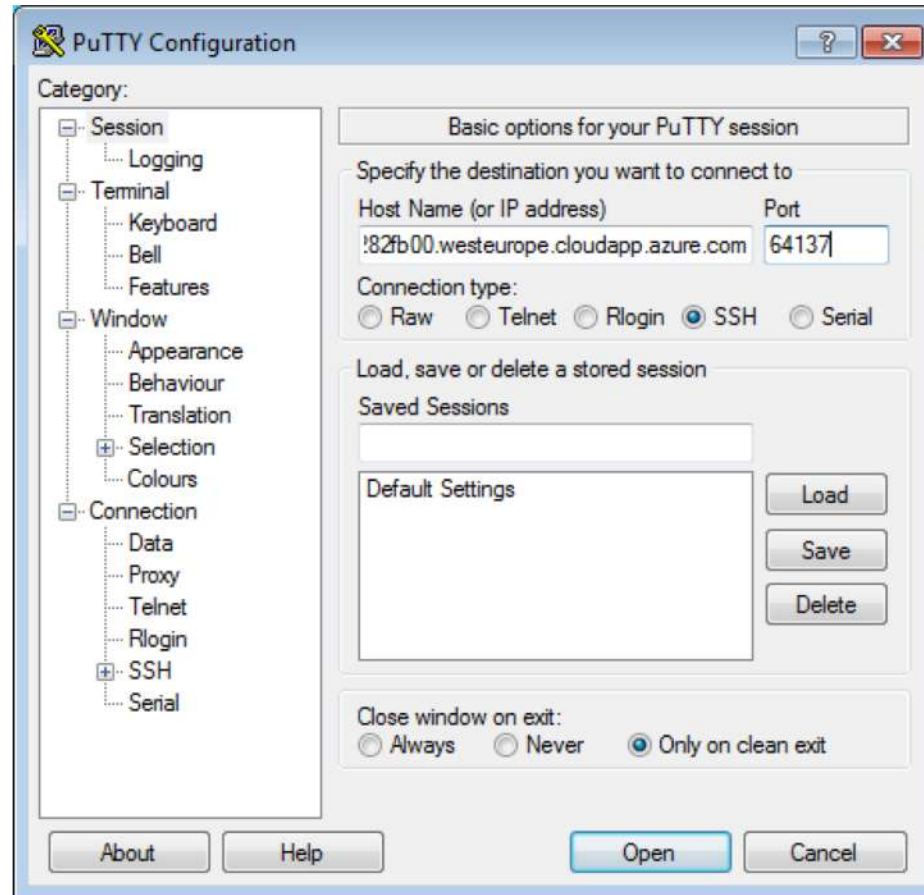
32-bit: [plink.exe](#) (or by FTP) (signature)

64-bit: [plink.exe](#) (or by FTP) (signature)

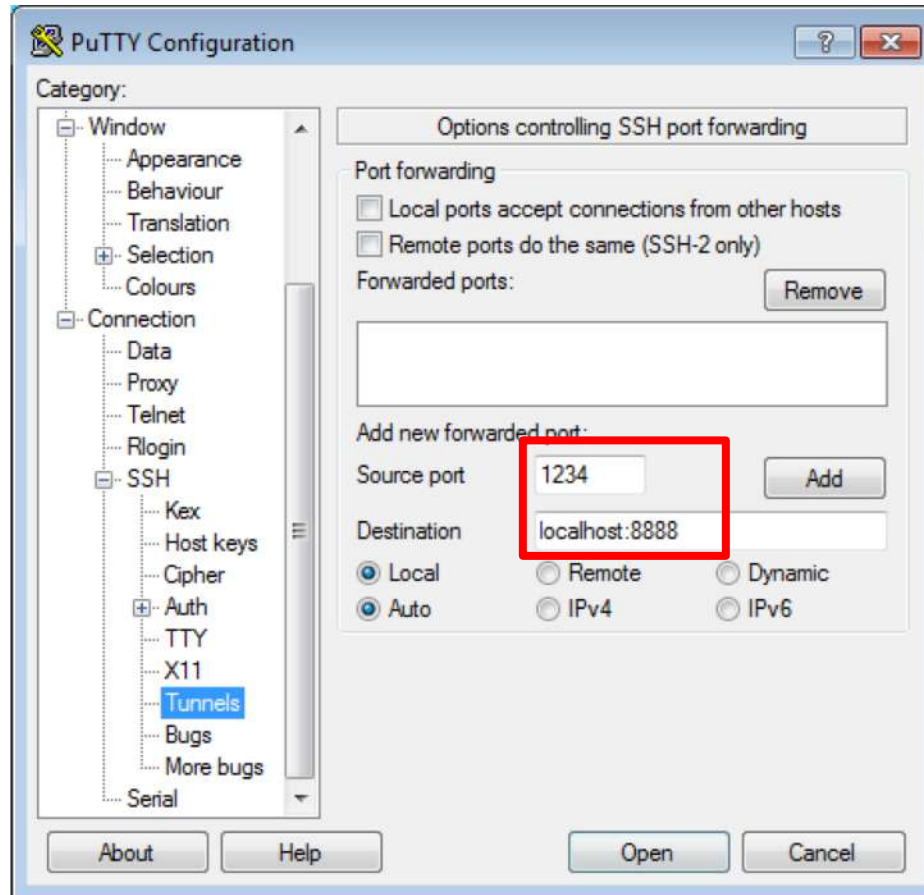
Download this executable.
It doesn't require any setup.



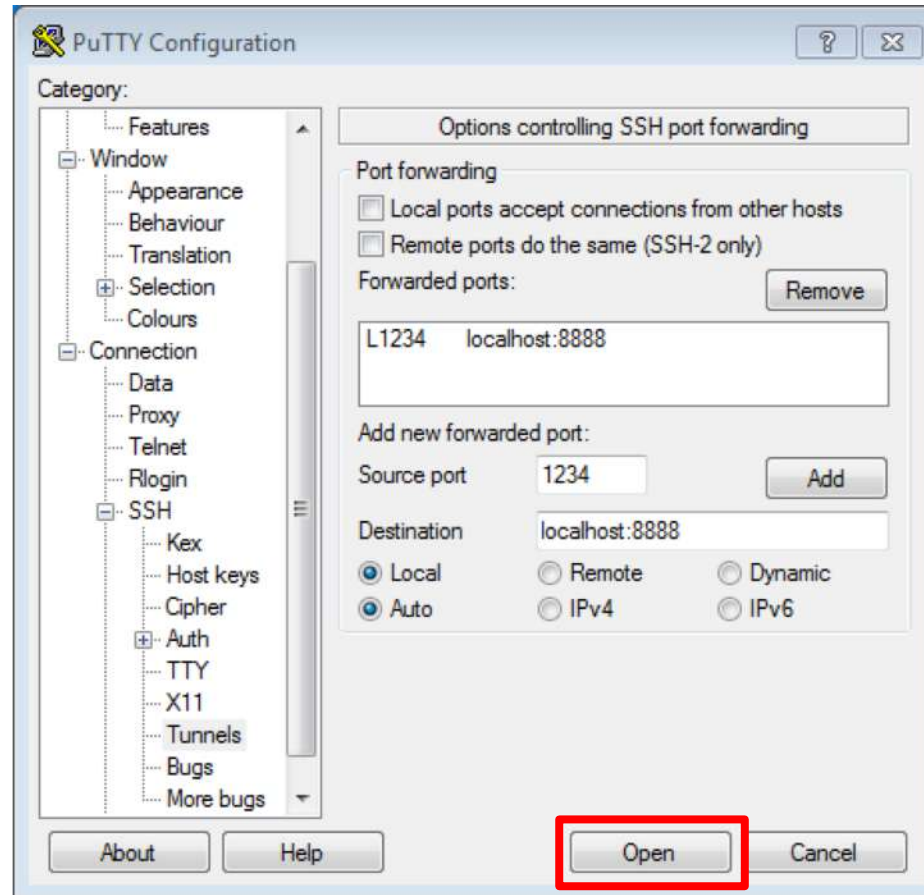
Launch putty.exe.



Input the address
and port from earlier.



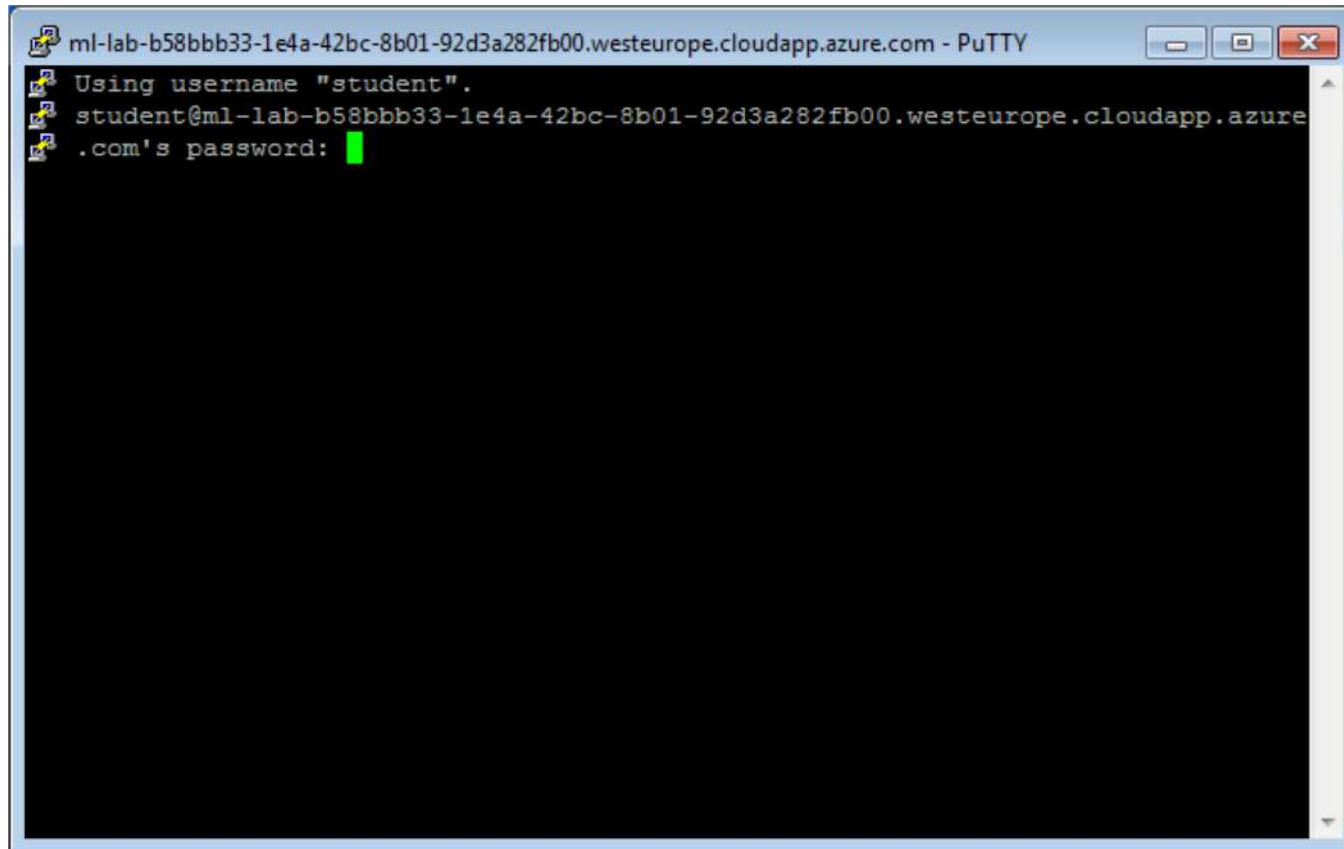
Setup the tunnel
and press Add.



Press Open.



You will get a warning about accessing an unknown host. Say yes.



The image shows a PuTTY terminal window with a blue title bar. The title bar text is "ml-lab-b58bbb33-1e4a-42bc-8b01-92d3a282fb00.westeurope.cloudapp.azure.com - PuTTY". The terminal area has a black background with white text. The text displayed is: "Using username 'student'.", "student@ml-lab-b58bbb33-1e4a-42bc-8b01-92d3a282fb00.westeurope.cloudapp.azure", and ".com's password: " followed by a green cursor block. The window has standard minimize, maximize, and close buttons on the right side of the title bar.

```
ml-lab-b58bbb33-1e4a-42bc-8b01-92d3a282fb00.westeurope.cloudapp.azure.com - PuTTY
Using username "student".
student@ml-lab-b58bbb33-1e4a-42bc-8b01-92d3a282fb00.westeurope.cloudapp.azure
.com's password: 
```

You will be prompted for your password. Note that your input will not be printed.

```
student@ML-EnvVm-00000: ~  
  
* Overheard at KubeCon: "microk8s.status just blew my mind".  
  
    https://microk8s.io/docs/commands#microk8s.status  
  
0 packages can be updated.  
0 updates are security updates.  
  
New release '18.04.3 LTS' available.  
Run 'do-release-upgrade' to upgrade to it.  
  
*****  
* Welcome to the Linux Data Science Virtual Machine on Azure!      *  
*                                                                    *  
* For more information on available tools and features,           *  
* visit http://aka.ms/dsvm/discover.                             *  
*****  
  
Last login: Tue Dec  3 13:08:49 2019 from 130.236.70.83  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
  
student@ML-EnvVm-00000:~$
```

You should now be logged in.

Setting up the environment

dayab27 — test-user@ML-EnvVm-00014: ~ — ssh -p 60264 -L localhost:1234:localhost:8888 test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com — 10...
test-user@ML-EnvVm-00014:~\$ mkdir lab && cd lab

Create a folder for all the lab files and move into it.

```
davab27 — student@ML-EnvVm-00000: ~/lab — ssh -p 64137 -L localhost:1234:localhost:8888 student@ml-lab-b58bbb33-1e4a-42bc-8b01-92d3a282fb00.westeurope.cloudapp.azure.com — 10...
student@ML-EnvVm-00000:~/lab$ wget -O seg_lab.zip https://tiny.cc/vxt7gz
```

Download the lab files. The option -O uses the letter O, not a zero.

```
davab27 — student@ML-EnvVm-00000: ~/lab — ssh -p 64137 -L localhost:1234:localhost:8888 student@ml-lab-b58bbb33-1e4a-42bc-8b01-92d3a282fb00.westeurope.cloudapp.azure.com — 10...
student@ML-EnvVm-00000:~/lab$ wget -O seg_lab.zip https://tiny.cc/vxt7gz
--2019-12-03 20:13:22-- https://tiny.cc/vxt7gz
Resolving tiny.cc... 192.241.240.89
Connecting to tiny.cc[192.241.240.89]:443... connected.
HTTP request sent, awaiting response... 303 See other
Location: https://lionline-my.sharepoint.com/:u:/g/personal/davab27_liu_se/ESibIRhFBoZFt07YBsvwt9QBldQfyFC_py9Q8SpF3hRQmA?download=1 [following]
--2019-12-03 20:13:22-- https://lionline-my.sharepoint.com/:u:/g/personal/davab27_liu_se/ESibIRhFBoZFt07YBsvwt9QBldQfyFC_py9Q8SpF3hRQmA?download=1
Resolving lionline-my.sharepoint.com... 40.108.160.43
Connecting to lionline-my.sharepoint.com[40.108.160.43]:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: /personal/davab27_liu_se/Documents/seg_lab.zip?&originalPath=aHR0cHM6Ly9saXVvbmxpbmUtXkuc2hhcmVwb2ludC5jb20v0nU6L2cvcGVyc29uYWwvZGF2YWlyN19saXVfc2UvRVNpYk1SaEZCb1pGdDA3WUJzdnd0OVFCbERRZnlgQ19weTlROFNwRjNoU1FtQT9ydGltZT1EVTZVUHkxNDEwZWw [following]
--2019-12-03 20:13:23-- https://lionline-my.sharepoint.com/personal/davab27_liu_se/Documents/seg_lab.zip?&originalPath=aHR0cHM6Ly9saXVvbmxpbmUtXkuc2hhcmVwb2ludC5jb20v0nU6L2cvcGVyc29uYWwvZGF2YWlyN19saXVfc2UvRVNpYk1SaEZCb1pGdDA3WUJzdnd0OVFCbERRZnlgQ19weTlROFNwRjNoU1FtQT9ydGltZT1EVTZVUHkxNDEwZWw
Reusing existing connection to lionline-my.sharepoint.com:443.
HTTP request sent, awaiting response... 200 OK
Length: 27292866 (26M) [application/x-zip-compressed]
Saving to: 'seg_lab.zip'

seg_lab.zip          100%[=====>]  26.03M  80.9MB/s   in 0.3s

2019-12-03 20:13:23 (80.9 MB/s) - 'seg_lab.zip' saved [27292866/27292866]

student@ML-EnvVm-00000:~/lab$
```

```
davab27 — student@ML-EnvVm-00000: ~/lab — ssh -p 64137 -L localhost:1234:localhost:8888 student@ml-lab-b58bbb33-1e4a-42bc-8b01-92d3a282fb00.westeurope.cloudapp.azure.com — 10...
student@ML-EnvVm-00000:~/lab$ unzip seg_lab.zip
Archive:  seg_lab.zip
  creating: Data/
  creating: Data/Masks/
  inflating: Data/Masks/mask9.png
  inflating: Data/Masks/mask8.png
  extracting: Data/Masks/mask7.png
  extracting: Data/Masks/mask6.png
  inflating: Data/Masks/mask60.png
  extracting: Data/Masks/mask5.png
  inflating: Data/Masks/mask59.png
  inflating: Data/Masks/mask58.png
  inflating: Data/Masks/mask57.png
  inflating: Data/Masks/mask56.png
  extracting: Data/Masks/mask55.png
  inflating: Data/Masks/mask54.png
  inflating: Data/Masks/mask53.png
  extracting: Data/Masks/mask52.png
  inflating: Data/Masks/mask51.png
  inflating: Data/Masks/mask50.png
  inflating: Data/Masks/mask4.png
  inflating: Data/Masks/mask46.png
  inflating: Data/Masks/mask44.png
  inflating: Data/Masks/mask43.png
  inflating: Data/Masks/mask42.png
  inflating: Data/Masks/mask41.png
  inflating: Data/Masks/mask40.png
  inflating: Data/Masks/mask3.png
  extracting: Data/Masks/mask39.png
  inflating: Data/Masks/mask38.png
  inflating: Data/Masks/mask37.png
```

Extract the data.

dayab27 — student@ML-EnvVm-00000: ~/lab — ssh -p 64137 -L localhost:1234:localhost:8888 student@ml-lab-b58bbb33-1e4a-42bc-8b01-92d3a282fb00.westeurope.cloudapp.azure.com — 10...
student@ML-EnvVm-00000:~/lab\$ conda env create -f env.yml

Create an Anaconda environment for the lab. This will Python and all the required packages.

```

davab27 — student@ML-EnvVm-00000: ~/lab — ssh -p 64137 -L localhost:1234:localhost:8888 student@ml-lab-b58bbb33-1e4a-42bc-8b01-92d3a282fb00.westeurope.cloudapp.azure.com — 10...
student@ML-EnvVm-00000:~/lab$ conda env create -f env.yml
Collecting package metadata (repodata.json): done
Solving environment: done

Downloading and Extracting Packages
pygments-2.5.2          | 672 KB | ##### | 100%
ca-certificates-2019    | 132 KB | ##### | 100%
prompt_toolkit-3.0.2    | 234 KB | ##### | 100%
importlib_metadata-1    | 45 KB  | ##### | 100%
certifi-2019.11.28      | 156 KB | ##### | 100%
jupyter_console-5.2.    | 37 KB  | ##### | 100%
setuptools-42.0.2       | 653 KB | ##### | 100%
Preparing transaction: done
Verifying transaction: / channel 3: open failed: connect failed: Connection refused
channel 3: open failed: connect failed: Connection refused
done
Executing transaction: done
#
# To activate this environment, use
#
#     $ conda activate lab
#
# To deactivate an active environment, use
#
#     $ conda deactivate

student@ML-EnvVm-00000:~/lab$ █

```

It will take a while. You may see many more downloaded packages.

```
student@ML-EnvVm-00000: ~/lab$ conda activate lab  
(lab) student@ML-EnvVm-00000: ~/lab$
```

Start the Anaconda environment.
Note the change in the prompt.


```
davab27 — student@ML-EnvVm-00000: ~/lab — ssh -p 64137 -L localhost:1234:localhost:8888 student@ml-lab-b58bbb33-1e4a-42bc-8b01-92d3a282fb00.westeurope.cloudapp.azure.com — 10...
(lab) student@ML-EnvVm-00000:~/lab$ jupyter notebook --no-browser
[W 20:18:32.734 NotebookApp] Error loading server extension sparkmagic
Traceback (most recent call last):
  File "/data/anaconda/envs/lab/lib/python3.6/site-packages/notebook/notebookapp.py", line 1655, in
init_server_extensions
    mod = importlib.import_module(modulename)
  File "/data/anaconda/envs/lab/lib/python3.6/importlib/__init__.py", line 126, in import_module
    return _bootstrap._gcd_import(name[level:], package, level)
  File "<frozen importlib._bootstrap>", line 994, in _gcd_import
  File "<frozen importlib._bootstrap>", line 971, in _find_and_load
  File "<frozen importlib._bootstrap>", line 953, in _find_and_load_unlocked
ModuleNotFoundError: No module named 'sparkmagic'
[I 20:18:32.832 NotebookApp] Serving notebooks from local directory: /data/home/student/lab
[I 20:18:32.832 NotebookApp] The Jupyter Notebook is running at:
[I 20:18:32.832 NotebookApp] http://localhost:8888/?token=c97097091c55e55d623927116a65883e46dba02fb4bfb4
4a
[I 20:18:32.832 NotebookApp] or http://127.0.0.1:8888/?token=c97097091c55e55d623927116a65883e46dba02fb4
bfb4a
[I 20:18:32.832 NotebookApp] Use Control-C to stop this server and shut down all kernels (twice to skip
confirmation).
[C 20:18:32.848 NotebookApp]

To access the notebook, open this file in a browser:
  file:///data/home/student/.local/share/jupyter/runtime/nbserver-4721-open.html
Or copy and paste one of these URLs:
  http://localhost:8888/?token=c97097091c55e55d623927116a65883e46dba02fb4bfb4a
  or http://127.0.0.1:8888/?token=c97097091c55e55d623927116a65883e46dba02fb4bfb4a
```

Start a Jupyter server. This is the Python editor we will use. Note the highlighted token. Be careful not to try to copy it with Ctrl + C or you will stop the server (Cmd + C in Mac is fine). Highlighting it with PuTTY should copy it.



Password or token:

Token authentication is enabled

If no password has been configured, you need to open the notebook server with its login token in the URL, or paste it above. This requirement will be lifted if you [enable a password](#).

The command:

```
jupyter notebook list
```

will show you the URLs of running servers with their tokens, which you can copy and paste into your browser. For example:

```
Currently running servers:  
http://localhost:8888/?token=c8de56fa... :: /Users/you/notebooks
```

or you can paste just the token value into the password field on this page.

See [the documentation on how to enable a password](#) in place of token authentication, if you would like to avoid dealing with random tokens.

Cookies are required for authenticated access to notebooks.

Setup a Password

You can also setup a password by entering your token and a new password on the fields below:

Token

New Password

Input this address in your browser to connect to the Jupyter server. You will be prompted for the token. Input it and log in.

Mail - David Abramian - Outlook x My virtual machines - Azure Lab x Home Page - Select or create x +

localhost:1234/tree?

jupyter

Quit Logout

Files Running Clusters

Select items to perform actions on them.

Upload New ↻

<input type="checkbox"/>	0 ▾	📁 /	Name ▾	Last Modified	File size
<input type="checkbox"/>		📁 Data		14 days ago	
<input type="checkbox"/>		📄 SegLab_students.ipynb		4 hours ago	25 kB
<input type="checkbox"/>		📄 env.yml		in 30 minutes	124 B
<input type="checkbox"/>		📄 seg_lab.zip		28 minutes ago	27.3 MB
<input type="checkbox"/>		📄 u-net-architecture.png		7 hours ago	109 kB

This is the tree view of Jupyter. You can access the lab notebook from here.

lab_setup_com....pdf ^ lab_setup_com....pdf ^ pictures.zip ^ Show All x

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localhost:1234/notebooks/Lab3a.ipynb ☆ D

jupyter Lab3a (unsaved changes) Logout

File Edit View Insert Cell Kernel Widgets Help Not Trusted Python [default]

Image Classification Laboratory

Images used in this laboration are from CIFAR 10 (<https://en.wikipedia.org/wiki/CIFAR-10>). The CIFAR-10 dataset contains 60,000 32x32 color images in 10 different classes. The 10 different classes represent airplanes, cars, birds, cats, deer, dogs, frogs, horses, ships, and trucks. There are 6,000 images of each class. Your task is to make a classifier that can correctly classify each image into the correct class.

Let's start being sure that our script can see the graphics card that will be used. The graphics cards will perform all the time consuming convolutions in every training iteration.

```
In [ ]: import os
import warnings

# Ignore FutureWarning from numpy
warnings.simplefilter(action='ignore', category=FutureWarning)

import keras.backend as K
import tensorflow as tf

os.environ["CUDA_DEVICE_ORDER"]="PCI_BUS_ID";

# The GPU id to use, usually either "0" or "1";
os.environ["CUDA_VISIBLE_DEVICES"]="0";

# Allow growth of GPU memory (otherwise it will look like all the memory is being used, even if you only use 10 MB)
config = tf.ConfigProto()
config.gpu_options.allow_growth = True
K.tensorflow_backend.set_session(tf.Session(config=config))
```

Load data

Load the images and labels from keras.datasets

```
In [ ]: from keras.datasets import cifar10
```

Open the notebook and work on it. All computations will run on the remote machine. Some of the initial commands may take a while to run.

When you are done

```
davab27@ad-mac0558: ~ scp -r -P 60264 test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.c  
loudapp.azure.com:~/lab Downloads/finished_lab/
```

Use SCP in a new terminal in your local machine to retrieve the finished files. Note:

- the capital P for the port, unlike for SSH,
- the path to the remote files appears after the machine's address, separated by a colon,
- the path in your local machine where the files are left appears last.

If using Windows 7, use pscp with the same arguments. You will have to run it using the command line from the folder where you downloaded pscp.exe. Ask for help if you have issues.

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localhost:1234/tree?

jupyter

Quit Logout

Files Running Clusters

Select items to perform actions on them.

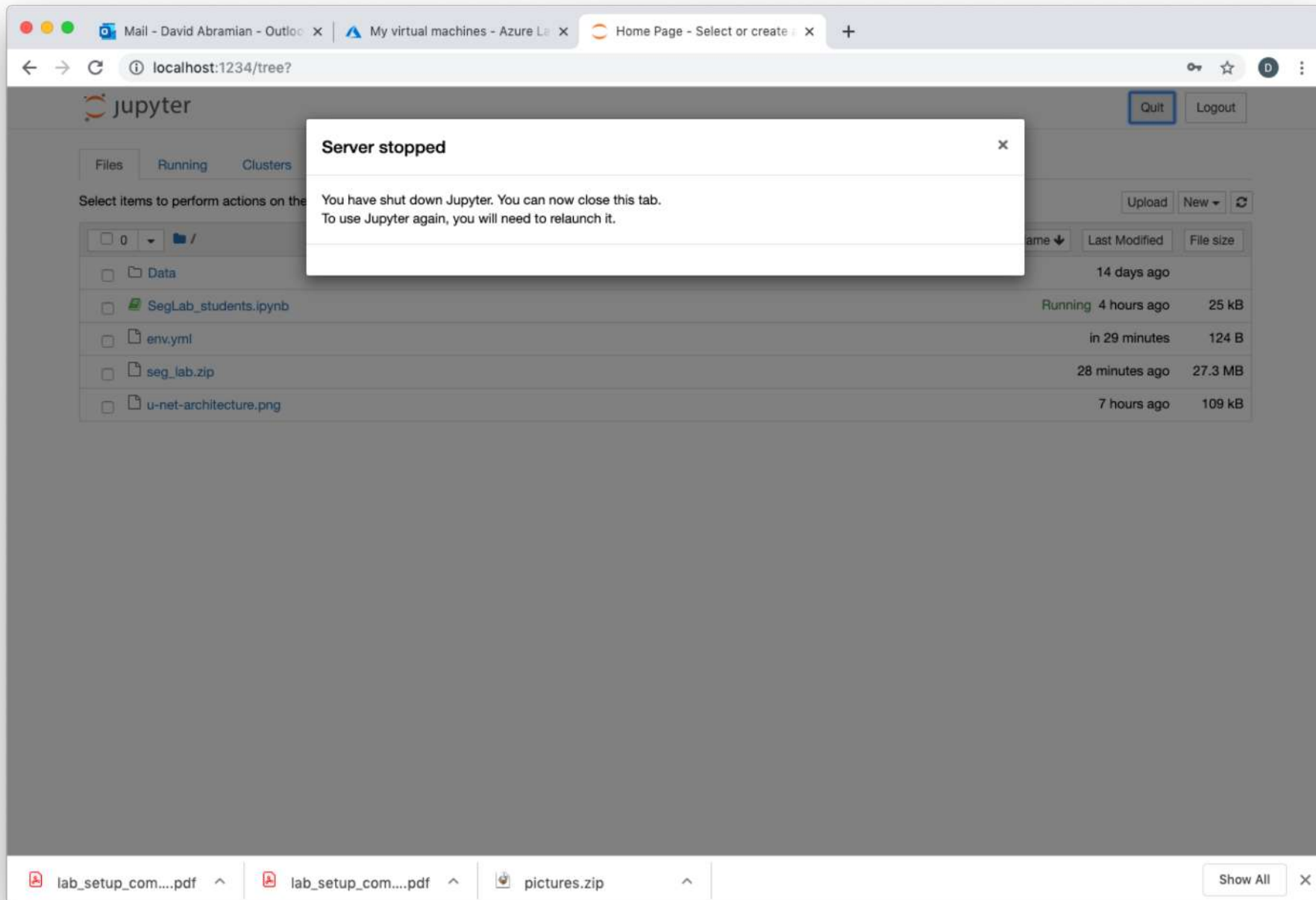
Upload New ↕

<input type="checkbox"/> 0 ▾	📁 /	Name ▾	Last Modified	File size
<input type="checkbox"/>	📁 Data		14 days ago	
<input type="checkbox"/>	📄 SegLab_students.ipynb		Running 4 hours ago	25 kB
<input type="checkbox"/>	📄 env.yml		in 30 minutes	124 B
<input type="checkbox"/>	📄 seg_lab.zip		28 minutes ago	27.3 MB
<input type="checkbox"/>	📄 u-net-architecture.png		7 hours ago	109 kB

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Show All x

Shut down the Jupyter server by pressing Quit.




```
davab27 — student@ML-EnvVm-00000: ~ — -bash — 104x31
(lab) student@ML-EnvVm-00000:~$ exit
logout
Connection to ml-lab-b58bbb33-1e4a-42bc-8b01-92d3a282fb00.westeurope.cloudapp. closed.
davab27@ad-mac0558: ~
```

Exit from the remote virtual machine (if you are using PuTTY this will close it).

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labs.azure.com/virtualmachines

Azure Lab Services

My virtual machines

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<div><div></div><div>1.7 / 10 hour(s) used</div></div>	<div><div></div><div>1.1 / 10 hour(s) used</div></div>	<div><div></div><div>2.3 / 10 hour(s) used</div></div>
<div><div>Stopped</div><div></div></div>	<div><div>Stopped</div><div></div></div>	<div><div>Stopping...</div><div></div></div>

Most importantly,
shut down the
virtual machine!
The time is used
as long as it is on.

lab_setup_com....pdf lab_setup_com....pdf pictures.zip Show All x