

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

lin.u LINKÖPINGS UNIVERSITET 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
- Updates 33

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 v i n

[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>0.7 / 10 hour(s) used</p> <p><input checked="" 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>2.1 / 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 x +

labs.azure.com/virtualmachines

Azure Lab Services

My virtual machines

Machine learning for industry	SmallGPU_Compute	TBMI02 - Segmentation assi...
		
<div><div></div></div> 0.7 / 10 hour(s) used	<div><div></div></div> 1.1 / 10 hour(s) used	<div><div></div></div> 2.1 / 10 hour(s) used
<div><div></div> Starting...</div> <div> </div>	<div><div></div> Stopped</div> <div> </div>	<div><div></div> Stopped</div> <div> </div>




It may take a few minutes.

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labs.azure.com/virtualmachines

Azure Lab Services

My virtual machines

<p>Machine learning for industry</p> <p>0.7 / 10 hour(s) used</p> <p>Running</p> <p></p>	<p>SmallGPU_Compute</p> <p>1.1 / 10 hour(s) used</p> <p>Stopped</p> <p></p>	<p>TBMI02 - Segmentation assi...</p> <p>2.1 / 10 hour(s) used</p> <p>Stopped</p> <p></p>
---	--	---

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

The screenshot shows a web browser window with the URL `labs.azure.com/virtualmachines`. The page title is "My virtual machines" and it displays a list of virtual machines. A modal dialog box titled "Reset password" is open in the foreground. The dialog contains the following text: "Enter a new password to be used when logging in. Resetting the password may take several minutes." Below this, there is a "Username" field with the value "test-user" and a "Password" field with a text input and a toggle icon. At the bottom of the dialog are two buttons: "Reset password" and "Cancel".

My virtual machines

Machine learning for industry

0.7 / 10 hour(s) used

Running

SmallGPU_Compute

1.1 / 10

TBMI02 - Segmentation assi...

Reset password

Enter a new password to be used when logging in. Resetting the password may take several minutes.

Username

test-user

Password

Reset password Cancel

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

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

labs.azure.com/virtualmachines

Azure Lab Services

My virtual machines

Machine learning for industry

0.7 / 10 hour(s) used

Running

SmallGPU_Compute

1.1

TBMI02 - Segmentation assi...

Connect to your virtual machine

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

```
ssh -p 60264 test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com
```

Copy

Done

This is the login command. Note the port number (here 60264) and the address (everything after).

Logging in with Linux/Mac/Windows 10

davab27@ad-mac0558: ~

Open a terminal (Linux/Mac) or
the command line (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.

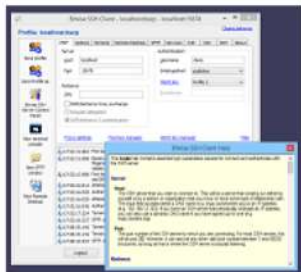
Below suggestions are independent of the authors of PuTTY. They are *not* to be seen as endorsements by the PuTTY project.

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)

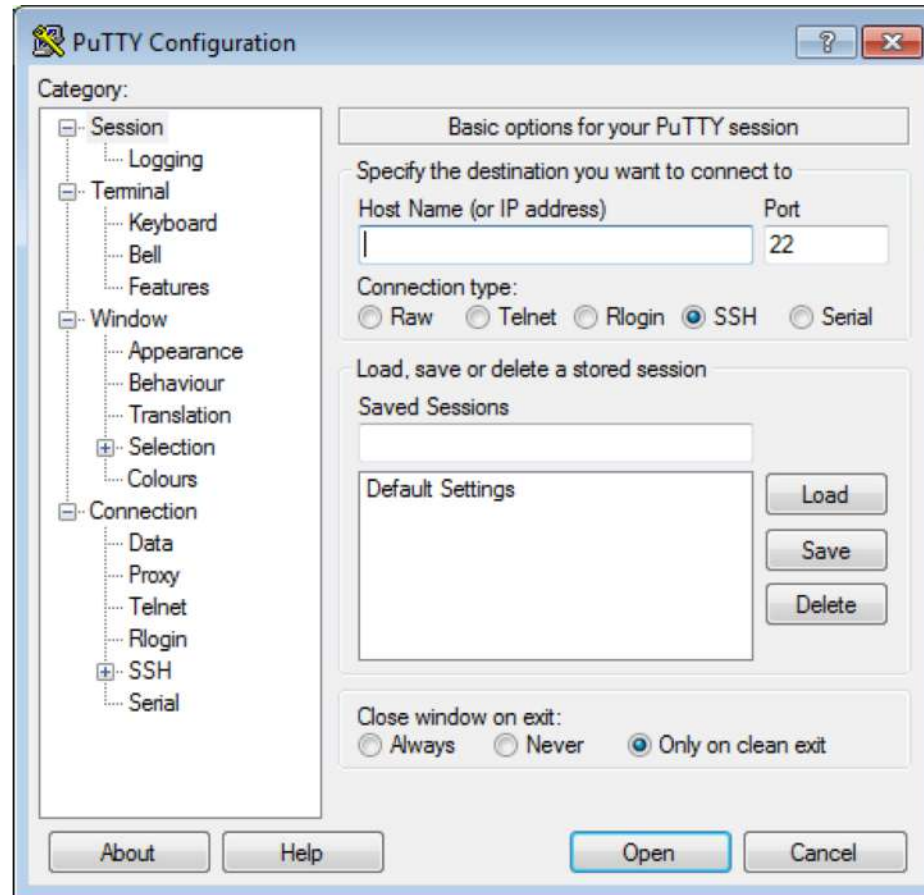
64-bit: [puttytel.exe](#) (or by FTP) (signature)

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

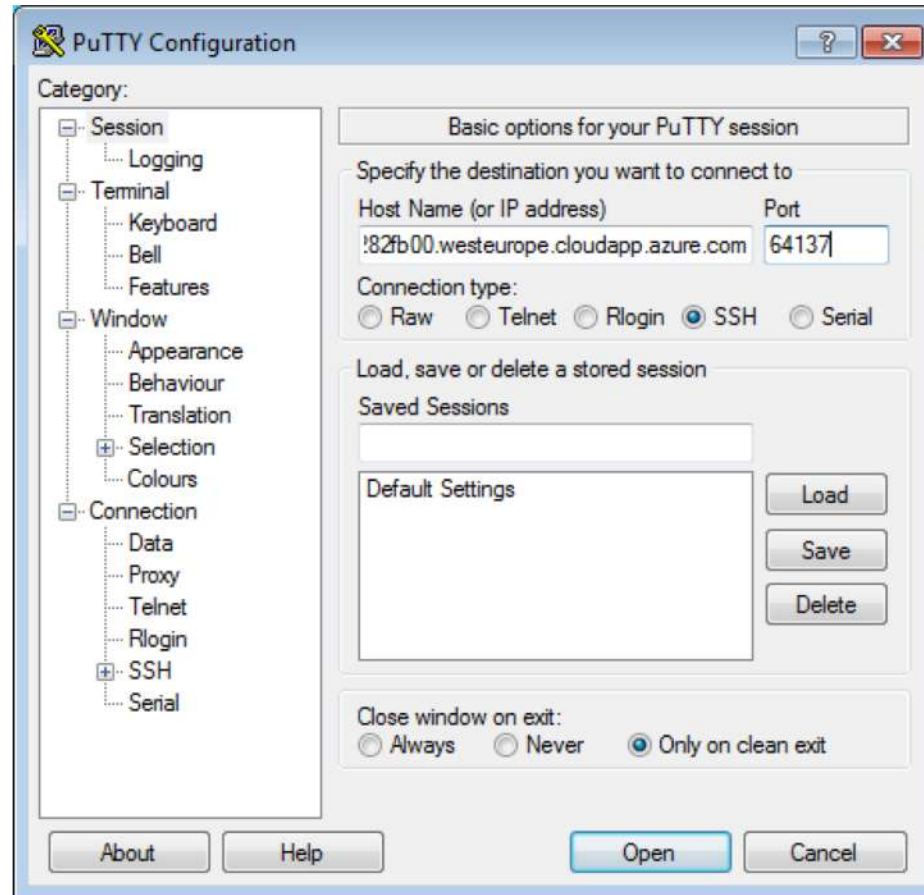
32-bit: [plink.exe](#) (or by FTP) (signature)

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

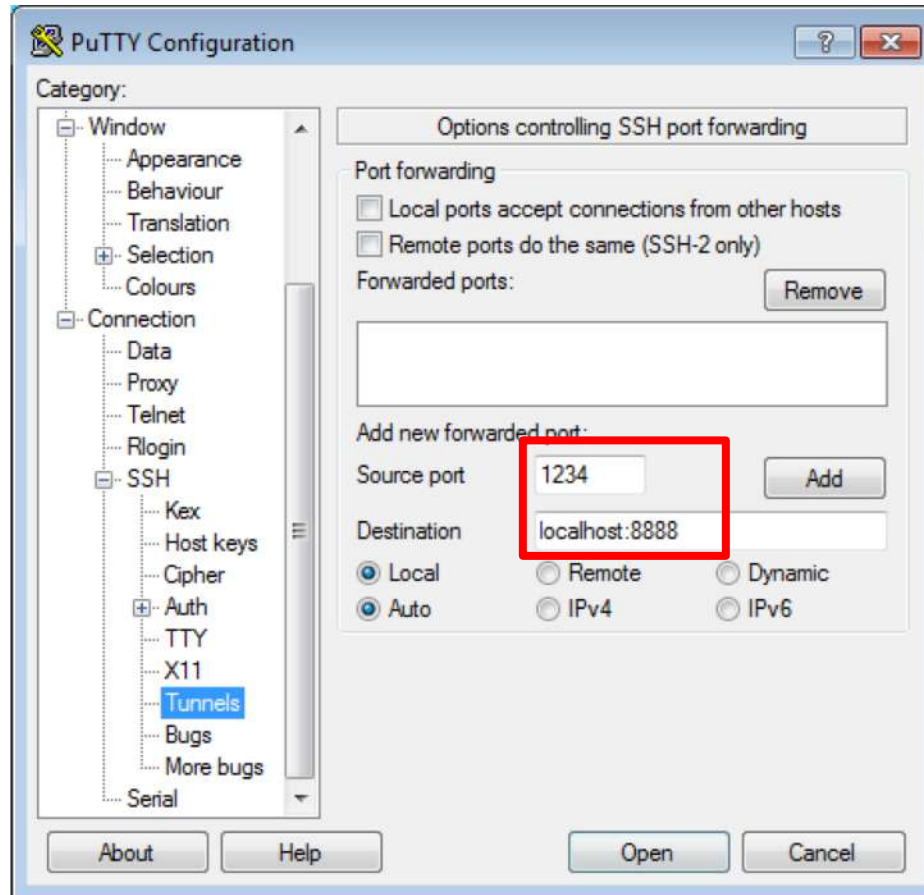
Download this executable.
It doesn't require any setup.
You will also need PSCP in
order to copy the finished
labs back to your computer.



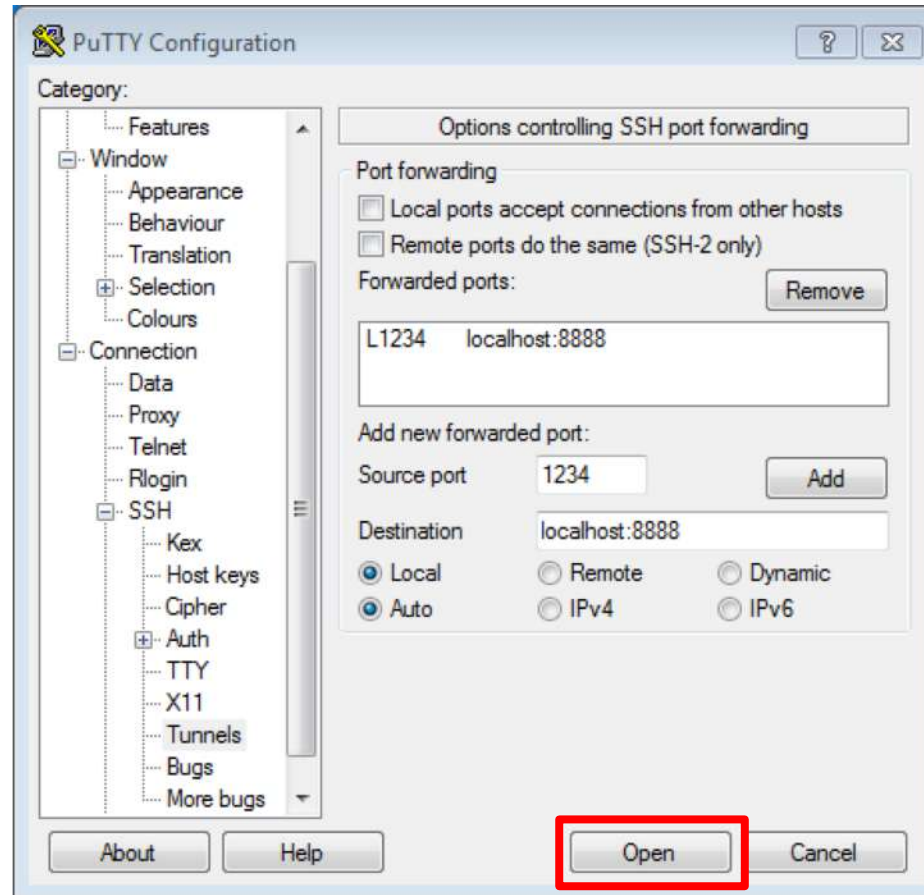
Launch putty.exe.



Input the address
and port from earlier.



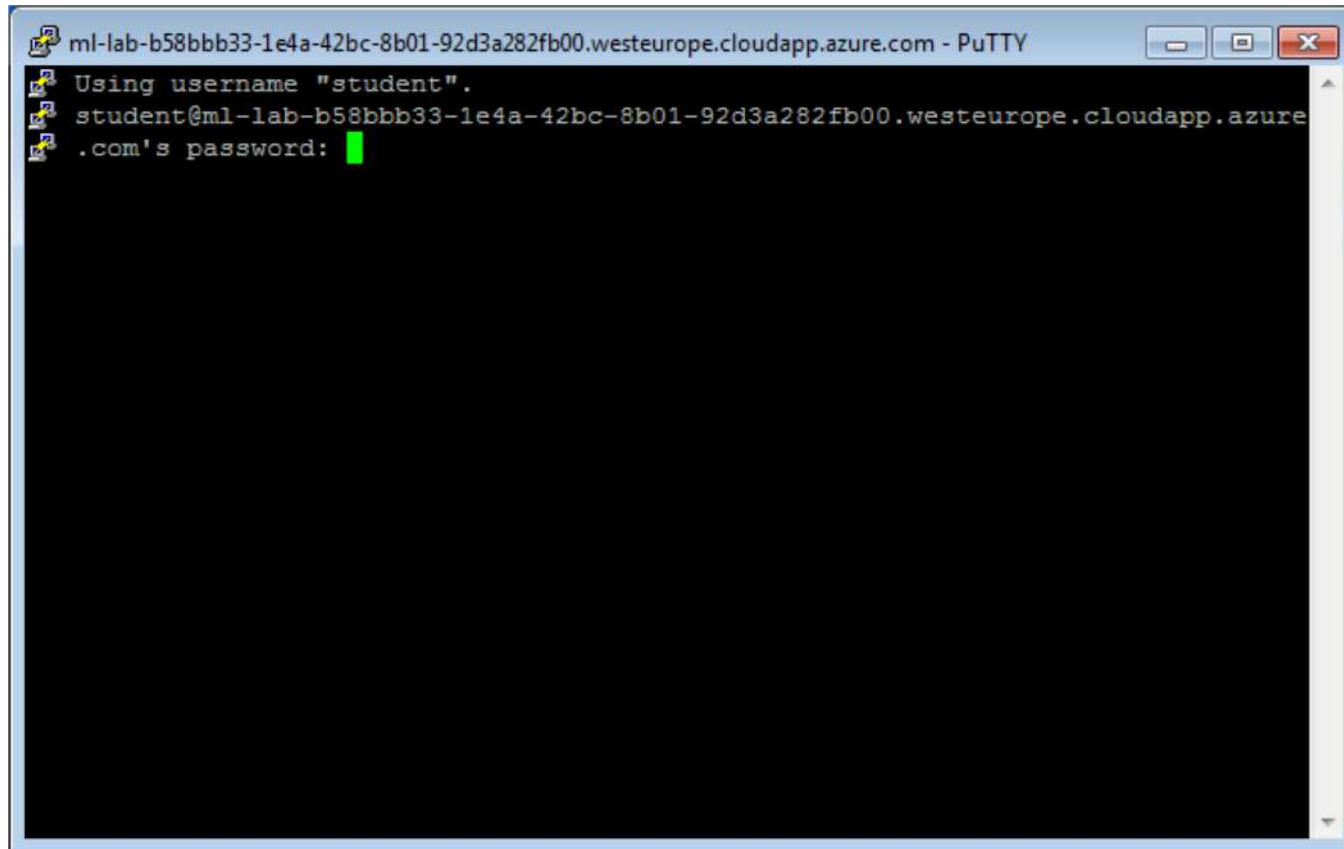
Setup the tunnel
and press Add.



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.

Mail - David Abramian - Outlook x My virtual machines - Azure Lab x STIMALIU/ml4industry: Machine Learning x

github.com/STIMALIU/ml4industry

Lecture block 5 - Neural networks and convolutional neural networks
Reading: [Slides](#) | Chapters 6, 7, 8, 9 in [Deep Learning](#).
Code:
Other material: [Tensorflow playground](#), [Keras documentation](#)

Lecture block 6 - Generative adversarial networks and recurrent neural networks
Reading: [Slides](#) | Chapters 10, 11, 20.10.4 in [Deep Learning](#).
Code:
Other material:

Computer lab 3 - 2D CNNs
[Image classification](#)
[Image segmentation](#)
Lecturer: Andrei
Lab assistant: I

Topic 4 - Re

Lecture block
Reading: [Slides](#)
Code:
Other material:

Lecture block
Reading: [Slides](#)
Code:
Other material:

Lecturer: Jose
Lab assistant: Joel Oskarsson

Course literature

- Bishop [Pattern Recognition and Machine Learning](#), Springer, 2006. [PRML]

<https://raw.githubusercontent.com/STIMALIU/ml4industry/master/Labs/Lab3a.ipynb> [book](#) O'Reilly, 2016. [PDSH]

Open Link in New Tab
Open Link in New Window
Open Link in Incognito Window
Save Link As...
Copy Link Address
Copy
Search Google for "Image classification"
Print...
AdBlock — best ad blocker
Evernote Web Clipper
EZProxy Redirect
Google Translate
Open Link in New Suspended Tab
Save current session
SingleFile
Inspect
Speech
Services

You will find download links for the files in the GitHub page of this course.

```
davab27 — test-user@ML-EnvVm-00014: ~/lab — ssh -p 60264 -L localhost:1234:localhost:8888 test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com —
test-user@ML-EnvVm-00014: ~/lab$ wget https://raw.githubusercontent.com/STIMALiU/ml4industry/master/Labs/Lab3a.ipynb
--2019-12-03 16:13:51-- https://raw.githubusercontent.com/STIMALiU/ml4industry/master/Labs/Lab3a.ipynb
Resolving raw.githubusercontent.com... 151.101.36.133
Connecting to raw.githubusercontent.com|151.101.36.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 18738 (18K) [text/plain]
Saving to: 'Lab3a.ipynb'

Lab3a.ipynb          100%[=====>]  18.30K  --.-KB/s    in 0.002s

2019-12-03 16:13:51 (8.84 MB/s) - 'Lab3a.ipynb' saved [18738/18738]

test-user@ML-EnvVm-00014: ~/lab$ wget https://raw.githubusercontent.com/STIMALiU/ml4industry/master/Labs/Lab3b.ipynb
--2019-12-03 16:14:04-- https://raw.githubusercontent.com/STIMALiU/ml4industry/master/Labs/Lab3b.ipynb
Resolving raw.githubusercontent.com... 151.101.36.133
Connecting to raw.githubusercontent.com|151.101.36.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 25228 (25K) [text/plain]
Saving to: 'Lab3b.ipynb'

Lab3b.ipynb          100%[=====>]  24.64K  --.-KB/s    in 0.002s

2019-12-03 16:14:04 (11.1 MB/s) - 'Lab3b.ipynb' saved [25228/25228]

test-user@ML-EnvVm-00014: ~/lab$ wget -O data.zip https://www.dropbox.com/s/k3k37y3hsr6i46h/SegmentationImages.zip?dl=1
--2019-12-03 16:14:50-- https://www.dropbox.com/s/k3k37y3hsr6i46h/SegmentationImages.zip?dl=1
Resolving www.dropbox.com... 162.125.65.1, 2620:100:6021:1::a27d:4101
Connecting to www.dropbox.com|162.125.65.1|:443... connected.
```

Download the files for the two parts of the lab and the data. Note the different command for the data (it's the letter O, not the number zero).

```
davab27 — test-user@ML-EnvVm-00014: ~/lab — ssh -p 60264 -L localhost:1234:localhost:8888 test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com — ...
test-user@ML-EnvVm-00014: ~/lab$ unzip data.zip
Archive: data.zip
  creating: Data/
  inflating: Data/.DS_Store
    creating: __MACOSX/
    creating: __MACOSX/Data/
  inflating: __MACOSX/Data/._.DS_Store
    creating: Data/Images/
  inflating: Data/Images/image13.tif
    creating: __MACOSX/Data/Images/
  inflating: __MACOSX/Data/Images/._image13.tif
  inflating: Data/Images/image12.tif
  inflating: __MACOSX/Data/Images/._image12.tif
  inflating: Data/Images/image38.tif
  inflating: __MACOSX/Data/Images/._image38.tif
  inflating: Data/Images/image10.tif
  inflating: __MACOSX/Data/Images/._image10.tif
  inflating: Data/Images/image11.tif
  inflating: __MACOSX/Data/Images/._image11.tif
  inflating: Data/Images/image39.tif
  inflating: __MACOSX/Data/Images/._image39.tif
  inflating: Data/Images/image15.tif
  inflating: __MACOSX/Data/Images/._image15.tif
  inflating: Data/Images/image29.tif
  inflating: __MACOSX/Data/Images/._image29.tif
  inflating: Data/Images/image28.tif
  inflating: __MACOSX/Data/Images/._image28.tif
  inflating: Data/Images/image14.tif
  inflating: __MACOSX/Data/Images/._image14.tif
  inflating: Data/Images/image16.tif
  inflating: __MACOSX/Data/Images/._image16.tif
```

Extract the data.

```
test-user@ML-EnvVm-00014: ~/lab$ conda activate py35  
(py35) test-user@ML-EnvVm-00014: ~/lab$
```

Start the Anaconda environment.
This contains Python and all the
required packages for the lab.
Note the change in the prompt.


```
davab27 — test-user@ML-EnvVm-00014: ~/lab — ssh -p 60264 -L localhost:1234:localhost:8888 test-user@m1-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com — ...
(py35) test-user@ML-EnvVm-00014:~/lab$ jupyter notebook --no-browser
[I 16:17:08.311 NotebookApp] [nb_conda_kernels] enabled, 5 kernels found
[I 16:17:08.537 NotebookApp] JupyterLab extension loaded from /data/anaconda/envs/py35/lib/python3.5/site-packages/jupyterlab
[I 16:17:08.537 NotebookApp] JupyterLab application directory is /data/anaconda/envs/py35/share/jupyter/lab
[I 16:17:08.810 NotebookApp] [nb_anacondacloud] enabled
[I 16:17:08.813 NotebookApp] [nb_conda] enabled
[I 16:17:08.847 NotebookApp] \u2713 nbpresent HTML export ENABLED
[W 16:17:08.847 NotebookApp] \u2717 nbpresent PDF export DISABLED: No module named 'nbbrowserpdf'
/data/anaconda/envs/py35/lib/python3.5/importlib/_bootstrap.py:222: RuntimeWarning: numpy.dtype size changed, may indicate binary incompatibility. Expected 96, got 88
  return f(*args, **kwargs)
/data/anaconda/envs/py35/lib/python3.5/importlib/_bootstrap.py:222: RuntimeWarning: numpy.dtype size changed, may indicate binary incompatibility. Expected 96, got 88
  return f(*args, **kwargs)
[I 16:17:13.545 NotebookApp] sparkmagic extension enabled!
[I 16:17:13.547 NotebookApp] Serving notebooks from local directory: /data/home/test-user/lab
[I 16:17:13.547 NotebookApp] 0 active kernels
[I 16:17:13.547 NotebookApp] The Jupyter Notebook is running at:
[I 16:17:13.547 NotebookApp] http://localhost:8888/?token=5b6d5a7fbd9235a92367f205c69f9f4ab7045230444c2e41
[I 16:17:13.547 NotebookApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).
[C 16:17:13.547 NotebookApp]

Copy/paste this URL into your browser when you connect for the first time,
to login with a token:
    http://localhost:8888/?token=5b6d5a7fbd9235a92367f205c69f9f4ab7045230444c2e41&token=5b6d5a7fbd9235a92367f205c69f9f4ab7045230444c2e41
[I 16:17:42.504 NotebookApp] 302 GET / (127.0.0.1) 0.63ms
```

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.

The screenshot shows the JupyterLab interface in a web browser. The address bar indicates the URL is `localhost:1234/tree?`. The Jupyter logo is in the top left, and 'Quit' and 'Logout' buttons are in the top right. Below the logo, there are tabs for 'Files', 'Running', 'Clusters', and 'Conda'. The 'Files' tab is active, showing a file browser. At the top of the file browser, there is a prompt 'Select items to perform actions on them.' and buttons for 'Upload', 'New', and a refresh icon. Below this, there is a table of files and folders. The files are listed with checkboxes, names, last modified times, and file sizes. The files 'Lab3a.ipynb' and 'Lab3b.ipynb' are highlighted with a red box.

	Name	Last Modified	File size
<input type="checkbox"/>	0		
<input type="checkbox"/>	__MACOSX	a day ago	
<input type="checkbox"/>	Data	a month ago	
<input type="checkbox"/>	Lab3a.ipynb	7 minutes ago	18.7 kB
<input type="checkbox"/>	Lab3b.ipynb	7 minutes ago	25.2 kB
<input type="checkbox"/>	data.zip	6 minutes ago	48.3 MB

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

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localhost:1234/notebooks/Lab3a.ipynb

jupyter Lab3a (unsaved changes) Logout

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

Markdown Edit Presentation Show Presentation

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 notebooks and work on them. All computations will run on the remote machine.

When you are done

davab27 — test-user@ML-EnvVm-00014: ~ — bash — 104x31
davab27@ad-mac0558: ~ scp -P 60264 test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com:~/lab/Lab*.ipynb 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.

```
dayab27 — test-user@ML-EnvVm-00014: ~ — ssh • scp -P 60264 test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com:~/lab/Lab*.ipynb Downloads/finish...
davab27@ad-mac0558: ~ scp -P 60264 test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com:~/lab/Lab*.ipynb Downloads/finished_lab/
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: ~ — bash — 104x31
davab27@ad-mac0558: ~ scp -P 60264 test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com:~/lab/Lab*.ipynb Downloads/finished_lab/
test-user@ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.westeurope.cloudapp.azure.com's password:
Lab3a.ipynb                                     100% 18KB 424.4KB/s 00:00
Lab3b.ipynb                                     100% 25KB 1.1MB/s 00:00
davab27@ad-mac0558: ~ ls Downloads/finished_lab/
Lab3a.ipynb Lab3b.ipynb
davab27@ad-mac0558: ~
```

The files should appear
in the specified path.

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localhost:1234/tree? ☆ D

jupyter

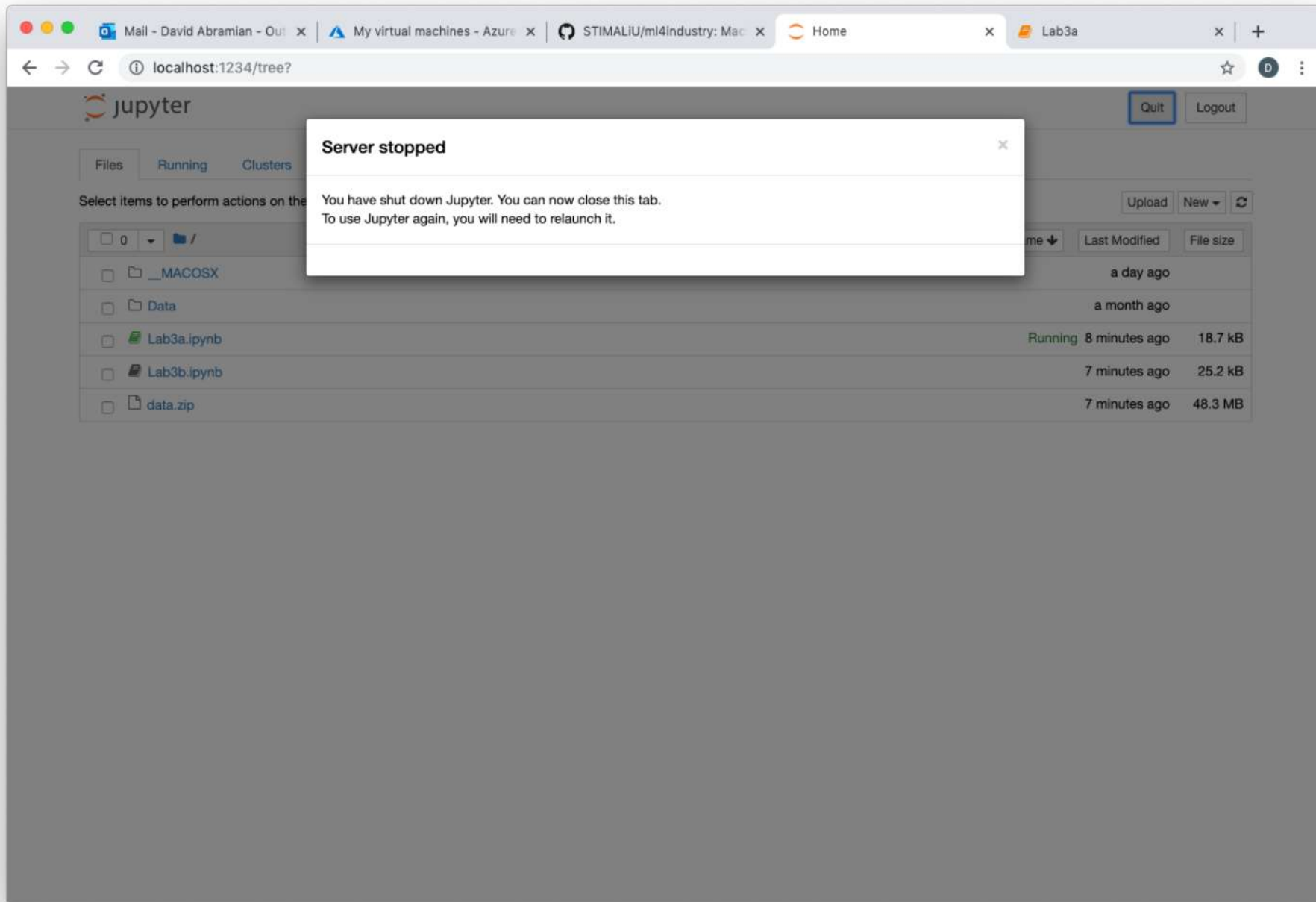
Quit Logout

Files Running Clusters Conda

Select items to perform actions on them. Upload New ↻

<input type="checkbox"/>	0 ▾	📁 /	Name ▾	Last Modified	File size
<input type="checkbox"/>		📁 __MACOSX		a day ago	
<input type="checkbox"/>		📁 Data		a month ago	
<input type="checkbox"/>		📄 Lab3a.ipynb	Running	7 minutes ago	18.7 kB
<input type="checkbox"/>		📄 Lab3b.ipynb		7 minutes ago	25.2 kB
<input type="checkbox"/>		📄 data.zip		6 minutes ago	48.3 MB

Shut down the Jupyter server by pressing Quit.




```
(py35) test-user@ML-EnvVm-00014:~/lab$ exit
```

```
logout
```

```
Connection to ml-lab-9215244b-cd2b-41cc-9bc4-2b02c548b1e8.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

Machine learning for industry	SmallGPU_Compute	TBMI02 - Segmentation assi...
		
<div><div></div></div> 0.9 / 10 hour(s) used	<div><div></div></div> 1.1 / 10 hour(s) used	<div><div></div></div> 2.1 / 10 hour(s) used
<div><input checked="" type="checkbox"/> Stopping...</div> <div> </div>	<div><input type="checkbox"/> Stopped</div> <div> </div>	<div><input type="checkbox"/> Stopped</div> <div> </div>

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