

Tutorial to setup coding environment for ML4T

This tutorial will show how to setup the environment for coding the assignments for machine learning for trading in windows 10 platform. Two different methods will be shown here:

Method 1: Install python and all the required libraries on windows platform directly using anaconda. However this method will **NOT be supported** in this class and grading scripts won't run.

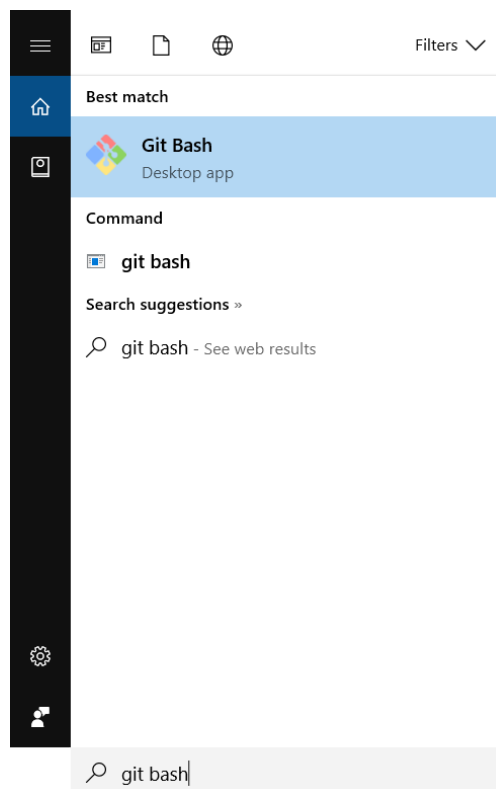
Method 2: Load Ubuntu 16.04 image using virtualbox on windows and install python and all the required libraries inside the ubuntu virtualbox. This method will run all the code including grading scripts without any issues.

Method 1

Install python and all the required libraries on windows 10 platform directly using anaconda.

1. Install git for windows:

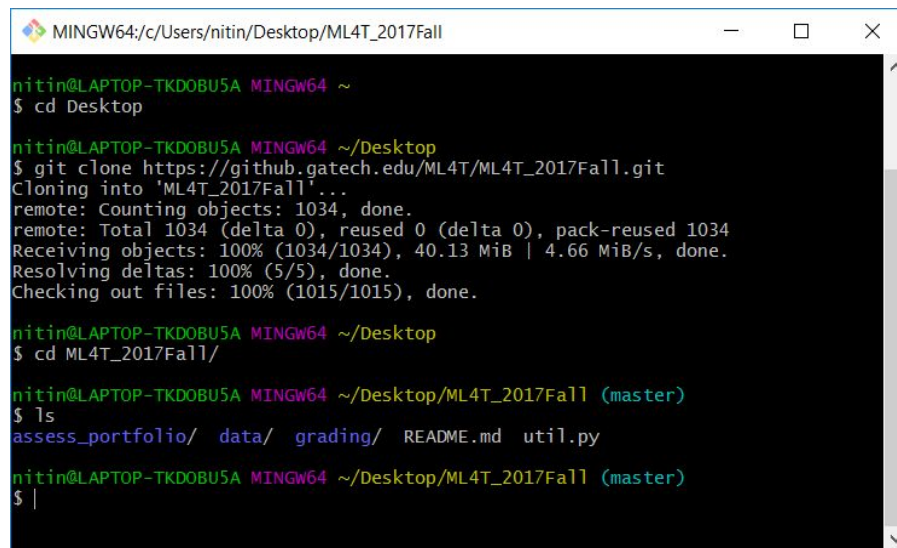
- Download git from <https://git-for-windows.github.io/> and install it with default options.
- Search for git bash in windows search menu:



- In the git bash, go to any folder where you want to clone the ml4t assignments repository.
- Type the following command to clone the git repo :

git clone https://github.gatech.edu/ML4T/ML4T_2017Fall.git

- The ml4t assignment git repository would have been successfully cloned as shown below:



```
MINGW64:/c/Users/nitin/Desktop/ML4T_2017Fall
nitin@LAPTOP-TKDOBU5A MINGW64 ~
$ cd Desktop

nitin@LAPTOP-TKDOBU5A MINGW64 ~/Desktop
$ git clone https://github.gatech.edu/ML4T/ML4T_2017Fall.git
Cloning into 'ML4T_2017Fall'...
remote: Counting objects: 1034, done.
remote: Total 1034 (delta 0), reused 0 (delta 0), pack-reused 1034
Receiving objects: 100% (1034/1034), 40.13 MiB | 4.66 MiB/s, done.
Resolving deltas: 100% (5/5), done.
Checking out files: 100% (1015/1015), done.

nitin@LAPTOP-TKDOBU5A MINGW64 ~/Desktop
$ cd ML4T_2017Fall/

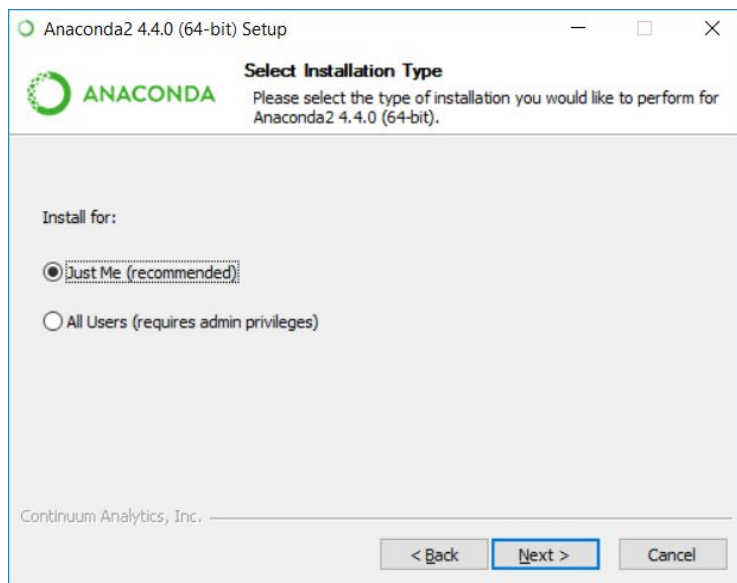
nitin@LAPTOP-TKDOBU5A MINGW64 ~/Desktop/ML4T_2017Fall (master)
$ ls
assess_portfolio/  data/  grading/  README.md  util.py

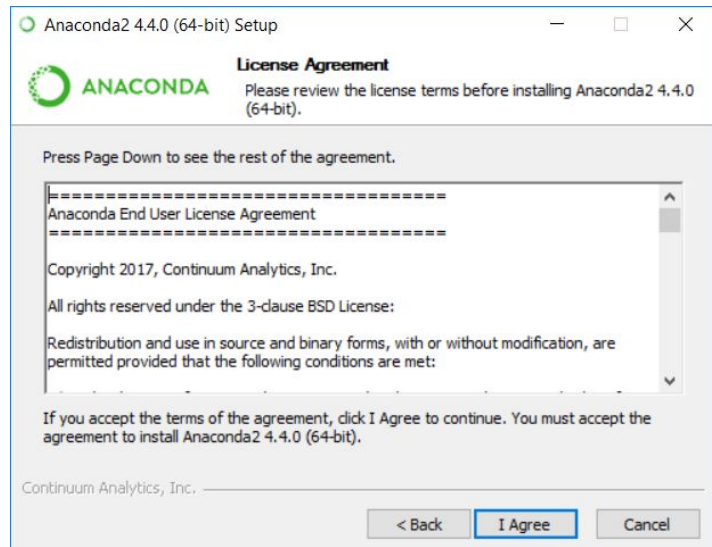
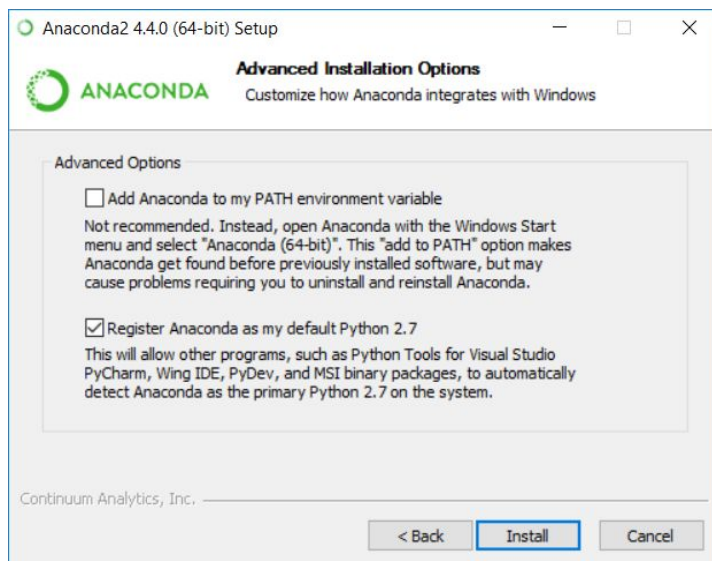
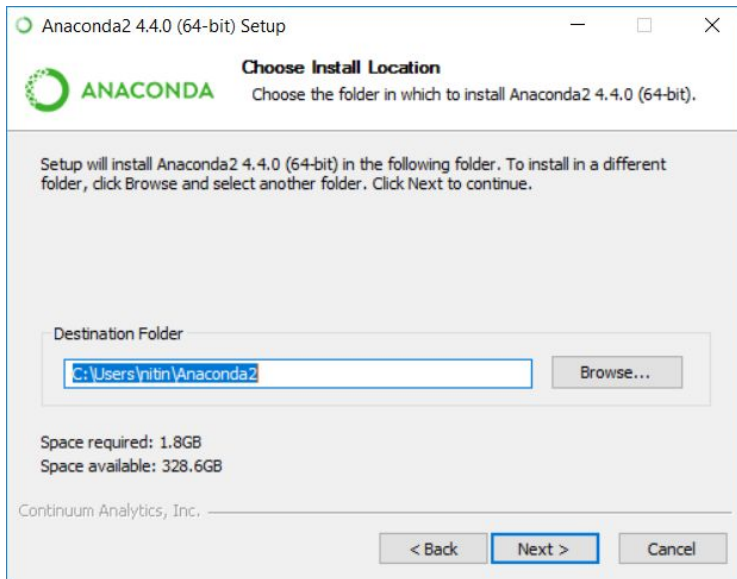
nitin@LAPTOP-TKDOBU5A MINGW64 ~/Desktop/ML4T_2017Fall (master)
$ |
```

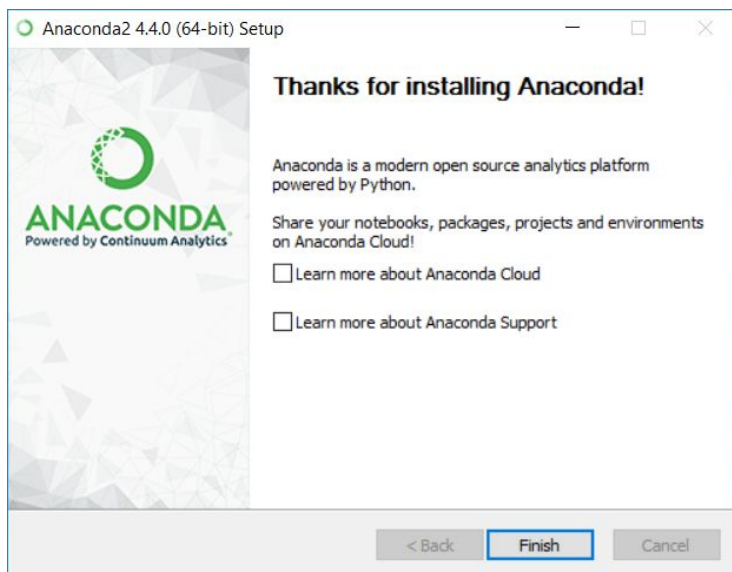
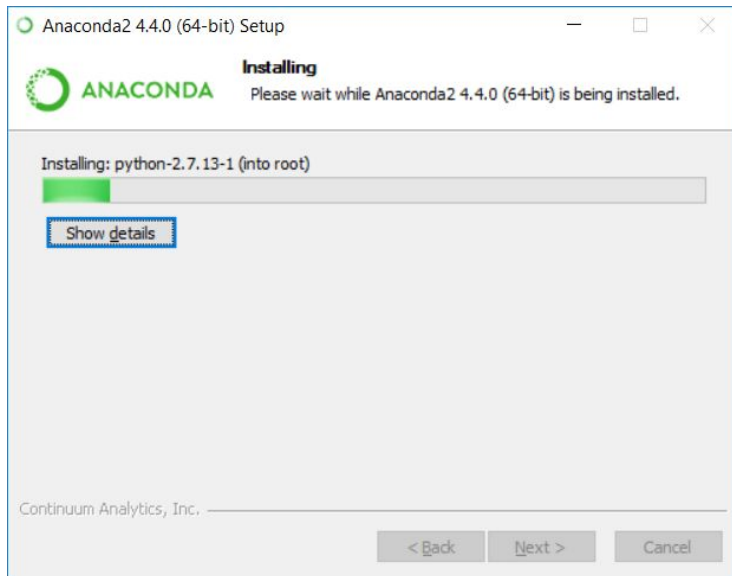
2. Install Anaconda:

Download anaconda 4.4.0 installer (python 2.7 version) from <https://www.anaconda.com/download/#download> , either the 64 bit or 32 bit version based on your machine.

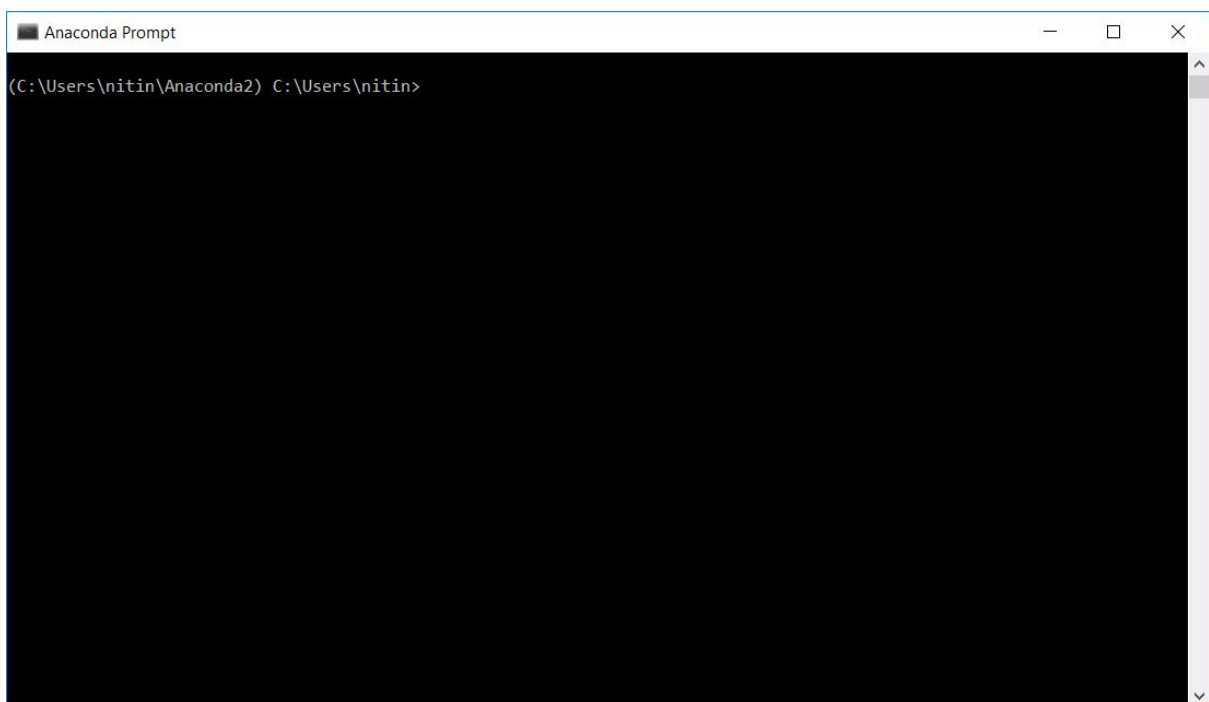
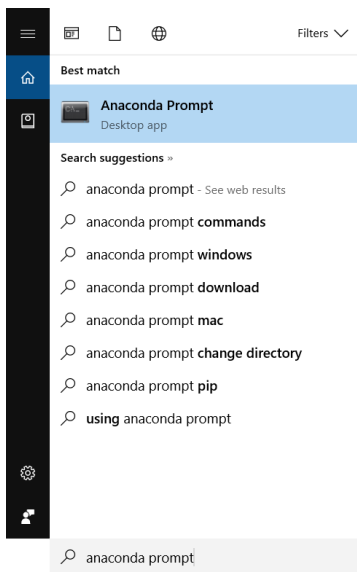
Follow the screenshots below to install anaconda:







Open anaconda prompt from windows search menu:



3. Create virtual environment:

- In anaconda prompt, type in the following command to create a virtual environment named ml4t with specific version of python.

conda create -n ml4t python=2.7.12

Type y if any prompts appear.

- Type the following command to install all the libraries inside 'ml4t' virtual environment. Type y if any prompts appear

```
conda install -n ml4t cycler=0.10.0 functools32=3.2.3.2 matplotlib=2.0.2  
numpy=1.13.1 pandas=0.20.3 py=1.4.34 pyparsing=2.2.0 pytest=3.2.1  
python-dateutil=2.6.1 pytz=2017.2 scipy=0.19.1 six=1.10.0 subprocess32=3.2.7
```

Type y if any prompts appear.

- In future, if you want to remove the 'ml4t' virtual environment, you can use the following command:

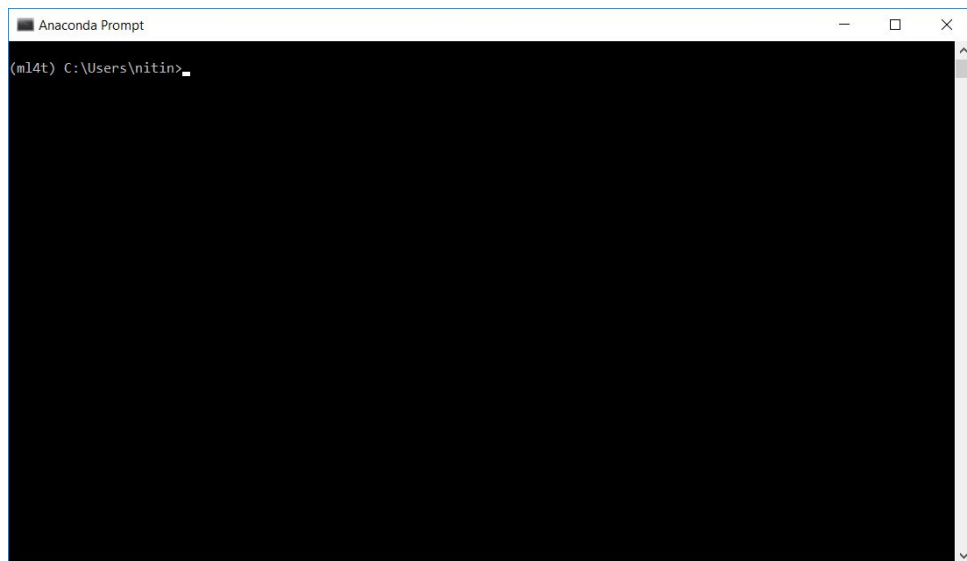
```
conda env remove -n ml4t
```

4. Using virtual environment:

- To start coding in the virtual environment, type the following command:

```
activate ml4t
```

You should see ml4t appear in the terminal as shown below:



- To check python version:

```
python --version
```

It will print:

```
Python 2.7.12 :: Continuum Analytics, Inc.
```

- To verify that the correct version of libraries are installed, type:

conda list

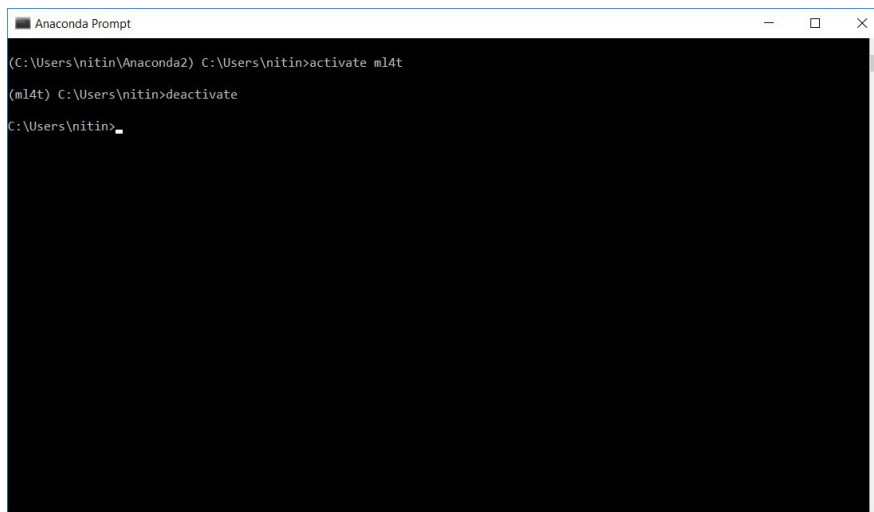
Make sure the appropriate libraries are matching the versions listed here;

http://quantsoftware.gatech.edu/ML4T_Software_Installation

- To deactivate from the virtual environment type,

deactivate

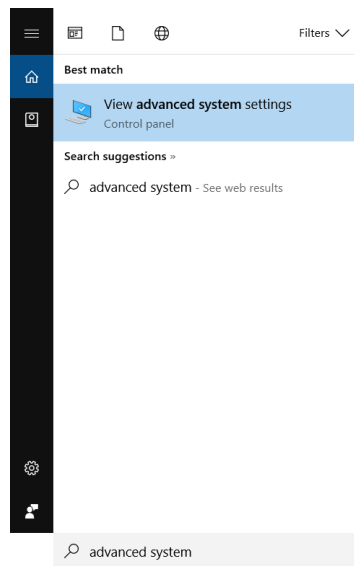
However this puts the user out of the anaconda environment itself, and activate command when typed again won't be recognized. You can start a new anaconda prompt to activate the virtual environment again. Refer to image below.



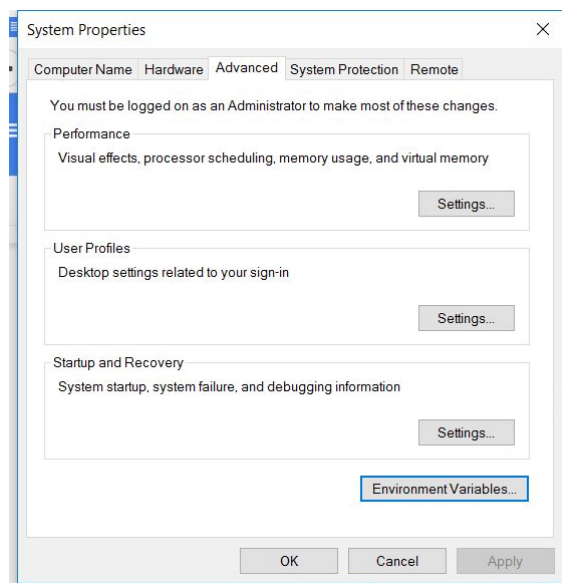
```
Anaconda Prompt
(C:\Users\nitin\Anaconda2) C:\Users\nitin>activate ml4t
(ml4t) C:\Users\nitin>deactivate
C:\Users\nitin>
```

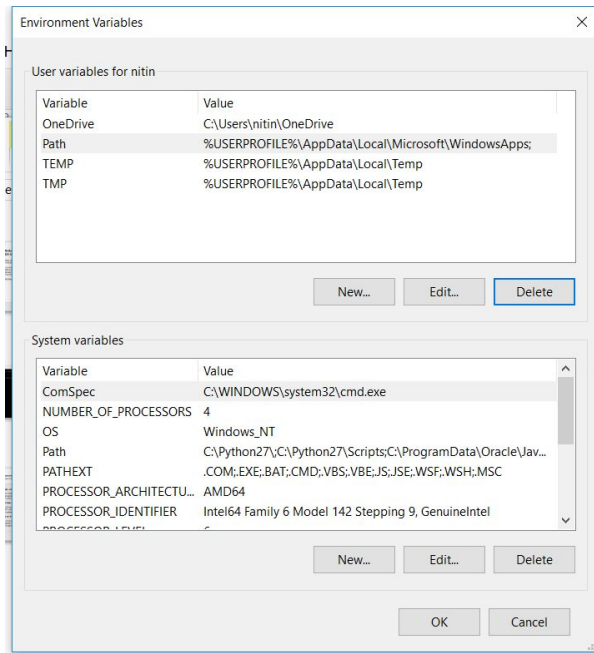
- Before we start running our code, the path to the git repository needs to be added to PYTHONPATH, as python needs to find the support scripts for grading and util (i.e grading folder and util.py inside the repo). For this, we need to add the path to environment variables as shown below:

Type advanced system settings in windows search menu and select it:

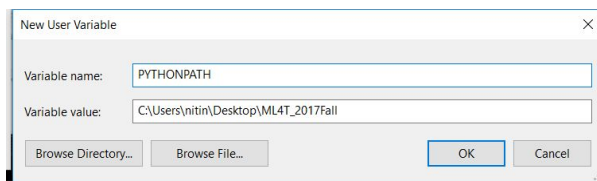


Click on environment variables:

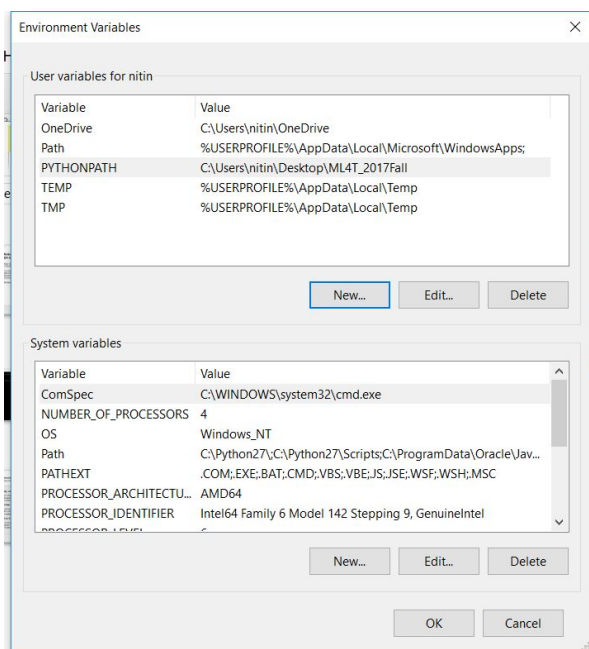




Click on New.. and type PYTHONPATH in variable name and path to ML4T_2017Fall (the git repo) in variable value. Select ok.



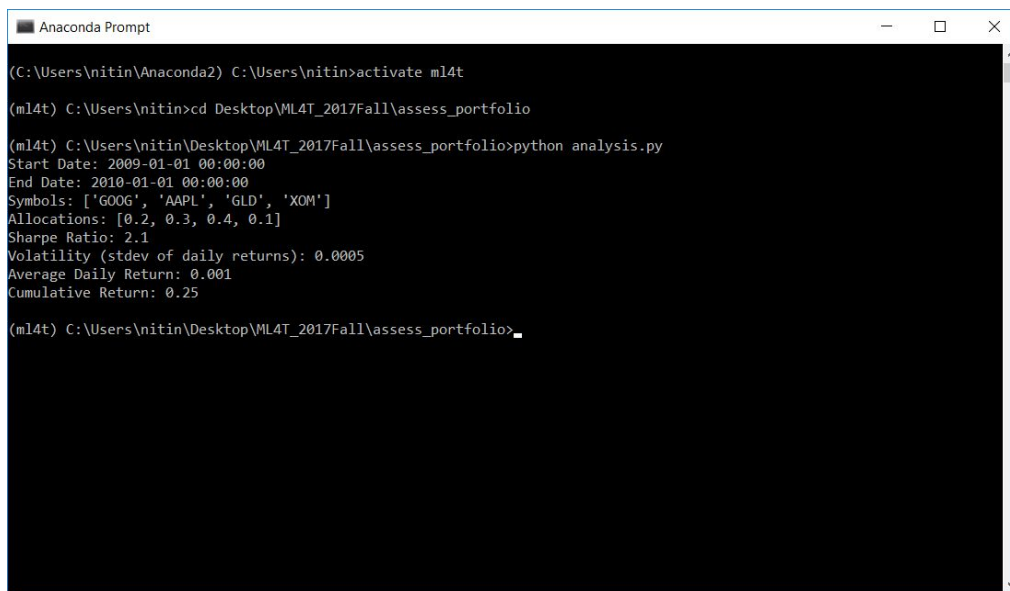
PYTHONPATH would have been added in environment variables. Select ok.



- Now make sure to open a new anaconda prompt, and activate 'ml4t' virtual environment, then go to the ml4t git repository cloned previously and enter 'assess_portfolio' folder and type:

python analysis.py

You should see the following result as shown in image below:

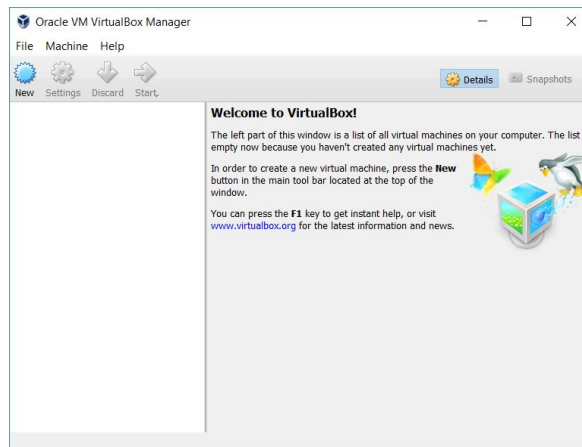


```
Anaconda Prompt
(C:\Users\nitin\Anaconda2) C:\Users\nitin>activate ml4t
(ml4t) C:\Users\nitin>cd Desktop\ML4T_2017Fall\assess_portfolio
(ml4t) C:\Users\nitin\Desktop\ML4T_2017Fall\assess_portfolio>python analysis.py
Start Date: 2009-01-01 00:00:00
End Date: 2010-01-01 00:00:00
Symbols: ['GOOG', 'AAPL', 'GLD', 'XOM']
Allocations: [0.2, 0.3, 0.4, 0.1]
Sharpe Ratio: 2.1
Volatility (stdev of daily returns): 0.0005
Average Daily Return: 0.001
Cumulative Return: 0.25
(ml4t) C:\Users\nitin\Desktop\ML4T_2017Fall\assess_portfolio>
```

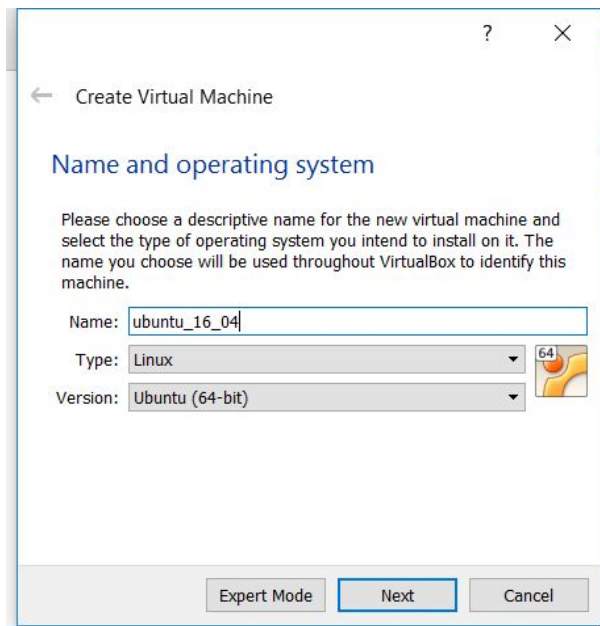
Method 2: Using Ubuntu 16.04 image in virtualbox on windows.

1. Download ubuntu 16.04.3 LTS image from <https://www.ubuntu.com/download/desktop> .
2. Download and install virtualbox from <https://www.virtualbox.org/wiki/Downloads> using default options.
3. Follow the instructions below to load ubuntu 16.04 as virtual machine.

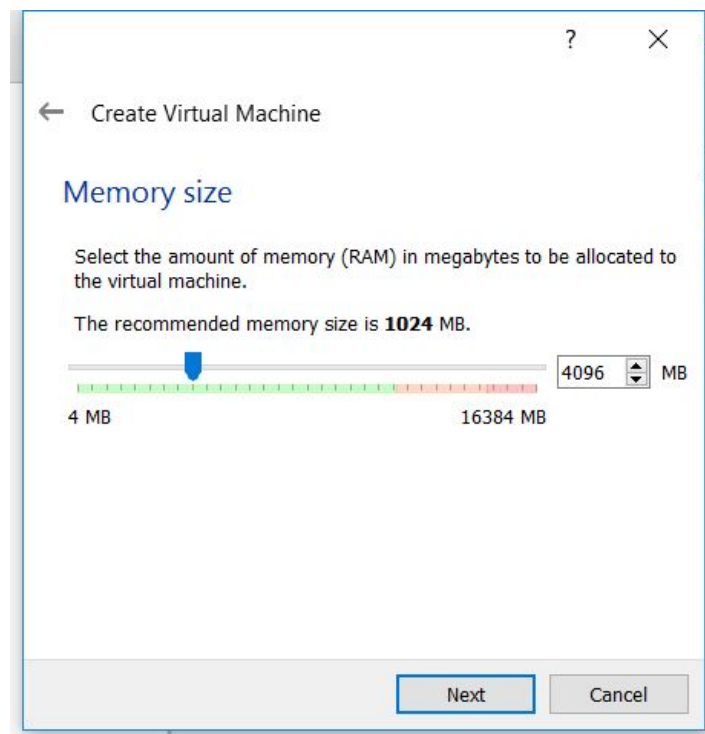
Open virtualbox and click on new.



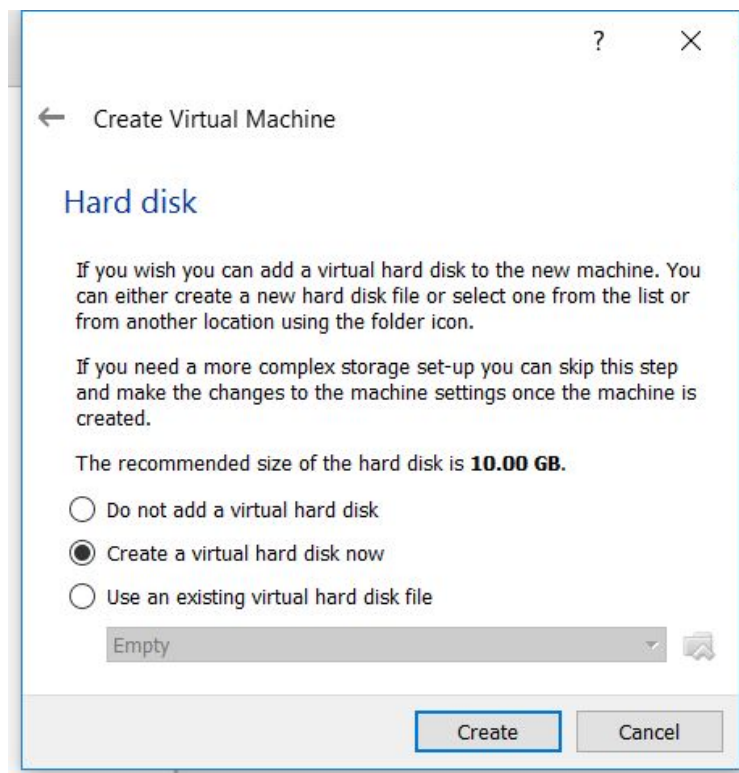
In the new dialog box, give a name to the virtual box and select type as linux and version as ubuntu (32 bit or 64 bit accordingly).



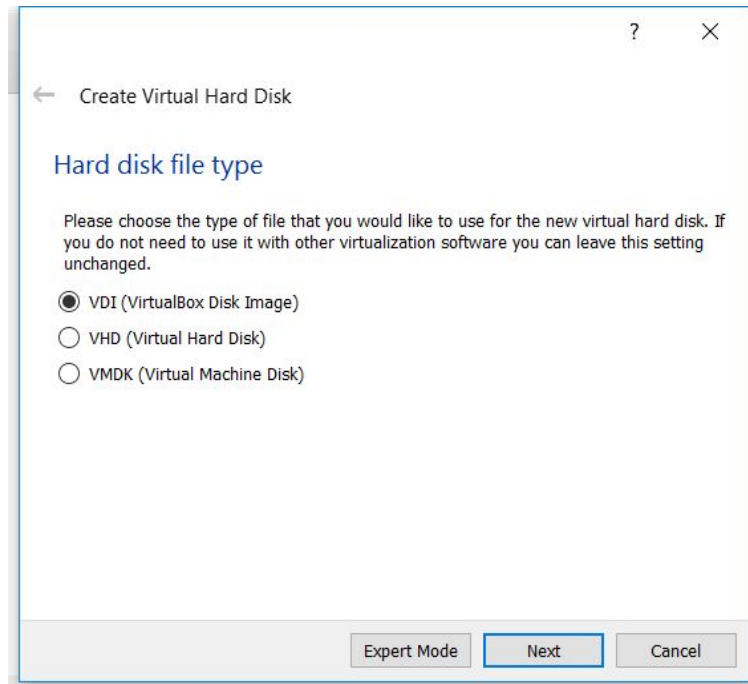
Allocate some amount of memory for virtual machine as feasible.



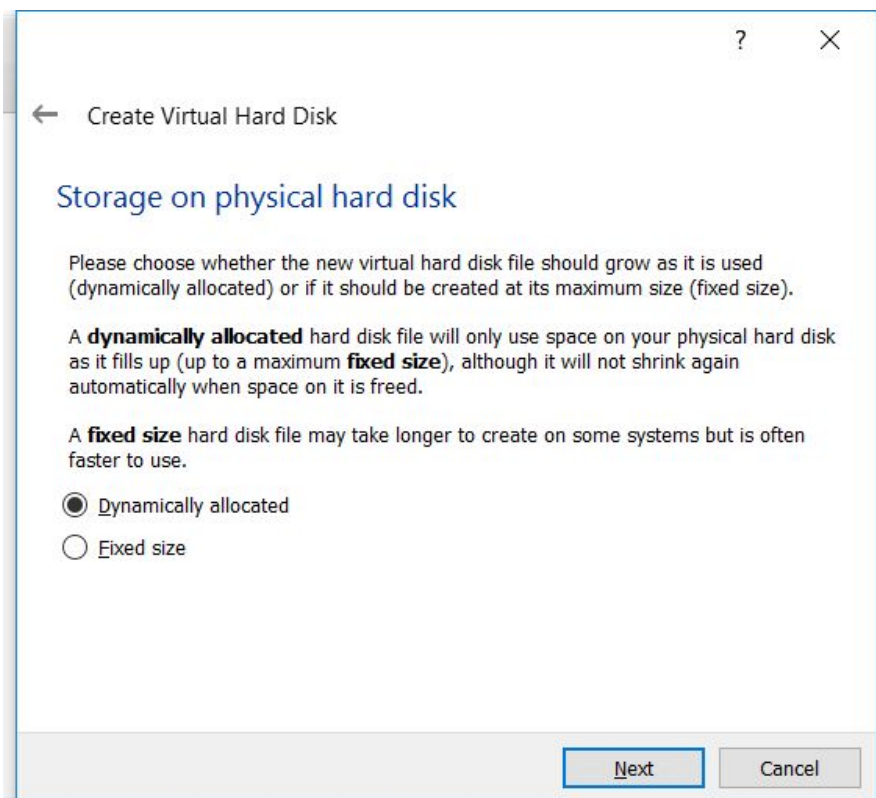
Select 'Create a virtual hard disk now'



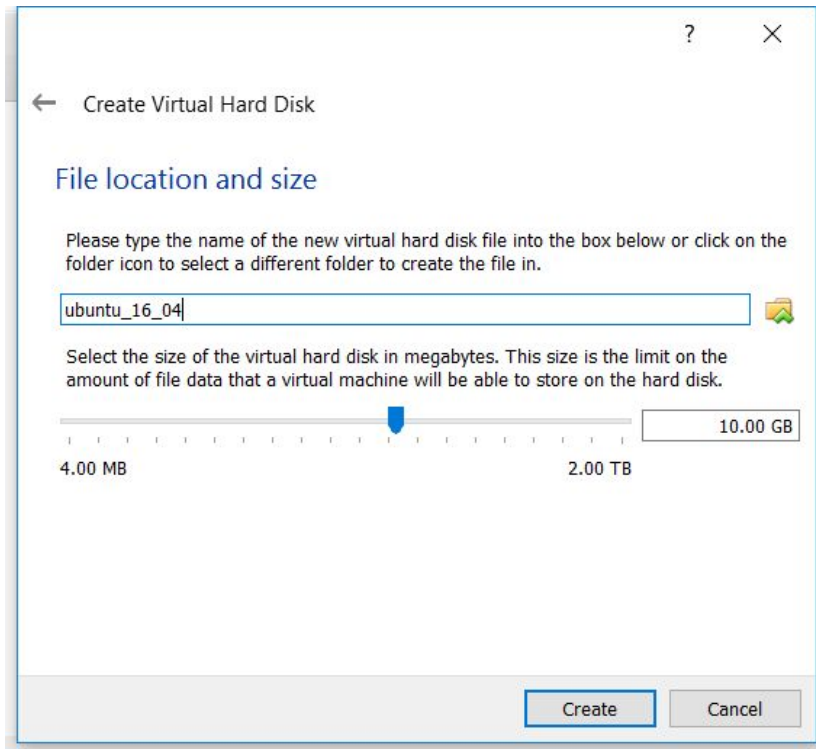
Select 'VDI (VirtualBox Disk Image)'



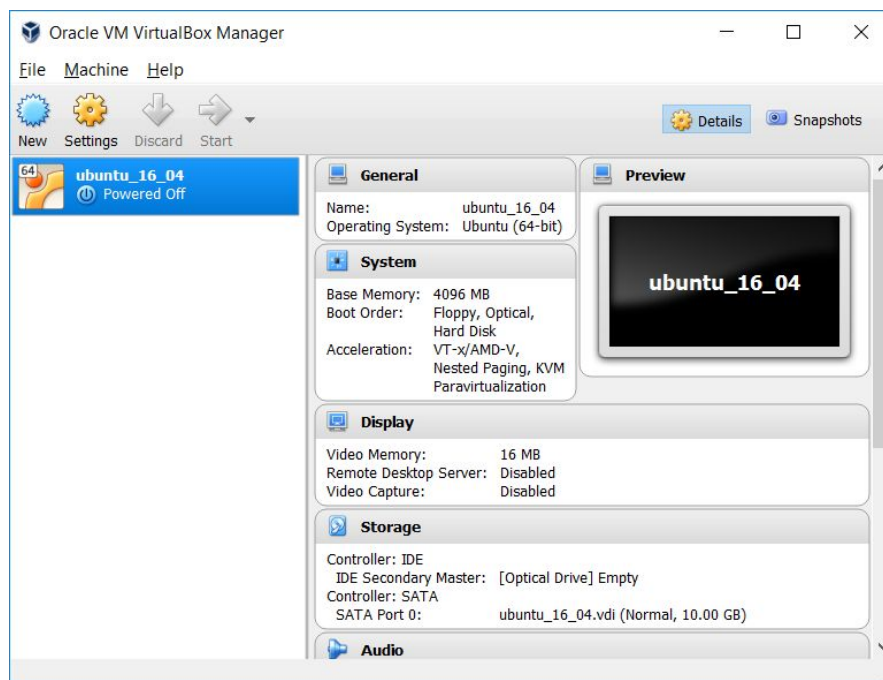
Select 'Dynamically allocated' .



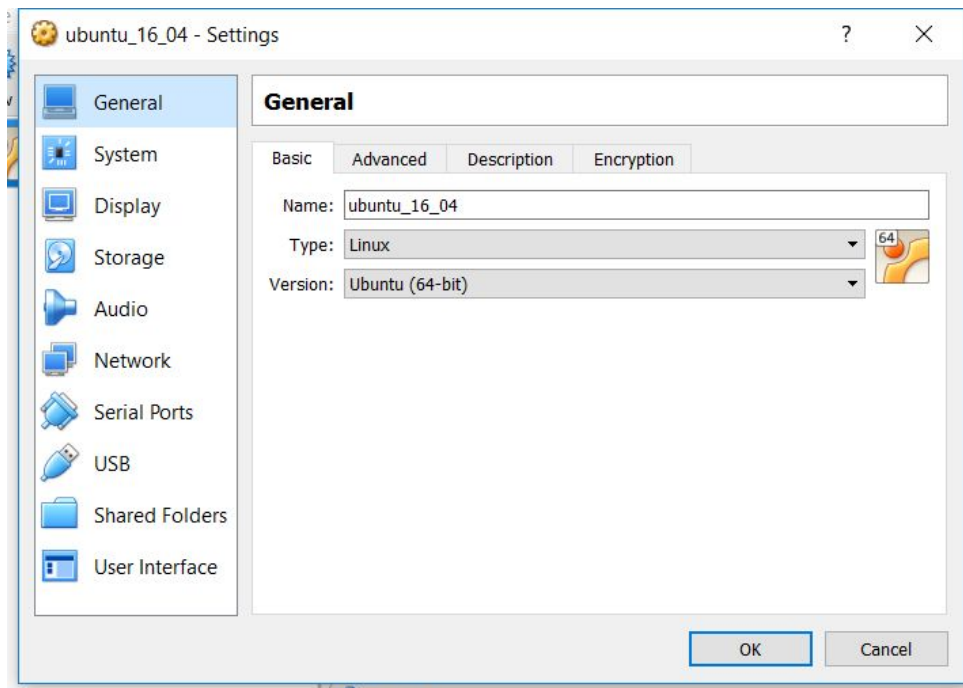
Choose a name for the virtual hard disk which will store ubuntu 16.04 and select some amount of storage as feasible. Then select create.



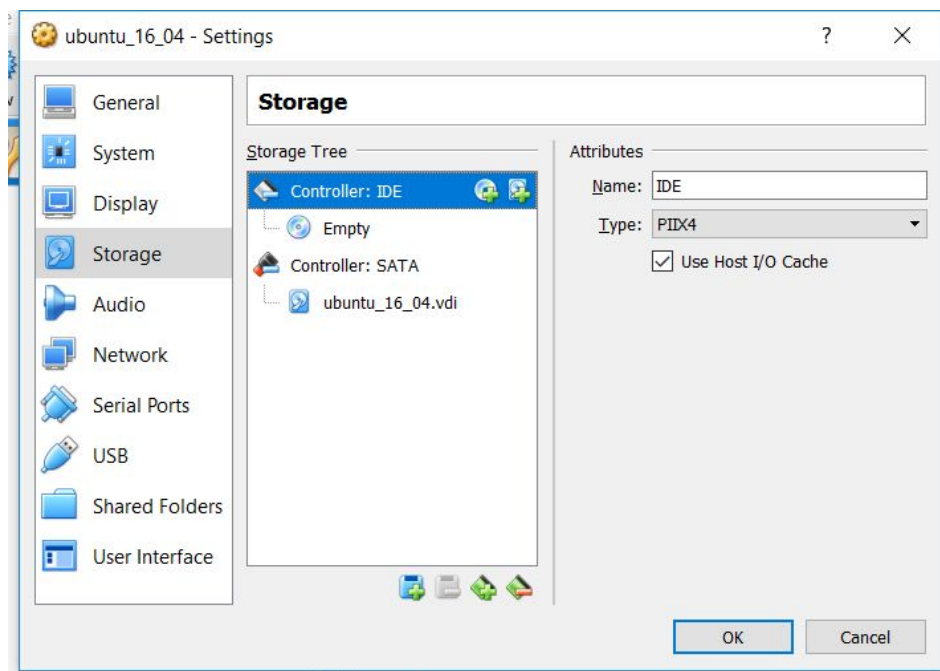
A new virtual machine for ubuntu 16.04 would have been created.



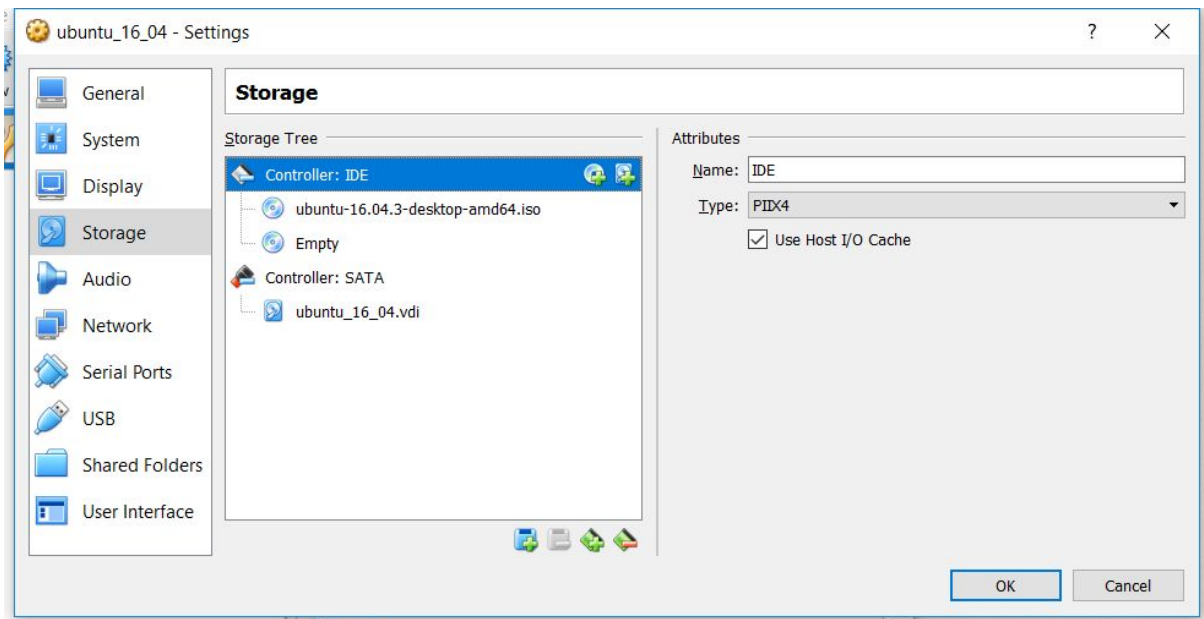
Select the newly created virtual machine (ubuntu_16_04) and go to settings.



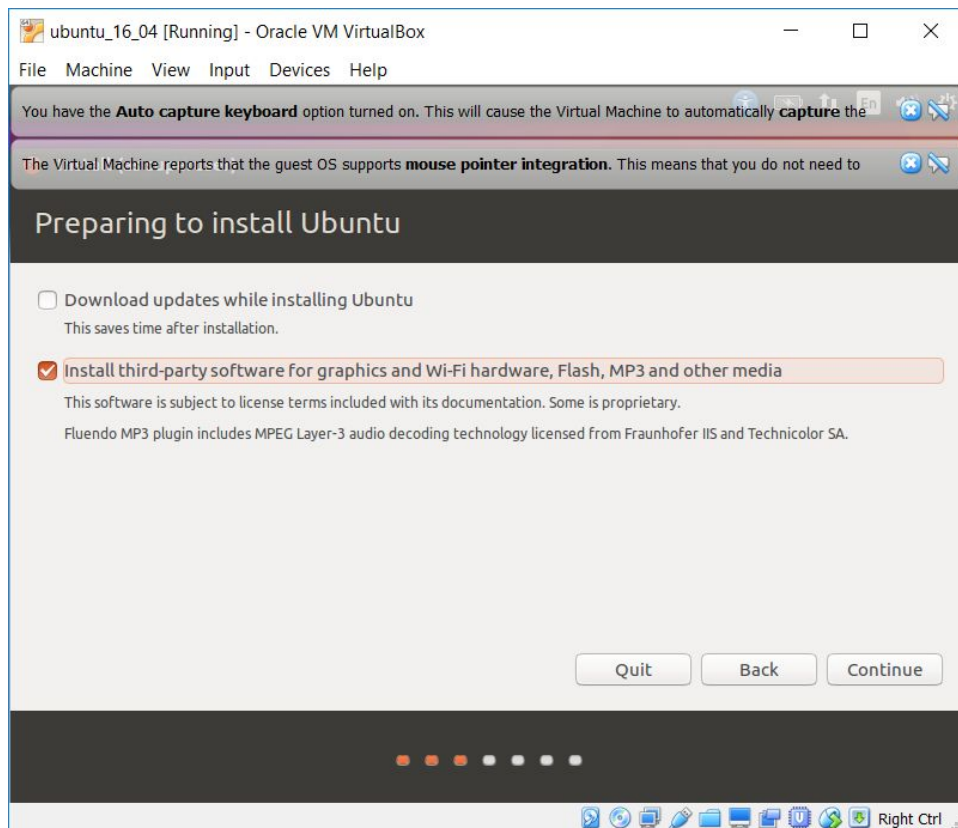
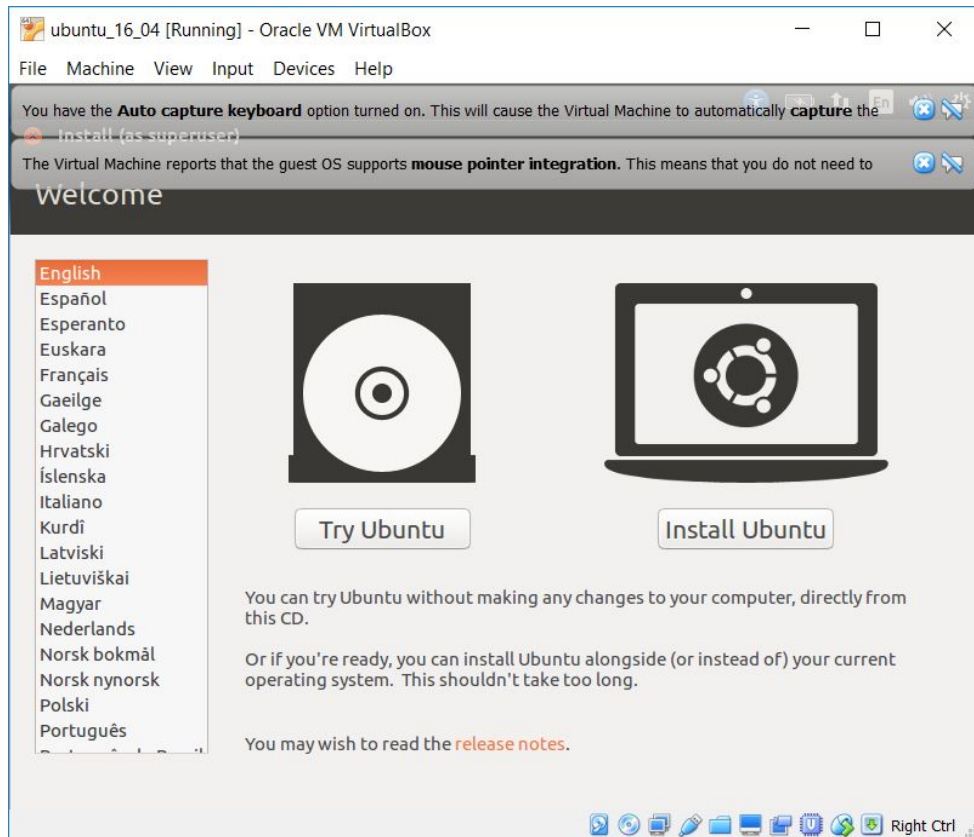
Go to storage.

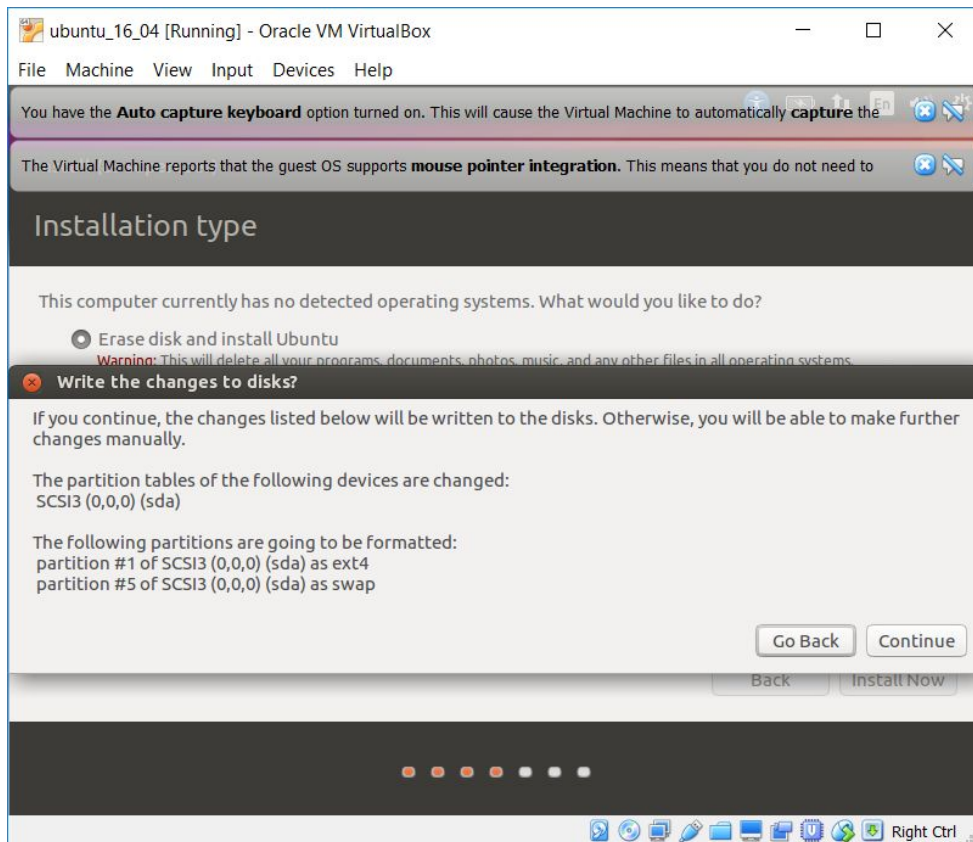
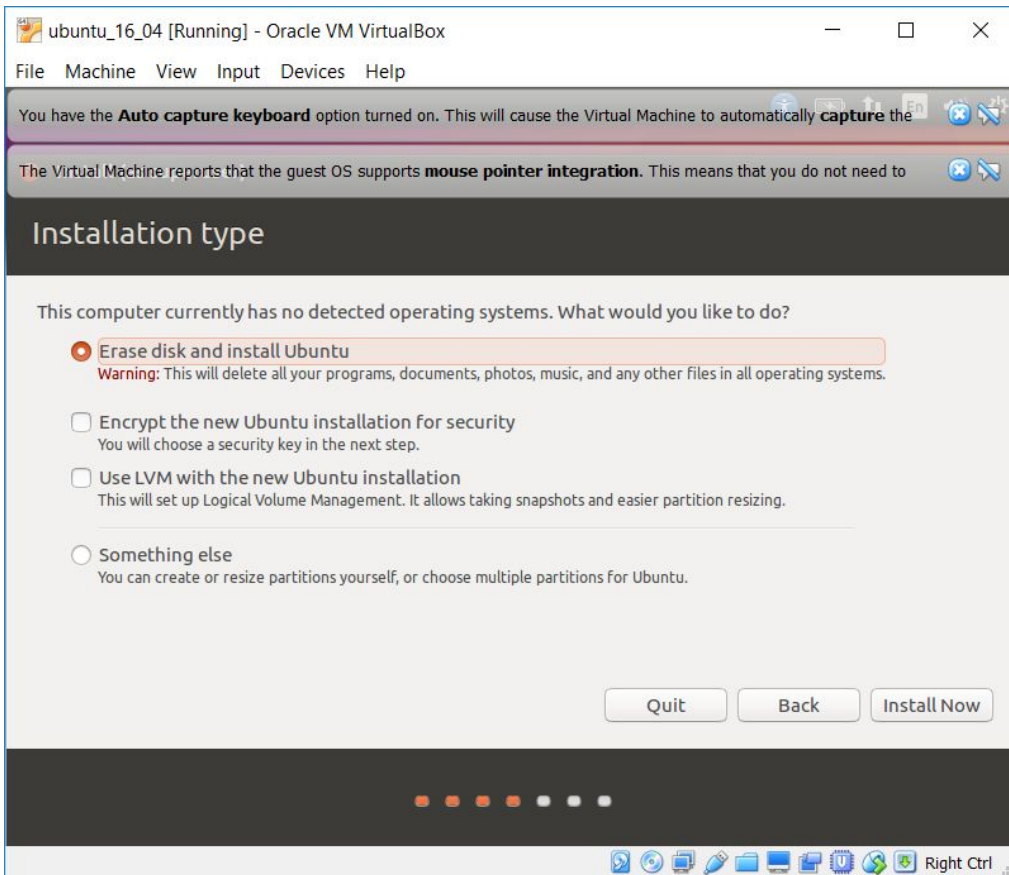


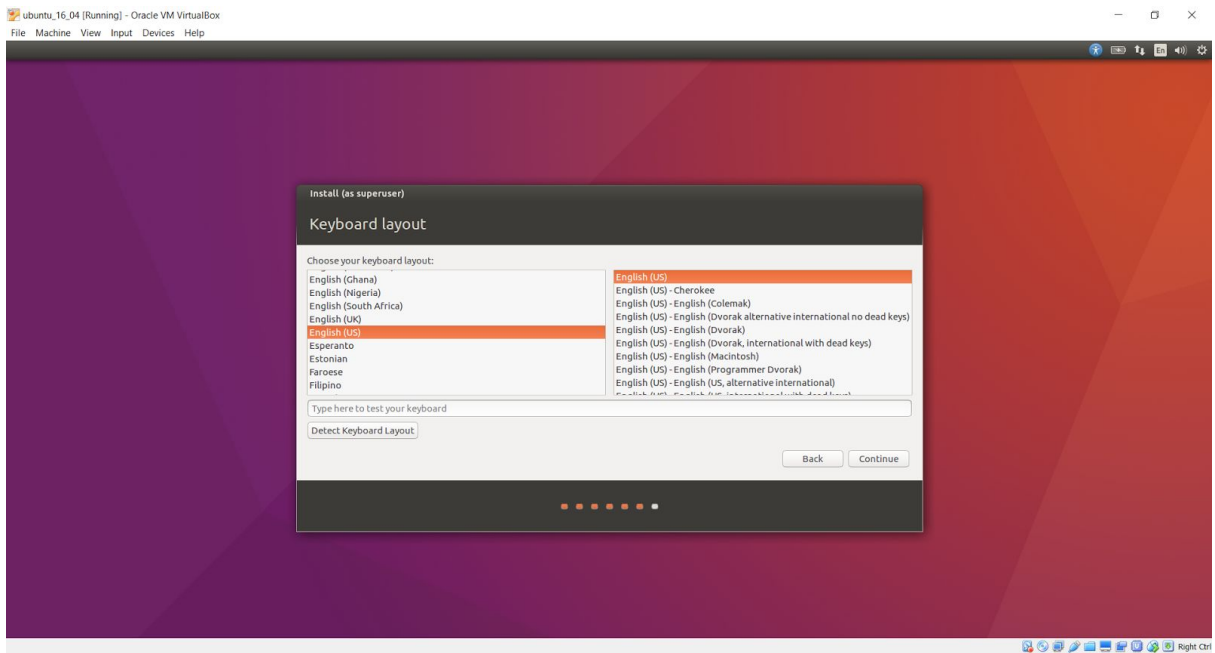
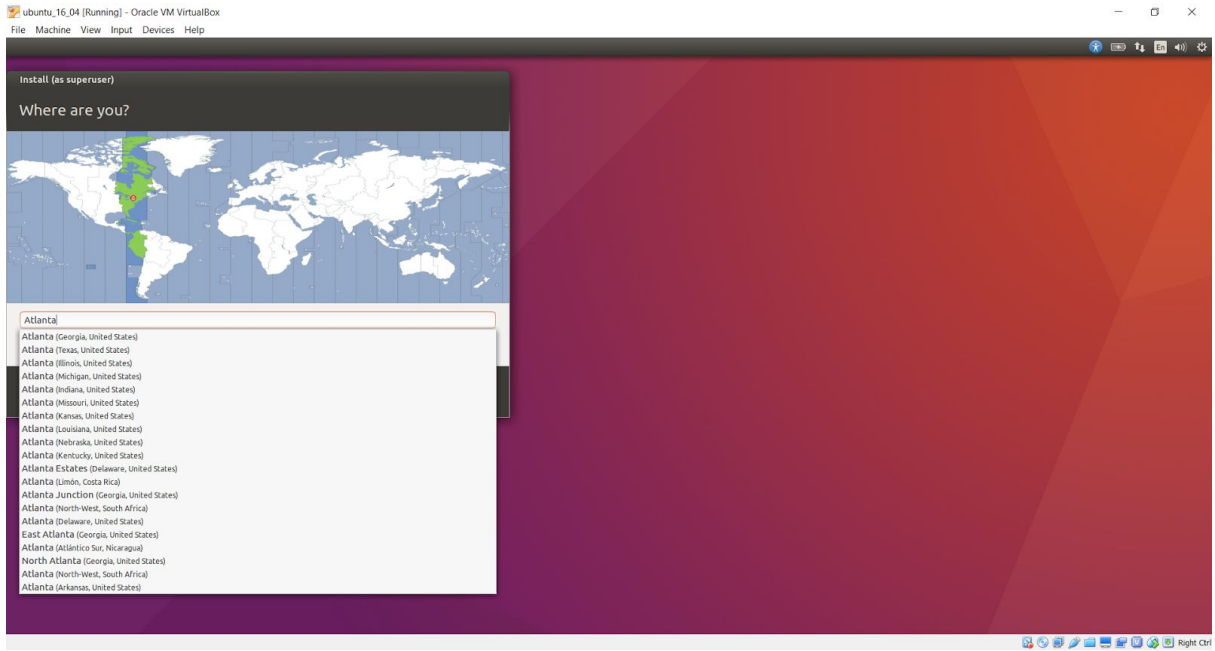
Click on the + sign with disc to add a new optical drive and select the ubuntu iso image downloaded previously. Then select ok. Back in the main menu, select the ubuntu_16_04 virtual machine and select start.



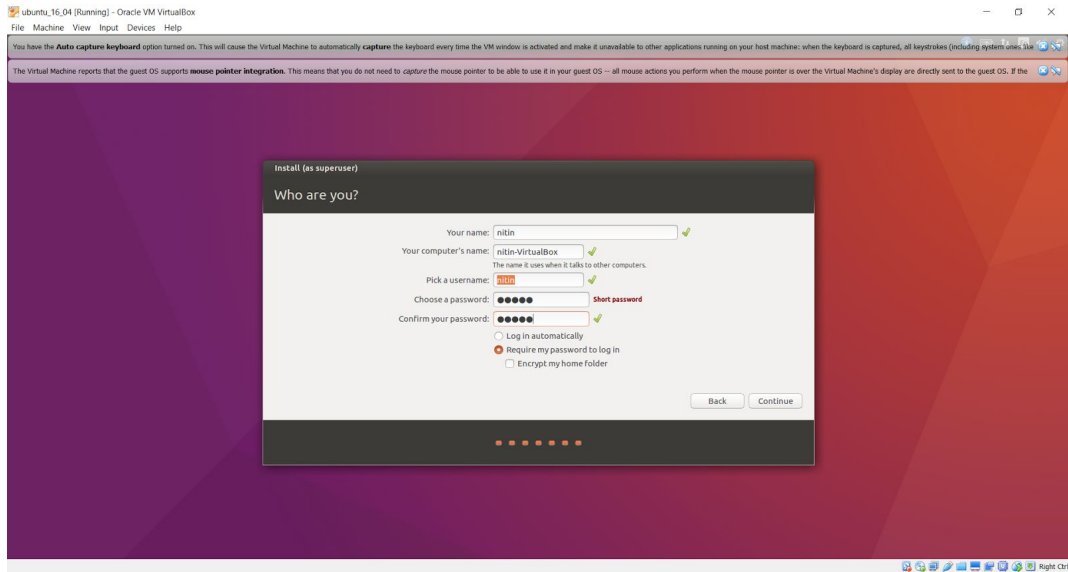
A new window with dialog box shown in the following image appears. Select install ubuntu and follow the instructions in the rest of the images.



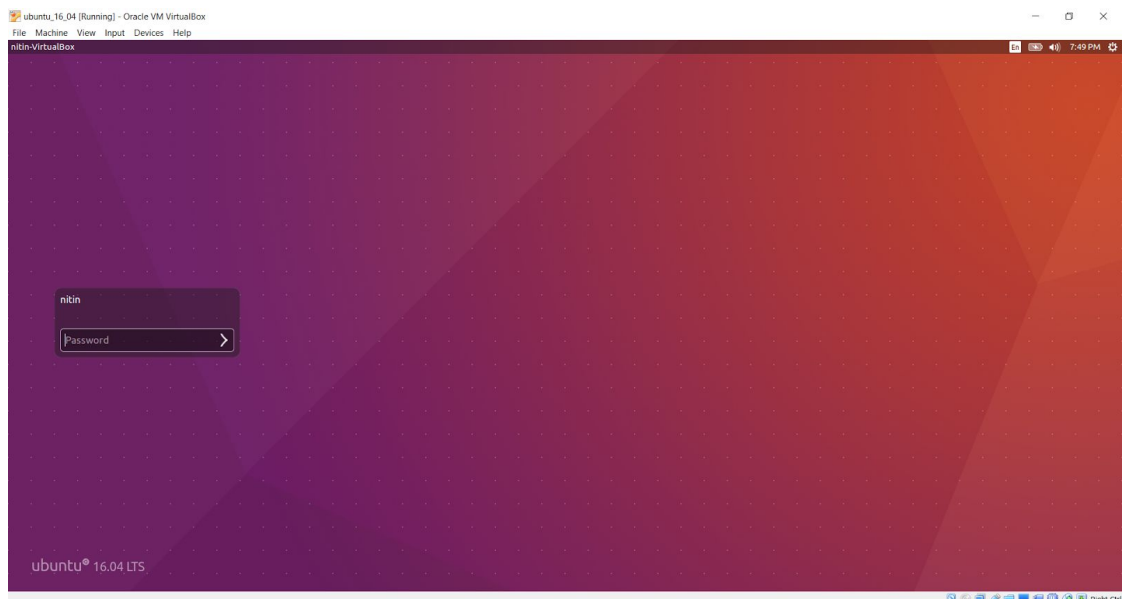




Select a username and password. Complete the installation. The installation might require a reboot.



Once the virtual machine is restarted, you will see the following screen, use your previously entered password to login.



Once inside ubuntu, you will need to install python 2.7.12 and the libraries with correct versions as mentioned in http://quantsoftware.gatech.edu/ML4T_Software_Installation.

You can do that with the following instructions, by opening a terminal (type terminal in Dash and open it) in ubuntu 16.04.

In the terminal type the following commands:

- Python 2.7.12 already comes installed with ubuntu 16.04

python --version

The above command displays the python version

- Update packages:

sudo-apt-get update

- Type software sources in Dash and open it. Tick the 'community maintained open source software (Universe)' option. Click close and choose reload from the next screen.

- Install pip

sudo apt-get install python-pip

- Install all required libraries for ML4T

```
pip install cycler==0.10.0
pip install cycler==0.10.0
pip install functools32==3.2.3.post2
pip install matplotlib==2.0.2
pip install numpy==1.13.1
pip install pandas==0.20.3
pip install py==1.4.34
pip install pyparsing==2.2.0
pip install pytest==3.2.1
pip install python-dateutil==2.6.1
pip install pytz==2017.2
pip install scipy==0.19.1
pip install six==1.10.0
pip install subprocess32==3.2.7
```

- Verify versions of all libraries

pip list

- Install git

```
sudo apt-get install git
```

- Clone the ML4T git repo:

```
git clone https://github.gatech.edu/ML4T/ML4T\_2017Fall.git
```

- Run the code for assignment 1:

```
cd ML4T_2017Fall
```

```
cd assess_portfolio
```

```
PYTHONPATH=../: python analysis.py
```

```
PYTHONPATH=../: python grade_analysis.py
```

You can also create a shared folder between windows host and ubuntu virtual machine by following this tutorial

<http://helpdeskgeek.com/virtualization/virtualbox-share-folder-host-guest/> .