

Configure the environment of Anaconda and Python libraries

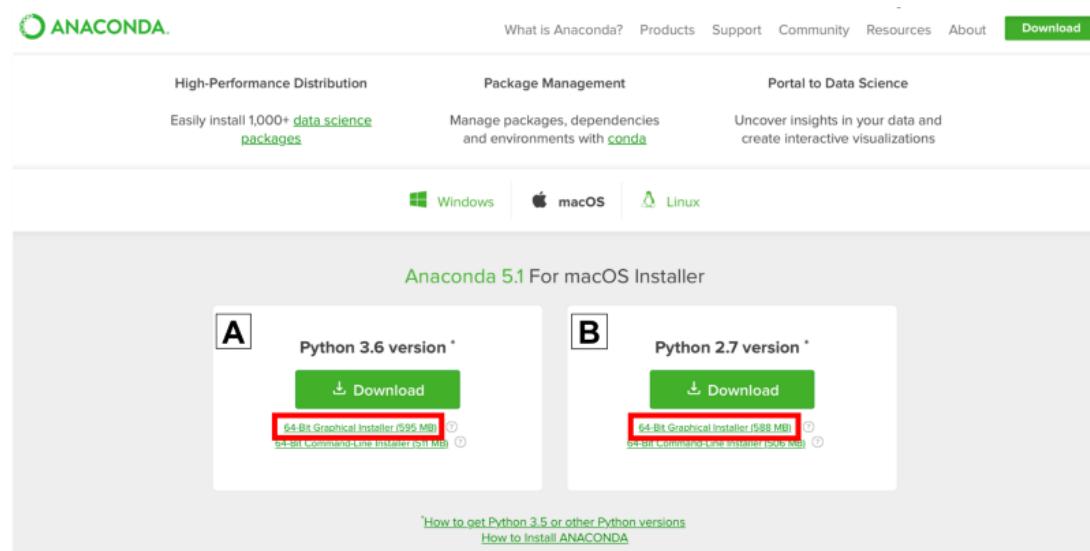
Python is an increasingly popular high-level programming language. It emphasizes legibility over highly complex structure. Python innately provides simple data structures allowing for easy data manipulation. Python provides a simple approach to object-oriented programming, which in turn allows for intuitive programming, and has resulted in a large user community that has created numerous libraries that extend the basic capacities of the language.

Python is an "interpreted" language. This means that every Python command that is executed is actually translated to lower-level programming languages. Lower-level programming languages are very fast and powerful, but writing programs in these languages can be difficult.

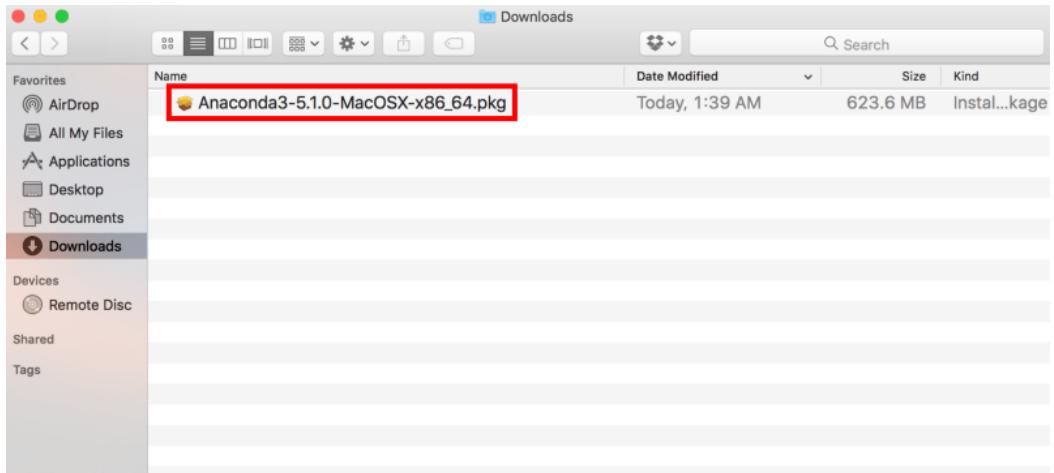
The Anaconda makes configuring Python programming environment super easy. The Anaconda is cross-platform library manager and it is very easy to install different libraries in Anaconda. The following tutorial will walk you through the tutorial for installing Anaconda and required Python modules.

1. Install Anaconda on your computer

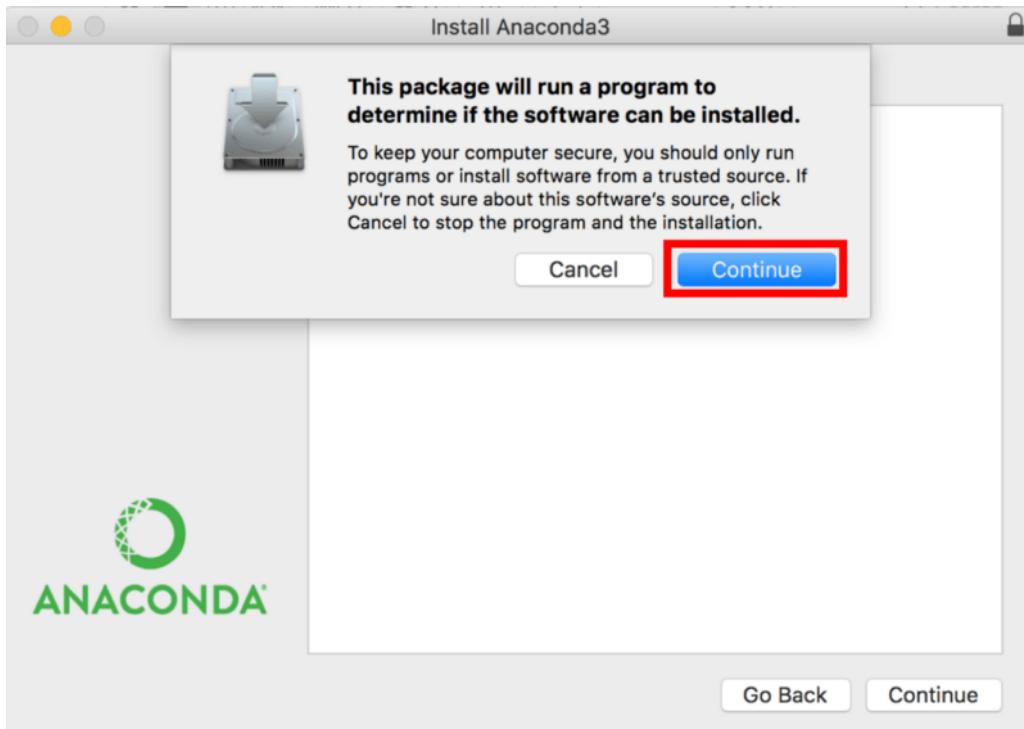
- (1) Go to website <https://www.anaconda.com/distribution/#macos> to download Anaconda for different OS.

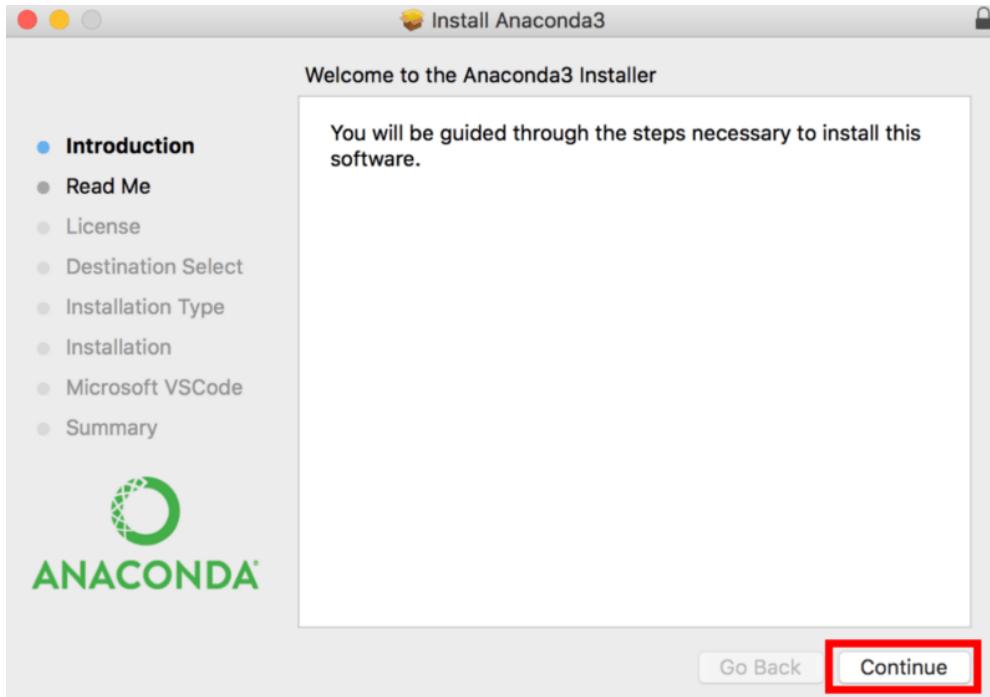


- (2) Locate your downloaded file and double click it

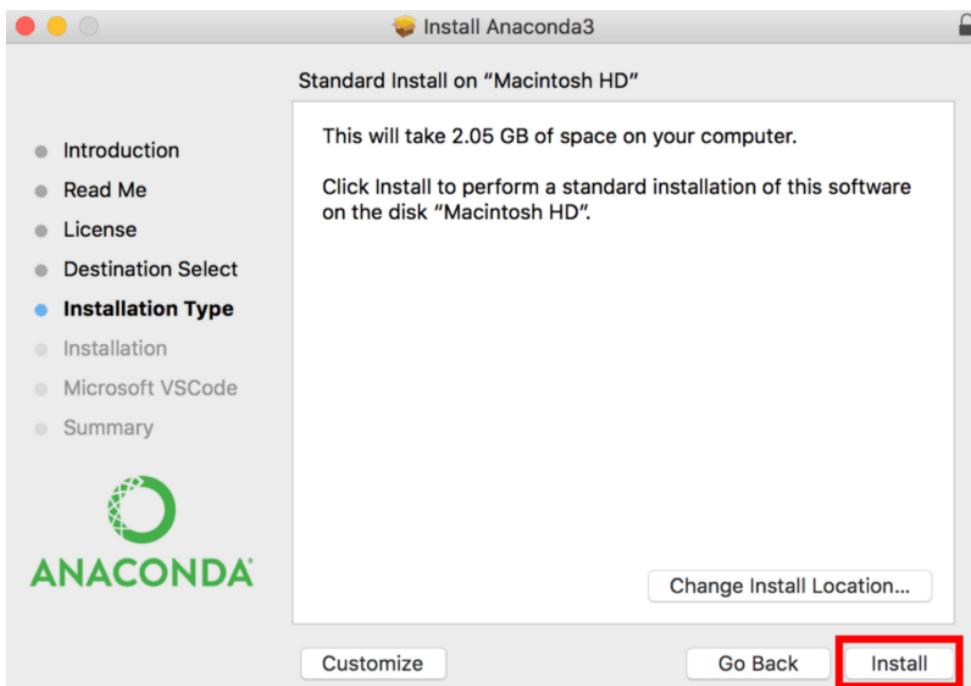


(3) Click on “*Continue*” and then following the instructions

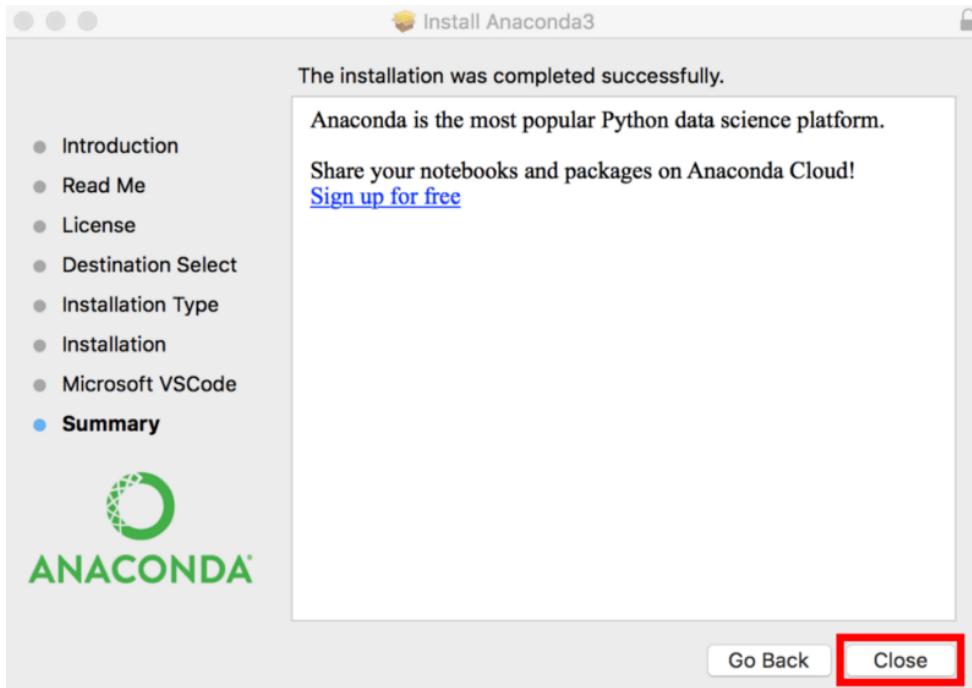




(4). Click on “*Install*”

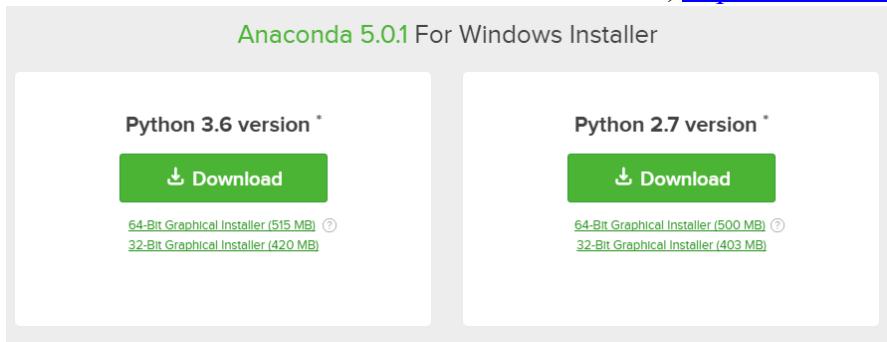


(5) Finally, click the “*close*” to finish the installment.



For Windows, reference: <https://problemsolvingwithpython.com/01-Orientation/01.03-Installing-Anaconda-on-Windows/>

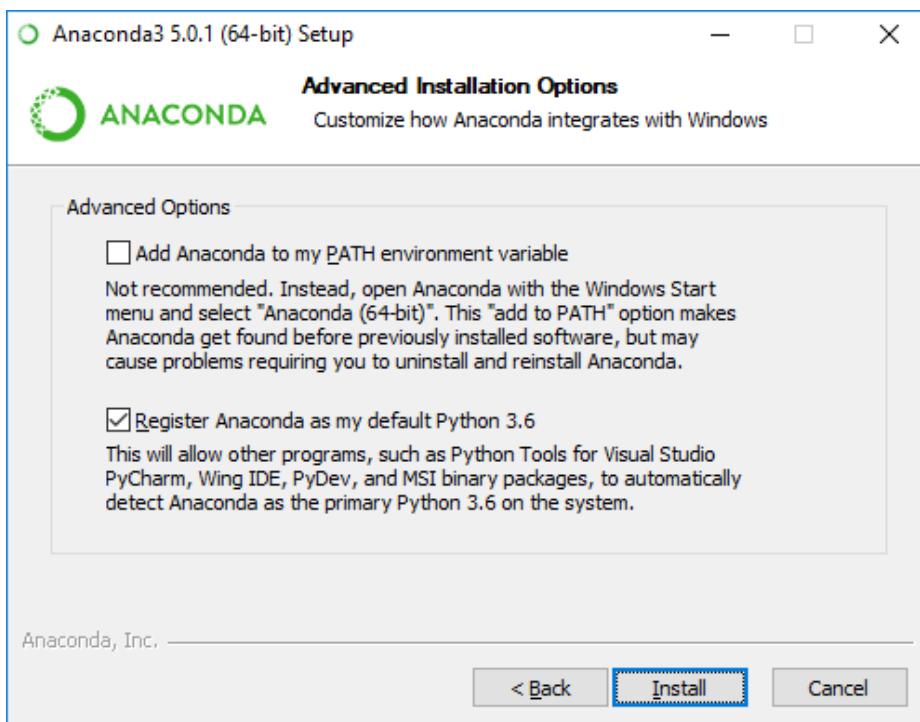
Go to the website and then download the install file, <https://www.anaconda.com/download/>



Locate the downloaded file and then install the file,



At the Advanced Installation Options screen, I recommend that you **do not check** "Add Anaconda to my PATH environment variable"



2. Anaconda tutorial

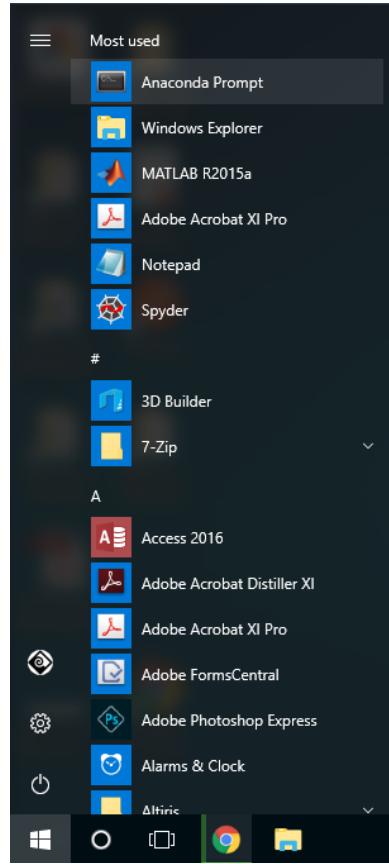
(1) Open the Anaconda command line terminal

For **Mac** users: Open your terminal directly. You may then see a window like this.



For **Windows** users:

After the installation of Anaconda is complete, you can go to the Windows start menu and select the Anaconda Prompt.



Windows look like this:

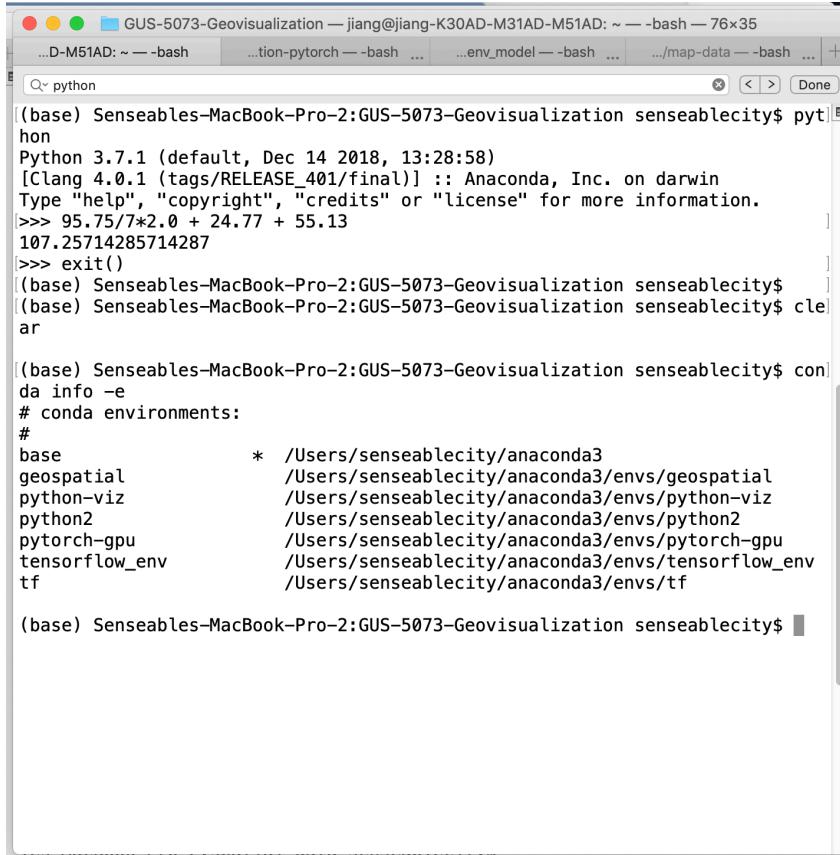
```
python
(C:\Users\peter.kazarinoff\AppData\Local\Continuum\Anaconda3) C:\Users\peter.kazarinoff>python
Python 3.6.1 |Anaconda 4.4.0 (64-bit)| (default, May 11 2017, 13:25:24) [MSC v.1900 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> import this
The Zen of Python, by Tim Peters

Beautiful is better than ugly.
Explicit is better than implicit.
Simple is better than complex.
Complex is better than complicated.
Flat is better than nested.
Sparse is better than dense.
Readability counts.
Special cases aren't special enough to break the rules.
Although practicality beats purity.
Errors should never pass silently.
Unless explicitly silenced.
In the face of ambiguity, refuse the temptation to guess.
There should be one-- and preferably only one --obvious way to do it.
Although that way may not be obvious at first unless you're Dutch.
Now is better than never.
Although never is often better than *right* now.
If the implementation is hard to explain, it's a bad idea.
If the implementation is easy to explain, it may be a good idea.
Namespaces are one honking great idea -- let's do more of those!
>>> -
```

Note: Anaconda is the Python distribution and the Anaconda Prompt is a command line shell (a program where you type in commands instead of using a mouse). The black screen and text that makes up the Anaconda Prompt doesn't look like much, but it is really helpful for problem solvers using Python.

(2) Check the current conda virtual environment by typing,

```
conda info -e
```



```
GUS-5073-Geovisualization — jiang@jiang-K30AD-M31AD-M51AD: ~ — bash — 76x35
...D-M51AD: ~ — bash ...tion-pytorch — bash ...env_model — bash .../map-data — bash ...
Q~ python
(base) Senseables-MacBook-Pro-2:GUS-5073-Geovisualization senseablecity$ pytho
hon
Python 3.7.1 (default, Dec 14 2018, 13:28:58)
[Clang 4.0.1 (tags/RELEASE_401/final)] :: Anaconda, Inc. on darwin
Type "help", "copyright", "credits" or "license" for more information.
>>> 95.75/7*2.0 + 24.77 + 55.13
107.25714285714287
>>> exit()
(base) Senseables-MacBook-Pro-2:GUS-5073-Geovisualization senseablecity$ 
(base) Senseables-MacBook-Pro-2:GUS-5073-Geovisualization senseablecity$ cle
ar

(base) Senseables-MacBook-Pro-2:GUS-5073-Geovisualization senseablecity$ con
da info -e
# conda environments:
#
base          * /Users/senseablecity/anaconda3
geospatial      /Users/senseablecity/anaconda3/envs/geospatial
python-viz       /Users/senseablecity/anaconda3/envs/python-viz
python2         /Users/senseablecity/anaconda3/envs/python2
pytorch-gpu      /Users/senseablecity/anaconda3/envs/pytorch-gpu
tensorflow_env   /Users/senseablecity/anaconda3/envs/tensorflow_env
tf              /Users/senseablecity/anaconda3/envs/tf

(base) Senseables-MacBook-Pro-2:GUS-5073-Geovisualization senseablecity$
```

If you have many virtual environments installed on your computer, then you will see a list of these. In this class, we can create a new virtual environment called “geoviz”. So, we can simply type,

```
conda create -n geoviz python=3.7
```

The above command will create a new virtual environment of “geoviz” with Python 3.7.

The following packages will be downloaded:

package	build
ca-certificates-2019.5.15	1
certifi-2019.6.16	py37_1
pip-19.2.2	py37_0
python-3.7.4	h359304d_1

Total: 23.8 MB

The following NEW packages will be INSTALLED:

ca-certificates	pkgs/main/osx-64::ca-certificates-2019.5.15-1
certifi	pkgs/main/osx-64::certifi-2019.6.16-py37_1
libcxx	pkgs/main/osx-64::libcxx-4.0.1-hcfea43d_1
libcxxabi	pkgs/main/osx-64::libcxxabi-4.0.1-hcfea43d_1
libedit	pkgs/main/osx-64::libedit-3.1.20181209-hb402a30_0
libffi	pkgs/main/osx-64::libffi-3.2.1-h475c297_4
ncurses	pkgs/main/osx-64::ncurses-6.1-h0a44026_1
openssl	pkgs/main/osx-64::openssl-1.1.1c-h1de35cc_1
pip	pkgs/main/osx-64::pip-19.2.2-py37_0
python	pkgs/main/osx-64::python-3.7.4-h359304d_1
readline	pkgs/main/osx-64::readline-7.0-h1de35cc_5
setuptools	pkgs/main/osx-64::setuptools-41.0.1-py37_0
sqlite	pkgs/main/osx-64::sqlite-3.29.0-ha441bb4_0
tk	pkgs/main/osx-64::tk-8.6.8-ha441bb4_0
wheel	pkgs/main/osx-64::wheel-0.33.4-py37_0
xz	pkgs/main/osx-64::xz-5.2.4-h1de35cc_4
zlib	pkgs/main/osx-64::zlib-1.2.11-h1de35cc_3

Proceed ([y]/n)?

Type in “y” in the terminal, and then follow the instructions and you will have the virtual environment installed. If everything works, then you can type in

```
conda info -e
```

You should see the “geoviz” there. Then you have created the virtual environment of “geoviz” successfully.

```
xiaojiang — bash — 76x37
...OneDrive - Temple University/Teaching/gus-geoviz — bash ...
xz          pkgs/main/osx-64::xz-5.2.4-h1de35cc_4
zlib        pkgs/main/osx-64::zlib-1.2.11-h1de35cc_3

Proceed ([y]/n)? y

Downloading and Extracting Packages
certifi-2019.6.16 | 155 KB | #####| 100%
python-3.7.4      | 21.6 MB | #####| 100%
ca-certificates-2019 | 133 KB | #####| 100%
pip-19.2.2       | 1.9 MB | #####| 100%
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
#
# To activate this environment, use
#
# $ conda activate geoviz
#
# To deactivate an active environment, use
#
# $ conda deactivate
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ conda info -e
# conda environments:
#
base          * //anaconda3
geoviz        //anaconda3/envs/geoviz
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ conda
```

Before we can use the created “geoviz” environment, we need to activate it first by,

```
conda activate geoviz
```

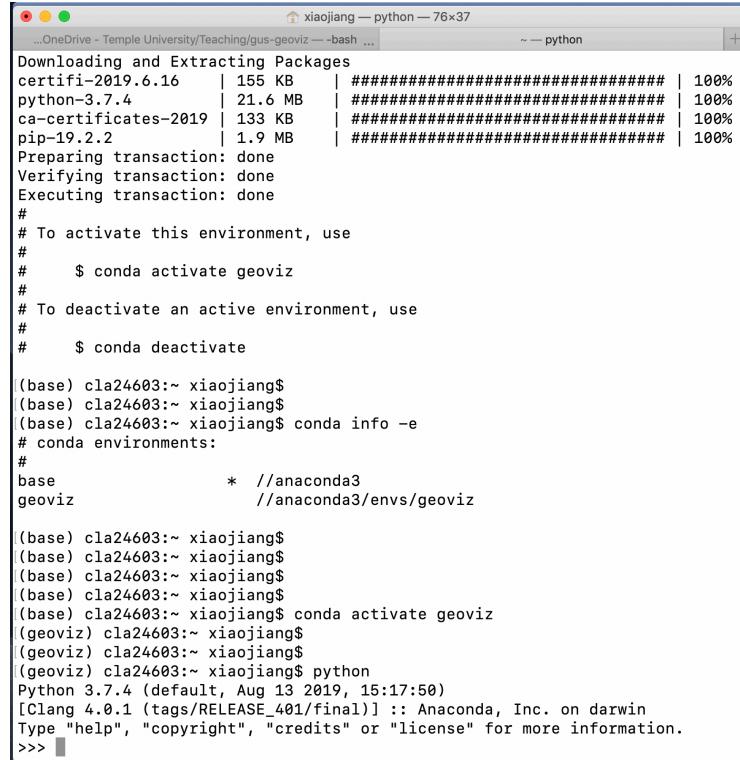
Then you can enter the virtual environment of geoviz

```
xiaojiang — bash — 76x37
...OneDrive - Temple University/Teaching/gus-geoviz — bash ...
zlib        pkgs/main/osx-64::zlib-1.2.11-h1de35cc_3

Proceed ([y]/n)? y

Downloading and Extracting Packages
certifi-2019.6.16 | 155 KB | #####| 100%
python-3.7.4      | 21.6 MB | #####| 100%
ca-certificates-2019 | 133 KB | #####| 100%
pip-19.2.2       | 1.9 MB | #####| 100%
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
#
# To activate this environment, use
#
# $ conda activate geoviz
#
# To deactivate an active environment, use
#
# $ conda deactivate
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ conda info -e
# conda environments:
#
base          * //anaconda3
geoviz        //anaconda3/envs/geoviz
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ conda activate geoviz
(geoviz) cla24603:~ xiaojiang$ 
```

We are ready to go and write Python code! Let's write a very simple Python code in the terminal. We can type in python in the terminal and then enter to the Python command line environment,



```
...OneDrive - Temple University/Teaching/gus-geoviz --bash ... ~ -- python
xiaojiang — python — 76x37
Downloading and Extracting Packages
certifi-2019.6.16      | 155 KB    | #####| 100%
python-3.7.4           | 21.6 MB   | #####| 100%
ca-certificates-2019  | 133 KB    | #####| 100%
pip-19.2.2             | 1.9 MB    | #####| 100%
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
#
# To activate this environment, use
#
#     $ conda activate geoviz
#
# To deactivate an active environment, use
#
#     $ conda deactivate
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ conda info -e
# conda environments:
#
base          * //anaconda3
geoviz          //anaconda3/envs/geoviz
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ conda activate geoviz
(geoviz) cla24603:~ xiaojiang$ 
(geoviz) cla24603:~ xiaojiang$ 
(geoviz) cla24603:~ xiaojiang$ 
(geoviz) cla24603:~ xiaojiang$ python
Python 3.7.4 (default, Aug 13 2019, 15:17:50)
[Clang 4.0.1 (tags/RELEASE_401/final)] :: Anaconda, Inc. on darwin
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

We can use the Python command line in the terminal now, let's do simple calculation and print the python version by typing in,

```
Python 3.7.4 (default, Aug 13 2019, 15:17:50)
[Clang 4.0.1 (tags/RELEASE_401/final)] :: Anaconda, Inc. on darwin
Type "help", "copyright", "credits" or "license" for more information.
>>> print(2+4)
6
>>> import sys
>>> print(sys.version)
3.7.4 (default, Aug 13 2019, 15:17:50)
[Clang 4.0.1 (tags/RELEASE_401/final)]
>>>
```

```

xiaojiang — python — 76x37
...OneDrive - Temple University/Teaching/gus-geoviz — bash ...
~ — python

#
#      $ conda activate geoviz
#
# To deactivate an active environment, use
#
#      $ conda deactivate

(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ conda info -e
# conda environments:
#
base          * //anaconda3
geoviz        //anaconda3/envs/geoviz

(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ 
(base) cla24603:~ xiaojiang$ conda activate geoviz
(geoviz) cla24603:~ xiaojiang$ 
(geoviz) cla24603:~ xiaojiang$ 
(geoviz) cla24603:~ xiaojiang$ python
Python 3.7.4 (default, Aug 13 2019, 15:17:50)
[Clang 4.0.1 (tags/RELEASE_401/final)] :: Anaconda, Inc. on darwin
Type "help", "copyright", "credits" or "license" for more information.
>>> print(2+4)
6
>>> import sys
>>> print(sys.__version__)
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
AttributeError: module 'sys' has no attribute '__version__'
>>> print(sys.version)
3.7.4 (default, Aug 13 2019, 15:17:50)
[Clang 4.0.1 (tags/RELEASE_401/final)]
>>>

```

(3) Install required modules using conda

After we get all the above setup, then we can use Anaconda to install Python modules. For example, in the lab we need to use the “Matplotlib” to plot graphics, then we can install the Matplotlib by simply typing,

```
conda install -c conda-forge matplotlib
```

We can also install other modules using conda easily. In the following labs, I will show you how to install different Python modules for different purposes.

Reference

Installing Anaconda on Mac OS X: <https://www.datacamp.com/community/tutorials/installing-anaconda-mac-os-x>

Install Anaconda on Mac, <https://docs.anaconda.com/anaconda/install/mac-os/>

Install Anaconda on Window, <https://docs.anaconda.com/anaconda/install/windows/#>