Programming With Python

1st part

By: Chamsseddine

Table of contents :

Welcome to the Python Workshop 7
Activities and Exercises 8
Installation and Setup 9
Installing Jupyter on your System 9
Launching the Jupyter Notebook 9
To Install the Python Terminal on your System 11
Chapter 1: Vital Python (Math, Strings, Conditionals, and Loops) ... *Erreur ! Signet non défini.*
Overview ..... **Erreur ! Signet non défini.**
Introduction ..... **Erreur ! Signet non défini.**
Vital Python ..... **Erreur ! Signet non défini.**
Numbers: Operations, Types, and Variables ..... **Erreur ! Signet non défini.**
To Open a Jupyter Notebook ..... **Erreur ! Signet non défini.**
Python as a Calculator ..... **Erreur ! Signet non défini.**
Standard Math Operations ..... **Erreur ! Signet non défini.**
Basic Math Operations ..... **Erreur ! Signet non défini.**
Order of Operations ..... **Erreur ! Signet non défini.**
Exercise 1: Getting to Know the Order of Operations ..... **Erreur ! Signet non défini.**
Spacing in Python ..... **Erreur ! Signet non défini.**
Number Types: Integers and Floats ..... **Erreur ! Signet non défini.**
Exercise 2 : Integer and Float Types ..... **Erreur ! Signet non défini.**
Complex Number Types ..... **Erreur ! Signet non défini.**
Errors in Python ..... **Erreur ! Signet non défini.**
Variables ..... **Erreur ! Signet non défini.**
Variable Assignment ..... **Erreur ! Signet non défini.**
Exercise 3 : Assigning Variables ..... **Erreur ! Signet non défini.**
Changing Types ..... **Erreur ! Signet non défini.**
Reassigning Variables in Terms of Themselves ..... **Erreur ! Signet non défini.**
Activity 1: Assigning Values to Variables ..... **Erreur ! Signet non défini.**
Variable Names ..... **Erreur ! Signet non défini.**
Multiple Variables ..... **Erreur ! Signet non défini.**
Exercise 4 : Variable Names ..... **Erreur ! Signet non défini.**
Exercise 5: Multiple Variables in Python ..... **Erreur ! Signet non défini.**
Comments ..... **Erreur ! Signet non défini.**
Exercise 6: Comments in Python ..... **Erreur ! Signet non défini.**
Docstrings ..... **Erreur ! Signet non défini.**
Activity 2: Finding a Solution Using the Pythagorean Theorem in Python ..... **Erreur ! Signet non défini.**
Strings: Concatenation, Methods, and input() ..... **Erreur ! Signet non défini.**
String Syntax ..... **Erreur ! Signet non défini.**
Exercise 7: String Error Syntax ..... **Erreur ! Signet non défini.**
Escape Sequences with Quotes ..... **Erreur ! Signet non défini.**
Multi-Line Strings ..... **Erreur ! Signet non défini.**

The print() Function ..... **Erreur ! Signet non défini.**
Exercise 8: Displaying Strings ..... **Erreur ! Signet non défini.**
String Operations and Concatenation ..... **Erreur ! Signet non défini.**
Exercise 9: String Concatenation ..... **Erreur ! Signet non défini.**
String Interpolation ..... **Erreur ! Signet non défini.**
Comma Separators ..... **Erreur ! Signet non défini.**
Format ..... **Erreur ! Signet non défini.**
The len() Function ..... **Erreur ! Signet non défini.**
String Methods ..... **Erreur ! Signet non défini.**
Exercise 10: String Methods ..... **Erreur ! Signet non défini.**
Casting ..... **Erreur ! Signet non défini.**
Exercise 11: Types and Casting ..... **Erreur ! Signet non défini.**
The input() Function ..... **Erreur ! Signet non défini.**
Exercise 12: The input() Function ..... **Erreur ! Signet non défini.**
Activity 3: Using the input() Function to Rate Your Day ..... **Erreur ! Signet non défini.**
String Indexing and Slicing ..... **Erreur ! Signet non défini.**
Indexing ..... **Erreur ! Signet non défini.**
Slicing ..... **Erreur ! Signet non défini.**
Strings and Their Methods ..... **Erreur ! Signet non défini.**
Booleans and Conditionals ..... **Erreur ! Signet non défini.**
Booleans ..... **Erreur ! Signet non défini.**
Exercise 13 : Boolean Variables ..... **Erreur ! Signet non défini.**
Logical Operators ..... **Erreur ! Signet non défini.**
Comparison Operators ..... **Erreur ! Signet non défini.**
Exercise 14: Comparison Operators ..... **Erreur ! Signet non défini.**
Open a new Jupyter Notebook. ..... **Erreur ! Signet non défini.**
Comparing Strings ..... **Erreur ! Signet non défini.**
Exercise 15: Comparing Strings ..... **Erreur ! Signet non défini.**
Conditionals ..... **Erreur ! Signet non défini.**
The if Syntax ..... **Erreur ! Signet non défini.**
Indentation ..... **Erreur ! Signet non défini.**
Exercise 16: Using the if Syntax ..... **Erreur ! Signet non défini.**
if else ..... **Erreur ! Signet non défini.**
Exercise 17: Using the if-else Syntax ..... **Erreur ! Signet non défini.**
The elif Statement ..... **Erreur ! Signet non défini.**
Loops ..... **Erreur ! Signet non défini.**
The while Loops ..... **Erreur ! Signet non défini.**
An Infinite Loop ..... **Erreur ! Signet non défini.**
break ..... **Erreur ! Signet non défini.**
Activity 4: Finding the Least Common Multiple (LCM) ..... **Erreur ! Signet non défini.**
Programs ..... **Erreur ! Signet non défini.**
eval ..... **Erreur ! Signet non défini.**

Exercise 18: Calculating Perfect Squares ..... **Erreur ! Signet non défini.**
Exercise 19 : Real Estate Offer ..... **Erreur ! Signet non défini.**
The for Loop ..... **Erreur ! Signet non défini.**
The continue Keyword ..... **Erreur ! Signet non défini.**
Exercise 20: Using for Loops ..... **Erreur ! Signet non défini.**
Chapter 2: Python Structures ..... *Erreur ! Signet non défini.*
Overview ..... **Erreur ! Signet non défini.**
Introduction ..... **Erreur ! Signet non défini.**
The Power of Lists ..... **Erreur ! Signet non défini.**
Exercise 21: Working with Python Lists ..... **Erreur ! Signet non défini.**
Matrices as Nested Lists ..... **Erreur ! Signet non défini.**
Exercise 22: Using a Nested List to Store Data from a Matrix ..... **Erreur ! Signet non défini.**
Activity 6: Using a Nested List to Store Employee Data ..... **Erreur ! Signet non défini.**
Matrix Operations ..... **Erreur ! Signet non défini.**
Exercise 23: Implementing Matrix Operations (Addition and Subtraction) ..... **Erreur ! Signet non défini.**
Matrix Multiplication Operations ..... **Erreur ! Signet non défini.**
Exercise 24 : Implementing Matrix Operations (Multiplication) ..... **Erreur ! Signet non défini.**
List Methods ..... **Erreur ! Signet non défini.**
Exercise 25: Basic List Operations ..... **Erreur ! Signet non défini.**
Accessing an Item from a List ..... **Erreur ! Signet non défini.**
Exercise 26: Accessing an Item from Shopping List Data ..... **Erreur ! Signet non défini.**
Adding an Item to a List ..... **Erreur ! Signet non défini.**
Exercise 27: Adding Items to Our Shopping List ..... **Erreur ! Signet non défini.**
Dictionary Keys and Values ..... **Erreur ! Signet non défini.**
Exercise 28: Using a Dictionary to Store a Movie Record ..... **Erreur ! Signet non défini.**
Activity 7: Storing Company Employee Table Data Using a List and a Dictionary ..... **Erreur ! Signet non défini.**
Zipping and Unzipping Lists Using zip() ..... **Erreur ! Signet non défini.**
Exercise 29: Using the zip() Method to Manipulate Dictionaries ..... **Erreur ! Signet non défini.**
Dictionary Methods ..... **Erreur ! Signet non défini.**
Exercise 30: Accessing a Dictionary Using Dictionary Methods ..... **Erreur ! Signet non défini.**
Tuples ..... **Erreur ! Signet non défini.**
Exercise 31: Exploring Tuple Properties in Our Shopping List ..... **Erreur ! Signet non défini.**
A Survey of Sets ..... **Erreur ! Signet non défini.**
Exercise 32: Using Sets in Python ..... **Erreur ! Signet non défini.**
Set Operations ..... **Erreur ! Signet non défini.**
Exercise 33: Implementing Set Operations ..... **Erreur ! Signet non défini.**
Choosing Types ..... **Erreur ! Signet non défini.**
Chapter 2 Summary: ..... **Erreur ! Signet non défini.**
Chapter 3: Executing Python (Programs, Algorithms, and Functions) ..... *Erreur ! Signet non défini.*
Overview ..... **Erreur ! Signet non défini.**
Introduction ..... **Erreur ! Signet non défini.**
Python Scripts and Modules ..... **Erreur ! Signet non défini.**

Exercise 34: Writing and Executing our First Script ..... **Erreur ! Signet non défini.**
Exercise 35: Writing and Importing our First Module ..... **Erreur ! Signet non défini.**
Shebangs in Ubuntu ..... **Erreur ! Signet non défini.**
Docstrings ..... **Erreur ! Signet non défini.**
Exercise 36: Adding a Docstring to my_module.py ..... **Erreur ! Signet non défini.**
Imports ..... **Erreur ! Signet non défini.**
Exercise 37: Finding the System Date ..... **Erreur ! Signet non défini.**
The if __name__ == "__main__" Statement ..... **Erreur ! Signet non défini.**
Activity 8: What's the Time? ..... **Erreur ! Signet non défini.**
Python Algorithms ..... **Erreur ! Signet non défini.**
Exercise 38: The Maximum Number ..... **Erreur ! Signet non défini.**
Time Complexity ..... **Erreur ! Signet non défini.**
Time Complexity for the Maximum Number Algorithm ..... **Erreur ! Signet non défini.**
Sorting Algorithms ..... **Erreur ! Signet non défini.**
Exercise 39: Using Bubble Sort in Python ..... **Erreur ! Signet non défini.**
Searching Algorithms ..... **Erreur ! Signet non défini.**
Exercise 40: Linear Search in Python ..... **Erreur ! Signet non défini.**
Exercise 41: Binary Search in Python ..... **Erreur ! Signet non défini.**
Basic Functions ..... **Erreur ! Signet non défini.**
Exercise 42: Defining and Calling the Function in Shell ..... **Erreur ! Signet non défini.**
Exercise 43: Defining and Calling the Function in Python Script ..... **Erreur ! Signet non défini.**
Exercise 44: Importing and Calling the Function from the Shell ..... **Erreur ! Signet non défini.**
Positional Arguments ..... **Erreur ! Signet non défini.**
Default Arguments ..... **Erreur ! Signet non défini.**
Exercise 45: Defining the Function with Keyword Arguments ..... **Erreur ! Signet non défini.**
Positional and Keyword Arguments ..... **Erreur ! Signet non défini.**
Exercise 46: Defining the Function with Positional and Keyword Arguments ..... **Erreur ! Signet non défini.**
*args and **kwargs Arguments ..... **Erreur ! Signet non défini.**
Exercise 47: Using **kwargs ..... **Erreur ! Signet non défini.**
Activity 9: Formatting Customer Names ..... **Erreur ! Signet non défini.**
Iterative Functions ..... **Erreur ! Signet non défini.**
Exiting Early ..... **Erreur ! Signet non défini.**
Exercise 48: A Simple Function with a For Loop ..... **Erreur ! Signet non défini.**
Exercise 49: Exiting the Function During the For Loop ..... **Erreur ! Signet non défini.**
Activity 10: The Fibonacci Function with an Iteration ..... **Erreur ! Signet non défini.**
Recursive Functions ..... **Erreur ! Signet non défini.**
A Terminating Case ..... **Erreur ! Signet non défini.**
Exercise 50: Recursive Countdown ..... **Erreur ! Signet non défini.**
Exercise 51: Factorials with Iteration and Recursion ..... **Erreur ! Signet non défini.**
Activity 11: The Fibonacci Function with Recursion ..... **Erreur ! Signet non défini.**
Dynamic Programming ..... **Erreur ! Signet non défini.**
Exercise 52: Summing Integers ..... **Erreur ! Signet non défini.**

Timing Your Code ..... **Erreur ! Signet non défini.**
Exercise 53: Timing Your Code ..... **Erreur ! Signet non défini.**
Activity 12: The Fibonacci Function with Dynamic Programming ..... **Erreur ! Signet non défini.**
Helper Functions ..... **Erreur ! Signet non défini.**
Don't Repeat Yourself ..... **Erreur ! Signet non défini.**
Exercise 54: Helper Currency Conversion ..... **Erreur ! Signet non défini.**
Variable Scope ..... **Erreur ! Signet non défini.**
Variables ..... **Erreur ! Signet non défini.**
Defining inside versus outside a Function ..... **Erreur ! Signet non défini.**
The Global Keyword ..... **Erreur ! Signet non défini.**
The Nonlocal Keyword ..... **Erreur ! Signet non défini.**
Lambda Functions ..... **Erreur ! Signet non défini.**
Exercise 55: The First Item in a List (lambda function) ..... **Erreur ! Signet non défini.**
Mapping with Lambda Functions ..... **Erreur ! Signet non défini.**
Exercise 56: Mapping with a Logistic Transform ..... **Erreur ! Signet non défini.**
Filtering with Lambda Functions ..... **Erreur ! Signet non défini.**
Exercise 57: Using the Filter Lambda ..... **Erreur ! Signet non défini.**
Sorting with Lambda Functions ..... **Erreur ! Signet non défini.**
Chapter 3 Summary: ..... **Erreur ! Signet non défini.**

Why python:

Python is easy to use, powerful, and versatile, making it a great choice for beginners and experts alike. Python's readability makes it a great first programming language — it allows you to think like a programmer and not waste time with confusing syntax, it is a high-level, interpreted and general-purpose dynamic programming language that focuses on code readability. The syntax in Python helps the programmers to do coding in fewer steps as compared to Java or C++. ... The Python is widely used in bigger organizations because of its multiple programming paradigms.

why this book?

In this book, we tried to collect all the important titles in Python, and make it simpler, so after each part there is an exercise with the solution to explain that part more, and make it more comprehensible.(+50 exercise and 10 activities with solutions),and also it contains images from the executor (Jupyter), and illustrations for better understanding.

Welcome to the Python Workshop

Thank you for purchasing the book: **programming with python!** Before we get started we just need to explain some of the unique features of the course, and run through installation and setup for your local environment.

As you work through the material, you'll notice that all practical hands-on elements in the course (which we call **exercises** and **activities**) start by walking through a step-by-step reference implementation, followed by an instructor screencast. We recommend that you try to follow the step-by-step instructions for each practical task first, *before* walking through the guided example with an instructor.

Taking this approach helps hack your brain, building and reinforcing your learning. It helps with embedding core concepts so that they stick with you for the years ahead. This is also why you'll periodically come across knowledge-check events in the form of informal quizzes. They're not graded and there is zero pressure; they're just there to help you benchmark and lock-in what you've worked through over the duration of the course.

If you find yourself getting a lot of summary questions incorrect, it's worth stepping back, taking a break and revisiting a section another time. This fits in with a general rule; don't be too hard on yourself! Learning is not an instantaneous process, and is best conducted in chunks over a longer period of time. We've structured the course so that you can dip in and out to meet **your** needs, with quizzes and exercises acting as useful self-diagnostic tools.

Activities and Exercises

One last thing we should mention is the difference between exercises and activities. Exercises are completely end-to-end and step-by-step. Combined with instructor screencasts, you should never get stuck or be left wondering why something isn't working.

Activities start off the same as exercises, but leave you with open-ended expansion points for self-study and exploration. It's absolutely worth stepping back and spending some time on extending activities. The process helps to extend your frame of reference and apply your own creative input to what you've just learned, further embedding your new skills. Just in case you run into some roadblocks, at the end of the course you'll still find reference solutions for all activities.

With the methodology of the course out of the way, let's move on to installation and setup!

Installation and Setup

Installing Jupyter on your System

We will be using Python 3.7:

To install Jupyter on Windows, MacOS and Linux follow these steps:

1. Head to Anaconda Distribution (https://www.anaconda.com/) to install the Anaconda Navigator, which is an interface through which you can access your local Jupyter notebook.
2. Now, based on your Operating system (Windows, macOS or Linux) you need to download the Anaconda Installer. Have a look at the following figure where we have downloaded the Anaconda files for Windows:

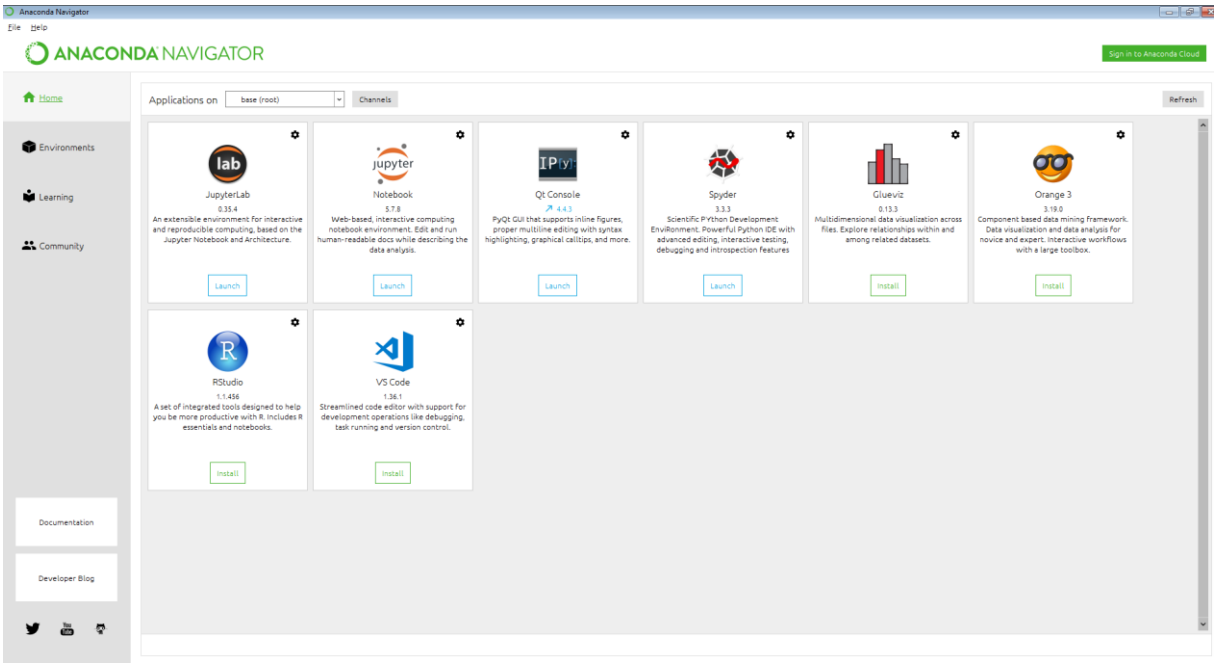

Figure 0.1: The Anaconda home screen

Launching the Jupyter Notebook

To Launch the Jupyter Notebook from the Anaconda Navigator you need to follow the mentioned steps below:

1. Once you install the Anaconda Navigator you will have the following screen at your end as shown in *Figure 0.2*.

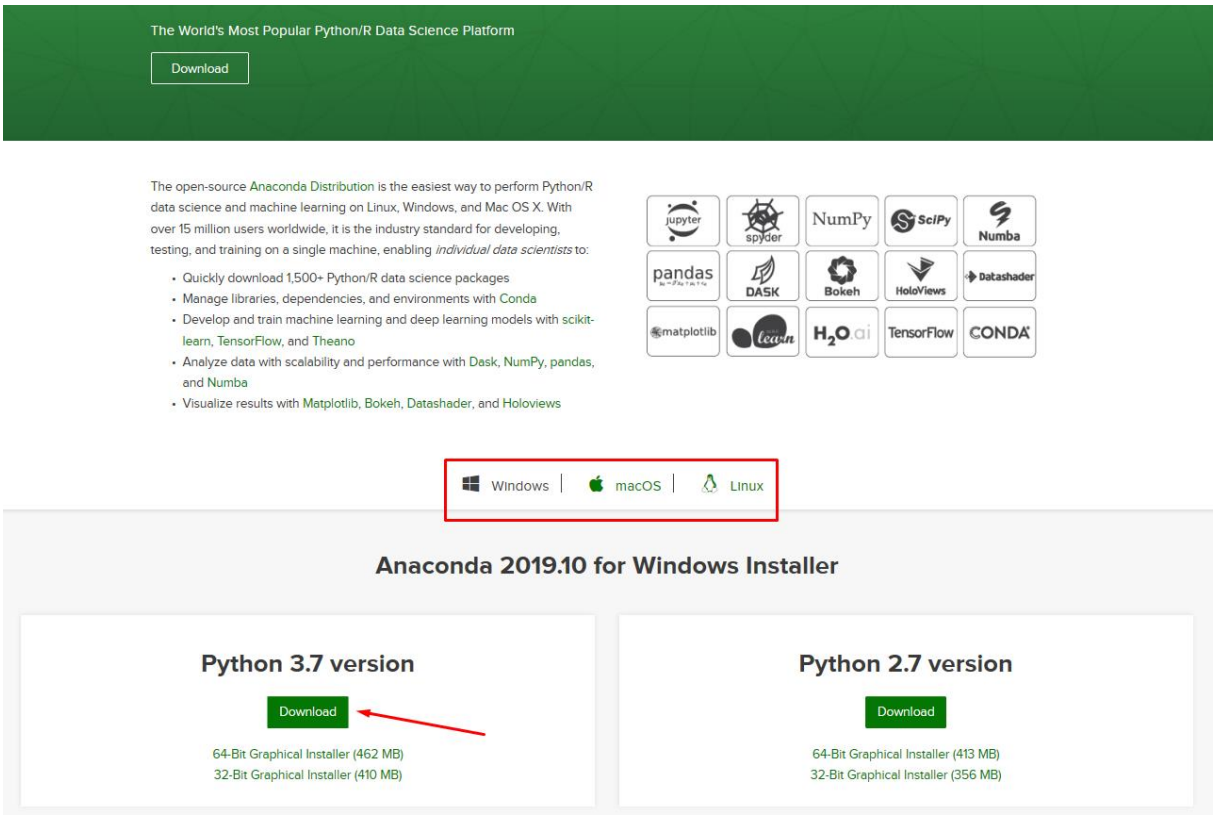

Figure 0.2: Anaconda installation screen

2. Now, click on **`Launch`** under the Jupyter Notebook option and launch the notebook on your local system:

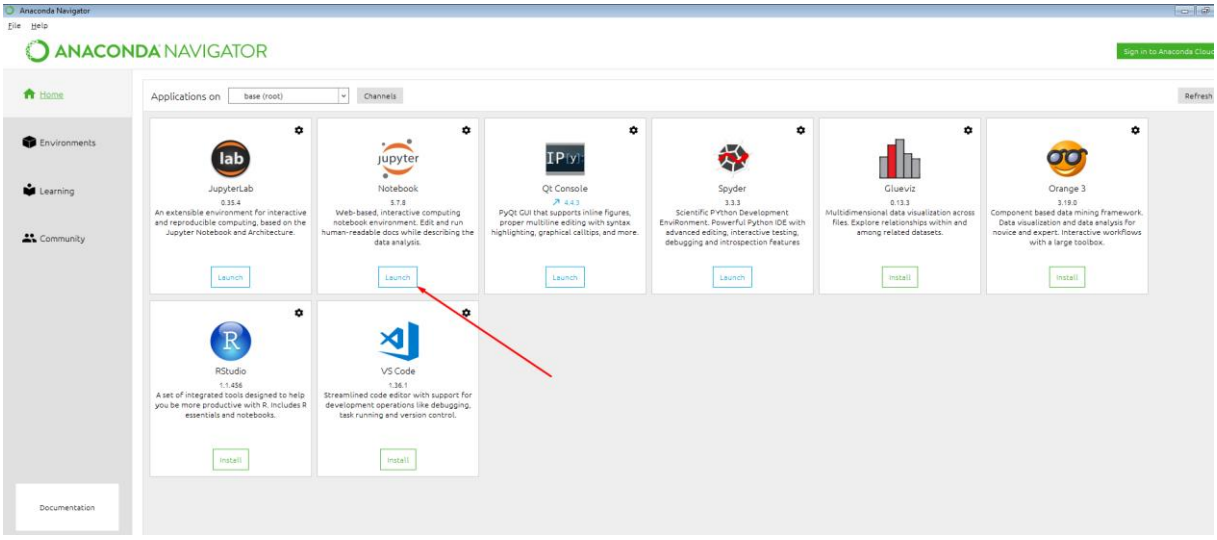

Figure 0.3: Jupyter notebook launch option

You have successfully installed Jupyter Notebook onto your system.

To Install the Python Terminal on your System

To install the Python terminal on your system, follow these steps:

1. Open the following link, which is the Python community : www.python.org/downloads/

2. Select the Operating System (Windows, macOS or Linux) you would be working on as highlighted in the following screenshot:

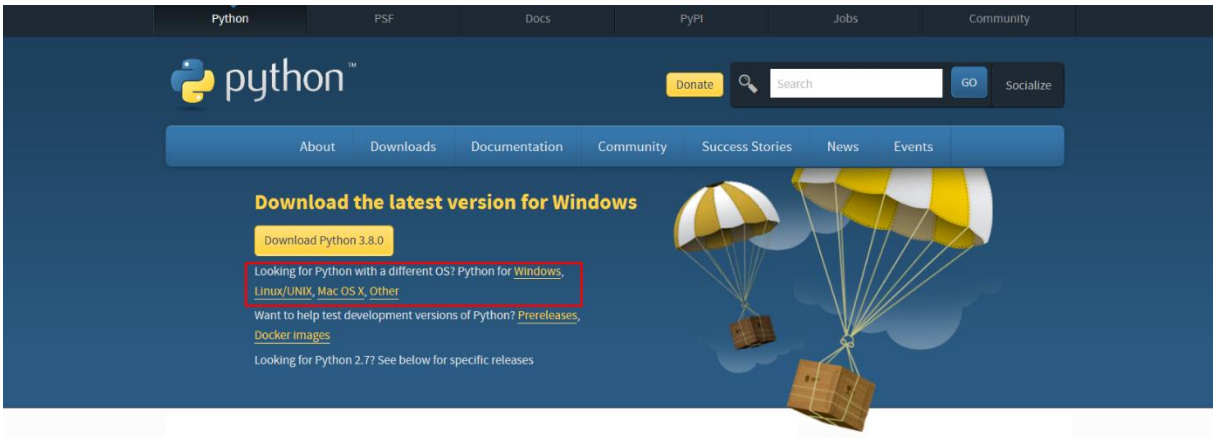

Figure 0.4: The Python home screen

3. Once you have downloaded the software, you need to install it.
4. Have a look at the following screenshot in which we have installed the Python terminal on a Windows system. We load it through the Start menu and search for Python and **click** on the software. The Python terminal will look like this:

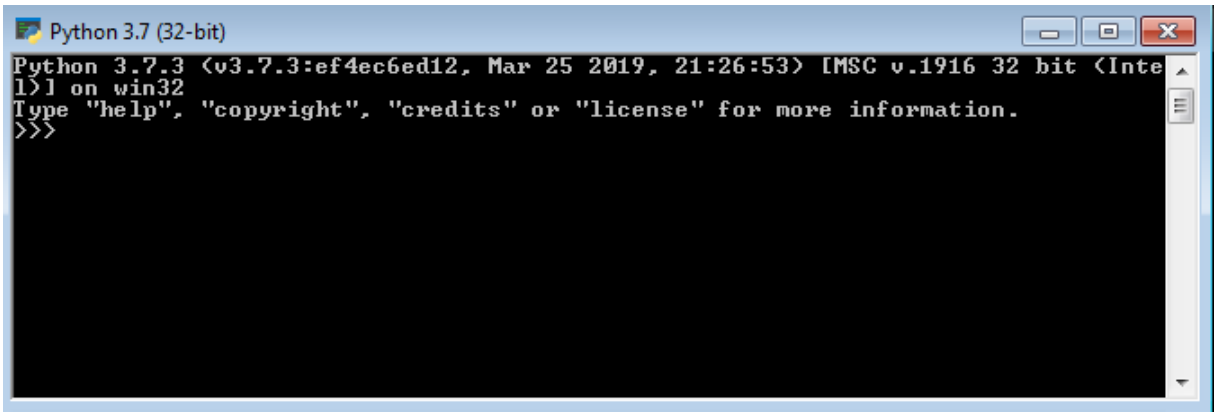

Figure 0.5: Python terminal interface

You have successfully installed the Python terminal onto your system.