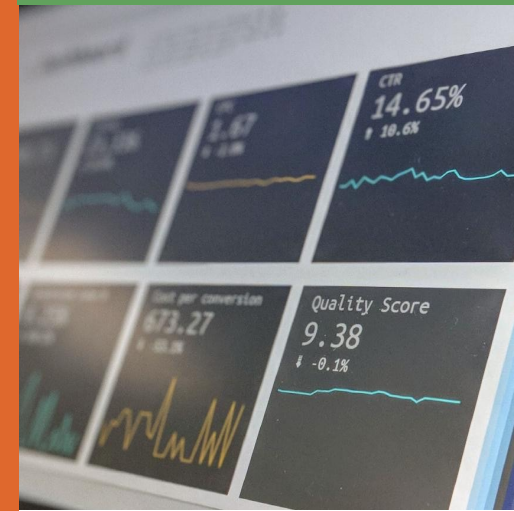


RESPONSIBLE ARTIFICIAL INTELLIGENCE LAB (RAIL)

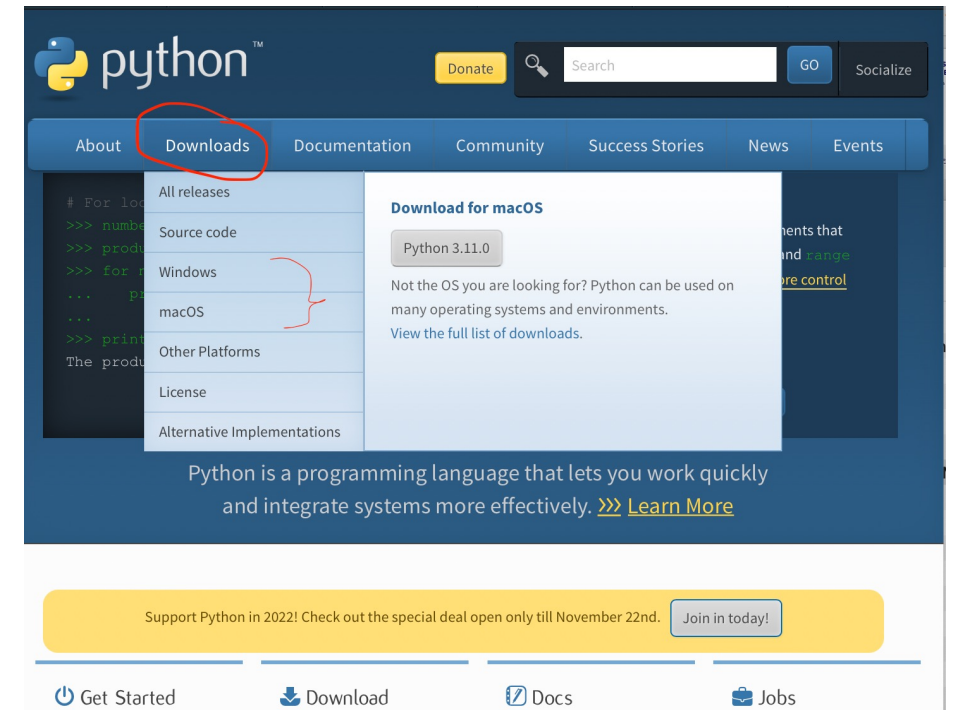
Python Primer

5th December 2022



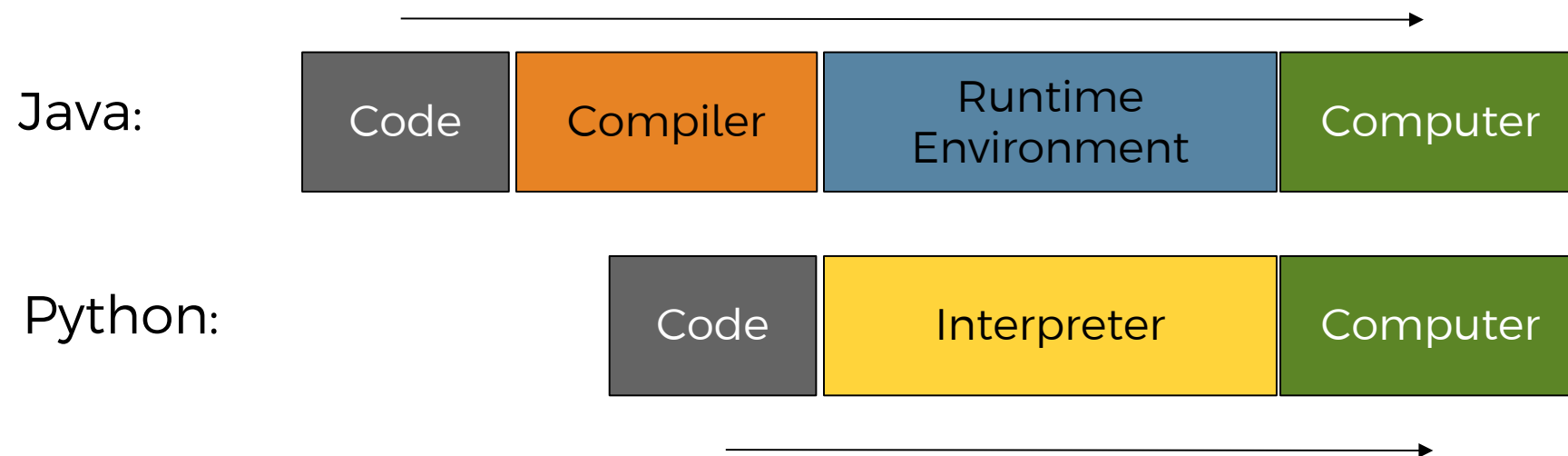
Python

- Created in 1991 by Guido van Rossum
- Useful as a scripting language
 - Script: A small program meant for one-time use
 - Targeted towards small to medium-sized projects
- Used by:
 - Google, Yahoo!, Youtube
 - Many Linux distributions
 - Games and apps



Interpreted Language

- Python is Interpreted Language
- Code is written and directly executed by an interpreter
- Not Compiled Like Java, etc.



Our First Python Code

- Python does not have a **main** method like Java.
- The program's main code is just written directly in the file
- Python statements do not end with semicolons

hello.py

```
1 print("Hello, world!")
```

The Print Statement

- `print("text")`
- `print()` (a blank line)
- Escape sequences such as `\` are the same as in Java
- Strings can also start/end with `'`

first_code.py

```
1 print("Hello, world!")
2 print()
3 print("This is your first python code. \"Anaconda\"
4 is great")
print('Science or "Engineering" student?')
```

Comments

Syntax:

comment text (one line)

first_code.py

```
1 # RAIL Short Course, KNUST
2 # This program prints important messages.
3 print("Hello, world!")
4 print()                    # blank line
5 print("This is your first python code. \"Anaconda\"
6 is great")
print('Science or "Engineering" student?')
```

Functions

Function: Equivalent to a static method in Java.

Syntax:

```
def name():  
    statement  
    statement  
    ...  
    statement
```

functions.py

```
1  # Prints a helpful message.  
2  def hello():  
3      print("Hello, world!")  
4  
5  # main (calls hello twice)  
6  hello()  
7  hello()
```

Must be declared above the 'main' code

Statements inside the function must be indented

White Space Significance

- It makes the code simpler and more readable.
- In most programming languages, indenting is optional. In Python, you **MUST** indent.

hello3.py

```
1  # Prints a helpful message.
2  def hello():
3      print("Hello, world!")
4      print("How are you?")
5
6  # main (calls hello twice)
7  hello()
8  hello()
```


Python Libraries

- The Python language has only elementary operations.
- Most functions are in various libraries.
- E.g. The NumPy library is convenient for extensive mathematical operation.
- The image shows how to import NumPy with the prefix np and then use it to call a common mathematical function.

```
import numpy as np

# mathematical constants
print(np.pi)
print(np.e)

# trigonometric functions
angle = np.pi/4
print(np.sin(angle))
print(np.cos(angle))
print(np.tan(angle))
```

```
3.141592653589793
2.718281828459045
0.707106781187
0.707106781187
1.0
```

Working with Lists

- Lists are a versatile way of organising your data in Python.
- Concatenation is the operation of joining one list to another.
- Sum a list of numbers
- Iterating over Lists

```
xList = [1, 2, 3, 4]  
xList
```

```
[1, 2, 3, 4]
```

```
# Concatenation  
x = [1, 2, 3, 4];  
y = [5, 6, 7, 8];  
  
x + y
```

```
[1, 2, 3, 4, 5, 6, 7, 8]
```

```
np.sum(x)
```

```
10
```

```
for x in xList:  
    print("sin({0}) = {1:8.5f}".format(x,np.sin(x)))
```

```
sin(1) = 0.84147  
sin(2) = 0.90930  
sin(3) = 0.14112  
sin(4) = -0.75680
```

Working with Dictionaries

- Dictionaries help store and retrieve data as key-value pairs.
- Add values to existing dictionaries.
- Retrieve values from dictionaries
- Iterating over a dictionary

```
mw = {'CH4': 16.04, 'H2O': 18.02, 'O2': 32.00, 'CO2': 44.01}
mw
```

```
{'CH4': 16.04, 'CO2': 44.01, 'H2O': 18.02, 'O2': 32.0}
```

```
mw['C8H18'] = 114.23
mw
```

```
{'C8H18': 114.23, 'CH4': 16.04, 'CO2': 44.01, 'H2O': 18.02, 'O2': 32.0}
```

```
mw['CH4']
```

```
16.04
```

```
for species in mw.keys():
    print("The molar mass of {:<s} is {:<7.2f}".format(species, mw[species]))
```

```
The molar mass of H2O is 18.02
The molar mass of CH4 is 16.04
The molar mass of C8H18 is 114.23
The molar mass of O2 is 32.00
The molar mass of CO2 is 44.01
```

Dictionaries can be sorted by key or by value

Plotting with Matplotlib

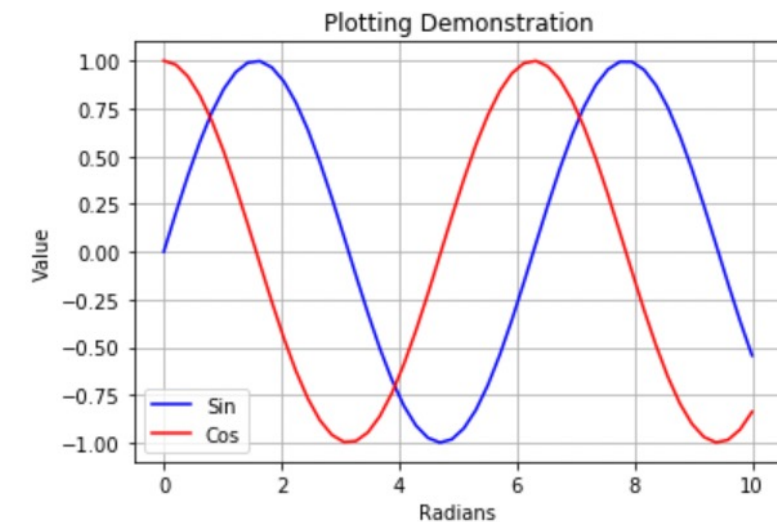
- Importing the “matplotlib.pyplot” library gives IPython notebooks plotting functionality similar to Matlab.

```
%matplotlib inline

import matplotlib.pyplot as plt
import numpy as np

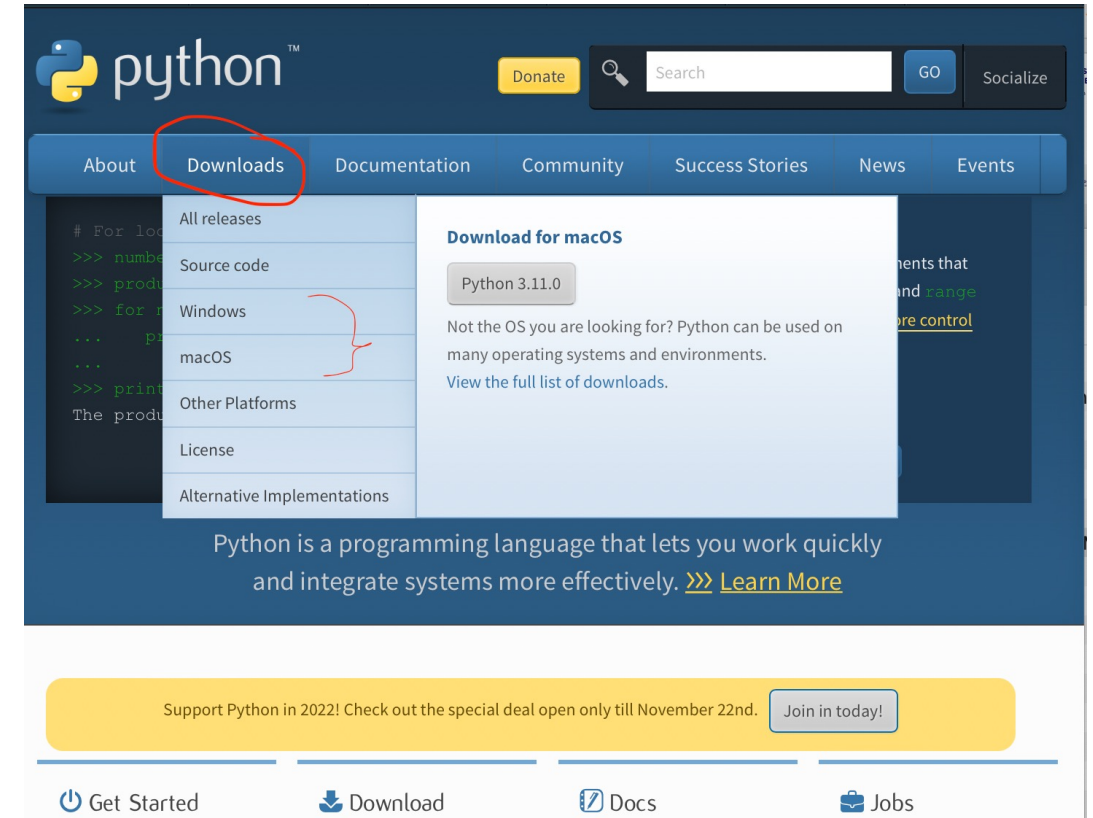
x = np.linspace(0,10)
y = np.sin(x)
z = np.cos(x)

plt.plot(x,y,'b',x,z,'r')
plt.xlabel('Radians');
plt.ylabel('Value');
plt.title('Plotting Demonstration')
plt.legend(['Sin','Cos'])
plt.grid()
```



Installations and Configurations

- Steps
 - Go to <https://www.python.org> to install python
 - Click on Downloads and download the latest python version for your operating system.
 - The website will automatically detect your operating system
 - Open the downloaded file and go through the installation process.



Installations and Configurations

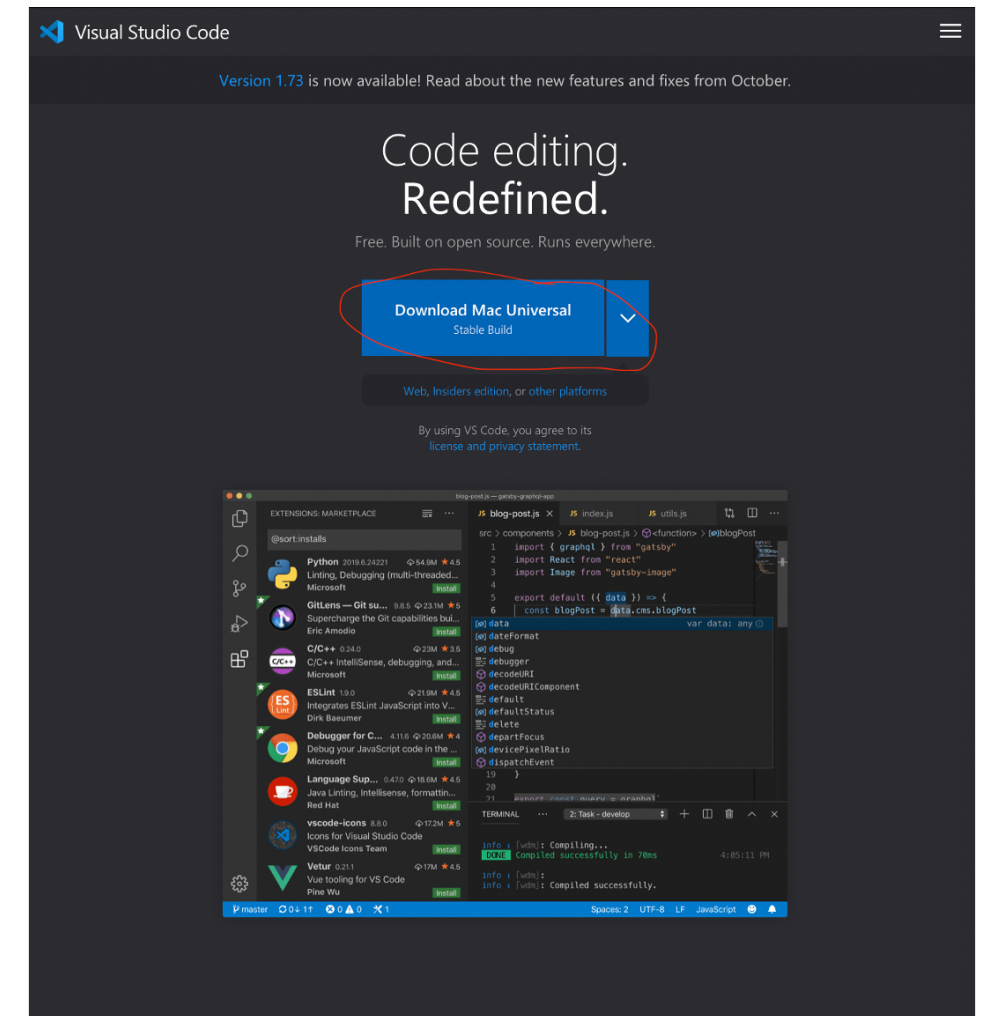
- Steps
 - Enter the command “which python” for Unix platforms and “where python” for Windows into your console to check the location of your python libraries
 - Check the installed python version on your system by typing “python --version”
 - Once you see similar outputs as you see in the image, we are ready to install the code editor

Python 3.9.7

```
@Macintosh ~ % which python
/bin/python
@Macintosh ~ % python --version
Python 3.9.7
```


Installations and Configurations

- Steps
 - Visit <https://code.visualstudio.com> and click on the download button on the home screen to download the VSCode distribution for your operating system.
 - Double-click the setup to install the application.
 - Open the VSCode and install python extensions (Python). Install requisite python packages



Installations and Configurations

- Steps
 - In the terminal use the command:
 - Pip: `pip install jupyter`
 - Conda: `conda install jupyter`



THANK YOU FOR YOUR TIME



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