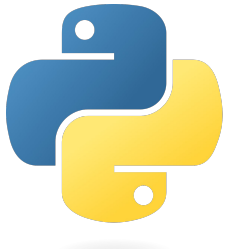


Introduction to Python

Python

- created by Guido van Rossum, and released in 1991

- **Programming Language** is a form of communication, that is used to instruct computer to perform some specific things. Example: Addition of two numbers.

- Python is a high level, interpreter based programming language which can be used in multiple field like Web Development, Artificial Intelligence, Networking, etc.

https://docs.python.org/3/tutorial/index.html

Features of Python

1. Free and Open Source
2. Easy to Read and Code
3. Object-Oriented and Procedure-Oriented Language
4. Dynamically Typed Language
5. Easy to Debug
6. Large Standard Library
7. Interpreted Language and many more ...

Runtime Vs Compile time

- Runtime is the time at which the executable code is started running
- Runtime errors can be:
  - Division by zero
  - Square root of negative numbers, etc

```c
#include <stdio.h>
int main()
{
   int a=20;
   int b=a/0; // division by zero
   printf("The value of b is : %d",b):
   return 0;
}
```

- Compile time is the time at which source code is converted to executable code
- Compile time errors can be:
  - Syntax errors
  - Semantic errors

```c
#include <stdio.h>
int main()
{
   int a=20;
   printf("The value of a is : %d",a):
   return 0;
}
```

Interpreter Vs Compiler

Tools that are used to convert source code to (user program) to machine code (assembly program) that computers can understand and process.

- Interpreter is a program that converts source code to machine code line by line when program is executed.
- At each execution, interpreter convert each line of user program to machine code, the process is slower.
- Example: Python, Ruby, etc

- Compiler is a program that converts source code to machine code in one go and generate executable file that can be run directly by the computer
- Compiler generates executable file, so it is faster to run compiled code than interpreted code.
- Example: C, C++, Java etc

COMPANIES


deerwalk
DIYO.AI
eydean
fuse | machines
nepal
cloudfactory
CRAFT DATA LABS
GrowByData
NEWRUN
OVAL ANALYTICS
Your Data Science Partner
ict
Paaila
rooster logic
InfoDevelopers Pvt. Ltd.
MONLIT SOLUTIONS
ROSEBAY
DOCSUMO
KHARPANN
Bottle
EKbana
extensoData
unleash your Xfactor
percept
leapfrog
TECHNOLOGY
identv
Numeric Mind
NAAMII
treeleaf.ai
Alpha Teds
DEEP-CNN
WISEYAK

Python Installation Guide

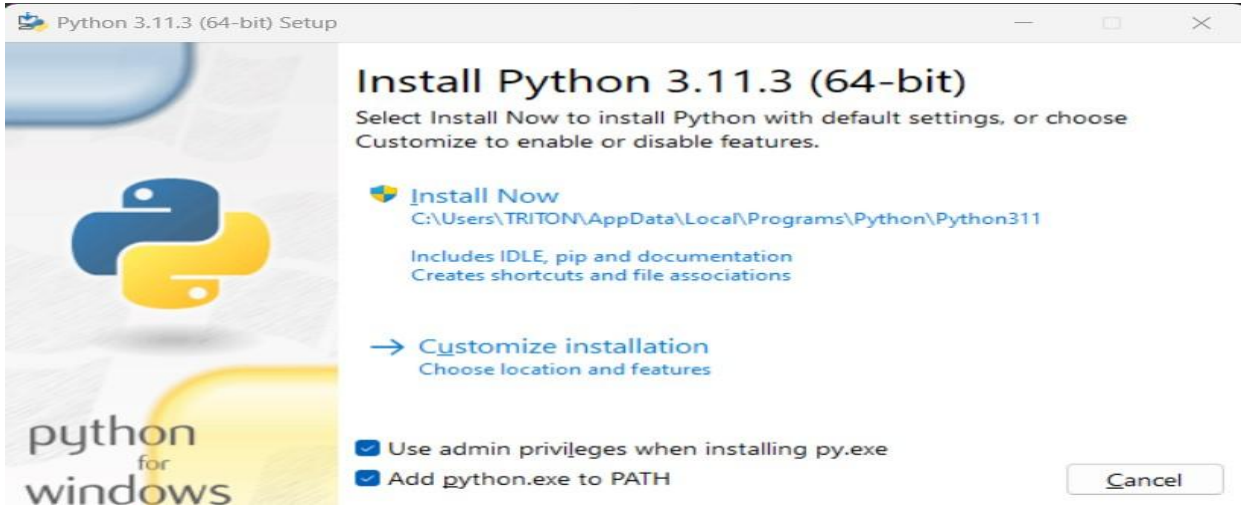
www.topictrick.com

Download Python Installer

- **Goto**: https://www.python.org/downloads/
- Download Stable **Python 3.x.x installer** appropriate to your system (64 bit or 32 bit)
    - Organizations are shifting their codebase from python 2 to python 3
    - However, Learning python 3, we will also know and able to learn python 2 syntax.

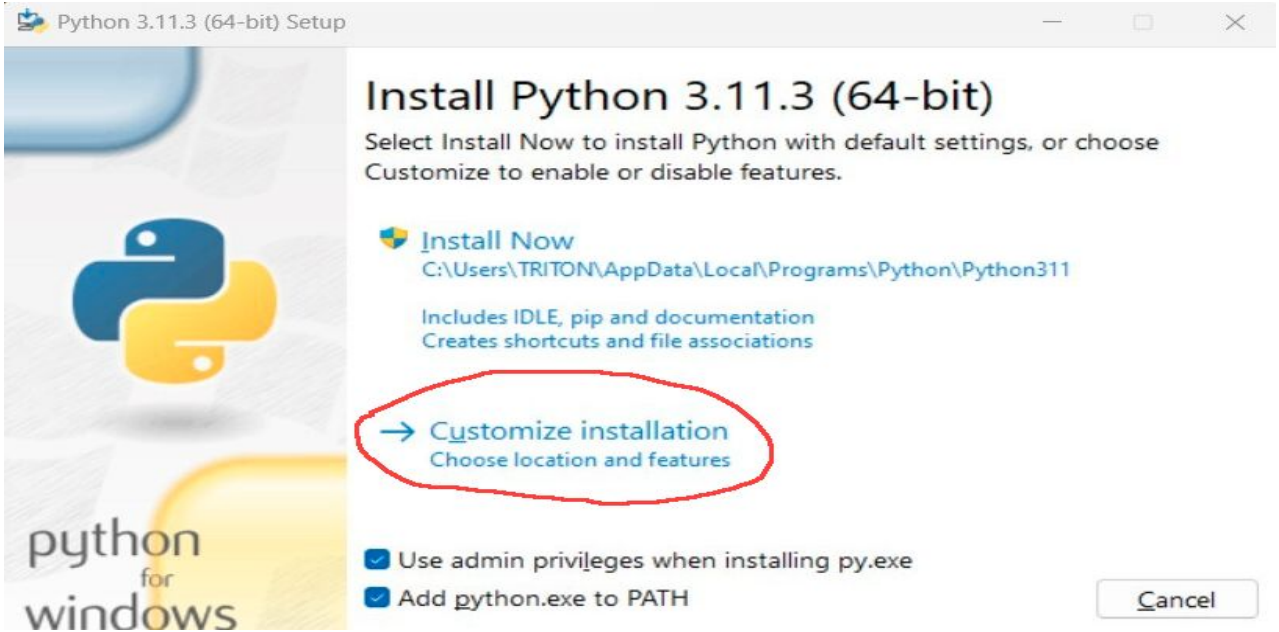
Python Installation on Windows

- Navigate to directory (Downloads) where the python installer is downloaded
    - DOUBLE CLICK to run python installer.
- In the Pop up window, Select Add **python.exe to PATH** checkbox as in below image. This allows us to launch python from command line.



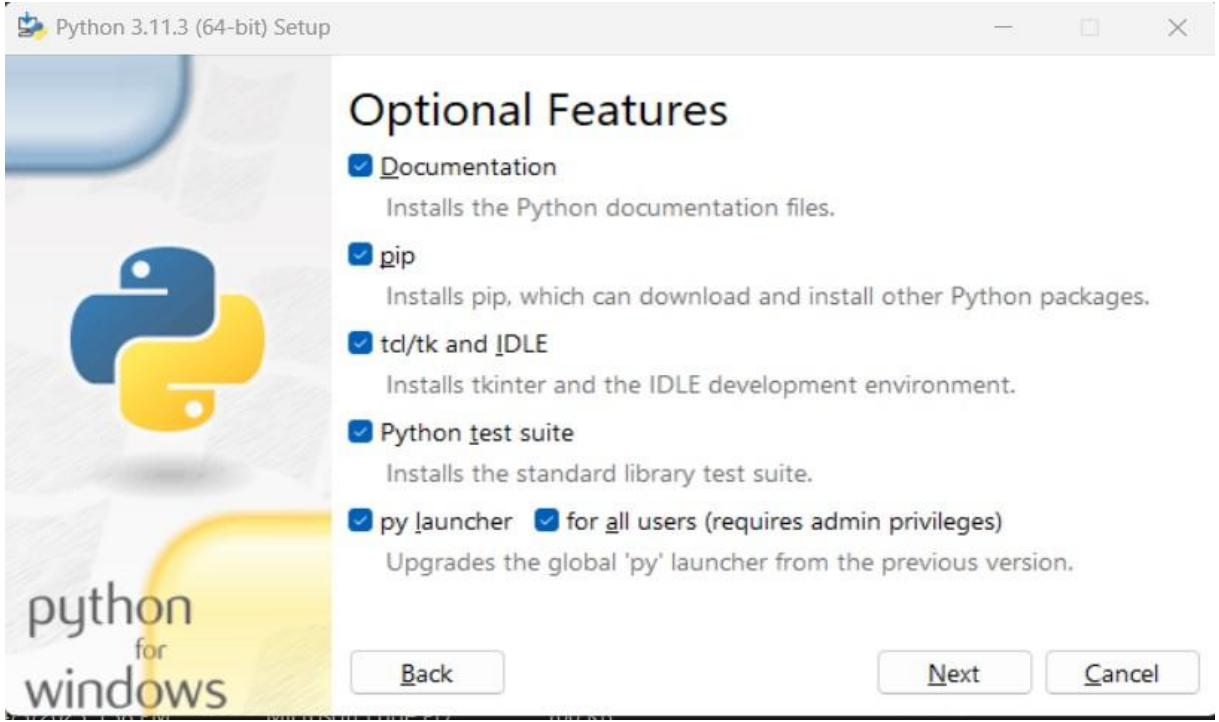
Python Installation on Windows (CONTD...)

- If you want to install some advanced features (Recommended), Click **customize installation.**



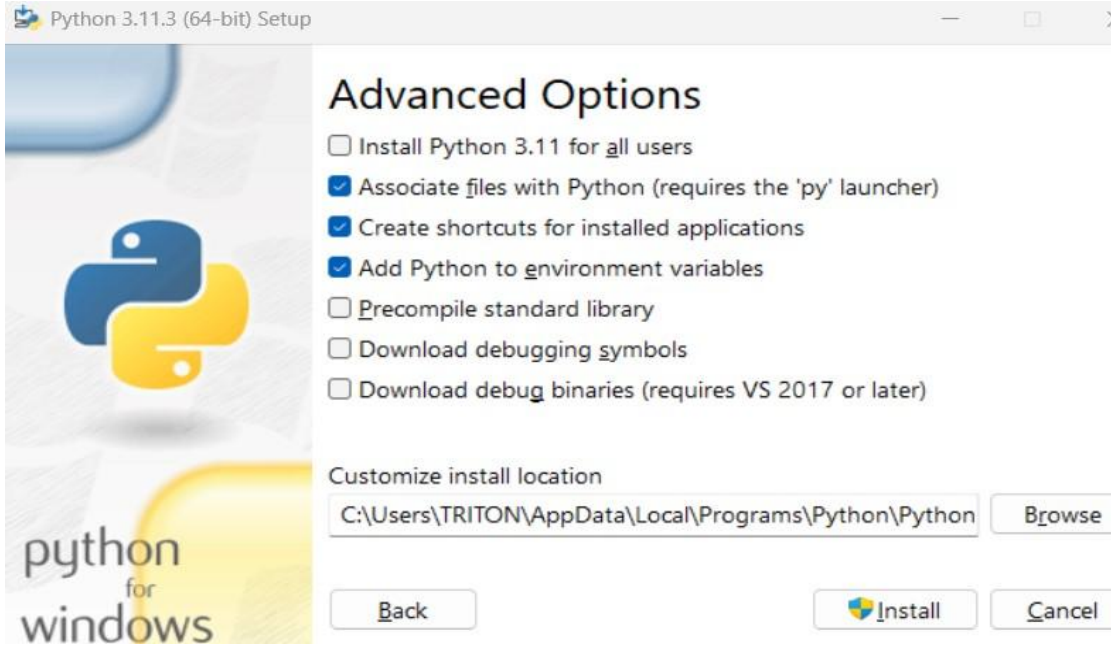
Python Installation on Windows (CONTD...)

- Check all of the box available as shown below and click **Next.**



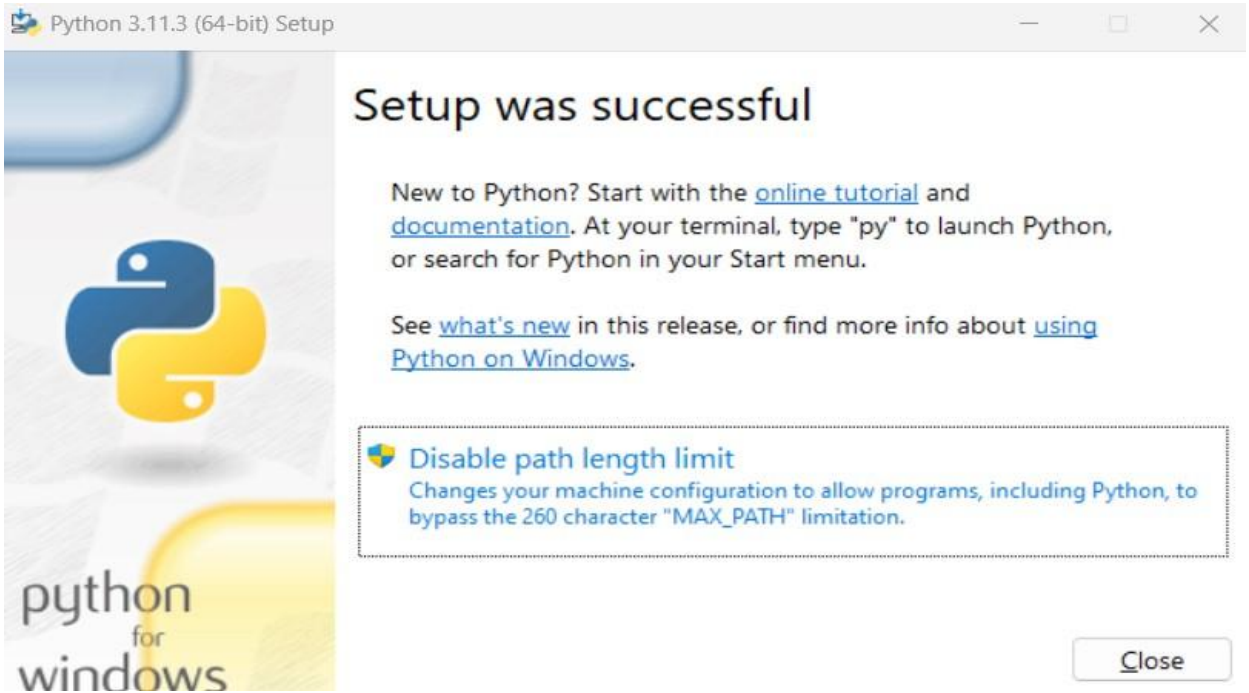
Python Installation on Windows (CONTD...)

- In advanced options sections, check 2nd, 3rd, 4th checkbox as shown below and **Click Install**



Python Installation on Windows (CONTD...)

- After Installation Completes, **Setup was successful** message displays as shown:



Verify Python Installation on Windows

- Goto Start
- Open Command Prompt (cmd)
- Type python and get output as shown:

```
C:\Users\TRITON>python
Python 3.11.3 (tags/v3.11.3:f3909b8, Apr  4 2023, 23:49:59) [MSC v.1934 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

Python Installation on Linux

- Note: Linux Distribution already has python version installed.

- Installation Steps:
  - Open your terminal (Ctrl + Alt + T)
  - Update your local system's repository
    - sudo apt update
  - Download the latest version of python3
    - sudo apt install python3
  - apt will find packages, and install python in your system
  - Verify Installation, Type python3 in terminal and get output as below:

```
fm-pc-lt-125@fm-pc-lt-125:~$ python3
Python 3.8.10 (default, Mar 13 2023, 10:26:41)
[GCC 9.4.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

Download IDE

- IDE stands for Integrated Development Environment
- A software application that helps programmers develop software code efficiently.
- IDE consists of:
  - Source code editor,
  - Debugger,
  - Build automation tools
- Examples: VScode, Pycharm, Eclipse etc
- Installation VScode
  - Visit https://code.visualstudio.com/download
  - Download and Install for your favourite Operating System
  - Open and Run VScode

Python Pip

- PIP is package manager for Python packages, or modules.

- Uses:
  - Download a package → pip install <package-name>
  - List Downloaded package → pip list / pip freeze
  - Remove a package → pip uninstall <package-name>

- Verify Installation:
  - pip - -version

Python package is like a directory that holds sub-packages and modules.

- Note:
  - *Installing python 3.4 or later includes PIP by default*

A python module is a file containing python code

Jupyter Notebook

- The name Jupyter is derived from Julia, Python, and R.

- Jupyter Notebook is one of the most popular tools to create and share documents that contain interactive code, visualizations, text, etc as a web applications.

- Features:
  - Interactive Environments:
    - Provides interactive computing environments to write and execute code in individual cells.
  - Rich Output:
    - Can display various types of outputs such as code, table, plots, images, etc within notebook
  - Documentation and Collaboration:
    - Supports, markdown, a markup language for creating rich-text documents.
    - Notebooks can be shared with others, enabling collaboration as well.
  - Code Execution in any order:
    - Can execute code cells in any order, rather than in sequence from top to bottom.

Installation Jupyter Notebook

- **Jupyter Notebook**
  - pip install notebook
  - jupyter notebook

- **Jupyter Lab**
  - pip install jupyter lab
  - jupyter lab

- **Notebook via Terminal**
  - pip install ipython
  - ipython

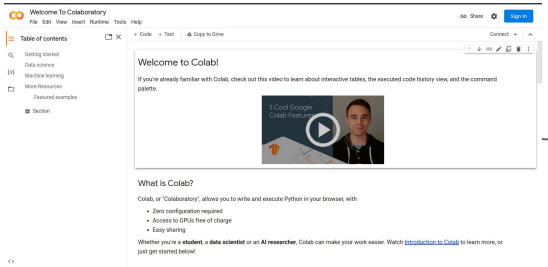
“Jupyter Lab is advanced version of Jupyter Notebook with cool features”

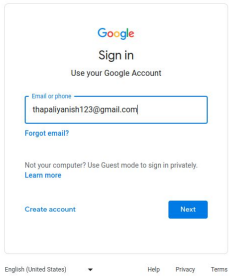
Introduction to Colaboratory

- According to documentation, Colab or Colaboratory allows you to write and execute Python in your browser.

- Features:
  - Zero configuration required
  - Access to GPUs free of charge
  - Easy sharing

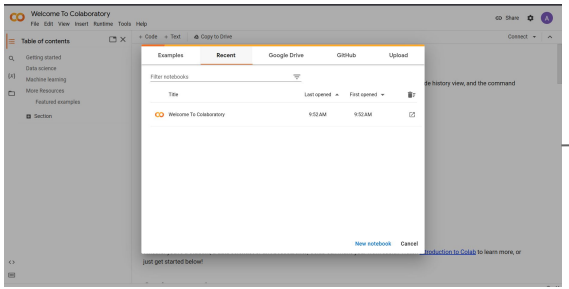
Setup Colaboratory





1. ***Visit***: [Google Colab]

2. Sign in with your credentials



3. Output after sign in successful

Python

Virtual Environment

(Create, Activate,

Use & Deactivate)

What is Virtual Environment?

- **Virtual environments** in python are isolated environments that allow you to create separate Python Installations and package installations for different projects.

- Structure of Virtual environments:
  1. **Directory**: Usually created within a directory, which serves as the root of the environment.

  2. **Python Interpreter**: Within virtual environment directory, there is a separated python interpreter isolated from the global Python Installation.

  3. **Site Packages**: Each virtual environment has its own site-packages directly. When you install package using pip or other package managers, they are stored in this directory.

  4. **Activate script**: To work with virtual environment, you need to activate, which can be done by executing an activate script.

  5. **Deactivate script**: Once you are done working with virtual environment, you can execute deactivate script specific to the virtual environments

Setup Virtual Environments

- **Linux:**
  - python3 -m venv <name>
- **Windows:**
  - python -m venv <name>
  - e.g. python -m venv my_env
- **Other Alternatives:**
  - Install virtualenv package: pip install virtualenv
  - Cmd: virtualenv <name>
- **Activate virtual environments**
  - source <venv directory>/bin/activate
- **Deactivate virtual environments**
  - deactivate

First Python Program

- A **python program** is a set of instruction that a computer uses to perform a specific task.
    - Display Hello World in your computer screen

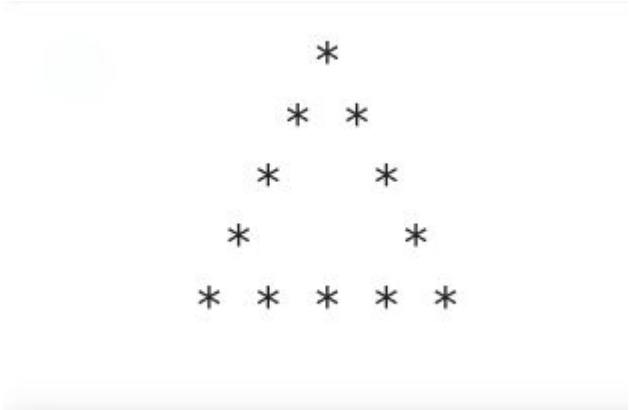
```
print("Hello Word!!!")
```

Print Statement

- A **python statement** is a instructions that a python interpreter can execute.
    - `print("Hello Word!!!")` is print statement

Class Work

Q. Write a python program to draw a triangle shape using print statement only.



Python as a Calculator

Operators	Operation	Example
`**`	Exponent	`2 ** 3 = 8`
`%`	Modulus/Remainder	`22 % 8 = 6`
`//`	Integer division	`22 // 8 = 2`
`/`	Division	`22 / 8 = 2.75`
`*`	Multiplication	`3 * 3 = 9`
`-`	Subtraction	`5 - 2 = 3`
`+`	Addition	`2 + 2 = 4`

Python as a Calculator

"Interactive Mode"

Interactive Mode Vs Script Mode

- Interactive model is the way of executing a Python program in which statements are written in command prompt and display result in the same.
- It is suitable for writing very short programs.
- Debugging is tedious task
- Result is obtained after execution of each line of code.

- In script mode, python program is written in a file. Python interpreter reads the file, execute, display result.
- It is more suitable for writing long programs.
- Debugging is easier
- Entire program is compiled and then executed.

Python as a Calculator (Script Mode)

References

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- https://www.python.org/downloads/
- https://www.geeksforgeeks.org/what-is-the-difference-between-interactive-and-script-mode-in-python-programming/
- https://www.w3schools.com/python/python_intro.asp
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- https://www.digitalocean.com/community/tutorials/install-python-windows-10
- https://www.makeuseof.com/install-python-ubuntu/