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Day 1-4 April Environment Setup | Python Basics

1. What is Python?
2. Why Python?
3. Python Use cases.
4. Python Installation.
5. Ways to execute a python script.
6. Executing first Python Script.
7. Print Function
8. Approach to learning Python.

What is Python?

- Python is a popular general-purpose programming language that can be used for a wide variety of applications.
- Python is currently the most widely used multi-purpose, high-level programming language.
- Python allows programming in Object-Oriented and Procedural paradigms.
- Python programs generally are smaller than other programming languages like Java.
- Programmers have to type relatively less and indentation requirement of the language, makes them readable all the time.

Why Python ?

- Code is easy to read, use and maintain
- Python has a clean and structured code base, making the updation and maintenance tasks of the software easier for developers.
- The syntax rule of Python is composed mainly of English keywords, emphasizing the code readability. Code readability plays a major role while building the application.
- A robust application needs a powerful programming language that is easy to read, update and maintain. Python incorporates all these qualities.

Supports multiple programming paradigms

- **Procedural programming**: It is based on the pattern or procedures that consist of any series of computational steps.
- **Object-oriented programming**: It is based on the concept of object and class. In simple words, objects and classes are the sets of data that contains fields, variable data types, etc., in the form of code.
- It is an undeniable fact that one programming paradigm cannot solve all problems efficiently. The support of these multi programming paradigms (procedural, object-oriented and functional programming) makes Python a popular programming language among enterprises.

Compatible with Major Platforms and Systems

- Python supports all the major operating systems and architectures.
- With this support of operating systems and architectures, Python code can be run on any of these platforms
- It is easier to run the same Python program on multiple platforms, including Windows, Linux, macOS, etc.
- Whereas in compiled programming languages such as C, C++, and Java, we cannot copy the compiled program from the Linux computer to the Windows computer and expect the program to run successfully.

Large standard library

- Python has a robust and large standard library that makes it stand out from other programming languages.
- Its standard library contains a wide range of modules, operations and web service tools It offers various open-source frameworks, development tools, and libraries that significantly reduce the development cost and development time.
- The standard library provides low-level details to developers, therefore, developers can focus on the logic of the application rather than looking for low-level details for the apps.

Adopt Test Driven Development

- You can use Python to create prototype of the software application rapidly.
- You can easily write the required tests before writing code and use the tests to assess the application code continuously.
- The tests can also be used for checking if the application meets predefined requirements based on its source code.

Data Science

- Python libraries like Pandas, NumPy, SciPy, and several others help you to work with data and extract valuable information and insights.
- From Data Exploration to visualization to analysis,we mostly use Pandas.
- Matplotlib is the most popular library for exploration and data visualization in the Python ecosystem
- NumPy is one of the most essential Python Libraries for scientific computing and it is used heavily for the applications of Machine Learning and Deep Learning

Artificial Intelligence

- **Scikit-learn**: This popular machine learning library is a one-stop-shop for all of your machine learning needs with support for both supervised and unsupervised tasks.
- **Tensorflow**: Tensorflow is a high-level library for building neural networks.
- **Keras**: Keras is a popular high-level API that acts as an interface for the Tensorflow library. It's a tool for building neural networks using a Tensorflow backend that's extremely user friendly and easy to get started with.
- **Pytorch**: Pytorch is another framework for deep learning created by Facebook's AI research group.

Software Development

- Django and Flask are, by a wide margin, the most popular Python web development frameworks
- **Django** is a Python web framework that offers an open-source, high-level framework that “encourages rapid development and clean, pragmatic design.” It’s fast, secure, and scalable. Django offers strong community support and detailed documentation.
- **Flask** is considered a microframework, which is a minimalistic web framework.
- Flask is also a prevalent and powerful web framework as it’s used by large companies like Netflix, Linkedin, and Uber.

Game development

- Gaming app development is now a prominent industry, and it has many applications of Python programming. There are libraries which are widely used for interactive game development.
- Popular video games like Battlefield 2 and Pirates of the Caribbean use Python programming for a number of its functionalities and add-ons.These games use Python libraries like PyGame for development.
- Python allows game developers to build tree-based algorithms which are useful in designing different levels in a game. Games require handling multiple requests at once, and Python is extremely fantastic at that.

Web Scraping

- Web scraping of massive amounts of data is becoming useful for companies for extraction valuable customer information and making smart decisions.
- This real life application of Python includes scraping large amounts of websites and webpages to extract data for a particular purpose.
- It could be job listing, price comparison, detailed information and much more.
- **Selenium**: Selenium is a web testing library. It is used to automate browser activities.
- **BeautifulSoup**: Beautiful Soup is a Python package for parsing HTML and XML documents. It creates parse trees that is helpful to extract the data easily.
- Python has simple code, so it doesn't involve any complexity in writing software that can provide large amounts of data.

Desktop GUI

- Python programming language can work with multiple operating systems and has a powerful architecture for building applications.
- It has rich text processing tools and a clear syntax, allowing developers to code Desktop GUI applications without any hassle.
- Tkinter is standard python GUI Library.
- Kivy is a cross-platform Python software development framework. With it, you can create Desktop applications for Windows, OS X, and Linux
- Developers can create highly functional GUIs with Python and reduce the turnaround time for development.

Image recognition and text processing

- Applications built with Python can also enable companies to identify images from a database of images and also helps in text processing.
- With its unique image processing and graphic ensign capabilities, Python allows developers to design 2D and 3D images through different tools.
- Scikit-image uses NumPy arrays as image objects by transforming the original pictures.
- OpenCV has become a popular library due to its ease of use and readability. The library is focused on image processing, face detection, object detection, and more

Why Python is Dynamically Typed

- When we declare a variable in C or alike languages, this sets aside an area of memory for holding values allowed by the data type of the variable.
- The memory allocated will be interpreted as the data type suggests.
- If it’s an integer variable the memory allocated will be read as an integer and so on.
- But Python is a dynamically typed language. It doesn’t know about the type of the variable until the code is run.

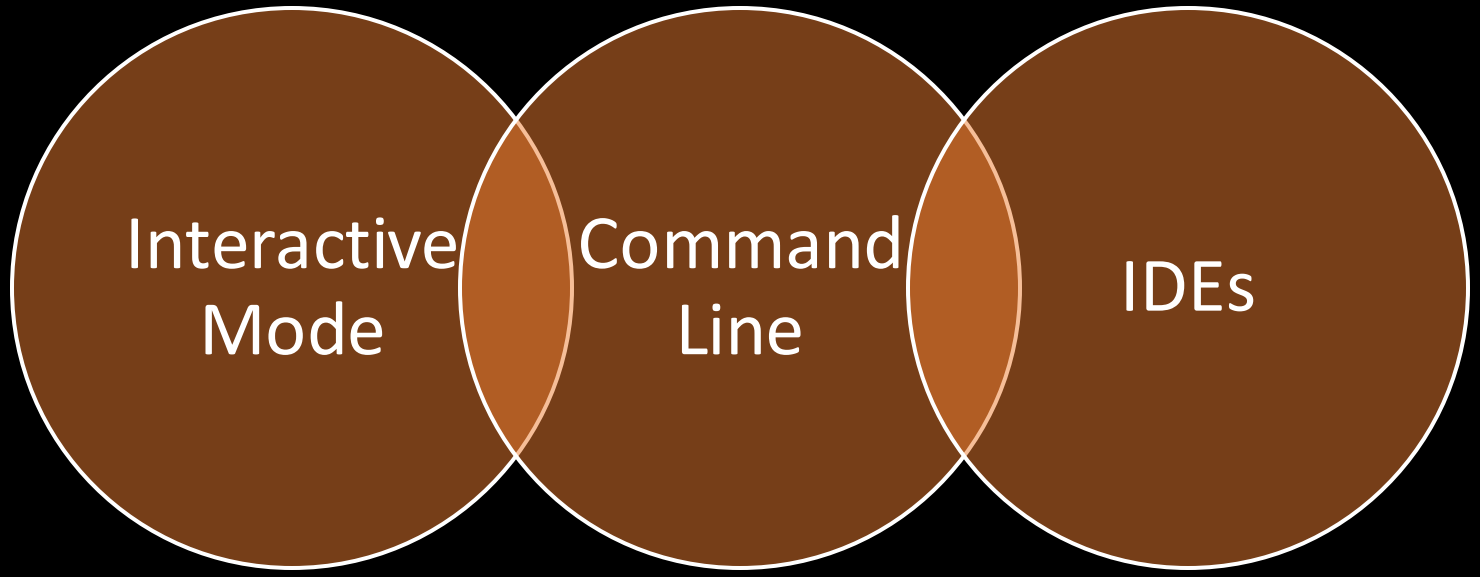
Ways to execute a python script

- The Python script is basically a file containing code written in Python. The file containing python script has the extension '.py' .
- There is more than one way to run a python script but before going toward the different ways to run a python script, we first have to check whether a python interpreter is installed on the system or not.
- So in windows, open **'cmd' (Command Prompt)** and type the following command.

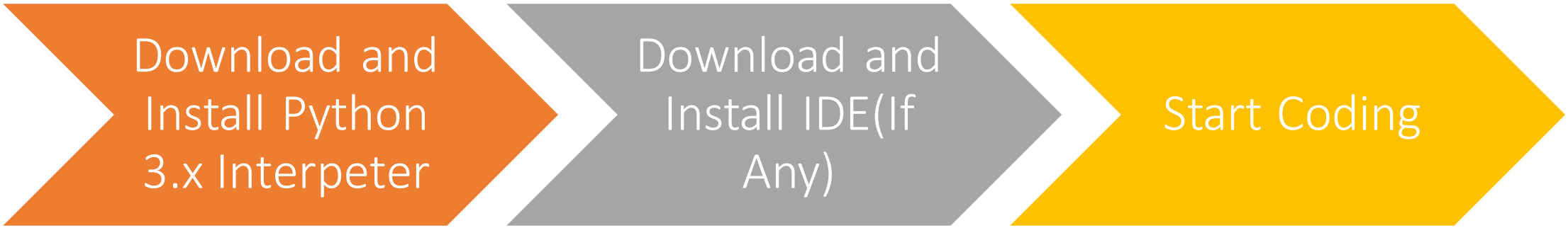
```
python -V
```

- This command will give the version number of the Python interpreter installed or will display an error if otherwise.

Different ways to run Python Script



Python Installation Steps



Python Installation

Interpreter

- Command Line Interface
- Interactive Version

IDEs

- Sublime Text
- PyCharm
- Spyder
- IDLE
- Jupiter Notebook

Online Interpreter

- Onlinegdb
- Python Anywhere
- Replit

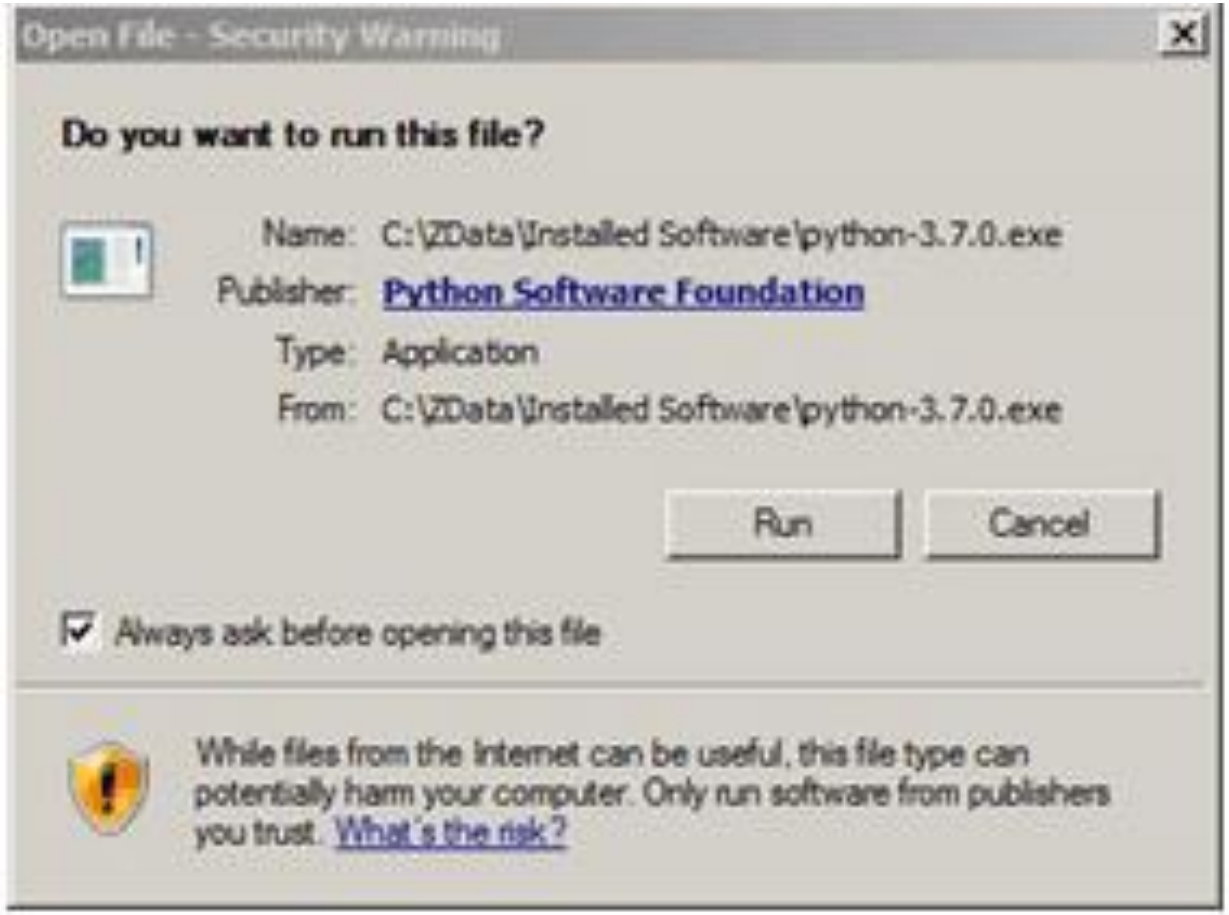
Finding an Interpreter

- Before we start Python programming, we need to have an interpreter to interpret and run our programs.
- ***Windows*:** There are many interpreters available freely to run Python scripts like IDLE (Integrated Development Environment) that comes bundled with the Python software downloaded.
- ***Linux*:** Python comes preinstalled with popular Linux distros such as Ubuntu and Fedora. To check which version of Python you're running, type "python" in the terminal emulator. The interpreter should start and print the version number.
- ***macOS*:** Generally, Python 2.7 comes bundled with macOS. You'll have to manually install Python 3 from **http://python.org/**.

Installation of Python 3.x

- To install Python, firstly You need to go to the Download Python page from its official site python.org/download and click on the latest version

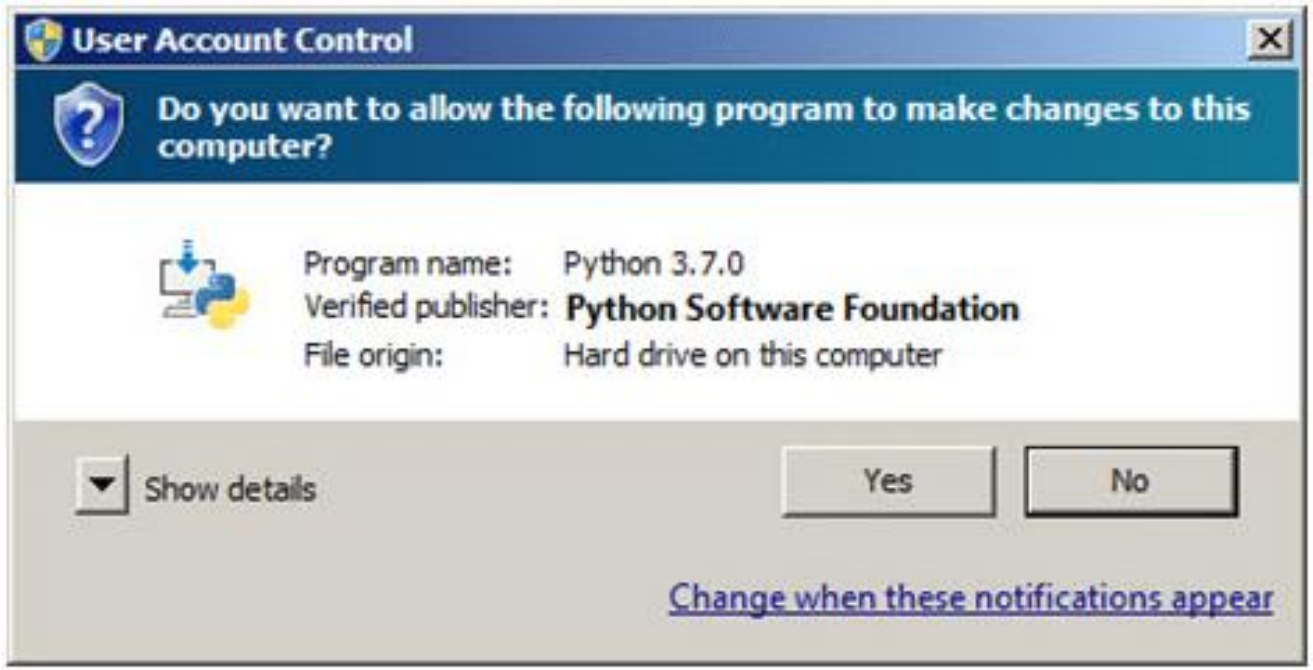
- Once the
  Python distribution download
  is completed, then double-
  click on
  the executable downloaded
  software, and then click on Run



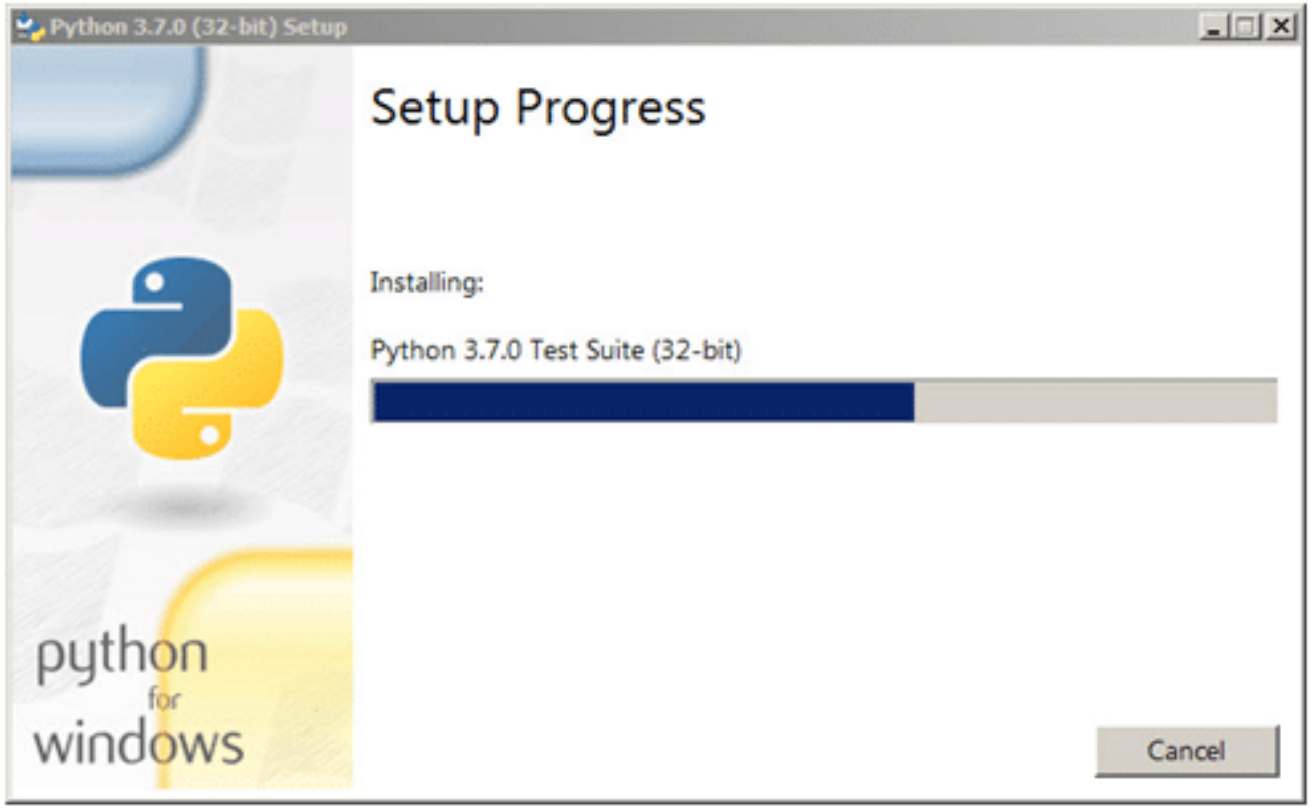
Now, once the installation set up starts, You need to follow the below-mentioned installation steps:

- **Step 1:** A pop-up window, Python Version 3.7.0 (32-bit) Setup, will appear. Here, You need to ensure that You have checked the checkboxes for 'Install launcher for all users (recommended)' and for 'Add Python 3.7 to PATH' at the bottom

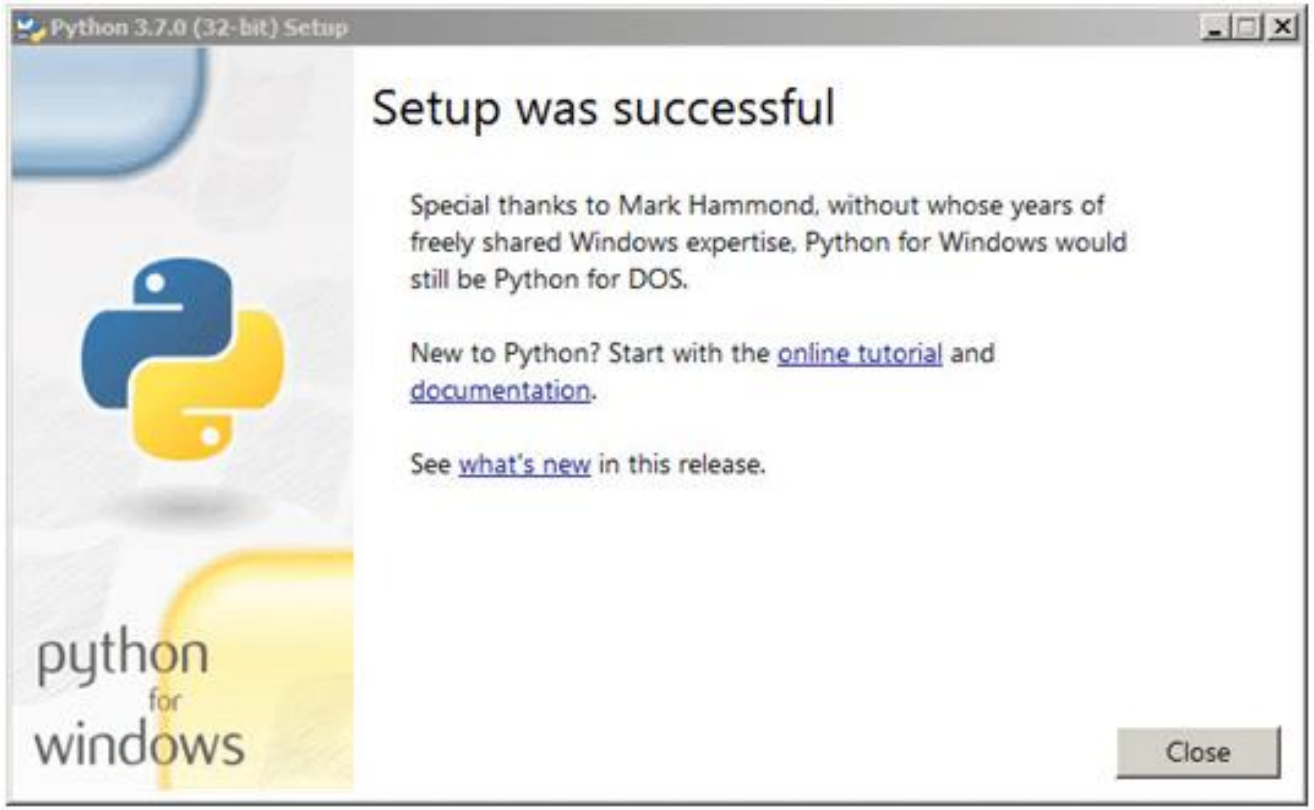
- **Step 2:** Now, a User Account Control pop-up window will appear, posing the question, ‘Do you want to allow the following program to make changes to this computer?’ Click on Yes
-



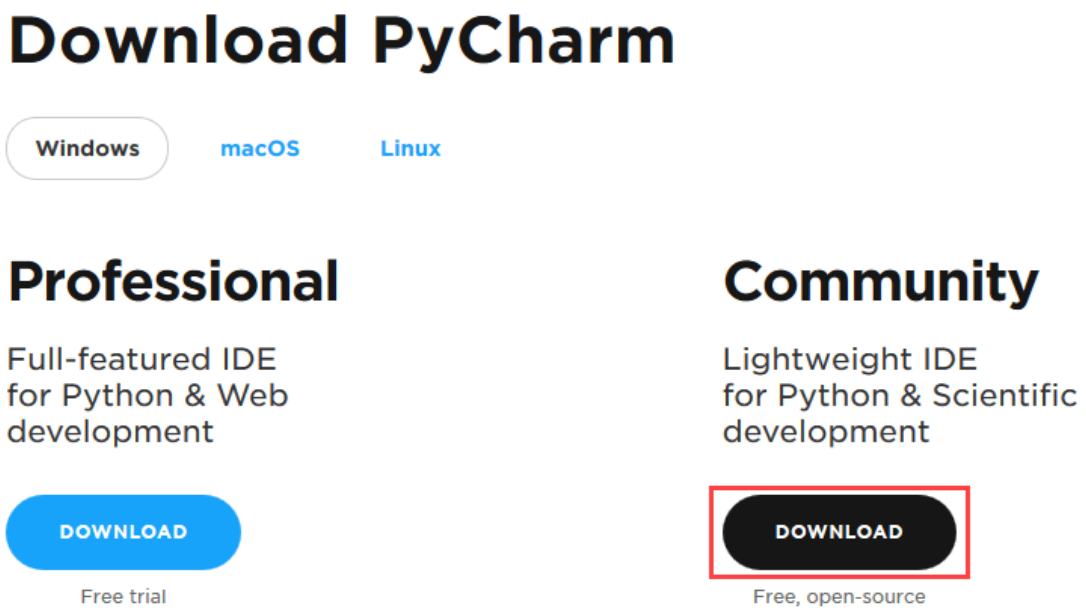
- **Step 3:** Now, a new Python 3.7.0 (32-bit) Setup pop-up window will appear with a ‘Setup Progress’ message and a progress bar. During the installation, it will show us various components it is installing, and it will move the progress bar toward completion. Soon, a new Python 3.7.0 (32-bit) Setup pop-up window will appear with a ‘Setup was successful’ message



- **Step 4:** Once the installation is done, click on the Close button. And now, Python is successfully installed

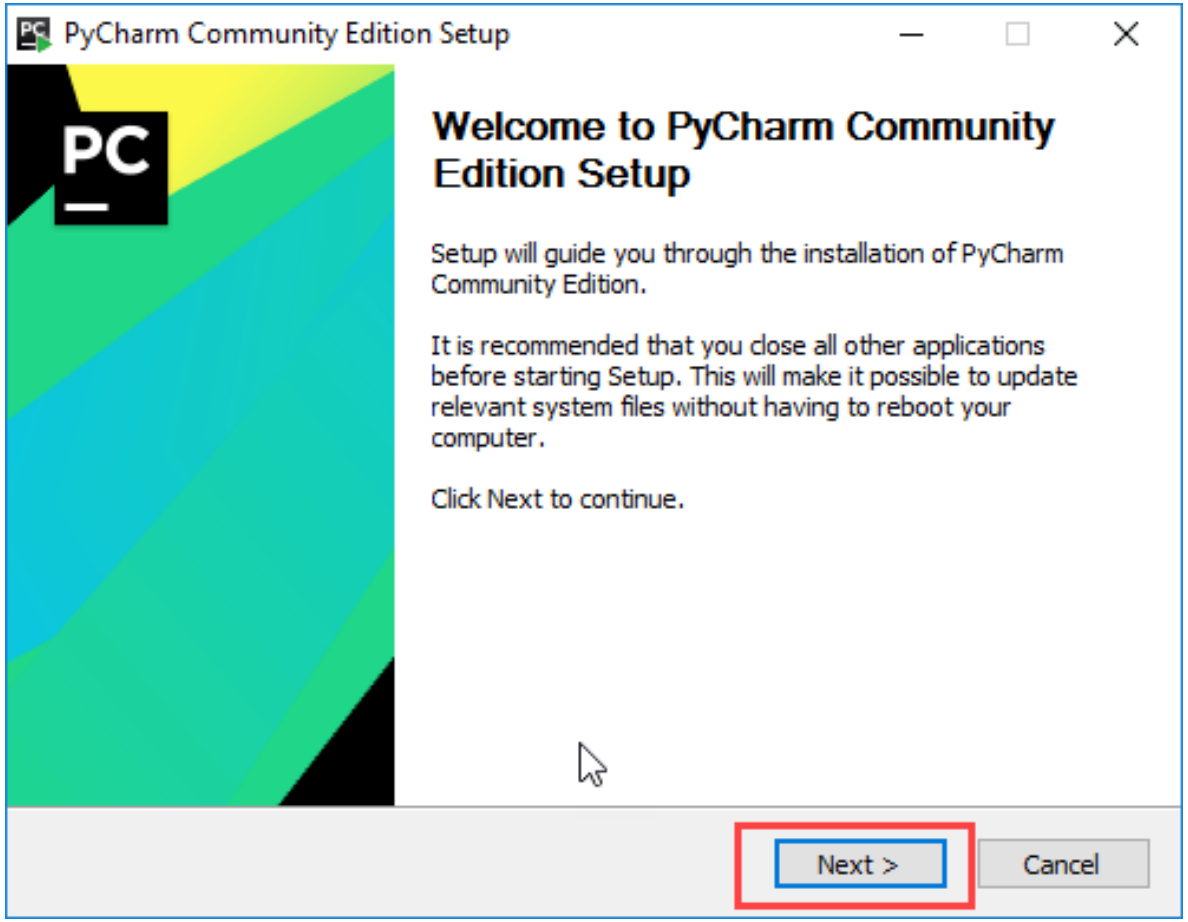


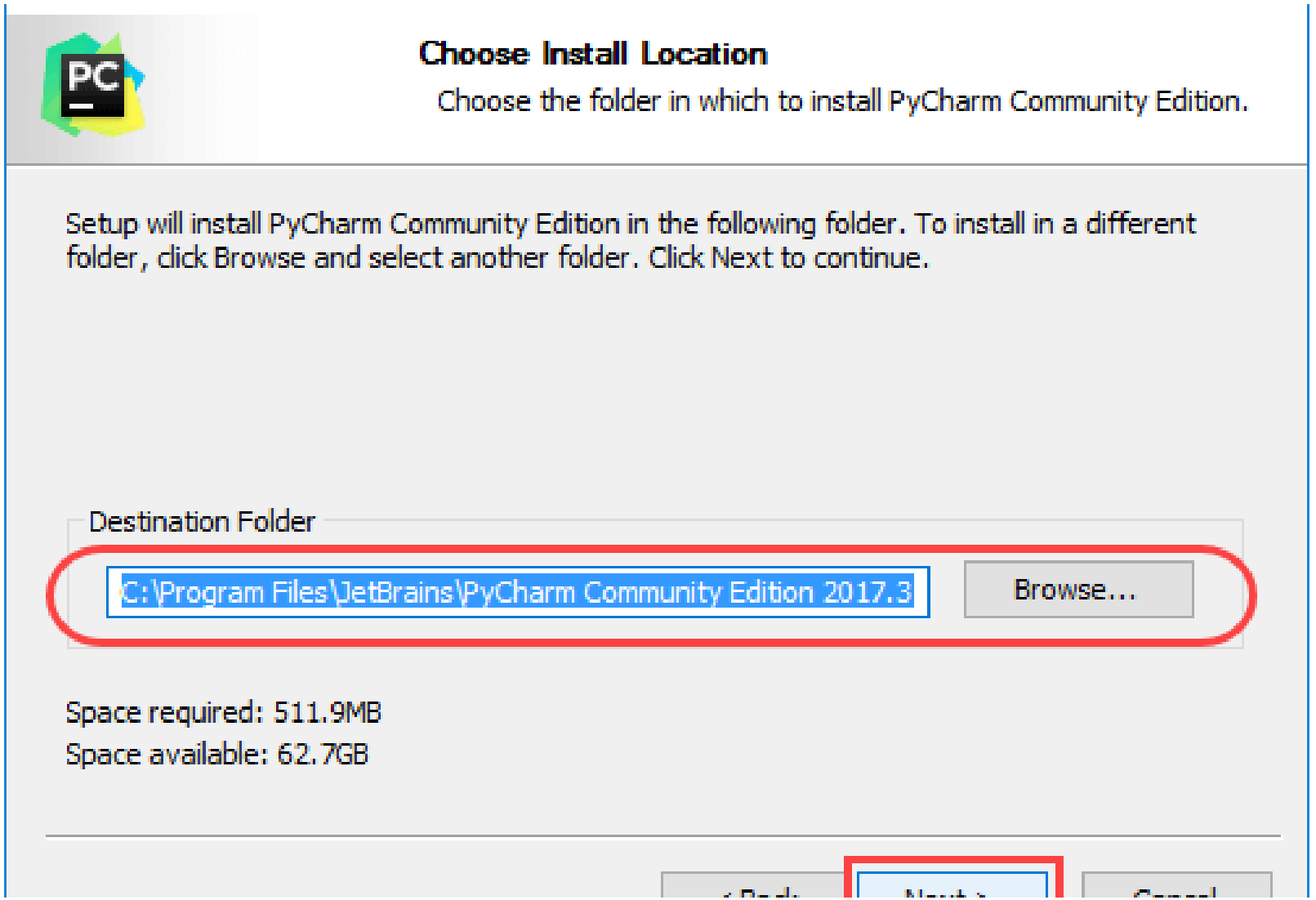
Pycharm Installation



- **Step 1)** To download PyCharm visit the website https://www.jetbrains.com/pycharm/download/ and Click the “DOWNLOAD” link under the Community Section.

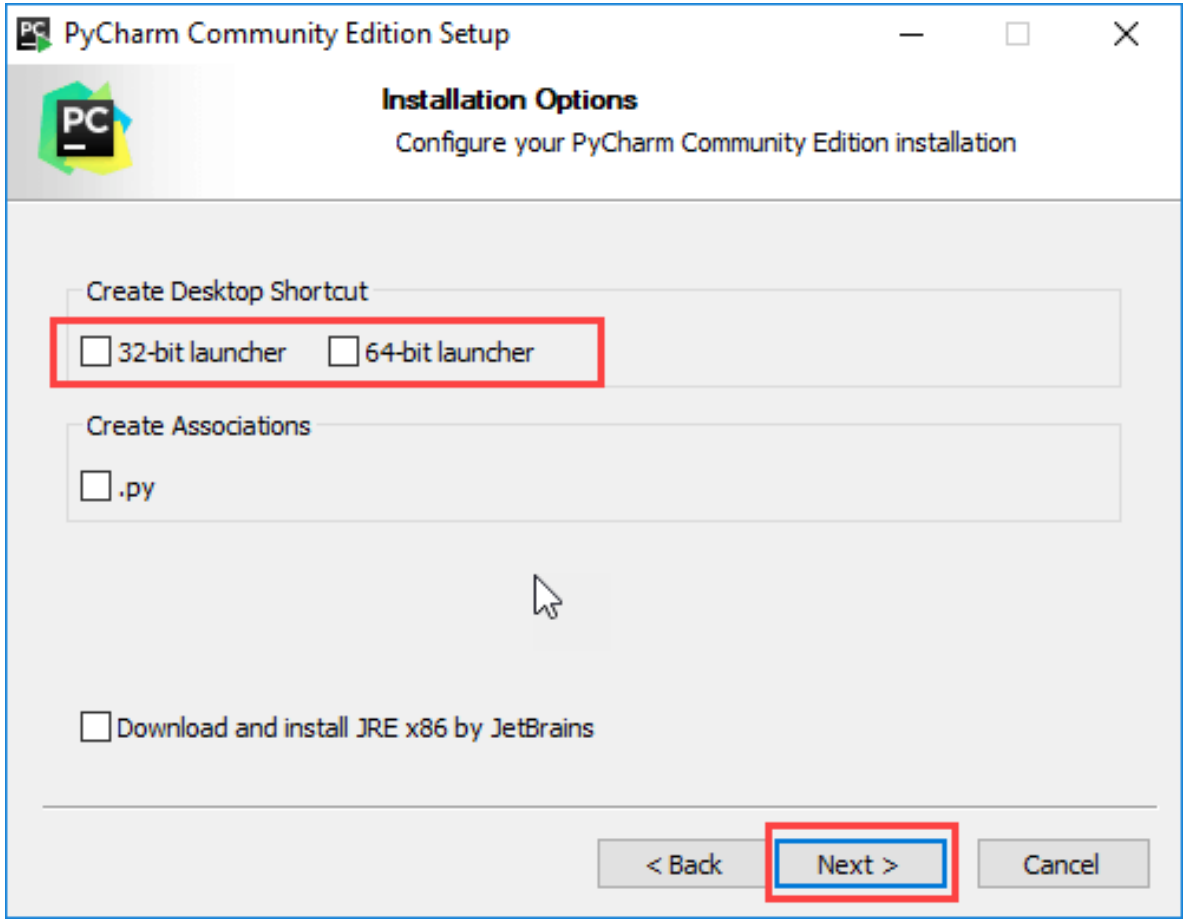
- **Step 2)** Once the download is complete, run the exe for install PyCharm. The setup wizard should have started. Click “Next”.



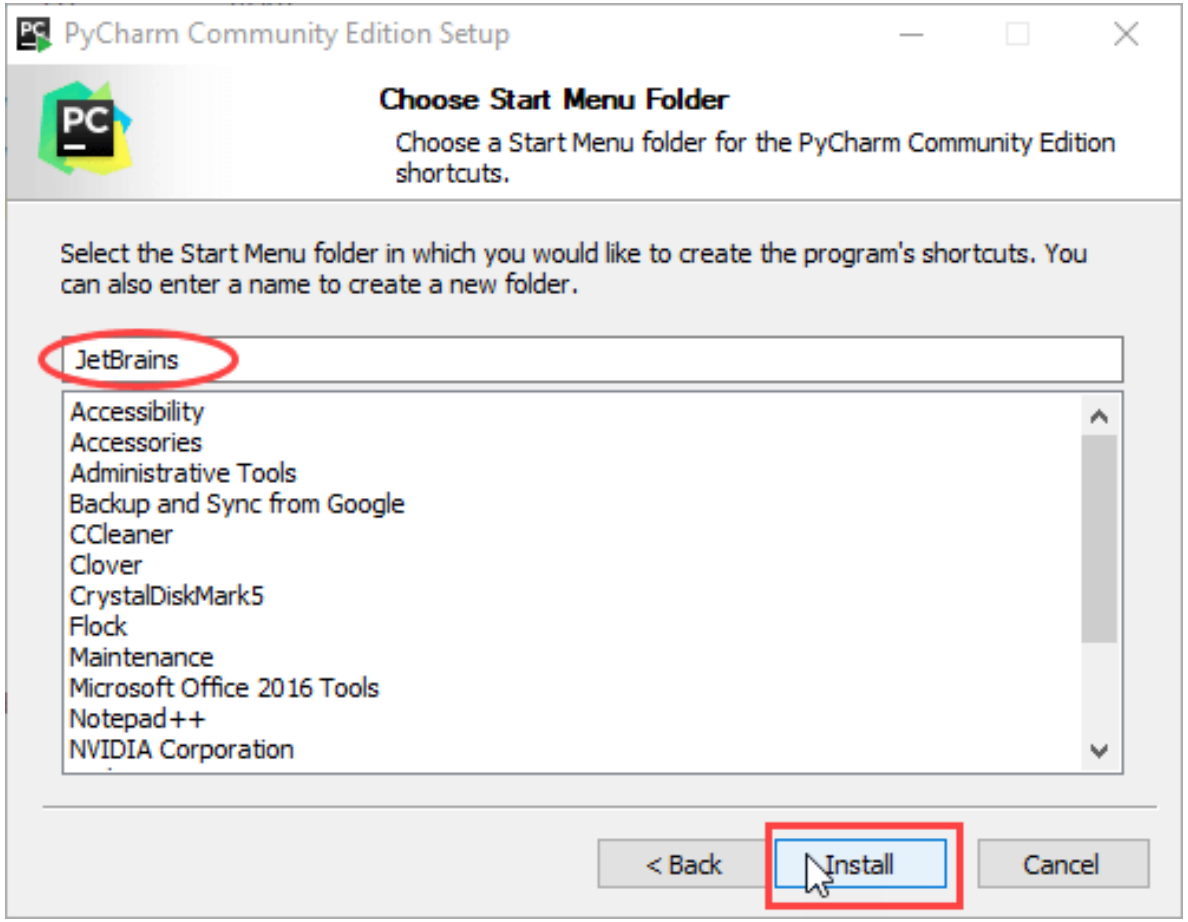


Step 3) On the next screen, Change the installation path if required. Click "Next".

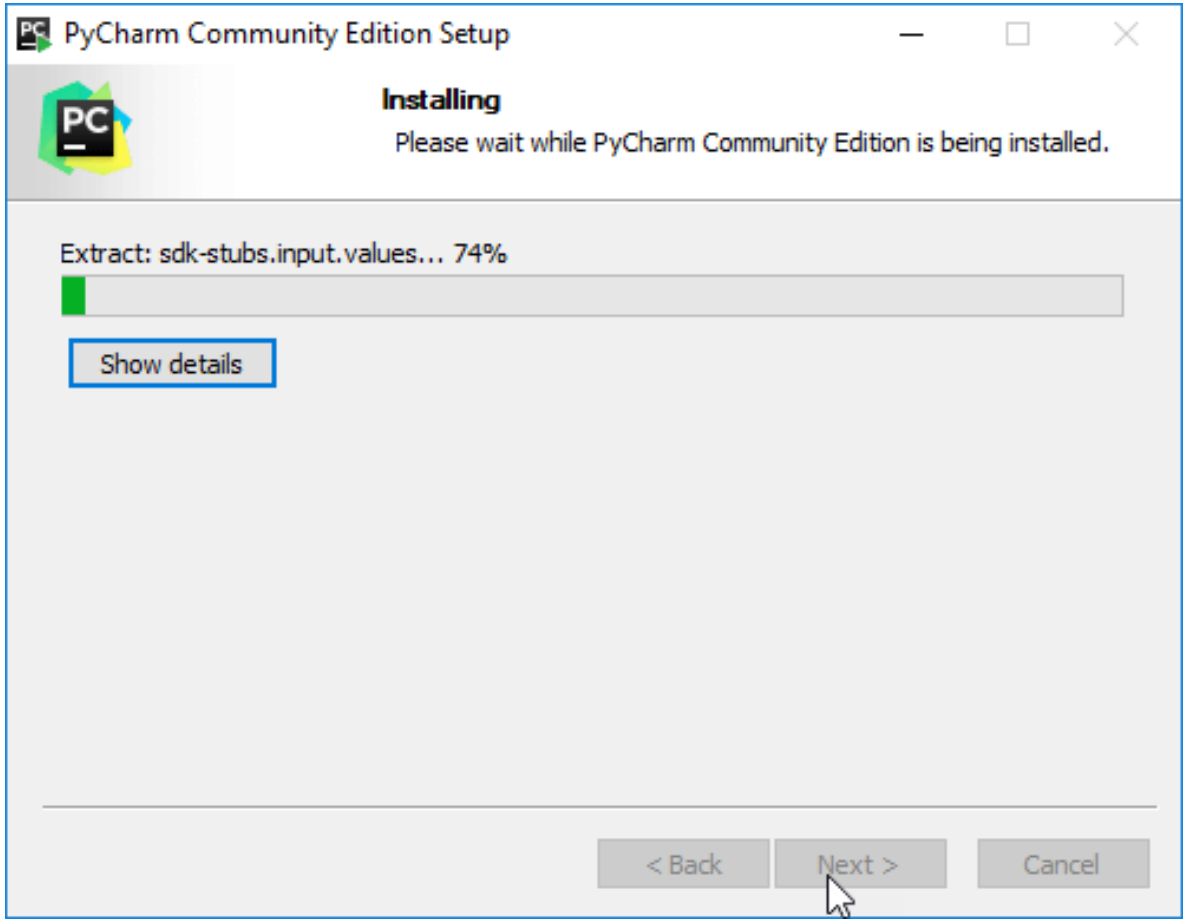
- **Step 4)** On the next screen, you can create a desktop shortcut if you want and click on “Next”.



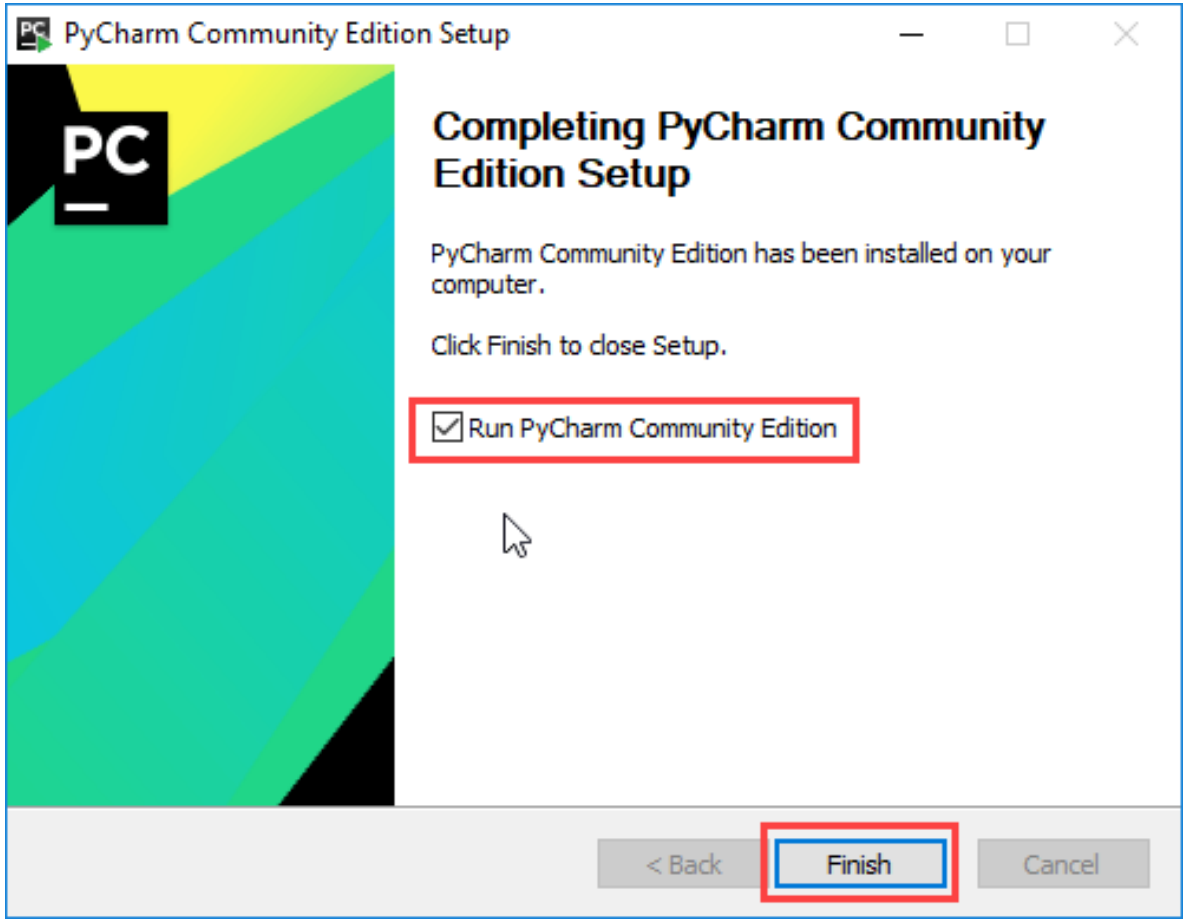
- **Step 5)** Choose the start menu folder. Keep selected JetBrains and click on “Install”.



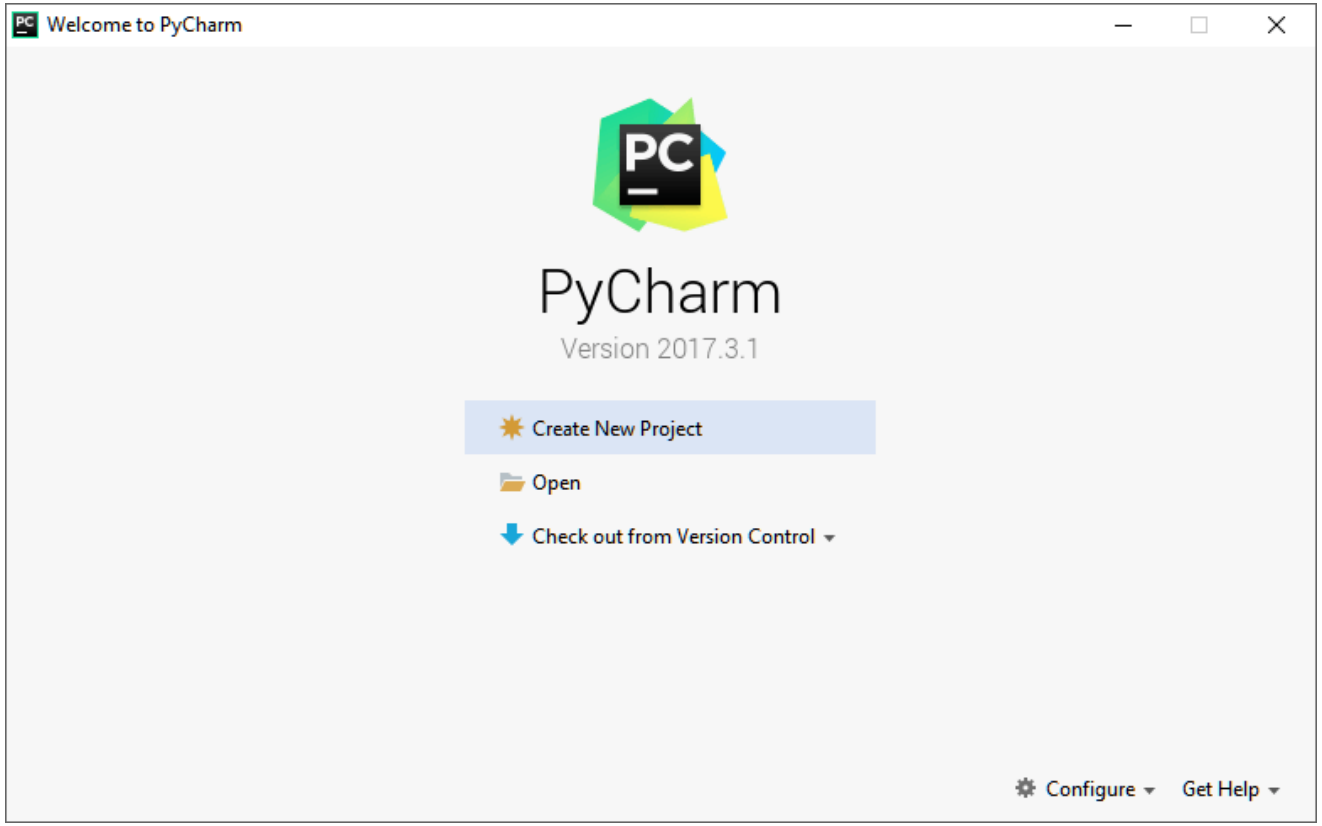
- **Step 6)** Wait for the installation to finish.

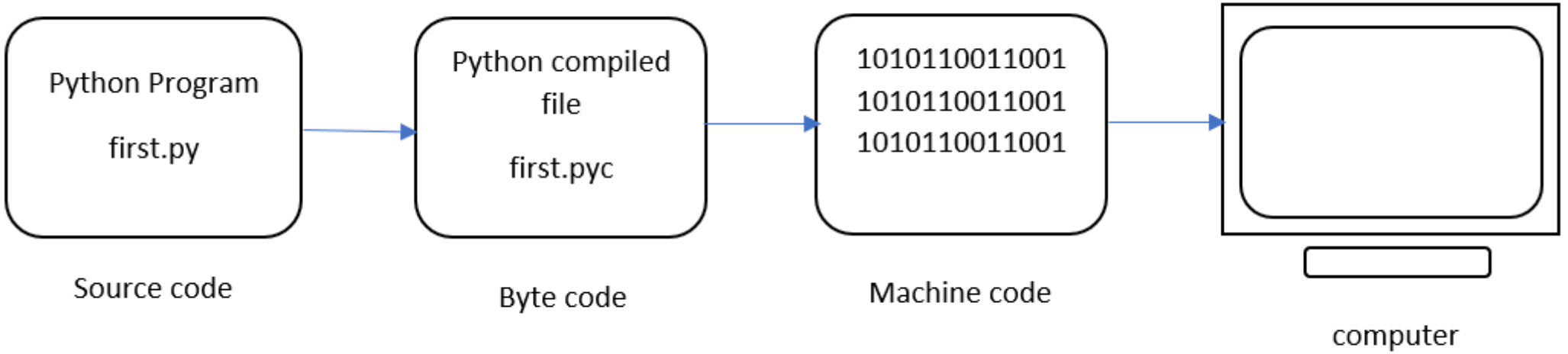


- **Step 7)** Once installation finished, you should receive a message screen that PyCharm is installed. If you want to go ahead and run it, click the “Run PyCharm Community Edition” box first and click “Finish”.



- **Step 8)** After you click on “Finish,” the Following screen will appear.





Executing first Python Script

The execution steps of a Python Program

- Compilation-The program is converted into **byte code.** Byte code is a fixed set of instructions that represent arithmetic, comparison, memory operations, etc. It can run on any operating system and hardware.
- Interpreter-The next step involves converting the byte code (.pyc file) into machine code. This step is necessary as the computer can understand only machine code (binary code).Further, these machine code instructions are executed by processor and the results are displayed.

Print Function

Syntax: print(value(s), sep= ‘ ‘, end = ‘\n’, file=file, flush=flush)

Parameters:

- value(s) : Any value, and as many as you like. Will be converted to string before printed
- sep=’separator’ : (Optional) Specify how to separate the objects, if there is more than one.Default :’ ‘
- end=’end’: (Optional) Specify what to print at the end.Default : ‘\n’
- file : (Optional) An object with a write method. Default :sys.stdout
- flush : (Optional) A Boolean, specifying if the output is flushed (True) or buffered (False). Default: False

Flush

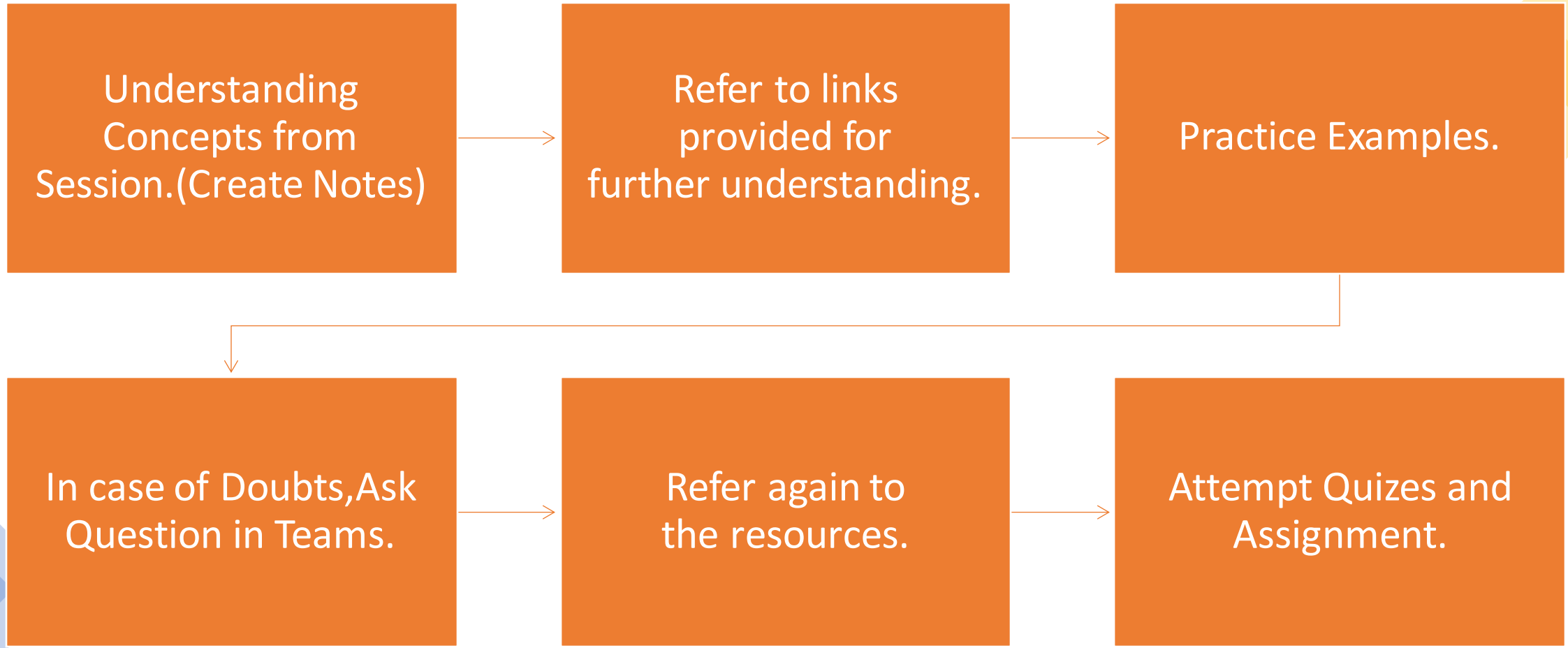
- Usually all I/Os are buffered, meaning they are written in chunks.
- Pythons print method as an exclusive attribute namely, flush which allows the user to decide if he wants his output to be buffered or not.
- The default value of this is False meaning the output will be buffered.
- If you change it to true, the output will be written as a sequence of characters one after the other.
- This process is usually slower because it's easier to write in chunks rather than writing one character at a time.

File Printing

Code Example--

```
sourceFile = open('python.txt', 'w')
print('Pretty cool, huh!', file = sourceFile)
sourceFile.close()
```

Approach to learning Python



Anyone ??