Fall 2019

CSE 216 : Programming Abstractions

TOPIC 5 – INTRODUCTION TO PYTHON

Outline

- Why study Python?
- Java vs Python
- Python and PyCharm installation

Why study Python?

- Great for beginners
- Used for web applications
  - Django, Flask
- Build code quickly – with minimal lines of code
- Popular for agile programming
- High salaries
- Future of AI and machine learning
  - NumPy, SciPy, scikit-learn, Keras, TensorFlow
- Add a new weapon to your arsenal!

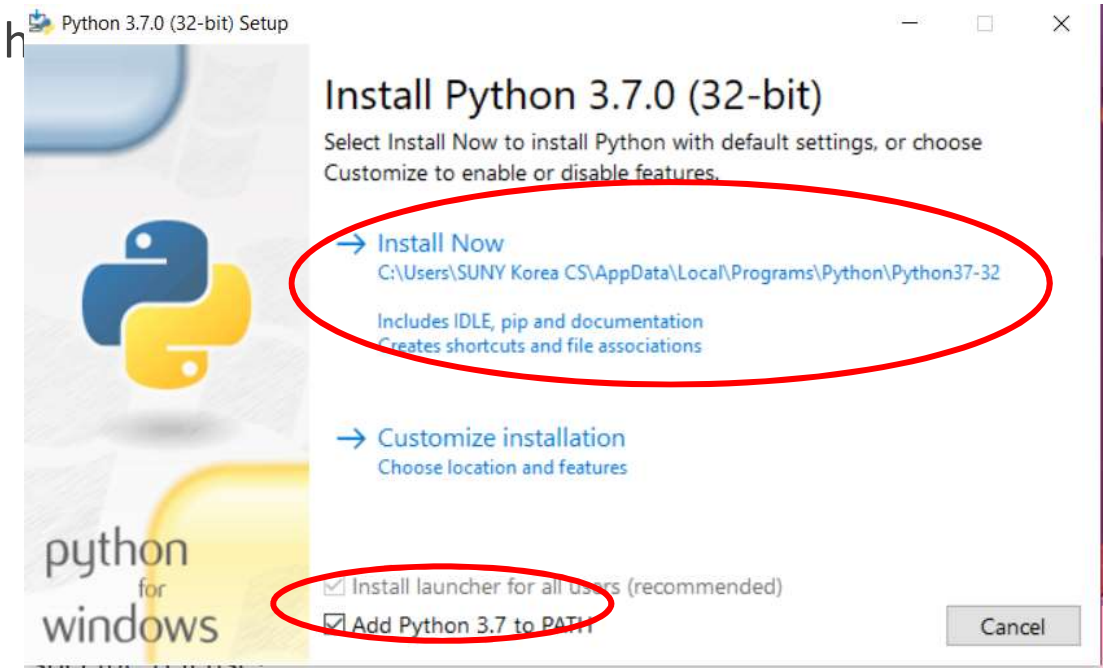
Java vs Python

Java	Python
Statically typed	Dynamically typed
Verbose	Terse (aka concise)
Not compact	Compact
Own file for each top level class	Multiple classes in a single file
Uses checked exceptions	Need not catch/throw exceptions in every method
Weak support for string handling	Good support for string handling
Heavy use of parenthesis	Minimal use of parenthesis

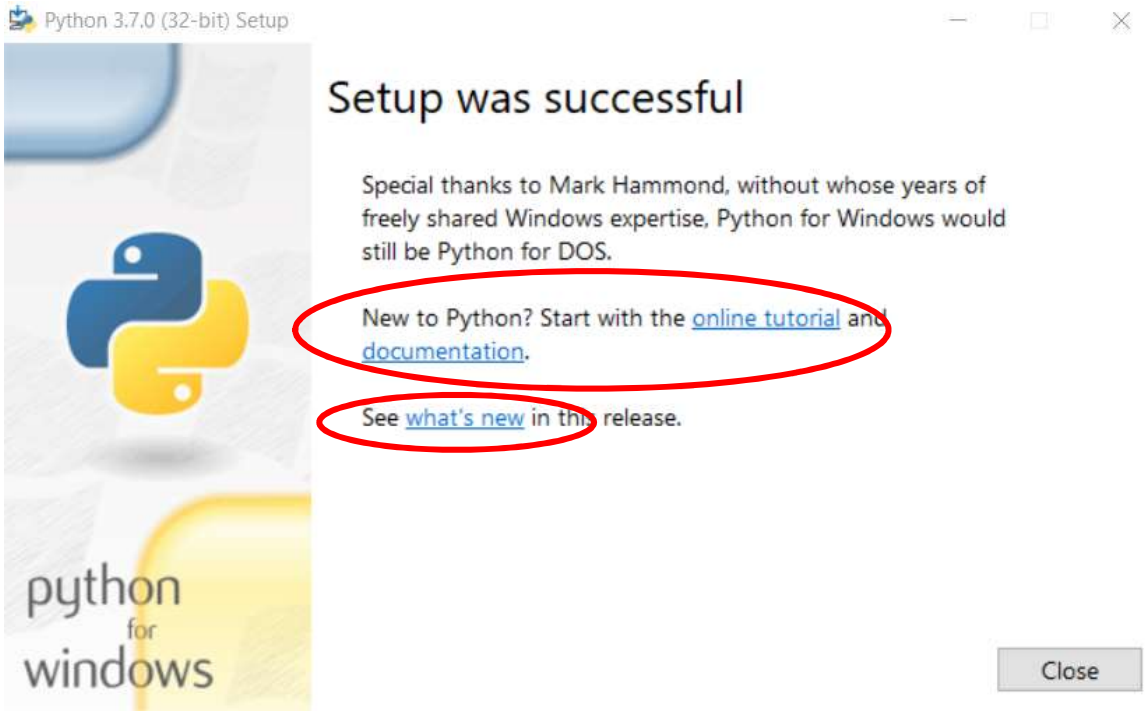
Python Installation on Windows

https://www.python.org/downloads/

Python Installation on Windows



Python Installation on Windows



Python Installation on MacBook

https://www.youtube.com/watch?v=8BiYGIDCvvA

What is a computer program?

- A computer program is a sequence of instructions the computer executes to solve a well-defined problem
- The instructions or steps the programmer writes constitute the **source code** of the program
- In Python, many of these instructions look like regular, everyday English with some extra punctuation thrown in
- There are two basic ways to give commands written in Python to the computer:

1. Type individual instructions via a **shell**, an interactive program that executes the commands
2. Write a complete, stand-alone **application** that we can run over and over

Python console / interactive shell

- The **console** (or interactive shell) is
  - a window where a single command or short set of commands can be typed to the computer
  - the computer tries to execute those command
- Python **interpreter**
  - Reads Python instructions typed into the console by the user
  - The interpreter converts them into a form the computer's hardware understands
  - The language that the hardware understands is called **machine language**
- No matter what language is used, at some point the source code must be translated into machine code for the computer to execute it

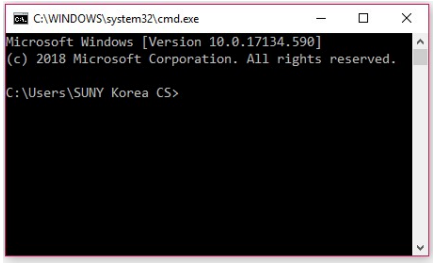
Opening a Terminal

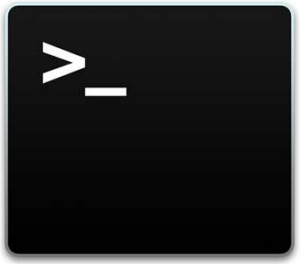
Windows

- Press "Win-R," type "cmd" and press "Enter" to open a Command Prompt session using just your keyboard.

Mac OS

- Finder -> Applications -> Utilities -> Terminal





Some Python Statements

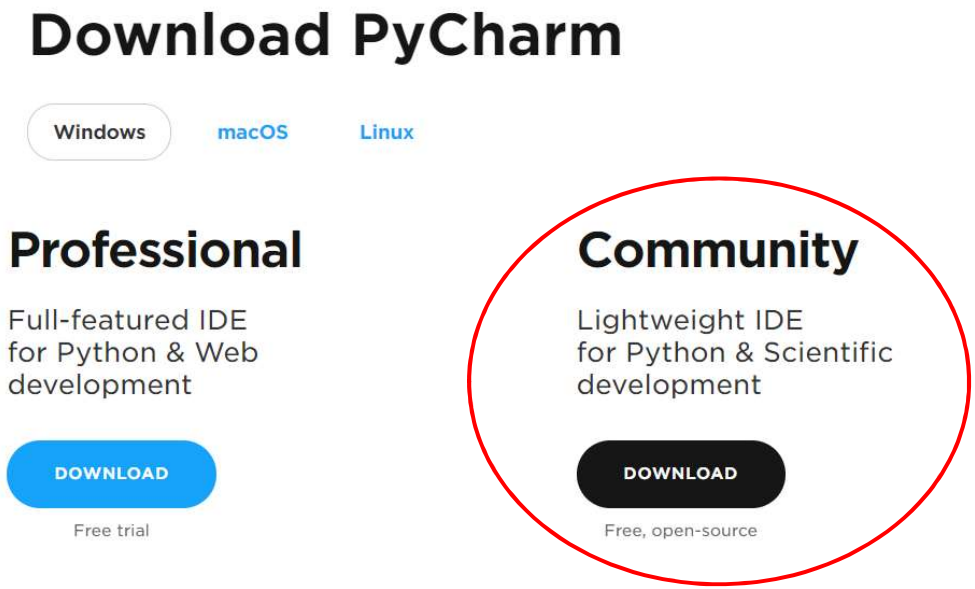
- print (“helloworld”)
- 1 + 1
- a = 1;
- b = 2;
- a + b
- name = “SUNY”
- country = “Korea”
- print (name + country)
- Pi = 22/7
- print (type(name))
- print (type(Pi))

The PyCharm IDE

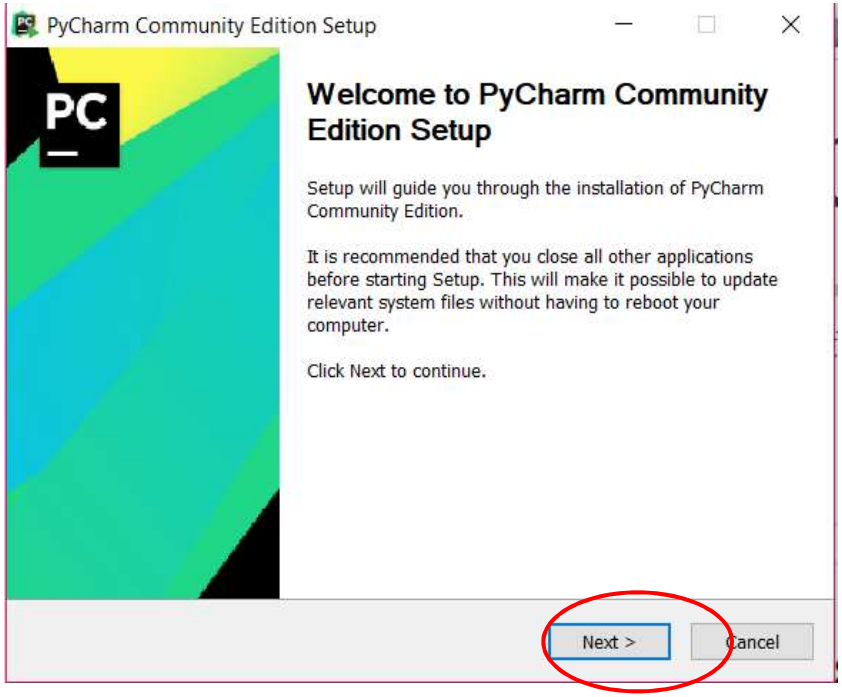
- In this course, an **integrated development environment** (IDE) called PyCharm will be used
- PyCharm is industry-grade software used by professional software developers
  - still easy enough for novice programmers to use
  - First download and install Python from www.python.org
  - Go to www.jetbrains.com/pycharm to download and install the free Community Edition of PyCharm

PyCharm Installation

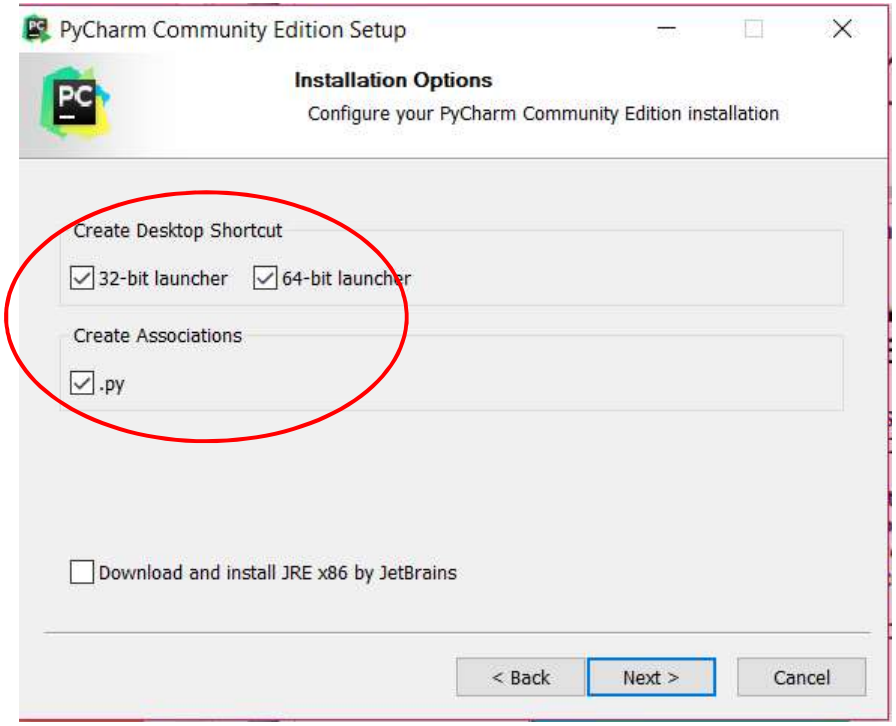
https://www.jetbrains.com/pycharm/download/#section=windows



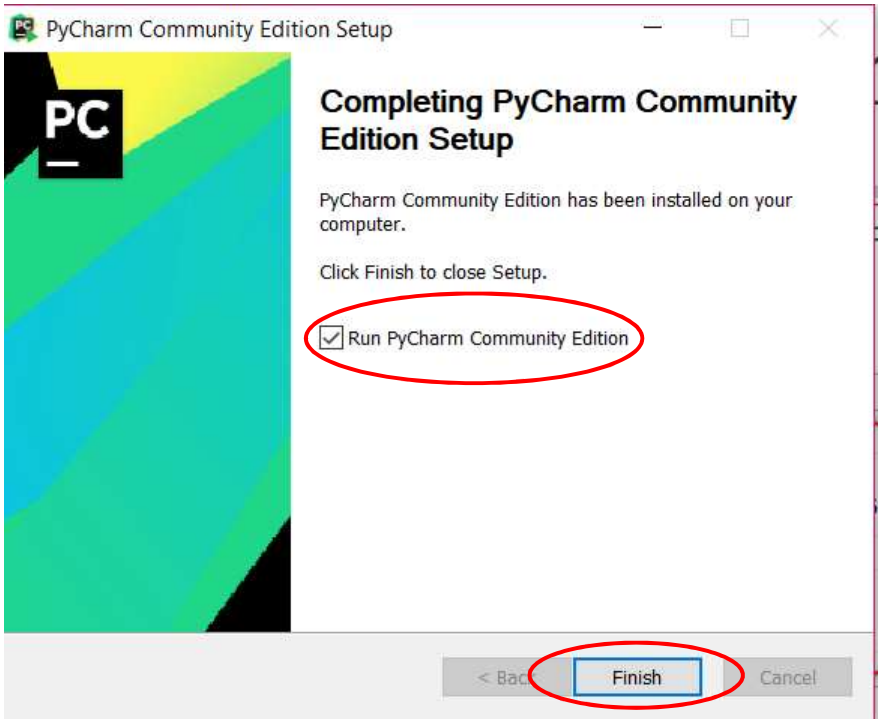
PyCharm Installation



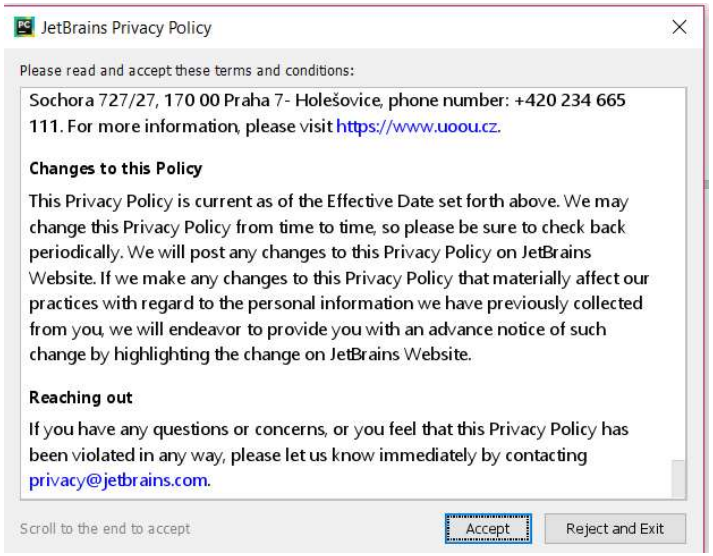
PyCharm Installation



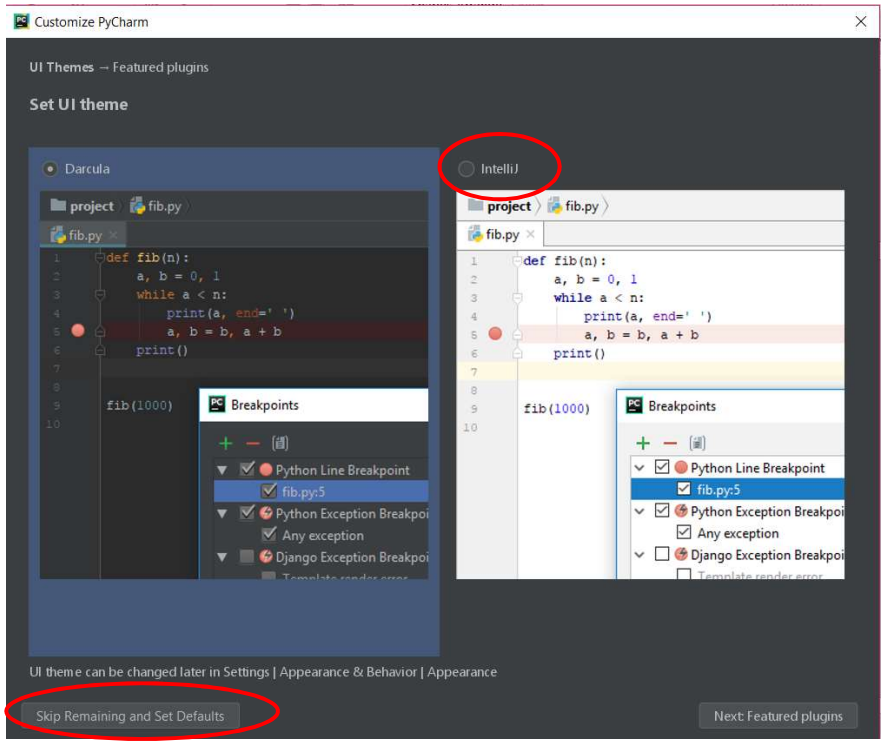
PyCharm Installation



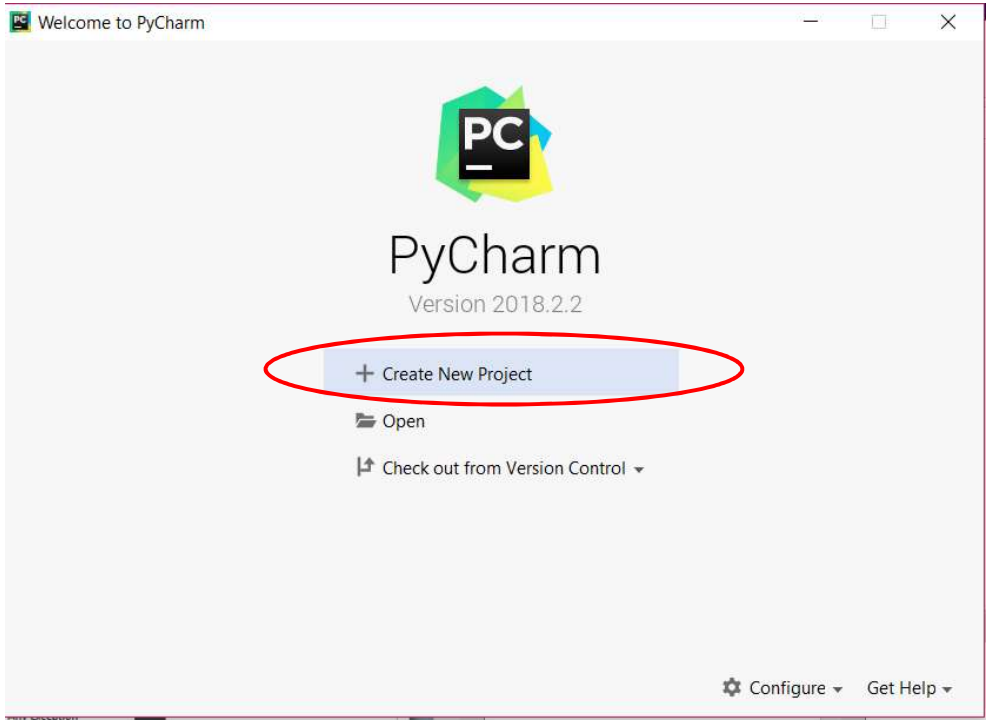
PyCharm Installation



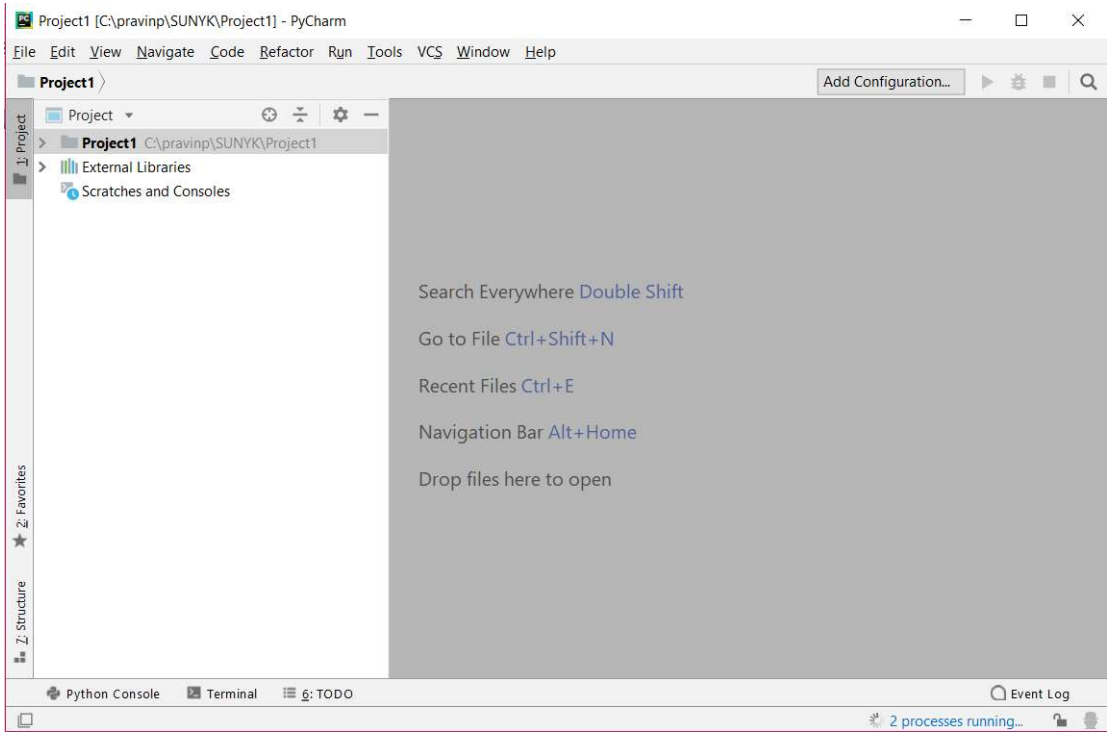
PyCharm Installation



PyCharm Project



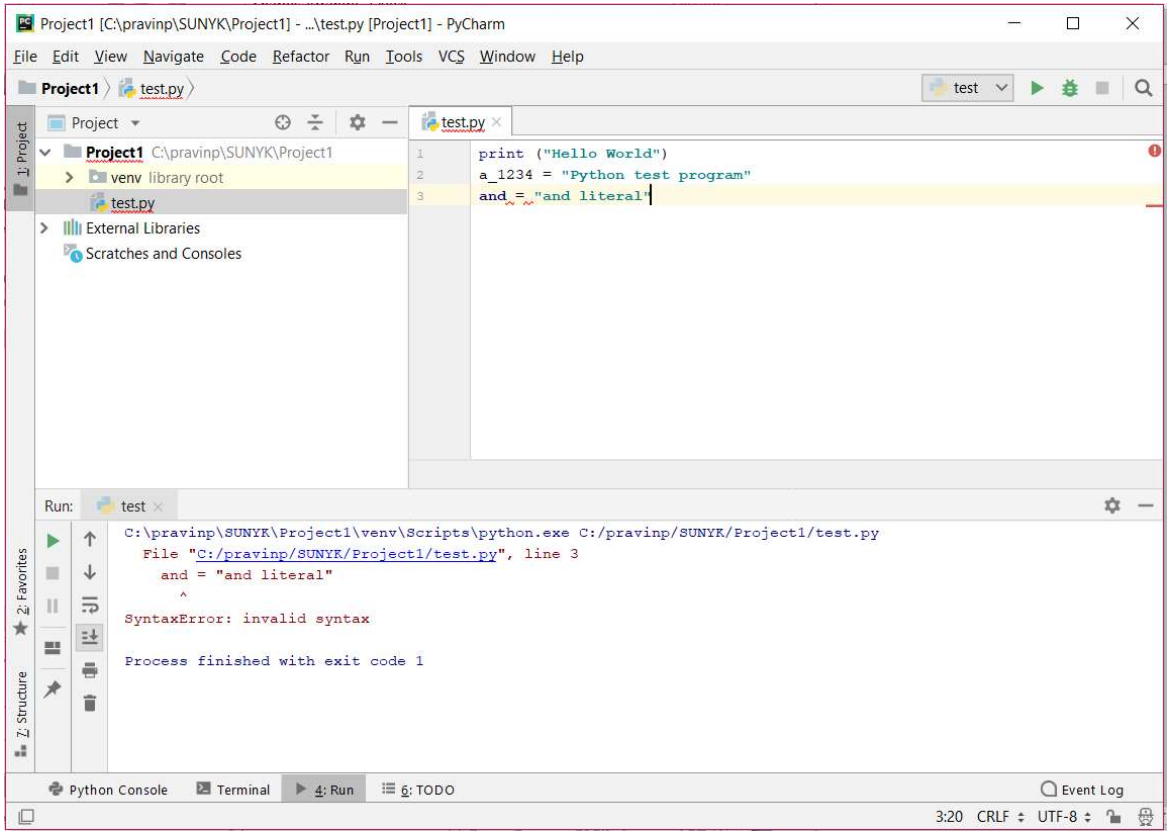
PyCharm IDE


Project1 [C:\pravinp\SUNYK\Project1] - PyCharm
File Edit View Navigate Code Refactor Run Tools VCS Window Help
Project1
Add Configuration...
Project
Project1 C:\pravinp\SUNYK\Project1
External Libraries
Scratches and Consoles
1: Project
2: Favorites
7: Structure
Search Everywhere Double Shift
Go to File Ctrl+Shift+N
Recent Files Ctrl+E
Navigation Bar Alt+Home
Drop files here to open
Python Console
Terminal
6: TODO
Event Log
2 processes running...

PyCharm Installation on Mac

https://www.youtube.com/watch?v=wb4HNqQtIlI

PyCharm IDE


Project1 [C:\pravinp\SUNYK\Project1] - ...\test.py [Project1] - PyCharm
File Edit View Navigate Code Refactor Run Tools VCS Window Help
Project1 test.py
test
Project
Project1 C:\pravinp\SUNYK\Project1
venv library root
test.py
External Libraries
Scratches and Consoles
test.py
print ("Hello World")
a_1234 = "Python test program"
and = "and literal"
Run: test
C:\pravinp\SUNYK\Project1\venv\Scripts\python.exe C:/pravinp/SUNYK/Project1/test.py
File "C:/pravinp/SUNYK/Project1/test.py", line 3
and = "and literal"
^
SyntaxError: invalid syntax
Process finished with exit code 1
1: Project
2: Favorites
7: Structure
Python Console
Terminal
4: Run
6: TODO
Event Log
3:20 CRLF UTF-8

Setting Default Python Interpreter in PyCharm

Step 1: Find out installation location of Python program:

Windows terminal command

- where python

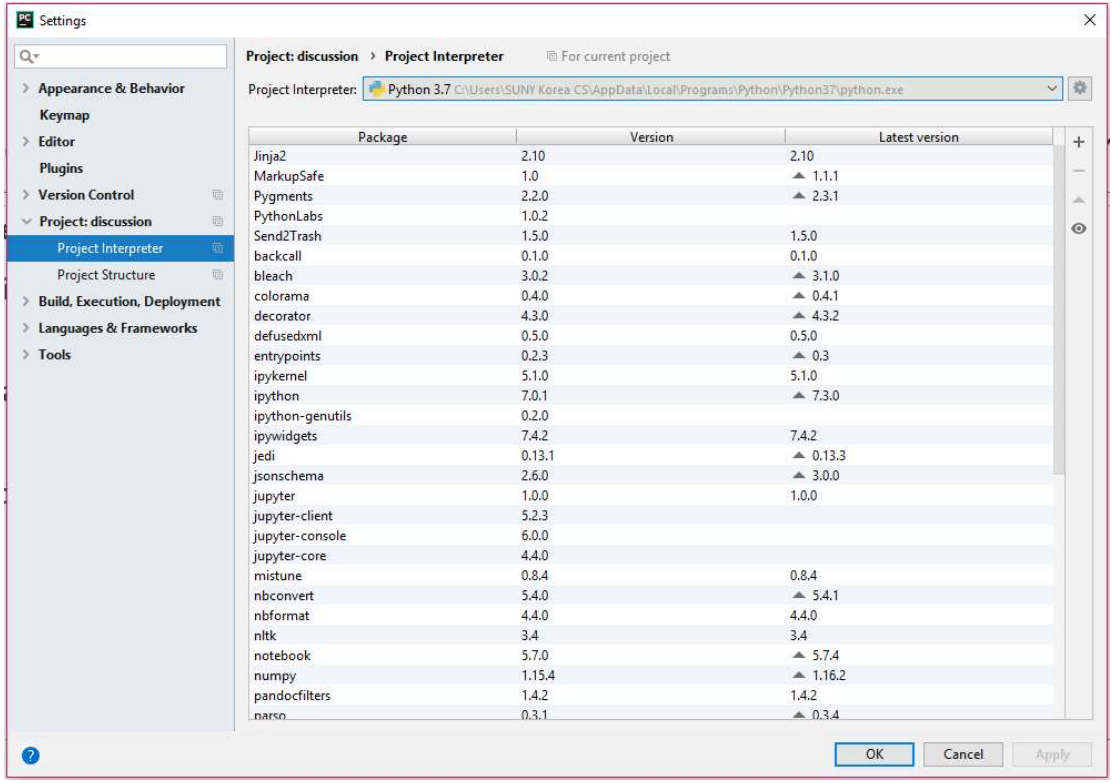
Mac terminal command

- which python3

Note down the paths of python installation.

Setting Default Python Interpreter in PyCharm

Step 2: Change project settings (and New Project Settings) in PyCharm:



PyCharm basics

- To create and run a stand-alone Python program:
  1. Start PyCharm and press the “Create New Project” button.
  2. Pick a “Location” and name for the Project (e.g., “CSE 101”).
  3. Select File Menu > New > Python File and enter the name of the file for the source code.
  4. Write the program and save the file.
  5. After saving, go to Run Menu > Run.
  6. Select the name of the program file to run it.
- The next time the program is to be run:
  - Hit the green triangle in the lower-left corner of the screen.
  - Or, right-click the name of the file and choose Run.

Questions?