

Think Twice

Code Once



The Islamic University of Gaza

Engineering Faculty

Department of Computer Engineering

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# Introduction to Computers

## Laboratory Manual

### Experiment #1

### Introduction to Python Programming

### What is Python?

Python is a widely used high-level programming language for **general-purpose programming**, created by Guido van Rossum and first released in 1991. Python is very simple, yet incredibly powerful programming language. You can use it for writing web and desktop applications, do scientific computations, create scripts, and more. **You can use Python for almost anything.** In this course, you will learn the basics of Python syntax, functions and creating console apps.

### The whole process

Python code is executed using an **interpreter**, which is a program that reads one statement from the source code, translates it to the machine code or virtual machine code, and then executes it right away.

Python is interpreted language, which means that Python code is translated and executed by an interpreter, one statement at a time.

At first, we write our python source file, a file that has `.py` extension. Then we use the python interpreter to interpret and run the program.

### Python Editions

Python is now being developed and maintained by a large team of volunteers and is available for free from the Python Software Foundation. Two versions of Python are currently coexistent: Python 2 and Python 3. The programs written in Python 3 will not run in Python 2. Python 3 is a newer version, but it is not backward-compatible with Python 2. This means that if you write a program using the Python 2 syntax, it may not work with a Python 3 interpreter. Python provides a tool that automatically converts code written in Python 2 into syntax Python 3 can use. **In this course, we will learn Python 2.**

## Installing Python

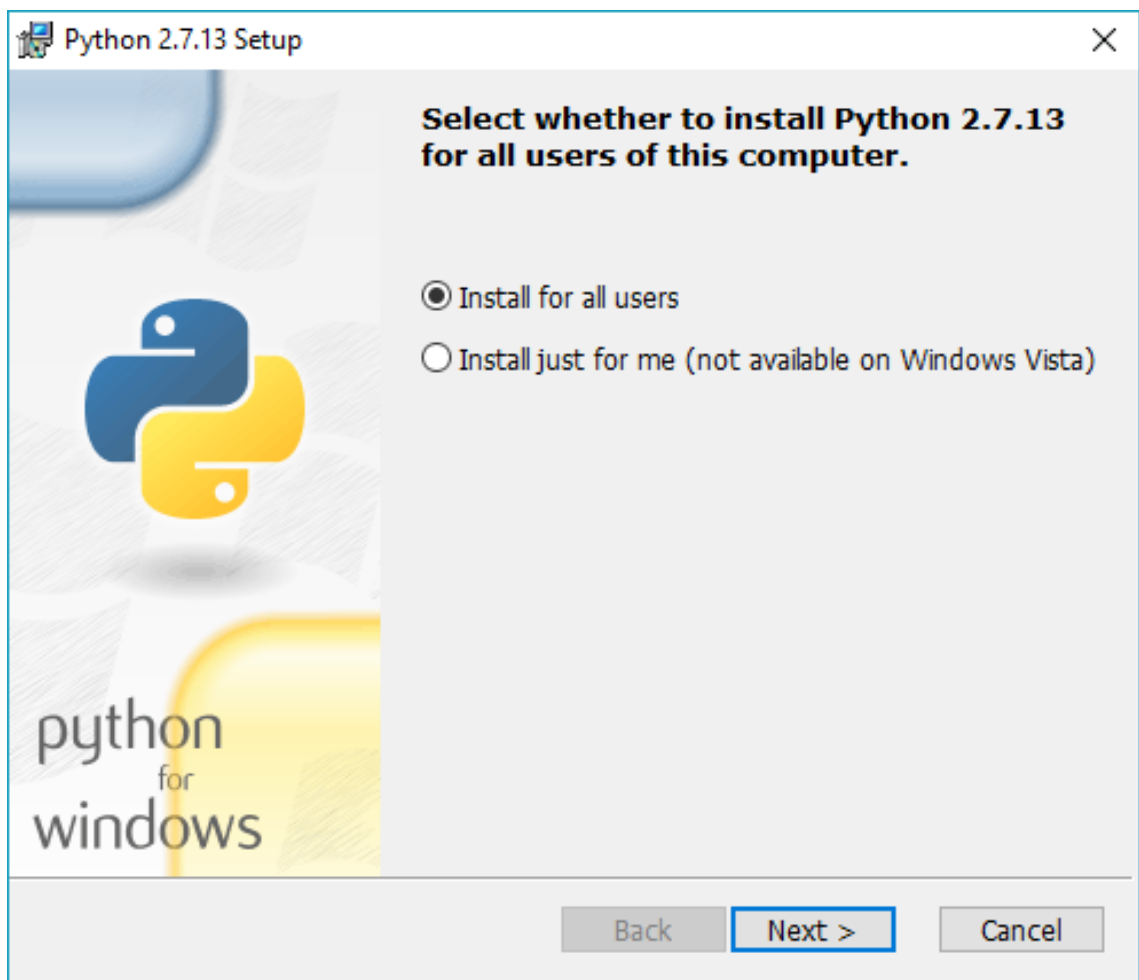
1. Go to Python's downloads page.

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

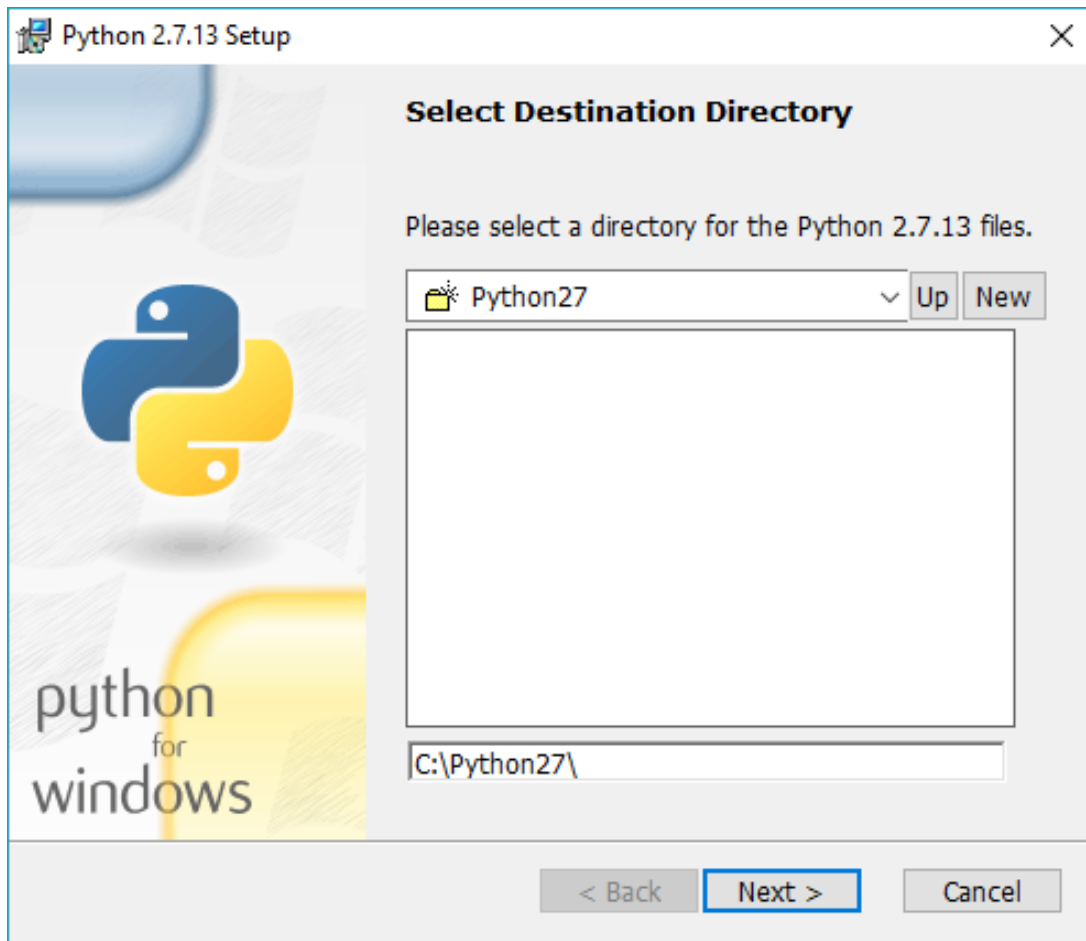
2. From the page, choose to download the **second edition** as illustrated in the figure below.



3. Run the installation wizard that you have just downloaded. At this screen, click "Next".

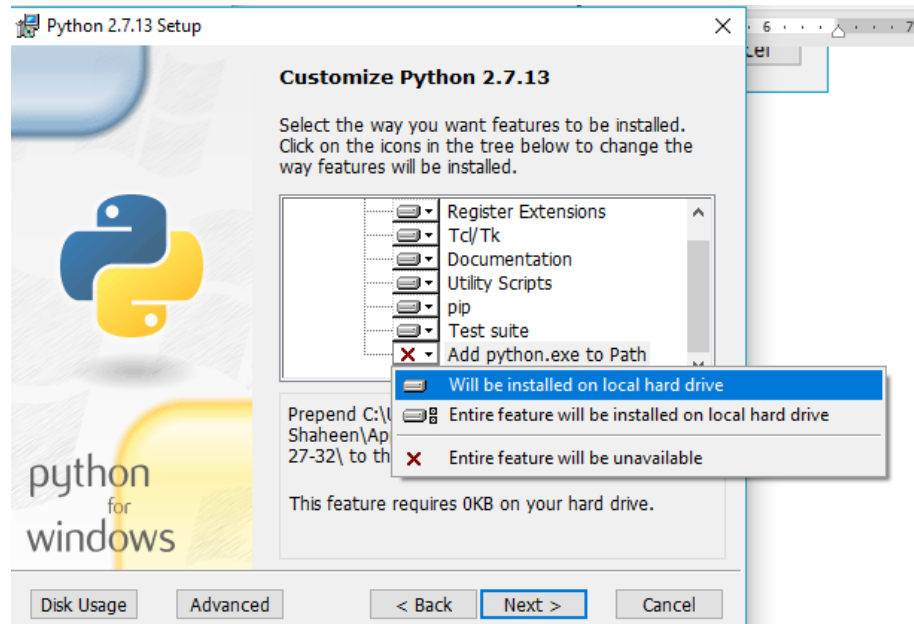


4. In this screen, you can specify the location where Python to be installed. Leave as default and click on Next.



## Experiment #1: Introduction to Python Programming

- Click on "Add python.exe to Path" and choose "Will be installed on local hard drive", then click Next.



- The installation process will start. At the end, you'll have Python installed on your machine and ready to be used.



## Check Python version

To check Python version installed on your machine follow the following steps.

1. To run the command prompt, press Win + R at the same time, then type `cmd` in the wizard. Or you can search for `cmd` from the start menu.
2. In the command prompt print the following command to test python's version.

```
python --version
```

3. Press Enter. The following result will be displayed on the screen.

```
Python 2.7.13
```

## Example 1: First Python Program

If you wanted to, you could develop python applications using any text editor, Notepad++, WordPad or any other editor. By using any text editor, you can write down the source code, then you could use command line tools to interpret and execute your program.

Python programs must be written with a particular structure. The syntax must be correct, or the interpreter will generate error messages and won't execute the program.

The following steps show the whole process:

1. Open any text editor of your choice and type in the following code:

```
# This code prints Hello, World on the screen  
print("Hello, World!")
```
2. Save the file as Test.py, then close it.
3. Open the command line and print the following command to interpret the source code and run the application.

```
python Test.py
```

4. You will notice Hello, World! printed out on the screen, WOW! 😊
  - `print` is a **function** used to print string on the screen.

- A `string` is sequence of characters, that is, any sentence.

### Installing PyCharm

As may you have noticed, that process is tedious and cumbersome. And we need a more productive model than that. So, developers around the world use those things called Integrated Development Environments (IDE) which allow us to type in our code, compile, debug and format it, everything in one place.

PyCharm Community Edition is the free version of PyCharm, a premier IDE for Python. In this lab, we are going to use it.

The following steps show you how to install it:

1. Go to the download page and download the latest version of PyCharm Community Edition.

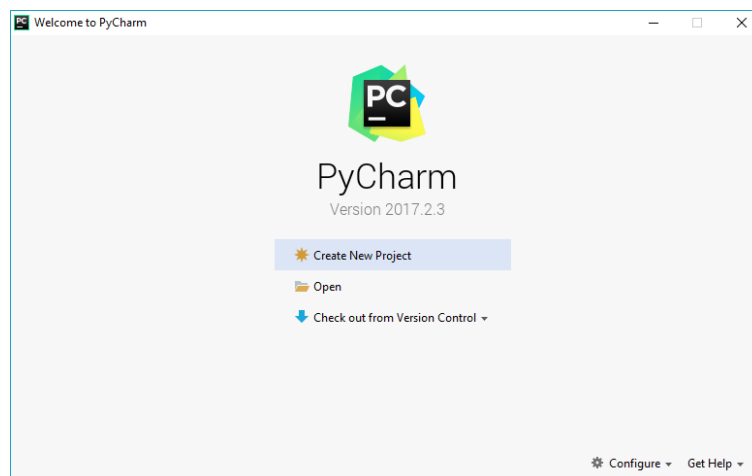
<https://www.jetbrains.com/pycharm/download/>

2. After download is complete, installation process is easy and straightforward. Do it yourself.

- As a feature of being a student 🎓, you can get PyCharm Professional Edition, and all other JetBrains products, for free as long as you are a student. Go to this link <https://www.jetbrains.com/student/>

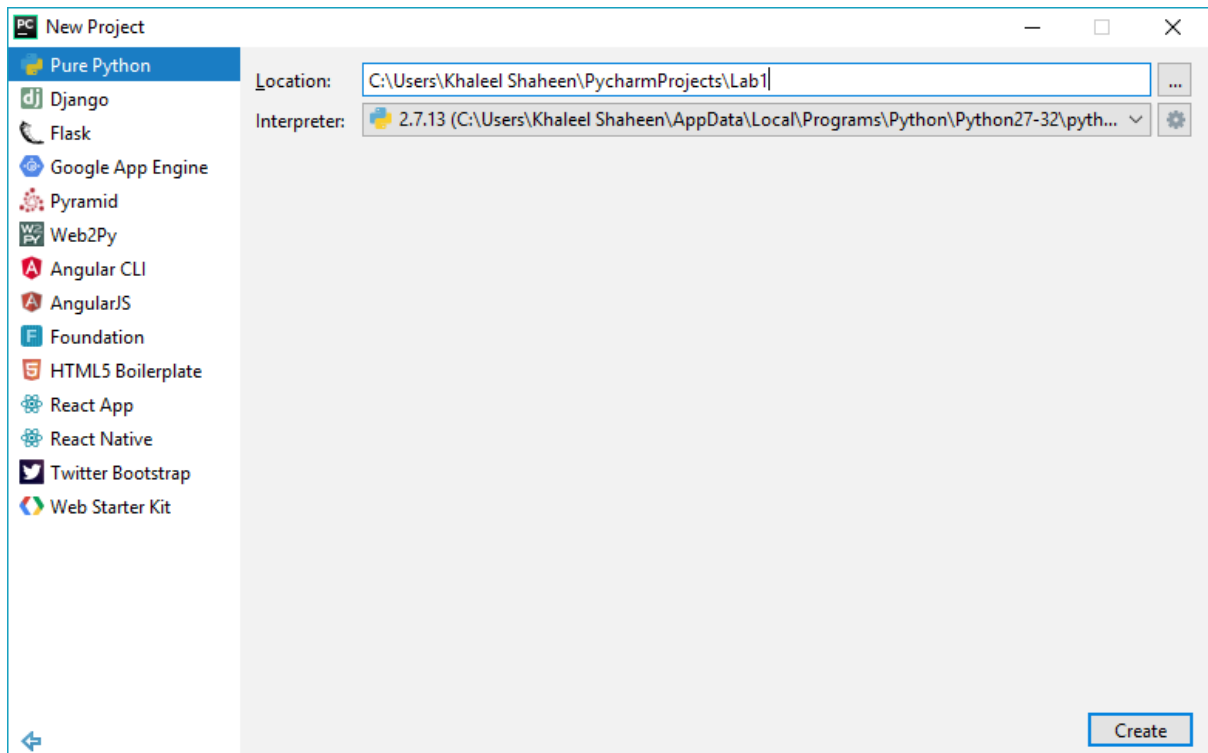
### Creating First PyCharm Project

1. When you open the IDE, you will see the following screen. Click on Create New Project.

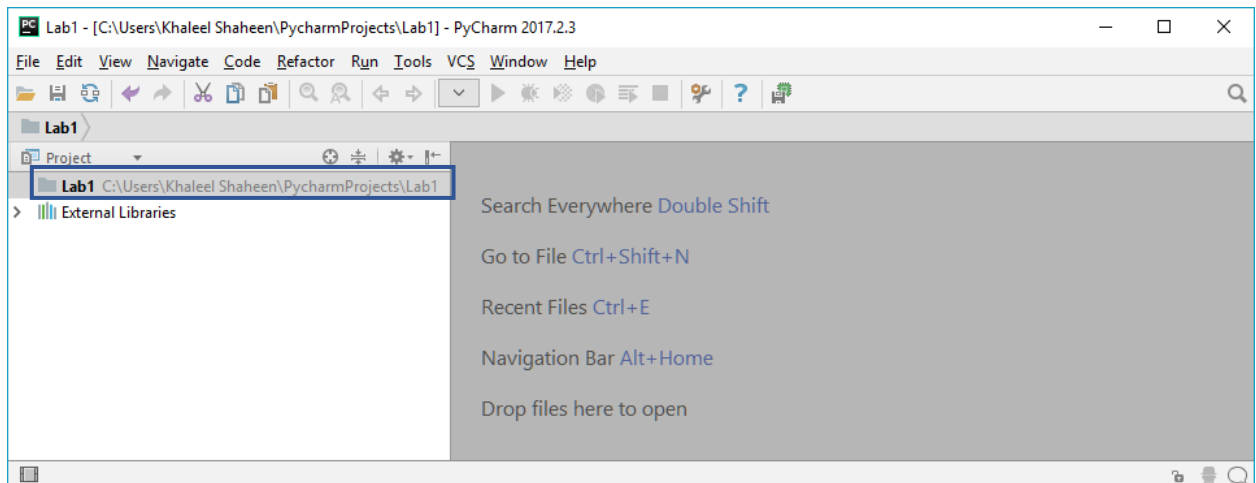


## Experiment #1: Introduction to Python Programming

- From the left menu choose Pure Python



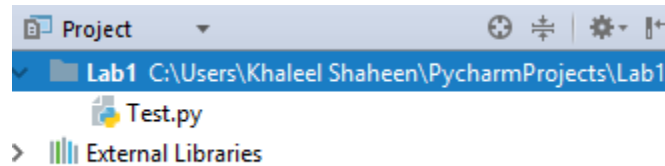
- Choose the location and name of the project.
  - When you open PyCharm for the first time, you may need to assign the interpreter path in Interpreter field.
- Click on Create button, and your amazing project will show up. 🤖



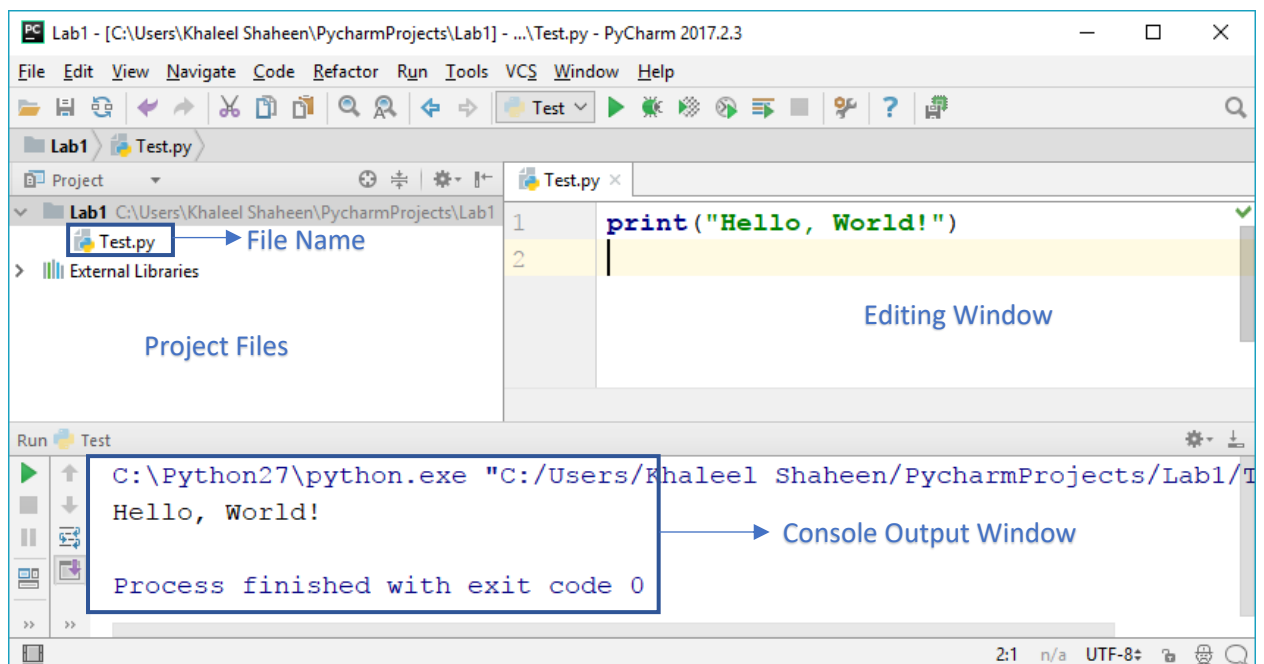


## Experiment #1: Introduction to Python Programming

- Right click on project name, choose new -> Python File and write the name you want for that file. You will notice a new python file is added.



- Double click on the file name, and write down the code snippet from the previous section. Click on Run menu from the menu bar and choose Run to run the program.



Congratulations! You have made a complete Python application. From now on, we will learn to build useful and complex applications.

### Example 2: Compute Mathematical Expression

In this example, we are going to write a Python program that computes the value of the mathematical expression  $\frac{15 * 3 + 2.9}{17 / 3.2 - 5}$  and prints the result on the screen.

```
# Compute Expression
print((15 * 3 + 2.9) / (17 / 3.2 - 5))
```

After executing the program, here is the result

```
153.28
```

```
Process finished with exit code 0
```

### Comments

Comments are text inside of your source code that are ignored by the interpreter. Comments help the people read the code, which is you most of the time, better understand the intent, structure and functionality of the program. Also, comments are frequently used to hide parts of the source code without completely deleting them.

There are two types of comments in Python:

1. Line Comments (`#`), the interpreter ignores everything until the end of the line. When the Python interpreter sees `#`, it ignores all text after `#` on the same line.

```
# This is a Line Comment
```

2. Block Comments (`""" ... """`), also called paragraph comments, the interpreter ignores everything between those notations. When it sees `"""`, it scans for the next `"""` and ignores any text between the triple quotation marks. They can happen in one or multiple lines.

```
'''  
This is a Block Comment  
'''
```

### Homework

The best way to teach programming is by example, and the only way to learn programming is by **doing**. So, please do it yourself and **don't copy paste** from others.

1. Write a program that displays **Welcome to Python**, **Welcome to Engineering**, and **Programming is fun** on the screen. Include some comments.
2. Write a program that displays the result of  $1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9$
3. Write a program that displays the result of  $\frac{9.5 * 4.5 - 2.5 * 3}{45.5 - 3.5}$

4. Write a program that displays the area and perimeter of a rectangle with the width of 4.9 and height of 7.5 using the following formulas:

$$\textit{area} = \textit{width} * \textit{height}$$

$$\textit{perimeter} = 2 * \textit{width} + 2 * \textit{height}$$

Good Luck

