Wrestling With Python (2014) Lab 2: Loops

Aim

The aim of this lab is to introduce you to loops. Loops are a construct available in most programming languages that enable the programmer to execute an instruction many times. The syntax for loops will also show you how whitespace is significant in Python.

Header

Throughout the labs it is assumed that you will follow a similar folder hierarchy to the one shown in the labs. Your code will be stored in a folder C:\Users**<<Your Login>>**\PycharmProjects\.

Remember, if you are struggling ask for help!

Coding in PyCharm

To launch PyCharm press the windows key and type "pyc", then select PyCharm.

Click File -> New Project. Give the project a name e.g. Lab 2. Check the project name displayed in the top left corner of the screen.

In the project window (left hand side of the screen), right click on the Lab2 and select New -> Python File. Give the file a name. e.g. loop.py
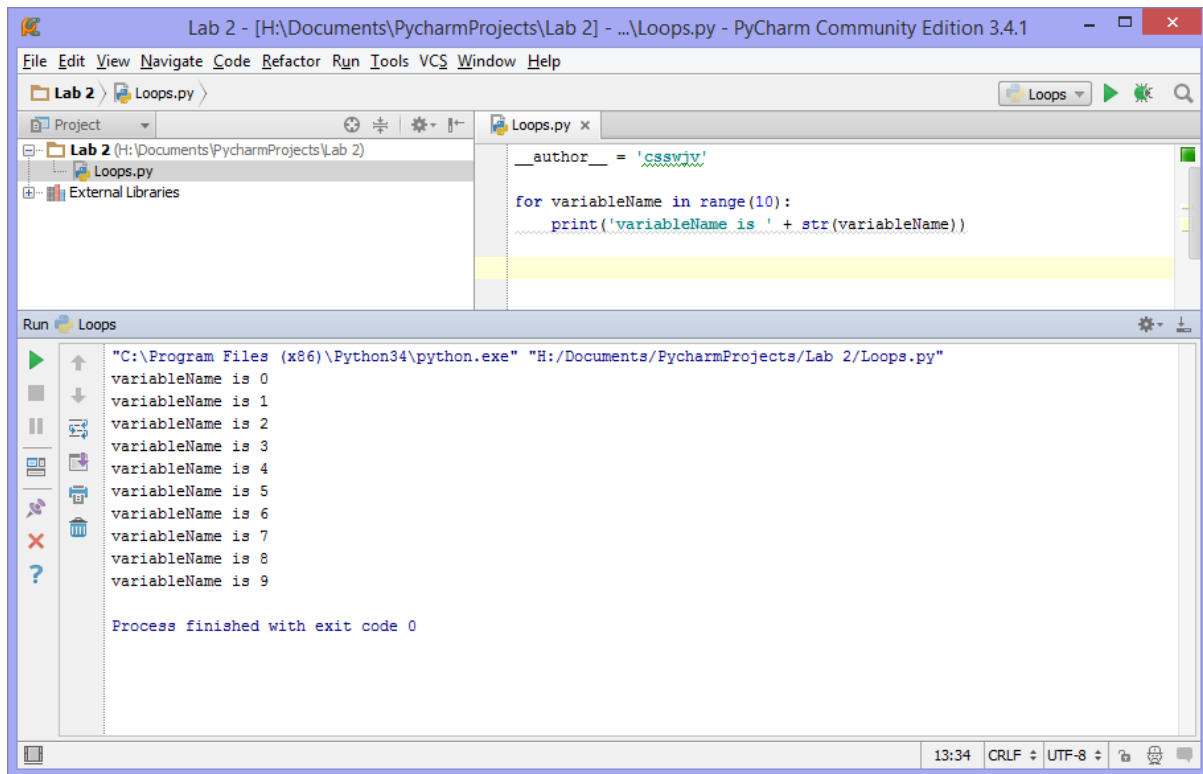
A new window called 'loop.py' should appear.

Type:

for variableName in range(10):

print("variableName is " + str(variableName))

Run your code by right clicking on the Loop.py in the project window and selecting 'Run'

Now consider the code you've just written. Variable name is assigned values from 0 to 9 in turn. Note the whitespace. Change your code to this:

for variableName in range(10):

      print("variableName is " + str(variableName))

      print("Whitespace is important in python")

print("because it determines where the loop ends!")

Using Loops

Open a new window. You're going to write a program that calculates the length of a fence around a field. The field has four sides. You need to ask the user what length each side is, then once you have all four length values you should print the total length of the fence.

Type the following code:

length = 0

for sides in range(4):

      length = length + int(input("Next length please: "))

print("total length = " + str(length))

Remember to enter your lengths, when prompted, in the lower window.

Create a new file in the project called Sheep.py.

Next you need to write a program that calculates the average weight of the sheep in the field. The problem is that you don't know how many sheep there are. This time see if you can write some code that first asks the user how many sheep there are in the field, then uses that value in the for construct. It should then ask the user to input the weight of each sheep, and finally it should calculate the average weight and output it to the screen.

Reading from a file

For your final program you are going to read values from a file. The file format is one that contains the number of values in the first line, followed by the values themselves.

Create a new Python file called 'Reading from a file.py'

Create a folder called Resources inside your Lab2 folder. You should put all your data files for this lab in this folder.

In order to open the file you should data use the following code:

dataFile = open('Resources/testData.txt', 'r')

This opens the file for reading. You can then read the first line, which contains the number of lines in the rest of the file like this:

line = dataFile.readline()

Hopefully you can work out the rest of the code yourself. Remember that line will be a string of text, so you may need to convert it to a number before you can use it.

Write code to print out the average of the values in the testData.txt. Your program may produce the result 13. The actual answer is 13.8, but because you've only been shown how to deal with integer values (whole numbers) the average has been truncated. To get a value with a decimal point when you read a line you should convert it to a floating point value rather than an integer. You can do that like this:

floatingValue = float(line)

If this is confusing ask for help!

Once your program works with the testData file, try it with the bigTestData file. What is the average value?