

Creating programs in Python

By Ryan Heitz

Programs allow you to create, save and run more complex sets of instructions. You can easily edit your programs and run them again. In this article, we'll you walk through creating a Python program.

This article is excerpted from [Hello Raspberry Pi!](#) Save 39% on Hello Raspberry Pi! with code 15dzamia at [manning.com](#).

Imagine you own a pizza shop and you want to use Python to calculate the cost of a meal, including tax. A customer orders a meal of two slices of pizza and orange soda. Let's start by creating two variables with the menu prices:

```
>>> Pizza_Slice = 3.5
>>> orange_soda = 1.50
```

Create two variables to keep track of the number of slices and number of drinks.

```
>>> num_slices = 2
>>> num_drinks = 1
```

Next, let's calculate the cost of the meal without tax.

```
>>> meal_no_tax = (num_slices * Pizza_Slice) + (num_drinks * orange_soda)
```

Define the tax rate of 5% and figure out the tax:

```
>>> tax = 0.05
>>> meal_cost = meal_no_tax + (meal_no_tax * tax)
>>> print(meal_cost)
8.925
```

Now imagine if any of the numbers changed? Let's say Pizza_Slices are now \$4.75 and orange soda is \$1.75. You'd have to enter all the information again. It takes way too long.

A better way is to put the eight statements into a text file. Then, we can tell Python to read the file and execute the instructions.

DEFINITION A program is a set of instructions. Python programs can be created in a text file. The programs can be run (or executed) over and over again.

Now you can run it again and again, making updates whenever needed. If the cost of menu items changes or a customer wants a different number of slices, you can update the program and run it again. That is a big time-saver!

A computer program is a set of instructions. Programs allow you to create, save and run more complex sets of instructions. You can easily edit your programs and run them again. Your programs might be as short as a few lines, or thousands of lines long.

Writing Python Programs with IDLE

To write a program, you need a way to input the instructions. IDLE will be our program of choice for this. IDLE is an application that makes it easier to develop programs.

A Spell Checker for Python

If you have ever used Microsoft Word or Gmail, you're familiar with the spell checker feature. It's saved thousands of homework assignments from receiving low grades and stopped misspelled emails from being sent. As it highlights words you misspell, you can easily find them and make corrections.

When you write programs, you want something to help catch your mistakes. IDLE does that for us. IDLE automatically color-codes your Python statements to let you know you are using the correct spelling. By using color-coding, IDLE can help alert you if you enter a command incorrectly and highlight errors or bugs. In later chapters, I'll introduce you to some of the features of IDLE.

Integrated Development Environments

Other programming languages have software applications similar to IDLE that make the process of programming more enjoyable, help prevent errors, and even suggest fixes. As a group, these software applications are called Integrated Development Environments or IDEs. IDLE is one of the most popular ones for Python.

Using Text Editors

In addition to IDLE, you can write and save Python programs in any text editor you like. For example, you could use LeafPad or Nano, which are other simple text editors that come with Raspbian. A word of caution, they allow you to write, but they don't help you avoid errors or find mistakes in your code, making IDLE a better choice for us.

Starting a New Program

Let's create a program called Hello World! While using the IDLE Python Shell select File→New Window. You will see a blank new window appear, with the title at the top of `Untitled` (see Figure 1). This is the IDLE text editor.

TIP. A keyboard shortcut to open a new IDLE text editor window is `Ctrl + N`.

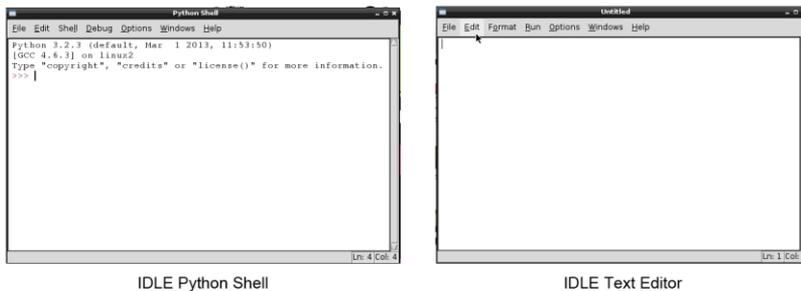


Figure 1 The left window is the IDLE Python Shell. The right window is the IDLE text editor that can be used to create and edit Python programs. You can open the IDLE text editor using `Ctrl+N` or selecting `File→New Window` from the IDLE Python Shell.

Let's write a program in the IDLE text editor. Enter the following lines of text:

```
my_message = "And now for something completely different."  
print(my_message)
```

TIP. The text editor automatically highlights keywords in the Python language. In this example, you will notice `print` appears in purple text signifying it is a Python keyword. Strings are color-coded green.

This is a classic line from Monty Python's Flying Circus. The show would begin with this quote. Figure 2 shows the program in the IDLE text editor.

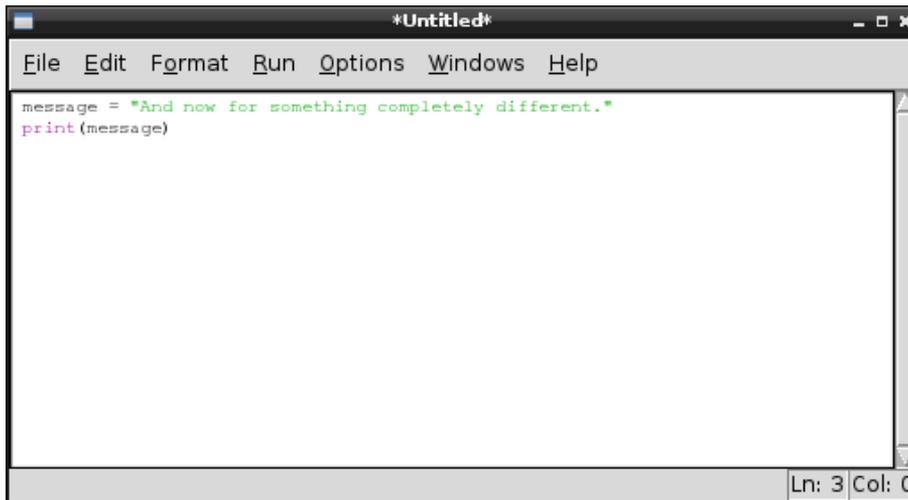


Figure 2 IDLE provides a text editor that helps you write Python programs. The editor highlights words to help you compose your programs and identify errors. This program prints a message to the screen.

Now that we have a program written, you'll want to save it so you can open, run it and edit it later.

Saving Programs

To save the program, click File→Save. A Save dialog window will appear. Name the file `firstprogram` and click Save (see figure 3). By default, the file will be saved to your `/home/pi` folder. If you want, you can create a folder for you Python programs.

TIP. A keyboard shortcut to save a program is Ctrl + S.

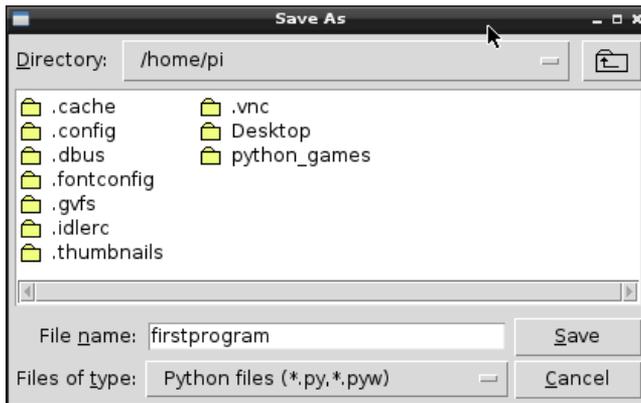


Figure 3 Save programs in IDLE using the File→Save menu selection or Ctrl +S. The default save location is /home/pi. When the file is saved, it will have .py appended to the end, signifying it is a Python program.

NOTE: When you click Save, the program is saved to your /home/pi folder with the extension .py. You can use File Manager to open your /home/pi folder and see the file you have saved: firstprogram.py.

While using the Python text editor, run the program by clicking Run→Run Module, or you can press F5. When you do this, the IDLE Python Shell will become the active window and you'll see the message printed to the Shell (see figure 4):

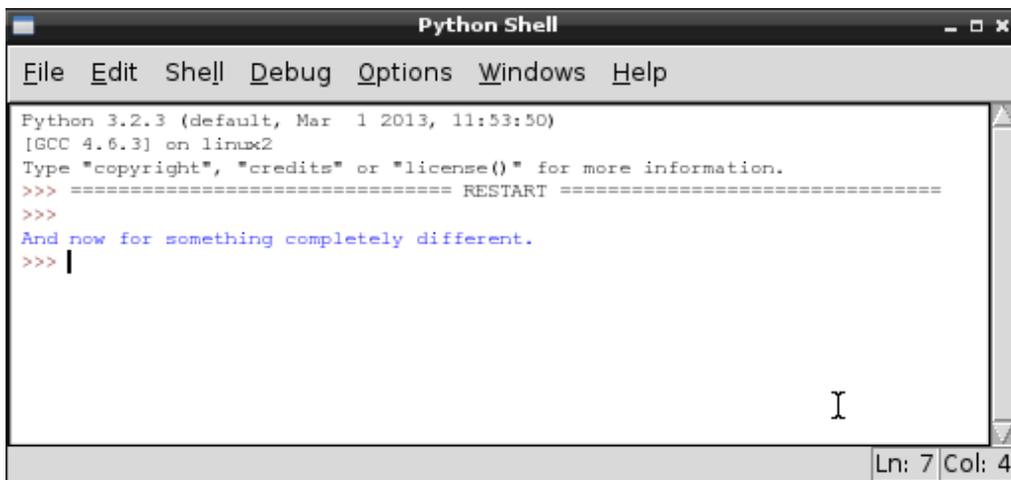


Figure 4 From the IDLE Text Editor, you can run programs.. Running a program in IDLE displays the results of the program in the Python Shell. This shows the output of our first program to display a message. The

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message appears in the Shell in blue text.

PYTHON INTERPRETING THE PROGRAM

When you run your program, Python opens your file and interprets each line of text. The first line creates a variable `message` and stored the value "And now for something completely different." The second line of your program called Python's `print` function and passed it your variable `message` to output to the screen.