Getting Started with Python

In this exercise you will install Python on your computer. You will save the output from the development tool you install, which will include the Python version number, and then submit the output to your instructor.

Computer programming is an important skill for scientists, whether experimental, observational or theoretical, and Python is one of the best languages to start with. Python is simple, easy to learn and easy to use. It runs on all platforms (Windows, Mac, and Linux), and it's free. There are a large variety of modules and accessories available for it, including modules for doing both simple and complex graphics, as well as modules for interfacing with hardware. Python supports "object oriented" programming, but it does not require it. Python is used by major physics experiments, such as LIGO and the ATLAS and CMS experiments at CERN. It is also used by many software companies and projects. Learning Python is a good way to get started with computer programming, and if you then want to continue developing your programming skills you can easily learn other languages.

Python Versions and IDE's

Before you can use Python, you should install it on your computer – though it may already be there. It may help you to know that there are different versions of Python, indicated by a version number. The latest version is 3.12 (as of Spring 2024), though there are still some computers that use version 2.7, even though that is now deprecated.† These exercises are based on Python 3, but will work just as well for Python 2.7 (perhaps with some minor adjustments, but usually none are required). Unless you have some overriding reason, you should learn using Python 3.

There are many different implementations of Python, which can be a bit confusing. The most commonly used implementations of Python provide a complete "*Integrated Development Environment*" (also known as an "IDE"), which means that they include a way for you to edit python programs (also called "scripts"), a way to run those scripts, and tools for debugging. For these exercises it would be wise to start you out with the easiest to use, but that might be different for different people. So we'll give you a choice, and let you start with the one that seems best to you (or to your instructor). You can always switch to try another if you wish.

So your first goal is to choose which Python IDE to install, either Thonny or IDLE. It's even possible to install both - they are completely separate and don't interfere with each other.

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† "Depricated" means that while it can still be used, it is going away and won't be supported at some point in the future, so you should use the newer version if you can.

Thonny

Thonny is the simplest tool for beginners learning Python, but it's useful enough that it does not hold you back when you are no longer a beginner. Thonny has improved greatly in recent years. Thonny has a simple user interface with a single window that shows both the code you are editing and the output from running that code. The editor helps you with syntax (like balancing parentheses and quotations marks) and there are also ways to get help when your code has an error. Thonny also makes it very easy to add modules to your Python installation. (If that does not mean anything to you now it will later.) Thonny can also be used to program microcontrollers like the Raspberry Pi Pico. So unless you or your instructor have a reason for choosing something else, Thonny is a good place to start.

You can get Thonny from `https://thonny.org`. Download the installer for your computer, for either Windows or Mac, and double click on it to begin the installation. On a Raspberry Pi computer Thonny is usually already installed. Thonny is also available for Linux, though you will need to use the software or package management tool on your system to install it.

IDLE

Another good choice for both beginners, and for everybody else, is IDLE,* which is maintained by the Python Software Foundation. When using IDLE, one window is for editing the code you are working on, while another window displays the output. Putting them side by side can make it easy to make changes to the code and see the result quickly.

You can get IDLE from the primary Python website at `python.org`. Pull down the "`Downloads`" menu and choose the option that fits your computer. After downloading the installation tool, double click on it to start the installation process. IDLE is already installed on Raspberry Pi computers. IDLE is also available for Linux, though you will probably need to use the software or package management tool on your system to install it.

Other Python Distributions

Python is a computer language, not a single piece of software. There are other software tools that let you use Python. Some of the more popular ones are:

- Jupyter Notebook
- Anaconda
- Google CoLab
- IPython
- PyCharm

Some of these are enhancements to the basic Python package you can get from `python.org`, while others are complete installations of Python. They can make big projects easier to

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* Python is named after the comedy troupe *Monty Python*, and so the name IDLE is a play on "IDE" and the name of comedian Eric Idle.

manage and less complicated, but they may add more complexity at first when you are starting out. The best thing to do is to discuss with your instructor which of these tools is best for you, and then remember that you can switch to another Python IDE later on once you have some experience with the language.

Assignment

Your goal for this exercise is to install a Python 3 IDE on your computer, and to verify that you can run it. You will start up Thonny or IDLE to display the version number for the Python you just installed, and then you will save a copy of the output to show to your instructor.

To complete this exercise follow these steps:

1. Use the instructions given above to install either Thonny or IDLE on your computer. Then...

2. Start Thonny or IDLE as follows:

   ▷ **Windows:** Click on the Windows icon on the left side of the task bar at the bottom of the screen. This brings up the "`Start`" menu. Scroll down the alphabetical list until you find a folder labeled "Python 3.11" or "Thonny". A single click on the folder icon opens it, and then a single click on the application will launch it.

   ▷ **macOS:** Using Launchpad (hopefully in the dock) find and click on the icon for Thonny or IDLE. Alternatively, navigate to the main `/Applications` folder, where you can double-click on the "Thonny" app, or open the folder labeled "`Python 3.12`" and double-click on the "IDLE" app.)

   ▷ **Raspberry Pi:** Pull down the "raspberry" menu from the upper left to "Programming" and then select either "Thonny" or "Python (IDLE)".

3. When you run a Python script, the output appears in the Shell window (for IDLE) or the Shell pane at the bottom of the single Thonny window. The Shell is connected to the Python interpreter, so you can use it to give direct input to Python, which will be processed immediately. One useful thing about this is that you can type in a mathematical expression and it will be evaluated. This means you can use Python as a calculator.

   So, locate the Shell window or pane, which is marked "Shell". It will contain the Python version number and the Python command prompt " `>>>`" . Click your mouse just after the `>>>` prompt and type something like "2+2" or "22/7" and press enter to see the result. Try it.

4. The final step is to share the contents of the Shell window or pane to your instructor. The simplest way to do so is to select the text (highlight it with the mouse) and copy it (using Control-C in Windows, or ⌘-C on a Mac) into an email or a text file (make sure the file name ends in `.txt`), and send it to your instructor (they should tell you how they prefer to receive it).