The Absolute Beginner's Guide to Python Programming

A Step-by-Step Guide with Examples and Lab Exercises

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About the Author

With over 20 years' experience in the computer industry, **Kevin Wilson** has made a career out of technology and showing others how to use it. After earning a master's degree in computer science, software engineering, and multimedia systems, Kevin has held various positions in the IT industry including graphic and web design, digital film and photography, programming and software engineering, developing and managing corporate networks, building computer systems, and IT support. He currently teaches computer science at college and works as an IT trainer in England while researching for his Ph.D.

About the Technical Reviewer

Joos Korstanje is a data scientist, with over five years of industry experience in developing machine-learning tools. He has a double M.Sc. in applied data science and environmental science and has extensive experience working with geodata use cases. He currently works at Disneyland Paris, where he develops machine learning for a variety of tools. His project experience includes forecasting, recommender engines, optimization, machine learning on GPS tracking data, and more. Joos is also an active blogger on Medium and has worked on multiple book publications.

Introduction

The aim of this book is to provide a first course in the use of Python to develop programs.

It provides a foundation for those who wish to write computer programs based on sound programming principles, and because the book is intended to be a primer, it allows the beginner to become comfortable with basic programming tasks.

As it is a first course, no previous experience of computer programming is assumed.

Throughout the book, we'll explore the Python programming language with worked examples and lab exercises for you to complete yourself. For this purpose, we've included all the source code for this book in the following repository: github.com/apress/absolute-beginners-guide-python

CHAPTER 1

Introduction to Computer Programming

What is a computer program? A computer is a device that processes instructions to achieve a task. This set of instructions is called a computer program.

A computer program usually takes some data such as a string or a number and performs calculations to produce results. We usually refer to the data as the program's input and the results as the program's output.

To write computer programs, we use a computer programming language. There are many different languages such as BASIC, C, C++, and Python. In this guide, we are going to concentrate on the Python programming language.

Every computer program manipulates data to produce a result, so most languages allow the programmer to choose names for each item of data. These items are called variables or constants. A variable, as the name suggests, is an item that can contain different values as the program is executed. A constant stays the same.

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For example, if we wrote a program to calculate the volume of a sphere, we could have variables for the radius and one for the result. We can also have a constant for the value of Pi as it never changes.

In larger programs, we often need to make decisions based on user input, a calculated result, or condition. In this case, we use an if statement. This is called selection.

Some blocks of code might also need to be repeated; in this case, we use a loop. This is called repetition.

The Python programming language has specific facilities to enable us to implement the concepts outlined earlier. Many of these will be introduced throughout this book.

What Is Python

Python is a high-level language developed by Guido van Rossum in the late 1980s and is used in web development, scientific applications, gaming, AI, and is well suited to education for teaching computer programming.

Python is designed to be an easily readable language. Therefore, it uses an uncluttered formatting style and often uses English keywords where other languages use a symbol.

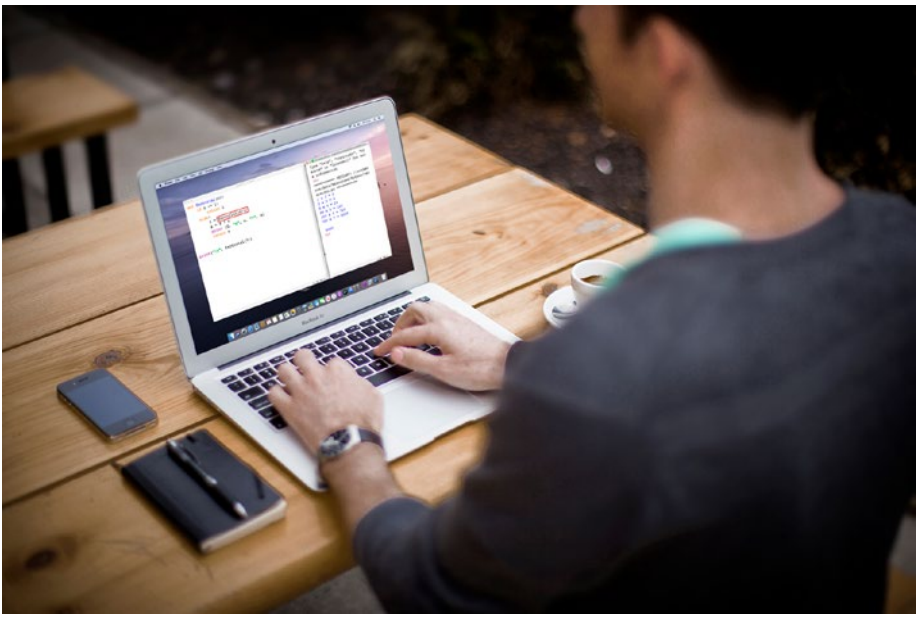
Python is an interpreted programming language, meaning Python programs are written in a text editor and then put through a Python interpreter to be executed.

Python is used in the field of artificial intelligence and can be found in many day-to-day applications. Streaming services such as Spotify use Python for data analysis, particularly users' listening habits in order to offer suggestions on which artist to follow, other music a particular user might be interested in, and so on. Python is also used within Netflix's machine-learning algorithms for recommending relevant content to users, monitoring browsing habits, and marketing.

In the world of games development, Python is used as a companion language, meaning Python scripts are used to add customizations to the core gaming engine, script AI behaviors, or server side elements. The performance of Python isn't fast enough for coding graphics-intensive, higher-end games; however, you can create simple games with Python using the pygame module.

Python is used in web development and allows a web developer to develop dynamic web apps very quickly.

Python is a multi-platform language and is available for Windows, MacOS, Linux, and the Raspberry Pi.



To start coding, you'll need a computer – either Windows, MacOS, or Linux – and an integrated development environment (IDE) with the Python interpreter.

Getting Started

In this section, we'll take a look at how to install the Python interpreter and development environment. You can install Python on Windows, Mac, or Linux.

Setting Up

Before we start writing programs, we need to set up our development environment. We'll take a look at installing Python on Windows, Mac, and Linux.

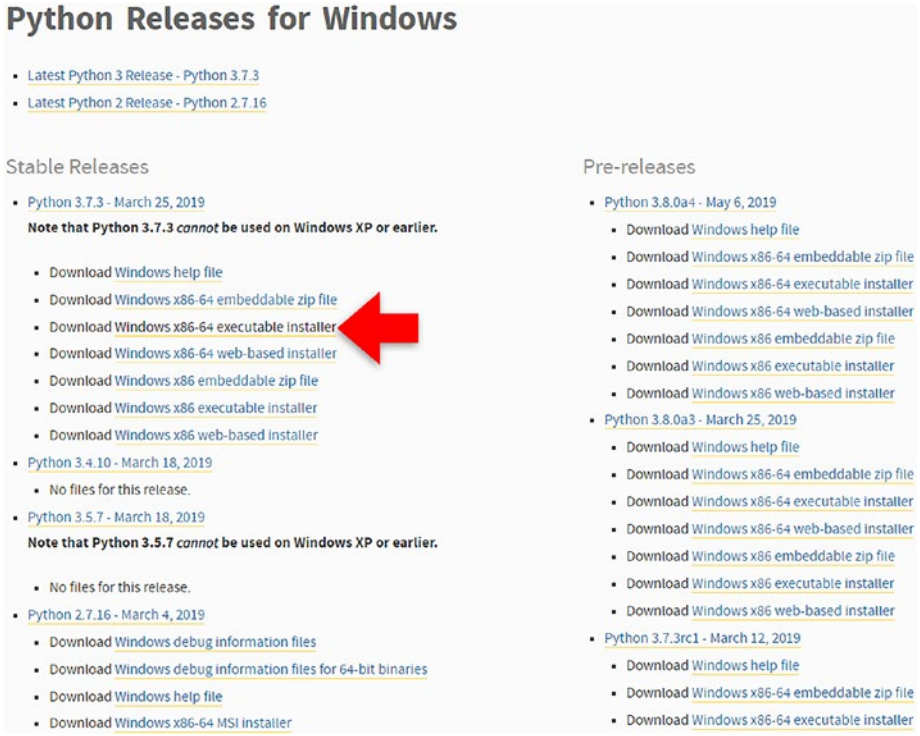
Install on Windows

In our lab, we're using Windows workstations, so we'll need to install the Python integrated development environment for Windows.

Open your web browser and navigate to the following website:

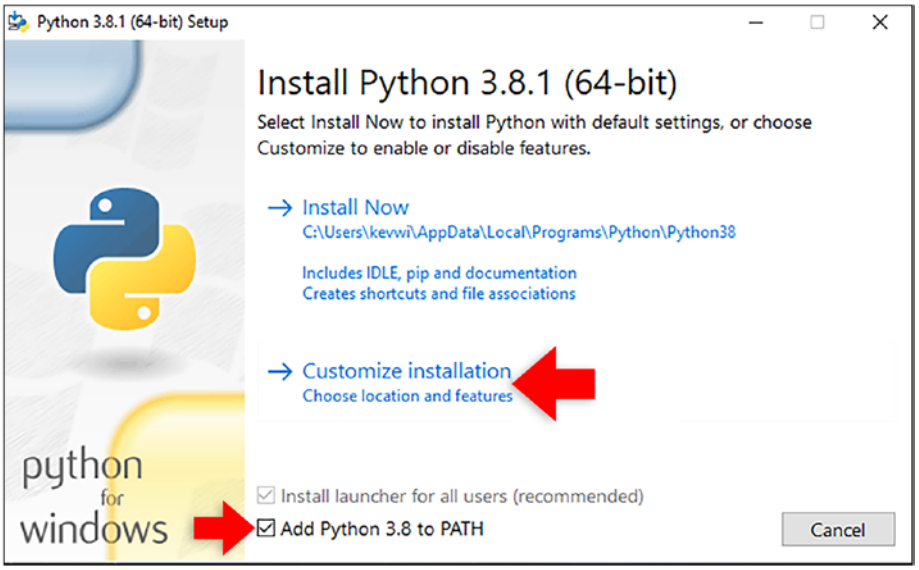
`www.python.org/downloads/windows`

From the Downloads page, select the "executable installer" of the latest stable release.

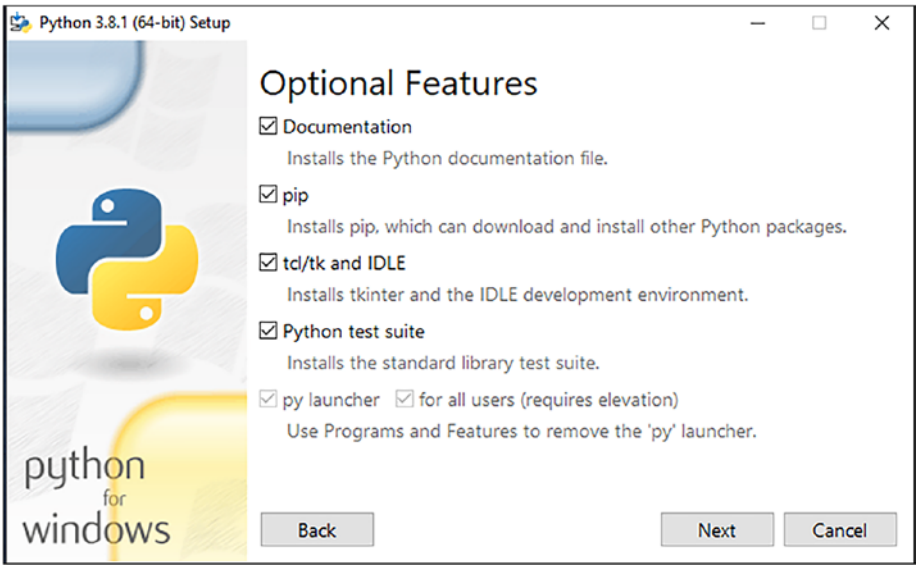


Click “run” when prompted by your browser. Or click “python-x.x.x-amd64.exe” if you’re using Chrome.

Once the installer starts, make sure "Add Python 3.x to PATH" is selected, and then click "Customize installation" to run through the steps to complete the installation.



Make sure you select all the tick boxes for all the optional features.



Click “Next.”

Make sure “Install for all users” is selected at the top of the dialog box. Click “Install” to begin.