Getting to Know Python

Python is one of the most used and popular programming languages. It's a great language on which to learn how to code, but it's also powerful enough to be used by companies when trawling through petabytes of raw data.

PYTHON POWER

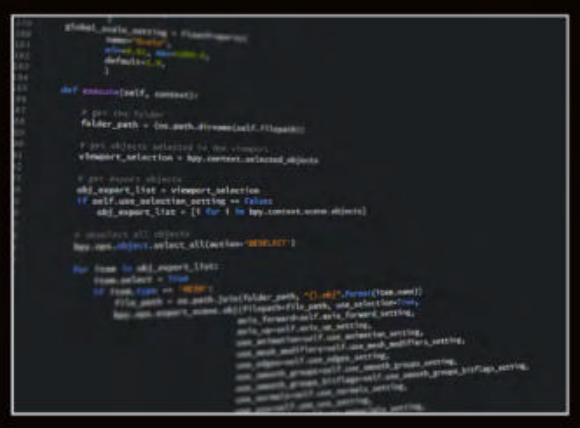
Python is a high-level, general-purpose programming language that was designed by Guido van Rossum in the late '80s, as a successor to the ABC Programming Language, and became available to use in 1990.

Guido van Rossum, the designer of Python.

The Python Software Foundation, a non-profit organisation devoted to both furthering and improving Python, currently develops the language. The foundation's purpose is to "promote, protect, and advance the Python programming language, and to support and facilitate the growth of a diverse and international community of Python programmers."

The structure of Python code has been designed to flow easily, allowing those who are just beginning to code to follow it without too much difficulty. Yet, despite its ease of use, Python is regularly used throughout a number of industries in real-world scenarios.

Big Data and AI are the two fastest growing Python-backed technologies at the moment. Big Data is simply a modern term used to describe huge amounts of data, such as sequences of numbers collated during a day's worth of trading on the Stock Exchange. Python code is used to dig into the voluminous collection of numbers, and then feed back with reports on the highs and lows, what's trending, and so on.



Made up from over 5 Petabytes of data, spread across a ton of hard drives, Python helped science to unveil the first image of a black hole.

As a side note, it's not just the likes of the Stock Exchange that use Python to study large quantities of data; in April 2019 the first image of a black hole was released, the supermassive black hole in the galaxy called M87, located roughly 55 million light years away. Thanks to the collaboration of over 200 scientists, using an array of telescopes spanning the world (called the Event Horizon Telescope Project), the combined power of the telescopes formed an impressive five petabytes of data, spread across tens of hard drives weighing in at nearly one ton. Five petabytes, by the way, equates to around 5,000 years' worth of MP3 files. Once all those hard drives were gathered together and shipped to a central supercomputer cluster, the team then used Python to painstakingly stitch together all the fragments of data from the five petabytes to finally form the most talked about astronomic event of the decade.

AI, if you're not familiar with the term, stands for Artificial Intelligence. Although we're still a long way off from the visionary stories of Arthur C. Clarke, AI is fast becoming one of the most influential technologies of our modern age. Rather than controlling robots, the AI that Python drives is designed to create autonomous ways of interacting with people online. For example, when you search for something on the Amazon website you will usually notice that similar products start to appear, whether within Amazon itself,

PYTHON 3 VS PYTHON 2

In a typical computing scenario, Python is complicated somewhat by the existence of two active versions of the language: Python 2 and Python 3.

Python 3 is the best option to download, or update to.

Python 3 is the newest release of the programming language. However, if you dig a little deeper into the Python site and investigate Python code online, you will undoubtedly come across Python 2. Crucially, although you can run Python 3 and Python 2 alongside each other, it's not recommended. Always opt for the latest stable release, as posted by the Python website. You will find, when using macOS or Linux, that Python 2 is already installed. This is because both these operating systems utilise elements of code necessary to the core functionality of the OS. Linux users tend to be better off, as most distributions package the latest version of Python 3 out-of-the-box, whereas macOS often has Python 3, it's usually an older version. Microsoft doesn't use any Python code for its core Windows systems, which is why you won't find Python inherent to Windows and therefore need to install it from scratch.

You need to be careful when you look up Python code online, although there are countless websites that offer quick tutorials, code snippets and support – and 99% of these site are a great help to those starting out with Python – a lot of the sites haven't been updated for some time, and as such use Python 2. If you enter Python 2 code into the Python 3 IDLE, the chances are it won't work due to incompatibilities between the older version and the newer. Python 2 is good, but Python 3 is better. You can obviously spend time converting the Python 2 code into version 3, but, to begin with, it's best to make sure that the code you're looking at is for the Python 3 libraries. Don't worry, though, all the code in this book is designed for Python 3, and that includes all the sub versions from Python 3.1 to the latest 3.x.

Python 3's growing popularity has meant that it's now prudent to start learning to develop with the new features and begin to phase out the previous version. Many development companies, such as SpaceX and NASA, use Python 3 for snippets of important code.

However, support for Python 2 is set to end on January 1st 2020, but this doesn't mean it'll be the last you see of it. Many Linux distros use Python 2 libraries, as does macOS, and to be fair, for the developers to transfer the existing Python 2 content to Python 3 may take more time than they have available, i.e. before the start of 2020. It's likely then, that we will still be seeing Python 2 long after it has had the final nail hammered into its coffin – in fact, expect to see that cut-off date extend further into the future.

or from a search engine, or even Facebook. The code behind these targeted snippets is Python, and it's using a form of AI to help determine what it is you would likely search for.

Despite the fact that many people find the targeting of advertising intrusive, or even an invasion of privacy, you have to admit that the code technology behind it all is rather impressive. With some very clever techniques, a Python developer is able to create a machine thinking script that not only displays items, news stories, books, other websites and ideas relating to what you've searched for, but it can also predict what you may be interested in looking for in the future. Another element to consider, with regards to AI, is that Python code can be used to help a computer learn how to do something more efficiently. In the case of neural networks in AI, the Python code is designed to return a result, then, as the code is run over and over again, the AI portion will begin to learn how to obtain a more accurate result, or do the maths behind the code quicker. It all depends on what the developer wants from their AI Python code.

An example of Python AI code, using a feedforward neural network.

```
import random
import numpy as np
class Network(object):
    def __init__(self, sizes):
        self.num_layers = len(sizes)
        self.sizes = sizes
        self.biases = [np.random.randn(y, 1) for y in sizes[1:]]
        self.weights = [np.random.randn(y, x)
                        for x, y in zip(sizes[:-1], sizes[1:])]
    def feedforward(self, a):
        for b, w in zip(self.biases, self.weights):
            a = sigmoid(np.dot(w, a)+b)
        return a
    def SGD(self, training_data, epochs, mini_batch_size, eta,
            test_data=None):
        if test_data: n_test = len(test_data)
        n = len(training_data)
```

ZEN OF PYTHON

Python lets you access all the power of a computer in a language that humans can understand. Behind all this is an ethos called "The Zen of Python". This is a collection of 20 software principles that influences the design of the language. Principles include "Beautiful is better than ugly" and "Simple is better than complex." Type `import this` into Python and it will display all the principles.

The Zen of Python, as seen when entering: import this, into the Python IDLE.

As you will discover over the coming pages, Python is a fantastic language to learn. Get to grips with the basics, and before long, you'll be creating your own Python code for games, tools, and maybe even something in AI. The only limit with Python is your own imagination.