**Python - Overview**

Python is a general-purpose high-level programming language. It is an open source language, released under a GPL-compatible license. [Python Software Foundation](https://www.python.org/psf-landing/)(PSF), a non-profit organization, holds the copyright of Python.

**Notes:**

**GPL** (General Public **License**) is a free **license** software that is popularly used across the world. It allows users to study, run, share, and modify the software. This **license** was originally written by **Richard Stallman** from the Free Software Foundation for the GNU Project.

**History of Python:**

Guido Van Rossum conceived Python in the late 1980s. It was released in 1991 at Centrum Wiskunde & Informatica (CWI) in the Netherlands as a successor to the ABC language. He named this language after a popular comedy show called 'Monty Python's Flying Circus'

**Little brief history:**

Python also refers to Monty Python, the British comedy team from the 1960s and 1970s, which is the source for the name of the Python language (seriously), as well as the general attitude of the Python community. Instead of using the standard terms foo and bar, for example, Python coders tend to use ham and eggs in their code examples. And Python documentation also uses references to Monty Python and the Holy Grail movie.

Started in December 1989 by Guido von Rossum, a Dutch programmer designated as BDFL or Benevolent Dictator for Life, Python has a lot to recommend it as a language for any skill level. The language, for example, has a very simple syntax used to write code. There are no curly quotes to balance out, no semi-colons to forget at the end of most lines. Python also works as scripting, compiled code, and embedded code. The community also has a fairly rigorous style for the use of comments, as well as encouraging the use of docstrings to make it fairly easy to create documentation from the code.

**Python Features:**

**Simple term:**

* less application development time –

Python code is usually one-third to one-fifth the size of equivalent C++ or Java code.

* code readability –

 Python code is easy to read, which means you spend less time interpreting it and more time making essential changes.

* cost –

 Python is completely free to use and distribute. You can download the entire Python system’s source code for free.

* easy to learn –

because of its simplicity and frequent usage of English keywords in the code, Python has become one of the most popular languages for teaching introductory computer science courses.

* wide user base –

 Python is used in a number of successful products. For example, most of YouTube’s core functionality is written in Python and Google uses Python in its search system.

* high salary –

Python programmers have one of the highest average salaries in the US.

**Brief  Features:**

Python is a clear and powerful object-oriented programming language, comparable to Perl, Ruby, Scheme, or Java.

Some of Python's notable features:

* Uses an elegant syntax, making the programs you write easier to read.
* Is an easy-to-use language that makes it simple to get your program working. This makes Python ideal for prototype development and other ad-hoc programming tasks, without compromising maintainability.
* Comes with a large standard library that supports many common programming tasks such as connecting to web servers, searching text with regular expressions, reading and modifying files.
* Python's interactive mode makes it easy to test short snippets of code. There's also a bundled development environment called IDLE.
* Is easily extended by adding new modules implemented in a compiled language such as C or C++.
* Can also be embedded into an application to provide a programmable interface.
* Runs anywhere, including [Mac OS X](https://www.python.org/downloads/mac-osx/), [Windows](https://www.python.org/downloads/windows/), [Linux](https://docs.python.org/3/using/unix.html), and [Unix](https://docs.python.org/3/using/unix.html), with unofficial builds also available for [Android](https://wiki.python.org/moin/Android) and iOS.
* Is free software in two senses. It doesn't cost anything to download or use Python, or to include it in your application. Python can also be freely modified and re-distributed, because while the language is copyrighted it's available under [an open source license](http://www.python.org/psf/license/).

Some programming-language features of Python are:

* A variety of basic data types are available: numbers (floating point, complex, and unlimited-length long integers), strings (both ASCII and Unicode), lists, and dictionaries.
* Python supports object-oriented programming with classes and multiple inheritance.
* Code can be grouped into modules and packages.
* The language supports raising and catching exceptions, resulting in cleaner error handling.
* Data types are strongly and dynamically typed. Mixing incompatible types (e.g. attempting to add a string and a number) causes an exception to be raised, so errors are caught sooner.
* Python contains advanced programming features such as generators and list comprehensions.
* Python's automatic memory management frees you from having to manually allocate and free memory in your code.

**Python Application Types:**

Even though Python started as a general-purpose programming language with no particular application as its focus, over last few years it has emerged as the language of choice for developers in some application areas. Some important applications of Python are summarized below:

Data Science

Python experienced a recent emergence in popularity charts mainly because of its Data science libraries. Huge amount of data is being generated today by web applications, mobile applications and other devices. Companies need business insights from this data.

Today Python has become the language of choice for data scientists. Python libraries like [**NumPy**](https://www.numpy.org/)**,** [**Pandas**](https://pandas.pydata.org/) **and** [**Matplotlib**](https://matplotlib.org/)are extensively used in the process of data analysis, including the collection, processing and cleansing of data sets, applying mathematical algorithms and generating visualizations for the benefit of users. Commercial and community Python distributions by third-parties such as [**Anaconda**](https://anaconda.org/)and ActiveState provide all the essential libraries required for data science.

Machine Learning

This is another key application area of Python. Python libraries such as [Scikit-learn](http://scikit-learn.org/stable/), [**Tensorflow**](https://www.tensorflow.org/)and [**NLTK**](https://www.nltk.org/) are widely used for the prediction of trends like customer satisfaction, projected values of stocks etc. Some of the real-world applications of machine learning include medical diagnosis, statistical arbitrage, basket analysis, sales prediction etc.

Web Development

This is another application area in which Python is becoming popular. Web application framework libraries like[**django**](https://www.djangoproject.com/)**,** [**Pyramid**](https://trypyramid.com/)**,** [**Flask**](http://flask.pocoo.org/) etc. make it very easy to develop and deploy simple as well as complex web applications. These frameworks are used extensively by various IT companies. Dropbox for example uses django as a backend to store and synchronize local folders.

Most of the web servers today are compatible with WSGI (Web Server Gateway Interface) - a specification for the universal interface between Python web frameworks and web servers. All leading web servers such as Apache, IIS, Nginxetc can now host Python web applications. Google's App Engine hosts web applications built with almost all Python web frameworks.

Image Processing

The [**OpenCV**](https://opencv.org/)library is commonly used for face detection and gesture recognition. OpenCV is a C++ library, but has been ported to Python. Because of the rapid development of this feature, Python is a very popular choice from image processing.

Game Development

Python is a popular choice for game developers. The [**PyGame**](https://www.pygame.org/)library is extensively used for building games for desktop as well as for mobile platforms. PyGame applications can be installed on Android too.

Embedded Systems and IoT

Another important area of Python application is in embedded systems. Raspberry Pi is a very popular yet a low-cost single-board computer. It is being extensively used in automation products, robotics, IoT, and kiosk applications. Popular microcontrollers like **Arduino** are used in many IoT products and are being programmed with Python. A lightweight version of Python called [Micropython](https://micropython.org/) has been developed especially for microcontrollers. A special Micropython-compatible controller called **PyBoard** has also been developed.

Android Apps

Although Android apps are predominantly developed using Android SDK, which is similar to Java, Python can also be used to develop Android apps. Python's **[Kivy library](https://kivy.org/)** has all the functionalities required for a mobile application.

Automated Jobs

Python is extremely useful and widely used for automating CRON (Command Run ON) jobs. Certain tasks like backups, defined in Python scripts can be scheduled to be invoked automatically by the operating system scheduler to be executed at predefined times.

Python is embedded as a scripting language in many popular software products. This is similar to VBA used for writing macros in Excel, PowerPoint, etc. Python API is integrated with Maya, PaintShop Pro, etc.

Rapid Development Tool

Standard distribution of Python as developed by Rossum and maintained by Python Software Foundation is called [**CPython**](https://en.wikipedia.org/wiki/CPython)which is a reference implementation. Its alternative implementations - [Jython](http://www.jython.org/) the JRE implementation of Python and [IronPython](http://ironpython.net/) - the .NET implementation, interact seamlessly with Java and C#, respectively. For example Jython can use all Java libraries such as Swing etc. So the development time can be minimized by using simpler Python syntaxes and Java libraries for prototyping the software product.