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CS3012

Biography of an
Influential Software Engineer

Guido van Rossum

Guido van Rossum is best known as the author of the Python programming language and until recently, its “Benevolent Dictator for Life”.

Early Life

Van Rossum was born in the Netherlands in 1956. His interest in technology was sparked at age 10 when he began playing with an electronics kit. In high school, he excelled in physics and formed a group of friends with an interest in electronics. This carried through to University where he majored in mathematics at the University of Amsterdam and became acquainted with a mainframe computer in the basement of the science building, thus beginning his interest in computing. This single mainframe was actually bought between two universities in Amsterdam and another research lab, due to the extreme cost of such machines at the time. Despite the high cost, Guido and his friends had to take turns running their programs due to the limited resources of the mainframe.

Access to the mainframe lead to him learning several programming languages including Algol, Fortran and Pascal. Van Rossum managed to land a part-time job working with the mainframe as part of a service centre called SARA. The job granted him freer access to the mainframe and gave him more freedom to develop his skills.

His work at SARA lasted 5 years and involved writing software for the Control Data operating system which was run on the mainframe. He eventually ended up implementing a programming language to support control flow in the control language used by the OS.

His academic performance dropped while working at SARA and he was 26 by the time he graduated with a Master's degree in mathematics and computer science, claiming at that point: "I was truly done with academic learning and I had no interest in a PhD position."

CWI & ABC

Van Rossum's first job after college built on his experience with learning and writing programming languages. During University, Van Rossum was a member of the Dutch Pacifist Party (incidentally, his father was also a pacifist and had been jailed for refusing to join the army). Guido was involved in helping the party upgrade their hardware and software, learning COBOL from scratch in order to do so. It was here that he met Lambert Meertens who would end up employing him at CWI (Centrum Wiskunde & Informatica - Centre for Mathematics and Computer Science) immediately out of college.

At CWI, Van Rossum joined a team including Lambert Meertens and a British graduate called Steven Pemberton, picked by Meertens based on his work on a Pascal compiler. The team was headed by Meertens who wanted to design a new programming language called ABC which would take on one of the languages of choice at that time, BASIC, or as their motto went, would "stamp out BASIC." Meertens was the driver of the project and Van Rossum claims his motivation was to create "a language that would be useful for researchers, lab assistants, professional users of computers who were not also professional programmers." In other words, he wanted a language with a low barrier to entry that could be picked up quickly and easily even by non-programmers.

The ABC project ultimately failed and was abandoned after 4 years. Guido cites poor marketing, poor timing, over-engineering and a lack of internet among the reasons for its failure. The project lived on in spirit, with Van Rossum attributing a good amount of credit to ABC as inspiration for the defining work of his life.

Python's Conception

Van Rossum remained at CWI after the ABC project was shelved and began working on another project: Amoeba. Amoeba is a distributed operating system which aims to make a network of machines operate like a single machine. Guido's work on Amoeba involved allowing the machines to communicate over the internet as opposed to needing to plug amoeba machines into each other. This involved writing proprietary applications for purposes such as email and user login. As he found himself writing a lot of C code in order to build these applications, he began to long for something like ABC which would have made the process less tedious.

If we had an ABC implementation here, I would just write that whole login program in 15 minutes and then I would move on to the account management program or something and in C it takes me a week each. - Guido van Rossum

The idea entered his mind to reboot the ABC project on a smaller scale, where he would be the only one working on it over the course of a few months. Van Rossum was a believer in the ABC project and was one of the most disappointed to see it fail. Some of the characteristics of the ABC language that he admired were:

- facilitating increased programmer productivity.
- being an interpreted language.
- enabling expressive code.
- having good readability.

These would be the core characteristics of a new language he wanted to design to be used as part of the Amoeba toolkit. He named the language Python, in homage to Monty Python's Flying Circus, of which he was a fan.

During the Christmas break of 1989, the first work on Python began. Van Rossum had experience working with lexical analysis tools like Lex and Yacc. He was skeptical of Yacc and had disdain for Lex so he decided to write his own lexical analyzer for Python. The first few months of work on the new project consisted of writing the analyzer and parser generator as well as designing the Python grammar. After around

a year, the Amoeba team were successfully running Python programs on the Amoeba system.

So you could run a portable Python program on your Amoeba system but you could also write an Amoeba-specific program that was interacting directly with the Amoeba file system, which is—has a very different philosophy than the Unix file system - Guido van Rossum

Python's Success

Python would grow to huge popularity beyond the realm of the Amoeba project and Van Rossum cites several possible reasons. Among the biggest are its readability and the quality of its standard library, which he believes facilitates rapid prototyping. Python is being used for anything from tiny scripts to large-scale applications and Van Rossum cites its extensibility as the reason for its success in so many areas. Python works well with other languages and this enables users of Python to tap into many libraries that might have been written in other languages like C or C++ without them having to learn C or C++ themselves.

Van Rossum also cites external influences on Python as being beneficial to its success. Chief among these are the internet and Open Source movement as well as the rapid improvement of computers in terms of power. These factors he says "entirely changed the interaction between the makers and users of computer software" and in turn helped to boost Python's popularity. We saw that he named the lack of internet as a potential reason for ABC not taking off while Python faced no such barrier. He states that the internet allows for a "release early, release often" philosophy and facilitates a "healthy feedback loop between the makers of the language and its users" which is crucial to the language's success.

I believe the most important idea is that Python is developed on the Internet, entirely in the open, by a community of volunteers (but not amateurs!) who feel passion and ownership. - Guido van Rossum

In this vain, Python was never going to be proprietary or used for making money. Van Rossum claims that "Python was open source before the term open source

had ever been invented." In 1991 Python was released under a very slightly altered version of the MIT license, where, in an effort to make a Monty Python-style joke, they simply scribbled out MIT and wrote in CWI. Later in the 90's, he met Eric Raymond and eventually agreed that Python fell under Raymond's definition of Open Source.

Today

Van Rossum installed himself as the "Benevolent Dictator for Life" of Python, meaning he retained the final say in changes made. Changes in Python come about in PEPs (Python Enhancement Proposals) and Guido cites a protracted battle over PEP 572, in which he faced stiff criticism for his decisions, as one of the reasons for him stepping down from his role as BDFL in July 2018, after PEP 572 was through. He still remains a core developer for Python and has been employed as a Principal Engineer at Dropbox since 2013. As part of his contract with Dropbox, he can spend up to 50% of his time on Python.

Why Guido?

I chose to write this essay on Guido van Rossum primarily because Python was the first programming language I learned and remains one of my go-to languages. I had never looked into him much until the recent turmoil which ended with him stepping down as BDFL. With his role in Python's future taking a significant turn, I decided it would be a good time to look into his history and see how Python came about in the first place.

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