AI Project – Python Refresher

Winter Semester 2024/2025

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Python History...

General Information

Guido van Rossum – Developer of Python

> Over six years ago, in December 1989, I was looking for a "hobby" programming project that would keep me occupied during the week around Christmas. My office (a government-run research lab in Amsterdam) would be closed, but I had a home computer, and not much else on my hands. I decided to write an interpreter for the new scripting language I had been thinking about lately: a descendant of ABC that would appeal to Unix/C hackers. I chose Python as a working title for the project, being in a slightly irreverent mood (and a big fan of **Monty Python's Flying Circus**).

Python

- Developed in the early 90s at the Center for Mathematics in Amsterdam (successor of the teaching language ABC)
- Python versions – 0.9 (1991), 1.0 (1994), 2.0 (2000), 3.0 (2008)
- Latest Python version (as of February 6, 2024) – 3.12.2

Source: https://de.wikipedia.org/wiki/Guido_van_Rossum

Python General Information...

"The Zen of Python"

Start Python – "import this"

Beautiful is better than ugly.
Explicit is better than implicit.
Simple is better than complex.
Complex is better than complicated.
Flat is better than nested.
Sparse is better than dense.
Readability counts.
Special cases aren't special enough to break the rules.
Although practicality beats purity.
Errors should never pass silently.
Unless explicitly silenced.
In the face of ambiguity, refuse the temptation to guess.
There should be one– and preferably only one –obvious way to do it.
Although that way may not be obvious at first unless you're Dutch.
Now is better than never.
Although never is often better than *right* now.
If the implementation is hard to explain, it's a bad idea.
If the implementation is easy to explain, it may be a good idea.
Namespaces are one honking great idea – let's do more of those!

Source: https://incusdata.com/blog/the-zen-of-python

General Information...

Properties, Advantages and Disadvantages

Osthayerische Technische Hochschule Amberg-Weiden

Properties

- Simple and minimalist
- Open source and a high-level language
- Portable, interpreted, object-oriented, embeddable and extensible with many extensive libraries

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- Quick to learn and easy to read code
- Widespread distribution and an active “community” on the web (tutorials, forums, etc.)
- Extensive standard library and many useful packages (especially “Data Analytics”)
- Suitable for research/prototyping as well as for production systems

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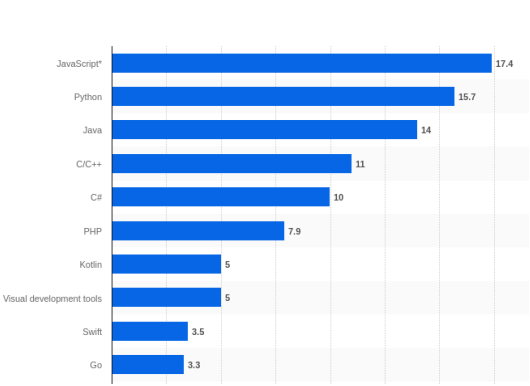
Disadvantages

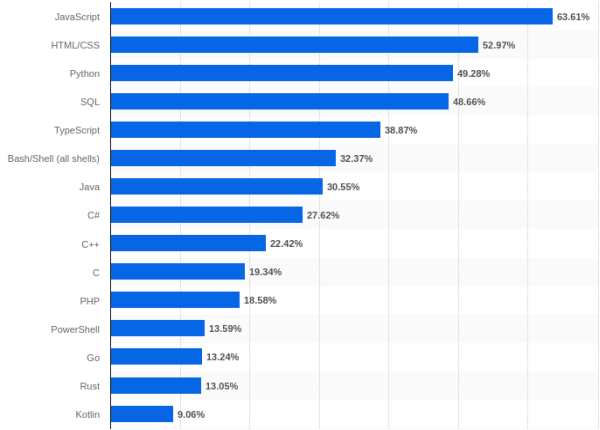
- Lower execution speed compared to compiler languages
- Not a good choice for multi-threading (GIL)
- Dynamic typing may lead to later detection of errors

General Information...

"Everywhere Python"

Most Used Programming Languages (2023) & Largest Programming Communities (2022)





Source: https://www.statista.com/statistics/793628/worldwide-developer-survey-most-used-languages/ – Stand: 2023, © Statista 2023

Source: https://www.statista.com/statistics/1241923/worldwide-software-developer-programming-language-communities/ – Stand: 2022, © Statista 2022

Software Environment & First Steps

Why Python?

- Useful packages and data structures for e.g. data manipulation, data analysis & data visualization
- Machine/deep learning, statistics, natural language processing, web applications & much more
- Jupyter-Notebook as an interactive development environment
- Machine/Deep Learning & Statistik
- Literature:
  - Matthes Eric, “Python crash course: A hands-on, project-based introduction to programming”, ISBN: 978-1-59327-603-4, ©2023 no starch press
  - Paul Barry, “Head First Python”, ISBN: 978-1-49205-129-9, ©2023 Publisher(s): O’Reilly Media, Inc.
  - Bernd Klein, “Einführung in Python 3”, ISBN: 978-3-446-45208-4, ©2018 Carl Hanser Verlag GmbH & Co. KG
  - Python – https://docs.python.org/3/tutorial/

Source: https://www.amazon.de/-/en/Paul-Barry/dp/1492051292
Source: https://www.amazon.de/Python-Crash-Course-Eric-Matthes/dp/1718502702
Source: https://www.oreilly.com/library/view/head-first-python/9781492051282

General Information...

Python-Interpreter Using Command Line

- Calling the Python interpreter via “python”

```
be@nb-berglecn:~$ python
Python 3.10.12 (main, Jun 11 2023, 05:26:28) [GCC 11.4.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> 1+(3.2+4.1/2)
6.25
>>> s = "Python"
>>> print(s)
Python
>>> for index in range(3):
...     print(index)
...
0
1
2
>>> exit()
be@nb-berglecn:~$
```

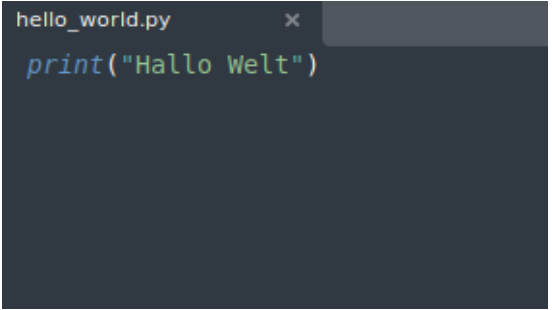
- Use as “calculator”, declare and use variables, comments
- Command-Stack, the variable _ (“underscore”), exiting the Python shell – exit()
- Multiline statements (“\”), report all variables with dir(), print()

General Information...

"C++ vs. Python"

hello_world.cpp

hello_world.py



Let's switch to Jupyter and get hands on Python...

Source: https://www.activestate.com/blog/top-10-coding-mistakes-in-python-how-to-avoid-them/