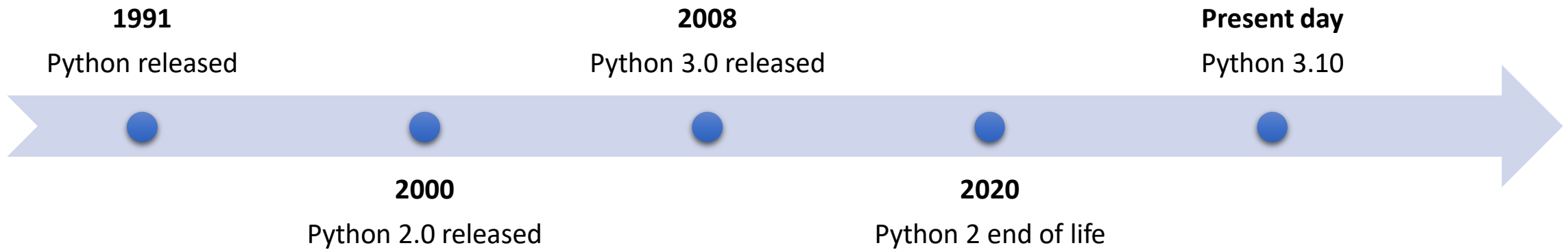# Python for Beginners

Session 1. Basics of Python: Getting started
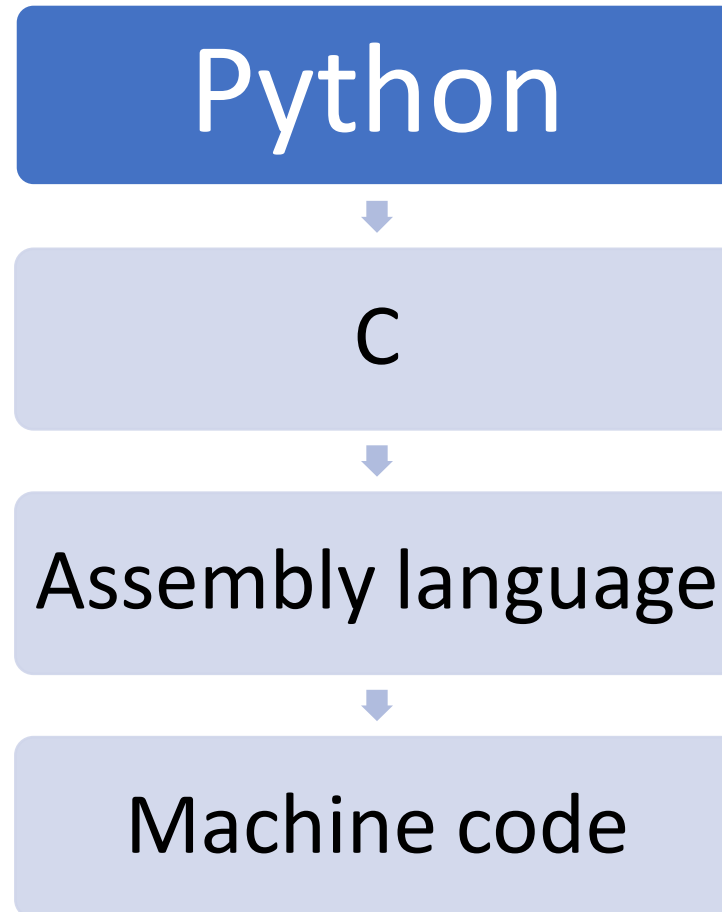
What is Python?

What is Python?

- According to the Wikipedia: "Python is an *interpreted high-level general-purpose* programming language. Its design philosophy emphasizes code readability with its use of significant indentation."

- *Interpreted:* there is no need to compile Python code; you can simply run the code

- *High-level:* Python is written on top of the C language, itself written on top of others

- *General-purpose:* modules can be imported for almost any purpose

History of Python

1991

Python released

2008

Python 3.0 released

Present day

Python 3.10

2000

Python 2.0 released

2020

Python 2 end of life

Python structure

Python's popularity

- Python has consistently ranked among the most popular programming languages for over a decade

- As of October 2021, Python is now the #1 programming language according to the software company TIOBE

- TIOBE named Python "language of the year" for 2007, 2010, 2018, and 2020. No other language can lay claim to this title.

TIOBE Index for Python

Source: www.tiobe.com
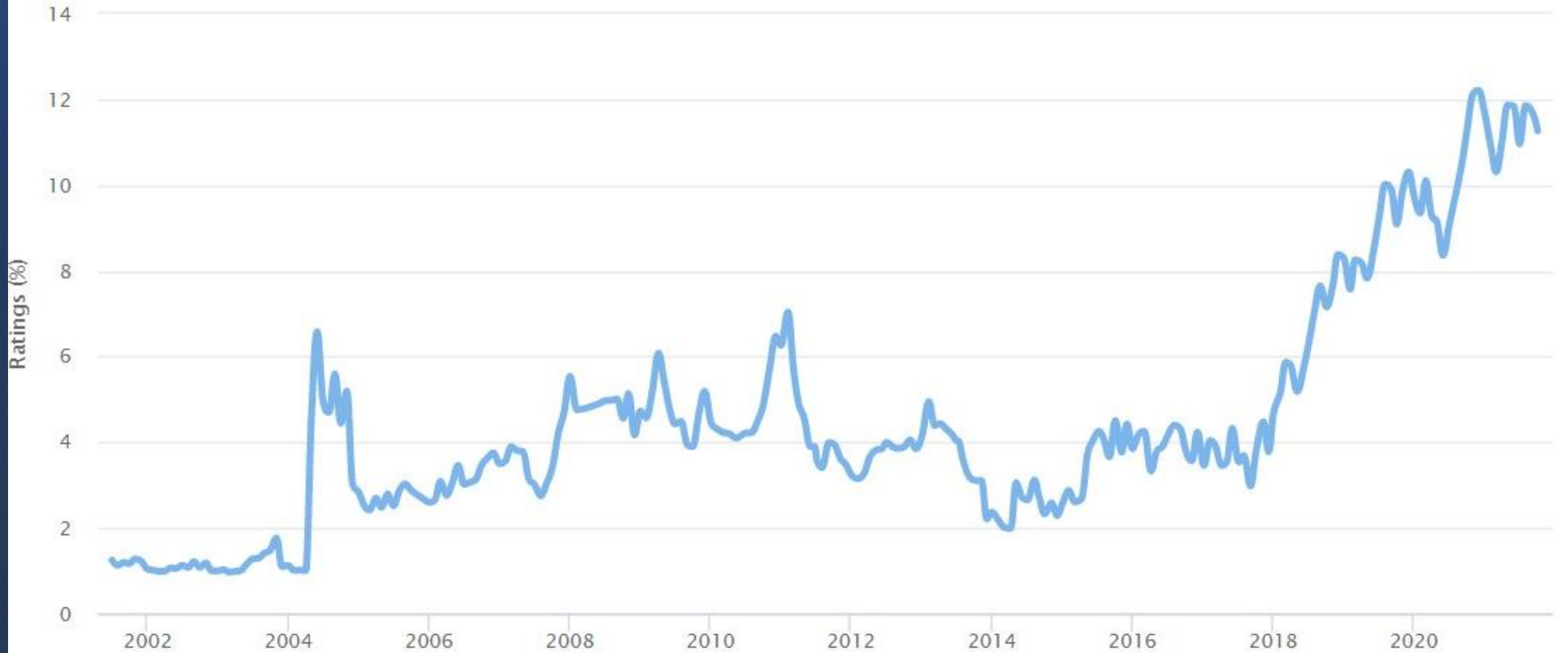
Philosophy of Python

- Python tends to have only one obvious method for each programming goal

- Python design philosophy:
  - Beautiful is better than ugly.
  - Explicit is better than implicit.
  - Simple is better than complex.
  - Complex is better than complicated.
  - Readability counts.

- Code written in this way is referred to as "Pythonic"

Pros of using Python

- Easy for beginners to computer programming

- Simple syntax relying on indentation rather than curly brackets and semicolons

- Dynamic typing means Python figures out all data types for you, greatly reducing the time it takes to write a working program

- No need to compile the code before execution; code just runs!

- Wide range of modules that can be imported for almost anything you want to program

Cons of using Python

- Dynamic typing and execution at compile time mean it's slower than other languages such as Java and C

Some commonly used modules

- ***NumPy*** – operates similarly to Matlab, can process arrays of data very quickly and efficiently
- ***SymPy*** – do symbolic math similar to Mathematica
- ***Pandas*** – used for data analysis
- ***Matplotlib*** – plot a wide variety of plots, charts, and graphics
- ***TensorFlow*** – specifically designed for machine learning
- ***PyExcel*** – read and write various Excel spreadsheet formats
- ***PyGame*** – make your own video games in Python
- ***Requests*** and ***BeautifulSoup*** – scrape websites and mine data

Obtaining Python

Method 1: Direct install

1. Go to https://www.python.org/

2. Go to "Downloads" on the menu bar and click on the latest release for your operating system

3. Once the installer downloads, follow the instructions, making sure to install pip and to add Python to your environmental variables.

4. Python should now work from the command line

Method 2: Spyder

1. Go to https://www.spyder-ide.org/

2. Scroll down to "Download" and click the link

3. Once installer is done downloading, follow the instructions and install

Some other editors for Python

Free:

- Notepad++

- Atom

- Visual Studio Code

Paid:

- Sublime Text

- PyCharm (free for students/teachers, otherwise has a free version available)

Programming with Python

Your first program

- Getting started with programming in Python is very easy!

1. Open Spyder

2. In the upper left-hand corner, click on the "New file" icon

3. In the editor, type in the following line:

```
print("Hello world!")
```

Variables and objects

- Python relies heavily on **variables**
- A **variable** is a name that points to an **object**
- Defined by the "=" operator; assigns the variable name on the left to the object on the right
- Try the following code:

```
x = "Hello world!"
print(x)
```

Python data types

- Every object in Python has a "type" (in Python, identical to "class")
- Fundamental data types include str, int, float, complex, list, tuple, dict, set, bool, and others.

Type of object	Example	Purpose
str	'Hello world!'	Text
int	2	Integer
float	2.99	Decimal
complex	1+8j	Complex number
list	[1,3,5,7,9]	List
dict	{'a':1,'b':2,'c':3}	Dictionary
bool	True	Boolean value

References

General info on Python:

- https://www.python.org
- https://en.wikipedia.org/wiki/Python_(programming_language)

Tutorials:

- https://www.w3schools.com/python/default.asp

Great YouTube channels with Python content:

- mCoding
- Tech with Tim
- Python Engineer