Introduction to Python

Tutorial by Milton S. Gomez
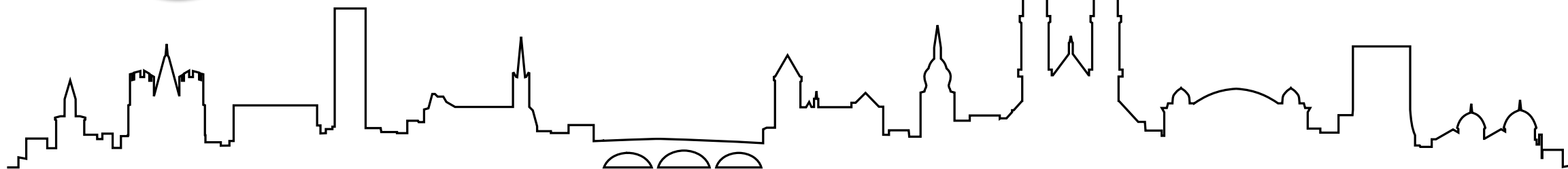
EuroSciPy
Aug 2023 - Basel, CH

UNIL | Université de Lausanne

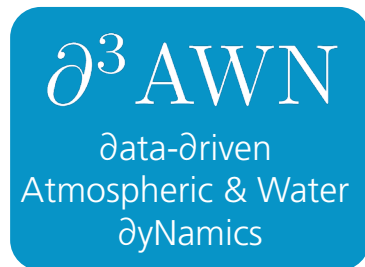# Who am I, and who are you?

2ⁿᵈ year PhD Student working with
Tom Beucler

Unil
UNIL | Université de Lausanne

My main research focus is
AI and Tropical Meteorology

∂^3 AWN
∂ata-∂riven
Atmospheric & Water
∂yNamics

EuroSciPy

Are you new to...

... Scientific Programming?

... Python?

What should you expect?

By the end of the session, you should be able to:

Describe Python in broad terms

Indicate reasons for using Python for scientific computing

Identify variables types and container types in Python

Understand how conditionals, loops, and functions work in Python

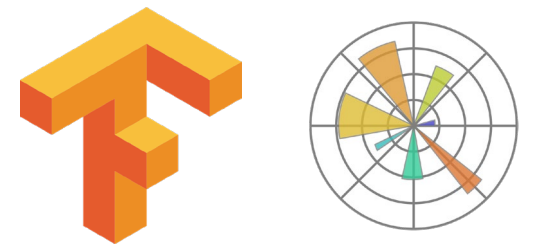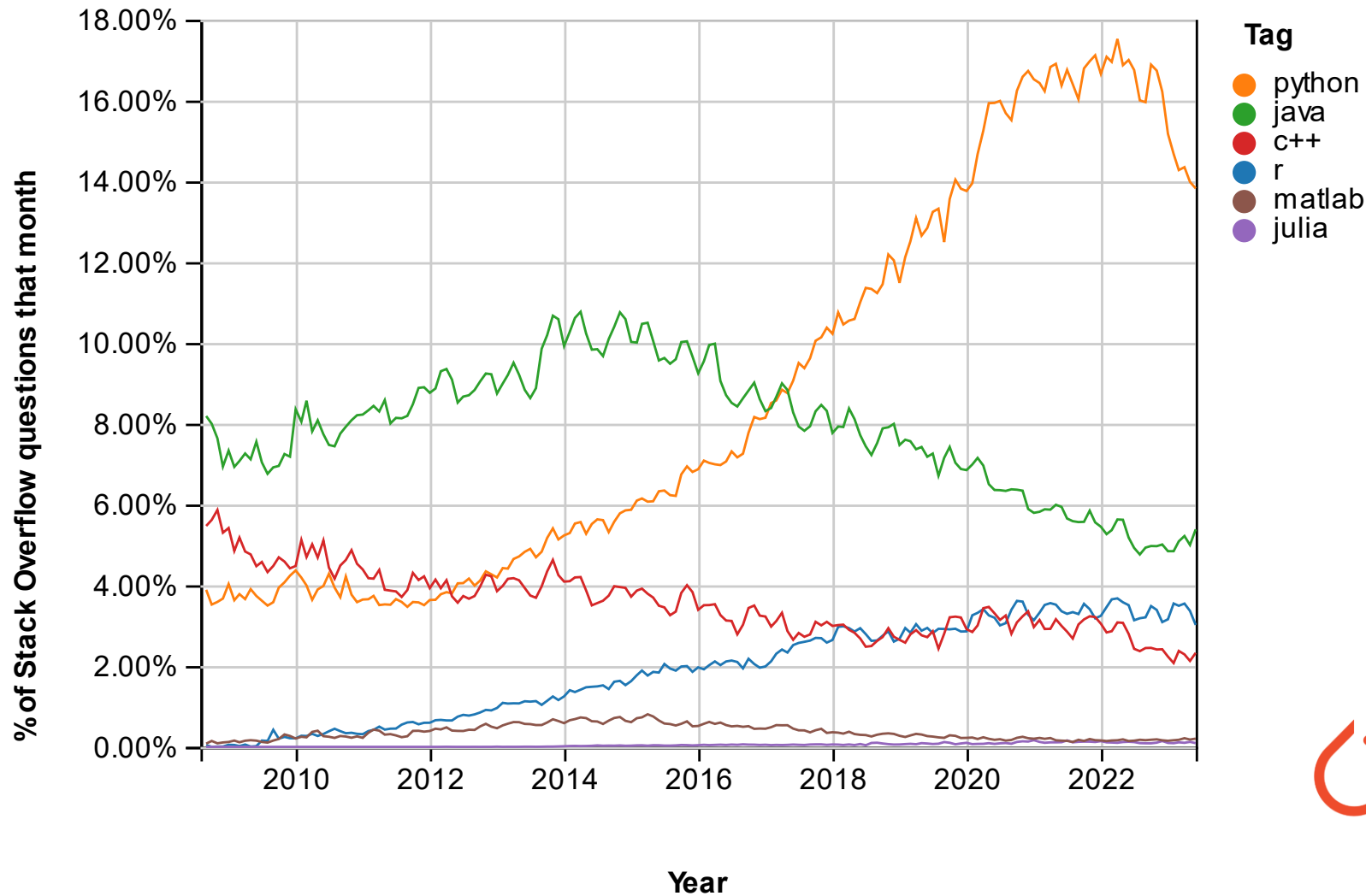Develop an intuition for the use of Objects in Python

Can you describe Python?

What is Python, anyway?

Python is a **high-level** programming language

```python
my_age = 36
my_age_group = "adult" if my_age >= 18 else "minor"
print(my_age_group)
```

It is also an interpreted language – *programs don't have to be compiled*

Why use Python?

Where do we start?

Today we'll be working on Jupyter Notebooks with your choice of Binder or Google Colaboratory …

… but the repo wiki on GitHub has the information you need to set up a local environment with miniconda.
(00_Running_Python_Scripts.md)

https://tinyurl.com/EuroSciPy-Intro2Python

What type of information do we store in computers?
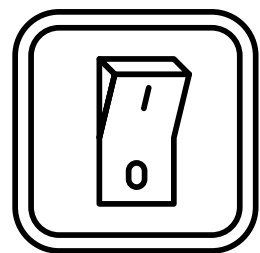
Storing information digitally
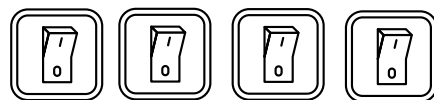
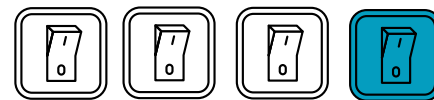Computers use switches (bits) to represent all information

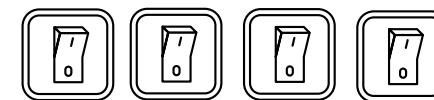| Booleans	Integers	Floats	Strings
True			
False	1 2 3 ... 32	1 2 x 10^0 10^1 ... 8	1 = a 2 = b ... 26 = z 27 = ...

How do we group digital information?

Sequences of Information

We often need to store sequences

$$[0, 1, 1, 2, 3, 5, 8, \ldots]$$

$$student \begin{cases} Name \\ Age \\ Nationality \\ Languages \\ Institution \\ Major \end{cases}$$

$$Coordinate\ Pairs$$
$$(x_1, y_1)$$
$$(x_2, y_2)$$
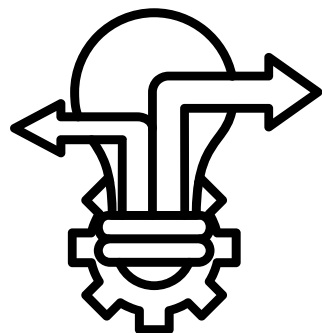$$(x_3, y_3)$$
$$\ldots$$
$$(x_n, y_n)$$

What else do we do with computers?

Performing tasks digitally
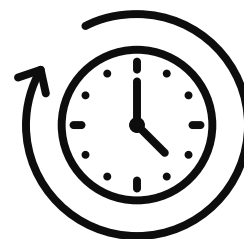
Our code represents tasks for the computer to carry out
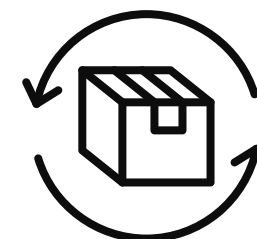
Loops

Conditionals

For Loops

While Loops

What to do when X happens

Fixed number of Iterations
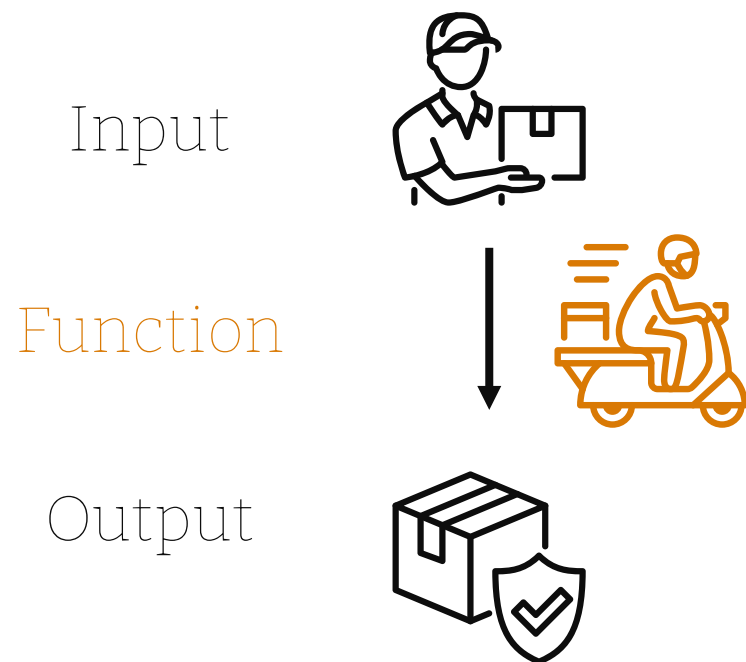
Iterate until condition is met
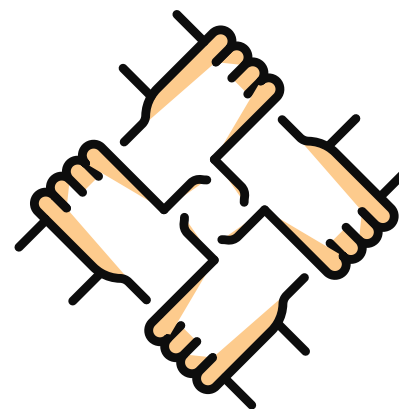
What if we want to repeat a task, but we don't have a fixed condition?

Repeating tasks

We often need to do the same thing more than once, or use somebody else's solution to our problem

Functions

Input

Function

Output

Libraries

We can solve larger problems together

How do we organize code and data?

How do we organize code?

Objects

Attributes

(Variables)

Methods

(Functions)

Any questions?

By now we should be able to…

Describe Python in broad terms

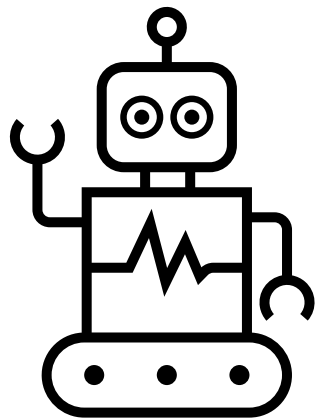Indicate reasons for using Python for scientific computing

Identify variables types and container types in Python

Understand how conditionals, loops, and functions work in Python

Develop an intuition for the use of Objects in Python

Coming to a repository near you...

AI assisted coding practice exercises

ChatGPT