

85<sup>a</sup> EDIÇÃO

**SEQ UFRJ**  
20 a 24 de agosto



# Introdução à programação para ciência e engenharia em *Python*

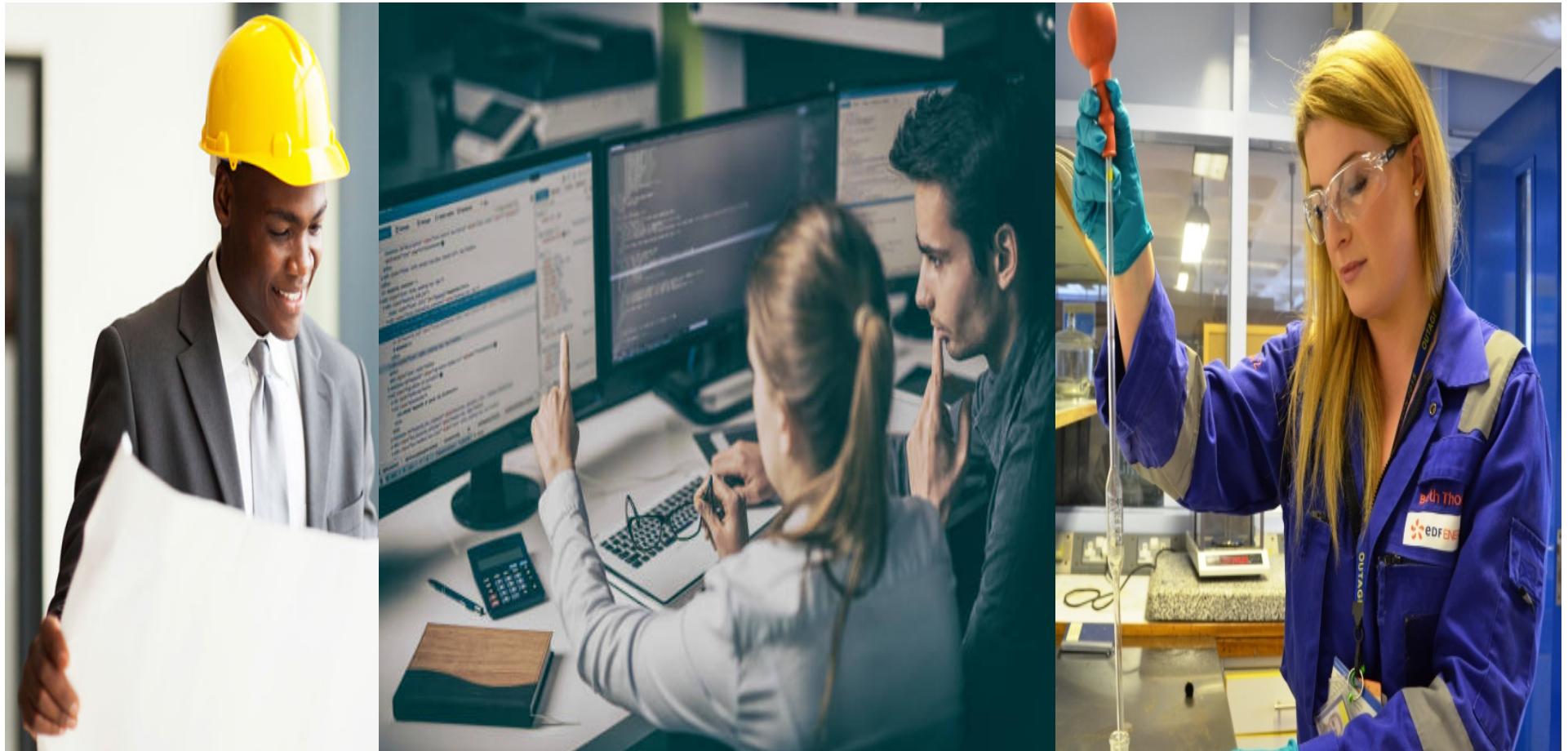
*Iuri Soter Viana Segtovich*

<https://github.com/>

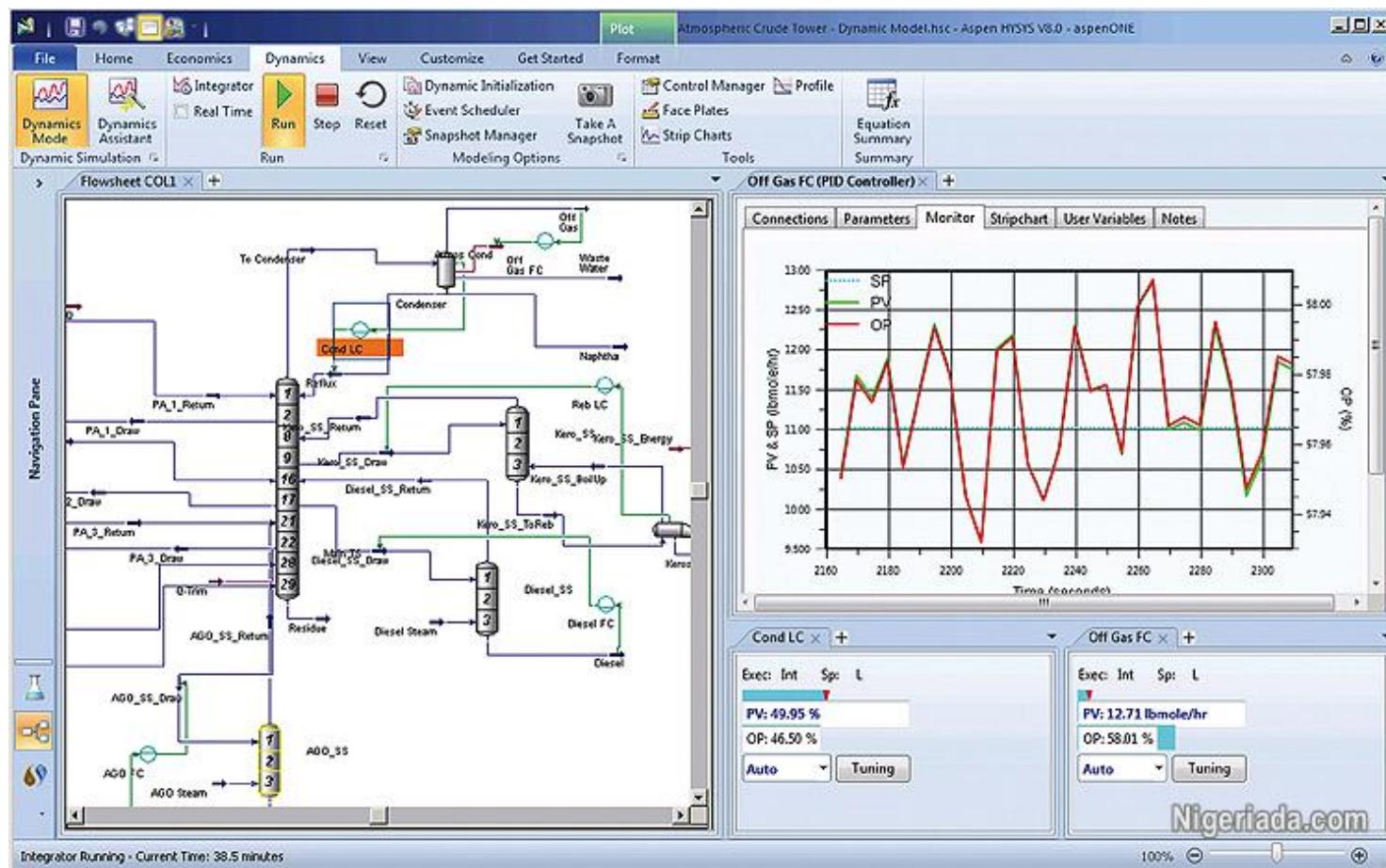
*iurisegtovich/*

*CursoSciPySEQ2018/*

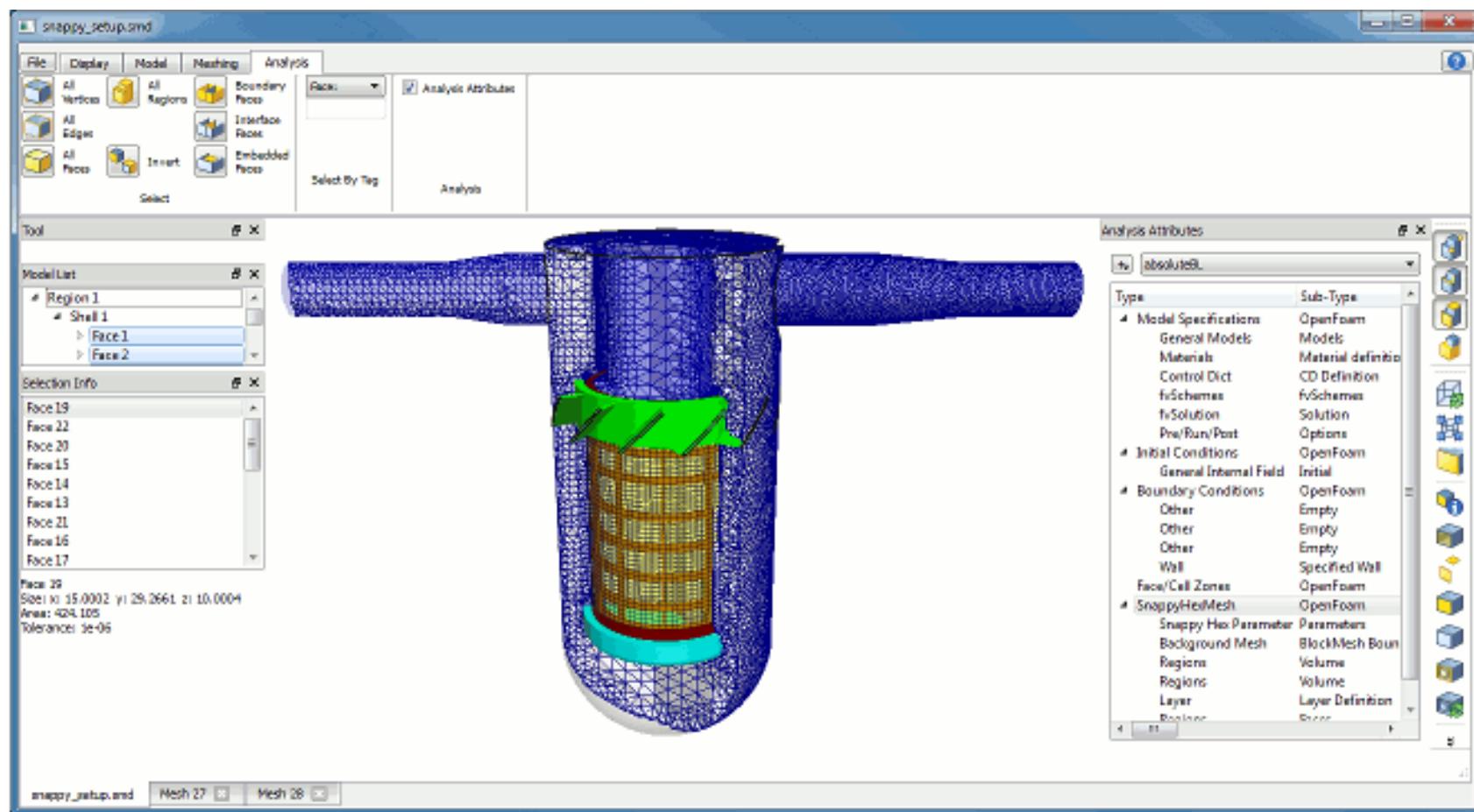
# Programação em ciência e engenharia



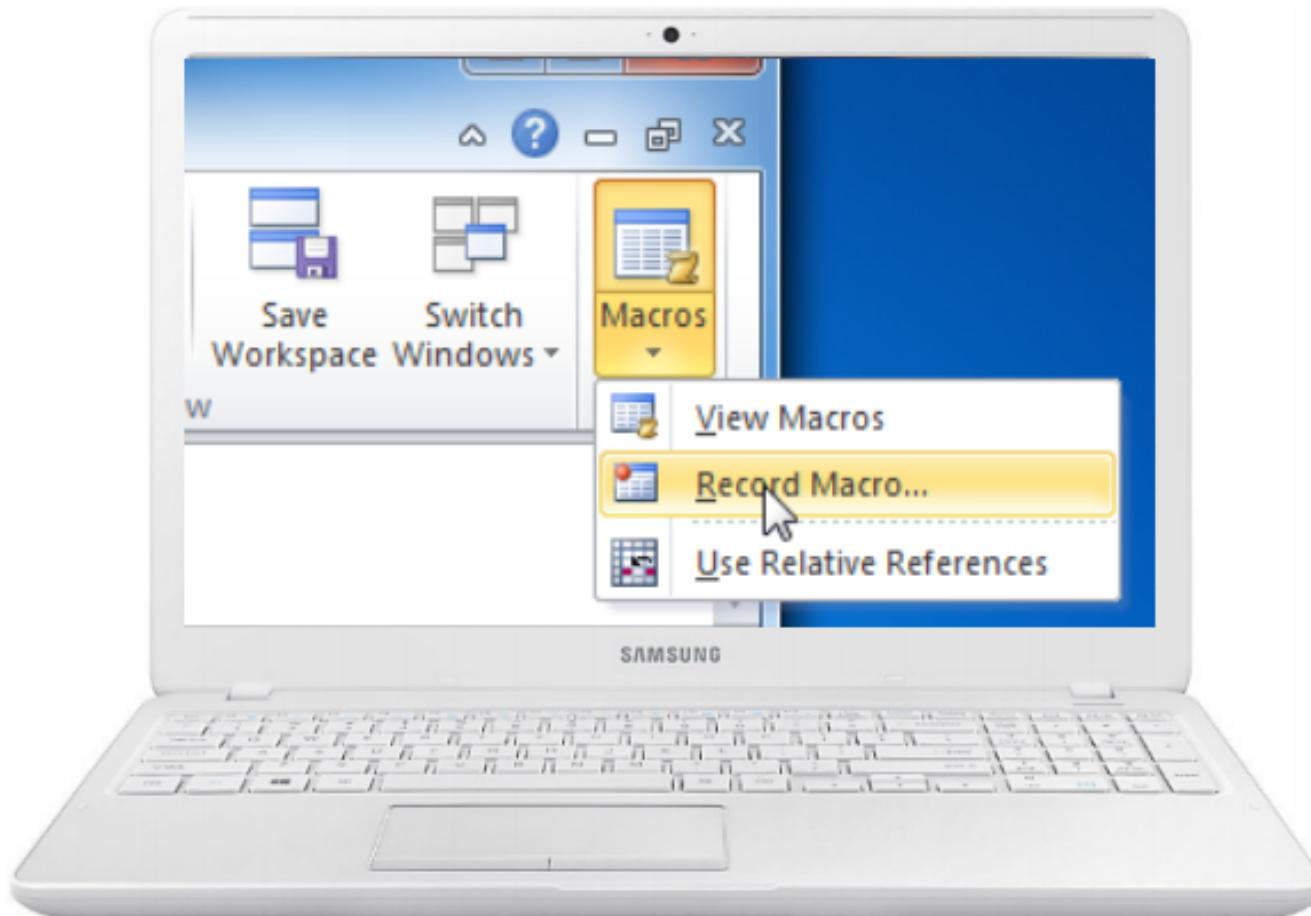
# Simulador de processos



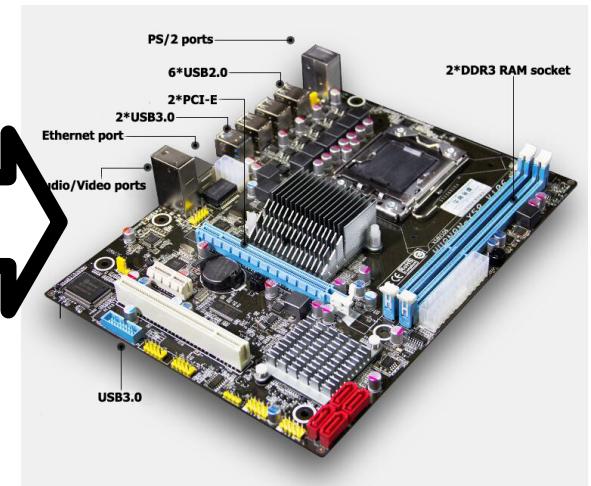
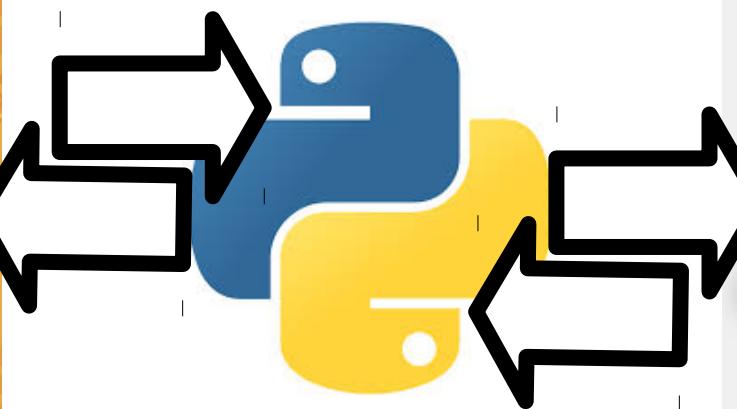
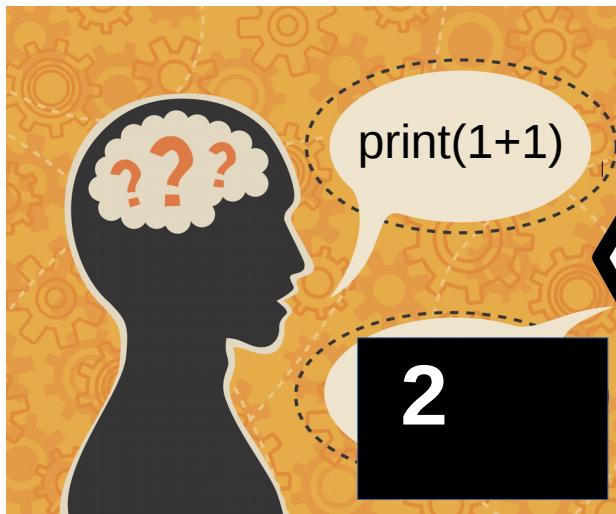
# Fluidodinâmica computacional



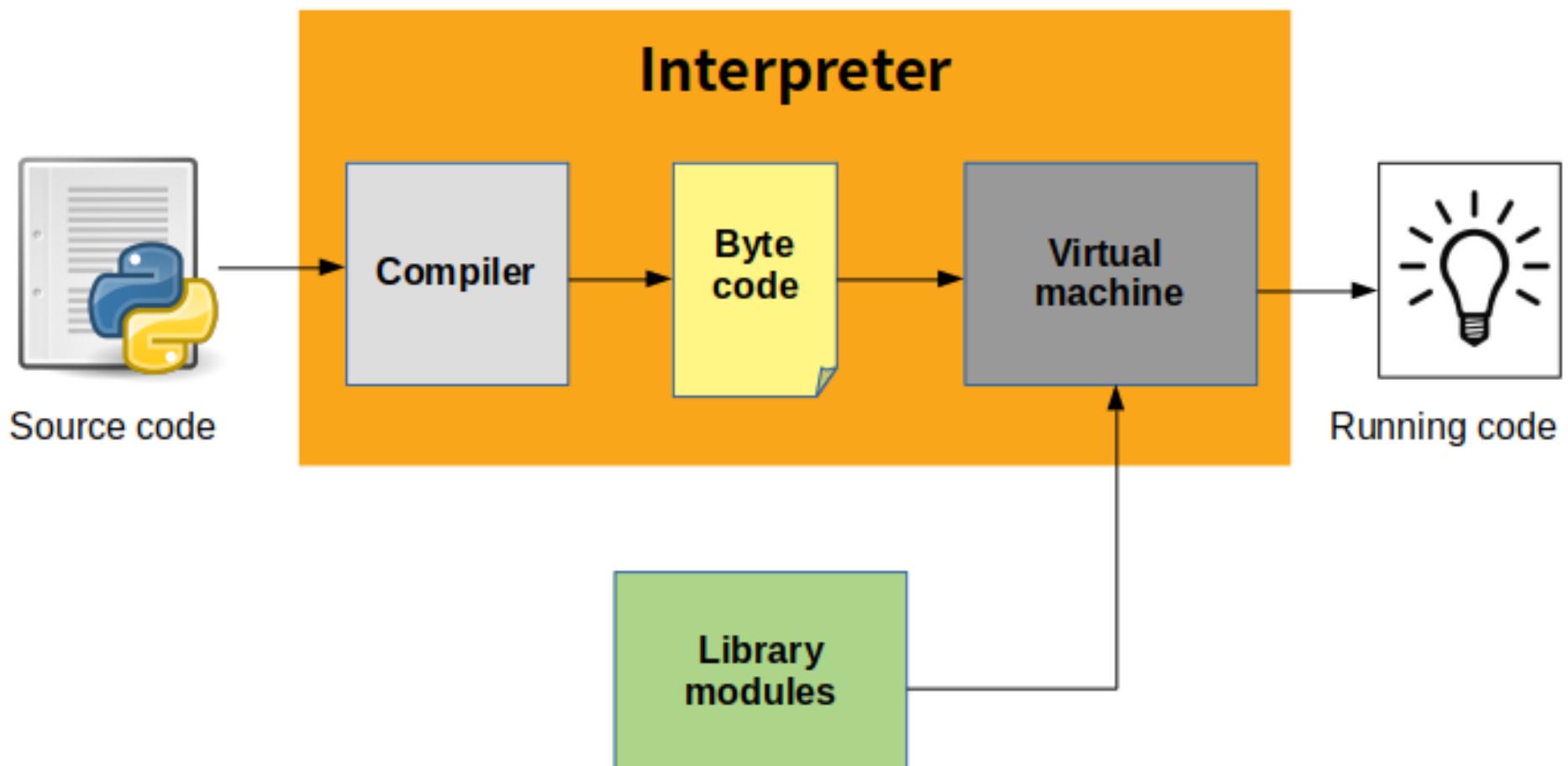
# Automação de tarefas em planilhas de gestão



# A linguagem python



# Como o python funciona



# Como o python funciona



Source code



```
print("Hello World!")
```

```
00000000: 00000011 11110011 00001101 00001010 01000010 00101001 ....B)
00000006: 01110100 01011011 01100011 00000000 00000000 00000000 t[c...
0000000c: 00000000 00000000 00000000 00000000 00000000 00000001 .....
00000012: 00000000 00000000 00000000 01000000 00000000 00000000 ...@..
00000018: 00000000 01110011 00001001 00000000 00000000 00000000 .s....
0000001e: 01100100 00000000 00000000 01000111 01001000 01100100 d..GHd
00000024: 00000001 00000000 01010011 00101000 00000010 00000000 ..S..
0000002a: 00000000 00000000 01110011 00001100 00000000 00000000 ..s...
00000030: 00000000 01001000 01100101 01101100 01101100 01101111 .Hello
00000036: 00100000 01010111 01101111 01110010 01101100 01100100 World
0000003c: 00100001 01001110 00101000 00000000 00000000 00000000 !N...
00000042: 00000000 00101000 00000000 00000000 00000000 00000000 .(....
00000048: 00101000 00000000 00000000 00000000 00000000 00101000 (....(
0000004e: 00000000 00000000 00000000 00000000 01110011 00001101 ....s.
00000054: 00000000 00000000 00000000 01101000 01100101 01101100 ...hel
0000005a: 01101100 01101111 01110111 01101111 01110010 01101100 loworl
00000060: 01100100 00101110 01110000 01111001 01110100 00001000 d.pyt.
00000066: 00000000 00000000 00000000 00111100 01101101 01101111 ...<mo
0000006c: 01100100 01110101 01101100 01100101 00111110 00000001 dule>.
00000072: 00000000 00000000 00000000 01110011 00000000 00000000 ...s...
00000078: 00000000 00000000 ..
```

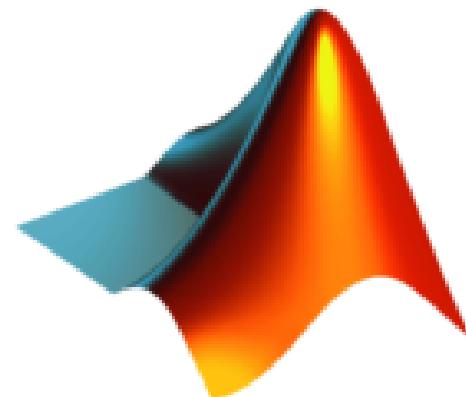
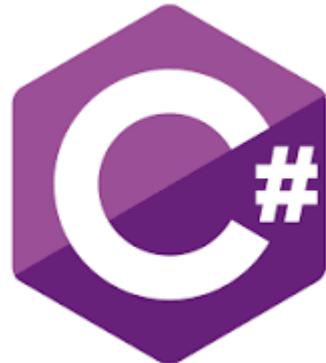


Running code



```
Hello World
```

# Por quê o python?



# assembly → C → python

```
section .data
msg    db      'Como programar em Assembly'
len     equ     $-msg

section .text
global _start
_start: mov     edx, len
        mov     ecx, msg
        mov     ebx, 1
        mov     eax, 4
        int     80h

        mov     ebx, 0
        mov     eax, 1
        int     80h
```

```
#include <stdio.h>
int main()
{
    // printf() displays the string
    printf("Hello, World!");
    return 0;
}
```

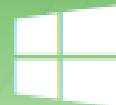
```
print('Hello, world!')
```

# Multiplataforma

## Download Anaconda Distribution

Version 5.2 | Release Date: May 30, 2018

Download For:



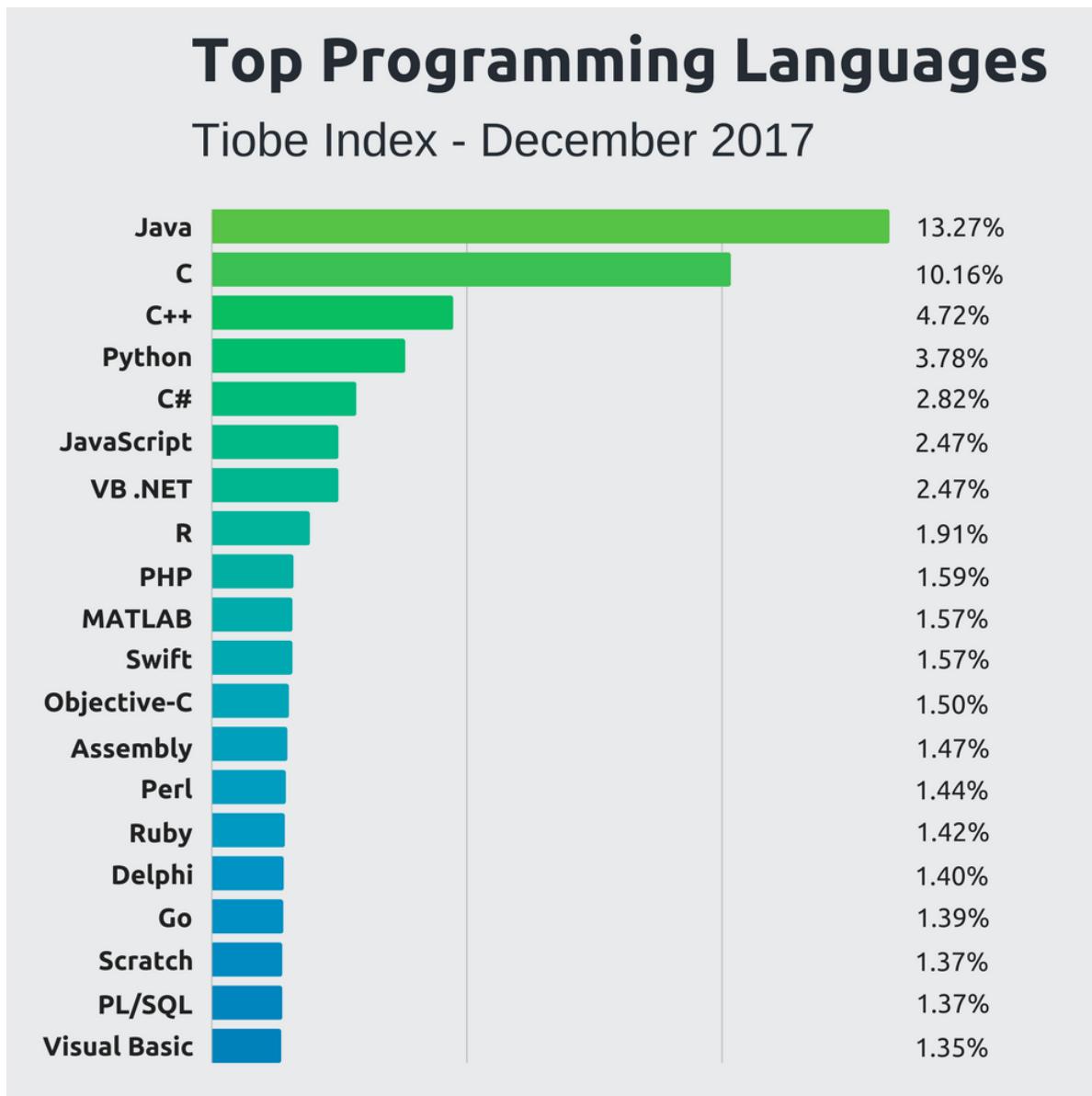
# Gratis

## Anaconda Distribution

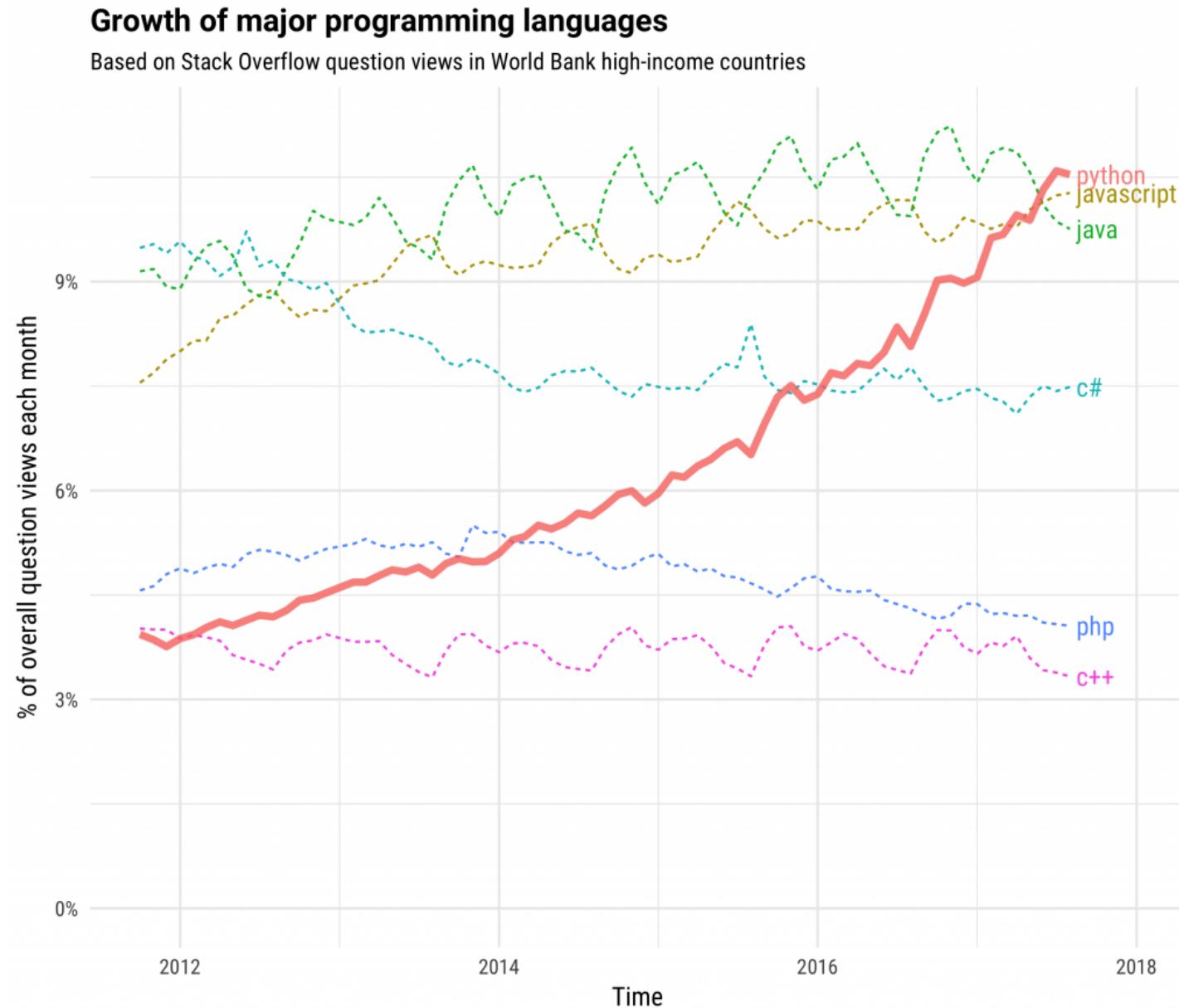
With over 6 million users, the open source [Anaconda Distribution](#) is the fastest and easiest way to do Python and R data science and machine learning on Linux, Windows, and Mac OS X. It's the industry standard for developing, testing, and training on a single machine.



# Amplamente utilizado

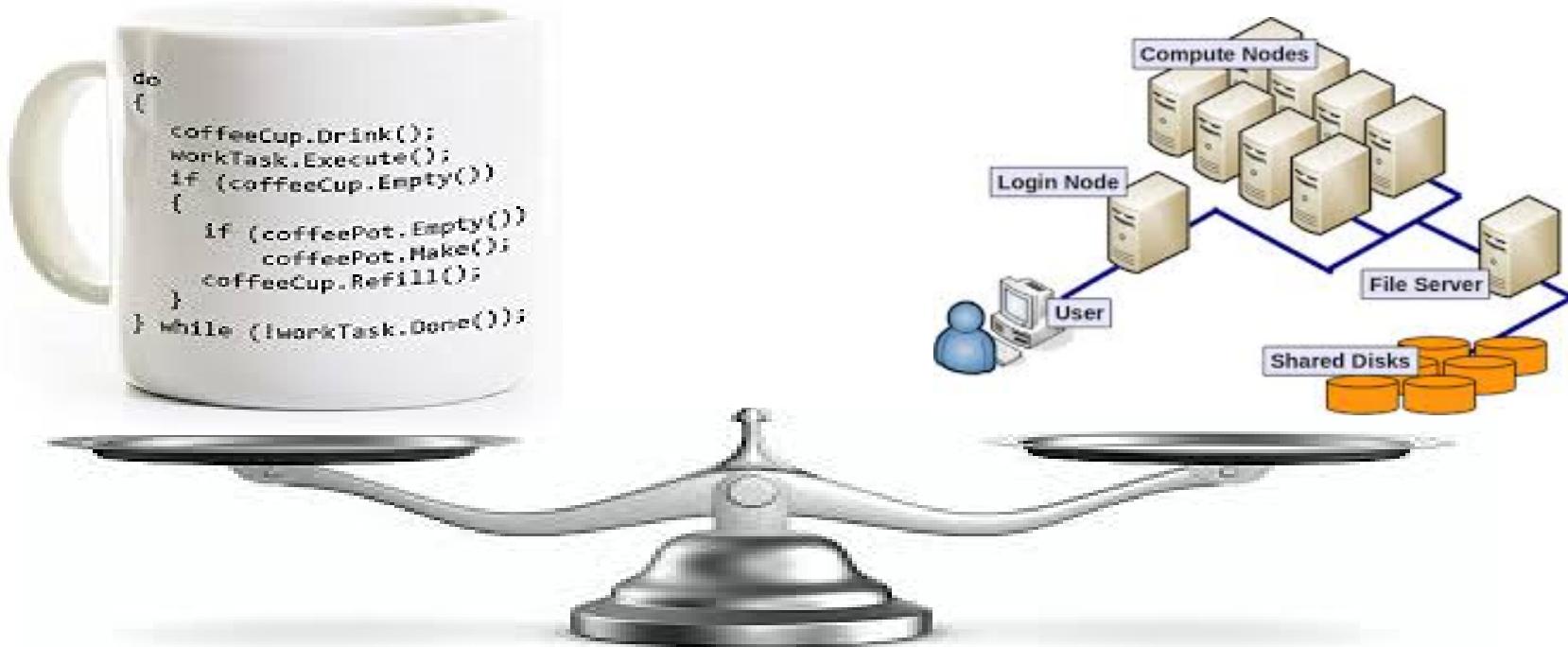


# Tendência de crescimento

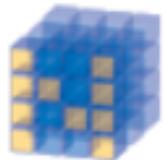


# Eficiente

- Tempo de desenvolvimento
  - Prototipagem
- Tempo de execução
  - Bibliotecas de alto desempenho



# O ecosistema python científico



NumPy  
Base N-dimensional  
array package



SciPy library  
Fundamental library  
for scientific  
computing



Matplotlib  
Comprehensive 2D  
Plotting



IPython  
Enhanced Interactive  
Console



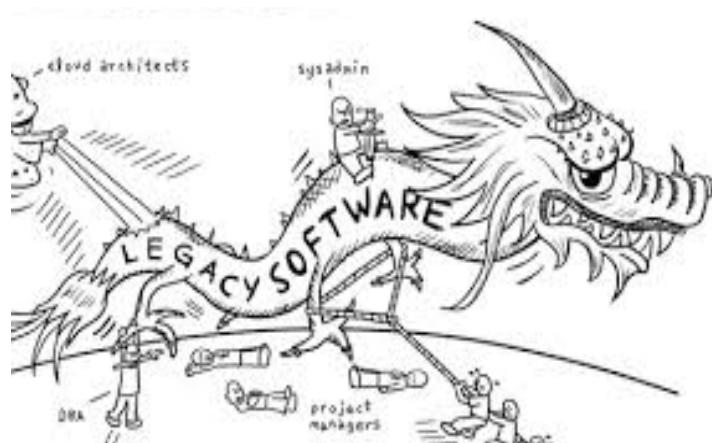
Sympy  
Symbolic mathematics



pandas  
Data structures &  
analysis

# Versões

- Python 2.x
  - Manutenção de projetos antigos. (*legacy*)
- Python 3.x
  - Desenvolvimento de projetos novos.
  - Acesso a bibliotecas atualizadas.



Does ... work with Python 3?



95% of most popular  
PyPI libraries support  
Python 3

<http://py3readiness.org/>

# Paradigmas

- Procedural
  - Lista de instruções
- Orientação a objeto (*OOP*)
  - Encapsular dados e métodos
- Funcional
  - Evitar variáveis globais

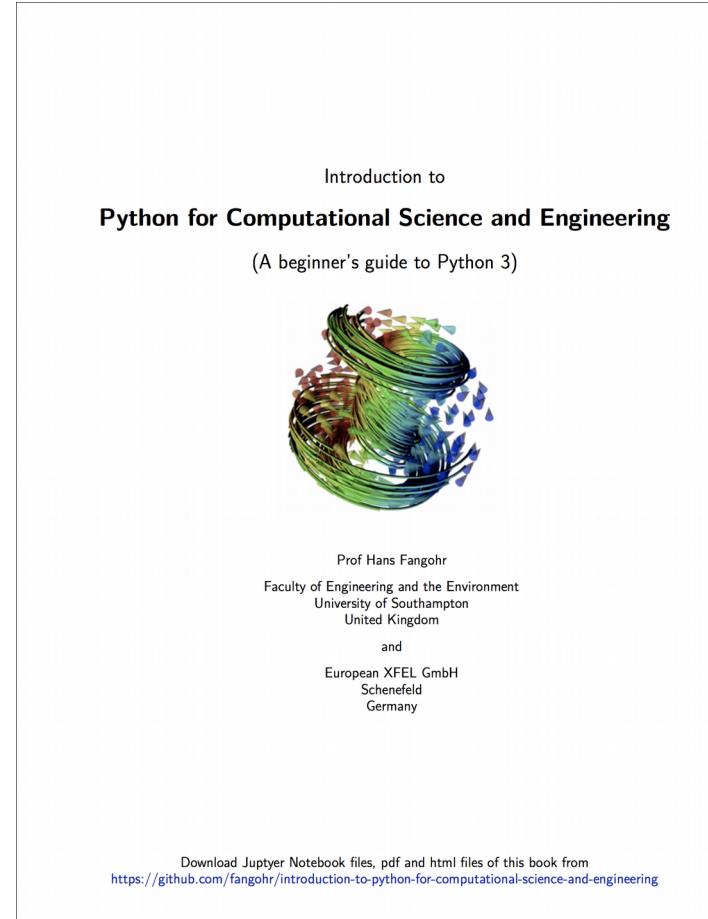
# Livro referência

"Introduction to Python for Computational Science and Engineering (A beginner's guide)"  
livro (em inglês, 173 páginas)  
de Hans Fangohr.

<https://github.com/fangohr/introduction-to-python-for-computational-science-and-engineering/>

Traduzido para português por Gustavo C. P. de Oliveira.

<https://github.com/gcpeixoto/lecture-ipynb/>



# Estrutura do curso

- Ferramentas
  - Python tutor
  - Anaconda
    - Spyder
    - Jupyter-lab
  - Google colab
- Tópicos
  - Lógica e sintaxe
  - Python científico

# Expectativa X Realidade



# Perguntas

