



# Engenharia de Software

## Computacional thinking with Python

Prof. Dr. Francisco Elânio

# Agenda da aula

- Objetivo
- Conteúdo da disciplina
- Avaliação
- Introdução a linguagem Python
- Linguagens mais utilizadas
- Por que Python está em alta?
- Mercado para desenvolvedores (Python)
- Algoritmos

# Objetivos

Apresentar e aplicar os conceitos de lógica de programação utilizando a linguagem de programação Python.

# Conteúdo – 1º semestre

- **Conceito de algoritmos**
- **Fluxograma | Pseudocódigo | Linguagem de programação**
- **Tipos de dados**
- **Inteiros | Reais | Texto | Lógico**
- **Casting: int() | float() | str() | bool()**
- **Variáveis e operadores Aritméticos**
- **Comandos de entrada, saída e processamento de dados**
- **print() | input()**



# Conteúdo – 1º semestre

- Estruturas de Decisão e Operadores
- Operadores Relacionais e Lógicos
- Decisão simples (if) | decisão composta (if else) | decisão encadeada (if elif else)
- Estrutura de Seleção
- Escolha: match - case
- Estruturas de repetição
- Condicional: while
- Contadora: for
- Tratamento de erros
- comando: try - except - else - finally

# Conteúdo – 2º semestre

- Subalgoritmos
- Funções | Procedimentos
- Parâmetros: Reais e formais | default | args
- Estrutura de dados unidimensional
- Estruturas de dados do tipo: vetor (dados homogêneos) | lista (list) | tupla (tuple)
- Estrutura de dados homogênea bidimensional tipo matriz (dados homogêneos)
- Busca e ordenação em vetores / listas

# Conteúdo – 2º semestre

- **Conjuntos (set)**
- **Dicionários**
- **Tabelas de memória (listas x dicionários)**
- **Arquivos**
- **Manipulação de arquivos texto**
- **Manipulação de arquivos CSV**

# Avaliação

A média final para aprovação deve ser maior ou igual a 6,0 pontos. Essa nota será resultante do novo sistema de avaliação da FIAP, assim composto:

Média 1º semestre:

- Challenge Sprint (2 atividades) e
- Checkpoints (2 a 3), representando 40% da nota semestral;
- Uma Global Solution, representando 60% da nota do semestre.

Obs 1: Essa nota representará 40% da média anual.

Média 2º semestre:

- Challenge Sprint (2 atividades) e
- Checkpoints (2 a 3), representando 40% da nota semestral;
- Uma Global Solution, representando 60% da nota do semestre.

Obs 2: Essa nota representará 60% da média anual.



# Bibliografia

## BÁSICA

ASCENCIO, A. F. G, CAMPOS, E. A. V. Fundamentos da Programação de Computadores: algoritmos, Pascal, C/C++ e Java, 2ª Edição, São Paulo: Pearson 2007.

FURGERI, Sérgio. Introdução à Programação em Python. São Paulo: Editora Senac, 2021.

MENEZES, Nilo. Introdução à Programação em Python. São Paulo: Novatec, 2019

SALVETTI, Dirceu Douglas; BARBOSA, Lisbete Madson. Algoritmos. São Paulo: Pearson, 2004.

## COMPLEMENTAR

BORGES, Luiz Eduardo. Python para Desenvolvedores, 2ª Edição. Rio de Janeiro: Novatec, 2010.

MATTHES, Eric. Curso Intensivo de Python: Uma introdução prática e baseada em projetos à programação. São Paulo: Novatec, 2016.

SWEIGART, Al. Automatize Tarefas Maçantes com Python: Programação prática para verdadeiros iniciantes. São Paulo: Novatec, 2015.

# *Introdução à linguagem de programação em Python*

# Linguagem de programação Python

Python é uma linguagem de programação de alto nível, dinâmica, interpretada, modular, multiplataforma, orientada e administrada pela Python Software Foundation.

Possui sintaxe simples e oferece suporte a módulos e pacotes.



# Autor da linguagem de programação Python

**Guido Van Rossum**

**Nascimento em 31 de janeiro de 1956 (67 anos)**

**Haarlem, Países Baixos**

**Prêmio Anual Software Livre (2001)**



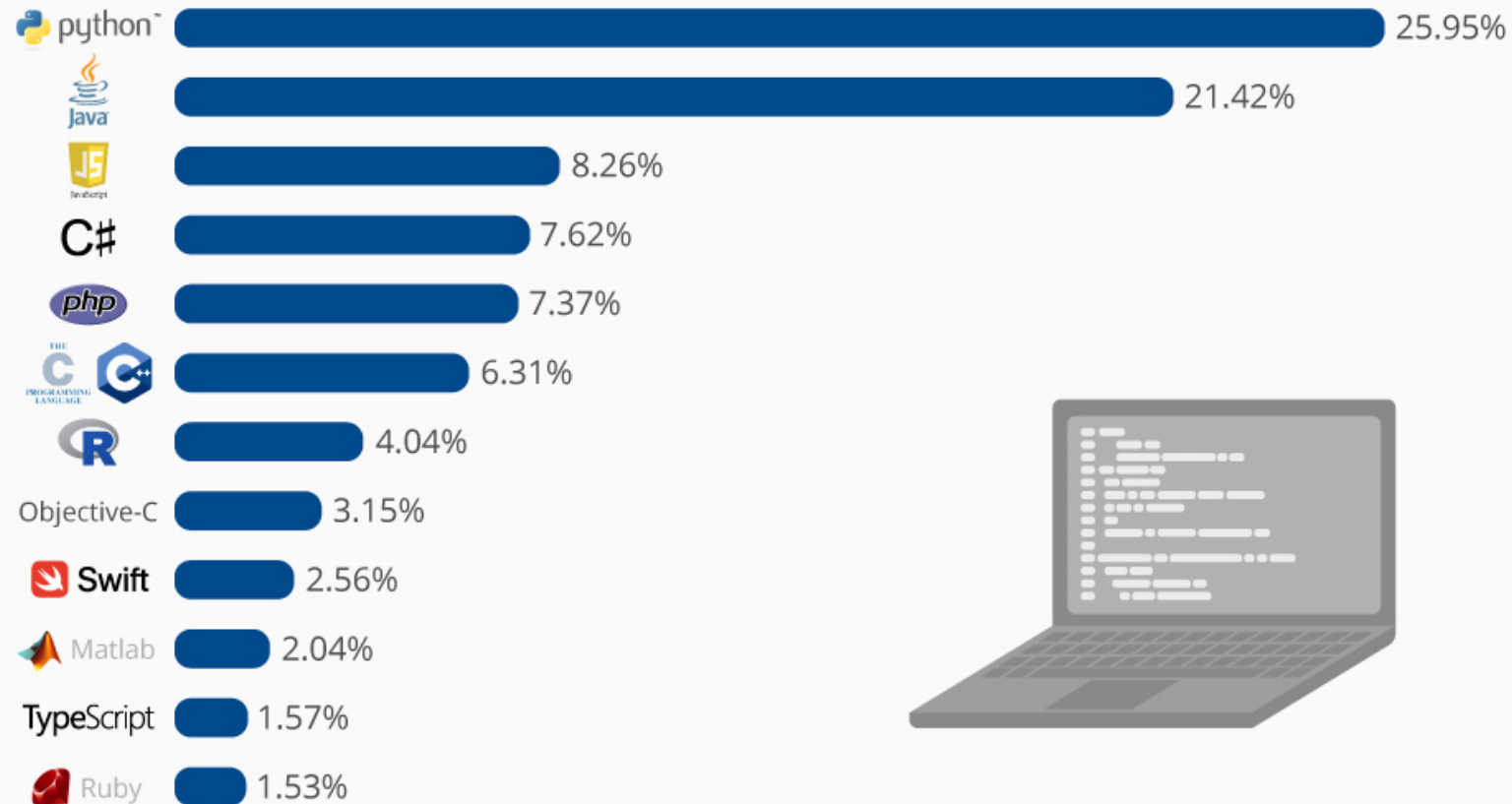
**Programador de computador na Holanda. Iniciou o seu projeto em 1989 no *Centrum Wiskunde & Informatica* (CWI).**



# Linguagens mais utilizadas

## The Most Popular Programming Languages

Share of the most popular programming languages in the world\*



# Por que Python está em alta?

Sintaxe simples



Alta segurança



Diversas  
Bibliotecas



Vasta  
comunidade



Útil em ML e IA



Útil em ciência  
de dados



Pesquisa científica  
acadêmica



Documentação

# Mercado para desenvolvedores (Python)

Vagas ▾

Data do anúncio ▾

Nível de experiência ▾

Empresa ▾

Tipo de vaga ▾

Presencial/remota ▾



Todos os filtros

data science em: Estados Unidos



113.412 resultados

Configurar alerta ☐



Promovida

**Experienced Senior Associate, Forensic Data & Analytics**  
BDO USA  
Oak Brook, IL (Híbrido)  
US\$ 110K/a - US\$ 125K/a (da descrição da vaga)  
 Recrutando agora



Promovida

**Senior Physical Design Engineer**  
NVIDIA  
Santa Clara, CA  
US\$ 156K/a - US\$ 287,5K/a (da descrição da vaga)  
 5 ex-alunos trabalham aqui

Promovida

**Crypto Quant Trader**  
Gravitas Recruitment Group (Global) Ltd  
Ásia Oriental (Remoto)  
 Dica Premium: envie uma mensagem ao anunciante da vaga diretamente

Promovida

**Statistician / Data Scientist**  
Footprint  
Gilbert, AZ (Presencial)  
Há 1 semana  Candidatura simplificada

**Senior Physical Design Engineer**  
NVIDIA · Santa Clara, CA

Aplicar ↗

Salvar

...


- Responsible for all aspects of physical design and implementation of GPU, CPU and other ASICs targeted at the desktop, laptop, workstation, and mobile markets.
- As a member of a team, we will all participate in establishing physical design methodologies, flow automation, chip floorplan, power/clock distribution, chip assembly and P&R, timing closure.
- Craft designs for static timing analysis, power and noise analysis and back-end verification.

What We Need To See

- BSEE (MSEE preferred) or equivalent experience.
- 8+ years of experience in large VLSI physical design implementation on 5nm, 4nm and 3nm technology.
- Your successful track record of delivering designs to production is a requirement.
- Shown experience in the following areas: Power, Performance and Area improvement Initiatives is a plus.
- Already a validated strong power user of P&R, Timing analysis, Physical Verification and IR Drop Analysis CAD tools from Synopsys (ICC2/DC/PT/STAR-RC/ICV), Cadence (Innovus, Tempus, SeaHawk ) and Mentor Graphics.
- Deep understanding of custom macro blocks such as RAMs, CAMs, high-speed IO drivers, PLLs.
- Confirmed prior experience in timing closure, clock/power distribution and analysis, RC extraction and correlation, place/ route and tapeout solutions.
- To be successful you should possess strong analytical and debugging skills required.

Proficiency using Python, Perl, Tcl, Make scripting is helpful.

NVIDIA is widely considered to be the leader of AI computing, and one of the technology world's most desirable employers. We have some of the most forward-thinking and hardworking people in the world working for us. If you're creative and auto want to hear from you.

 Mensagens 1



# Mercado para desenvolvedores (Python)

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Há 1 semana · [Candidatura simplificada](#)




**Data Scientist - Marketing Analytics**  
MarketBridge  
Washington, DC (Presencial)

Há 2 semanas · [Candidatura simplificada](#)




**Data Scientist**  
Key Cyber Solutions  
Richmond, VA (Presencial)

Há 2 semanas · [Candidatura simplificada](#)




**Senior Data Scientist (US Remote)**  
Prealize Health  
San Francisco, CA (Remoto)  
US\$ 140K/a - US\$ 200K/a (da descrição da vaga)

Há 3 semanas · [Candidatura simplificada](#)



**AI/NLP Researcher**  
Verneek  
Nova York, Estados Unidos (Presencial)

Há 2 semanas · [Candidatura simplificada](#)



**Data Scientist**  
BasisPath, Inc.  
Northern, VA (Presencial)

Há 2 semanas · [Candidatura simplificada](#)

Senior Data Scientist (US ...  
Prealize Health · San Francisco,...

[Candidatura simplificada](#)

Salvar

...

use the best approaches available


- Document and present your work to the team and our partners

**What You'll Need:**

- PhD and/or MS in computer science, statistics, biostatistics, economics, or equivalent
- Minimum 4 years of experience in building commercial products using machine learning
- Expert in Python or similar programming language
- Experience in distributed computing technologies like Spark
- Knowledge in experimental design and/or observational studies
- Familiarity with a variety of machine learning techniques (logistic regression, decision tree ensembles, neural networks, etc.)
- Experience working on interdisciplinary, collaborative projects as well as experience leading independent research projects
- Proficient at conducting research and developing strategies to solve novel challenges
- Possess excellent communication skills, and the ability to research and develop in an agile, open, and highly synchronized environment
- Comfortable working in a dynamic startup environment
- Experience in the healthcare domain is a plus
- US work authorization required

**What We Offer:**

- Flexible work environment
- Competitive base salary plus a generous bonus and equity plan
- Paid time off including holidays
- Medical, dental, vision
- 401k

 Mensagens 1



# Mercado para desenvolvedores (Python)

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Tipo de vaga ▾


Presencial/remota ▾

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Refinar por cargos

data scientist data analyst




**Data Analyst Family Health**  
Mb Staffing Services LLC  
Washington, DC (Presencial)

Há 1 semana ·  Candidatura simplificada





**AI Researcher (Anime)**  
Spellbrush  
San Francisco, CA (Híbrido)  
US\$ 75K/a - US\$ 200K/a


Há 2 semanas




**Machine Learning Engineer**  
Gradient Zero  
Herndon, VA (Remoto)  
US\$ 110K/a - US\$ 170K/a (da descrição da vaga)

Há 2 semanas ·  Candidatura simplificada




**Data Scientist**  
Yale University  
New Haven, CT (Presencial)  
 14 ex-alunos trabalham aqui

Há 1 semana



**Data Scientist Intern (Remote)**  
TECHY STAFFING

**Machine Learning Engineer**  
Gradient Zero · Herndon, VA (...)

 Candidatura simplificada

Salvar

...

Job Description:


We are seeking a **Machine Learning Software Engineer** to work collaboratively with our highly talented team to further our research in generative adversarial networks (GANs) and related methods for generating content. The ideal candidate has experience integrating TensorFlow based deep learning models into production pipelines. Candidates must be able to develop and maintain native TensorFlow functions and implement extensible, modular training and inference architectures to enable rapid test and verification of ideas and potential improvements to algorithms. Candidates must have strong programming skills in Python, Fluency with TensorFlow 2.x, and previous experience working with a team of engineers to productize offerings.

Location: Remote, United States

Requirements:

- A Bachelor's degree in Computer Science, Engineering, Machine Learning, or related fields from a nationally accredited college/university OR at least 6 years of experience in a similar Machine Learning Engineer role.
- U.S. citizenship is required.
- Experience with distributed training of deep neural networks across many GPUs/TPUs.
- Experience with generative modeling techniques (ex: GANs).
- Fluency with Python.
- Familiarity with other deep learning frameworks such as Keras, ONNX, or PyTorch.
- Fluency with TensorFlow 2.x.
- Strong communication ability to coordinate across engineering and customer-facing team.

Desired:

 Mensagens 1

# Mercado para desenvolvedores (Python)

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Presencial/remota



Todos os filtros



data science em: Estados Unidos




113.411 resultados



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**Delivery Manager**  
FLYR  
Los Angeles, CA  
 1 ex-aluno trabalha aqui  
Promovida

**Experienced Senior Associate, Forensic Data & Analytics**  
BDO USA  
Oak Brook, IL (Híbrido)  
US\$ 110K/a - US\$ 125K/a (da descrição da vaga)  
 Recrutando agora  
Promovida

**Senior Physical Design Engineer**  
NVIDIA  
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 5 ex-alunos trabalham aqui  
Promovida

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Gravitas Recruitment Group (Global) Ltd  
Ásia Oriental (Remoto)  
 Dica Premium: envie uma mensagem ao anunciante da vaga diretamente  
Promovida •  Candidatura simplificada

**Experienced Senior Associate, Forensic Dat...**  
BDO USA · Oak Brook, IL (Híbrido)  
  ...

- Data Visualization
- Data Automation
- Data Warehousing

**License/Certifications**

- CFE, CPA, and/or CAMS, preferred
- Microsoft SQL Server or Oracle certifications, preferred
- Tableau or Power BI certification, preferred

**Software**


- Ability to write SQL queries and manage large data sets within SQL Server or other databases to support various forensic reporting, required
- Experience with **Python**, R, and/or other programming languages or tools, preferred
- Experience with data profiling and data management tools, preferred
- Experience with data visualization software, preferred

**Language**

- Fluency on Spanish and/or Mandarin (read, speak and/or write), preferred

**Other Knowledge, Skills & Abilities**

- Ability to work with a high degree of professionalism and autonomy
- Excellent verbal and written communication skills
- Ability to communicate complex information in a clear and concise manner
- Strong organizational skills, especially the ability to meet project deadlines with a focus on details
- Ability to successfully multi-task while working independently or w

 Mensagens

# Mercado para desenvolvedores (Python)

Vagas

Data do anúncio

Nível de experiência

Empresa


Tipo de vaga


Presencial/remota


Todos os filtros


data science em: Estados Unidos  
113.411 resultados


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**Mentor**  
Fud, Inc.  
San Francisco, CA (Remoto)  
Recrutando agora  
Há 1 semana • [Candidatura simplificada](#)

**AI/ML, Data Science, and API Integration Engineer/Scientist**  
Stenera Consulting  
Estados Unidos (Remoto)  
Recrutando agora  
Há 1 semana • [Candidatura simplificada](#)

**Data Scientist | \$140K-\$180K + Benefits | PLEASE READ THE REQUIREMENTS**  
IT Pros, a tech recruiting co.  
Filadelfia, PA  
Há 23 horas • [Candidatura simplificada](#)

**AI Consultant**  
Fud, Inc.  
Boston, MA (Remoto)  
Recrutando agora  
Há 1 semana • [Candidatura simplificada](#)

**AI / ML /Data Science Engineers**  
Vector Technologies LLC  
Boston, MA (Remoto)  
Recrutando agora  
Há 1 semana • [Candidatura simplificada](#)

**Data Scientist | \$140K-\$1...**  
IT Pros, a tech recruiting co. • F...  
2-minute walk from Suburban Train Station

[Candidatura simplificada](#) [Salvar](#)

**Founded:** 2011

**Benefits:**

- Healthcare Benefits: 50% Employer-Paid
- Retirement Benefits: 401(k) with employer-match
- Paid Time Off
- Plus More...

**Job Description**


The Data Scientist will be responsible for a new flagship product built in Python.

**Additional Responsibilities:**

- Improving an existing data analytics and machine-learning model
- Enhancing an existing processing pipeline
- Refining that pipeline on an ongoing basis as new features and products are developed

**Qualifications**

- APPLICANTS MUST MEET ALL REQUIREMENTS\*\*\*
- ✓ Must be local to the Philadelphia region and willing to work in the Center City office 4 days per week + 1 day remote (NO RELOCATION OFFERED OR CONSIDERED)
- ✓ Must have a Ph.D. AND Bachelors in Computer Science
- ✓ Must have experience working with Python
- ✓ Must be authorized to work in the USA without any work restrictions
- ✓ Must have superior communication skills

 Mensagens

# Compiladores / Editores de código em Python



# Compiladores



# SPYDER

## The Scientific Python Development Environment

File Edit Search Source Run Debug Consoles Projects Tools View Help

temp.py interpolation.py \_init\_.py umd\_helper.py umd\_main.py README.md

Project explorer

spyder

tests

\_\_init\_\_.py

cli\_options.py

mac\_stylesheets

mainwindow.py

restart.py

start.py

tour.py

config

defaults

fonts

images

locale

plugins

tests

utils

widgets

windows

workers

\_\_init\_\_.py

dependencies.py

interpreter.py

otherplugins.py

pill\_patch.py

py2compat.py

pyplot.py

requirements.py

spyder\_breakpoints

spyder\_io\_dcm

spyder\_io\_hdf5

spyder\_profiler

spyder\_pylint

checkignore

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codecov.yml

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pep8speaks.yml

project

travis.yml

Announcements.md

aooveor.vml

Editor

16740156420fb678bb5ba67c3ee3aae4-551407feca17b0f67bb9f5687f4db8d1b95367816740156420fb678bb5ba67c3ee3aae4-551407feca17b0f67bb9f5687f4db8d1b953678

Outline

Variable explorer

6

7 import pylab

8 from numpy import cos, linspace, pi, sin, random

9 from scipy.interpolate import splprep, splev

10

11 # %% Generate data for analysis

12

13 # Make ascending spiral in 3-space

14 t = linspace(0, 1.75 \* 2 \* pi, 100)

15

16 x = sin(t)

17 y = cos(t)

18 z = t

19

20 # Add noise

21 x += random.normal(scale=0.1, size=x.shape)

22 y += random.normal(scale=0.1, size=y.shape)

23 z += random.normal(scale=0.1, size=z.shape)

24

25

26 # %% Perform calculations

27

28 # Spline parameters

29 smoothness = 3.0 # Smoothness parameter

30 k\_param = 2 # Spline order

31 nests = -1 # Estimate of number of knots needed (-1 = maximal)

32

33 # Find the knot points

34 knot\_points, u = splprep([x, y, z], s=smoothness, k=k\_param, nests=-1)

35

36 # Evaluate spline, including interpolated points

37 xnew, ynew, znew = splev(linspace(0, 1, 400), knot\_points)

38

39

40 # %% Plot results

41

42 # TODO: Rewrite to avoid code smell

43 pylab.subplot(2, 2, 1)

44 data, = pylab.plot(x, y, 'bo-', label='Data with X-Y Cross Section')

45 fit, = pylab.plot(xnew, ynew, 'r-', label='Fit with X-Y Cross Section')

46 pylab.legend()

47 pylab.xlabel('x')

48 pylab.ylabel('y')

49

50 pylab.subplot(2, 2, 2)

51 data, = pylab.plot(x, z, 'bo-', label='Data with X-Z Cross Section')

52 fit, = pylab.plot(xnew, znew, 'r-', label='Fit with X-Z Cross Section')

53 pylab.legend()

54 pylab.xlabel('x')

interpolation.py

1 Generate data for analysis

2 Perform calculations

3 Plot results

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# Compiladores



```
In [1]: %matplotlib inline
import pandas as pd
import numpy as np
import plotly
from IPython.display import display, Markdown as md
```

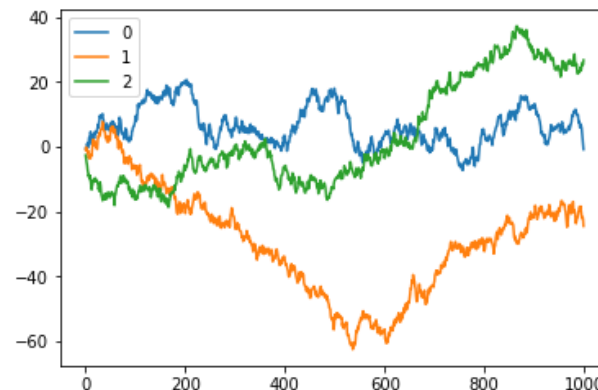
```
In [2]: title = "My Shiny Report"
x = 1000
y = 3
```

```
In [3]: display(md("# Just look at this graph from {}".format(title)))
```

**Just look at this graph from My Shiny Report**

```
In [4]: df = pd.DataFrame(np.random.randn(x, y))
df.cumsum().plot()
```

Out[4]: <matplotlib.axes.\_subplots.AxesSubplot at 0x7f127adda278>



# Compiladores



CO Untitled8.ipynb ☆

Arquivo Editar Ver Inserir Ambiente de execução Ferramentas Ajuda Todas as alterações foram salvas

+ Código + Texto

RAM Disco

```
[1] import pandas as pd
```

```
[6] dados = pd.read_csv('/content/drive/MyDrive/USP/dados_entrada.csv')
```

```
dados.describe()
```

	Unnamed: 0	tempo [s]	vaL [V]	vbL [V]	vcL [V]	vaR [V]	vbR [V]	vcR [V]	i
count	462042.000000	462042.000000	462042.000000	462042.000000	462042.000000	462042.000000	462042.000000	462042.000000	462042.000000
mean	231020.500000	0.050000	529.174340	1710.089969	-2204.016961	676.463827	1644.452992	-2263.043133	-252.000000
std	133380.180876	0.029017	210009.160558	203261.326087	200214.125871	213337.179691	207427.913233	204830.055785	2977.000000
min	0.000000	0.000000	-485649.948430	-450513.273718	-445192.351997	-503464.750527	-505434.767628	-492251.529863	-27766.000000
25%	115510.250000	0.025000	-164133.000457	-156280.835611	-154750.484131	-167040.535813	-159384.357780	-161027.216630	-242.000000
50%	231020.500000	0.050000	694.337909	104.418965	1333.897998	599.651423	-230.882865	1414.541495	-20.000000
75%	346530.750000	0.075000	165158.500039	158158.703409	149235.525002	167750.361614	164998.390024	153445.031366	205.000000
max	462041.000000	0.100000	457723.628046	451007.601928	445153.525903	501572.812203	488640.444575	494023.205454	19121.000000

✓ 0s conclusão: 21:04

# Compiladores



Visual Studio

Este compilador  
será utilizado  
nas aulas

The screenshot shows the Visual Studio Code editor interface. The Explorer panel on the left displays the file structure of a 'create-react-app' project, with 'serviceWorker.js' selected. The main editor area shows the code for 'serviceWorker.js', which includes comments about service worker functionality and a 'window.addEventListener' call. A tooltip is visible over the 'addEventListener' method. The bottom panel shows the 'TERMINAL' tab with the following output:

```
Compiled successfully!  
  
You can now view create-react-app in the browser.  
  
Local:      http://localhost:3000/  
On Your Network:  http://192.168.86.138:3000/  
  
Note that the development build is not optimized.  
To create a production build, use yarn build.
```

The status bar at the bottom indicates the file is at 'Ln 34, Col 13' and the editor is using 'Spaces: 2', 'UTF-8' encoding, and 'LF' line endings.



*O importante é não parar  
de questionar (Einstein)*

# Referências

**ASCENCIO, A. F. G, CAMPOS, E. A. V. Fundamentos da Programação de Computadores: algoritmos, Pascal, C/C++ e Java, 2ª Edição, São Paulo: Pearson 2007.**

**SALVETTI, Dirceu Douglas; BARBOSA, Lisbete Madson. Algoritmos. São Paulo: Pearson, 2004.**