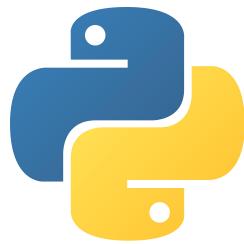


"If you want to teach people a new way of thinking, don't bother trying to teach them. Instead, give them a tool, the use of which will lead to new ways of thinking."
(R. Buckminster Fuller)

Lógica de programação aplicada à criação e análise da forma

Aula 01 - Introdução



Fernando Ferraz Ribeiro

fernando.ribeiro@ufba.br

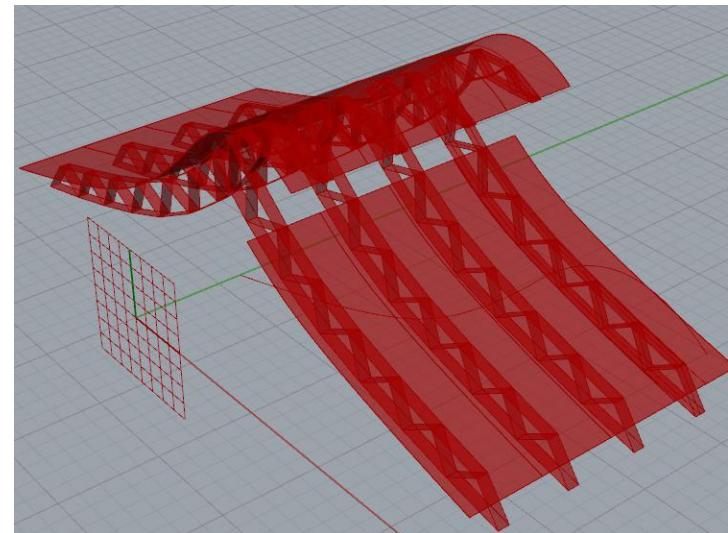
19/05/2017

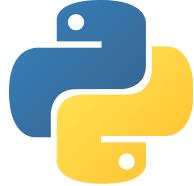
```
from __future__ import division
#importando bibliotecas do Rhinoceros:
#Rhino Common, rhinoscriptsyntax e ghpythonlib
from Rhino.Geometry import Point3d, Line, NurbsCurve
import rhinoscriptsyntax as rs
import ghpythonlib.components as gh

Tr_3D = []
Tr_copias = []
teste=[]
Cargas = []

if not Bz_1:
    Bz_1=Diag_1
if not Peso_esp_Tr:
    Peso_esp_Tr = 7800 #Peso especifico do aço Kg/m^3
if not Peso_cobertura:
    Peso_cobertura = 20 #Sobrecarga do telhado Kg/m^2
if not Fator_de_conv:
    Fator_de_conv = 10
if not N_Tr:
    N_Tr = 1

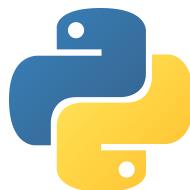
if not Plano:
    Plano = rs.WorldXYPlane()
#decompe o plano de trabalho nos componentes Origem e os eixos xyz
pOr, eX, eY, eZ = Plano
```





REGRAS DO LCAD

- 1. LABORATÓRIO EXCLUSIVO PARA AULAS DA FAUFBA. PERMITIDA A UTILIZAÇÃO COM A PRESENÇA DOS PROFESSORES E/OU MONITORES DAS DISCIPLINAS.**
- 2. ZELAR PELOS EQUIPAMENTOS DO LABORATÓRIO.**
- 3. TERMINANTEMENTE PROIBIDO DESCONECTAR OS EQUIPAMENTOS DA CPU: MOUSE, TECLADO, MONITOR, ETC.**
- 4. EVITAR O USO DE PEN DRIVES. UTILIZAR A INTERNET PARA A TRANSFERÊNCIA DE ARQUIVOS (GOOGLE DRIVE, DROPBOX, ONE DRIVE, GITHUB, ETC.**
- 5. APÓS UTILIZAR, DESLIGAR OS EQUIPAMENTOS. CPU, MONITOR E ESTABILIZADOR**
- 6. É PROIBIDO COMER E BEBER NO LABORATÓRIO. UTILIZA O INTERVALO PARA ISSO**
- 7. NÃO UTILIZAR O CELULAR NO PERÍODO DA AULA.**
- 8. RESPEITAR O HORÁRIO DA AULA E A TURMA EM QUE ESTÁ MATRICULADO.**



ALGORITMOS

Exemplo de Algoritmo

Divisão de um segmento de reta em "N" partes iguais:

1 - Dado o segmento de reta AB desenhar, a partir do ponto A ,uma semi-reta não paralela a AB.

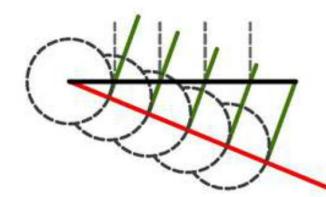
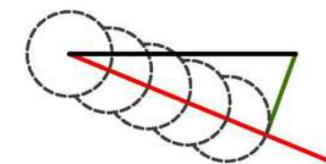
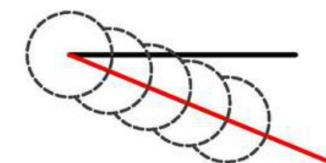
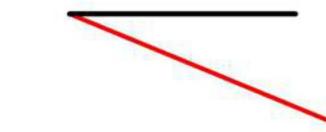
2 - Dado o número "N" de divisões, utilizando o compasso com uma mesma abertura qualquer, marcar "N" pontos equidistantes sobre a semi-reta Traçada no passo anterior.

3 - Traçar um segmento unindo o "N-ésimo" ponto marcado no passo anterior com a extremidade B do segmento AB

4 - Traçar paralelas ao segmento desenhado no passo 3, passando pelos pontos definidos no passo 2.

5- Fim

N=5 A ————— B



O segmento AB e o número inteiro "N" são as **variáveis de entrada**. Os Passos serão chamados de **operações ou funções**.

Relying upon software kills rather than mechanical ingenuity, graphics programmers first replicated the functions of traditional drafting instruments, and then went far beyond them. This has made a wider graphic vocabulary available to designers, together with a more elaborate syntax—in all, a richer and potentially more expressive graphic and spatial language.

MITCHELL, W. J. World's Greatest Architect MAKING, MEANING, AND NETWORK CULTURE. Cambrige: MIT Press, 2008. v. 40

1. Software de projeto

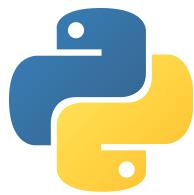
2. Ampliação de Software de projeto

3. Automação de Etapas de projeto

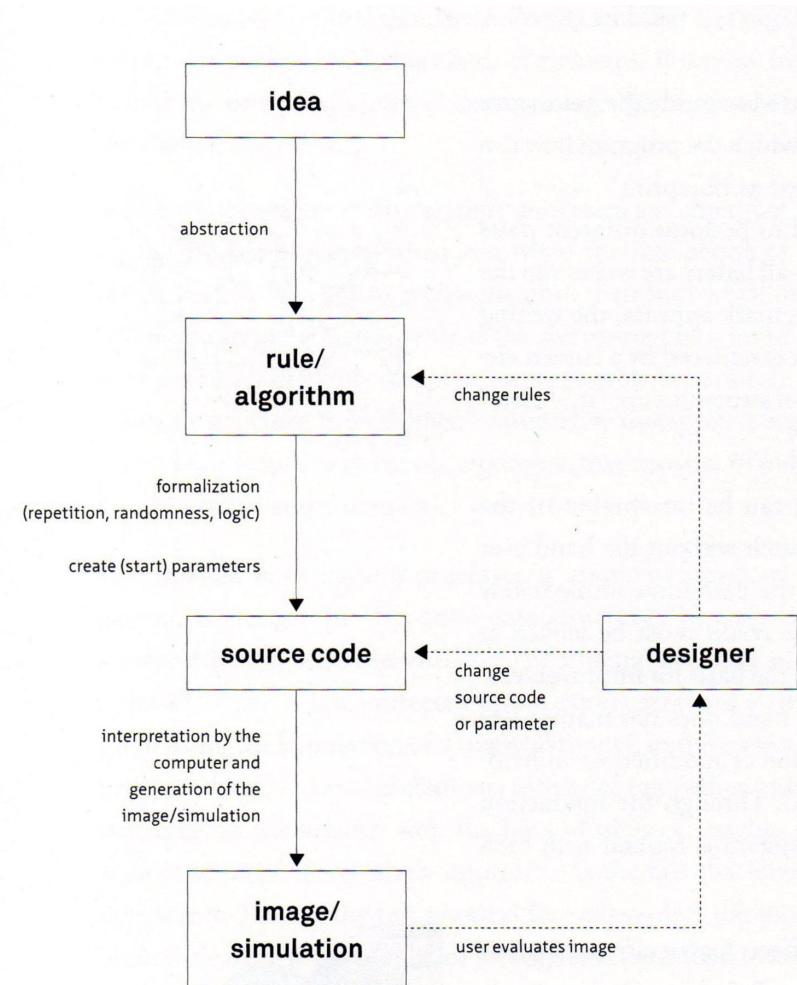
4. Auxílio na tomada de decisões em um projeto

5. Geração da Forma

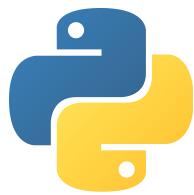
6. Organização, manipulação e extração da informação em
projetos



ALGORITMOS GENERATIVOS

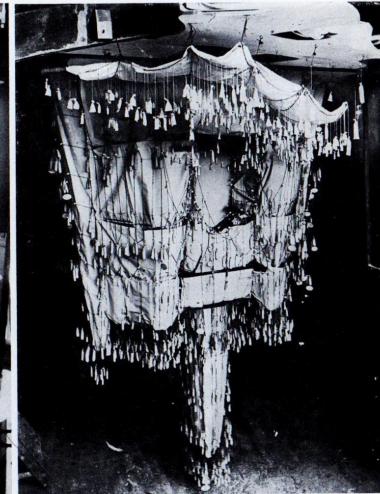
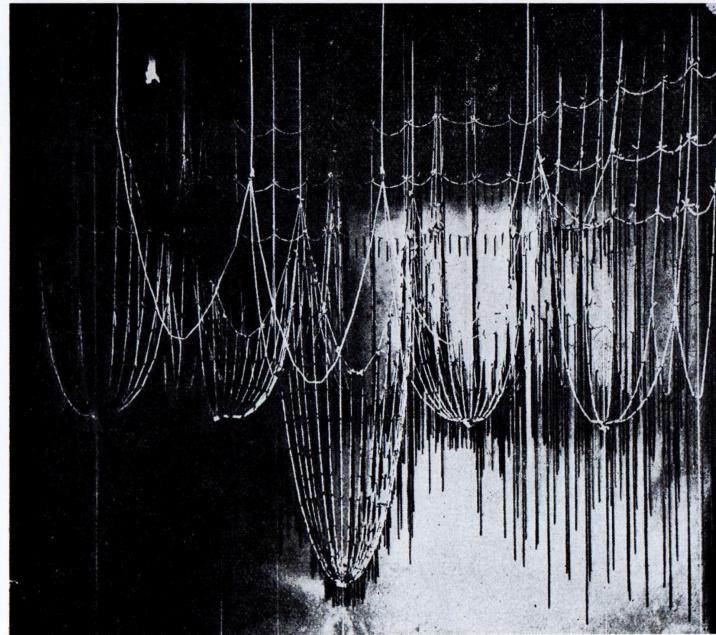


(Bohnacker et al. 2012)



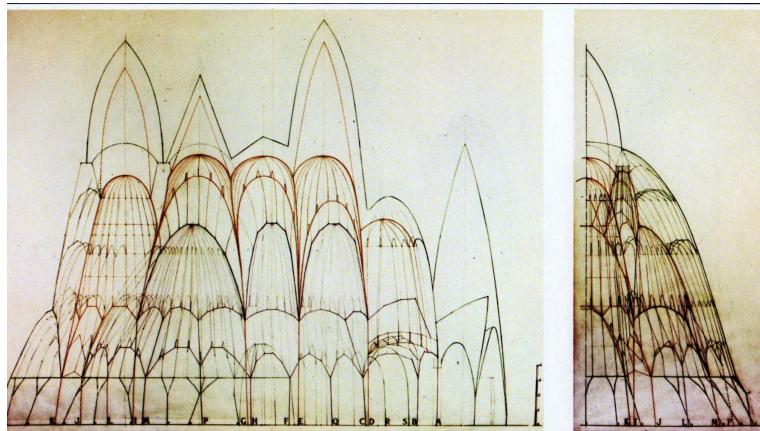
ALGORITMOS GENERATIVOS - ABORDAGEM CORRELATA

< 7 de 22 >

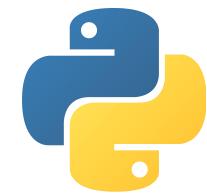


26. Maqueta funicular revestida. / Maqueta funicular revestida. / Draped funicular model.

25. Maqueta funicular revestida amb paper en plà d'estudi. / Maqueta funicular revestida con papel, en plan de estudio. / Funicular model hung with paper, in the course of study.



PUIG-BOADA, I.; ARIBAU, A. L'eglesia de la colonia Güell. Barcelona: Lumen, 1976.



ALGORITMOS GENERATIVOS

ALGORITMO DAS CÚPULAS MÓVEIS

As Cúplas do Hospital Hospital Sarah Kubitschek - RJ e as do TRT-Ba, do Arquiteto João (Lelé) Filgueiras Lima, serviram de inspiração para o algoritmo apresentado a seguir.



Hospital Sarah - RJ



TRT - Ba



ALGORITMOS GENERATIVOS

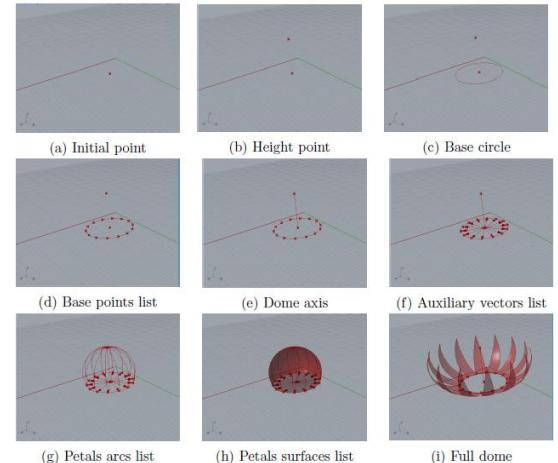
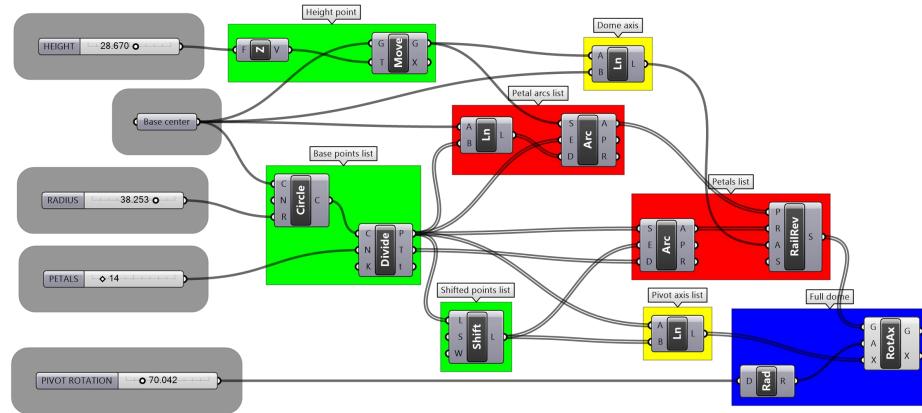
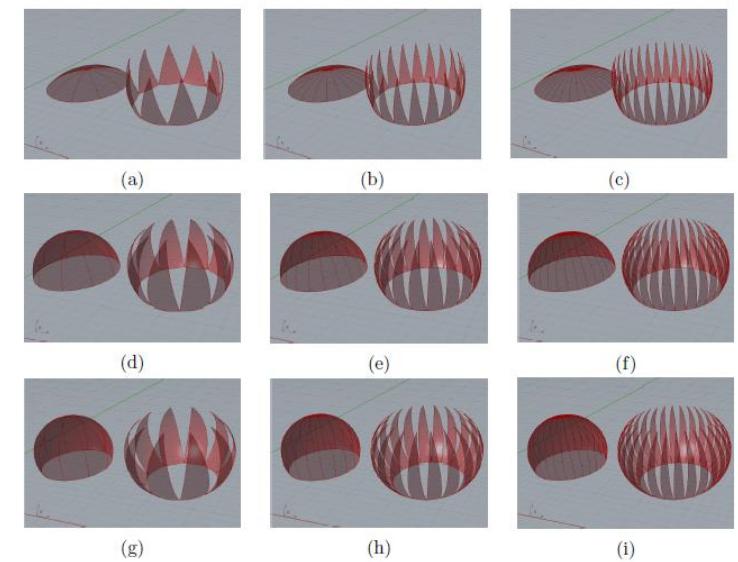
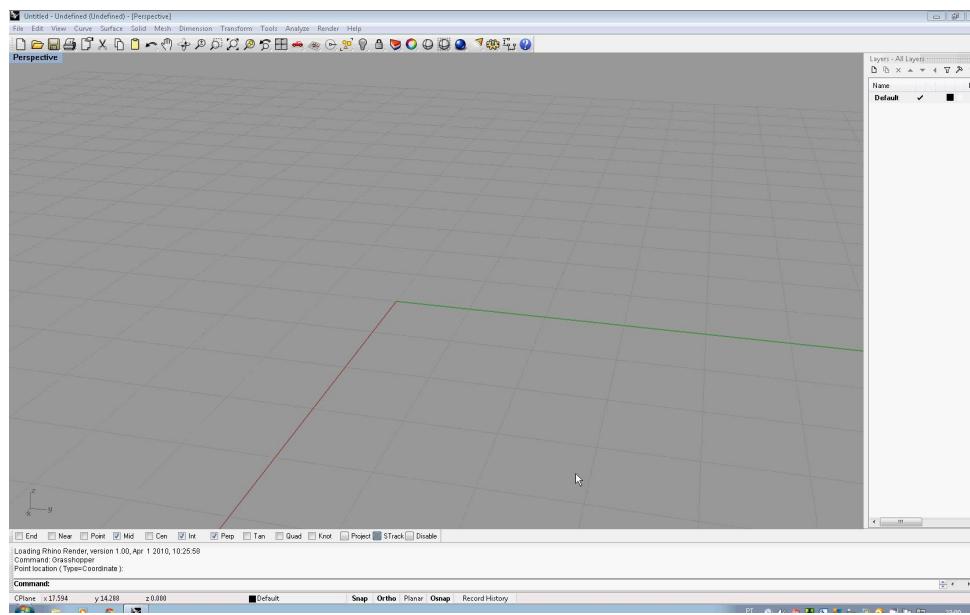
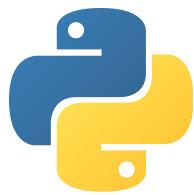


Figure 9: Steps of the list manipulation-based algorithm





História da Programação

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Precursors



Máquina de Anticítera (87 AC)



Wilhelm Schickard (1592-1635)



Blaise Pascal (1623-1662)



Gottfried Wilhelm Leibniz (1646-1726)



Joseph Marie Jacquard (1752-1834)

Calculadoras Mecânicas

Tear mecânico com leitura automática de cartões

O Motor Analítico

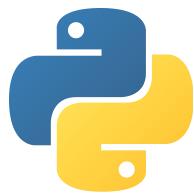


Ada Lovelace (1815-1852)



Charles Babbage (1792-1871)

Criadores do primeiro computador programável



História da Programação

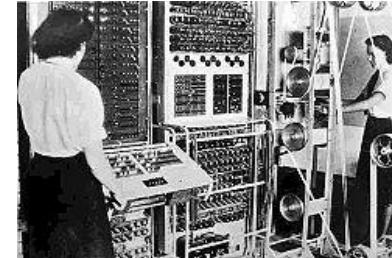
< 11 de 22 >



Replica do computador
Bombe (Alan Turing -
1939)



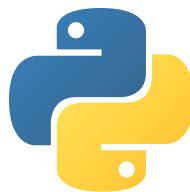
Alan Turing (1912 - 1954)



Computador Colossus
(Tommy Flowers - 1943)



Tommy Flowers (1905-1998)



História da Programação

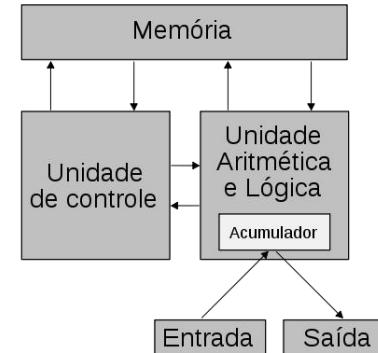
< 12 de 22 >



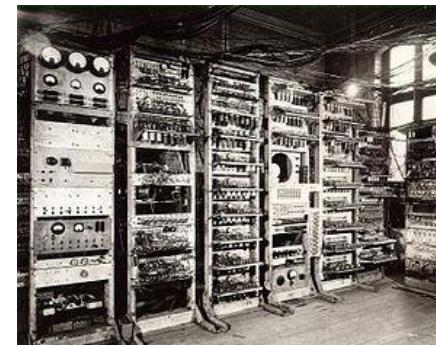
John von Neumann
(1903 -1957)



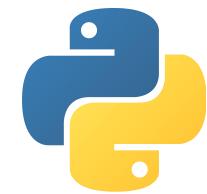
Replica do computador
Small-Scale Experimental
Machine (1948)



Arquitetura de von Neumann (1946)
computador digital de programa armazenado



Mark 1 (1949)



História da Programação

< 13 de 22 >

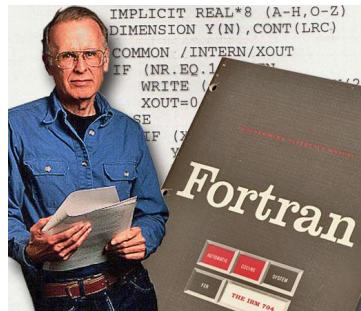
Flow-Matic / COBOL 1955

```
//COBCLG JOB CLASS=A,MSGCLASS=A,MSGLEVEL=(1,1)
//HELWORLD EXEC COBCLG,PARM.COB='MAP,LIST,LET'
//COBSYIN DD *
 001 IDENTIFICATION DIVISION.
 002 PROGRAM-ID. 'HELLO'.
 003 ENVIRONMENT DIVISION.
 004 CONFIGURATION SECTION.
 005 SOURCE-COMPUTER. IBM-360.
 006 OBJECT-COMPUTER. IBM-360.
 0065 SPECIAL-NAMES.
 0066 CONSOLE IS CNSL.
 007 DATA DIVISION.
 008 WORKING-STORAGE SECTION.
 009 77 HELLO-CONST PIC X(12) VALUE 'HELLO, WORLD'.
 075 PROCEDURE DIVISION.
 090 000-DISPLAY.
 100      DISPLAY HELLO-CONST UPON CNSL.
 110      STOP RUN.
//LKED.SYSLIB DD DSNAME=SYS1.COBLIB,DISP=SHR
//          DD DSNAME=SYS1.LINKLIB,DISP=SHR
//GO.SYSPRINT DD SYOUT=A
```



Grace Hopper (1906 -1992)

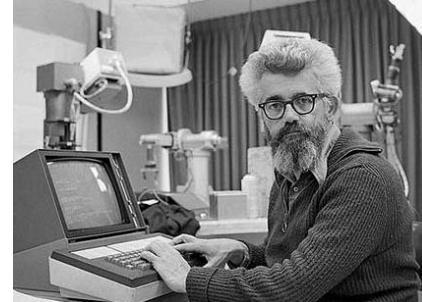
FORTRAN 1954/1957



John Backus
(1924 -2007)

LISP
1958

```
orial (n)
    n (- i 1))
    resultado 1 (* resultado i))
    0) resultado)))
```



John McCarthy (1927 -2011)

C
1972

```
# include <stdio.h>

typedef struct Pessoa
{
    char nome[64]; // vetor de 64 chars para o nome
    unsigned short int idade;
    char rg[13];
} Pessoa;

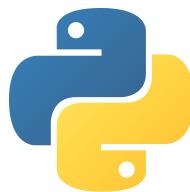
int main()
{
    Pessoa exemplo = {"Felipe", 16, "00.000.000-00"};

    printf("Nome: %s\n", exemplo.nome);
    printf("Idade: %hu\n", exemplo.idade);
    printf("RG: %s\n", exemplo.rg);

    getchar();
    return 0;
}
```



Dennis Ritchie (1941 -2011)



Linguagem de programação interpretada, multi-paradigma, multi-plataforma, orientada a objetos, imperativa, funcional, procedural, reflectiva e de código aberto.

Criada em 1989/1991 por Guido van Rossum

"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). "

Guido van Rossum





Python - IEEE Spectrum 2016

< 15 de 22 >

Language Rank	Types	Spectrum Ranking
1. C	📱💻⚙️	100.0
2. Java	🌐📱💻	98.1
3. Python	🌐💻	98.0
4. C++	📱💻⚙️	95.9
5. R	💻	87.9
6. C#	🌐📱💻	86.7
7. PHP	🌐	82.8
8. JavaScript	🌐📱	82.2
9. Ruby	🌐💻	74.5
10. Go	🌐💻	71.9

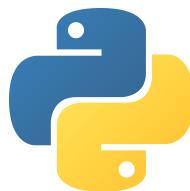


Python - IEEE Spectrum 2017

< 16 de 22 >

Language Rank	Types	Spectrum Ranking
1. Python	🌐💻	100.0
2. C	📱💻⚙️	99.7
3. Java	🌐📱💻	99.5
4. C++	📱💻⚙️	97.1
5. C#	🌐📱💻	87.7
6. R	💻	87.7
7. JavaScript	🌐📱	85.6
8. PHP	🌐	81.2
9. Go	🌐💻	75.1
10. Swift	📱💻	73.7

<https://spectrum.ieee.org/computing/software/the-2017-top-programming-languages>



The Zen of Python, by Tim Peters

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.

Principais influencias:

ABC
ALGOL 68
C
C++
Java
Lisp
Modula-3
Perl

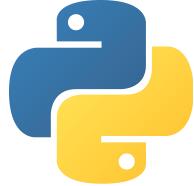
Inspirou:

Boo
Cobra
D
F#
Falcon
Go
Groovy
JavaScript,
Julia
Nim
Ruby
Swift

Dialeto oficial: CPython

Desenvolvido e mantido por:

The Python Fondation - www.python.org



Vantagens e Desvantagens

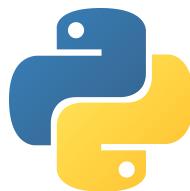
< 18 de 22 >

Vantagens:

- é uma linguagem interpretada
- fácil de aprender
- fácil de usar interativamente
- sintaxe clara, elegante e legível
- fácil testar e modificar componentes
- mais eficiente do que um interpretador clássico
- programa 2x - 10x menores que implementados em C / C++ ou Java
- pode ser facilmente integrada/expandida com C/C++

Desvantagens:

- é uma linguagem interpretada
- gera programas mais lentos que implementados em C / C++ ou Java



Python em programas Cad, GIS e 3D

< 19 de 22 >



Blender



Maya



Rhino 3D



Grasshopper



FreeCad



Revit



ArcGIS



QGIS

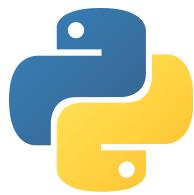


Unit 7: Python



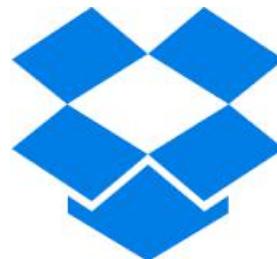
FUSION

Dynamo



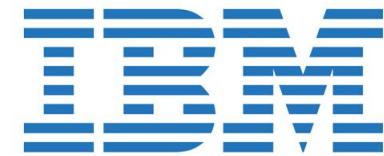
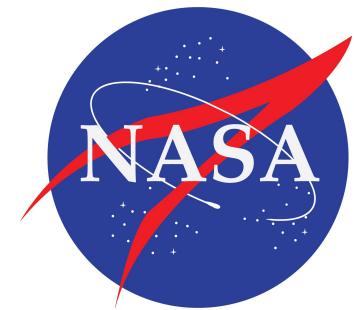
Outras Aplicações

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INDUSTRIAL
LIGHT & MAGIC

A LUCASFILM COMPANY





Instalando o Python

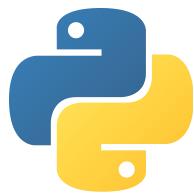
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<https://www.python.org/downloads/>

The screenshot shows the Python Software Foundation website at <https://www.python.org/downloads/>. The main navigation bar includes links for Python, PSF, Docs, PyPI, Jobs, and Community. The header features the Python logo and a search bar. A prominent banner in the center says "Download the latest version for Windows" with two buttons: "Download Python 3.5.0" and "Download Python 2.7.10". A red arrow points from the "Download Python 2.7.10" button to a larger, highlighted yellow button on the right labeled "Download Python 2.7.10". Below the banner, there's a section about the difference between Python 2 and 3, and links for other OSes. A large graphic of parachutes dropping boxes is in the background. A table lists specific releases:

Release version	Release date	Click for more
Python 3.5.0	2015-09-13	Download Release Notes
Python 2.7.10	2015-05-23	Download Release Notes
Python 3.4.3	2015-02-25	Download Release Notes
Python 2.7.9	2014-12-10	Download Release Notes
Python 3.4.2	2014-10-13	Download Release Notes

A red arrow also points from the "Python 2.7.10" entry in the table down to a detailed download row for Python 2.7.10, which includes the release date (2015-05-23), a download link, and a link to the release notes. This row is also highlighted with a red border.



Números e Operações Matemáticas

Python Shell

```
Python Shell
File Edit Shell Debug Options Windows Help
Python 2.7.4 (default, Apr  6 2013, 19:54:46) [MSC v.1500 32 bit (Intel)] on win
32
Type "copyright", "credits" or "license()" for more information.
>>> 3+2
5
>>> 3-2
1
>>> 3*2
6
>>> 3/2
1
>>> 3/2.0
1.5
>>> 3.0/2
1.5
>>> 3./2
1.5
>>> 3.0//2
1.0
>>> 3//2
1
>>> 5/3
1
>>> 5%3
2
>>> 5.0%3
2.0
>>> 3**2
9
>>>
```

- + → soma
- → subtração
- / → divisão (inteira ou real)
- // → divisão inteira
- % → resto (da divisão inteira)
- * → multiplicação
- ** → potenciação