Feimax

Lab 3 Introduction to Python

CAN201 – Introduction to Networking

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Dr. Gordon Boateng

Lab 3

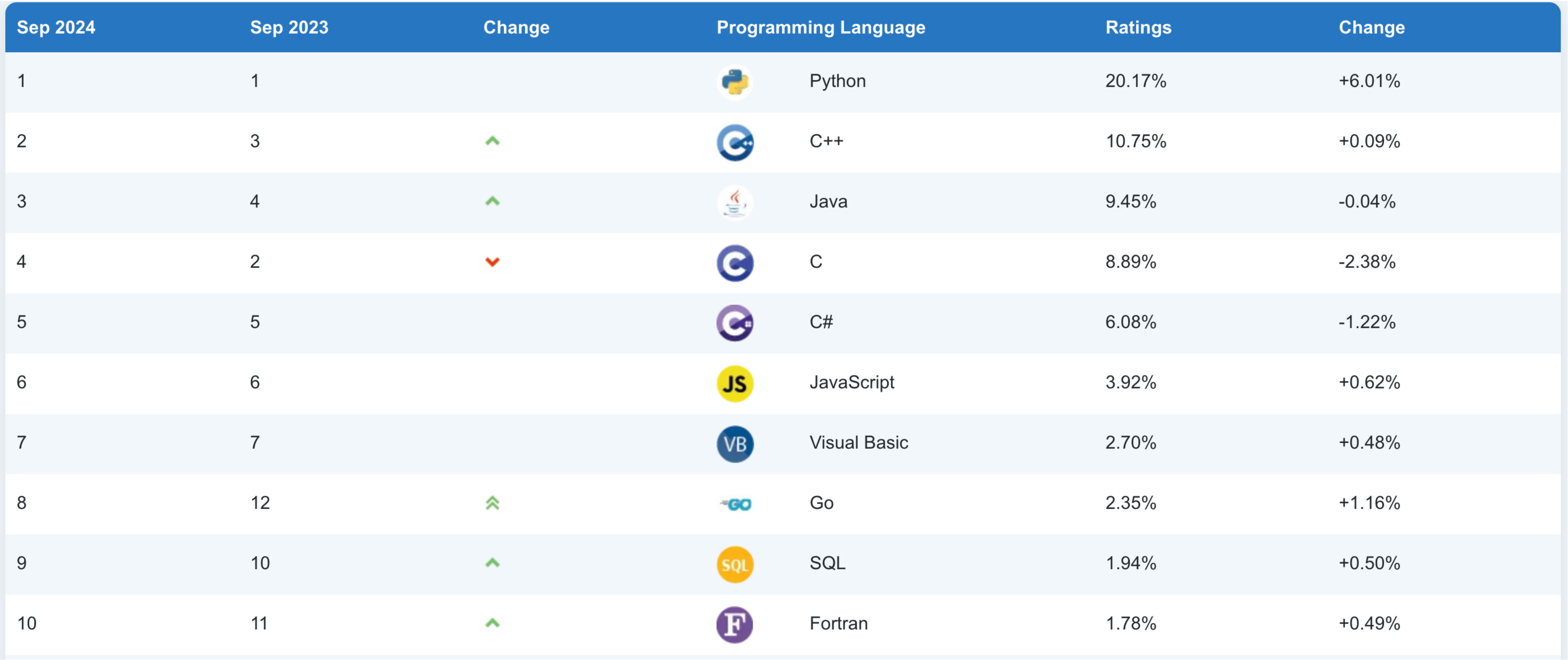
How to use the PyCharm on labs' computer and install python and PyCharm for your computer.

Write a code using raw python and build a virtual Python runtime environment using ***Virtualenv***

Basic Python Syntax:

Variables, if, loop…

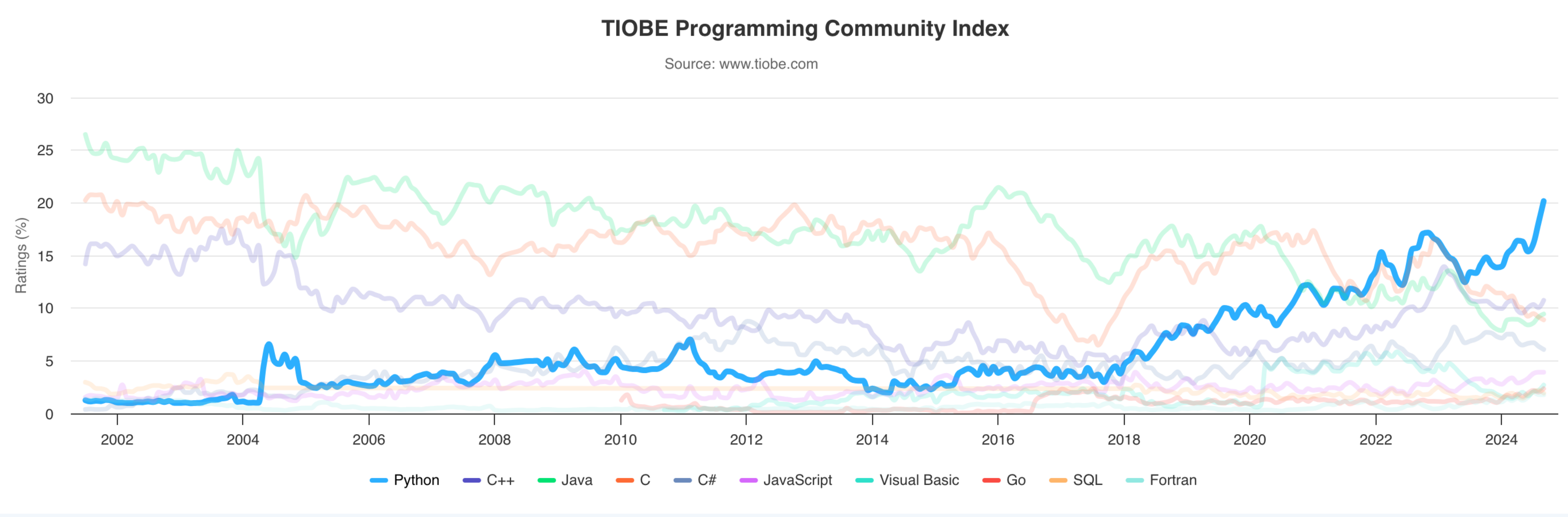
Python



Sep 2024	Sep 2023	Change	Programming Language	Ratings	Change
1	1		Python	20.17%	+6.01%
2	3	↑	C++	10.75%	+0.09%
3	4	↑	Java	9.45%	-0.04%
4	2	↓	C	8.89%	-2.38%
5	5		C#	6.08%	-1.22%
6	6		JavaScript	3.92%	+0.62%
7	7		Visual Basic	2.70%	+0.48%
8	12	⇈	Go	2.35%	+1.16%
9	10	↑	SQL	1.94%	+0.50%
10	11	↑	Fortran	1.78%	+0.49%

TIOBE September 2024

Python



September 2024

Python

- Python is a programming language that lets you work more quickly and integrate your systems more effectively.

Python is powerful... and fast;
plays well with others;
runs everywhere;
is friendly & easy to learn;
is Open.

These are some of the reasons people who use Python would rather not use anything else.

What exactly can Python do?

What can python do?

- **Almost everything**

- AI (+ Tensorflow, PyTorch, Scikit-Learn)
- Data mining (+ Numpy, Pandas, Matlotlib, Jupyter Notebook)
- Scientific Computing (+ Scipy)
- Computer vision (+ OpenCV)
- Web and network (+Django, web.py, flask, socket, requests)
- Web Crawler (+ beautifulsoap, selenium)
- To exe (+ Pyinstaller)
- GUI (+ tkinter, wxPython)
- …

PyTorch

NumPy

Flask

django

OpenCV

TensorFlow

Features

- Simple and rich syntax – list, tuple, dict …
- Without RAM management;
- A rich library of module packages (pypi) - numpy, scipy
- C/C++ connection – glue language
- ……

How to Start

- Difficulty in starting - so many ways to start!
  - Raw Python
  - Virtualenv
  - Anaconda
  - IPython: Interactive shell for python
  - Jupyter: GUI for Ipython

  - Spyder
  - PyCharm
  - VsCode
  - IDLE: idle…

Run Python using different ways

- On Labs Ubuntu
  - RAW Python
  - Virtual environment

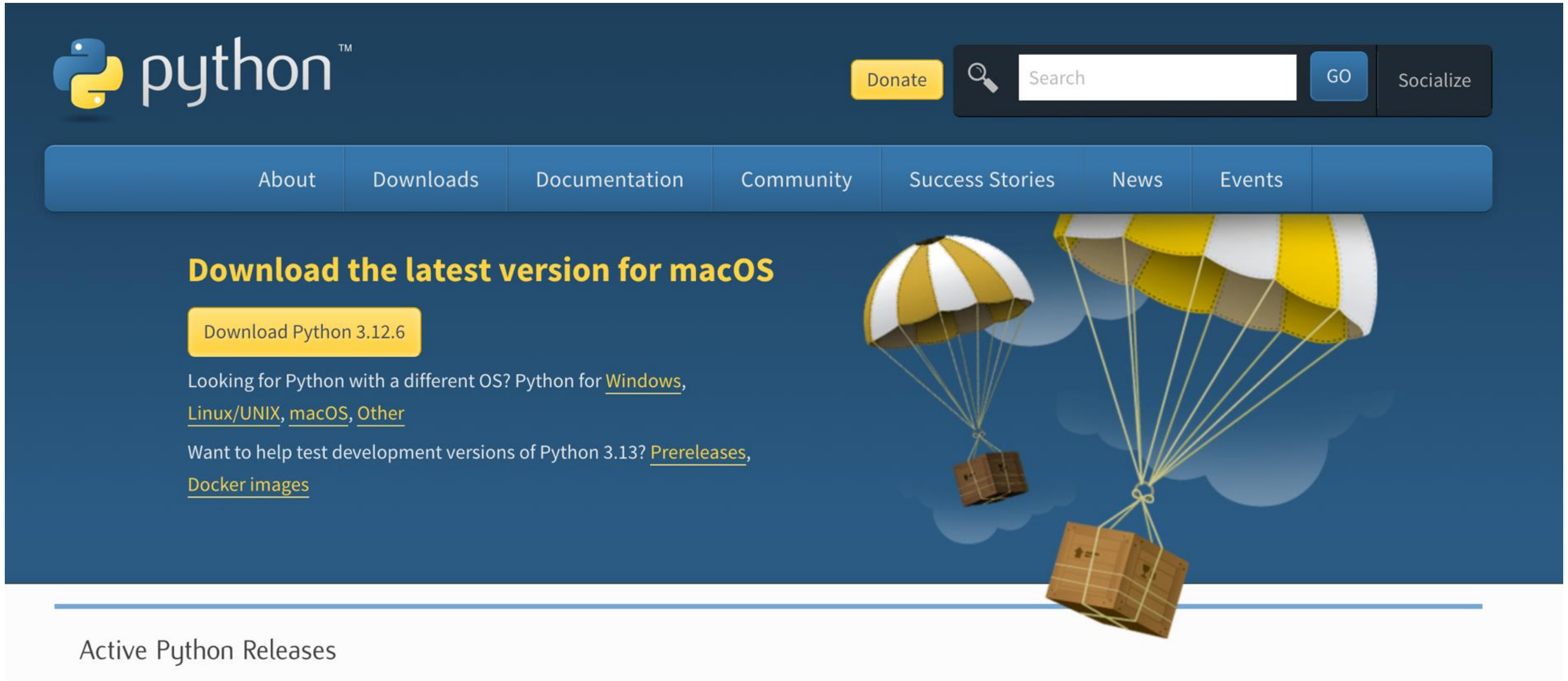
- On your computer(optional, strongly recommended)
  - RAW Python
  - Virtual environment

DEMO

- On Labs Ubuntu
- https://box.xjtlu.edu.cn/f/e04540f9950c4797903c/

How to get Python

- https://www.python.org/downloads/



Download the latest version for macOS

Download Python 3.12.6

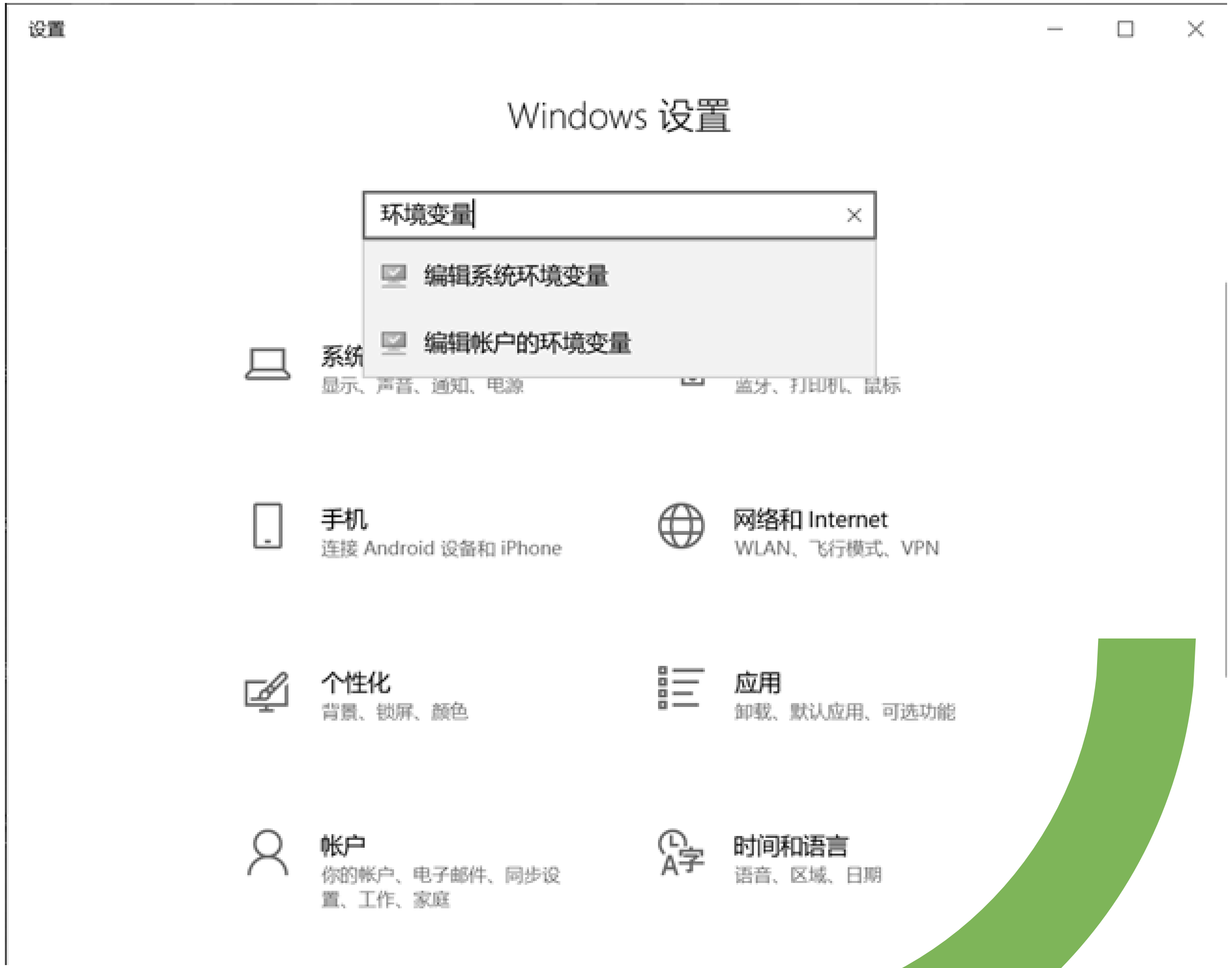
Looking for Python with a different OS? Python for Windows, Linux/UNIX, macOS, Other

Want to help test development versions of Python 3.13? Prereleases, Docker images

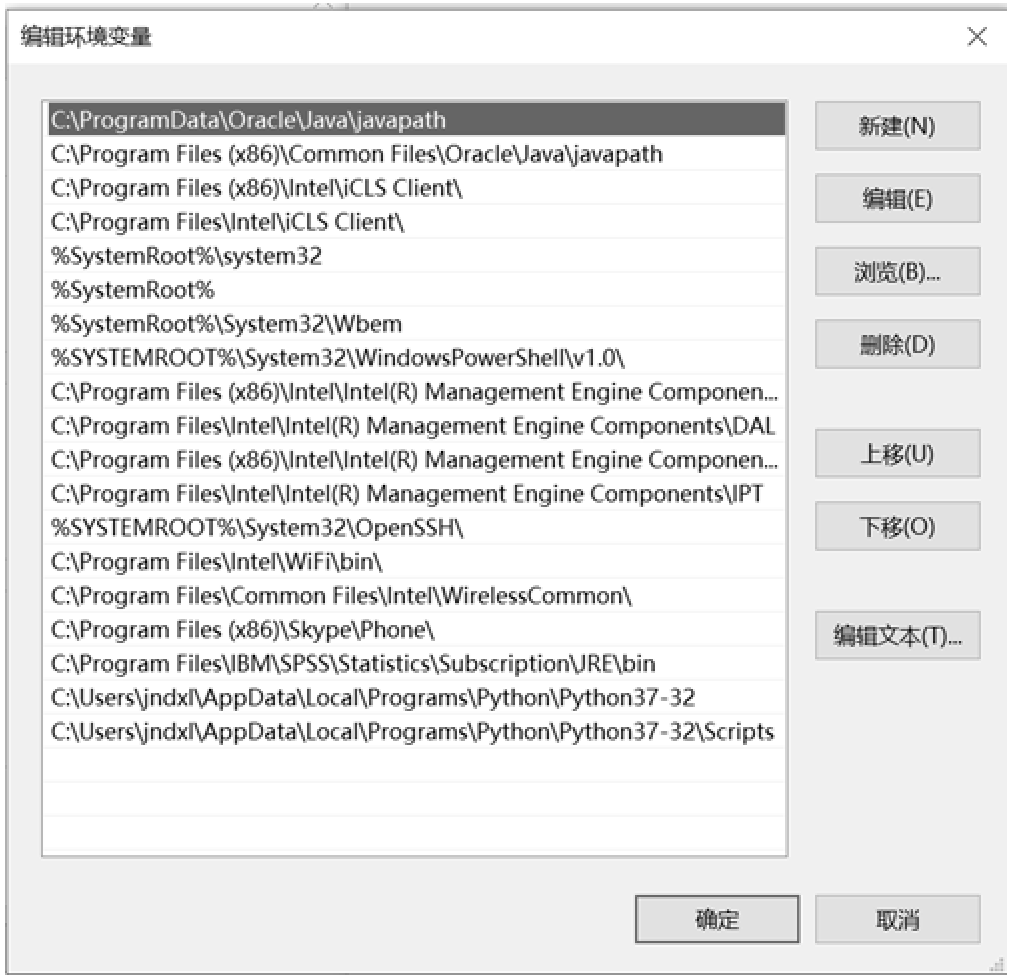
Active Python Releases

Windows

- Press Win key， select the gear icon on the left - Settings
- Search "Edit the system environment variables "
- Select " Edit the system environment variables "
- At the bottom right of the interface, select "Environment Variables"
- Find Path, in the list of Path
- Add the folder of python and pip
- Normally， path of python is
- C:\Users\xxx.xxx\AppData\Local\Programs\Python\Python37
- Path of pip:
- C:\Users\xxx.xxx\AppData\Local\Programs\Python\Python37\Scripts



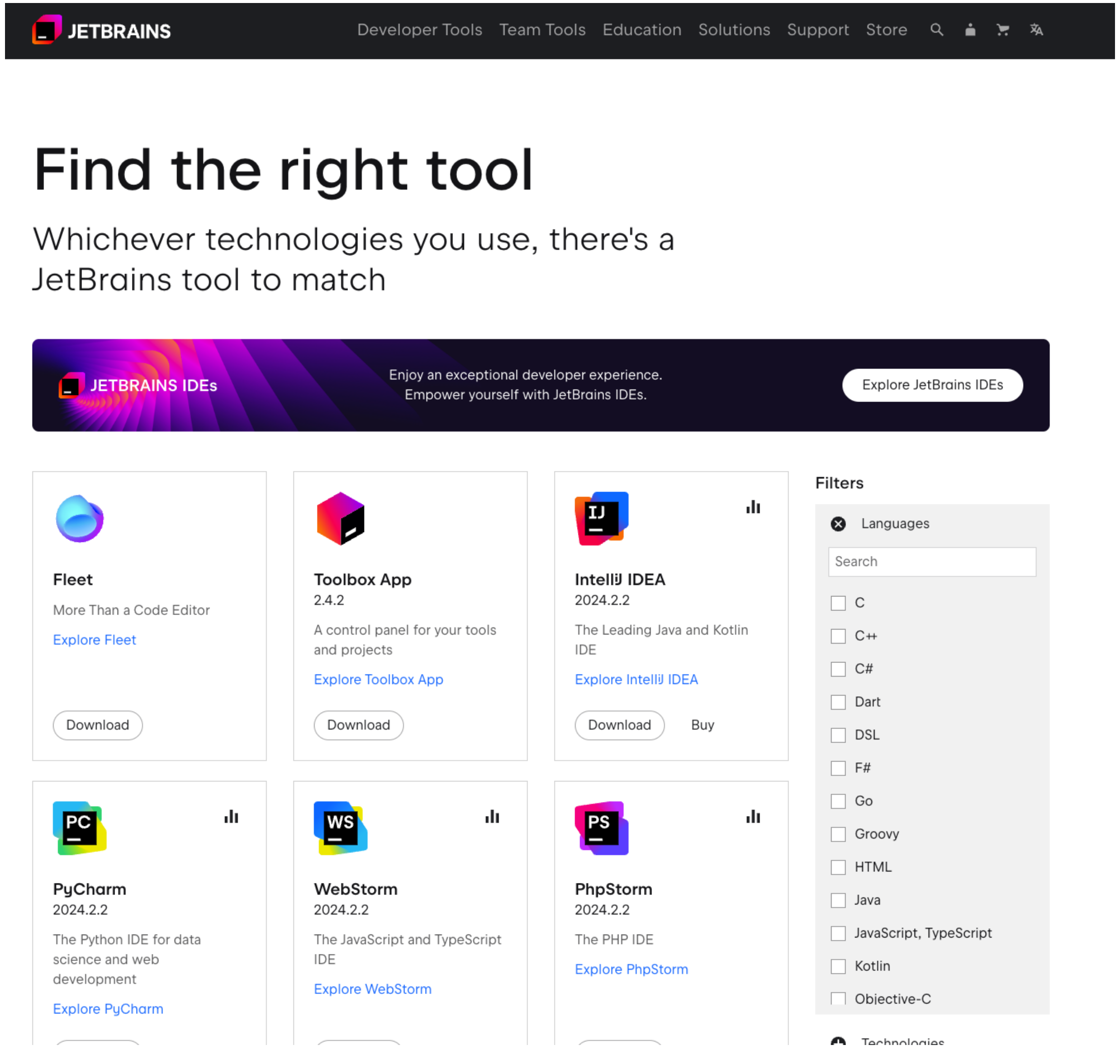
环境变量



```
C:\ProgramData\Oracle\Java\javapath
C:\Program Files (x86)\Common Files\Oracle\Java\javapath
C:\Program Files (x86)\Intel\iCLS Client\
C:\Program Files\Intel\iCLS Client\
%SystemRoot%\system32
%SystemRoot%
%SystemRoot%\System32\Wbem
%SYSTEMROOT%\System32\WindowsPowerShell\v1.0\
C:\Program Files (x86)\Intel\Intel(R) Management Engine Componen...
C:\Program Files\Intel\Intel(R) Management Engine Components\DAL
C:\Program Files (x86)\Intel\Intel(R) Management Engine Componen...
C:\Program Files\Intel\Intel(R) Management Engine Components\IPT
%SYSTEMROOT%\System32\OpenSSH\
C:\Program Files\Intel\WiFi\bin\
C:\Program Files\Common Files\Intel\WirelessCommon\
C:\Program Files (x86)\Skype\Phone\
C:\Program Files\IBM\SPSS\Statistics\Subscription\JRE\bin
C:\Users\jndxl\AppData\Local\Programs\Python\Python37-32
C:\Users\jndxl\AppData\Local\Programs\Python\Python37-32\Scripts
```

How to get PyCharm

- https://www.jetbrains.com/products/



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2024.2.2
The Leading Java and Kotlin IDE

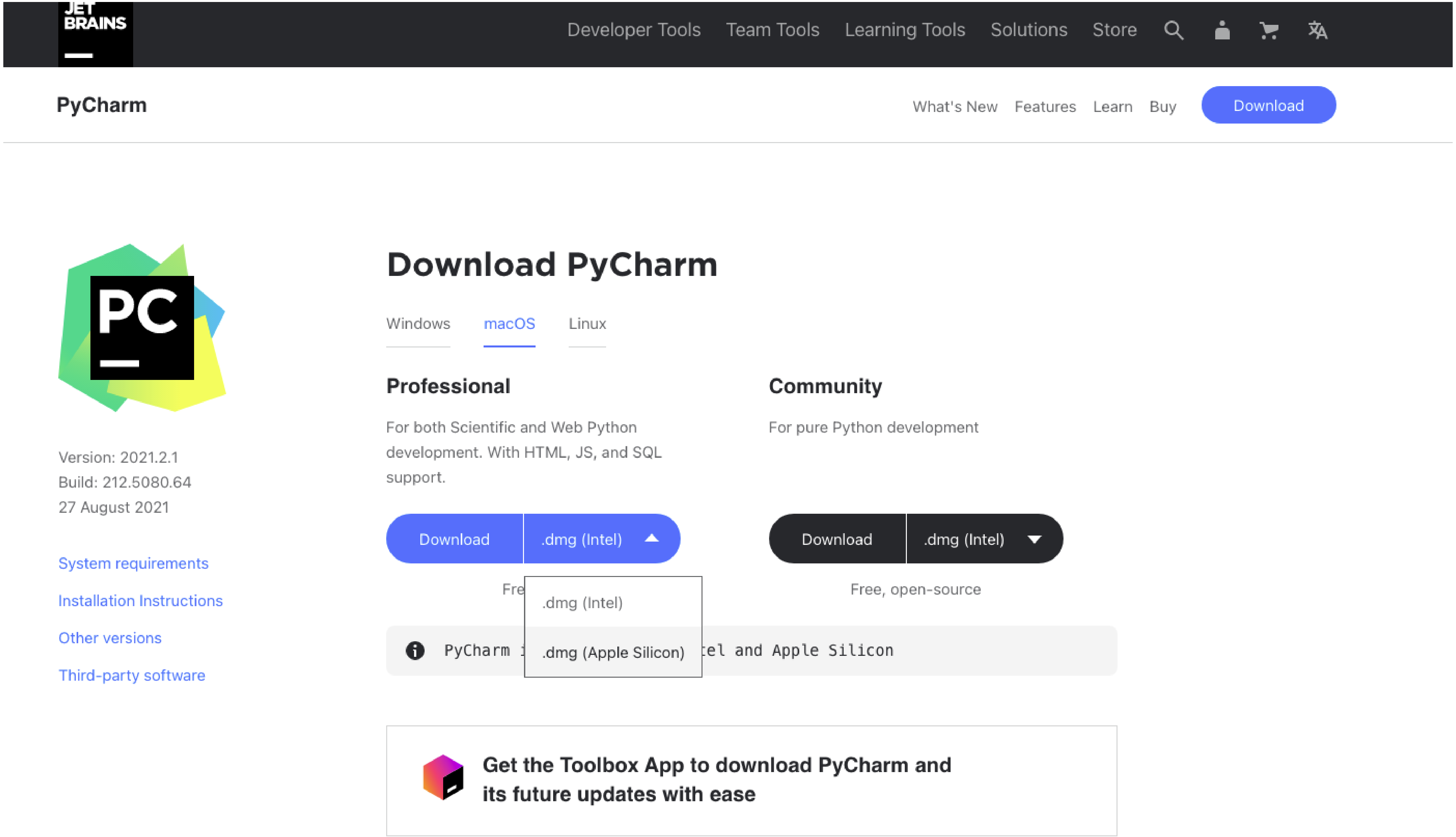
PyCharm
2024.2.2
The Python IDE for data science and web development

WebStorm
2024.2.2
The JavaScript and TypeScript IDE

PhpStorm
2024.2.2
The PHP IDE

Filters

□ C
□ C++
□ C#
□ Dart
□ DSL
□ F#
□ Go
□ Groovy
□ HTML
□ Java
□ JavaScript, TypeScript
□ Kotlin
□ Objective-C



Download PyCharm

Version: 2021.2.1
Build: 212.5080.64
27 August 2021

Professional

For both Scientific and Web Python development. With HTML, JS, and SQL support.

Community

For pure Python development

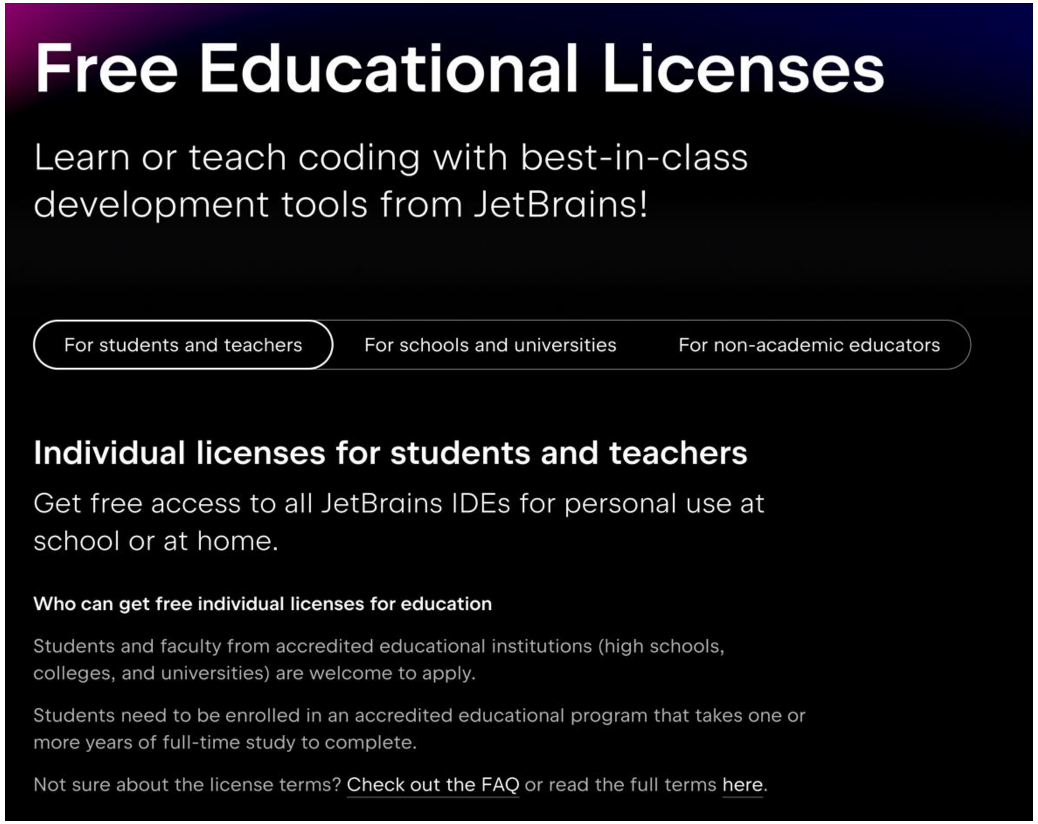
Free, open-source

`PyCharm i` `tel and Apple Silicon`

Get the Toolbox App to download PyCharm and its future updates with ease

Student jetbrains account

- https://www.jetbrains.com/community/education/#students



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How to start to learn computer language?

1. Install a beautiful IDE
2. Variables: how to define? Type?
3. How to print “hello world”?
4. How to input a number and a string? Know 1 and ‘1’ are different.
5. Know “if” conditional statement.
6. Know “for” loop and “while” statements.
7. Use functions
8. Try to adapt to the non-GUI environment.
9. How to deal with a large number of data? (Array and other data structure)
10. OOP if the language supports.

……

Basic Python Syntax

- Variables: numbers, strings, list
- Identifier: naming rule, python keywords
- Important syntax 1: line, indentation
- Flow Control: if…elif…else; ternary operator; for and while loop

Variables

- Variables in Python can be used without declaration.
  - Simple, fast
  - Ambiguity
- Get type of a variable
  - `type(v)`
  - `isinstance(v, type/class…)`

Variables - String

- Many ways to have a string
  - `'foo', "bar", '''foobar'''`
- String prefix
  - b: byte array
  - r: raw (avoid char escaping)
  - f: formatted
  - u: unicode
- Print string
  - `print()`
  - `pprint()   # a pretty printer`

Variables - Numbers

- int:
  - Binary, Decimal, Octal, Hexadecimal:
    - `int('1001', n) # make a base "n" number to a decimal number`
    - `# bin(d), oct(d), hex(d) convert a decimal number to b / o / x`
  - Rounding
    - `# int(f), round(f), math.ceil(f), math.floor(f)`
- float:
  - `float('0.15')`
- Variables precision
  - Try ***numpy***

Variables

DEMO

https://box.xjtlu.edu.cn/f/c4cdd1946dd64a88a03f/

"Variables" - List

- List: a super array
- Different type for each item!
- Easily nest

```
['a', 'ny', item, [1,2,3], [True, False, {'a': 1}]]
```

"Variables" - List

- Define:
  - `l = []`
- Sort
  - `l.sort([key=func])`
  - unique type / multiple type
- Index
  - `l.count()`
  - `l.index(item, [start, [, end]])`
- An item exist
  - `item in l  # a boolean value`

"Variables" - List

- Put an item
  - `l.append(item)`
  - `l.extend(another_list)`
- Take away an item
  - `l.pop(postion)  # get and remove this item`

List

DEMO

https://box.xjtlu.edu.cn/f/0bef8e2726c948b5bd42/

Identifier

- Definition:
  - identifier ::= (letter | "_") (letter | degit | "_")*
  - letter ::= "a" … "z" | "A"…"Z"
  - digit ::= "0"…"9"

BNF: Backus-Naur form

https://docs.python.org/3/reference/

- Name of:
  - variables, functions, class, python keywords

Coding Style - Name

- Name your classes and functions consistently; the convention is to use UpperCamelCase for classes and lowercase_with_underscores for functions and methods.
- Required by PEP-8: https://www.python.org/dev/peps/pep-0008/

  (Python Enhancement Proposals)

Identifier

- Python keywords (33):
  - ['False', 'None', 'True', 'and', 'as', 'assert', 'break', 'class', 'continue', 'def', 'del', 'elif', 'else', 'except', 'finally', 'for', 'from', 'global', 'if', 'import', 'in', 'is', 'lambda', 'nonlocal', 'not', 'or', 'pass', 'raise', 'return', 'try', 'while', 'with', 'yield']
- How to know python keywords

```
import keyword
print(keyword.kwlist)
```

Important syntax 1

- Line:
  - Explicit line joining: \
  - Implicit line joining: parentheses (), square brackets [] or curly braces {} can be split over more than one physical line without using backslashes
- Blank lines: spaces, tables, a comment (only)
- `pass #  not a blank line`

Important syntax 1

- Indentation:
  - Leading spaces and ~~tabs~~
  - Indentation is used to represent program blocks / scope
- Coding style:
  - Use 4-space indentation, and no tabs.
  - Wrap lines so that they don’t exceed 79 characters

Flow Control - if

- `if …`
- `if … else …`
- `if … elif … elif … else …`
- `Condition: support a < x <= c`
- ternary operator: **`z = x if condition else y`**
- No select or switch in Python

if

DEMO

https://box.xjtlu.edu.cn/f/e54e758f65a94334b688/

Flow Control - loop

-
  ```
  for item in generator:
      do_sth()
  ```

-
  ```
  while condition:
      do_sth()
  ```
- `break` and `continue`: the soul of loops
- No `do... while`: how to simulate?

loop

DEMO

https://box.xjtlu.edu.cn/f/dd8a8f9beaaa4737ad44/

Thanks ”