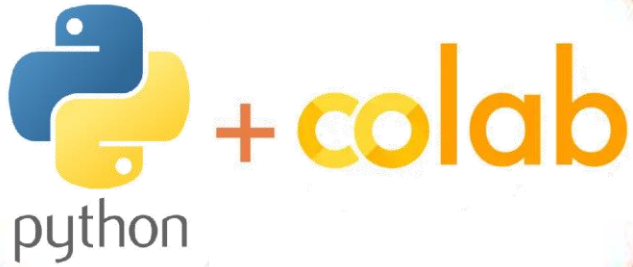

UDLA
UNIVERSIDAD DE LAS AMÉRICAS

Taller de Introducción a Python con Google Colab

FACULTAD DE INGENIERÍA Y NEGOCIOS

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Octubre - 2022

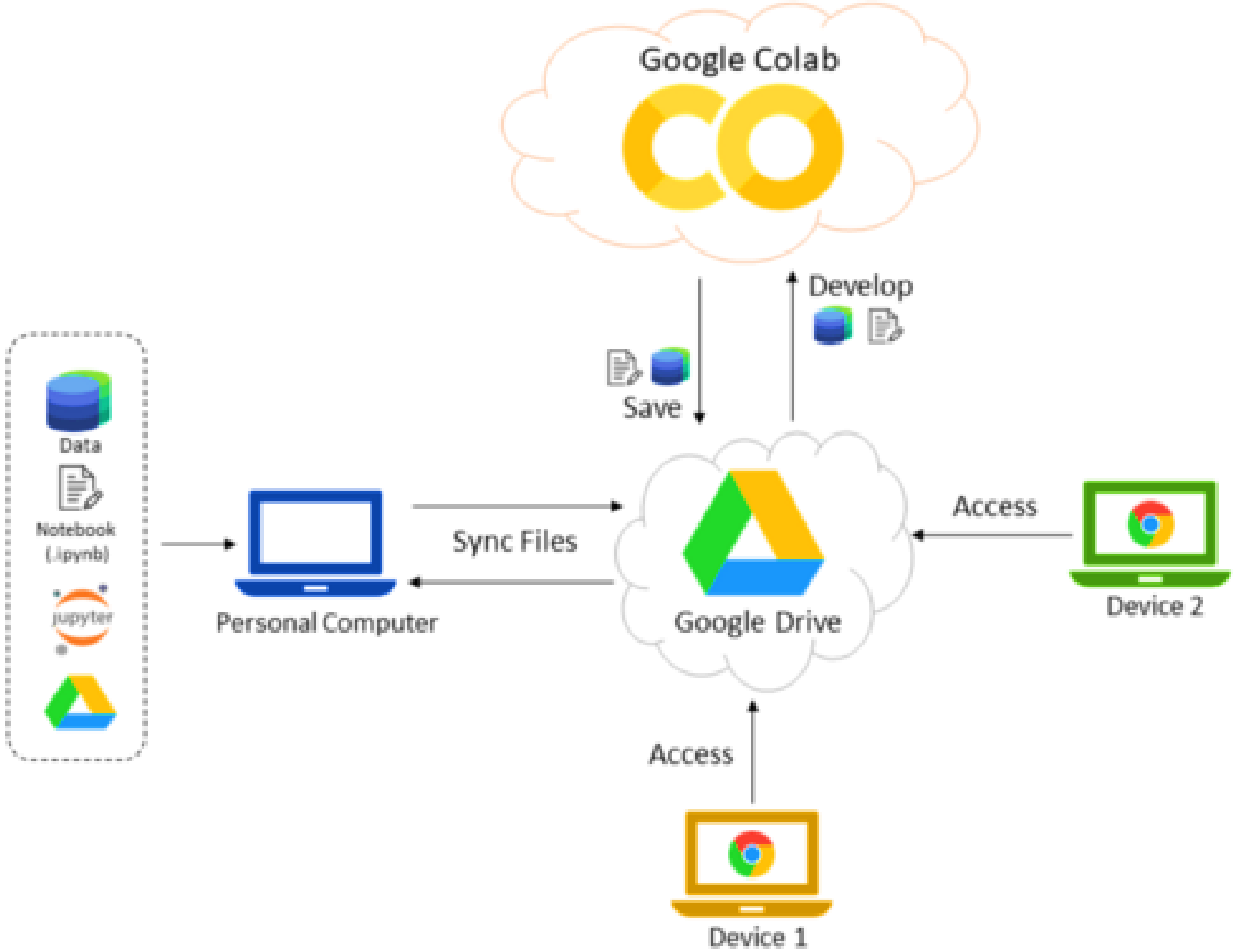
¿Qué es Colaboratory?

Es un servicio o libreta en línea gratuito, conectado con tu cuenta de Google, que te permite programar en python y usar CPU/GPU de una computadora en la nube.

Las ventajas que tiene son :

- No requiere configuración.
- Acceso a GPUs sin coste adicional.
- Permite compartir contenido fácilmente.
- Colab puede facilitar tu trabajo, ya seas **estudiante**, **científico de datos** o **investigador de IA**.

Google Colab Arquitectura

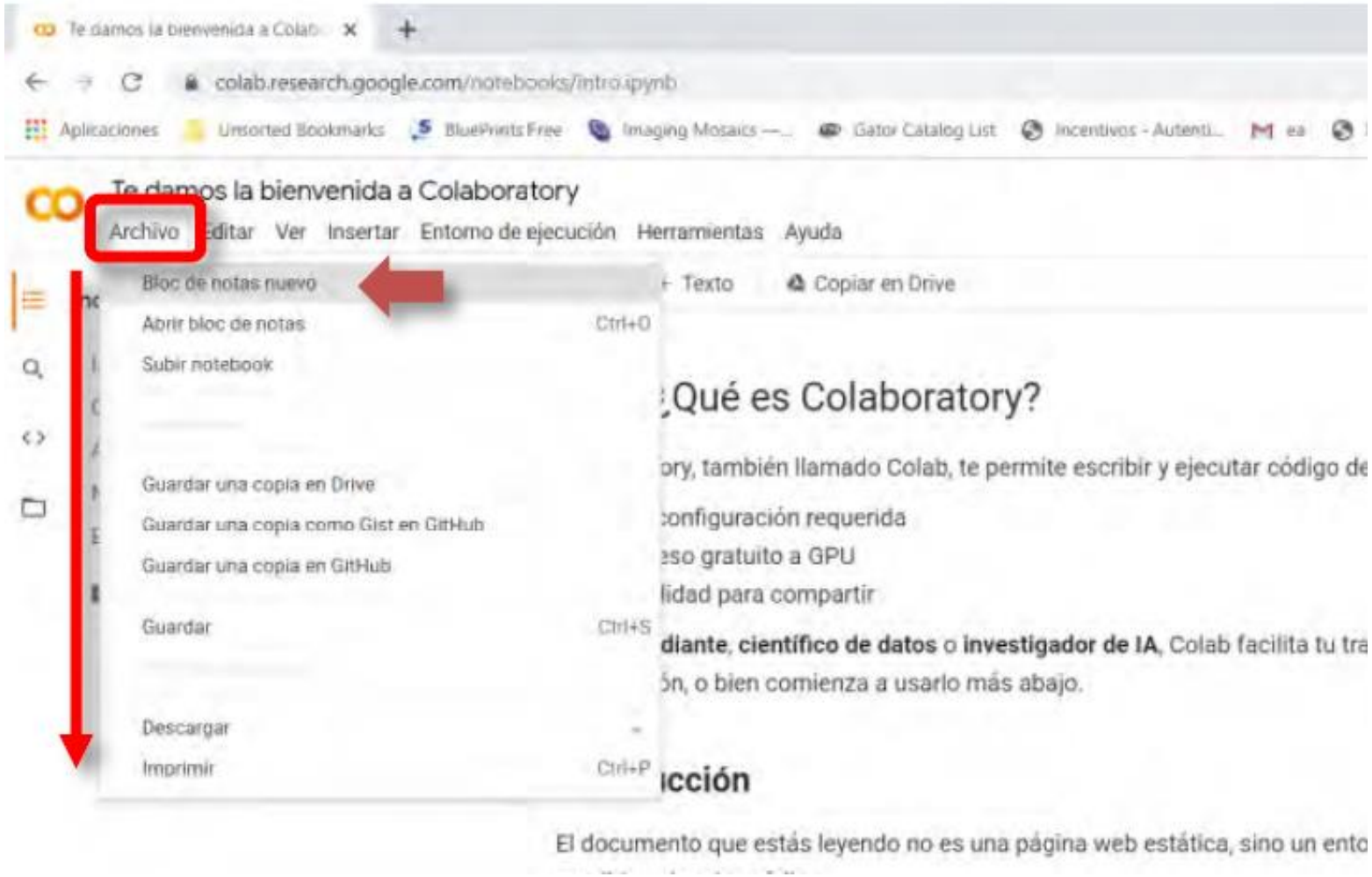


Para ejecución en la nube

- Google Colab
- Binder
- Kaggle notebooks
- DataLore
- Microsoft Azure ML

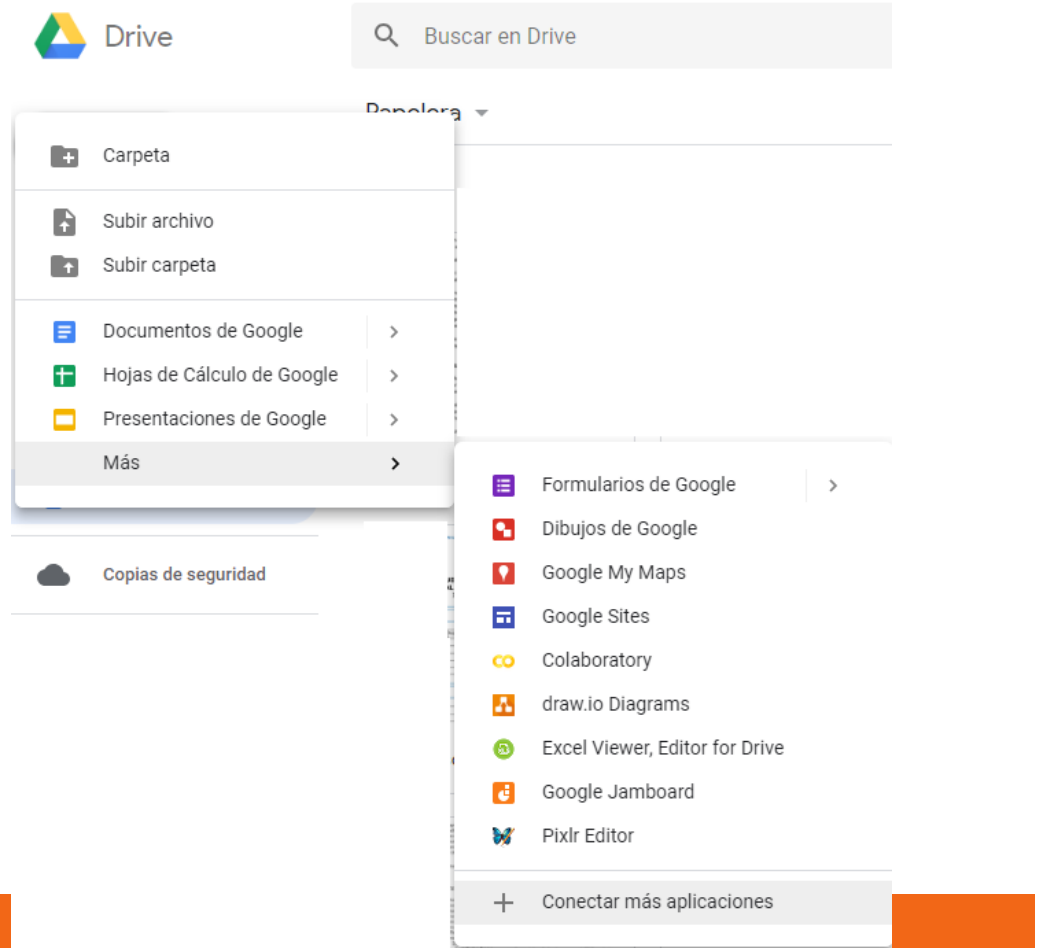
Acceso a Google Colab

Ir al sitio de “Google Colab” (https://colab.research.google.com/), ir a “Archivo” (arriba a la izquierda) y elegir la opción “Block de notas nuevo”



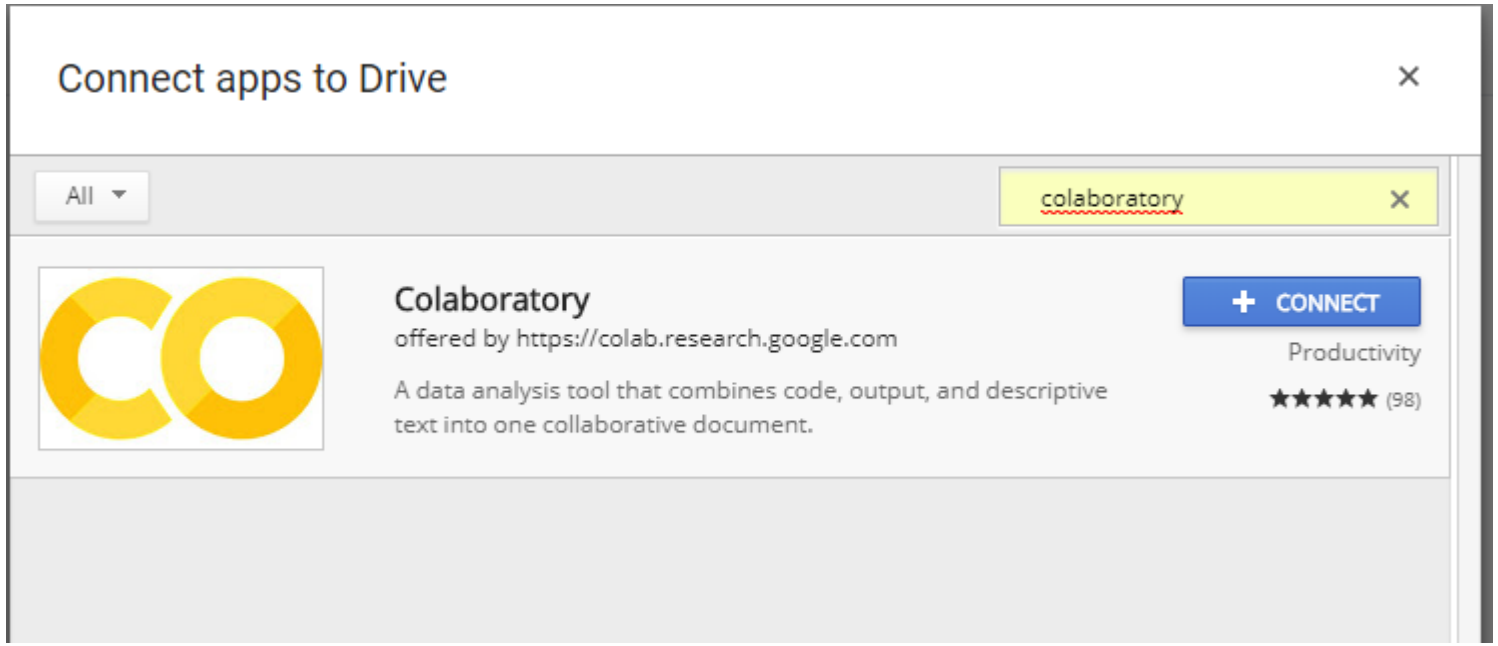
Acceso a Google Colab

- Google Colab es una aplicación como cualquier otra aplicación (Google Docs, Sheets, etc.) que desee utilizar en Google Drive. Para instalarlo, has clic en el botón + Nuevo -> Más-> Conectar más aplicaciones, como se muestra a continuación. En mi caso ya tengo instalado previamente Google Colab, por eso vas a ver el icono en la figura.



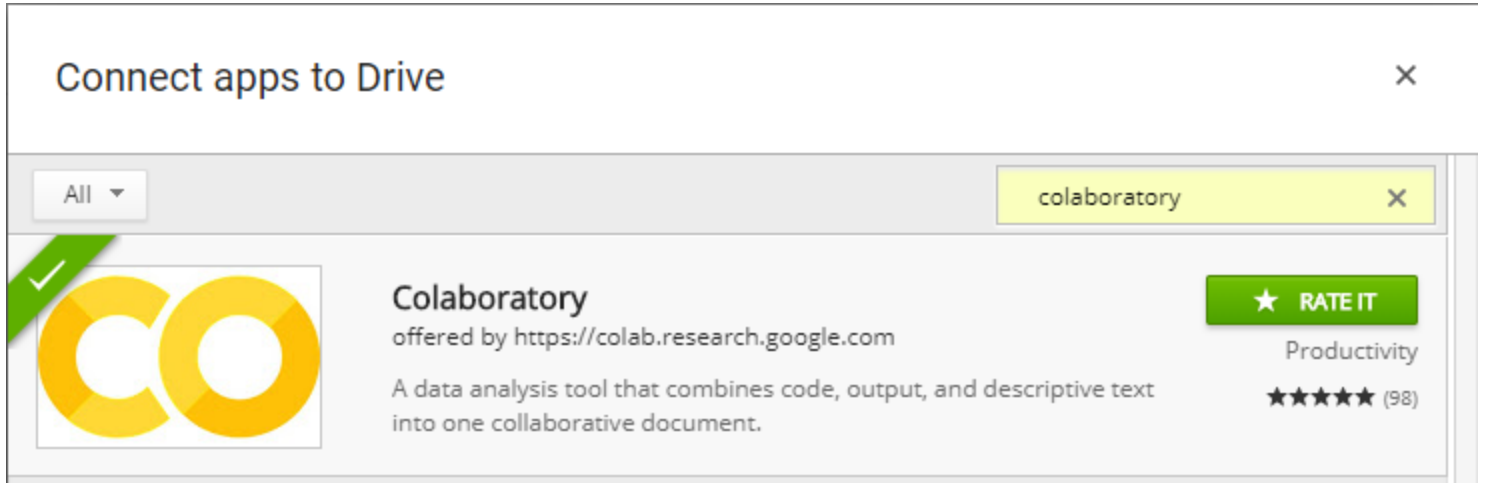
Acceso a Google Colab

- A partir de ahí, se abrirá una ventana. Todo lo que debes hacer es escribir en la pestaña dela esquina superior derecha “Colaboratory” y aparecerá la aplicación.



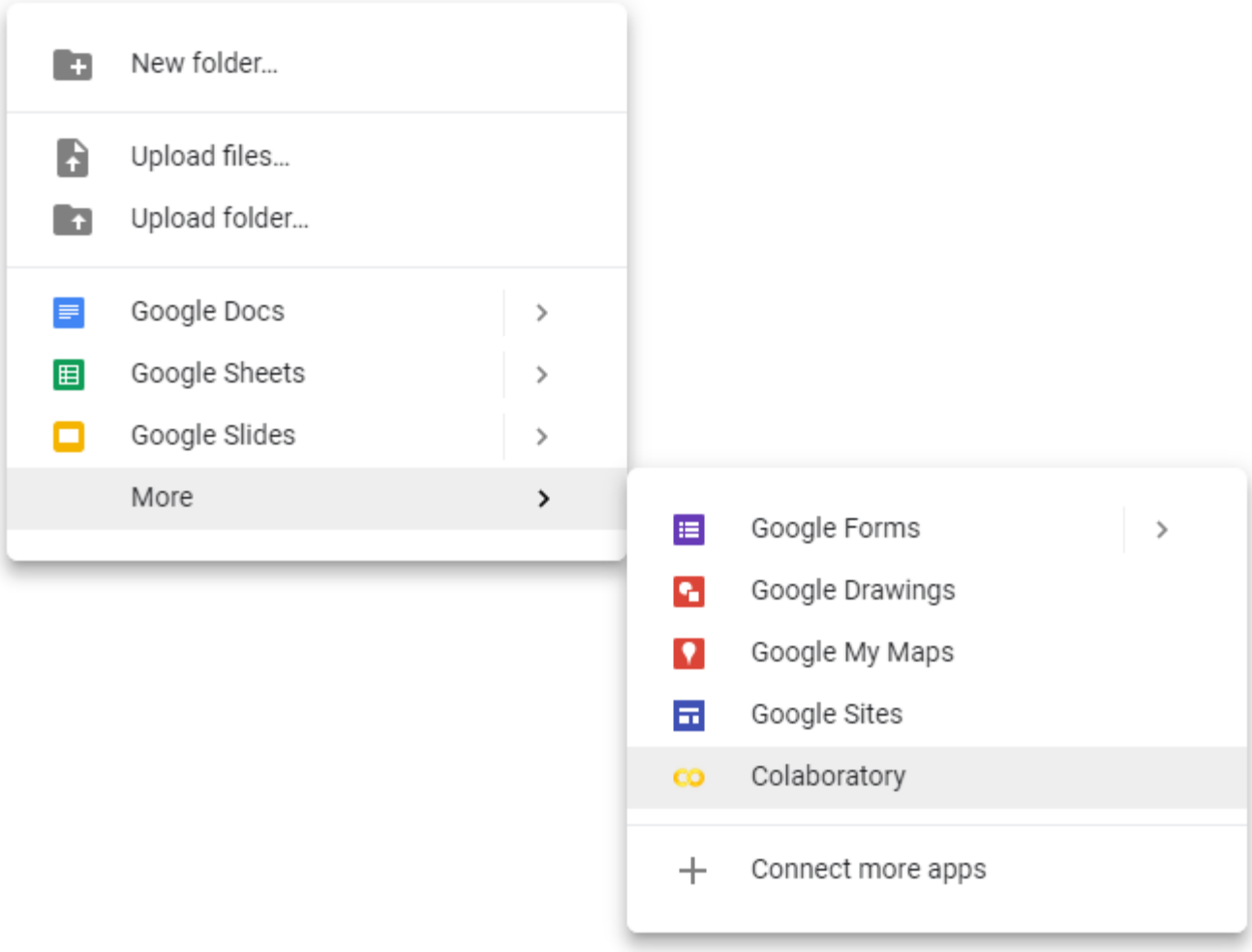
Acceso a Google Colab

- Ahora, has clic en el botón azul de conectar. Una vez instalada, aparecerá un mensaje indicando si permite que la aplicación abra archivos que puede abrir, has clic en Sí. Una vez que este paso se haya completado con éxito, debería verse el logotipo de Google Colab con un visto verde.



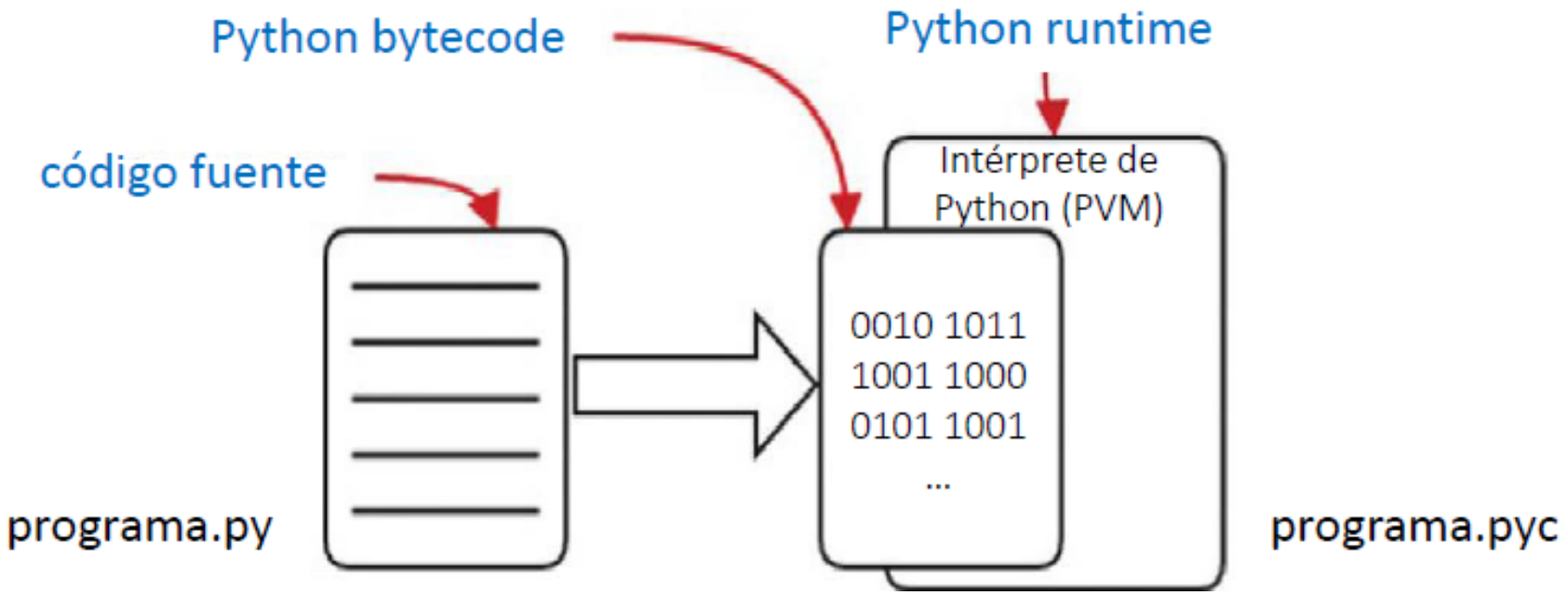
Acceso a Google Colab

- Ahora, has clic en el botón + Nuevo -> Colaboratory



Esto creará un cuaderno en tu unidad de Google Drivey abrirá una nueva pestaña para el cuaderno.

- Python es un lenguaje de programación multiparadigma: combina los paradigmas procedurales, orientado a objetos y funcional.
- Es un lenguaje interpretado: el *intérprete de Python* lee y ejecuta las instrucciones en el programa de usuario.
- El intérprete de Python compila a Python bytecode, un código multiplataforma que ejecuta en una Python Virtual Machine (PVM).



Python Data Science Handbook

Python Data Science Handbook

Python Data Science Handbook

Jake VanderPlas

https://jakevdp.github.io/PythonDataScienceHandbook/

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Benefits of Learning Python

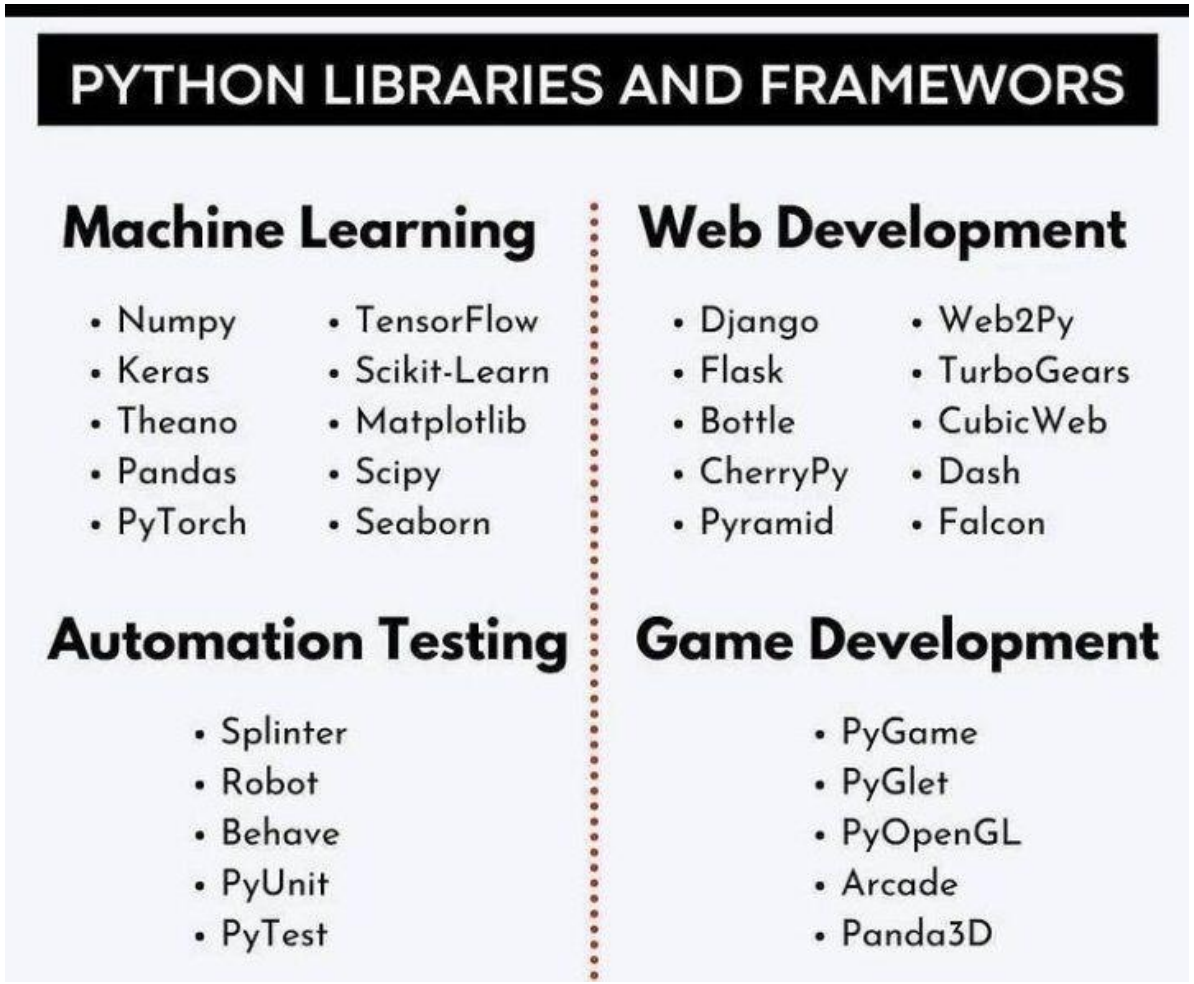
- Data science
- Machine Learning
- Deep Learning
- Web development
- Predictive Analytics
- Advanced Analytics

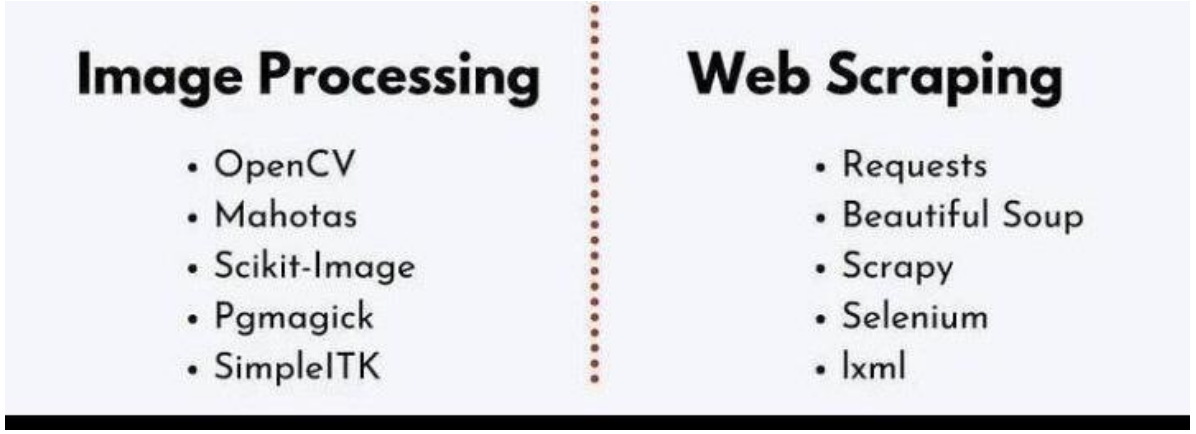
- Finance and Trading
- System automation
- Computer graphics
- Game development
- Scientific Research
- Security Testing

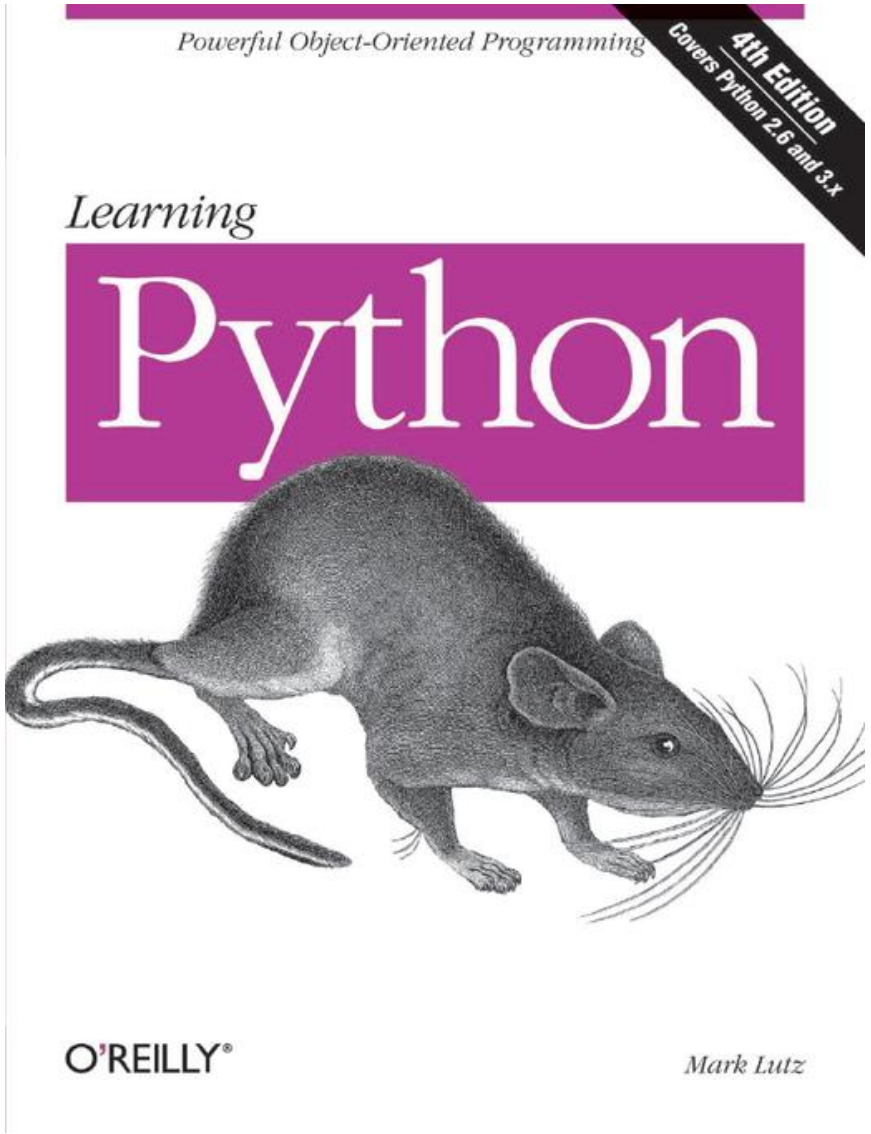
@pythonclcoding @clcoding

Python Coding

Python libraries and frameworks

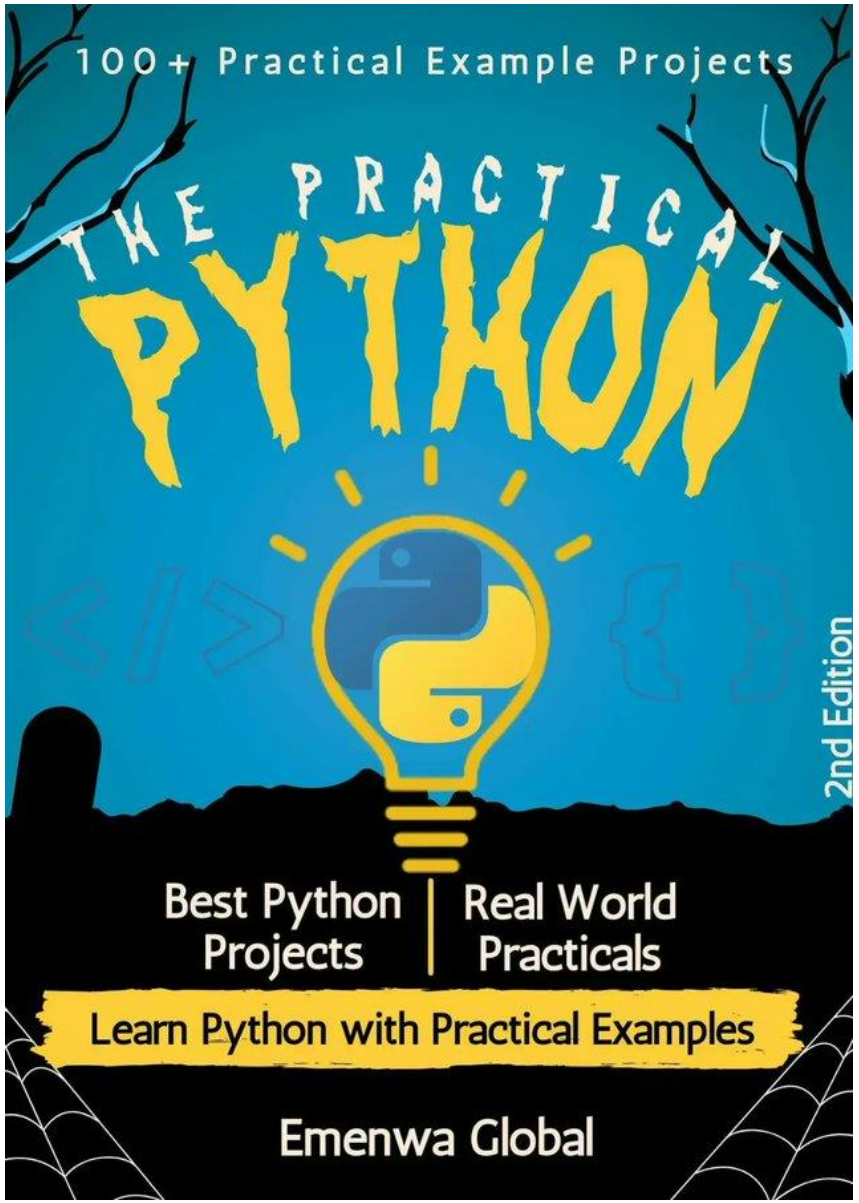






https://www.dropbox.com/s/3gxyaaz362pb4no/Learning_Python.pdf?dl=0

The Practical Python



https://www.goodreads.com/book/show/59823784-the-practical-python

https://python.plainenglish.io/85-data-science-projects-c03c8750599e

Top Python libraries a Data Scientist need to know

01	Pandas	Seaborn	06
02	NumPy	Scikit-Learn	07
03	SciPy	TensorFlow	08
04	Scrapy	Scikit-Image	09
05	Matplotlib	Librosa	10

Machine Learning Algorithms Explained With Python

https://www.theinsaneapp.com/2021/11/machine-learning-algorithms-for-beginners.html

Python 3 Cheat Sheet

Latest version on :
https://perso.limsi.fr/pointal/python:memento

Base Types

integer, float, boolean, string, bytes

```
int 783  0 -192  0b010  0o642  0xF3
                 zero  binary  octal  hexa
float 9.23  0.0  -1.7e-6
                      ×10^-6
bool True  False
str "One\nTwo"
      escaped new line
    'I\'m'
      escaped '
    """X\tY\tZ
    1\t2\t3"""
      escaped tab
bytes b"toto\xfe\775"
          hexadecimal  octal
```

Multiline string:

⇵ immutables

Container Types

- **ordered sequences**, fast index access, repeatable values

```
list [1,5,9]   ["x",11,8.9]   ["mot"]   []
tuple (1,5,9)   11,"y",7.4    ("mot",)  ()
```

Non modifiable values (immutables) — ⇵ expression with only comas → tuple

```
str bytes   (ordered sequences of chars / bytes)
                                        b""
```

- **key containers**, no *a priori* order, fast key access, each key is unique

```
dictionary  dict {"key":"value"}   dict(a=3,b=4,k="v")   {}
(key/value associations)  {1:"one",3:"three",2:"two",3.14:"π"}
collection  set {"key1","key2"}   {1,9,3,0}   set()
⇵ keys=hashable values (base types, immutables…)   frozenset immutable set   empty
```

Identifiers

for variables, functions, modules, classes… names

a…zA…Z_ followed by a…zA…Z_0…9

- diacritics allowed but should be avoided
- language keywords forbidden
- lower/UPPER case discrimination

```
☺ a toto x7 y_max BigOne
☹ 8y and for
```

Variables assignment

```
=
```

⇵ assignment ⇔ **binding** of a *name* with a *value*

1) *evaluation of right side expression value*
2) *assignment in order with left side names*

```
x=1.2+8+sin(y)
a=b=c=0          assignment to same value
y,z,r=9.2,-7.6,0 multiple assignments
a,b=b,a          values swap
a,*b=seq         unpacking of sequence in
*a,b=seq         item and list
x+=3             increment ⇔ x=x+3
x-=2             decrement ⇔ x=x-2
x=None           « undefined » constant value
del x            remove name x
```

and *= /= %= …

Conversions

```
type(expression)
int("15") → 15
int("3f",16) → 63          can specify integer number base in 2nd parameter
int(15.56) → 15            truncate decimal part
float("-11.24e8") → -1124000000.0
round(15.56,1)→15.6        rounding to 1 decimal (0 decimal → integer number)
bool(x)  False for null x, empty container x , None or False x ; True for other x
str(x)→ "…"   representation string of x for display (cf. formatting on the back)
chr(64)→'@'  ord('@')→64   code ↔ char
repr(x)→ "…"  literal representation string of x
bytes([72,9,64]) → b'H\t@'
list("abc") → ['a','b','c']
dict([(3,"three"),(1,"one")]) → {1:'one',3:'three'}
set(["one","two"]) → {'one','two'}
separator str and sequence of str → assembled str
  ':'.join(['toto','12','pswd']) → 'toto:12:pswd'
str splitted on whitespaces → list of str
  "words with  spaces".split() → ['words','with','spaces']
str splitted on separator str → list of str
  "1,4,8,2".split(",") → ['1','4','8','2']
sequence of one type → list of another type (via list comprehension)
  [int(x) for x in ('1','29','-3')] → [1,29,-3]
```

Sequence Containers Indexing

for lists, tuples, strings, bytes…

negative index	-5	-4	-3	-2	-1
positive index	0	1	2	3	4
lst=[	10,	20,	30,	40,	50]
positive slice	0	1	2	3	4	5
negative slice	-5	-4	-3	-2	-1	

Items count

```
len(lst)→5
```

⇵ index from 0 (here from 0 to 4)

Individual access to **items** via `lst[index]`

```
lst[0]→10   ⇒ first one      lst[1]→20
lst[-1]→50  ⇒ last one       lst[-2]→40
```

On mutable sequences (list), remove with `del lst[3]` *and modify with assignment*

```
lst[4]=25
```

Access to **sub-sequences** via `lst[start slice:end slice:step]`

```
lst[:-1]→[10,20,30,40]   lst[::-1]→[50,40,30,20,10]   lst[1:3]→[20,30]   lst[:3]→[10,20,30]
lst[1:-1]→[20,30,40]     lst[::-2]→[50,30,10]         lst[-3:-1]→[30,40] lst[3:]→[40,50]
lst[::2]→[10,30,50]      lst[:]→[10,20,30,40,50] shallow copy of sequence
```

Missing slice indication → from start / up to end.
On mutable sequences (list), remove with `del lst[3:5]` *and modify with assignment* `lst[1:4]=[15,25]`

Boolean Logic

Comparisons : `< > <= >= == !=` (boolean results) ≤ ≥ = ≠

`a and b` logical and — *both simultaneously*

`a or b` logical or — *one or other or both*

⇵ pitfall : `and` *and* `or` *return value of* `a` *or of* `b` *(under shortcut evaluation).*
⇒ *ensure that* `a` *and* `b` *are booleans.*

`not a` logical not

`True` `False` — True and False constants

Statements Blocks

parent statement :
  statement block 1…
parent statement :
  statement block2…
next statement after block 1

indentation !

⇵ configure editor to insert 4 spaces in place of an indentation tab.

Modules/Names Imports

module `truc` ⇔ *file* `truc.py`

```
from monmod import nom1,nom2 as fct
```

→ direct access to names, renaming with `as`

```
import monmod
```

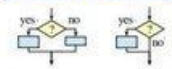
→ access via `monmod.nom1` …

⇵ modules and packages searched in *python path* (cf `sys.path`)

Conditional Statement

statement block executed only if a condition is true

```
if logical condition :
    statements block
```



Can go with several *elif*… and only one final *else*. Only the block of first true condition is executed.

```
if age<=18:
    state="Kid"
elif age>65:
    state="Retired"
else:
    state="Active"
```

⇵ with a var `x`:

```
if bool(x)==True:  ⇔ if x:
if bool(x)==False: ⇔ if not x:
```

Maths

⇵ *floating numbers… approximated values*

Operators: `+ - * / // % **`
Priority (…) × ÷ integer ÷ ÷ remainder

`@` → matrix × *python3.5+numpy*

```
(1+5.3)*2→12.6
abs(-3.2)→3.2
round(3.57,1)→3.6
pow(4,3)→64.0
```

⇵ *usual order of operations*

angles in radians

```
from math import sin,pi…
sin(pi/4)→0.707…
cos(2*pi/3)→-0.4999…
sqrt(81)→9.0   ✓
log(e**2)→2.0
ceil(12.5)→13
floor(12.5)→12
```

modules `math`, `statistics`, `random`, `decimal`, `fractions`, `numpy`, etc. (cf. doc)

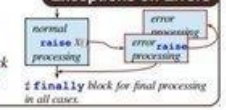
Exceptions on Errors

Signaling an error:

```
raise ExcClass(…)
```

Errors processing:

```
try:
    normal processing block
except Exception as e:
    error processing block
```



⇵ `finally` *block for final processing in all cases.*