Introducción a Python

CodeLab

29/11/2024

FAQ

Frequently Asked Questions

¿DE QUÉ VA A TRATAR?

Programación

Python

¿DE QUÉ NO VA A TRATAR?

Otras librerías*

Uso de frameworks

Inteligencia Artificial

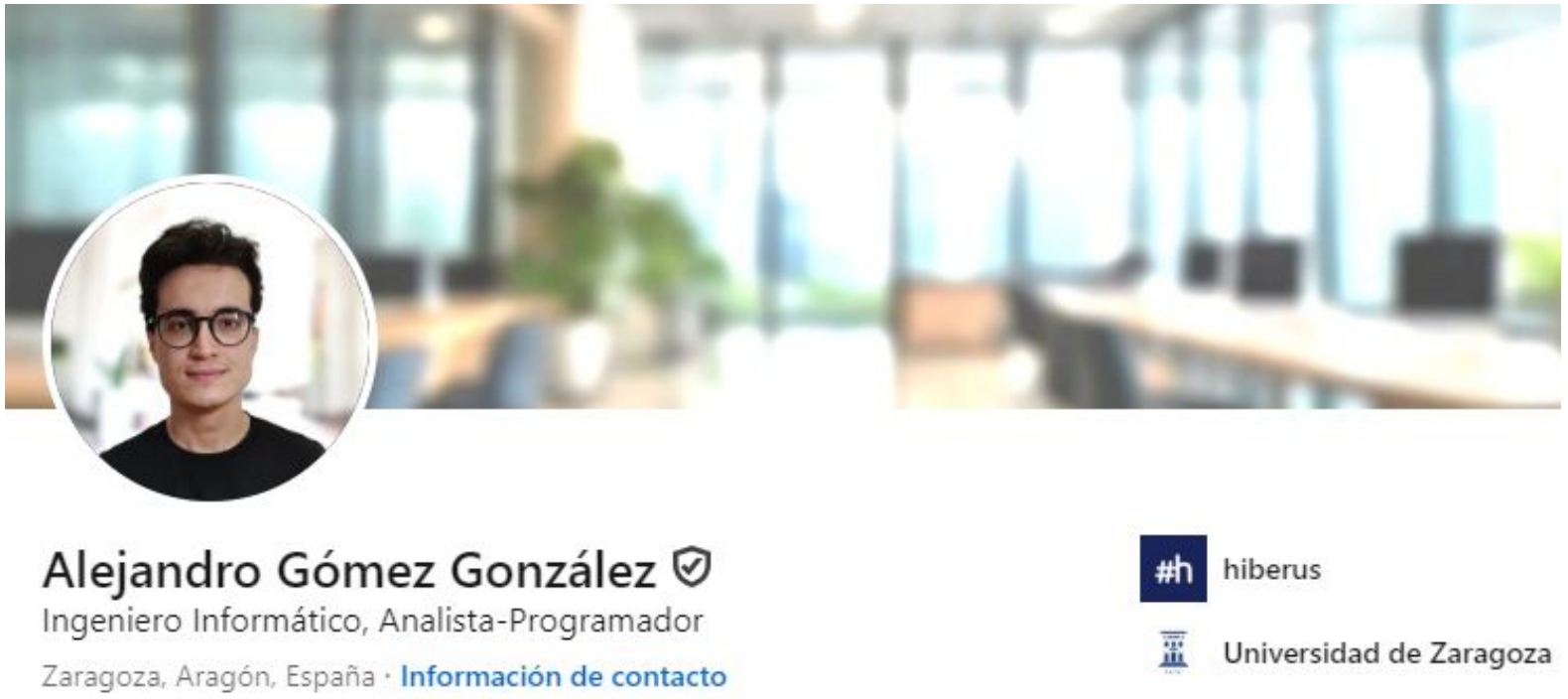
¿QUÉ TENGO QUE SABER?

Fundamentos de la programación (opcional)

* Si que se va a enseñar a importar código y gestionar dependencias

Presentación

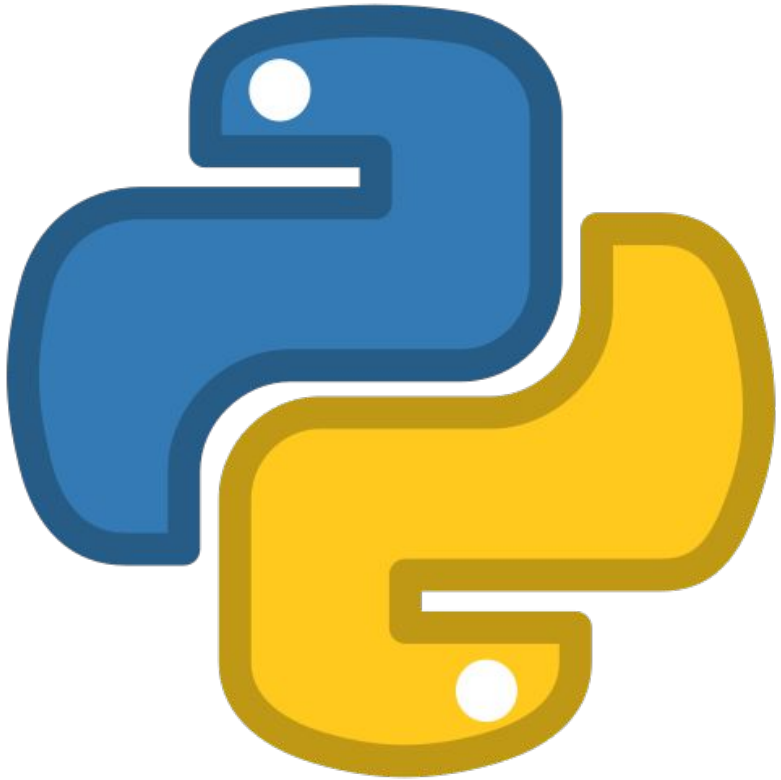
Sígueme en LinkedIn ;)



Índice

Duración aproximada 2-3h

1. Historia y filosofía
2. Sintaxis y ortografía
3. Importación de código
4. Entresijos
5. Anuncio



Entornos de desarrollo

Se vienen cositas

Google Colab

https://colab.research.google.com/#create=true

PyCharm Community Edition

Virtual Studio Code

https://vscode.dev/

Historia y filosofía

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Historia y filosofía

Origen

Van Rossum

En los 80 fue parte del equipo de desarrollando el lenguaje de programación ABC en el CWI

An example function to collect the set of all `words` in a document:

```
HOW TO RETURN words document:
   PUT {} IN collection
   FOR line IN document:
      FOR word IN split line:
         IF word not.in collection:
            INSERT word IN collection
   RETURN collection
```

Historia y filosofía

Origen

Van Rossum

Los caballeros de la mesa cuadrada (1975)

Versión 0.9.0 en 1991

Historia y filosofía

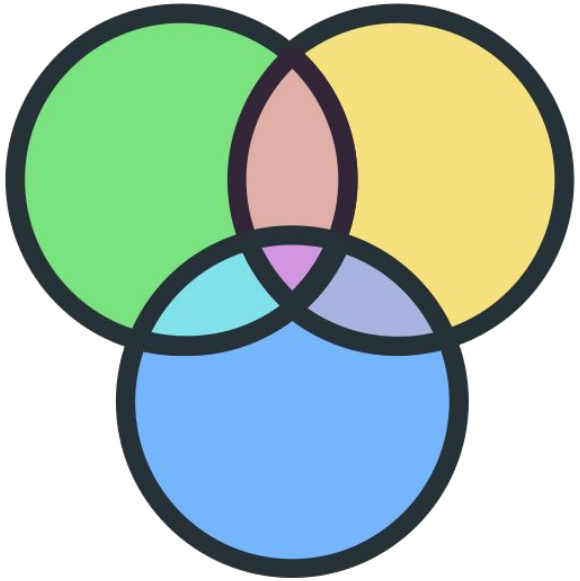
¿Qué tipo de lenguaje de programación es Python?

Según su nivel:
- Bajo nivel
- Medio nivel
- Alto nivel

Según su ejecución:
- Compilado
- Interpretado

Según su tipado:
- Fuertemente tipado
- Débilmente tipado

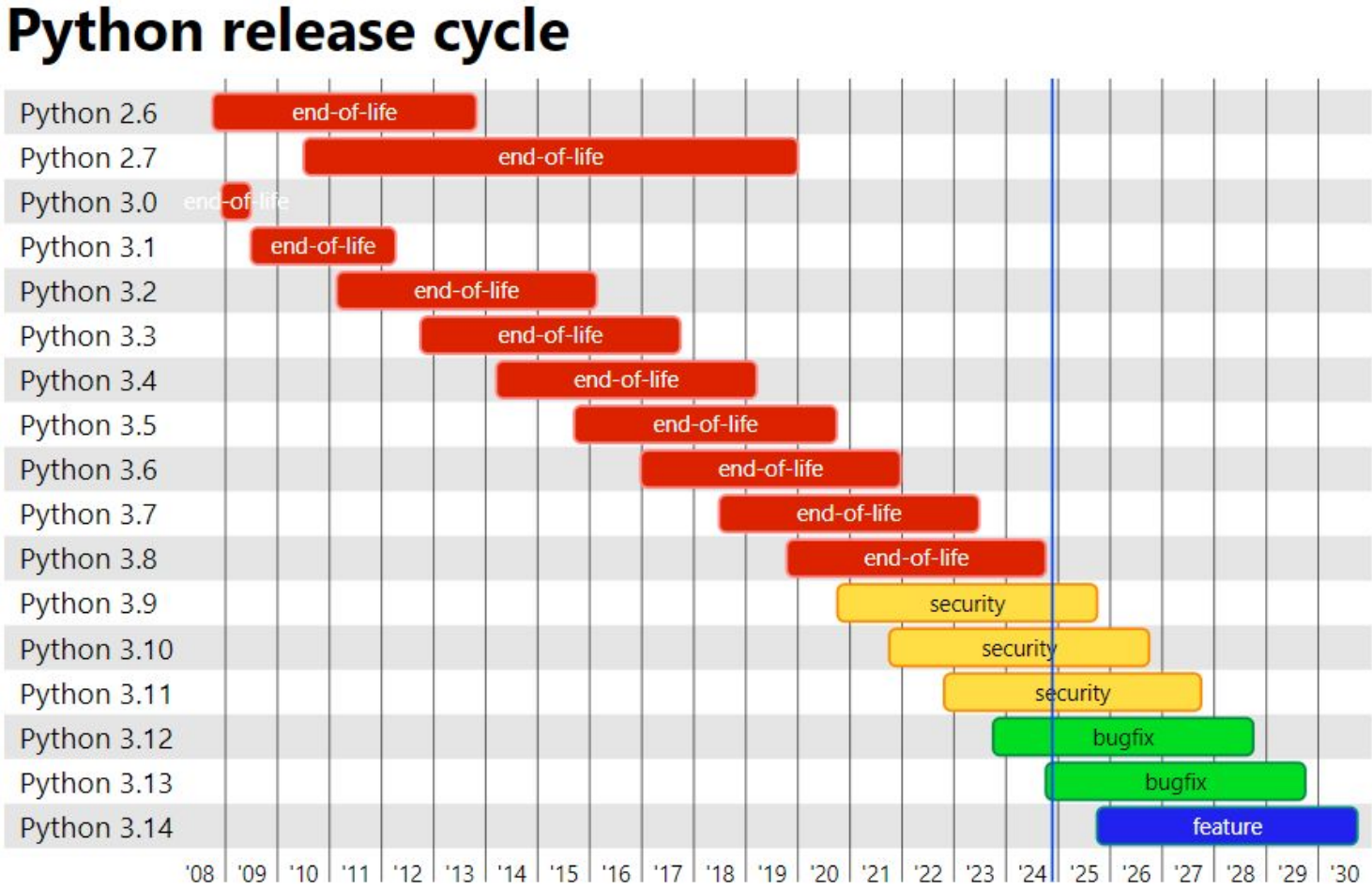
Según su programación:
- Programación orientada a objetos (POO)
- Programación funcional
- Programación imperativa
- Programación declarativa



Historia y filosofía

Historial de versiones

Versión 0.9.0 en 1991
Versión 1.0.0 en 1994
Versión 2.0.0 en 2000
Versión 3.0.0 en 2008

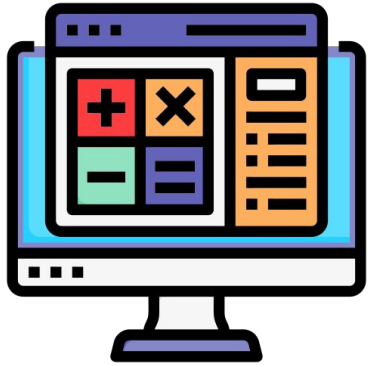


A Noviembre de 2024

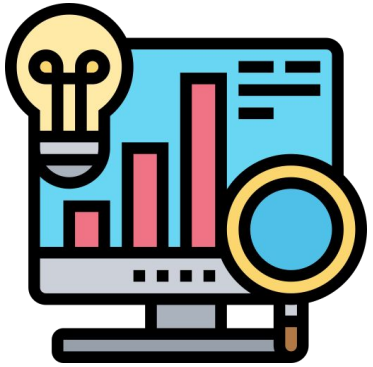
Historia y filosofía

Usos

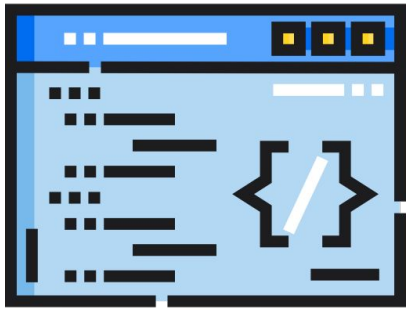
Desarrollo Web



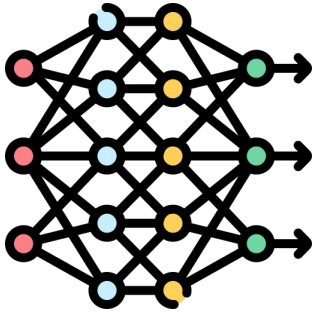
Aplicaciones de Escritorio



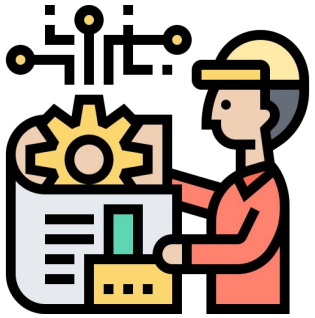
Ciencia de Datos y Análisis



Automatización y Tareas de Scripting



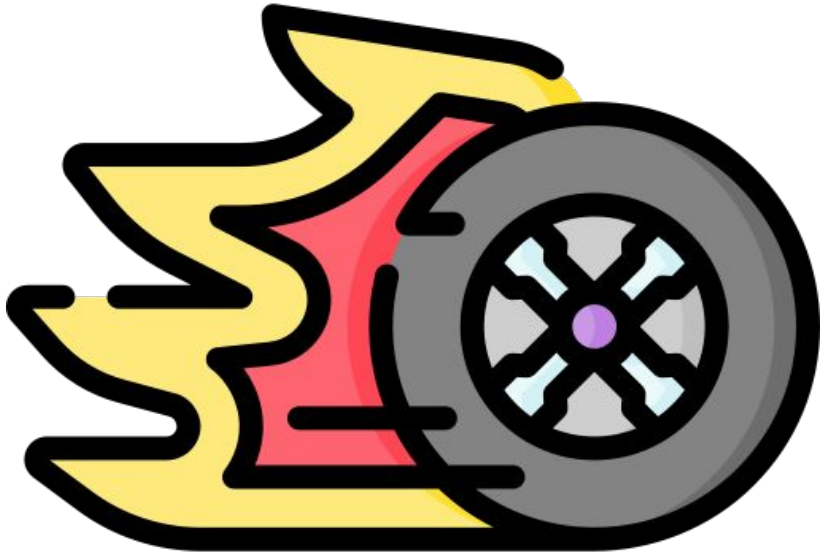
Inteligencia Artificial y Aprendizaje Automático



Aplicaciones Científicas y de Ingeniería

Historia y filosofía

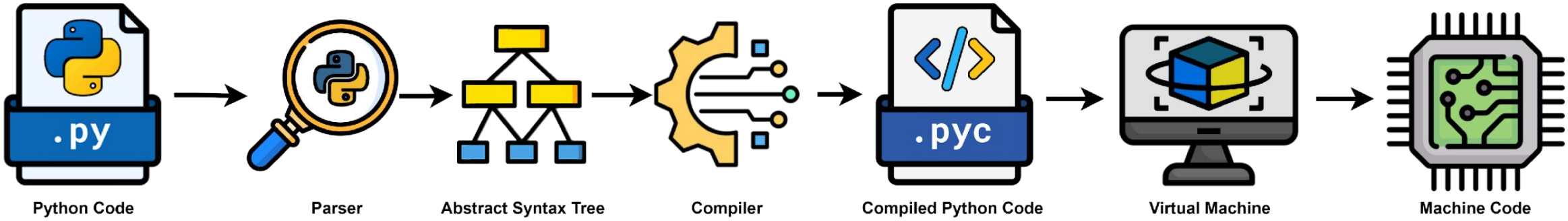
Puntos débiles



Rendimiento extremo

Historia y filosofía

Ejecución de Python



Sintaxis y ortografía:
Lo básico

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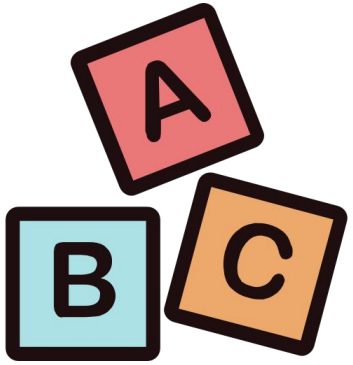
Sintaxis y ortografía

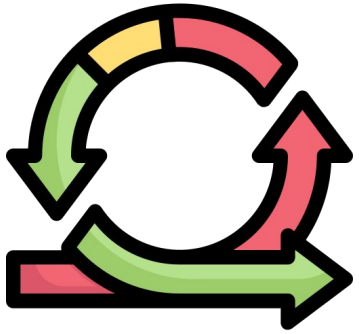
¿Qué hay en el código?

Comentarios



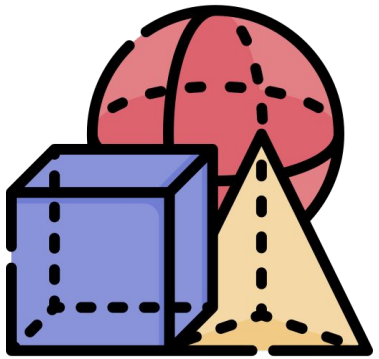
Variables

Operaciones



Estructuras de control

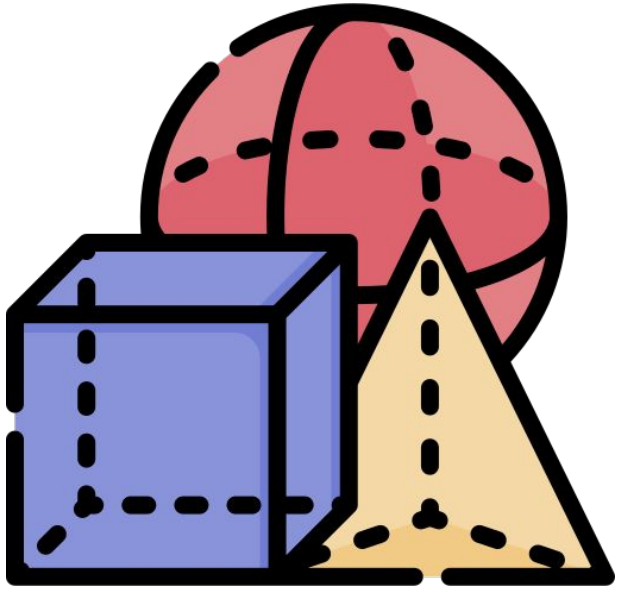
Funciones



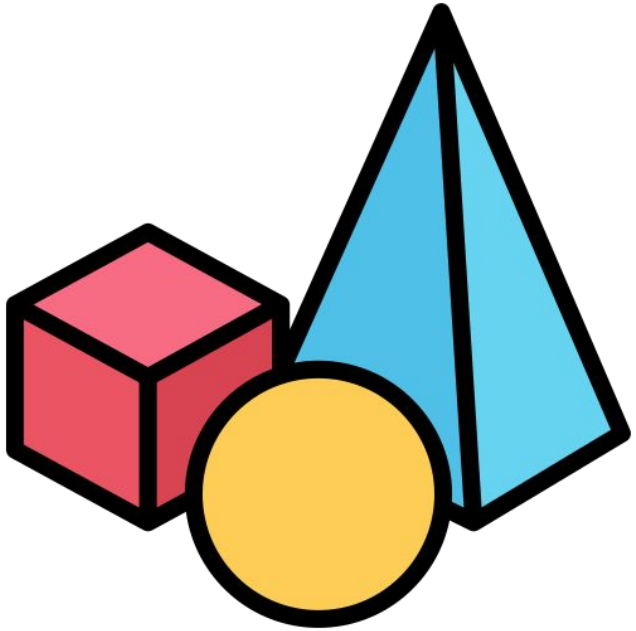
Clases

Sintaxis y ortografía

Las clases se instancian en objetos



Clases



Objetos

Sintaxis y ortografía

Comentarios

example.py

```python
# Comment: This is a single-line comment

"""
Multi-line comment:
This is a comment that spans multiple lines.
"""
```

Sintaxis y ortografía

Declaración de variables

example.py

```python
# Integers (int)
integer_number = 42

# Floats (float)
decimal_number = 3.14

# Strings (str)
name = "John"
message = 'Hello, World!'

# Booleans (bool)
is_true = True
is_false = False

# Multiple variables
x, y, z = 1, 2, 3

# Variables with names containing underscores (snake_case)
user_name = "user123"
```

Sintaxis y ortografía

Sugerencias de tipado (Type Hints)

example.py

```python
# Integers (int)
integer_number: int = 42

# Floats (float)
decimal_number: float = 3.14

# Strings (str)
name: str = "John"
message: str = 'Hello, World!'

# Booleans (bool)
is_true: bool = True
is_false: bool = False

# Multiple variables
# Only single target be annotated!!

# Variables with names containing underscores (snake_case)
user_name = "user123"
```

Sintaxis y ortografía

¿Se puede hacer esto?

example.py

```python
# Variable initialized annotated as an integer
x: int = 42

# Variable reassigned as an string
x: str = "The answer to all things"

```

Sintaxis y ortografía

Entrada y salida de datos por terminal

example.py

```python
# Get user input from terminal
name = input("Enter your name: ")

# Display content in terminal
print(f"{name} is learning python")

```

Sintaxis y ortografía

Operaciones básicas de strings

example.py

```python
# String Formatting
name = "Alice"
age = 30
formatted_message = f"Hello, my name is {name} and I am {age} years old."
print(formatted_message)
# Hello, my name is Alice and I am 30 years old.

# Concatenation
message = "Python" + " is " + "cool!"
print(message)
# Python is cool!

# String Methods
uppercase_message = message.upper()
print(f"Uppercase: {uppercase_message}")
# Uppercase: PYTHON IS COOL!

lowercase_message = message.lower()
print(f"Lowercase: {lowercase_message}")
# Lowercase: python is cool!

# String Length
message = "Python is amazing"
length = len(message)
print(f"The length of the message is {length} characters")
# The length of the message is 17 characters
```

Sintaxis y ortografía

Operaciones básicas

A	B	A and B	A or B
True	True	True	True
True	False	False	True
False	True	False	True
False	False	False	False

example.py

```python
# Boolean variables
is_true = True
is_false = False

# Logical AND
result_and = is_true and is_false
# result_and = False

# Logical OR
result_or = is_true or is_false
# result_or = True

# Logical NOT
result_not_true = not is_true
# result_not_true = False

```

Sintaxis y ortografía

Operaciones básicas

a es igual que b	a == b
a no es igual que b	a != b
a es mayor que b	a > b
a es menor que b	a < b
a es igual o mayor que b	a >= b
a es igual o menor que b	a <= b

example.py

```python
# Comparisons
a = 5
b = 10

# Equality
equal = a == b
# equal = False

# Inequality
not_equal = a != b
# not_equal = True

# Greater than
greater_than = a > b
# greater_than = False

# Less than
less_than = a < b
# less_than = True

# Greater than or equal to
greater_equal = a >= b
# greater_equal = False

# Less than or equal to
less_equal = a <= b
# less_equal = True

```

Sintaxis y ortografía

Operaciones básicas numéricas

example.py

```python
# Basic Arithmetic Operations in Python (I)

# Addition
num1 = 10
num2 = 3
sum_result = num1 + num2
print("Sum:", sum_result)
# Sum: 13

# Subtraction
difference = num1 - num2
print("Difference:", difference)
# Difference: 7

# Multiplication
product = num1 * num2
print("Product:", product)
# Product: 30

```

example.py

```python
# Basic Arithmetic Operations in Python (II)

# Division
quotient = num1 / num2
print("Quotient:", quotient)
# Quotient: 3.3333333333333335

# Integer Division (Floor Division)
integer_quotient = num1 // num2
print("Integer Quotient:", integer_quotient)
# Integer Quotient: 3

# Modulo (Remainder)
remainder = num1 % num2
print("Remainder:", remainder)
# Remainder: 1

# Exponentiation
power_result = num1 ** num2
print("Power:", power_result)
# Power: 1000

```

Sintaxis y ortografía

Declaración de condicionales

example.py

```python
# Conditional Statements (if, elif, else)
x = 10
y = 5
if x > y:
    print(f"{x} is greater than {y}")
elif x < y:
    print(f"{x} is less than {y}")
else:
    print(f"{x} is equal to {y}")
# 10 is greater than 5

```

Sintaxis y ortografía

Declaración de bucles while

example.py

```python
# While loop
i = 0
while i < 5:
    print(f"Countdown: {i}")
    i += 1
"""
Countdown: 0
Countdown: 1
Countdown: 2
Countdown: 3
Countdown: 4
"""
```

Sintaxis y ortografía

Declaración de bucles for

example.py

```python
for i in [0, 1, 2, 3, 4]:
    print(f"Iteration {i}")

"""
Iteration 0
Iteration 1
Iteration 2
Iteration 3
Iteration 4
"""

```

Sintaxis y ortografía

Declaración de bucles for

example.py

```python
# For loop
for i in range(5):
    print(f"Iteration {i}")
"""
Iteration 0
Iteration 1
Iteration 2
Iteration 3
Iteration 4
"""

```

example.py

```python
# For loop
for i in range(0, 5):
    print(f"Iteration {i}")
"""
Iteration 0
Iteration 1
Iteration 2
Iteration 3
Iteration 4
"""

```

Sintaxis y ortografía

Declaración de bucles for

example.py

```python
# For loop
for i in range(-2, 3):
    print(f"Iteration: {i}")
"""
Iteration: -2
Iteration: -1
Iteration: 0
Iteration: 1
Iteration: 2
"""

```

example.py

```python
# For loop
for i in range(0, 10, 2):
    print(f"Iteration {i}")
"""
Iteration 0
Iteration 2
Iteration 4
Iteration 6
Iteration 8
"""

```

Sintaxis y ortografía

Sentencia pass

pass = no hacer nada

example.py

```
1 if (number > 100):
2     # TODO: Decide how to treat this case
3     pass
4
```

Se suele utilizar para marcar algo que hay que hacer

Sintaxis y ortografía

Sentencia pass

example.py

```python
if evaluate_certain_condition():
  # Nothing to be done here
  pass
else:
  # Need to do something here
  print("Im doing things...")

```

No hagáis estas cosas…

Sintaxis y ortografía

Sentencia pass

example.py

```python
if not evaluate_certain_condition():
  # Need to do something here
  print("Im doing things...")

```

… hacer esto mejor

Sintaxis y ortografía

Sentencia continue

continue = saltar a la siguiente iteración del bucle

example.py

```
1 for i in range(5):
2     if i == 2:
3         continue
4     print(i)
5 """
6 0
7 1
8 3
9 4
10 """
11
```

Cuando llega al continue, salta a la siguiente iteración y no pasa por el

Sintaxis y ortografía

Sentencia break

break = salir del bucle

example.py

```python
for number in [10, 11, 12, 13, 14, 15]:
  if (number % 3) == 0:
    divisible_by_3 = number
# divisble_by_3 = 15

```

Itera sobre toda la lista

example.py

```python
for number in [10, 11, 12, 13, 14, 15]:
  if (number % 3) == 0:
    divisible_by_3 = number
    break
# divisble_by_3 = 12

```

Cuando llega al break, sale del bucle

Sintaxis y ortografía

Declaración de funciones sin argumentos

example.py

```
1 # Function with Arguments and a Return Value
2 def greet():
3     print("Hello world!")
4
5 # Calling the function
6 greet()
7 # Hello world!
8
```

Sintaxis y ortografía

Declaración de funciones con argumentos

example.py

```python
# Function with Arguments and a Return Value
def add(a, b):
    result = a + b
    return result

# Calling the function
sum_result = add(5, 3)
print(f"The sum is: {sum_result}")
# The sum is: 8

```

Sintaxis y ortografía

Declaración de funciones con argumentos opcionales

example.py

```python
# Function with Optional Arguments and a Return Value
def calculate_price(total, discount=0):
    discounted_price = total - (total * discount)
    return discounted_price

# Calling the function with and without a discount
total_price = calculate_price(100)
discounted_price = calculate_price(100, 0.1)

print(f"Total price: {total_price}")
# Total price: 100
print(f"Discounted price: {discounted_price}")
# Discounted price: 90.0

```

Sintaxis y ortografía

Declaración de funciones con argumentos variables

example.py

```python
# Function with Variable-Length Arguments
def average(*args):
    total = sum(args)
    return total / len(args)

# Calling the function with different numbers of arguments
average1 = average(4, 5, 6)
average2 = average(10, 20, 30, 40, 50)

print(f"Average 1: {average1}")
# Average 1: 5.0
print(f"Average 2: {average2}")
# Average 2: 30.0

```

Sintaxis y ortografía

Declaración de funciones con sugerencias de tipado

example.py

```
1 def add_integers(x: int, y: int):
2     return x + y
3
4
5 z = add_integers(3, 2)
6
```

Sintaxis y ortografía

Declaración de funciones con sugerencias de tipado

example.py

```
1 def add_integers(x: int, y: int):
2   return x + y
3
4
5 z = add_integers("eggs", "potatoes")
6
```

Sintaxis y ortografía

Funciones documentadas

example.py

```python
def add_integers(x: int, y: int) -> int:
    """
    This function adds two integers

    :param int x: the first variable of the sum operation
    :param int y: the second variable of the sum operation
    :return int: the sum of variable x and y
    """
    return x + y

```

Sintaxis y ortografía

Funciones como funciones como parámetro

example.py

```python
# Function that takes another function as an argument
def apply_function(func, x):
    result = func(x)
    return result

# Example function to be passed as an argument
def square(number):
    return number ** 2

# Another example function to be passed as an argument
def half(number):
    return number / 2

# Calling apply_function with the square function
result = apply_function(square, 5)
# result = 25

# Calling apply_function with the half function
result = apply_function(half, 5)
# result = 2.5

# Calling apply_function with a lambda function
result = apply_function(lambda x: x*2, 5)
# result = 10

```

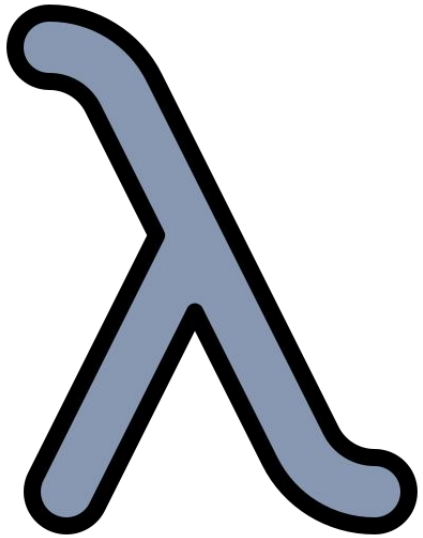
Sintaxis y ortografía

Funciones lambda

example.py

```python
add_lambda = lambda x, y: x + y

def add_function(x, y):
  return x + y
```



example.py

```python
# Single parameter lambda
duplicate = lambda x: x * 2
print(duplicate(2))
# 4

# Two parameter lambda
add = lambda x, y: x + y
print(add(2, 3))
# 5

# Conditional return
find_max = lambda x, y: x if x > y else y
print(find_max(2, 3))
# 3

# Boolean return
is_even = lambda x: x % 2 == 0
print(is_even(4))
# True

```

Sintaxis y ortografía

Declaración e instanciación de clases

example.py

```python
# Class declaration
class FormulaOneCar:
    def __init__(self, model, driver):
        self.model = model
        self.driver = driver
        self.is_running = False

    def start_engine(self):
        self.is_running = True

    def stop_engine(self):
        self.is_running = False

# Class instantiation
my_ferrari = FormulaOneCar("Ferrari SF23", "Carlos Sainz")

# Accessing class attributes
print(f"My F1 car is a {my_ferrari.model} driven by {my_ferrari.driver}.")
# My F1 car is a Ferrari SF23 driven by Carlos Sainz.

print(f"Is the engine running? {my_ferrari.is_running}")
# Is the engine running? False

# Calling class methods
my_ferrari.start_engine()
print(f"Is the engine running? {my_ferrari.is_running}")
# Is the engine running? True

```

¡Hagamos una calculadora!

CodeLab

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Volvemos a...

Sintaxis y ortografía:
Estructuras de datos

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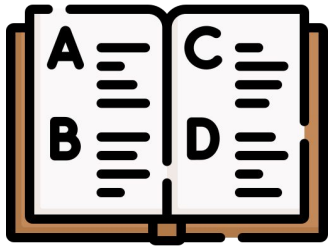
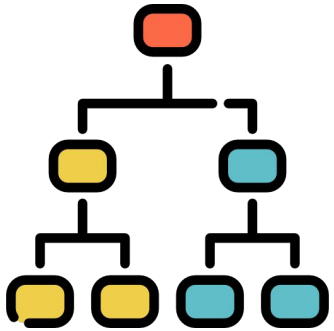
Sintaxis y ortografía

Estructuras de datos

Grafos

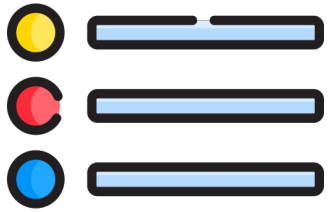


Diccionarios

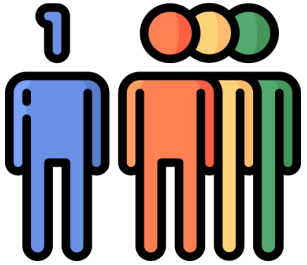


Árboles

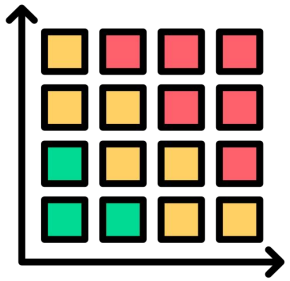
No lineales



Listas



Colas



Matrices

Lineales

Sintaxis y ortografía

Estructuras de datos: lista, tupla, set, diccionario

example.py

```python
# Lists are versatile and commonly used for storing collections of items of varying types.
my_list = [1, 2, 3, 'apple', 'banana']

# Tuples are used to store INMUTABLE sequences of elements, often for data that should not be changed.
my_tuple = (1, 2, 3, 'apple', 'banana')

# Sets are used for storing UNIQUE elements and are useful for tasks like removing duplicates from a list.
my_set = {1, 2, 3, 4, 5}

# Dictionaries are used for mapping keys to values and are helpful for representing structured data.
my_dict = {
  'name': 'Alice',
  'age': 30,
  'city': 'New York'
}

```

Sintaxis y ortografía

Estructuras de datos: diccionarios anidados

example.py

```python
hiberus_ecosystem = {
  'location': {
    'city': 'Zaragoza',
    'postal_code': 50009,
    'address': 'P. de Isabel la Católica, 6'
  }
  'workers': {'Alejandro G', 'Alejandro P', 'Raúl J'}
}

```

Sintaxis y ortografía

Operaciones con listas

example.py

```python
# Creating a list
my_list = [1, 2, 3, 4, 5]

# Accessing elements by index
first_element = my_list[0]
# first_element = 1
last_element = my_list[-1]
# last_element = 5

# Slicing a list
subset = my_list[1:4]
# subset = [2, 3, 4]

# Modifying elements
my_list[2] = 99  # Modifies the third element
# my_list = [1, 2, 99, 4, 5]

# Append element to the end of the list
my_list.append(6)
# my_list = [1, 2, 99, 4, 5, 6]

# Extend list with other list
my_list.extend([7, 8, 9])
# my_list = [1, 2, 99, 4, 5, 6, 7, 8, 9]

# Remove element by value
my_list.remove(99)
# my_list = [1, 2, 4, 5, 6, 7, 8, 9]

# Remove element by list position
popped_element = my_list.pop(2)
# my_list = [1, 2, 5, 6, 7, 8, 9]

```

example.py

```python
my_list = [1, 2, 3, 4, 5]

# Finding elements
element_index = my_list.index(5)

# element_index = 4

# Checking membership
is_3_present = 3 in my_list
# is_3_present = True
is_9_present = 9 in my_list
# is_3_present = False

# Sort list in ascending order
my_list.sort()
# my_list = [1, 2, 3, 4, 5]

# Sort list in reverse order
my_list.reverse()
# my_list = [5, 4, 3, 2, 1]

# Shallow copying a list
new_list = my_list.copy()

# Length of a list
list_length = len(my_list)
# list_length = 5

# Removes all elements
my_list.clear()
# my_list = []

```

Sintaxis y ortografía

Operaciones con tuplas

example.py

```python
# Creating a tuple
fruits = ('apple', 'banana', 'cherry',
'date')

# Accessing elements by index
first_fruit = fruits[0]
# first_fruit = 'apple'
last_fruit = fruits[-1]
# last_fruit = 'date'

# Slicing a tuple
selected_fruits = fruits[1:3]
# selected_fruits = ('banana', 'cherry')

# Checking membership
is_melon_in_fruits = 'melon' in fruits
# is_melon_in_fruits = False

# Counting elements
count_cherry = fruits.count('cherry')
# count_cherry = 1

# Finding the index of an element
index_banana = fruits.index('banana')
# index_banana = 1

# Length of a tuple
num_fruits = len(fruits)
# num_fruits = 4

```

Sintaxis y ortografía

Operaciones con sets

example.py

```python
# Creating a Set
fruits = {"apple", "banana", "cherry"}

# Adding Elements
fruits.add("orange")

# Removing Elements
fruits.remove("banana")

# Checking Membership
is_melon_in_fruits = "melon" in fruits
# is_melon_in_fruits = False

set1 = {1, 2, 3}
set2 = {3, 4, 5}

# Union of sets
union_set = set1.union(set2)
# union_set = {1, 2, 3, 4, 5}

# Intersection of sets
intersection_set = set1.intersection(set2)
# intersection_set = {3}

# Set difference
difference_set = set1.difference(set2)
# difference_set = {1, 2}

# Length of a Set
num_fruits = len(fruits)

```

Sintaxis y ortografía

Operaciones con diccionarios

example.py

```python
# Dictionary Creation
person = {
  "name": "Alex",
  "age": 24,
  "city": "Zaragoza"
}

# Accessing Elements
# Accessing information about Alex
print(f"{person['name']} is {person['age']} years old and lives in {person['city']}")
# Alex is 24 years old and lives in Zaragoza

# Modifying Elements
person["age"] = 25

# Adding new element
person["height"] = 184

# Checking Key Existence
if "height" in person:
    print("Alex's height is:", person["height"])

# Deleting Elements
person.pop("age")

# Dictionary Length (number of elements in the dictionary)
num_elements = len(person)

```

Sintaxis y ortografía

Inicialización de lista, tupla, set y diccionario

example.py

```python
# Empty initialization
empty_list = list()
empty_tuple = tuple()
empty_set = set()
empty_dictionary = dict()

```

example.py

```python
# Regular initialization
my_list = [1, 2, 3]
my_tuple = (1, 2, 3)
my_set = {1, 2, 3}
my_dict = {1: False, 2: True, 3: False}

```

Sintaxis y ortografía

Conversiones de lista a otros tipos

example.py

```python
# Transform a tuple into a list
my_list_from_tuple = list(my_tuple)
print(my_list_from_tuple)
# [1, 2, 3]

# Transform a set to list
my_list_from_set = list(my_set)
print(my_list_from_set)
# [1, 2, 3]

# Transform a dictionary into a list of keys and values
keys_list = list(my_dict.keys())
print(keys_list)
# [1, 2, 3]

values_list = list(my_dict.values())
print(values_list)
# [False, True, False]

```

Sintaxis y ortografía

Conversiones de tupla a otros tipos

example.py

```python
# Transform a list into a tuple
my_tuple_from_list = tuple(my_list)
print(my_tuple_from_list)
# (1, 2, 3)

# Transform a set into a tuple
my_tuple_from_set = tuple(my_set)
print(my_tuple_from_set)
# (1, 2, 3)

# Transform a dictionary into a tuple of keys and values
keys_tuple = tuple(my_dict.keys())
print(keys_tuple)
# (1, 2, 3)

values_tuple = tuple(my_dict.values())
print(values_tuple)
#(False, True, False)

```

Sintaxis y ortografía

Conversiones de set a otros tipos

example.py

```
# Transform a list into a set
my_set_from_list = set(my_list)
print(my_set_from_list)
# {1, 2, 3}

# Transform a tuple into a set
my_set_from_set = set(my_tuple)
print(my_set_from_set)
# {1, 2, 3}

# Transform a dictionary into a set of keys and values
keys_set = set(my_dict.keys())
print(keys_set)
# {1, 2, 3}

values_tuple = set(my_dict.values())
print(values_tuple)
# {False, False}

```

Sintaxis y ortografía

Conversiones de diccionario a otros tipos

example.py

```python
person = dict(name = "Alex", age = 24, city = "Zaragoza")
print(person)
# {'name': 'Alex', 'age': 24, 'city': 'Zaragoza'}

# Transform a list of lists into a dictionary
list_of_lists = [['name', 'Alex'], ['age', 24], ['city', 'Zaragoza']]
dict_from_list_of_lists = dict(list_of_lists)
print(dict_from_list_of_lists)
# {'name': 'Alex', 'age': 24, 'city': 'Zaragoza'}

# Transform a list of tuples into a dictionary
list_of_tuples = [['name', 'Alex'], ['age', 24], ['city', 'Zaragoza']]
dict_from_list_of_tuples = dict(list_of_tuples)
print(dict_from_list_of_tuples)
# {'name': 'Alex', 'age': 24, 'city': 'Zaragoza'}

# Transform a tuple of lists into a dictionary
tuple_of_lists = (['name', 'Alex'], ['age', 24], ['city', 'Zaragoza'])
dict_from_tuple_of_lists = dict(tuple_of_lists)
print(dict_from_tuple_of_lists)
# {'name': 'Alex', 'age': 24, 'city': 'Zaragoza'}

# Transform a tuple of tuples into a dictionary
tuple_of_tuples = (('name', 'Alex'), ('age', 24), ('city', 'Zaragoza'))
dict_from_tuple_of_tuples = dict(tuple_of_tuples)
print(dict_from_tuple_of_tuples)
# {'name': 'Alex', 'age': 24, 'city': 'Zaragoza'}

```

¡Añadamos un histórico a la calculadora!

CodeLab

29/11/2024

Sintaxis y ortografía:
Comprensión de listas, tuplas, dict

CodeLab

29/11/2024

Sintaxis y ortografía

Sintaxis de comprensiones

example.py

```
1 list = [value for element in iterable]
2 set = {value for element in iterable}
3 dictionary = {key: value for element in iterable}
4
```

Sintaxis y ortografía

Bucle vs Comprensión

example.py

```python
# Traditionally
result = []
for character in 'text':
    reusult.append(character)
print(result)
# ['t', 'e', 'x', 't']

# With list comprehension
result = [character for character in 'text']
print(result)
# ['t', 'e', 'x', 't']

```

Sintaxis y ortografía

Bucle vs Comprensión

example.py

```python
# Traditionally
squared_numbers = []
for number in range(0,11):
    squared_numbers.append(number**2)
print(squared_numbers)
# [0, 1, 4, 9, 16, 25, 36, 49, 64, 81, 100]

# With list comprehension
squared_numbers = [number**2 for number in range(0,11)]
print(squared_numbers)
# [0, 1, 4, 9, 16, 25, 36, 49, 64, 81, 100]

```

Sintaxis y ortografía

Bucle vs Comprensión

example.py

```python
# Traditionally
even_numbers = []
for number in range(0,11):
    if number % 2 == 0:
        even_numbers.append(number)
print(even_numbers)
# [0, 2, 4, 6, 8, 10]

# With list comprehension
even_numbers = [number for number in range(0,11) if number % 2 == 0 ]
print(even_numbers)
# [0, 2, 4, 6, 8, 10]

```

Sintaxis y ortografía

Bucle vs Comprensión

example.py

```python
# Traditionally
squared_numbers = []
for number in range(0,11):
    squared_numbers.append(number**2)

squared_even_numbers = []
for squared_number in squared_numbers:
    if squared_number % 2 == 0:
        squared_even_numbers.append(squared_number)
print(squared_even_numbers)
# [0, 4, 16, 36, 64, 100]

# With list comprehension
squared_numbers = [number**2 for number in range(0, 11)]
squared_even_numbers = [squared_number for squared_number in squared_numbers if squared_number % 2 == 0]
print(squared_even_numbers)
# [0, 4, 16, 36, 64, 100]

```

Sintaxis y ortografía

Comprensión de listas

example.py

```python
# With list comprehension
squared_even_numbers = [number**2 for number in range(0, 11) if number**2 % 2 == 0]
print(squared_even_numbers)
# [0, 4, 16, 36, 64, 100]

```

Sintaxis y ortografía

Bucle vs Comprensión

example.py

```python
module_of_7 = set()
for number in [7, 10, 11, 14]:
    module_of_7.add(number % 7)
print(module_of_7)
# {0, 3, 4}

# Set comprehension
module_of_7 = {number % 7 for number in [7, 10, 11, 14]}
print(module_of_7)
# {0, 3, 4}

```

Sintaxis y ortografía

Bucle vs Comprensión

example.py

```python
# Traditionally
is_even_by_number = {}
for number in range(0,6):
    is_even_by_number[number] = number % 2 == 0
print(is_even_by_number)
# {0: True, 1: False, 2: True, 3: False, 4: True, 5: False}

# With list comprehension
is_even_by_number = {number: number % 2 == 0 for number in range(0,6) }
print(is_even_by_number)
# {0: True, 1: False, 2: True, 3: False, 4: True, 5: False
```

Sintaxis y ortografía

Bucle vs Comprensión

Sintaxis y ortografía:
Map y Filter

CodeLab

29/11/2024

Sintaxis y ortografía

Map

Sintaxis y ortografía

Map

example.py

```python
numbers = [1, 2, 3, 4, 5]
squared = list(map(lambda x: x**2, numbers))
# squared = [1, 4, 9, 16, 25]
```

Sintaxis y ortografía

Map

example.py

```python
numbers_1 = [1, 7, 5, 9, 6]
numbers_2 = [2, 3, 8, 4, 10]

# Lambda function that takes two arguments
find_max = lambda x, y: x if x > y else y

# map() with a 2 paramater lambda function process 2 lists
max_result = list(map(find_max, numbers_1, numbers_2))
print(max_result)
# [2, 7, 8, 9, 10]

```

Sintaxis y ortografía

Map

example.py

```python
numbers = [7, 10, 11, 14]
module_of_7 = set(map(lambda x: x % 7, numbers))
# module_of_7 = {0, 3, 4}

```

Sintaxis y ortografía

Filter

Sintaxis y ortografía

Filter

example.py

```python
numbers = [-3, -1, 0, 2, 5, -8, 9]
positive_numbers = list(filter(lambda x: x > 0, numbers))
# positive_numbers = [2, 5, 9]

```

Sintaxis y ortografía:
Herencia de clases

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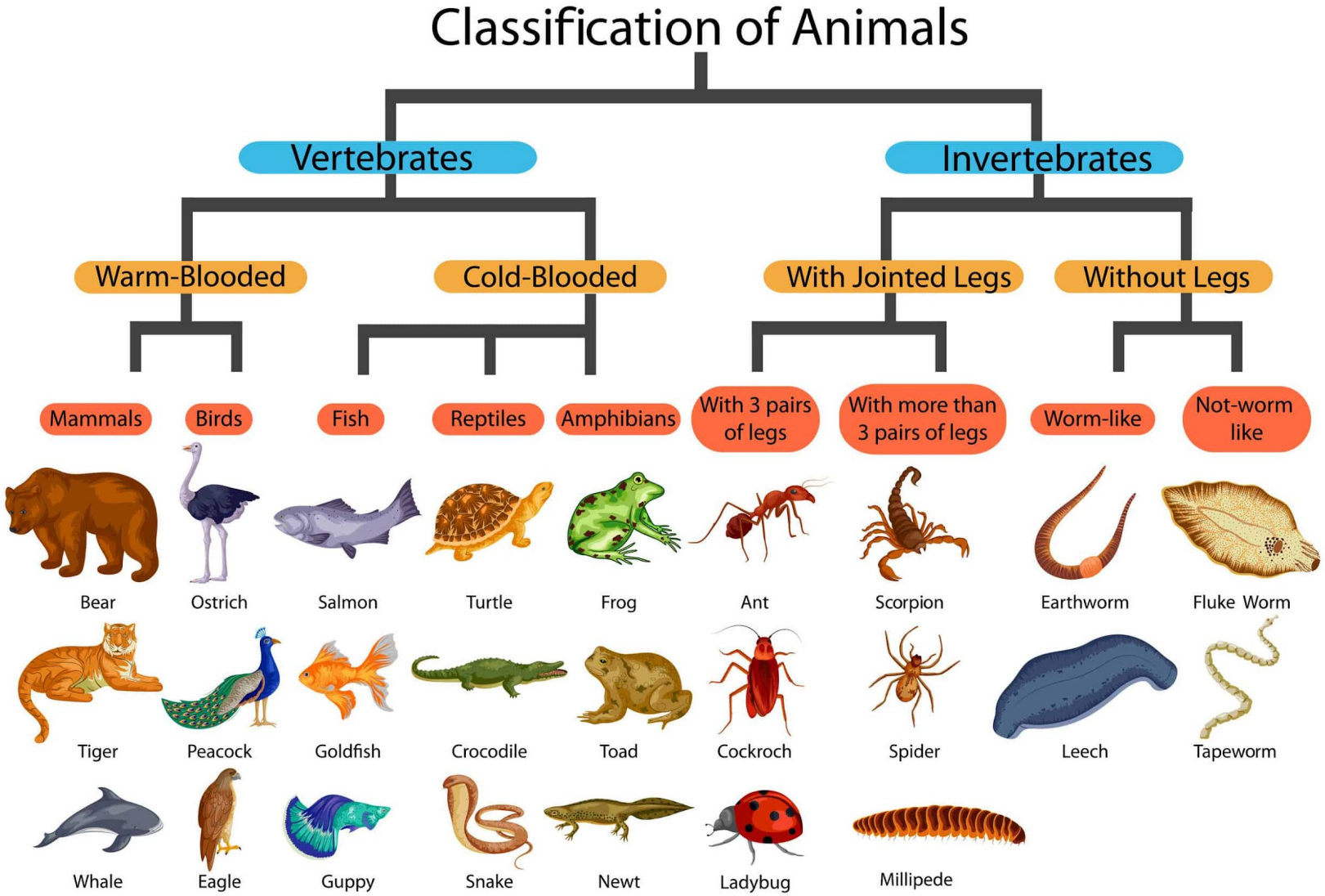
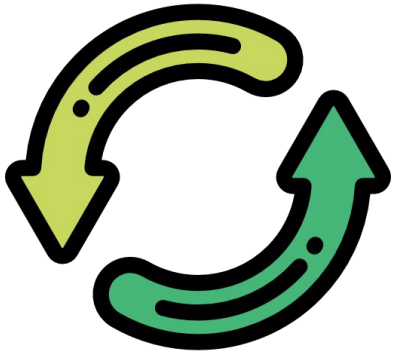
Sintaxis y ortografía

Definición herencia de clases

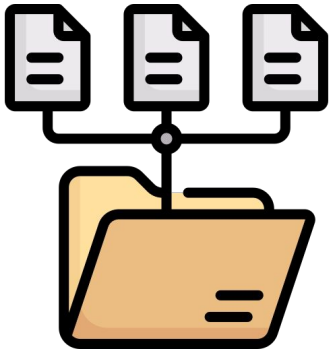


Sintaxis y ortografía

Utilidad herencia de clases

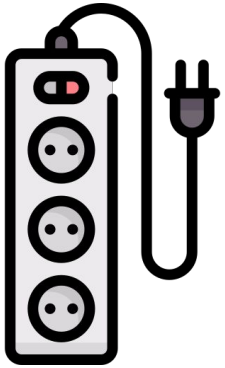


Reutilizar código



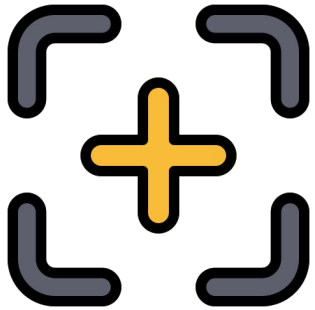
Estructuración

Polimorfismo



Extensibilidad

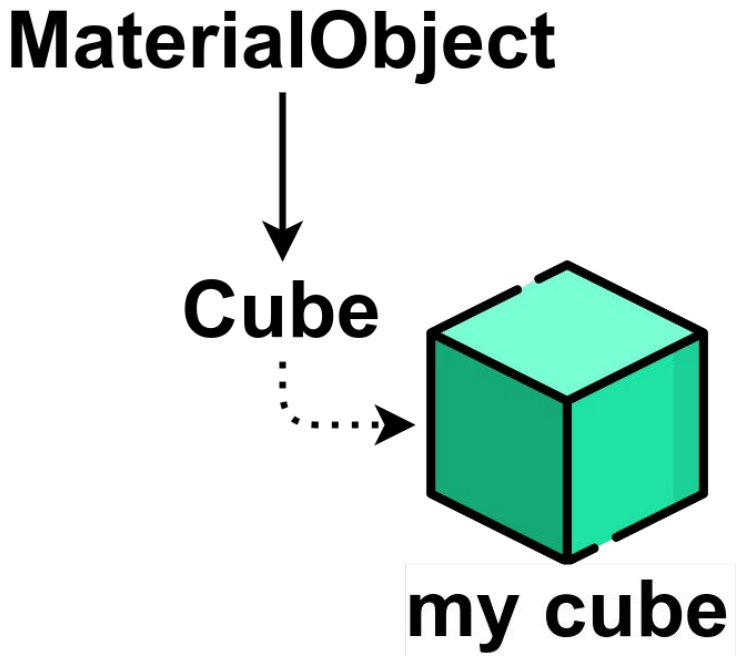
Abstracción



Especialización

Sintaxis y ortografía

Herencia simple

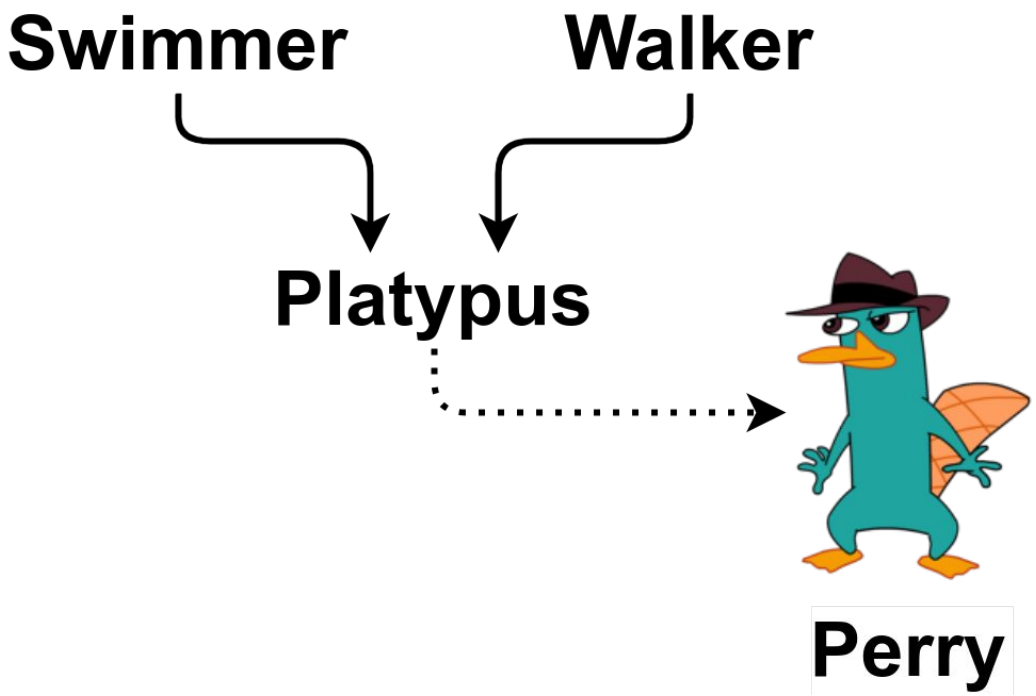


example.py

```python
class MaterialObject:
  def __init__(self, volume, mass):
    self.volume = volume
    self.mass = mass

  def calculate_volume(self):
    return self.mass / self.volume

class Cube(MaterialObject):

  def __init__(self, side, mass):
    self.side = side
    return super().__init__(side**3, mass)

  def calculate_area(self):
    return self.side**2 * 6

my_cube = Cube(2, 10)
print(f"My cube volume is: {my_cube.calculate_volume()}")
# My cube volume is: 1.25
print(f"My cube area is: {my_cube.calculate_area()}")
# My cube area is: 24

```

Sintaxis y ortografía

Herencia múltiple

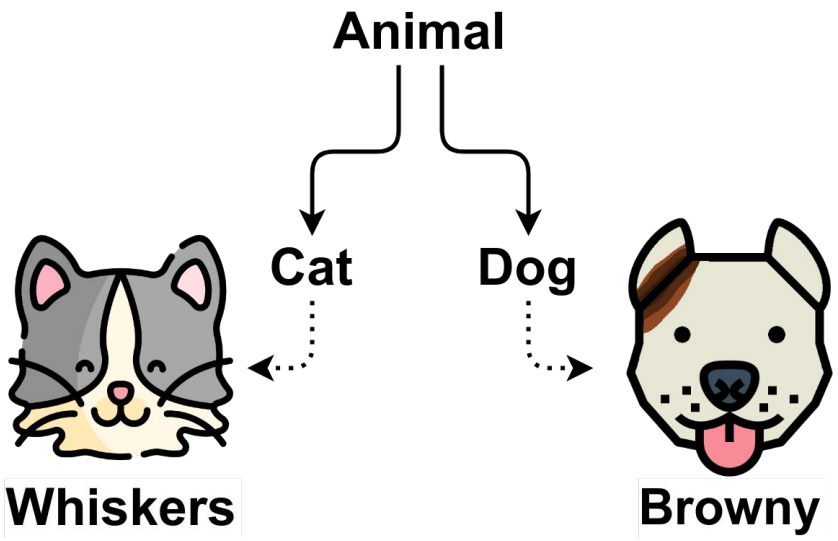


example.py

```python
# Base class 1
class Swimmer:
    def swim(self):
        return "Swimming gracefully."

# Base class 2
class Walker:
    def walk(self):
        return "Walking on land."

# Derived class inheriting from Swimmer and Walker
class Platypus(Swimmer, Walker):
    def __init__(self, name):
        self.name = name

    def description(self):
        return f"A platypus? {self.name} the platypus!"

# Create an instance of the Platypus
perry = Platypus("Perry")

# Use methods from both base classes
print(perry.swim())
# Swimming gracefully.
print(perry.walk())
# Walking on land.

# Use the method of the derived class
print(perry.description())
# A platypus? Perry the platypus!

```

Sintaxis y ortografía

Sobreescritura de métodos mediante heren

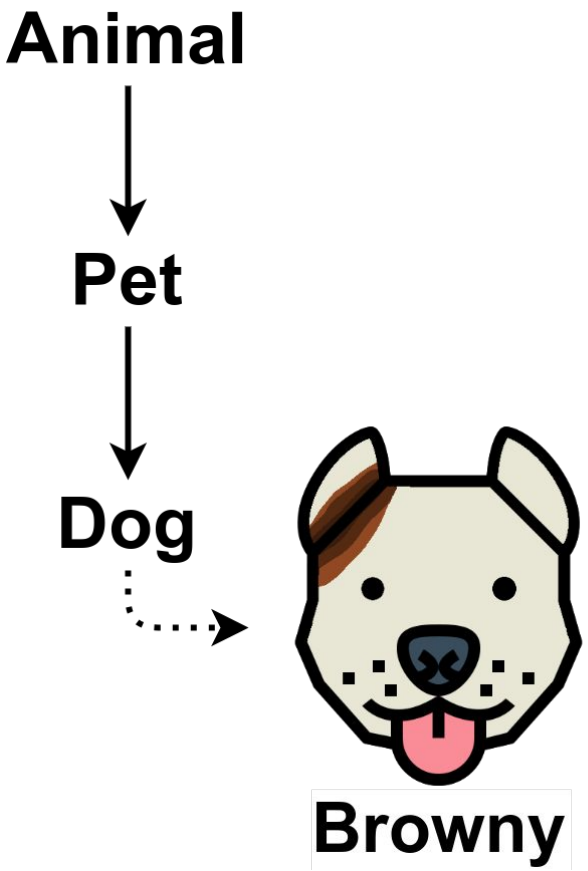


example.py

```python
# Base class
class Animal:
    def __init__(self, name):
        self.name = name

    def speak(self):
        return f"{self.name} can speak!"

# Derived classes with method overriding
class Dog(Animal):
    def speak(self):
        return f"{self.name} the dog says Woof!"

class Cat(Animal):
    def speak(self):
        return f"{self.name} the cat says Meow!"


# Creating instances of derived classes
dog = Dog("Browny")
cat = Cat("Whiskers")

# Using method overridden in derived classes
print(dog.speak())
# Browny the dog says Woof!
print(cat.speak())
# Whiskers the cat says Meow!

```

Sintaxis y ortografía

Ejemplo herencia



example.py

```python
# Base class
class Animal:
    def __init__(self, name):
        self.name = name

    def speak(self):
        return f"{self.name} can speak!"

# Intermediate class with shared behavior
class Pet(Animal):
    def __init__(self, name, owner):
        super().__init__(name)
        self.owner = owner

    def introduce(self):
        return f"{self.name} is owned by {self.owner}."

# Derived classes with method overriding and new attributes
class Dog(Pet):
    def __init__(self, name, owner, breed):
        super().__init__(name, owner)
        self.breed = breed

    def speak(self):
        return f"{self.name} the dog ({self.breed}) says Woof!"

# Creating instances of derived classes with new attributes
dog = Dog("Browny", "Carlos", "Pitbull")

# Using methods and accessing new attributes
print(dog.introduce())
# Browny is owned by Carlos
print(dog.speak())
# Browny the dog (Pitbull) says Woof!

```

Sintaxis y ortografía

Clases abstractas

example.py

```python
from abc import ABC, abstractmethod

# Abstract class
class Animal(ABC):
    def __init__(self, name, species):
        self.name = name
        self.species = species

    @abstractmethod
    def speak(self):
        pass

class Dog(Animal):

    def __init__(self, name):
        super().__init__(name, "Dog")

    def speak(self):
        return "Woof!"

# The next line will give a TypeError (Can't instantiate abstract class)
abstract_animal = Animal("Name", "Species")
# Creating instance of the Dog class
browny_boy = Dog("Browny")
```

Sintaxis y ortografía:
Decoradores

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Sintaxis y ortografía

Decoradores

decorators.py

```python
def my_decorator(func):
  def wrapper_my_decorator(*args, **kwargs):
    # Here goes wathever you want
    print("You are using a decorator")
    return func(*args, **kwargs)
  return wrapper_my_decorator

@my_decorator
def hello_world():
  print("Hello world!")

hello_world()
# You are using a decorator
# Hello world!
```

Sintaxis y ortografía

Crisis de identidad con decoradores

decorators.py

```
1 name = hello_world.__name__
2 # name = wrapper_my_decorator
3
4 help(hello_world)
5 # Help on function wrapper_my_decorator in module decorators:
6 # wrapper_my_decorator(*args, **kwargs)
7
```

Sintaxis y ortografía

Resolver crisis de identidad con decoradores

decorators.py

```python
import functools


def my_decorator(func):
    @functools.wraps(func)
    def wrapper_my_decorator(*args, **kwargs):
        # Here goes wathever you want
        print("You are using a decorator")
        return func(*args, **kwargs)

    return wrapper_my_decorator


@my_decorator
def hello_world():
    print("Hello world!")


hello_world()
# You are using a decorator
# Hello world!

name = hello_world.__name__
# name = hello_world

help(hello_world)
# Help on function hello_world in module decorators:
# hello_world()

```

Sintaxis y ortografía

Múltiples decoradores

decorators.py

```python
import functools


def decorator_a(func):
    @functools.wraps(func)
    def inner_a():
        print("Decorator a called")
        return "Decorator a: " + func()
    return inner_a

def decorator_b(func):
    @functools.wraps(func)
    def inner_b():
        print("Decorator b called")
        return "Decorator b: " + func()
    return inner_b

@decorator_a
@decorator_b
def hello_world_with_decorators():
    return "Hello world!"


result = hello_world_with_decorators()
## Decorator a called
## Decorator b called
# result = Decorator a called: Decorator b called: Hello world!
= "Decorator a: " + ("Decorator b: " + ("Hello world!"))

```

Sintaxis y ortografía

Decoradores con parámetros

decorators.py

```python
import functools

def multiply_by(x):
  def inner_multiply_by(func):
    @functools.wraps(func)
    def wrapper_multiply_by(*args, **kwargs):
      return x * func(*args, **kwargs)
    return wrapper_multiply_by
  return inner_multiply_by

@multiply_by(3)
def give_me_a_number():
  return 2

result = give_me_a_number()
# result = 6

```

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Sintaxis y ortografía

Ejemplo práctico con decoradores

decorators.py

```python
import functools
import time


# Decorator to measure execution time
def calculate_execution_time(func):
  @functools.wraps(func)
  def wrapper(*args, **kwargs):
    # Record the start time
    start_time = time.time()
    # Execute the original function
    result = func(*args, **kwargs)
    # Record the end time
    end_time = time.time()
    # Calculate the execution time
    execution_time = end_time - start_time
    print(f"The function '{func.__name__}' took {execution_time:.4f} seconds to execute.")
    return result

  return wrapper

```

main.py

```python
import math

from decorators import calculate_execution_time

# Gets n first prime numbers
@calculate_execution_time
def get_prime_numbers(n: int):
  prime_numbers = [2, 3]

  def evaluate_number(number):
    for prime_number in prime_numbers:
      if prime_number * 3 > number:
        prime_numbers.append(number)
        break
      if number % prime_number == 0:
        break

  def uneven_numbers(min_uneven=0, max_uneven=math.inf):
    if min_uneven % 2 == 0:
      min_uneven += 1

    i = min_uneven
    while i < max_uneven:
      yield i
      i += 2

  for i in uneven_numbers(5):
    evaluate_number(i)
    if len(prime_numbers) >= n:
      break
  return prime_numbers


get_prime_numbers(10000)
# The function 'get_prime_numbers' took 0.8821 seconds to execute.

```

Sintaxis y ortografía:
Gestores de contexto

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Sintaxis y ortografía

Gestores de contexto

example.py

```
1 file = open('some_file', 'r')
2 text_in_file = file.read()
3 print(text_in_file)
4 file.close()
5
```

example.py

```
1 with open('some_file', 'r') as file:
2   text_in_file = file.read()
3   print(text_in_file)
4
```

Sintaxis y ortografía

Modos de abrir un fichero

Modo	Descripción
'r'	Modo de lectura (read): Abre el archivo para lectura. Si el archivo no existe, se genera un error.
'w'	Modo de escritura (write): Abre el archivo para escritura. Si el archivo ya existe, trunca su contenido; si no existe, crea uno nuevo.
'a'	Modo de agregado (append): Abre el archivo para escritura, pero agrega datos al final sin truncar. Si el archivo no existe, se crea uno nuevo.
'r+'	Modo de lectura y escritura (read-write): Abre el archivo para lectura y escritura. Si el archivo no existe, se genera un error.
'w+'	Modo de escritura y lectura (write-read): Abre el archivo para escritura y lectura. Si el archivo ya existe, trunca su contenido. Si no existe, crea uno nuevo.
'a+'	Modo de agregado y lectura (append-read): Abre el archivo para lectura y escritura. Si el archivo no existe, se crea uno nuevo. Permite agregar datos al final.
'x'	Modo de creación exclusiva (exclusive creation): Abre el archivo para escritura, generando un error si ya existe. Útil para crear nuevos archivos de forma segura.
'rb'	Modo binario de lectura (binary read): Abre el archivo en modo binario para lectura. Utilizado para leer archivos binarios como imágenes.
'wb'	Modo binario de escritura (binary write): Abre el archivo en modo binario para escritura. Utilizado para escribir archivos binarios.

Sintaxis y ortografía

Concurrencia con ThreadPool

example.py

```python
from concurrent.futures import ThreadPoolExecutor, as_completed

CONCURRENCY = 4


def calculate_square(number):
    return number ** 2


tasks = []
with ThreadPoolExecutor(CONCURRENCY) as executor:
    for number in range(10):
        tasks.append(executor.submit(calculate_square, number))
    for task in as_completed(tasks):
        result = task.result()
        print(result)
```

Sintaxis y ortografía

Gestores de contexto

example.py

```python
# Class definition:
class DatabaseConnection(object):
    def __init__(self, db_name):
        self.db_name = db_name

    def __enter__(self):
        self.db_resource = open_db_resource(self.db_name)

        return self.db_resource

    def __exit__(self, *args):
        self.db_resource.close()



# Use example:
with DatabaseConnection('my_database') as db_connection:
    db_connection.save_entity(my_entity)

```

Sintaxis y ortografía:
Control de excepciones

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Sintaxis y ortografía

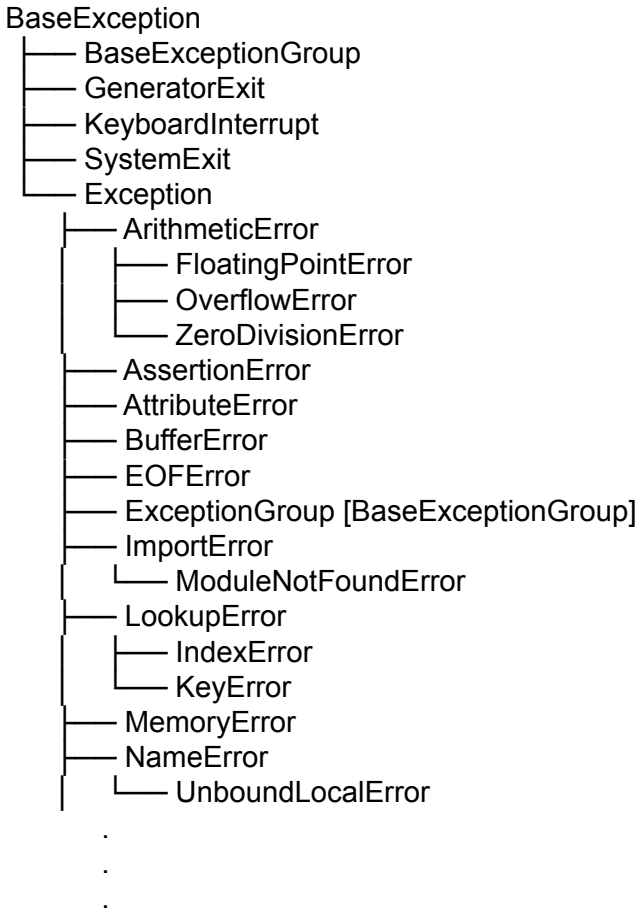
Sintaxis control de excepciones

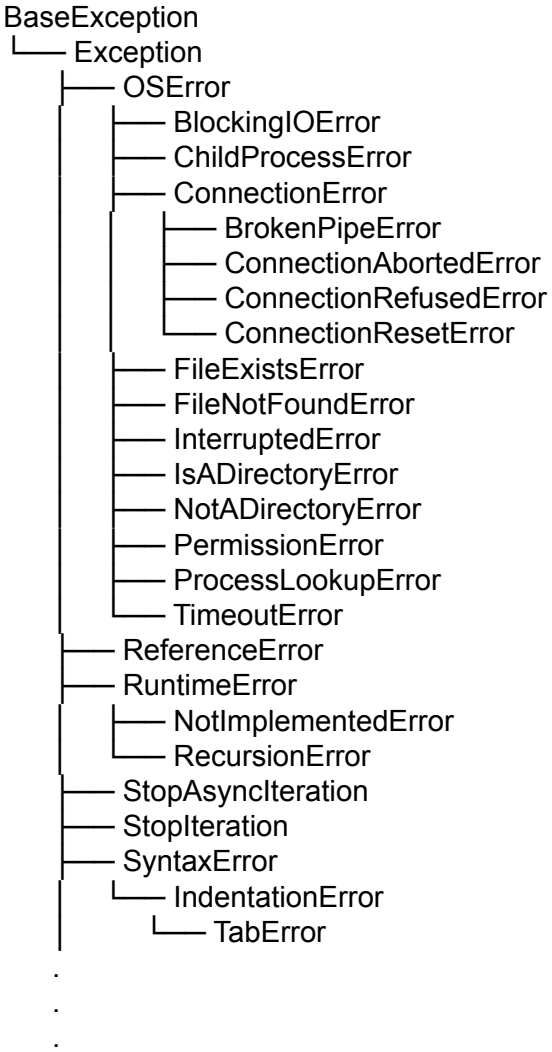
example.py

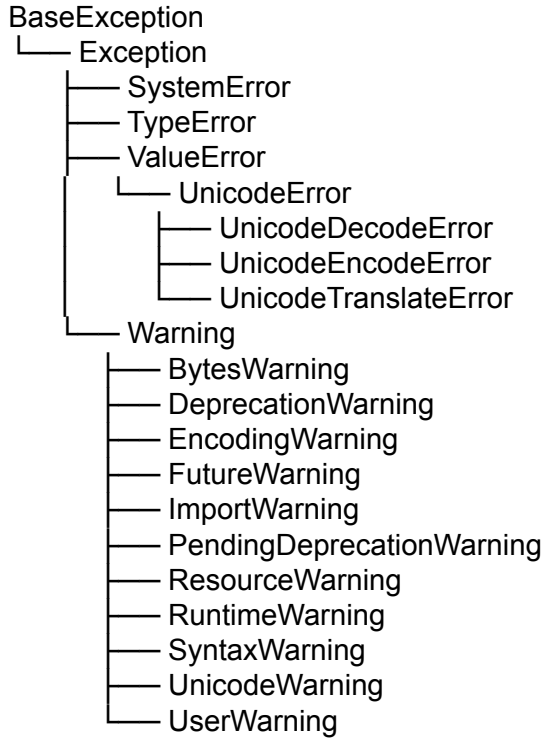
```python
try:
    # Try to execute code that may raise an exception
    number = int(input("Enter a number: "))
    result = 10 / number
    print("The result is:", result)

except ZeroDivisionError:
    # Catch the ZeroDivisionError exception if it occurs
    print("Error: You can't divide by zero.")

except ValueError as e:
    # Catch the ValueError exception if it occurs, and display the error message
    print(f"Error: {e}")

except Exception as e:
    # Catch any other unhandled exceptions
    print(f"Unexpected error: {e}")

else:
    # This block executes if no exception is raised
    print("Operation successful.")

finally:
    # This block always executes, regardless of whether there was an exception
    print("End of the program.")

```

Sintaxis y ortografía

Tipos de excepciones







Sintaxis y ortografía

Ejemplo de control de excepciones

example.py

```python
# Custom exception class for Shrek-related errors
class ShrekException(Exception):
    def __init__(self, message="Oops! Something Shrektastic happened."):
        super().__init__(message)

# Function that may raise the custom ShrekException
def is_it_swampy():
    swamp_decision = input("Is it swampy? (yes/no): ").lower().strip()
    if swamp_decision != "yes":
        raise ShrekException("This is not a swamp! Shrek would not approve.")

def shrek_color():
    what_colour = input("What's your favourite colour?: ").lower().strip()
    if what_colour != "green":
        raise ShrekException("Why not green! Shrek would not approve.")

try:
    is_it_swampy()
    shrek_color()
    print("If you can see this, shrek is happy and no exception was raised")
except ShrekException as e:
    print(f"Shrek Exception: {e}")

```

Importación de código:
Módulos, paquetes e importaciones

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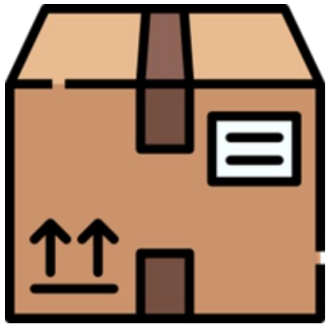
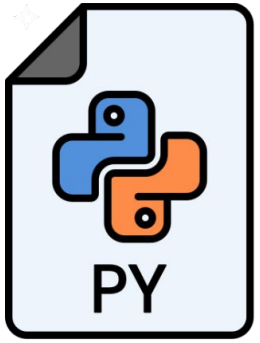
Importación de código

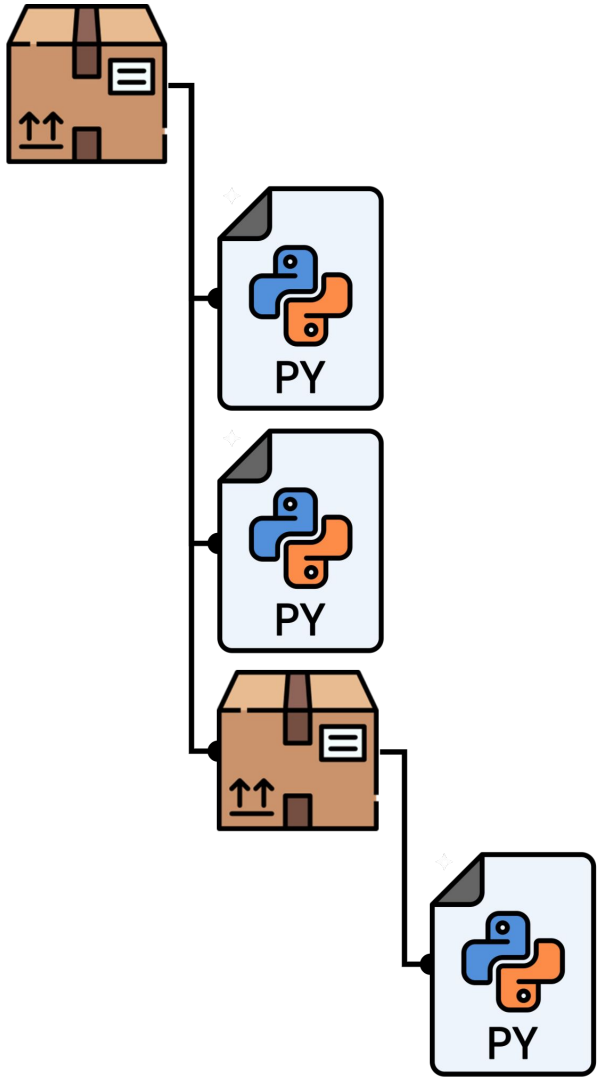
Módulos y paquetes



package



module.py



Organización de paquetes y modulos

Importación de código

Como importar código

example.py

```python
import module
import package.module
import package.subpackage.module
import module_1, module_2
import module as custom_name

from module import object
from package.module import object
from module import object_1, object_2

```

Importación de código

Módulos y paquetes

```
animals/
    • animal.py
    • dog.py
    • pet.py
main.py
```

animal.py

```python
class Animal:
    def __init__(self, name):
        self.name = name

    def speak(self):
        pass

```

Importación de código

Módulos y paquetes

```
animals/
    • animal.py
    • dog.py
    • pet.py
main.py
```

pet.py

```python
from .animal import Animal


class Pet(Animal):
    def __init__(self, name, owner):
        super().__init__(name)
        self.owner = owner

    def introduce(self):
        return f"{self.name} is owned by {self.owner}."

```

Importación de código

Módulos y paquetes

```
animals/
    • animal.py
    • dog.py
    • pet.py
main.py
```

dog.py

```python
from .pet import Pet


class Dog(Pet):
    def __init__(self, name, owner, breed):
        super().__init__(name, owner)
        self.breed = breed

    def speak(self):
        return f"{self.name} the dog ({self.breed}) says Woof!"

```

Importación de código

Módulos y paquetes

```
animals/
    • animal.py
    • dog.py
    • pet.py
main.py
```

main.py

```python
from animals.dog import Dog


# Creating instances of derived classes with new attributes
dog = Dog("Browny", "Carlos", "Pitbull")

# Using methods and accessing new attributes
print(dog.introduce())
# Browny is owned by Carlos.
print(dog.speak())
# Browny the dog (Pitbull) says Woof!

```

Importación de código:
Librerías externas

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Importación de código

Python Package Index (PyPI)

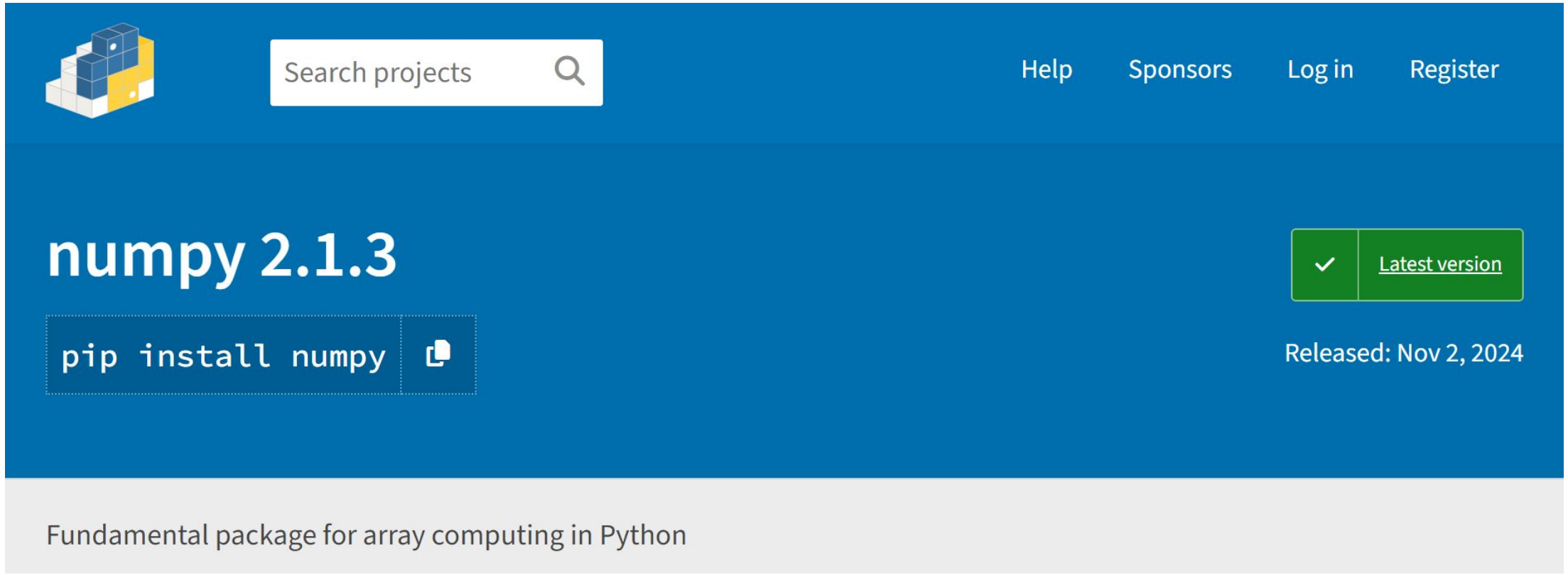
Python Package Index (PyPI)

Importación de código

Instalación de dependencias

Importación de código

Instalación de dependencias



Importación de código

Instalación de dependencias

terminal

```
pip install numpy
```

example.py

```
1 import numpy as np
2
3 a = np.array([[1, 2, 3], [4, 5, 6]])
```

Librerías externas

Gestionar dependencias – requirements.txt

requirements.txt

```
# Framework
fastapi==0.115.0
uvicorn==0.30.6

# Database connection
pymongo==4.9.1

# Operation
numpy==2.1.1

# Testing
pytest==8.3.3

```

Para instalar las dependencias:

terminal

```
pip install -r requirements.txt
```

Importación de código

Gestionar dependencias – pipenv

Para instalar las dependencias:

terminal

```
pipenv install fastapi==0.115.0
```

Pipfile

```
[[source]]
url = "https://pypi.org/simple"
verify_ssl = true
name = "pypi"

[packages]
fastapi = "==0.115.0"
uvicorn = "==0.30.6"
pymongo = "==4.9.1"
numpy = "==2.1.1"

[dev-packages]
pytest = "==8.3.3"

[requires]
python_version = "3.13"
python_full_version = "3.13.0"

```

Entresijos:
Referencia o valor

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Sintaxis y ortografía

Los argumentos por referencia o por valor

Sintaxis y ortografía

Los argumentos por referencia o por valor

example.py

```python
def modify_number(num):
    num += 10
    return num

x = 5
result = modify_number(x)
# x = 5 (unchanged)
# result = 15 (modified and returned inside the function)

```

Sintaxis y ortografía

Los argumentos por referencia o por valor

example.py

```python
def modify_list(my_list):
    my_list.append(4)
    return my_list

my_list = [1, 2, 3]
result = modify_list(my_list)
# my_list = [1, 2, 3, 4] (modified inside the function)
# result = [1, 2, 3, 4] (same list)

```

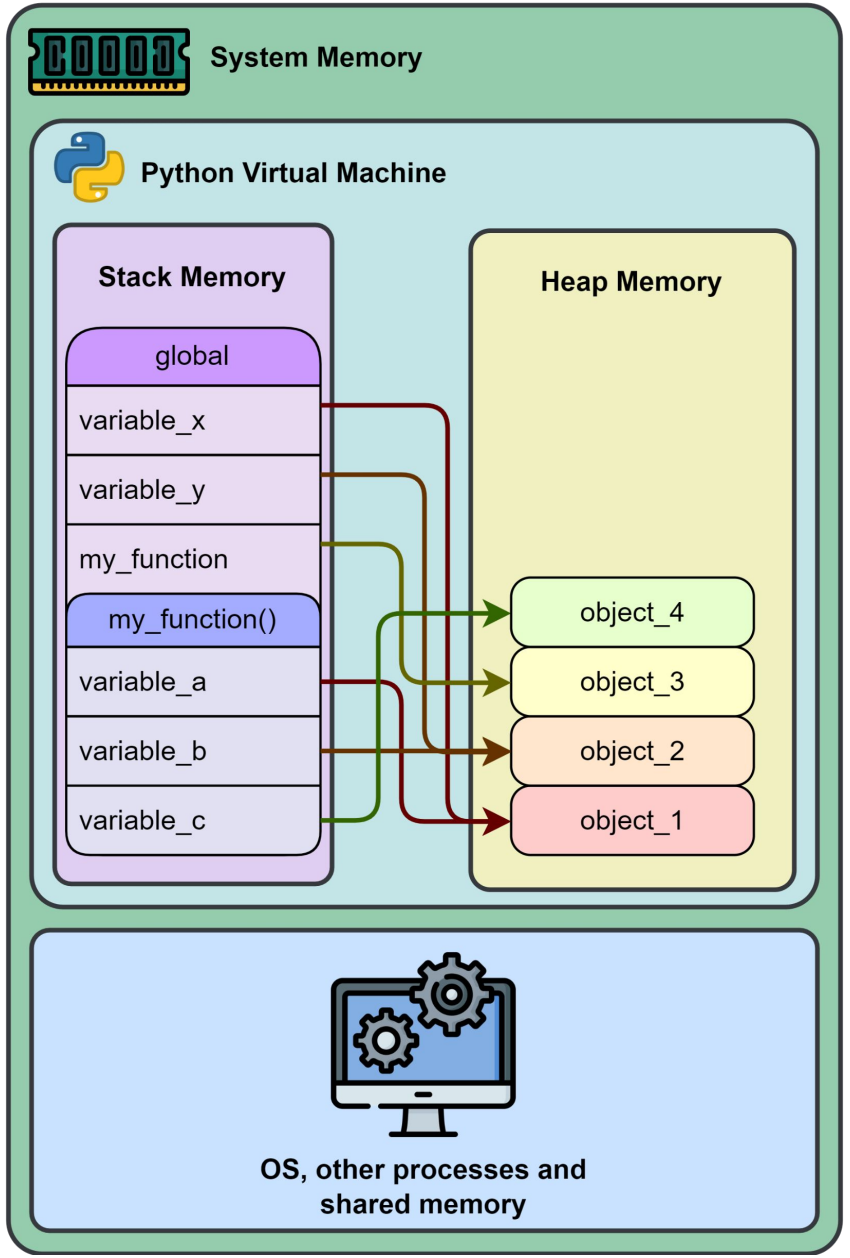
Sintaxis y ortografía

Los argumentos por referencia o por valor

No es lo mismo reasignar que modificar…

example.py

```
1 # Reassign
2 variable_a = "red"
3
4 variable_a = "blue"
5
6
7 # Modify
8 variable_b = ["eggs"]
9
10 variable_b.append("potatoes")
```



Entresijos:
Funcionamiento de los import

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Entresijos

Funcionamiento de import

module_a.py

```python
import module_b


def function_a():
    # Do some stuff...
    print("function_a called")
    module_b.function_b()


function_a()

```

module_b.py

```python
def function_b():
    # Do some stuff...
    print("function_b called")


function_b()

```

terminal

```
$ python module_a.py
function_b called
function_a called
function_b called
```

Entresijos

Funcionamiento de import

module_a.py

```python
from module_b import function_b


def function_a():
    # Do some stuff...
    print("function_a called")
    function_b()


function_a()

```

module_b.py

```python
def function_b():
    # Do some stuff...
    print("function_b called")


function_b()

```

terminal

```
$ python module_a.py
function_b called
function_a called
function_b called
```

Entresijos

if __name__ == '__main__':

module_a.py

```python
import module_b


def function_a():
    # Do some stuff
    print("function_a called")
    module_b.function_b()


if __name__ == '__main__':
    function_a()

```

module_b.py

```python
def function_b():
    # Do some stuff
    print("function_b called")


if __name__ == '__main__':
    function_b()

```

terminal

```
$ python module_a.py
function_a called
function_b called
```

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¡Muchas gracias!

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