

FONDAMENTI DI INFORMATICA

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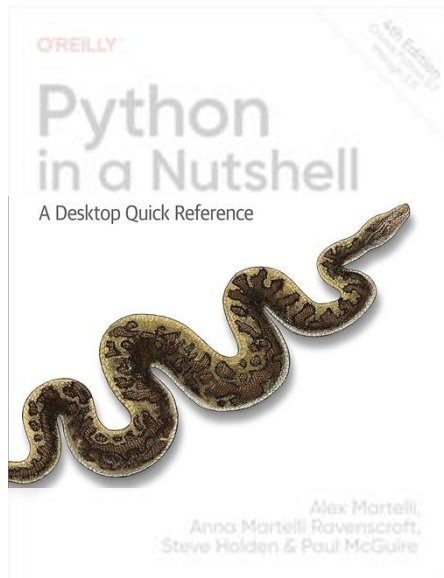
INTRODUZIONE A PYTHON E SETUP

Anno Accademico 2024/2025

Introduzione

Introduzione

- Ideato da Guido von Rossum all'inizio degli anni '90
- Libero, gratuito, open source
- Multi-piattaforma (Linux, Windows, MacOS, ...)
- Spesso descritto come *modern, general-purpose, object-oriented, high-level programming language*



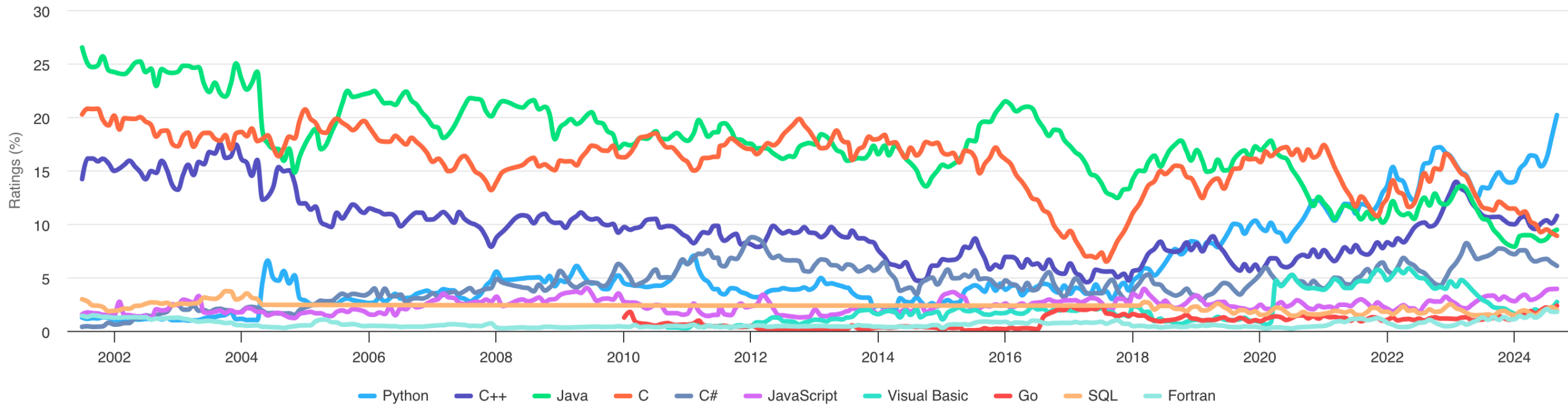
I **Monty Python** sono stati un gruppo comico **britannico**, attivo principalmente dal **1969** al **1983** e costituito da **Graham Chapman**, **John Cleese**, **Terry Gilliam**, **Eric Idle**, **Terry Jones** e **Michael Palin**.



Introduzione

TIOBE Programming Community Index

Source: www.tiobe.com



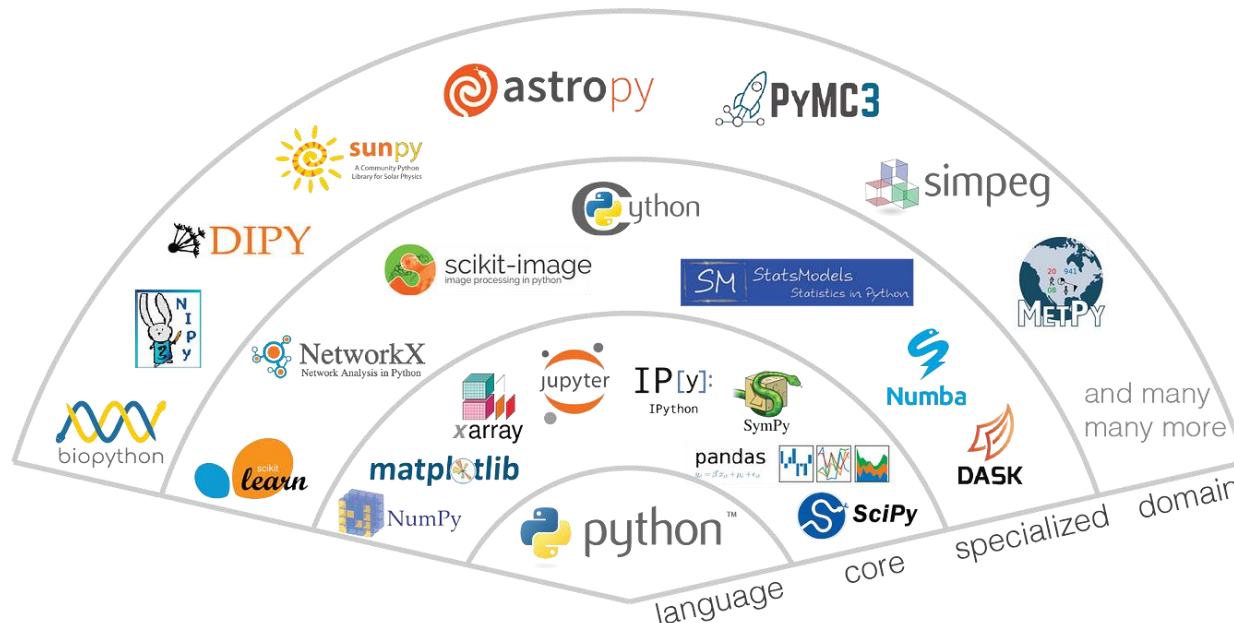
TIOBE index wiki: https://it.wikipedia.org/wiki/TIOBE_Programming_Community_Index

TIOBE index homepage: <https://www.tiobe.com/tiobe-index/>

- Altre stime: <https://spectrum.ieee.org/top-programming-languages-2024>

Introduzione

- Ecosistema "batteries included"
 - *Standard library* ricca e versatile immediatamente disponibile (200+ moduli)
 - Per dare un'occhiata: <https://docs.python.org/3/py-modindex.html>
- In aggiunta, possiamo accedere a centinaia di migliaia di componenti



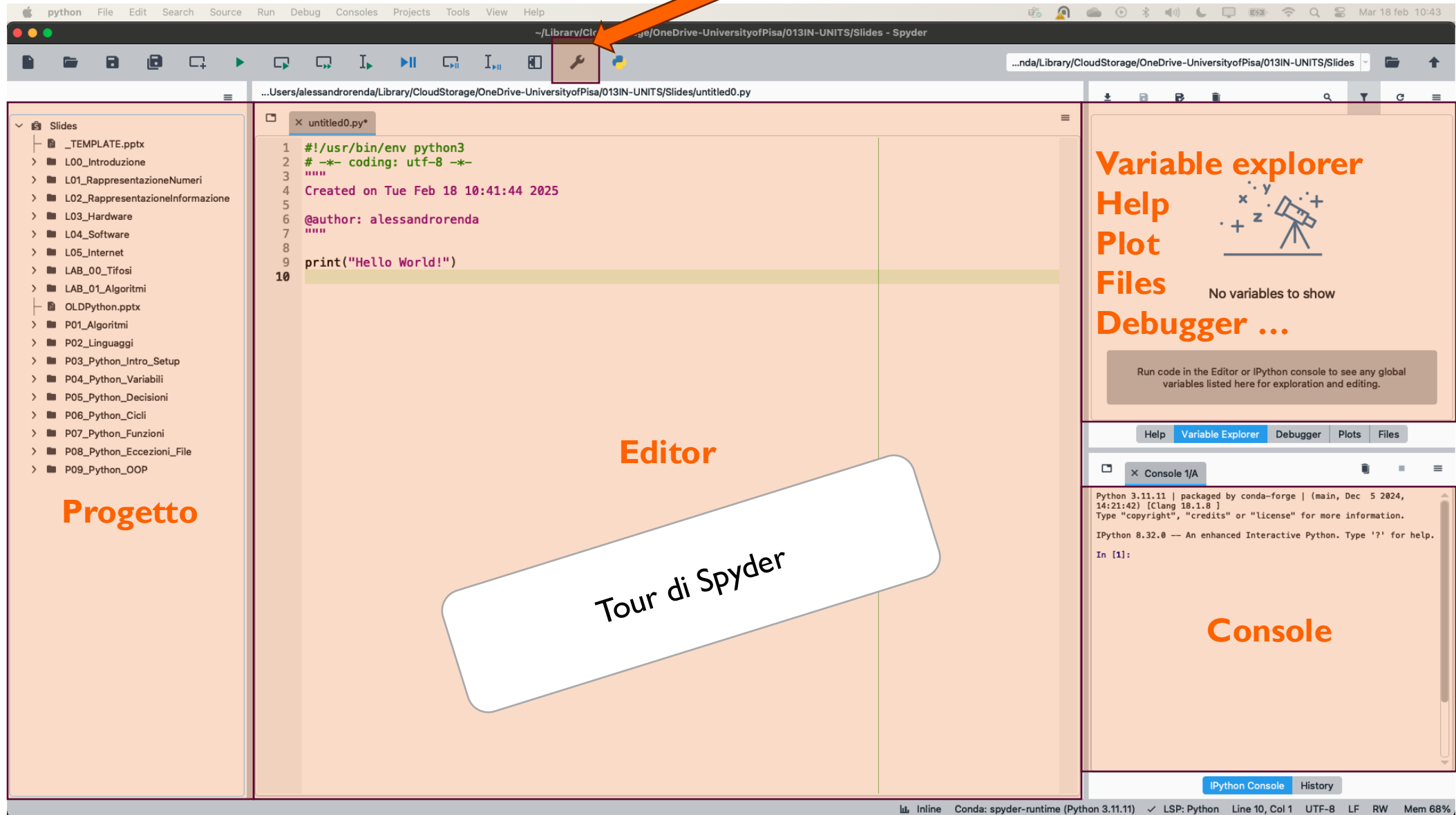
Ambienti di sviluppo

Ambienti di sviluppo

- Ambiente di sviluppo - *integrated development environment* (IDE)
 - Programma che consiste di un editor di codice sorgente, dell'interprete Python e spesso di altre *facilities* (*debugger, version control tools ...*)
- Varie sfumature e varie alternative
 - Tradizionali: **Spyder**, IDLE, PyCharm, Visual Studio Code, ...
 - Interattivi e Notebook: IPython, Jupyter Notebook, Google Colab
 - Online: **PythonAnywhere**, PythonTutor, Repl.it

IDE Tradizionale: Spyder

Impostazioni



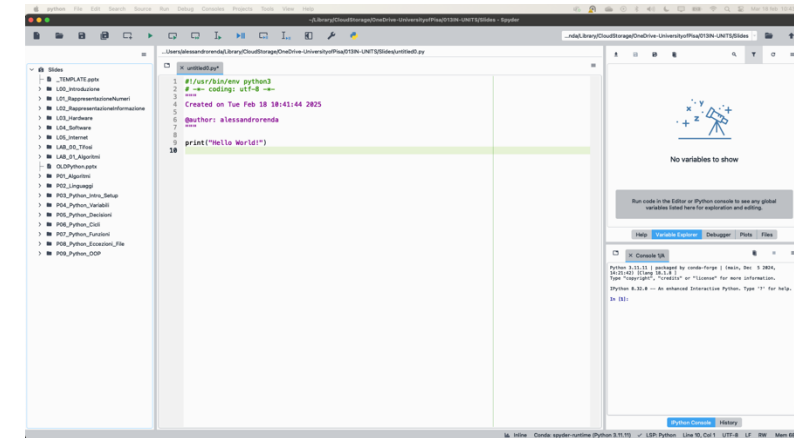
IDE Tradizionale: Spyder



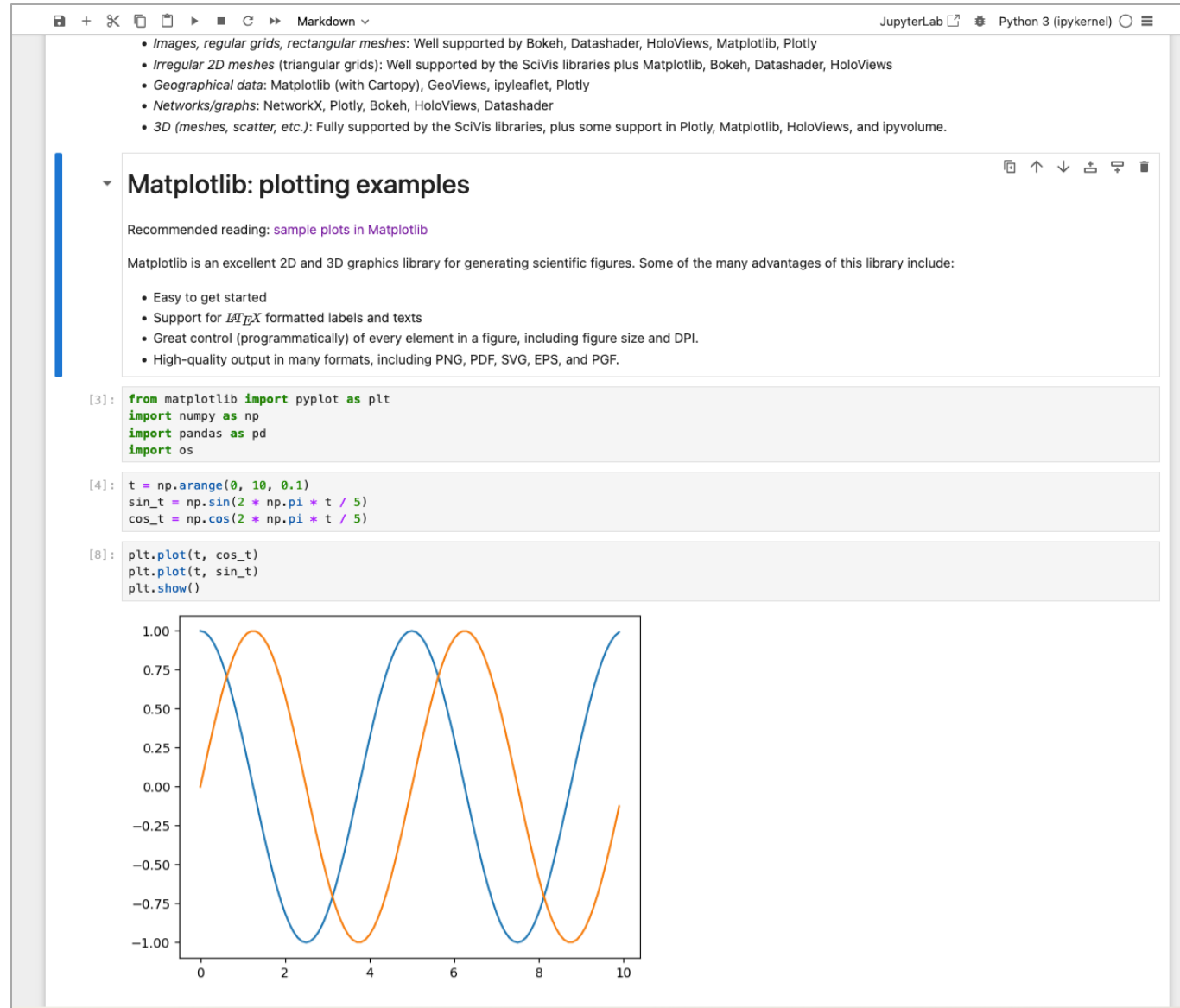
- Spyder ci permette di associare una cartella ad un **progetto**
- Particolarmente utile per orientarsi fra file e sottocartelle diverse quando il nostro programma ne richiede molti
- Consiglio operativo:
 - Creare un nuovo progetto (cartella) per ogni nuovo programma
 - Quindi, creare uno o più file Python all'interno del progetto

IDE Tradizionale: Spyder

- Pro
 - *Facile* da installare ed utilizzare
 - *Batteries included* potenziato
- Contro
 - Potremmo avere differenti versioni di Spyder e differenti versioni di Python
 - Richiede circa 2 – 3 GB di spazio su disco
 - La gestione di *versioni di Python*, *environment* e *pacchetti* non inclusi nell'installer originale richiede un po' di sforzo aggiuntivo: <https://docs.spyder-ide.org/current/faq.html#using-packages-installer>



Interattivi e Notebook



Soluzioni online

- <https://eu.pythonanywhere.com/>

The screenshot shows the PythonAnywhere dashboard for user **alere90**. The top navigation bar includes links for **Send feedback**, **Forums**, **Help**, **Blog**, **Account**, and **Log out**. The main header displays the PythonAnywhere logo and navigation tabs for **Dashboard**, **Consoles**, **Files**, **Web**, **Tasks**, and **Databases**. The dashboard content includes a welcome message, resource usage statistics (CPU and File storage), and sections for Recent Consoles, Recent Files, Recent Notebooks, and All Web apps. A message indicates that the account does not support Jupyter Notebooks.

pythonanywhere
by ANACONDA

Dashboard Consoles Files Web Tasks Databases

Welcome, **alere90**

CPU Usage: 0% used – 0.00s of 100s. Resets in 4 hours, 21 minutes [More Info](#)

File storage: 2% full – 8.6 MB of your 512.0 MB quota [More Info](#)

Recent Consoles [+ 5 -](#)

- Bash console 670179
- Bash console 670180

Recent Files [+ 5 -](#)

- /home/alere90/script.py
- /home/alere90/module.py
- /home/alere90/2.4_Modules_Package...
- /home/alere90/2.3_Functions_Classes...
- /home/alere90/2.2_Control_Flow.py

Recent Notebooks [+ 5 -](#)

Your account does not support Jupyter Notebooks. [Upgrade your account](#) to get access!

All Web apps

You don't have any web apps. [Open Web tab](#)

New console:

You can have up to 2 consoles. To get more, [upgrade your account!](#)

[+ Open another file](#) [Browse files](#)

Tour di PythonAnywhere

The screenshot shows the PythonAnywhere code editor for user **alere90**. The editor displays a Python script named `hello.py` with the following code:

```
1 from datetime import datetime
2 print("Hello, the time is {}".format(datetime.now()))
```

The interface includes a top bar with **Keyboard shortcuts**, **Normal** dropdown, **Share**, **Save**, **Save as...**, and **>>> Run** buttons. The output area at the bottom shows the result of the script execution: `, the time is 2025-02-18 10:09:36.999629`.

Soluzioni online

- <https://eu.pythonanywhere.com/>
 - Il codice viene eseguito sulla piattaforma di cloud computing Amazon Web Services
- Pro
 - Ambiente di sviluppo già installato e configurato
 - È sufficiente accedere via browser, non è necessaria alcuna configurazione locale
 - *Batteries included* potenziato: https://eu.pythonanywhere.com/batteries_included/
 - Supporto "Education"
 - Funzionalità ulteriori
- Contro
 - La versione gratuita ha limiti: **2** consoles, **100 s** di CPU al giorno, **512 MB** spazio

Istruzioni per installazione e setup

- Spyder
 - Collegarsi al sito <https://www.spyder-ide.org/download/>
 - Scaricare la versione compatibile con il proprio sistema operativo
 - Avviare il programma di installazione e seguire i passaggi


Istruzioni per installazione e setup

- Python Anywhere
 - Creare un account su <https://eu.pythonanywhere.com/>
 - Account → Education → Aggiungere come *teacher*
 - Potrò copiare file dal mio account al vostro account e viceversa
 - **Warning:** questo significa che avrò completo accesso a tutto ciò che avete su *PythonAnywhere*: console, file, cartelle

Istruzioni per installazione e setup

[Send feedback](#) [Forums](#) [Help](#) [Account](#) [Log out](#)

You are currently using PythonAnywhere as [alere90](#) ▼

 pythonanywhere
by ANACONDA.

[Dashboard](#) [Consoles](#) [Files](#) [Web](#) [Tasks](#) [Databases](#)

Up here you will see instructions walking you through the key features of our Education beta.

(If after closing this helper, you want to go through it again – or try another one – go to the [Help page](#))

→

Close this tutorial

Dashboard

Welcome, [alere90](#)

CPU Usage: 19% used – 19.04s of 100s. Resets in 1 hour, 45 minutes [More Info](#)

File storage: 2% full – 8.6 MB of your 512.0 MB quota [More Info](#)

[Upgrade Account](#)

Recent
Consoles

+ 5 -

You have no recent consoles.

[View all](#)

New console:

Recent
Files

+ 5 -

[/home/alere90/Lab_00/Tifosi.py](#)

[/home/alere90/prova2.py](#)

[/home/alere90/hello.py](#)

[/home/alere90/script.py](#)

Recent
Notebooks

+ 5 -

Your account does not support Jupyter Notebooks. [Upgrade your account](#) to get access!

All
Web apps

+ 5 -

You don't have any web apps.

[Open Web tab](#)

Istruzioni per installazione e setup

Send feedback Forums Help Blog Account Log out

You are currently using PythonAnywhere as [alere90](#) ▼

[Dashboard](#) [Consoles](#) [Files](#) [Web](#) [Tasks](#) [Databases](#)

Up here you will see instructions walking you through the key features of our Education beta.

(If after closing this helper, you want to go through it again – or try another one – go to the [Help page](#))

[Close this tutorial](#)[Upgrade/Downgrade Account](#)[Security](#)[Email](#)[Education](#)[API Token](#)[System Image](#)

As part of our [Education beta](#), users can now nominate another user to be their "teacher". [Find out more.](#)

Your teacher

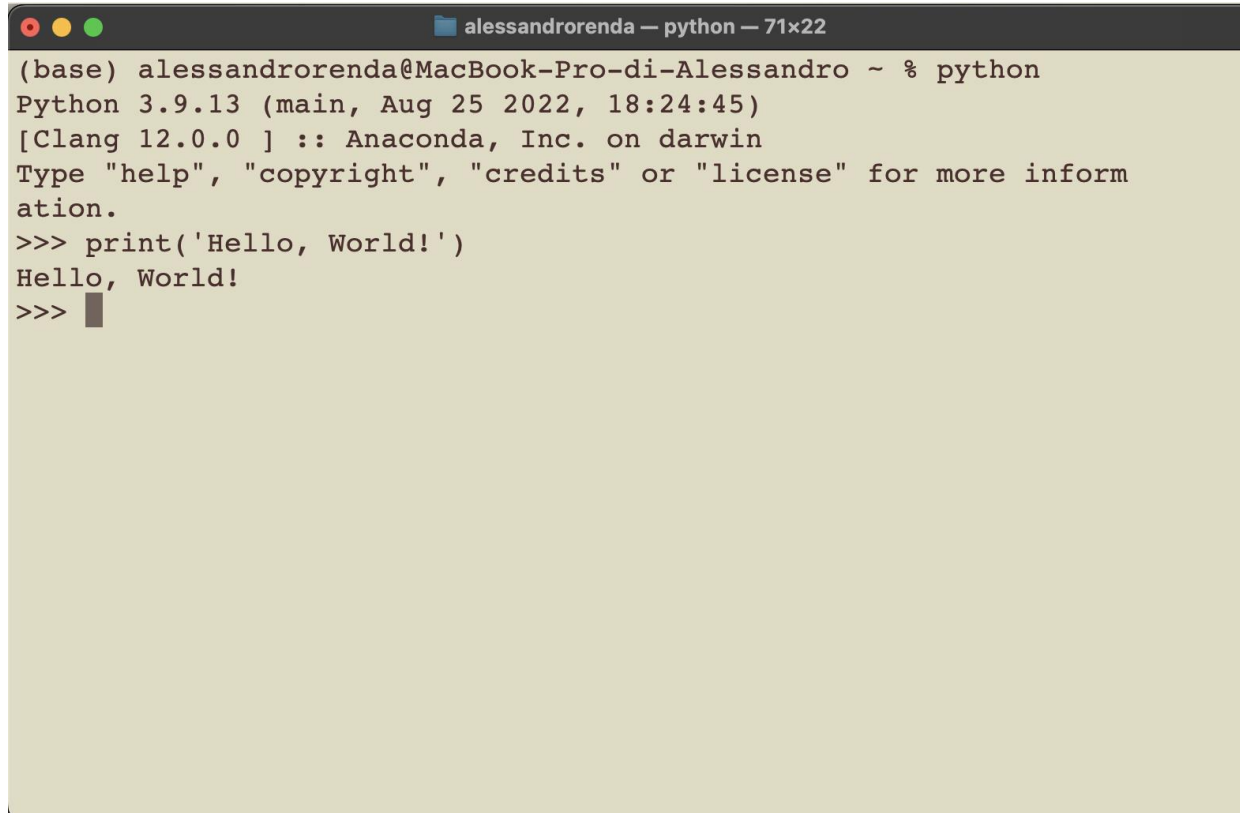
You can set who your teacher is below. **Warning!** this means they have [full access](#) to all your consoles, files and folders on PythonAnywhere, so you should make sure it's someone you trust!

You can revoke their access at any time by resetting the input field below. Blank means you don't have a teacher.

Esecuzione di codice Python

Interagire con l'interprete

- Su linux e MacOS, è sufficiente digitare python sul terminale
- Su Windows è più complicato (non lo vedremo)



```
(base) alessandrorenda@MacBook-Pro-di-Alessandro ~ % python
Python 3.9.13 (main, Aug 25 2022, 18:24:45)
[Clang 12.0.0 ] :: Anaconda, Inc. on darwin
Type "help", "copyright", "credits" or "license" for more information.
>>> print('Hello, World!')
Hello, World!
>>>
```

- I simboli >>> rappresentano il prompt, dove è possibile digitare il codice.
- L'interprete attende le nostre istruzioni passo dopo passo.
- Viene definito REPL (*read-eval-print loop*)

```
while True:
    code = input(">>> ")
    exec(code)
```

Interagire con l'interprete su *PythonAnywhere*

The screenshot displays the PythonAnywhere dashboard for user `alere90`. At the top, a navigation bar includes links for [Send feedback](#), [Forums](#), [Help](#), [Blog](#), [Account](#), and [Log out](#). Below this, a status bar indicates the user is logged in as `alere90`. The main header features the PythonAnywhere logo and navigation tabs for [Dashboard](#), [Consoles](#), [Files](#), [Web](#), [Tasks](#), and [Databases](#).

A green tutorial box is present, stating: "Up here you will see instructions walking you through the key features of our Education beta. (If after closing this helper, you want to go through it again – or try another one – go to the [Help page](#))". It includes a right arrow icon and a "Close this tutorial" button.



The dashboard content area shows system metrics: "CPU Usage: 22% used – 22.28s of 100s. Resets in 29 minutes" and "File storage: 2% full – 8.6 MB of your 512.0 MB quota", both with "More Info" links. An "Upgrade Account" button is located on the right.

Four panels are visible: "Recent Consoles" (empty), "Recent Files" (listing `/home/alere90/Lab_00/Tifosi.py`, `/home/alere90/prova2.py`, `/home/alere90/hello.py`, `/home/alere90/script.py`, and `/home/alere90/module.py`), "Recent Notebooks" (with a message that the account does not support Jupyter Notebooks and an "Upgrade your account" link), and "All Web apps" (empty).


The "New console:" section, highlighted with an orange box, allows creating a new console. It features a dropdown menu with options for "\$ Bash", ">>> Python", and a "More..." button. Below the dropdown, a "Version" selector shows buttons for Python versions 3.7, 3.8, 3.9, and 3.10. At the bottom of the dashboard, there are buttons for "+ Open another file" and "Browse files".

Interagire con l'interprete su *PythonAnywhere*

You are currently using PythonAnywhere as [alere90](#)

 [Python3.10 console 678574](#) [Share with others](#) 

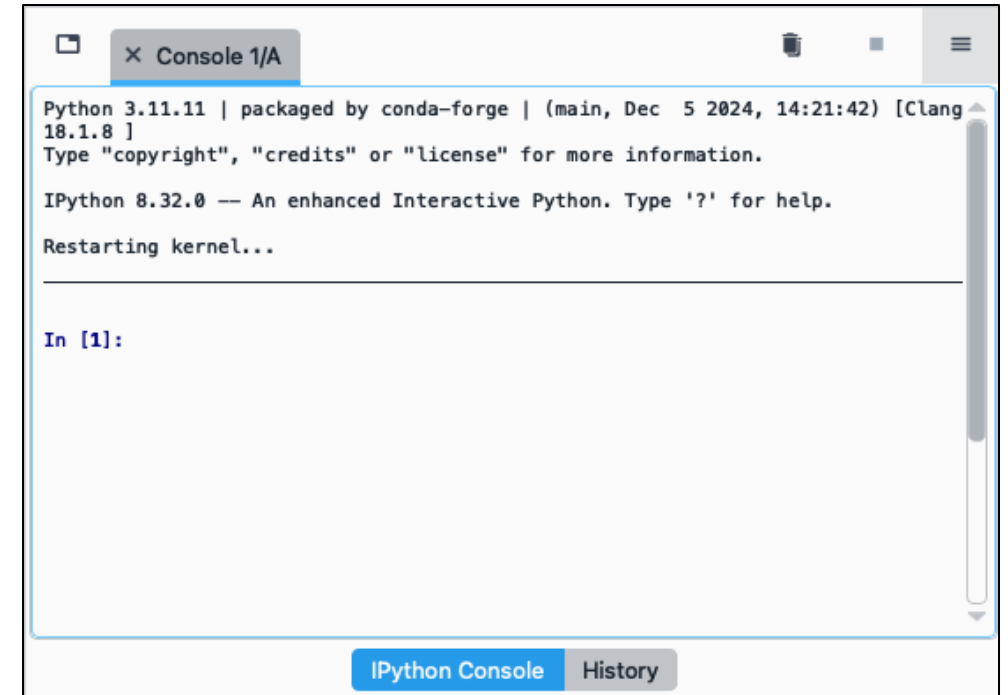
Up here you will see instructions walking you through the key features of our Education beta.
(If after closing this helper, you want to go through it again – or try another one – go to the [Help page](#))

 [Close this tutorial](#)

```
Python 3.10.5 (main, Jul 22 2022, 17:09:35) [GCC 9.4.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> print('Hello world!')
Hello world!
>>> 
```

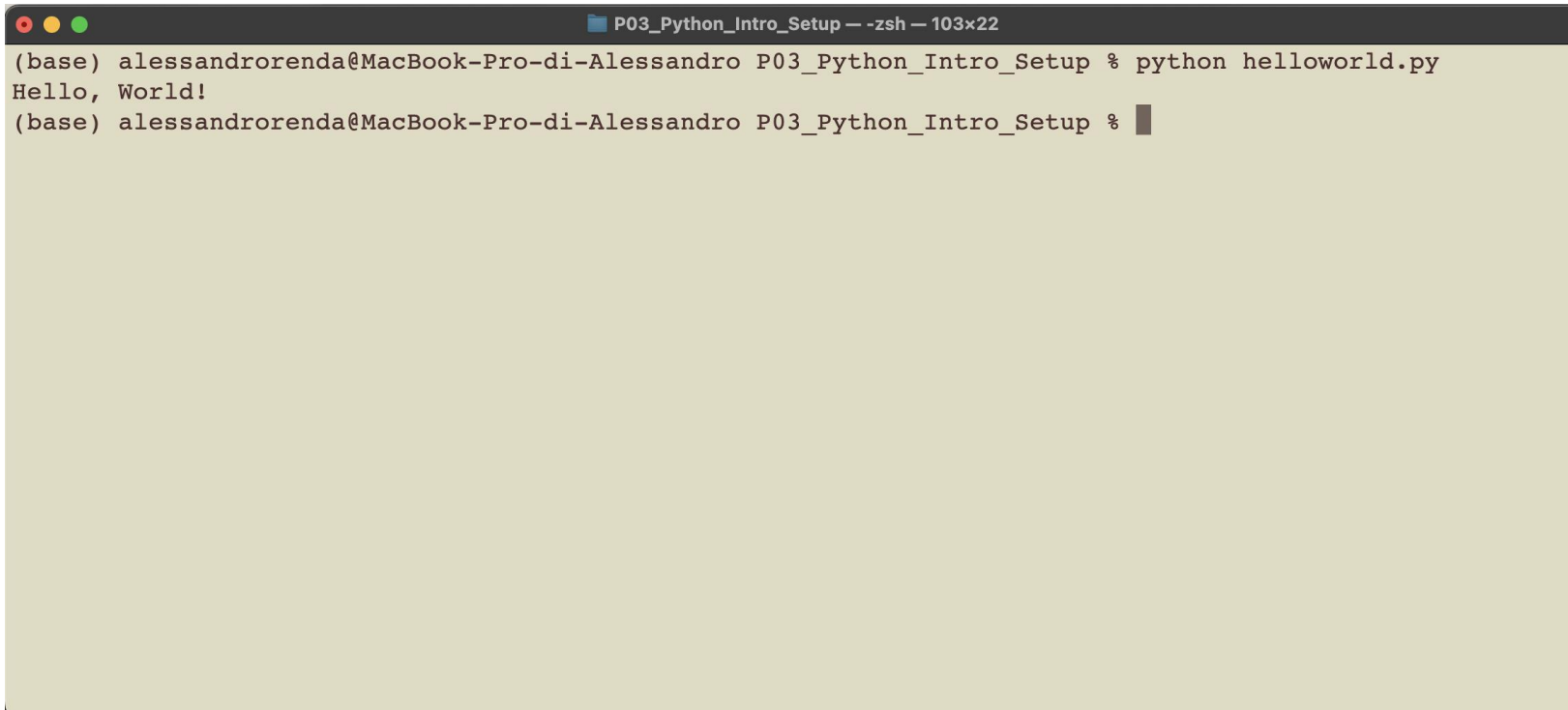
Interagire con l'interprete su *Spyder*

- Console IPython (*Interactive Python*)
- Simile all'interprete standard ma con più funzionalità, tra cui:
 - Completamento del codice
 - Meccanismo di *command history*
 - Aspetto grafico migliorato



Eseguire file python

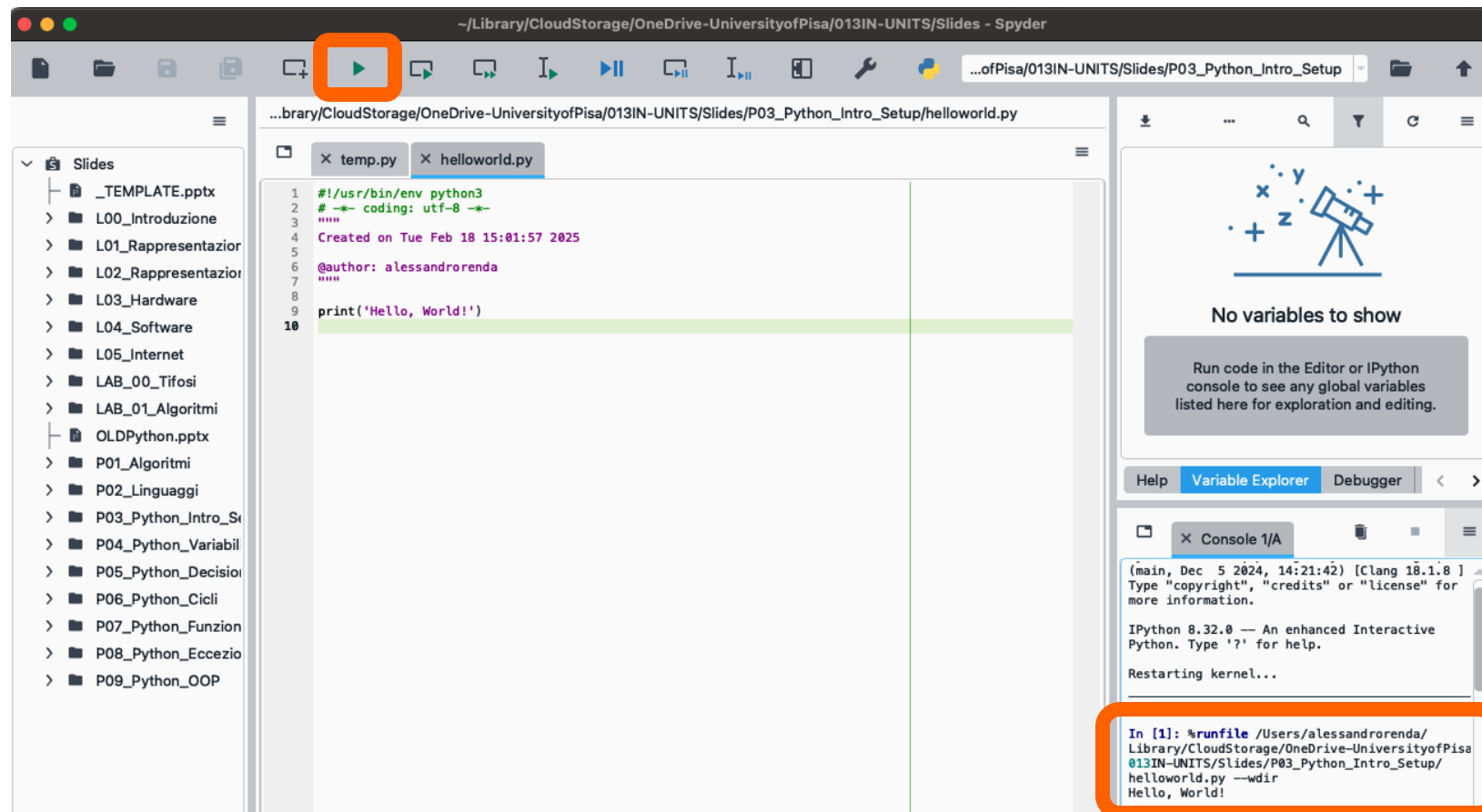
- Digito python seguito dal **percorso relativo del file** che desidero eseguire

A screenshot of a terminal window titled "P03_Python_Intro_Setup - zsh - 103x22". The terminal shows a user prompt "(base) alessandrorenda@MacBook-Pro-di-Alessandro P03_Python_Intro_Setup %". The user enters the command "python helloworld.py". The terminal outputs "Hello, World!". The prompt then changes to "(base) alessandrorenda@MacBook-Pro-di-Alessandro P03_Python_Intro_Setup %" with a cursor at the end.

```
(base) alessandrorenda@MacBook-Pro-di-Alessandro P03_Python_Intro_Setup % python helloworld.py
Hello, World!
(base) alessandrorenda@MacBook-Pro-di-Alessandro P03_Python_Intro_Setup %
```

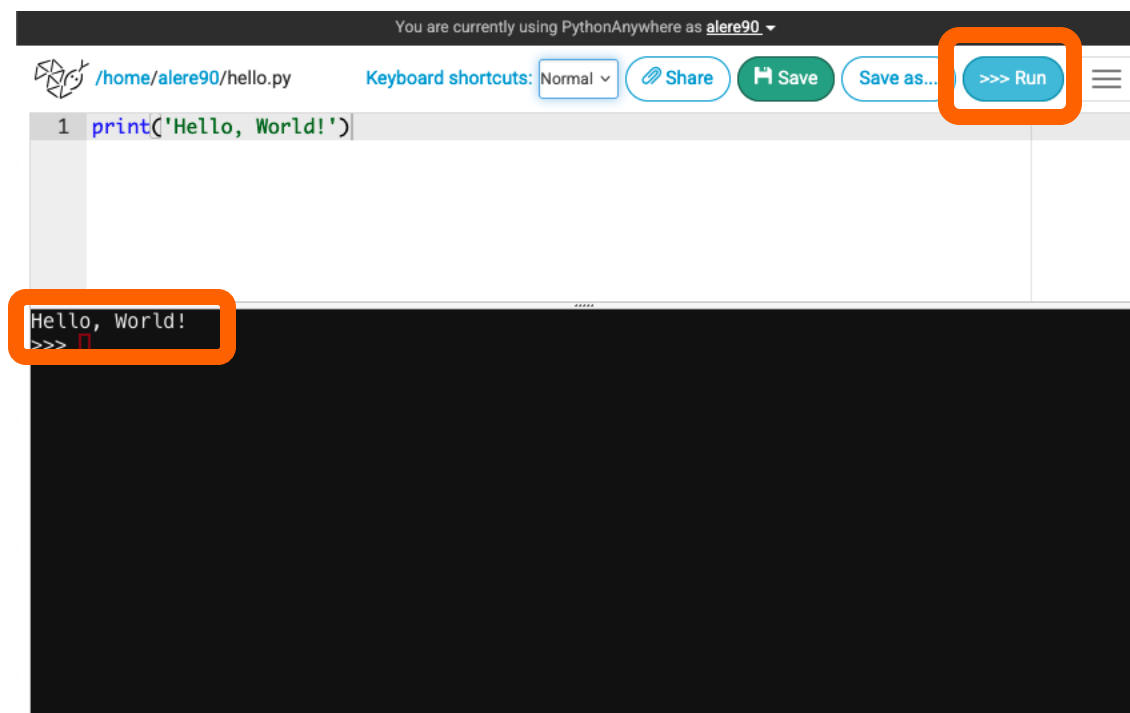
Eseguire file python su *Spyder* e *PythonAnywhere*

- Ci limiteremo a questo utilizzo



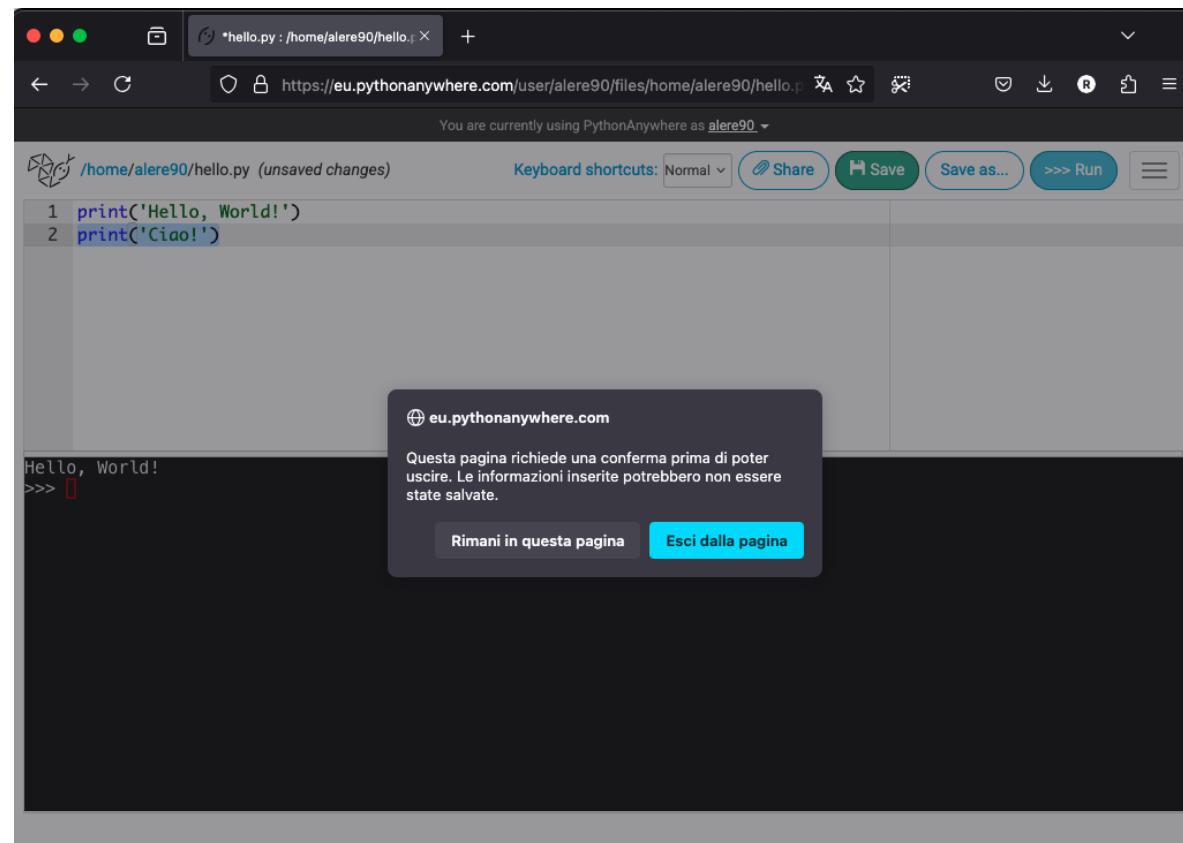
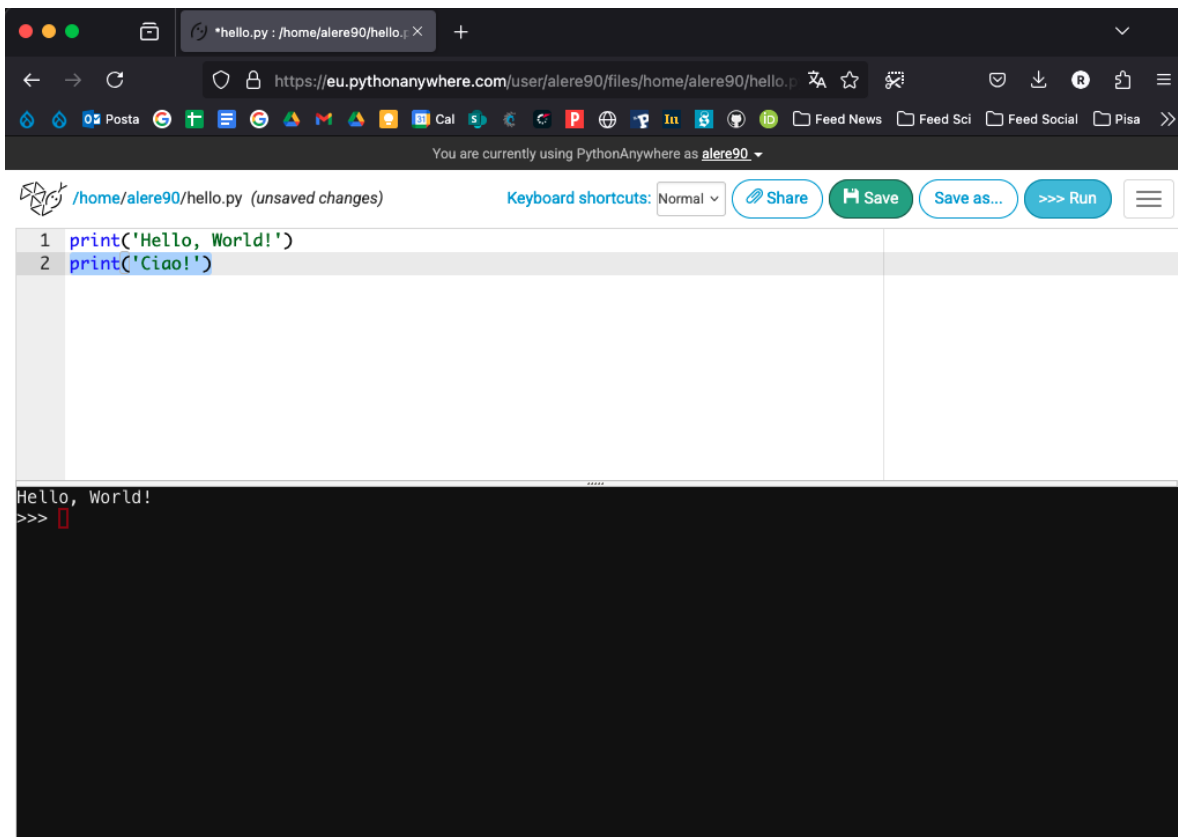
Eseguire file python su *Spyder* e *PythonAnywhere*

- Ci limiteremo a questo utilizzo



Alcune possibili insidie

PythonAnywhere



Spyder

The screenshot displays the Spyder Python IDE interface. The top toolbar contains icons for file operations and code execution. The left sidebar shows a file explorer with a tree view of the 'Slides' directory, listing files like '_TEMPLATE.pptx', 'L00_Introduzione', 'L01_Rappresentazi', 'L02_Rappresentazi', 'L03_Hardware', 'L04_Software', 'L05_Internet', 'LAB_00_Tifosi', 'LAB_01_Algoritmi', 'OLDPython.pptx', 'P01_Algoritmi', 'P02_Linguaggi', 'P03_Python_Intro_', 'P04_Python_Variat', 'P05_Python_Decisi', 'P06_Python_Cicli', 'P07_Python_Funzi', 'P08_Python_Eccez', and 'P09_Python_OOP'.

The central code editor shows a file named 'untitled2.py' with the following Python code:

```
1 #!/usr/bin/env python3
2 # -*- coding: utf-8 -*-
3 """
4 Created on Tue Feb 18 15:44:38 2025
5
6 @author: alessandrorenda
7 """
8
9 saluto = 'Hello World'
10 print(saluto)
```

The right sidebar contains the Variable Explorer, which displays a table of variables:

Name	Type	Size	Value
saluto	str	11	Hello World

Below the Variable Explorer is the IPython Console, which shows the output of the code execution:

```
Python 3.11.11 | packaged by conda-forge | (main, Dec 2024, 14:21:42) [Clang 18.1.8 ]
Type "copyright", "credits" or "license" for more information.

IPython 8.32.0 -- An enhanced Interactive Python. Type '?' for help.

Restarting kernel...

In [1]: %runfile /Users/alessandrorenda/Library/CloudStorage/OneDrive-UniversityofPisa/013IN-UNITS/Slides/untitled2.py --wdir
Hello World

In [2]:
```

The bottom status bar indicates the current state: 'Inline', 'Conda: spyder-runtime (Python 3.11.11)', 'LSP: Python', 'Line 10, Col 14', 'UTF-8', 'LF', 'RW', and 'Mem 70%'.

The screenshot displays the Spyder Python IDE interface. The top toolbar contains icons for file operations and code execution. The left sidebar shows a file explorer with a tree view of a project named 'Slides', containing various subfolders and files like '_TEMPLATE.pptx', 'L00_Introduzione', and 'P09_Python_OOP'. The central code editor is open to a file named 'untitled2.py' and contains the following Python code:

```
1 #!/usr/bin/env python3
2 # -*- coding: utf-8 -*-
3 """
4 Created on Tue Feb 18 15:44:38 2025
5
6 @author: alessandrorenda
7 """
8
9 #saluto = 'Hello World'
10 print(saluto)
```

The code on line 9 is highlighted in green. The right sidebar features a 'Variable Explorer' tab showing a table with one variable:

Name	Type	Size	Value
saluto	str	11	Hello World

Below the variable explorer is a 'Console' window titled 'Console 1/A'. It shows the output of the script execution, including a traceback for a `NameError`:

```
CloudStorage/OneDrive-UniversityofPisa/013IN-UNITS/Slides/untitled2.py --wdir
-----
NameError                                Traceback
(most recent call last)
File ~/Library/CloudStorage/OneDrive-UniversityofPisa/013IN-UNITS/Slides/untitled2.py:10
3 """
4 Created on Tue Feb 18 15:44:38 2025
5
6 @author: alessandrorenda
7 """
9 #saluto = 'Hello World'
--> 10 print(saluto)

NameError: name 'saluto' is not defined
```

The status bar at the bottom indicates the current environment: 'Conda: spyder-runtime (Python 3.11.11)', 'LSP: Python', 'Line 9, Col 2', 'UTF-8', 'LF', 'RW', and 'Mem 71%'.

The screenshot displays the Spyder Python IDE interface. On the left is a file explorer showing a project structure with folders like 'L00_Introduzione', 'L01_Rappresentazio', 'L02_Rappresentazio', 'L03_Hardware', 'L04_Software', 'L05_Internet', 'LAB_00_Tifosi', 'LAB_01_Algoritmi', and 'OLDPython.pptx'. The central code editor shows a file named 'untitled2.py' with the following Python code:

```
1 #!/usr/bin/env python3
2 # -*- coding: utf-8 -*-
3 
4 Created on Tue Feb 18 15:44:38 2025
5 
6 @author: alessandrorenda
7 
8 
9 #saluto = 'Hello World'
10 print(saluto)
```

On the right, the 'Variable Explorer' shows a single variable 'saluto' of type 'str' with a value of 'Hello World'. Below it, the 'Console' shows a 'NameError' message. A context menu is open over the console, with the 'Restart kernel' option highlighted by an orange rectangle.

Name	Type	Size	Value
saluto	str	11	Hello World

Console 1/A

```
NameError
recent call last
File ~/Library/CloudStorage/OneDrive-UniversityofPisa/013IN-UNITS/Slides/untitled2.py, line 10, in <module>
    print(saluto)
NameError: name 'saluto' is not defined

In [3]:
```

Restart kernel

Rename tab

Show environment variables

Show sys.path contents

Show elapsed time

Move

Undock

Close

IPy

Inline Conda: spyder-runtime (Python 3.11.11) LSP: Python Line 9, Col 2 UTF-8 LF RW Mem 71%