



Programming with Python

Getting Started

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合肥大学
中国安徽省合肥市

Programming with Python



This is a course on programming with the Python language at Hefei University (合肥大学).

The website with the teaching material of this course is <https://thomasweise.github.io/programmingWithPython> (see also the QR-code at the bottom right). There, you can find the course book and these slides. The repository with the example Python programs can be found at <https://github.com/thomasWeise/programmingWithPythonCode>.





Outline

1. Introduction
2. Installing Python
3. Installing PyCharm
4. Our First Program
5. Python in the Terminal
6. Obtaining the Examples
7. Summary





Introduction



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- We will also discuss how to write a simple program in a Python editor and how we can run Python programs.

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- We will also discuss how to write a simple program in a Python editor and how we can run Python programs.
- Indeed, we provide a big load of example programs in this course, based on which we will discuss the different aspects of Python programming.

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- We will also discuss how to write a simple program in a Python editor and how we can run Python programs.
- Indeed, we provide a big load of example programs in this course, based on which we will discuss the different aspects of Python programming.
- So, finally, we will also check how you can download these example programs.

Software Needed for Python Software Development

- What software is necessary to do Python programming?



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- I will provide examples and instructions for both Ubuntu and Microsoft Windows².



Installing Python



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 1. the official Python setup and usage page [https://docs.python.org/3/using⁶](https://docs.python.org/3/using),
 2. the Python Downloads at <https://www.python.org/downloads>, and
 3. the Python 3 Installation & Setup Guide
at <https://realpython.com/installing-python>

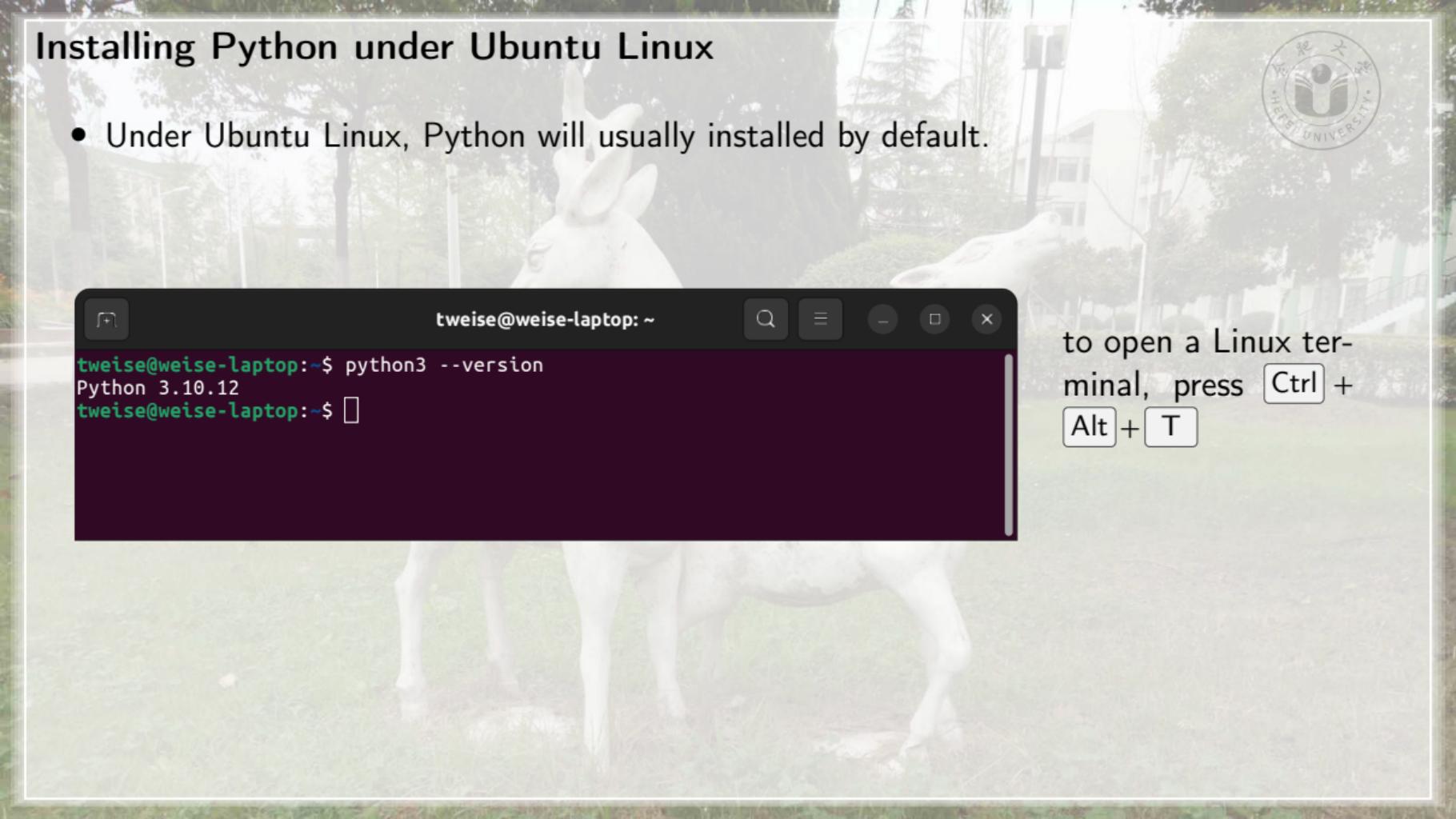
Installing Python under Ubuntu Linux

- Under Ubuntu Linux, Python will usually installed by default.



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A white deer is grazing in a grassy field in the background of the slide. In the top right corner, there is a circular logo for Wuhan University featuring a stylized figure and the university's name in Chinese and English.

```
tweise@weise-laptop: ~
tweise@weise-laptop:~$ python3 --version
Python 3.10.12
tweise@weise-laptop:~$
```

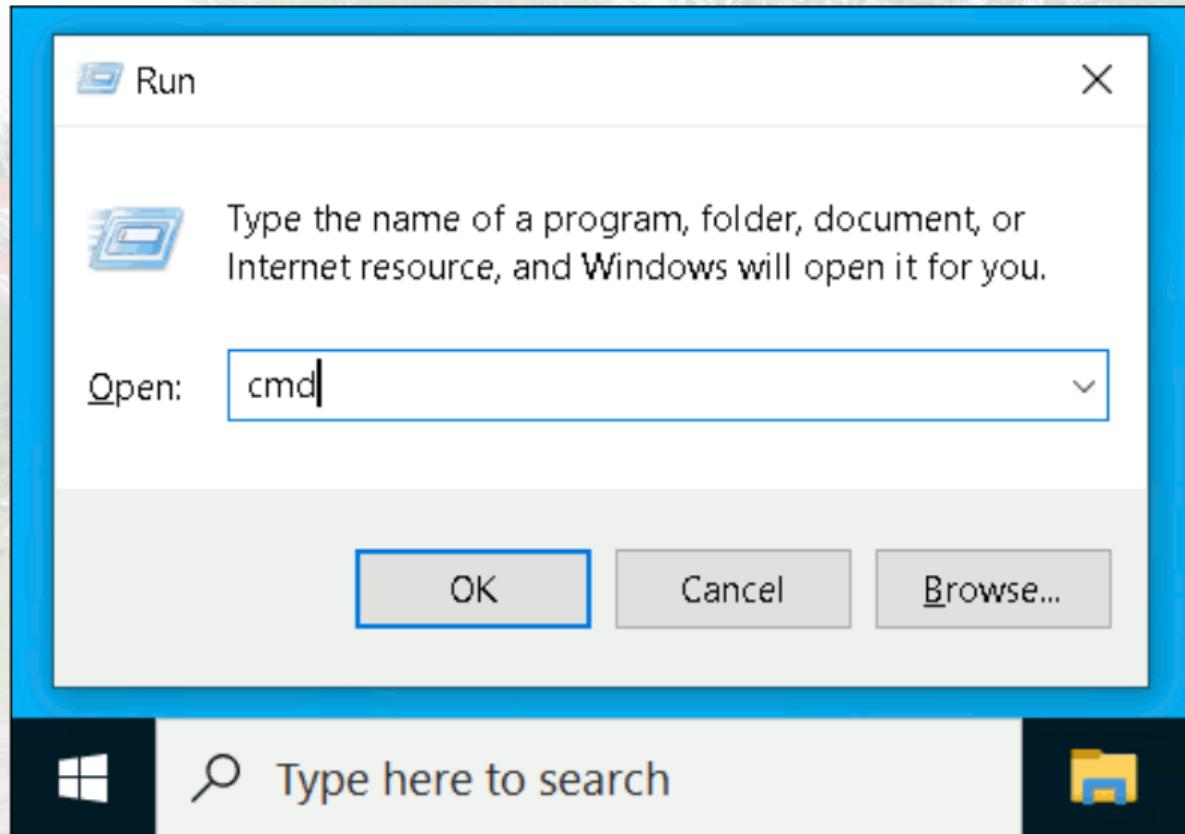
to open a Linux terminal, press **Ctrl + Alt + T**

Installing Python under Microsoft Windows

- Under Microsoft Windows, Python might not be installed by default.



Installing Python under Microsoft Windows



to open a Microsoft Windows terminal, press **Windows + R**, type in **cmd**, and hit **Enter**

Installing Python under Microsoft Windows



```
C:\WINDOWS\system32\cmd.exe
Microsoft Windows [Version 10.0.19045.4529]
(c) Microsoft Corporation. All rights reserved.

C:\Users\tweise>python3 --version
Python was not found; run without arguments to install from
the Microsoft Store, or disable this shortcut from Settings
> Manage App Execution Aliases.

C:\Users\tweise>
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Installing Python under Microsoft Windows

The screenshot shows the Microsoft Store interface. On the left, there's a sidebar with icons for Home, Apps, Gaming, AI Hub, What's New, Library, and Help. The main area displays the Python 3.12 app page. At the top, it says "Search apps, games, movies, and more". Below that is a "Screenshots" section showing two windows: a Command Prompt window and an IDLE Shell window. The Command Prompt window shows Python version information and a simple script. The IDLE Shell window shows the Python shell with a welcome message. The app itself has a large Python logo icon, the title "Python 3.12", the developer "Python Software Foundation", and a prominent blue "Get" button. Below the button, it shows a rating of "4.1 ★ Average" with 155 ratings. The "Description" section explains that Python is an easy-to-learn, powerful programming language with efficient data structures and dynamic typing, suitable for scripting and application development.

Microsoft Store

Search apps, games, movies, and more

Screenshots

Python 3.12

Python Software Foundation

Get

4.1 ★ Average 155 Ratings

What's New

Library

Help

Description

Python is an easy to learn, powerful programming language. It has efficient high-level data structures and a simple but effective approach to object-oriented programming. Python's elegant syntax and dynamic typing, together with its interpreted nature, make it an ideal language for scripting and rapid application development in many areas on most platforms.

The Python interpreter and the extensive standard library are freely available in source or binary form

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Microsoft Windows [Version 10.0.22631.3599]
(c) Microsoft Corporation. All rights reserved.
C:\Users\Pythonista>python3.12
Python 3.12.4 (tags/v3.12.4:8edba8a, Jun 6 2024, 19:30:16) [MSC v.1940 64 bit (AMD64)] on win32
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Installing PyCharm



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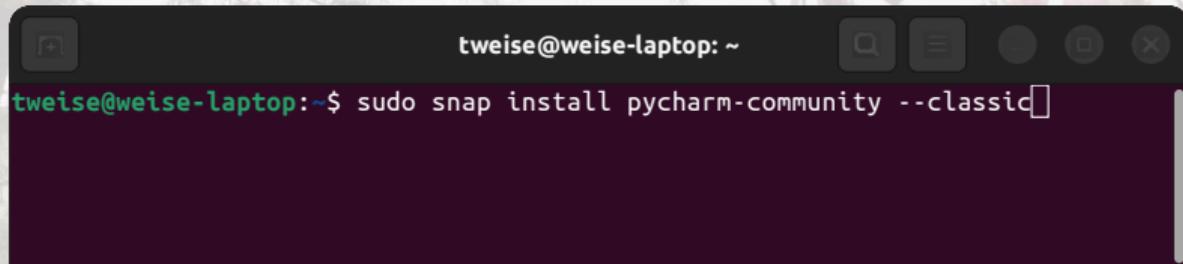
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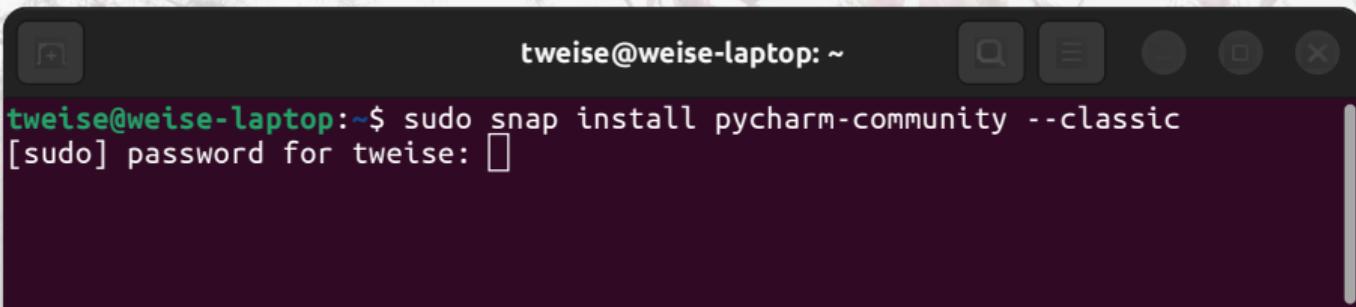
```
tweise@weise-laptop: ~
tweise@weise-laptop:~$ sudo snap install pycharm-community --classic
```

to open a Linux terminal, press **Ctrl** + **Alt** + **T**



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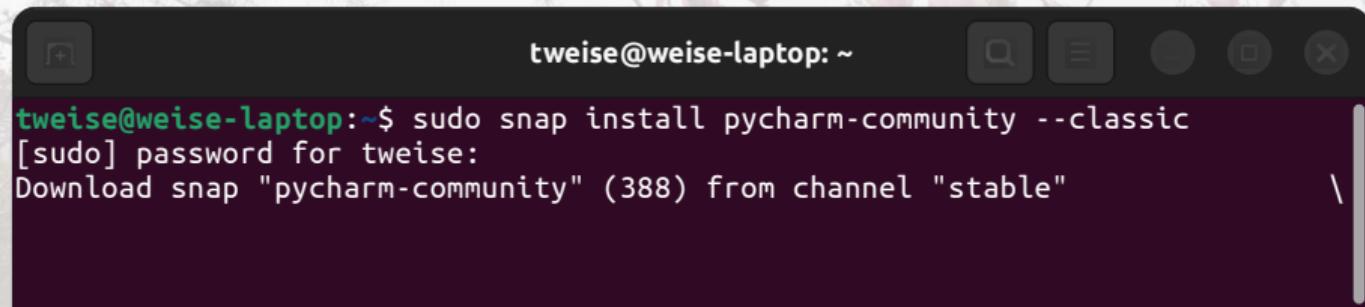
A terminal window with a dark background and light-colored text. The window title is "tweise@weise-laptop: ~". The terminal prompt is "tweise@weise-laptop:~\$". The user has run the command "sudo snap install pycharm-community --classic". A password entry field is visible, with the placeholder "[sudo] password for tweise: [REDACTED]".

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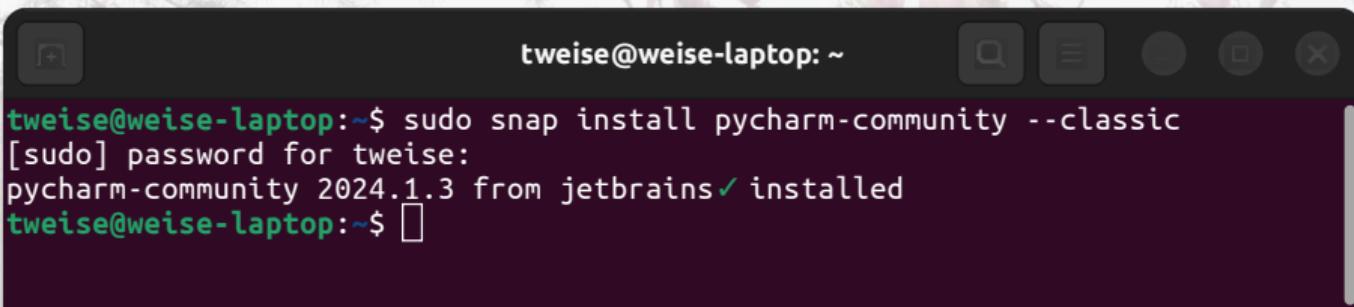
A screenshot of a terminal window titled "tweise@weise-laptop: ~". The window contains the following text:

```
tweise@weise-laptop:~$ sudo snap install pycharm-community --classic  
[sudo] password for tweise:  
Download snap "pycharm-community" (388) from channel "stable"
```



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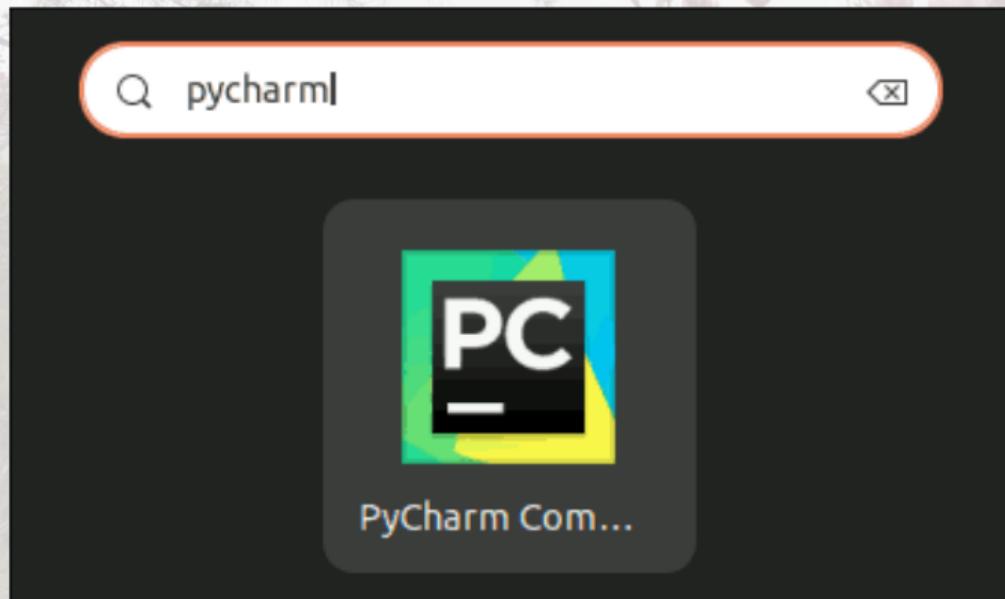
A terminal window titled "tweise@weise-laptop: ~" is shown. The window has a dark background and light-colored text. It displays the command "sudo snap install pycharm-community --classic" being run, followed by a password prompt "[sudo] password for tweise:", the successful installation message "pycharm-community 2024.1.3 from jetbrains✓ installed", and the final prompt "tweise@weise-laptop:~\$". The terminal window has a standard Linux-style header with icons for search, terminal, and close.

```
tweise@weise-laptop:~$ sudo snap install pycharm-community --classic
[sudo] password for tweise:
pycharm-community 2024.1.3 from jetbrains✓ installed
tweise@weise-laptop:~$
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Open the launcher
by pressing and
type in [pycharm](#)



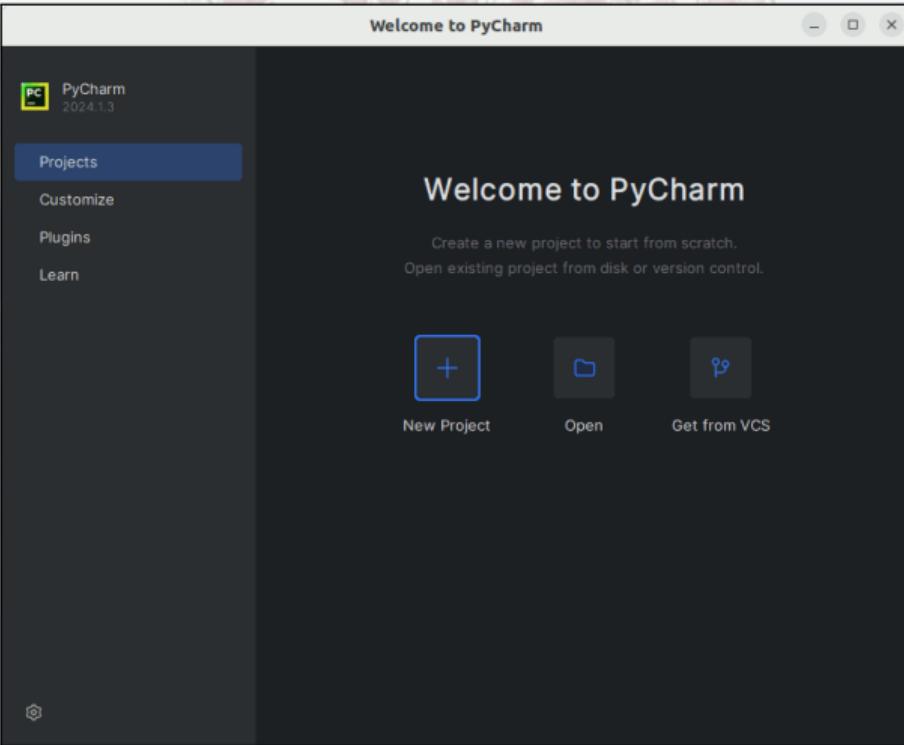
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The screenshot shows a web browser window with the URL <https://www.jetbrains.com/pycharm/download/?section=windows>. The page content is as follows:

PyCharm JetBrains IDEs Use Cases ▾ EAP What's New Features ▾ Learn ▾ Pricing Download

We value the vibrant Python community, and that's why we proudly offer the PyCharm Community Edition for free, as our open-source contribution to support the Python ecosystem.

 **PyCharm Community Edition**

The IDE for Pure Python Development

Download .exe (Windows) ▾

Free, built on open source

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PyCharm Community Edition
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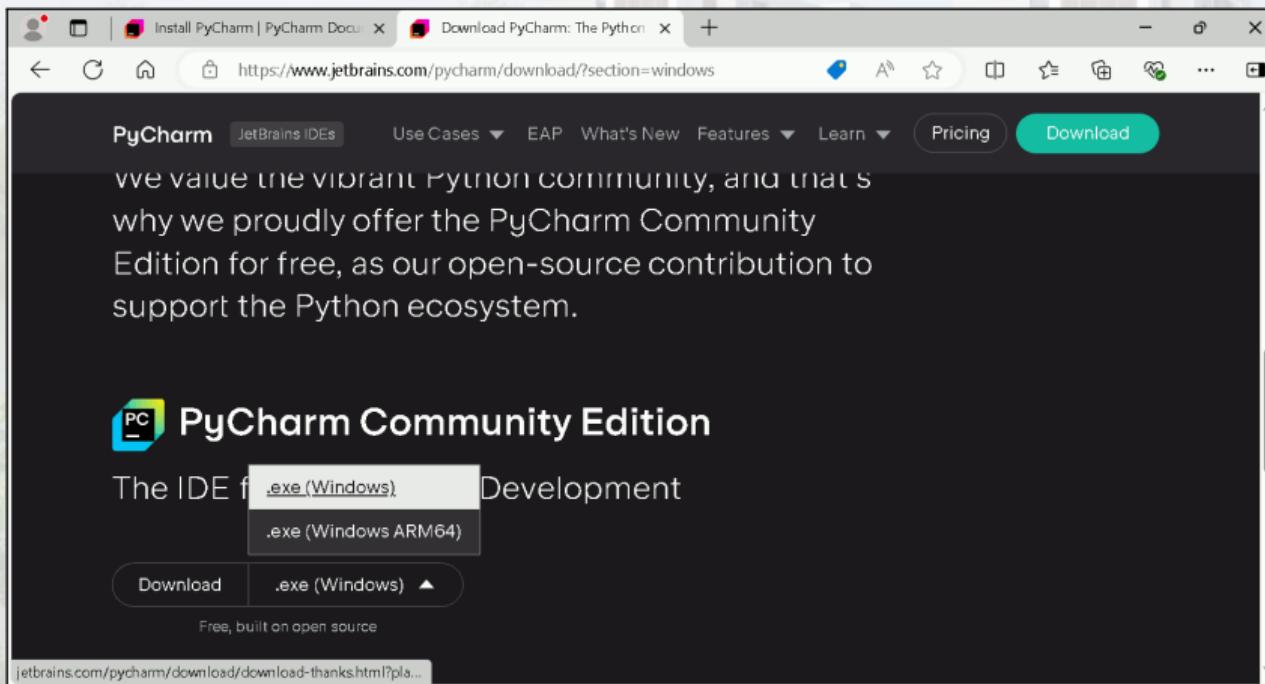
Download .exe (Windows) ▾ .exe (Windows)

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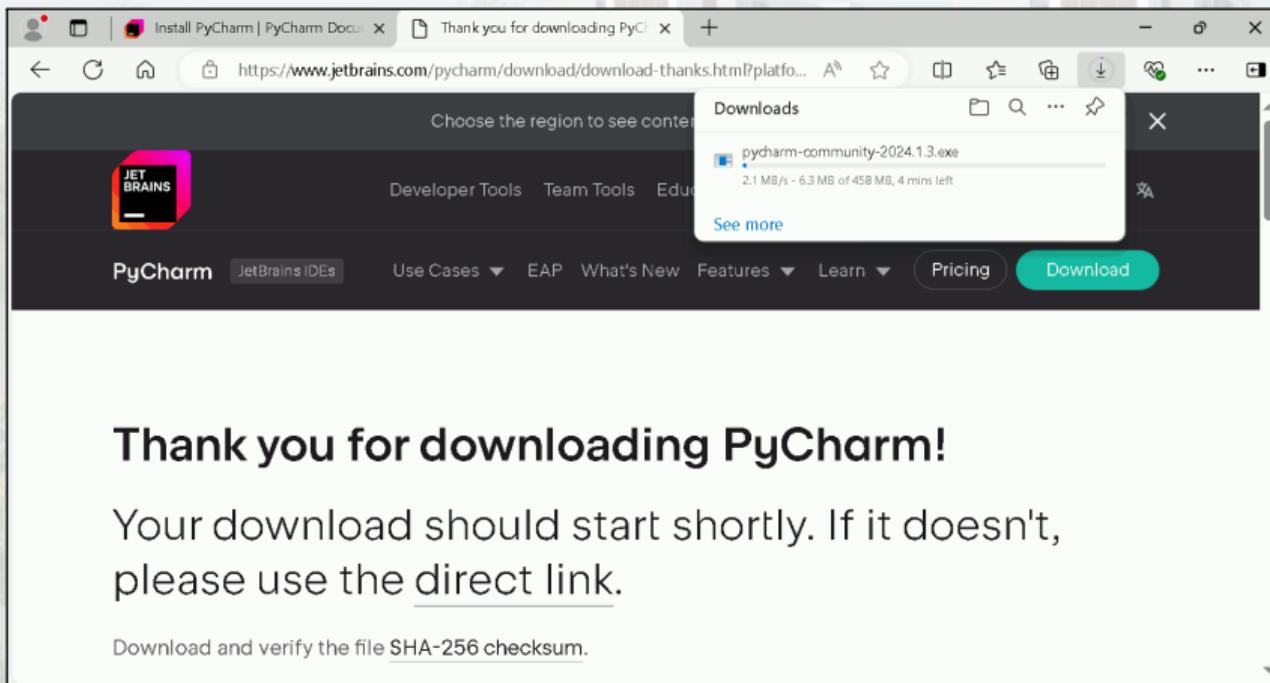


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The screenshot shows a web browser window with the URL <https://www.jetbrains.com/pycharm/download/download-thanks.html?platform=windows>. The page displays a 'Thank you for downloading PyCharm!' message. A download dialog box is overlaid on the page, showing a single file: 'pycharm-community-2024.1.3.exe'. The 'Open file' button is highlighted. The browser's address bar also shows the same download URL.

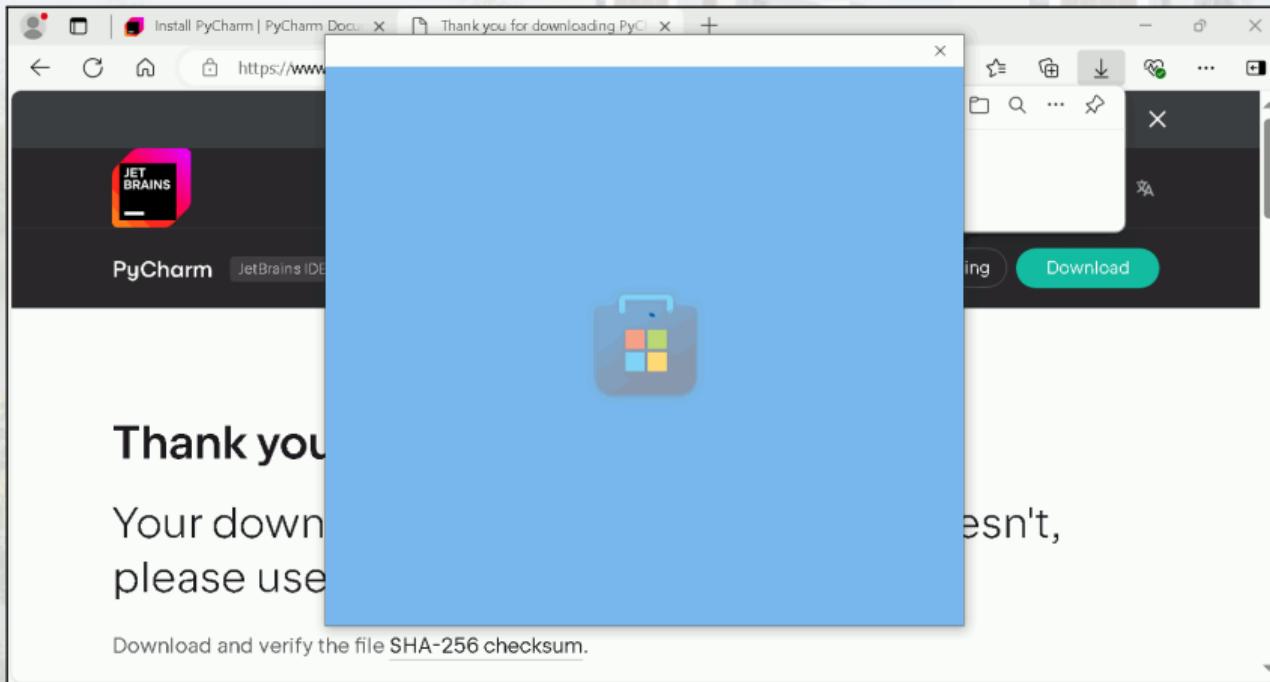
Thank you for downloading PyCharm!

Your download should start shortly. If it doesn't, please use the [direct link](#).

Download and verify the file [SHA-256 checksum](#).

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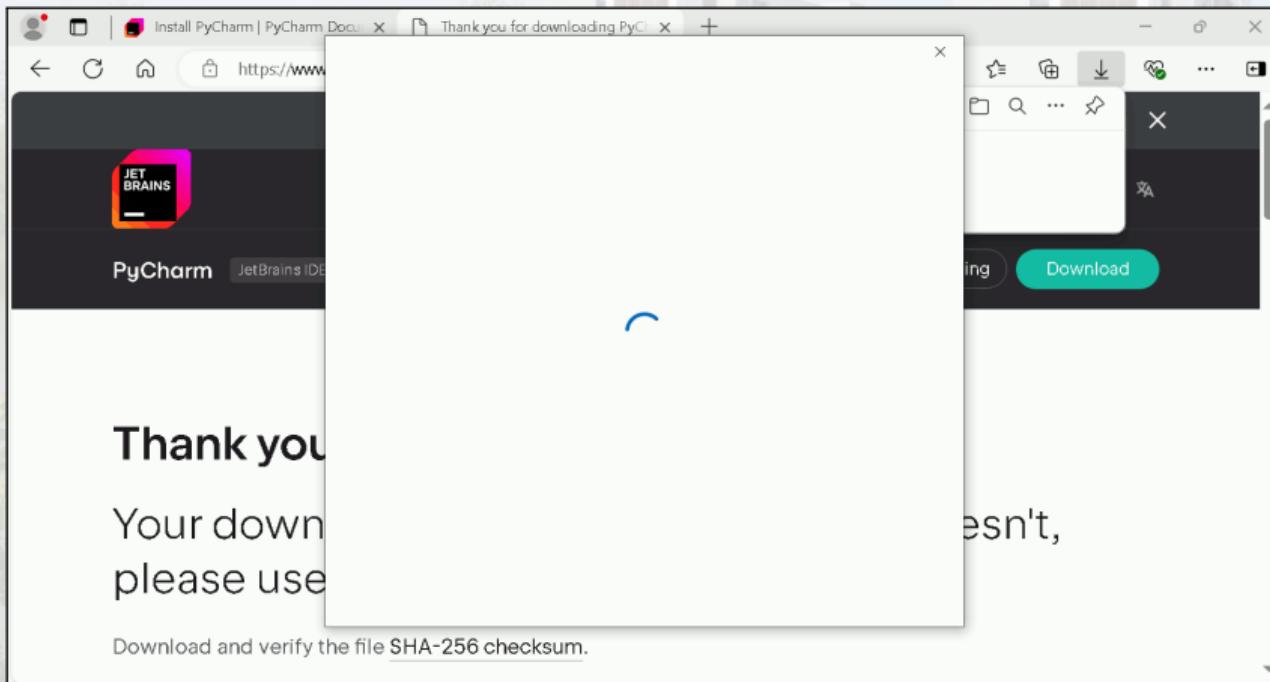
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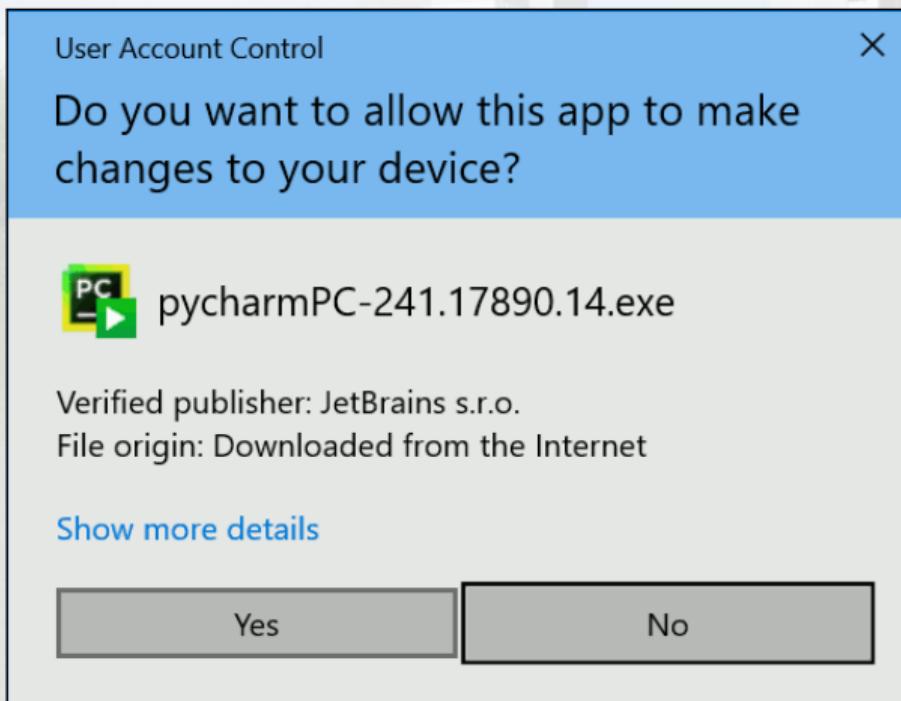
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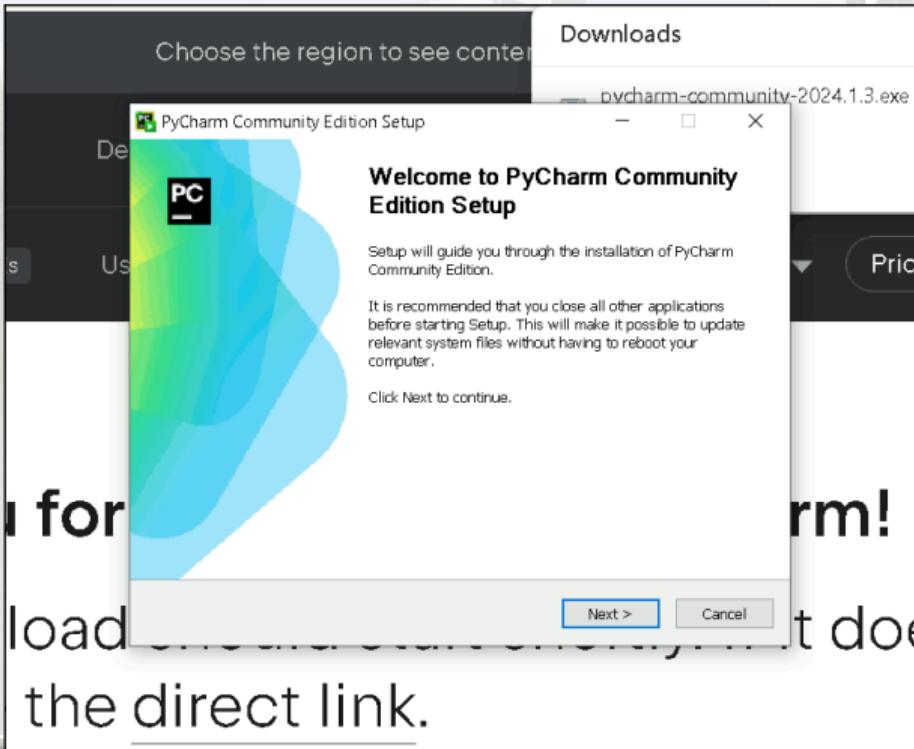
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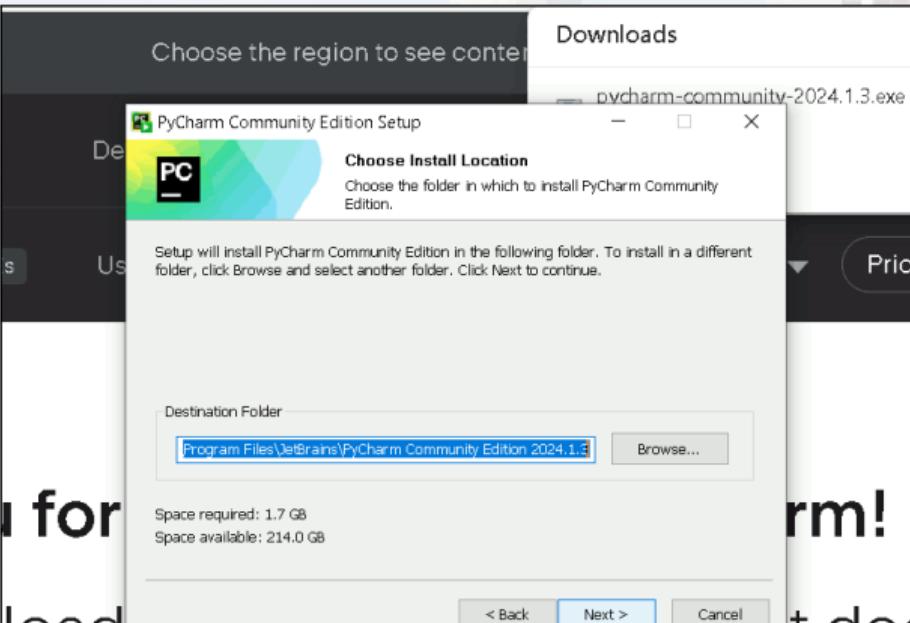
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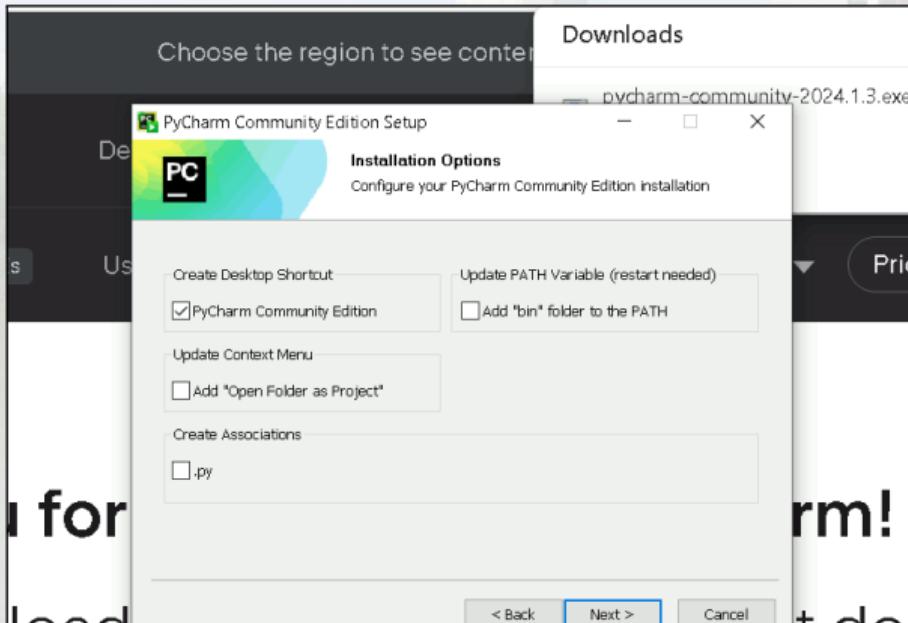


for
load
the direct link.



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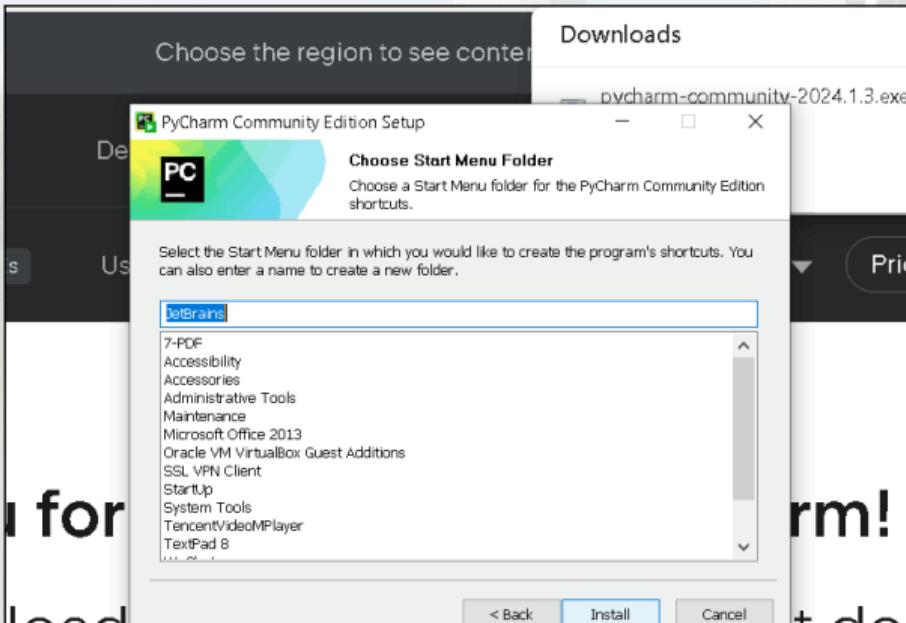
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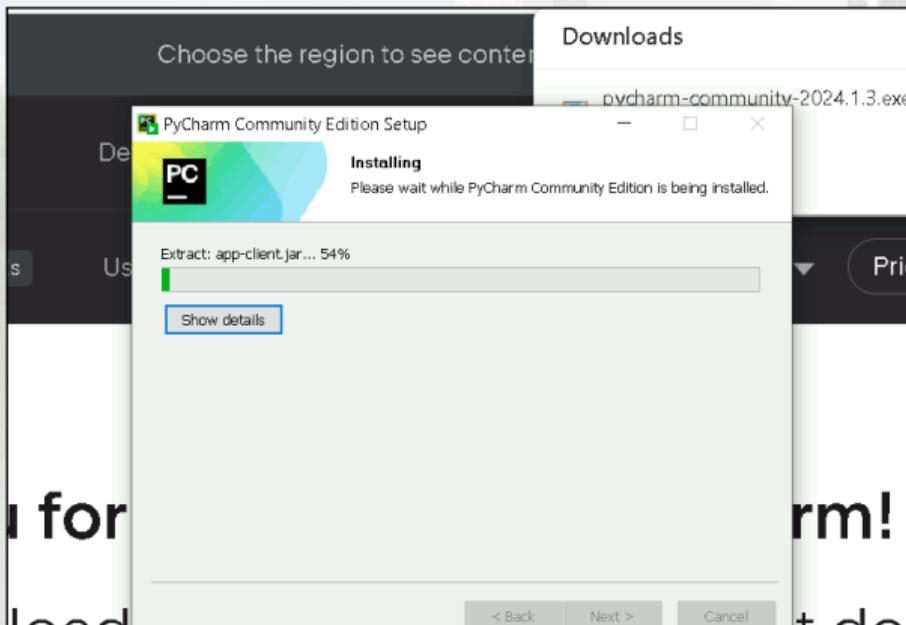


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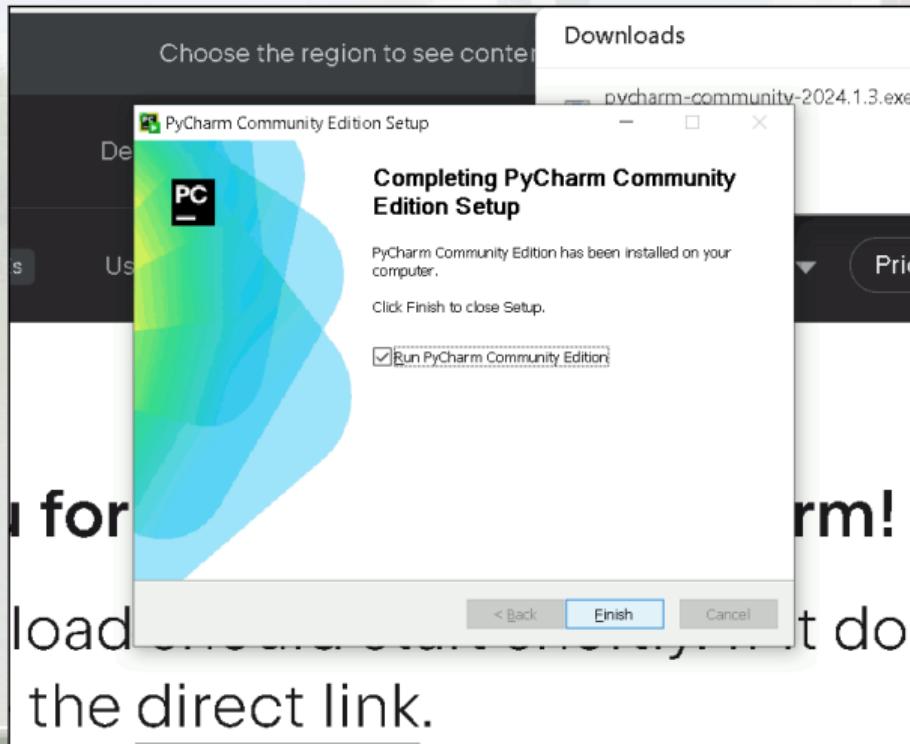


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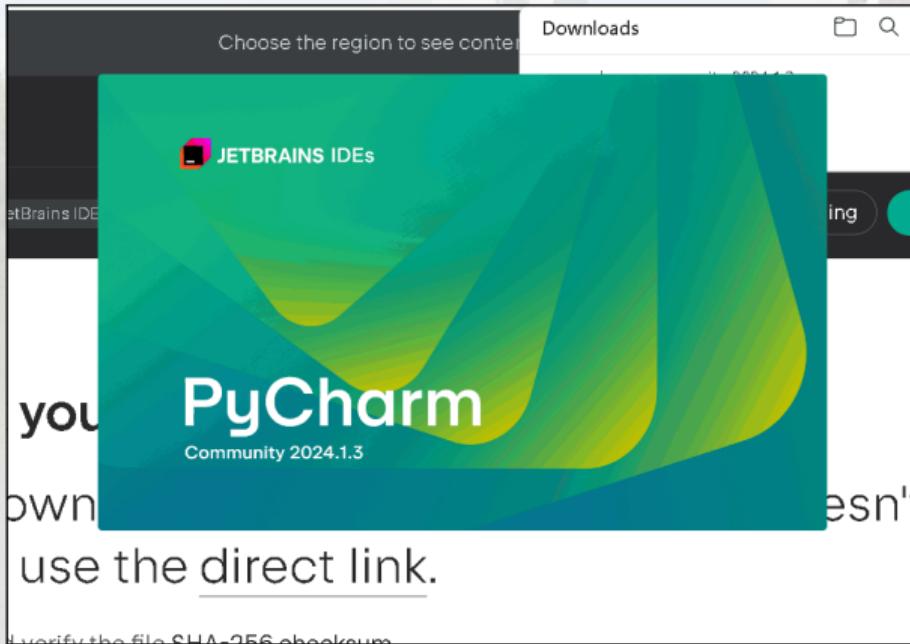
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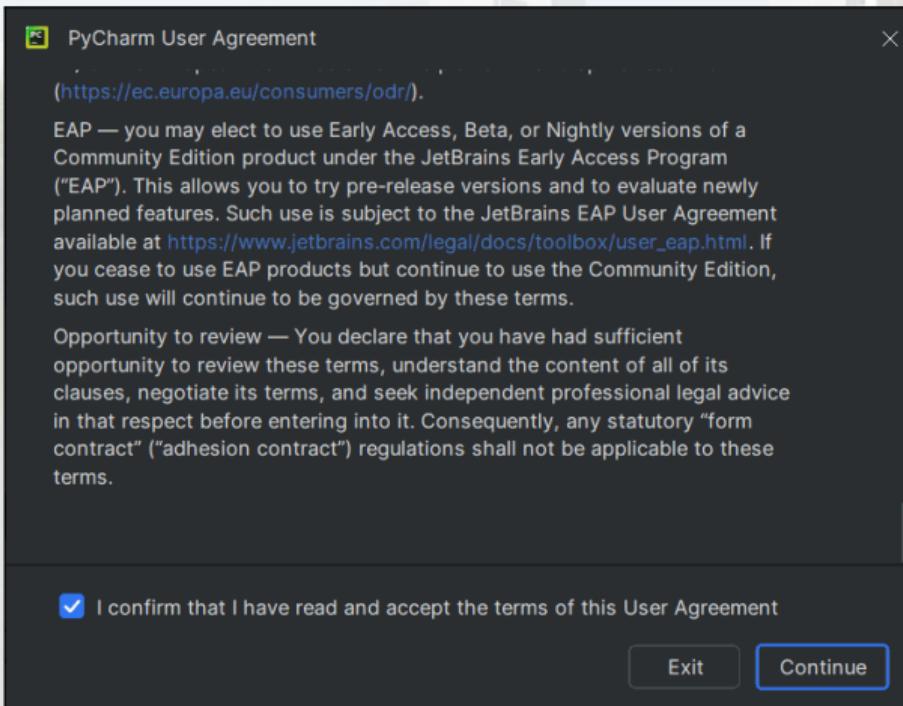
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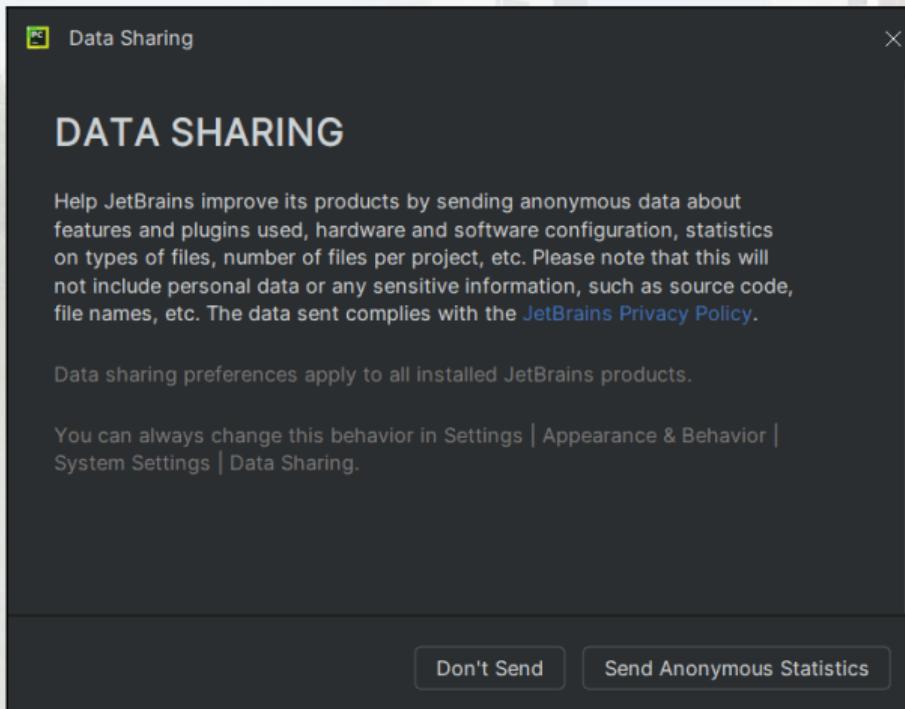
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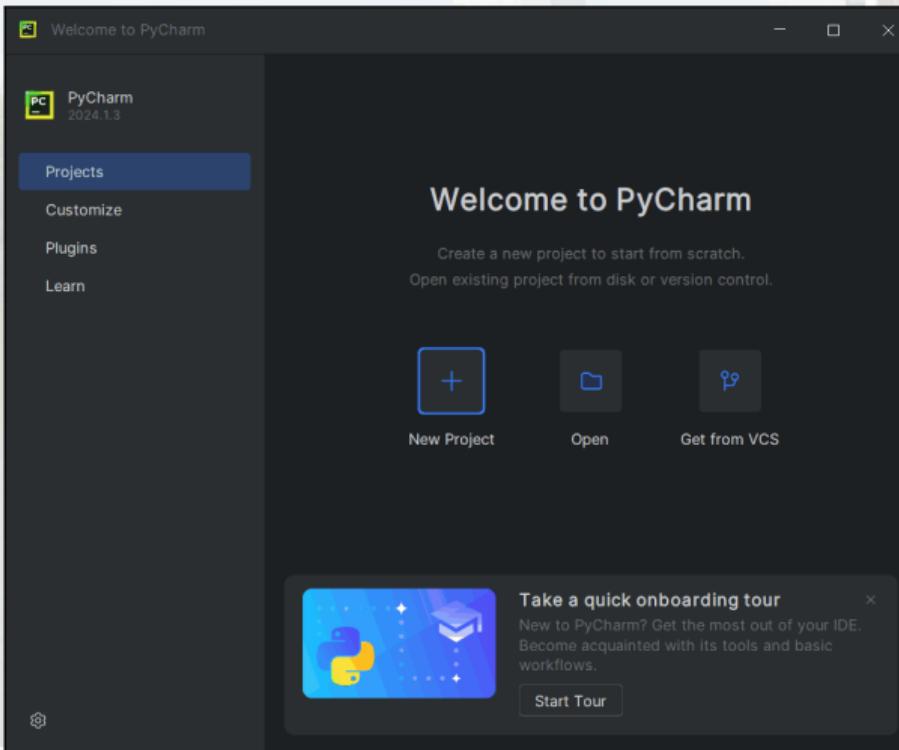
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Our First Program



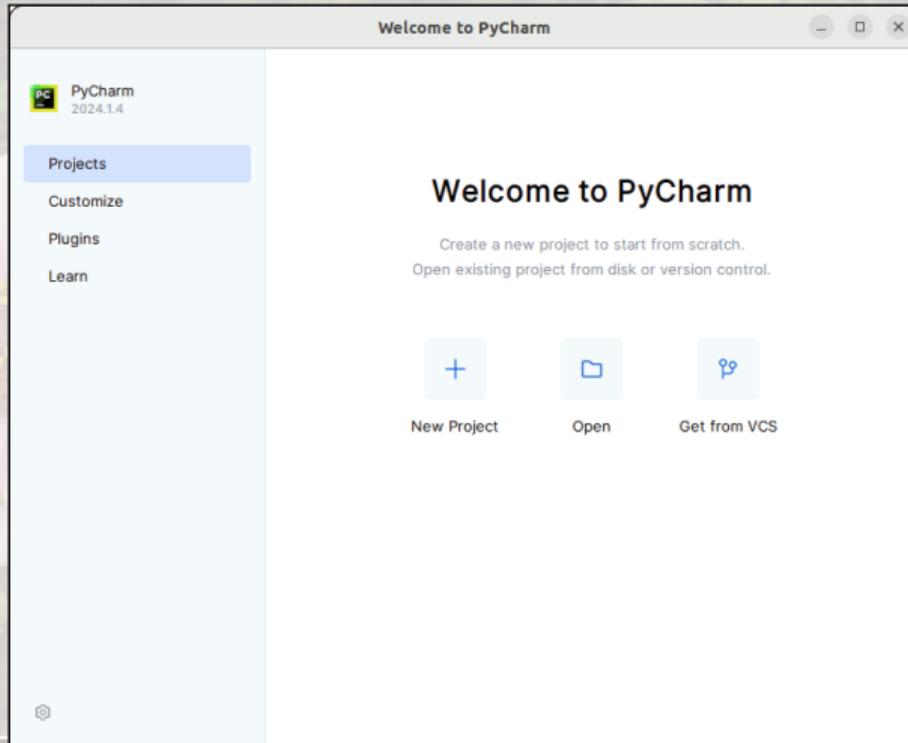
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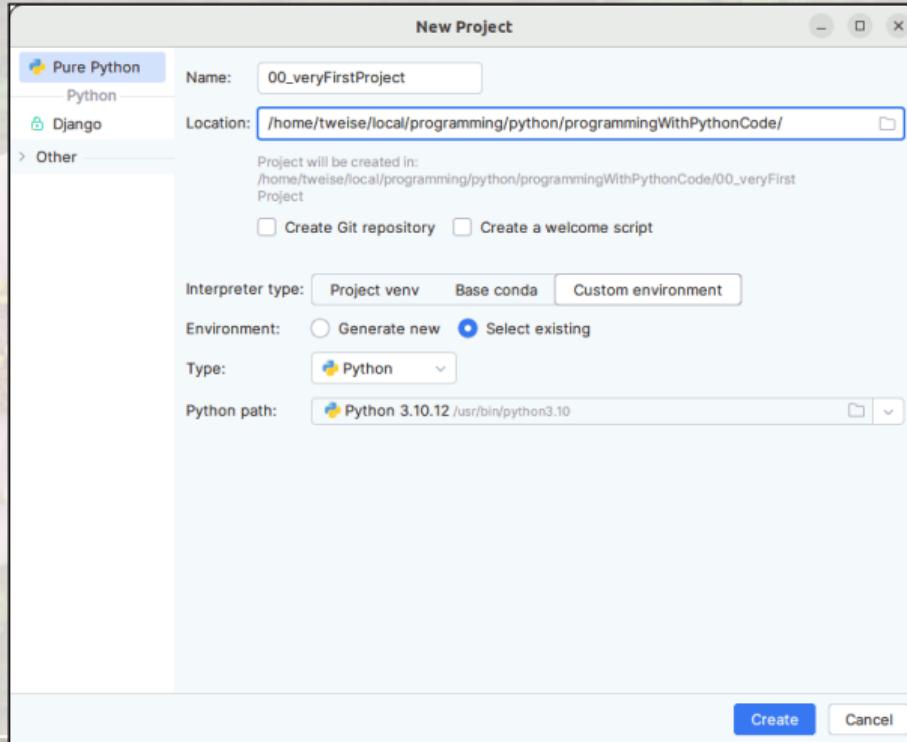
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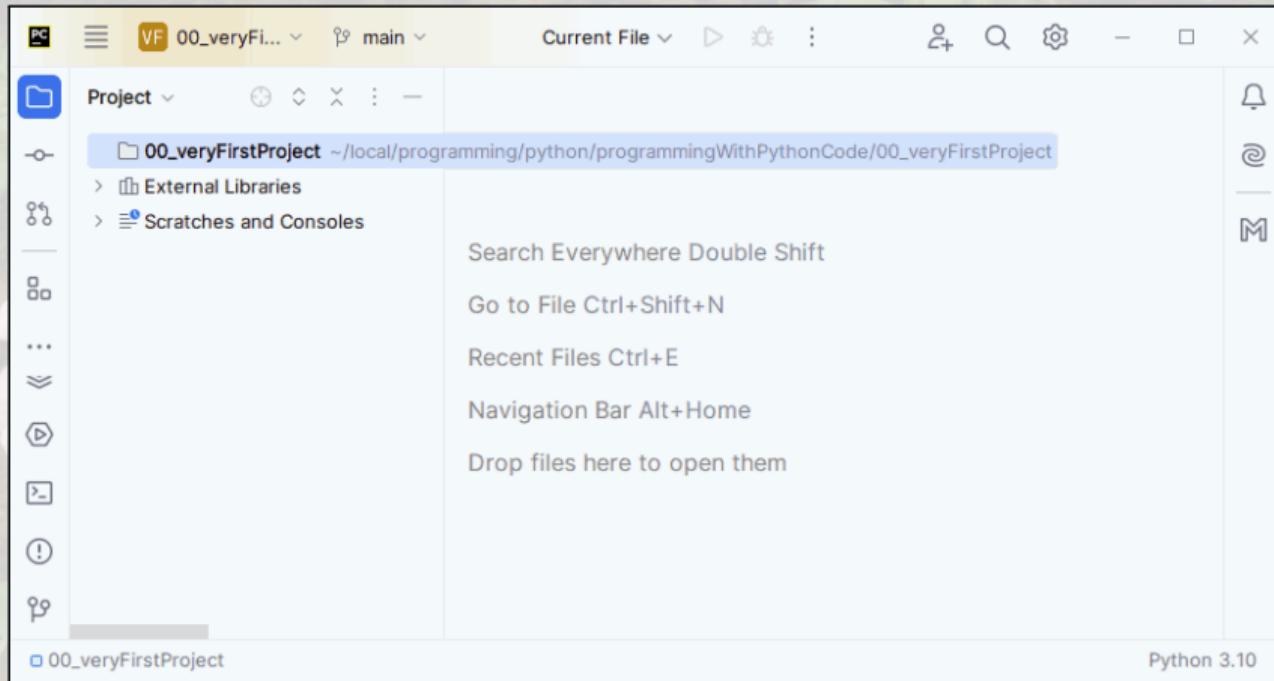
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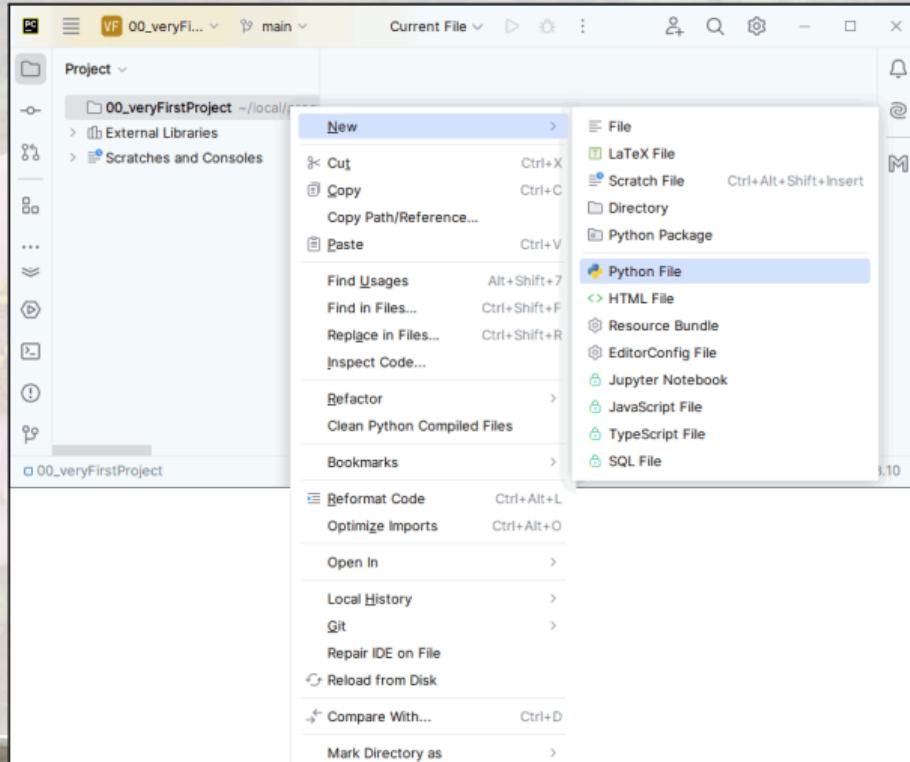
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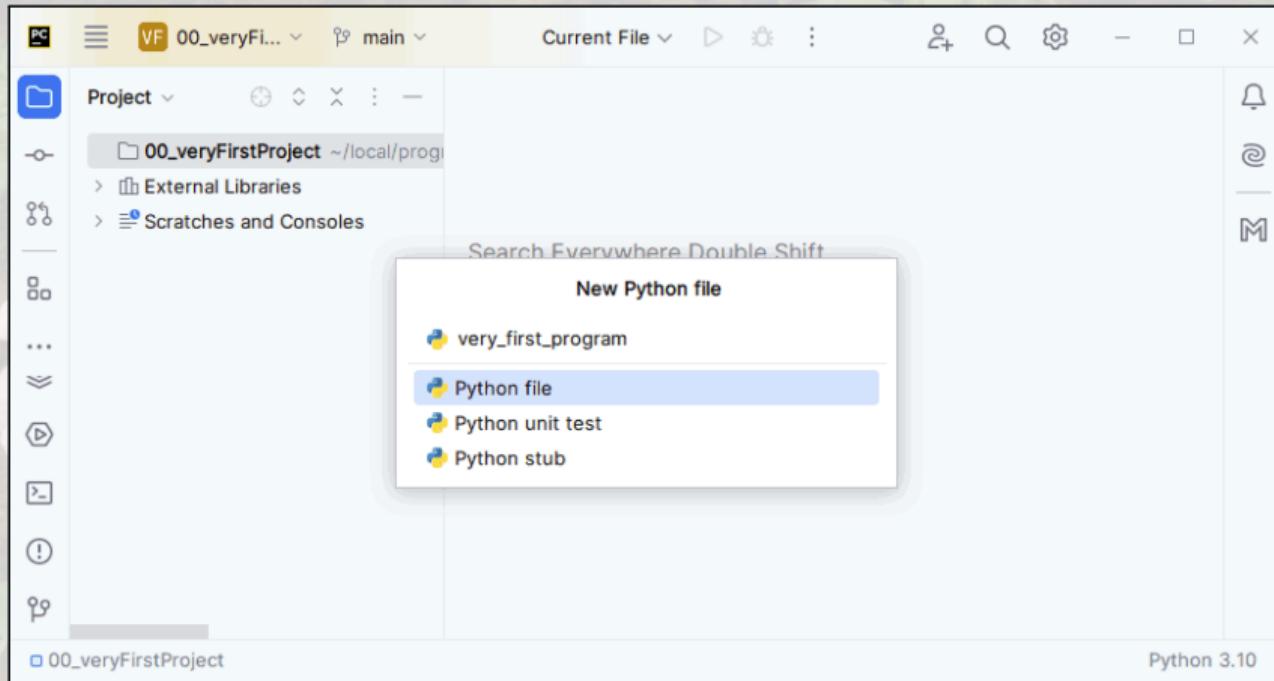
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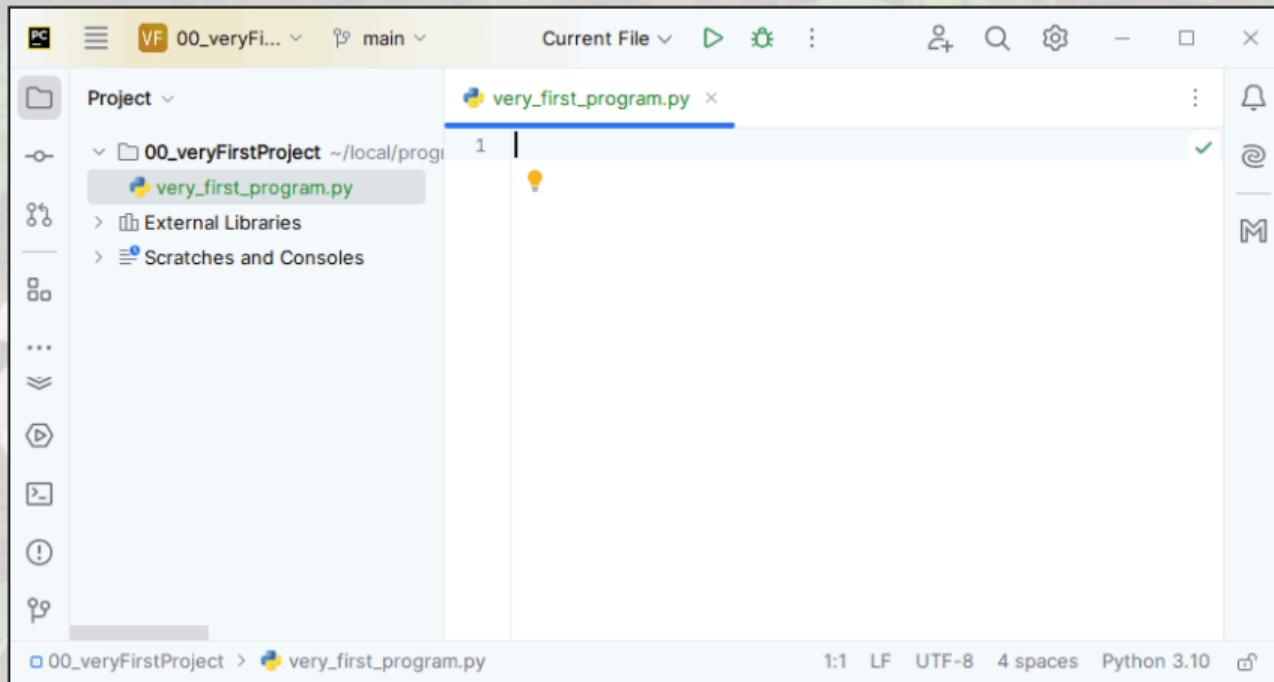
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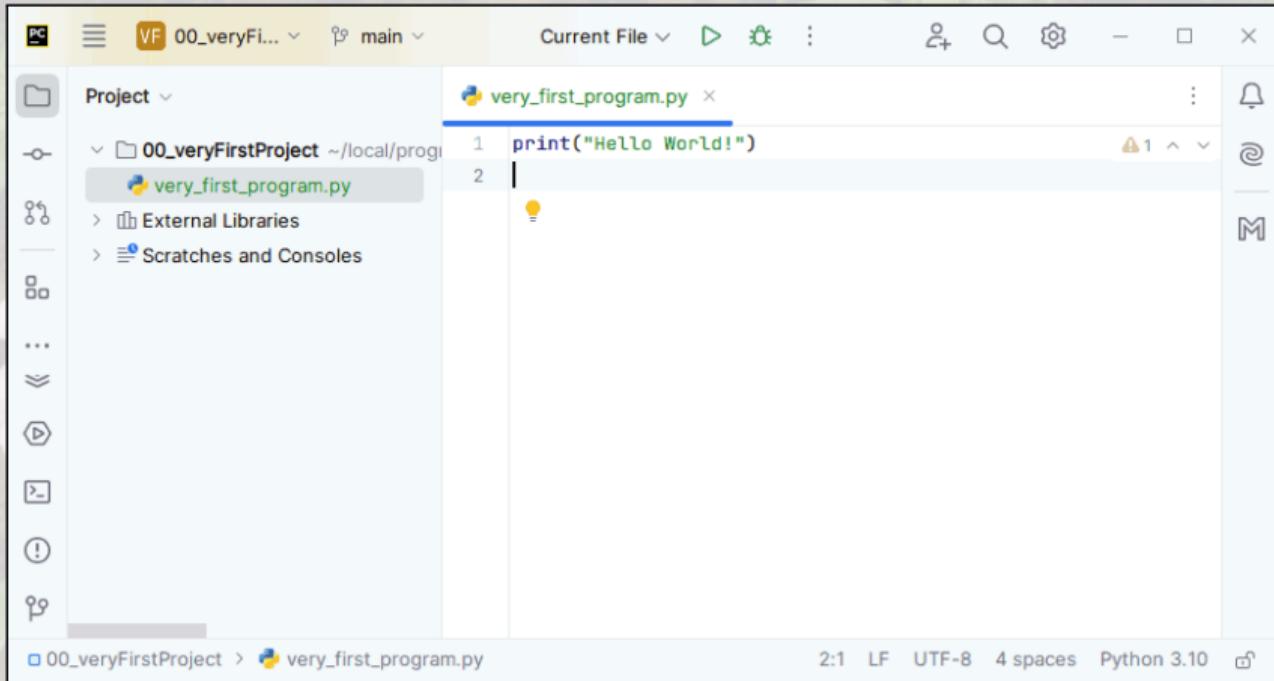
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Our First Program

- Let's create a program in PyCharm.



The screenshot shows the PyCharm IDE interface. The project navigation bar on the left lists a project named "00_veryFirstProject" containing a file "very_first_program.py". The main editor window displays the following Python code:

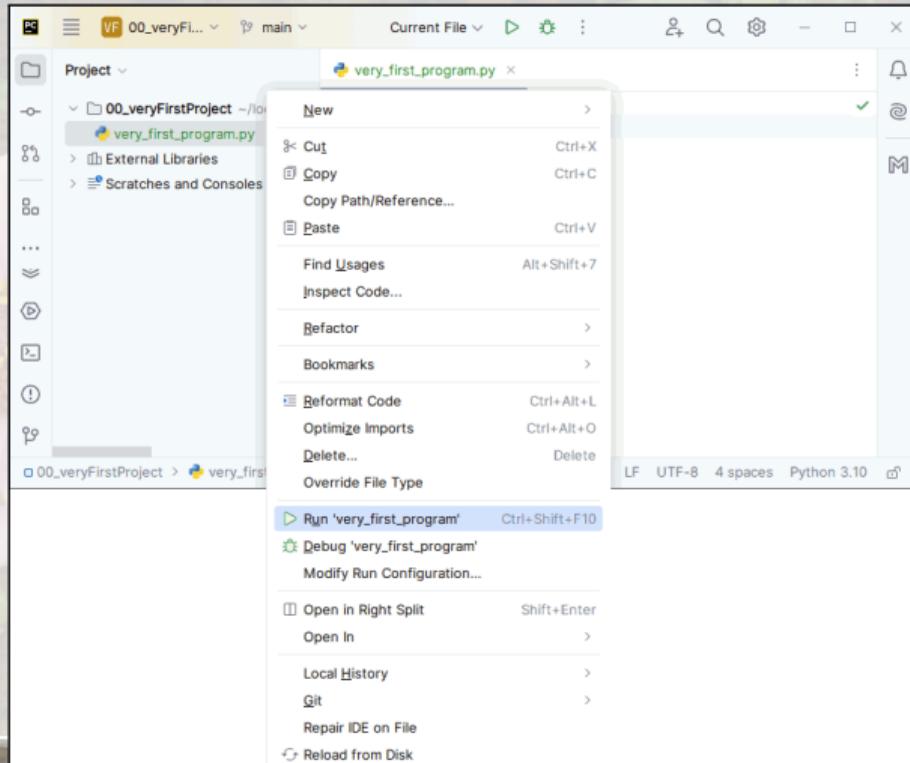
```
1 print("Hello World!")
```

The status bar at the bottom indicates the file is 2:1, LF, UTF-8, 4 spaces, and is using Python 3.10. The PyCharm logo is visible in the top right corner.



Our First Program

- Let's create a program in PyCharm.



Our First Program



- Let's create a program in PyCharm.

The screenshot shows the PyCharm IDE interface. The project navigation bar at the top indicates the current project is 'VF 00_veryFirstProject' and the active file is 'main'. The main window displays the code editor with the file 'very_first_program.py' containing the following code:

```
print("Hello World!")
```

Below the code editor is the 'Run' tool window, which shows the command used to run the program: '/usr/bin/python3.10 /home/tweise/local/programming/python/programmingWithPythonCode/00_veryFirstProject/very_first_program.py'. The output pane shows the program's output: 'Hello World!' followed by 'Process finished with exit code 0'. The bottom status bar shows the file path '00_veryFirstProject > very_first_program.py', and the Python version 'Python 3.10'.



Python in the Terminal



Ways to Execute a Python Program



- There are at least four ways to run a Python program:

Ways to Execute a Python Program



- There are at least four ways to run a Python program:
 1. We can enter the program into a Python file in the PyCharm IDE and then run it from there.



Ways to Execute a Python Program

- There are at least four ways to run a Python program:
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Ways to Execute a Python Program



- There are at least four ways to run a Python program:
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Ways to Execute a Python Program



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Ways to Execute a Python Program



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 4. We can use the Python console inside a terminal. We can then enter separate Python instructions and run them there.
- We already did option 1., now let's try the others.

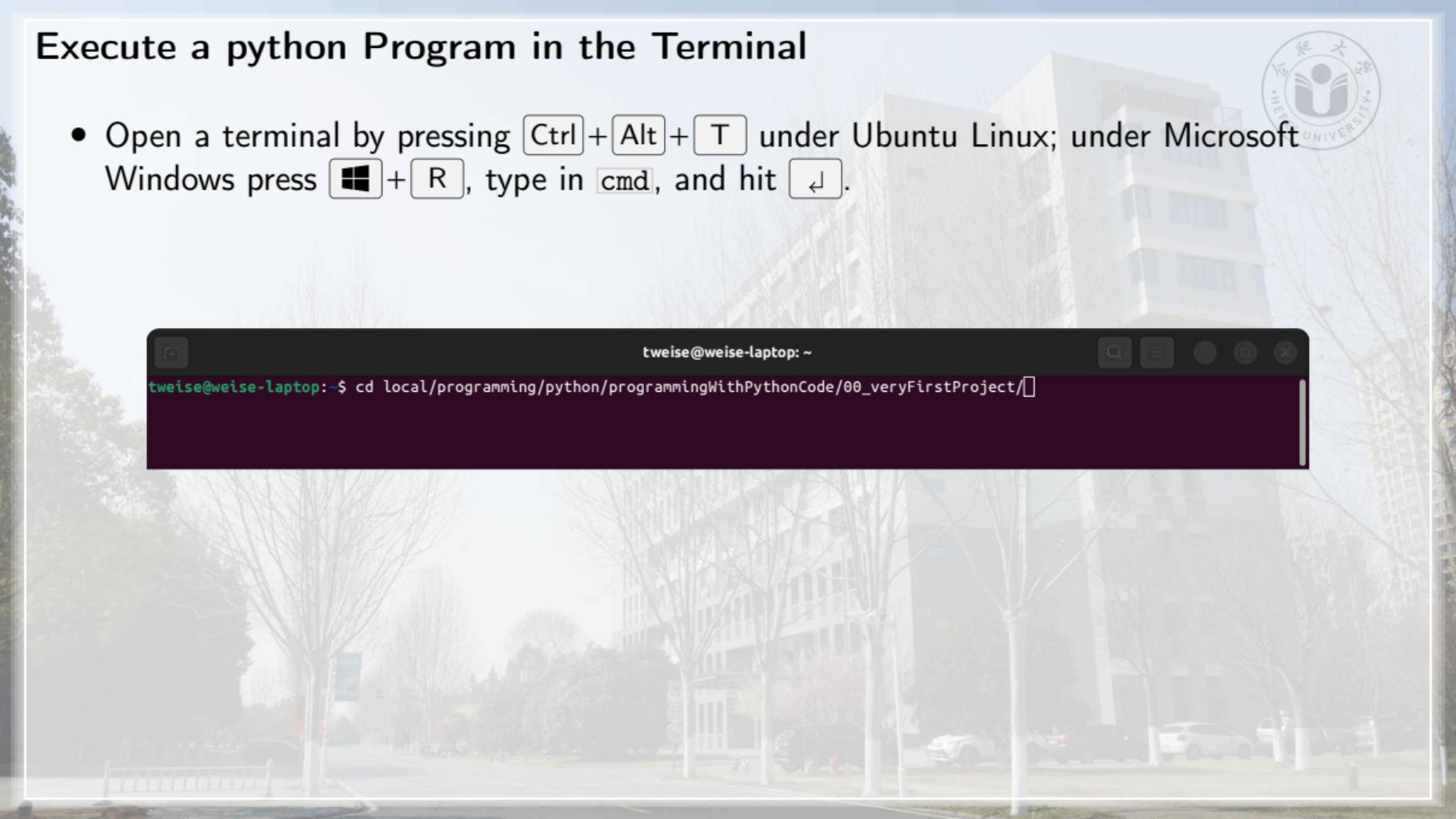
Execute a python Program in the Terminal

- Open a terminal by pressing `Ctrl + Alt + T` under Ubuntu Linux; under Microsoft Windows press `Windows + R`, type in `cmd`, and hit `↵`.



Execute a python Program in the Terminal

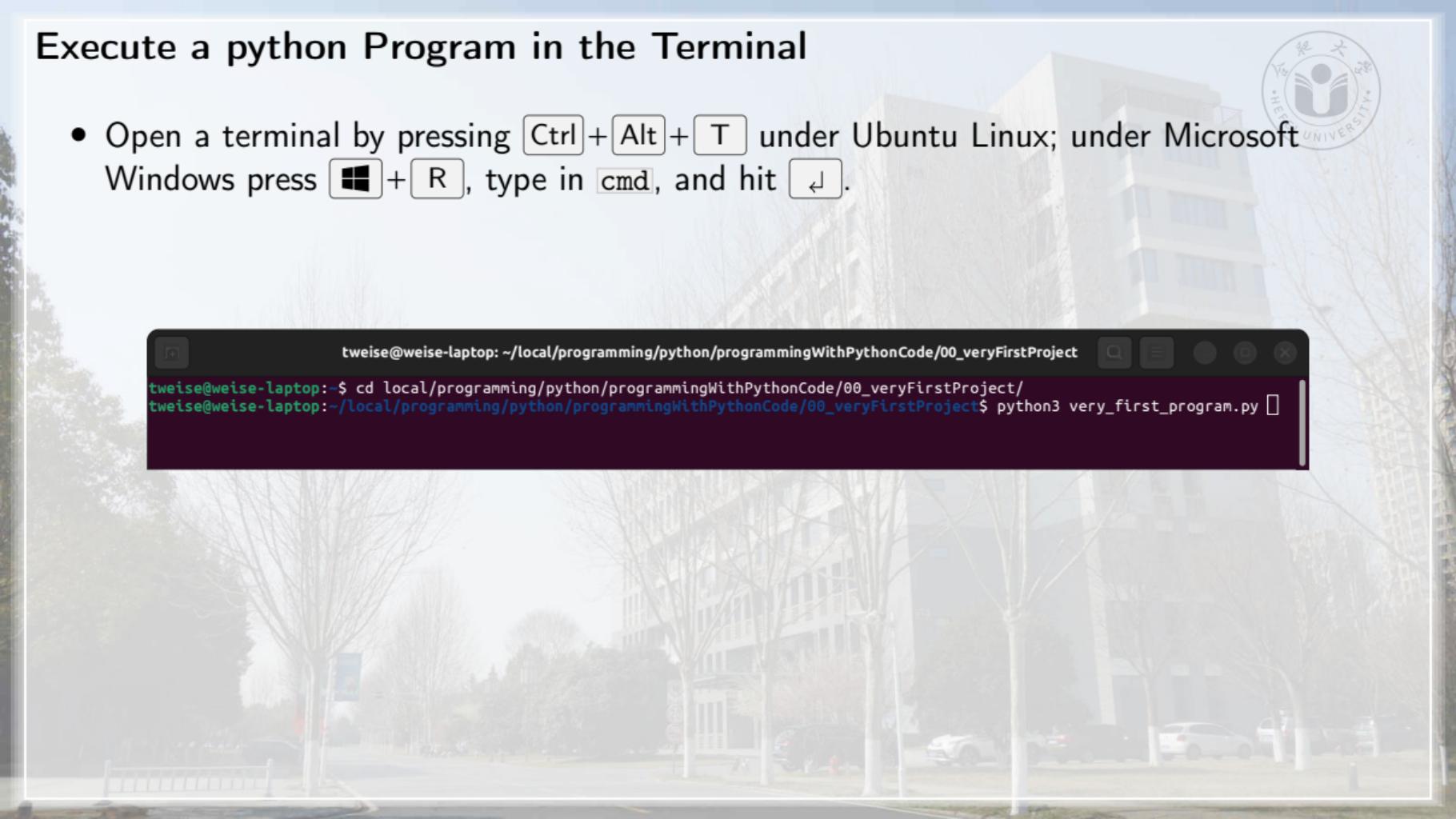
- Open a terminal by pressing `Ctrl + Alt + T` under Ubuntu Linux; under Microsoft Windows press `Windows + R`, type in `cmd`, and hit `↵`.



A screenshot of a terminal window titled "tweise@weise-laptop: ~". The terminal shows the command `tweise@weise-laptop:~$ cd local/programming/python/programmingWithPythonCode/00_veryFirstProject/` being typed. The background of the slide features a photograph of a university campus with modern buildings and bare trees.

Execute a python Program in the Terminal

- Open a terminal by pressing `Ctrl + Alt + T` under Ubuntu Linux; under Microsoft Windows press `Windows + R`, type in `cmd`, and hit `↵`.

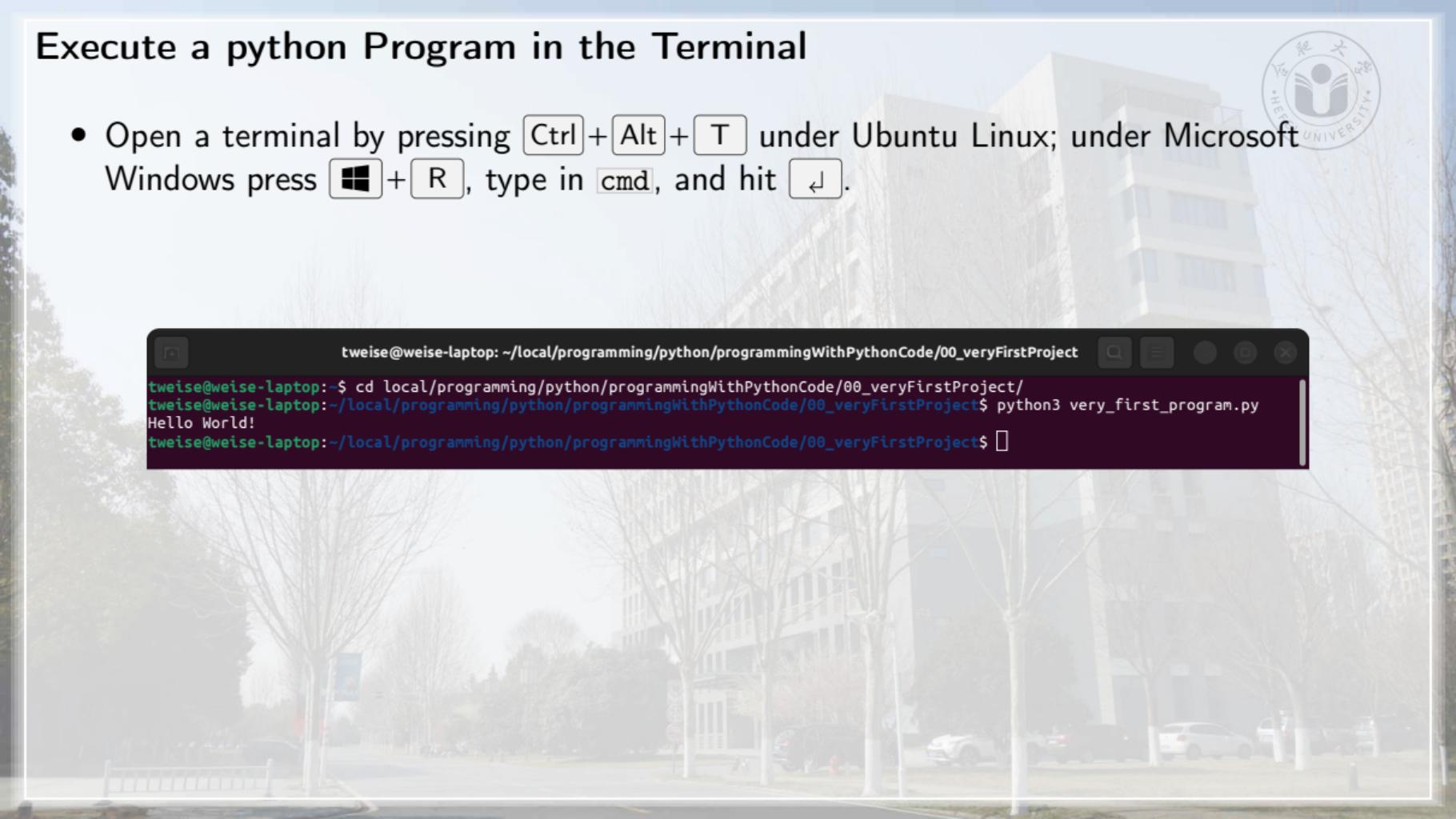


A screenshot of a terminal window showing a command-line session. The terminal has a dark background with light-colored text. At the top, it shows the user's name and location: `tweise@weise-laptop: ~/local/programming/python/programmingWithPythonCode/00_veryFirstProject`. Below that, two commands are entered: `cd local/programming/python/programmingWithPythonCode/00_veryFirstProject/` and `python3 very_first_program.py`. The terminal window has a standard Mac OS X style with a title bar and close/minimize/maximize buttons.

```
tweise@weise-laptop: ~/local/programming/python/programmingWithPythonCode/00_veryFirstProject
tweise@weise-laptop:~$ cd local/programming/python/programmingWithPythonCode/00_veryFirstProject/
tweise@weise-laptop:~/local/programming/python/programmingWithPythonCode/00_veryFirstProject$ python3 very_first_program.py
```

Execute a python Program in the Terminal

- Open a terminal by pressing `Ctrl + Alt + T` under Ubuntu Linux; under Microsoft Windows press `Windows + R`, type in `cmd`, and hit `↵`.



```
tweise@weise-laptop: ~/local/programming/python/programmingWithPythonCode/00_veryFirstProject
tweise@weise-laptop:~$ cd local/programming/python/programmingWithPythonCode/00_veryFirstProject/
tweise@weise-laptop:~/local/programming/python/programmingWithPythonCode/00_veryFirstProject$ python3 very_first_program.py
Hello World!
tweise@weise-laptop:~/local/programming/python/programmingWithPythonCode/00_veryFirstProject$ 
```

Execute a python Program in the Terminal

- Open a terminal by pressing `Ctrl + Alt + T` under Ubuntu Linux; under Microsoft Windows press `Windows + R`, type in `cmd`, and hit `↵`.



Execute a python Program in the Terminal



- Open a terminal by pressing **Ctrl + Alt + T** under Ubuntu Linux; under Microsoft Windows press **Windows + R**, type in **cmd**, and hit **↓**.

```
1 print("Hello World!")
```

↓ **python3 veryFirstProject.py** ↓

```
1 Hello World!
```

Entering Commands in the Python Console inside PyCharm



- We can also directly enter programs into the PyCharm Python console (press ) and execute them step-by-step.

Entering Commands in the Python Console inside PyCharm



- We can also directly enter programs into the PyCharm Python console (press) and execute them step-by-step.
- This does not make sense if we want to reuse our programs later.

Entering Commands in the Python Console inside PyCharm



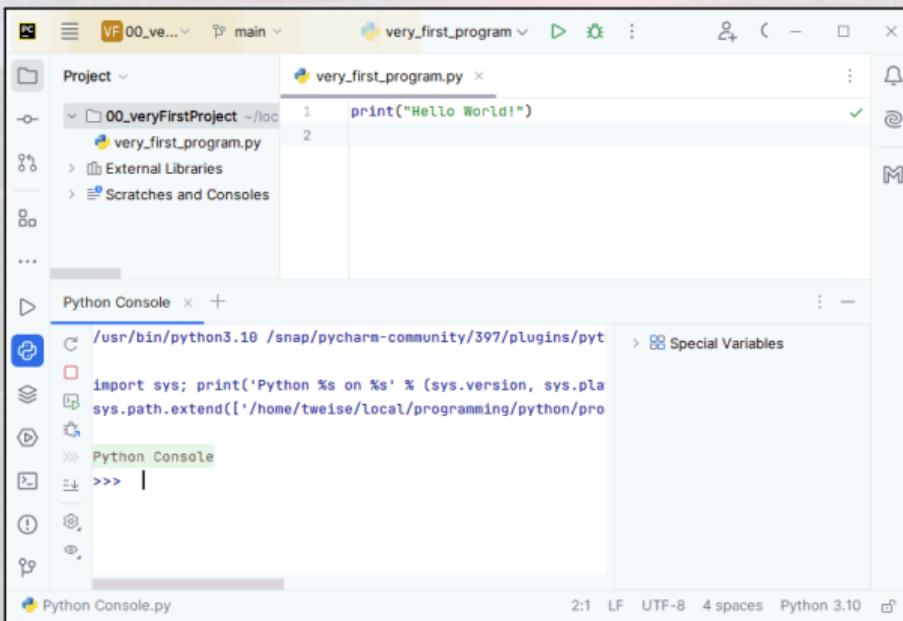
- We can also directly enter programs into the PyCharm Python console (press ) and execute them step-by-step.
- This does not make sense if we want to reuse our programs later.

The screenshot shows the PyCharm IDE interface. In the top navigation bar, there are tabs for 'Project' and 'Run'. The 'Run' tab is currently active, showing the path '/home/tweisse/local/programming/python/programmingWithPythonCode/00_veryFirstProject' and the file 'very_first_program.py'. The code editor window displays a single line of Python code: 'print("Hello World!")'. Below the code editor is the 'Python Console' window, which shows the command '/usr/bin/python3.10 /home/tweisse/local/programming/python/programmingWithPythonCode/00_veryFirstProject/very_first_program.py' followed by the output 'Hello World!' and the message 'Process finished with exit code 0'.

Entering Commands in the Python Console inside PyCharm



- We can also directly enter programs into the PyCharm Python console (press ) and execute them step-by-step.
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The screenshot shows the PyCharm IDE interface. On the left, the Project tool window displays a file named 'very_first_program.py' containing the code:

```
1 print("Hello World!")
```

Below the Project tool window is the Python Console tool window, which shows the output of running the program:

```
/usr/bin/python3.10 /snap/pycharm-community/397/plugins/pyt
<stdin> import sys; print('Python %s on %s' % (sys.version, sys.p
<stdin> sys.path.extend(['~/home/tweise/local/programming/python/pro
<stdin> Python Console
>>> >>>
```

The status bar at the bottom indicates the file is 'Python Console.py', encoding is 'UTF-8', and the Python version is 'Python 3.10'.

Entering Commands in the Python Console inside PyCharm



- We can also directly enter programs into the PyCharm Python console (press) and execute them step-by-step.
- This does not make sense if we want to reuse our programs later.

The screenshot shows the PyCharm IDE interface. On the left is the Project tool window displaying a file named 'very_first_program.py' with the code `print("Hello World!")`. In the center is the Editor tool window showing the same code. On the right is the Python Console tool window, which has the following content:

```
/usr/bin/python3.10 /snap/pycharm-community/397/plugins/pyt
<stdin> import sys; print('Python %s on %s' % (sys.version, sys.p
<stdin> sys.path.extend(['~/home/tweise/local/programming/python/pro
<stdin> Python Console
<stdin> >>> print("Hello World!")
```

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Entering Commands in the Python Console inside PyCharm



- We can also directly enter programs into the PyCharm Python console (press) and execute them step-by-step.
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The screenshot shows the PyCharm IDE interface. On the left is the Project tool window displaying a single file named 'very_first_program.py'. The code in the editor is:

```
1 print("Hello World!")
```

Below the editor is the Python Console tool window. It shows the command being run and its output:

```
/usr/bin/python3.10 /snap/pycharm-community/397/plugins/pyt
>>> import sys; print('Python %s on %s' % (sys.version, sys.p
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Entering Commands in the Python Console in a Terminal

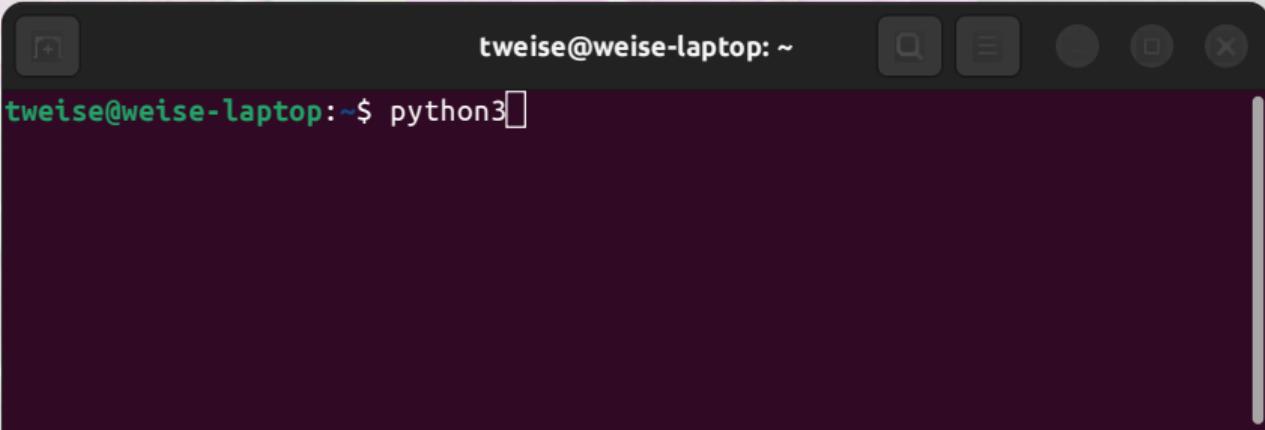


- ... or we can open a Python console in a terminal.

Entering Commands in the Python Console in a Terminal



- ... or we can open a Python console in a terminal.



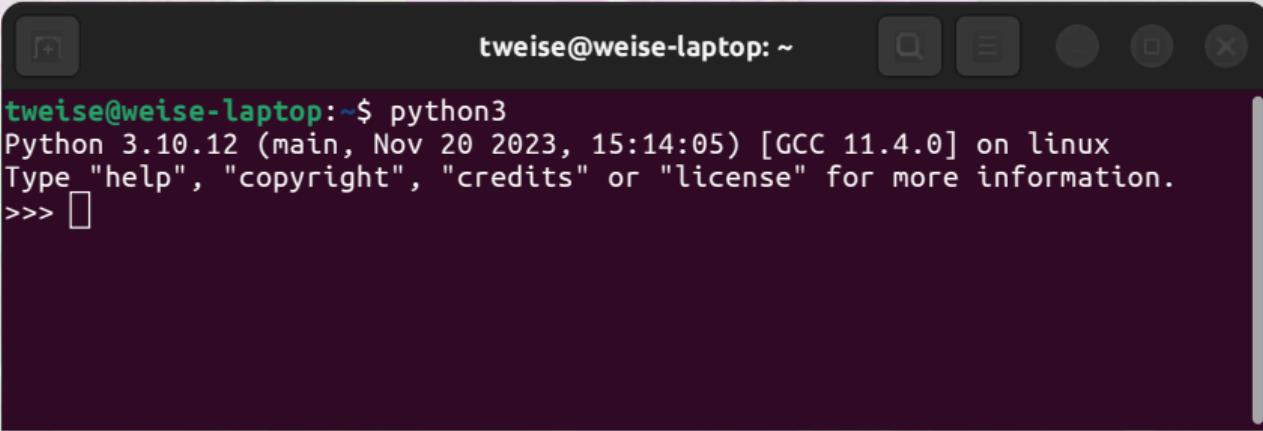
A screenshot of a terminal window titled "tweise@weise-laptop: ~". The window contains the command "tweise@weise-laptop:~\$ python3" followed by a cursor. The background of the slide shows a blurred image of pink flowers.

```
tweise@weise-laptop:~$ python3
```

Entering Commands in the Python Console in a Terminal



- ...or we can open a Python console in a terminal.



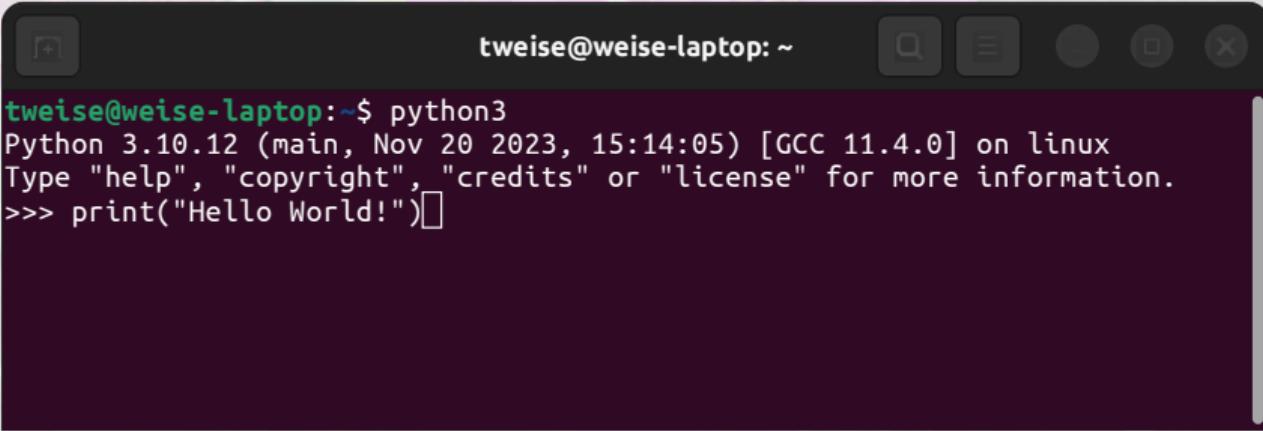
A screenshot of a terminal window titled "tweise@weise-laptop: ~". The window shows the following text:

```
tweise@weise-laptop:~$ python3
Python 3.10.12 (main, Nov 20 2023, 15:14:05) [GCC 11.4.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> 
```

Entering Commands in the Python Console in a Terminal



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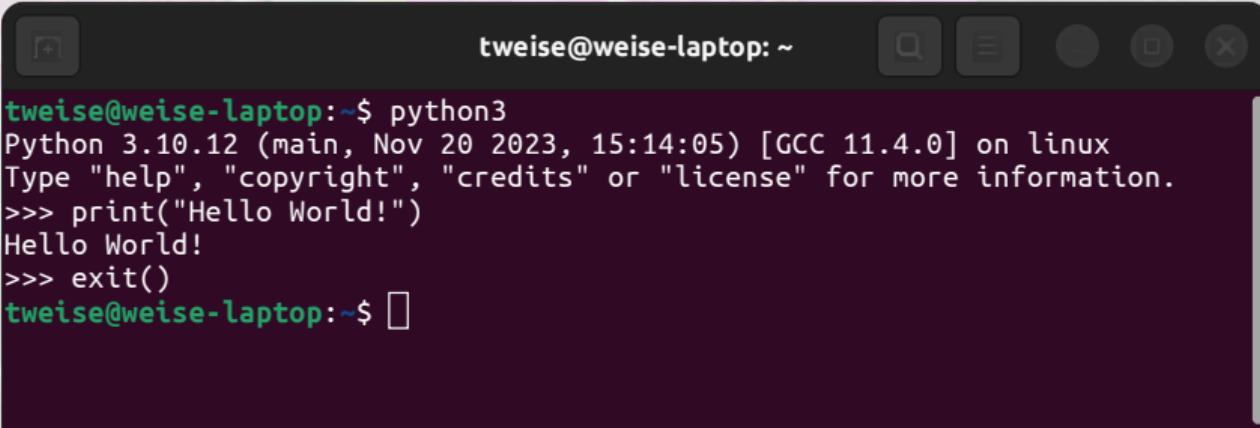
```
tweise@weise-laptop:~$ python3
Python 3.10.12 (main, Nov 20 2023, 15:14:05) [GCC 11.4.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> print("Hello World!")
Hello World!
>>> exit()
```

The terminal has a dark background and light-colored text. It includes standard window controls (minimize, maximize, close) at the top.

Entering Commands in the Python Console in a Terminal



- ... or we can open a Python console in a terminal.



A screenshot of a terminal window titled "tweise@weise-laptop: ~". The window contains the following text:

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Type "help", "copyright", "credits" or "license" for more information.
>>> print("Hello World!")
Hello World!
>>> exit()
tweise@weise-laptop:~$
```

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 1. We can enter the program into a Python file in the PyCharm IDE and then run it from there.
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Best Practice 1

The only proper way to run a Python application in a productive scenario is in the terminal.



Obtaining the Examples



Downloading the Examples

- This course is practice-centered, so it comes with lots of examples.



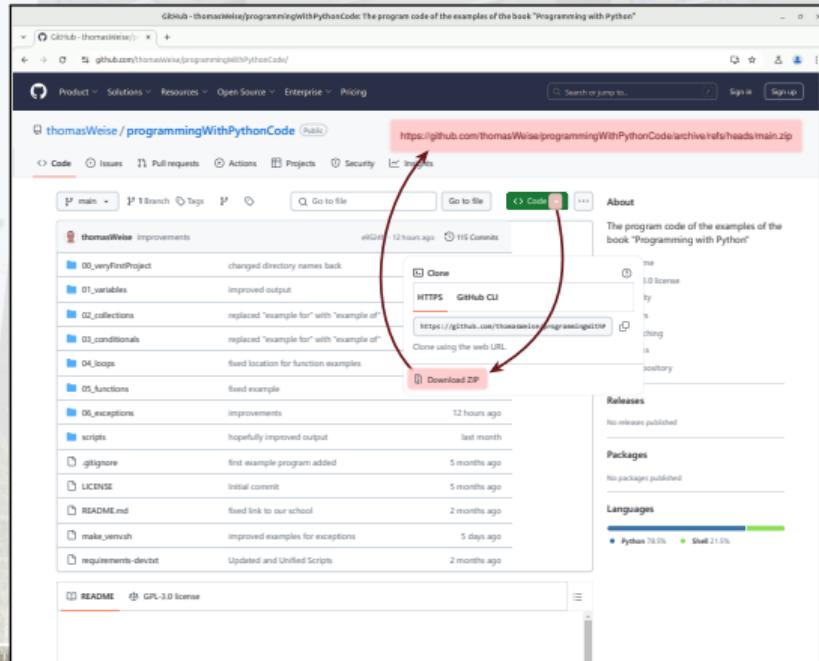


Downloading the Examples

- This course is practice-centered, so it comes with lots of examples.
- You can download them from <https://github.com/thomasWeise/programmingWithPythonCode/archive/refs/heads/main.zip>.

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Clone Repository in PyCharm

- You can also clone the repository

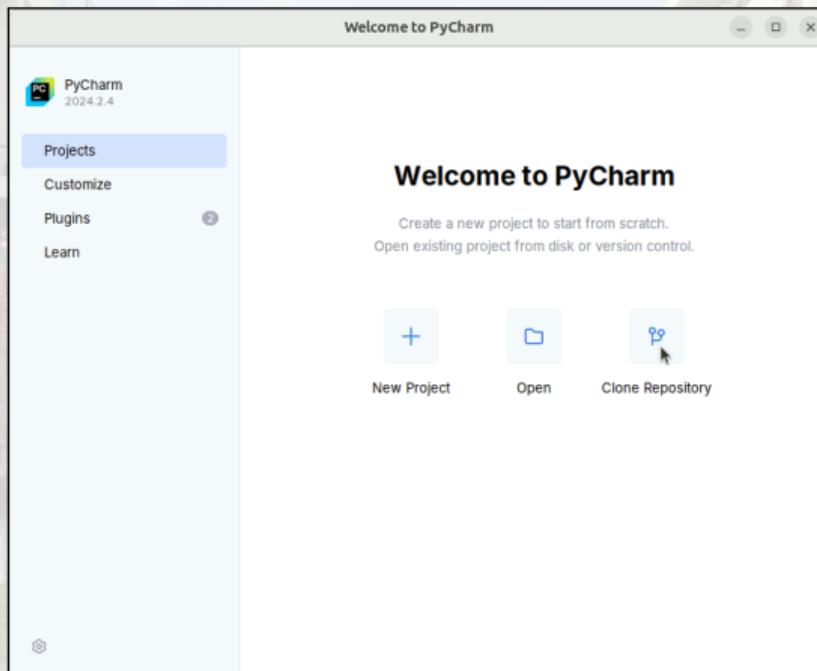
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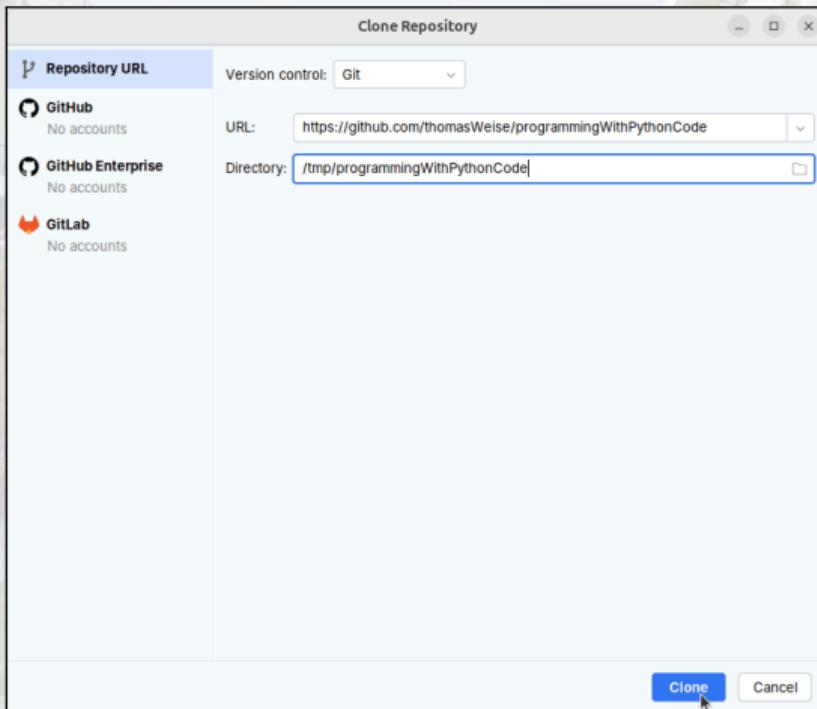
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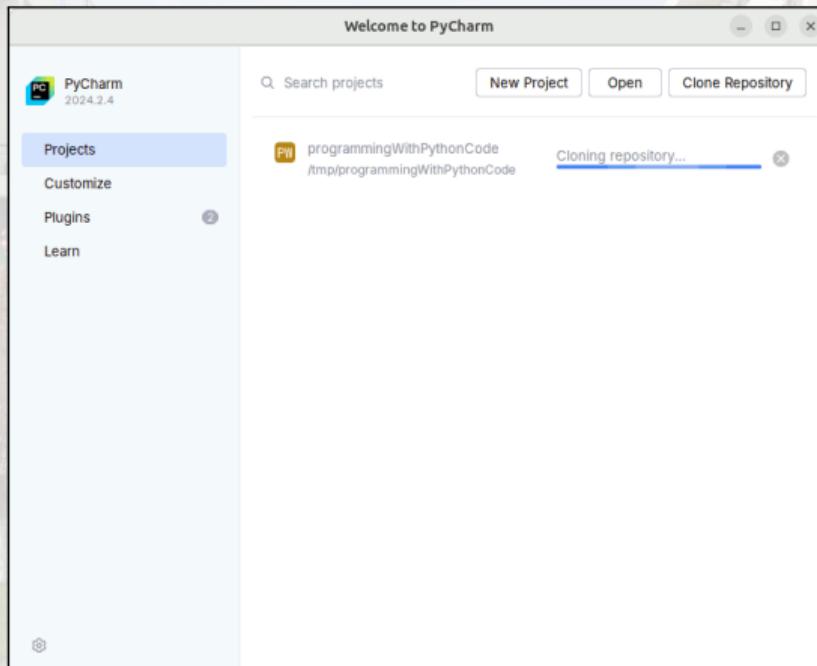
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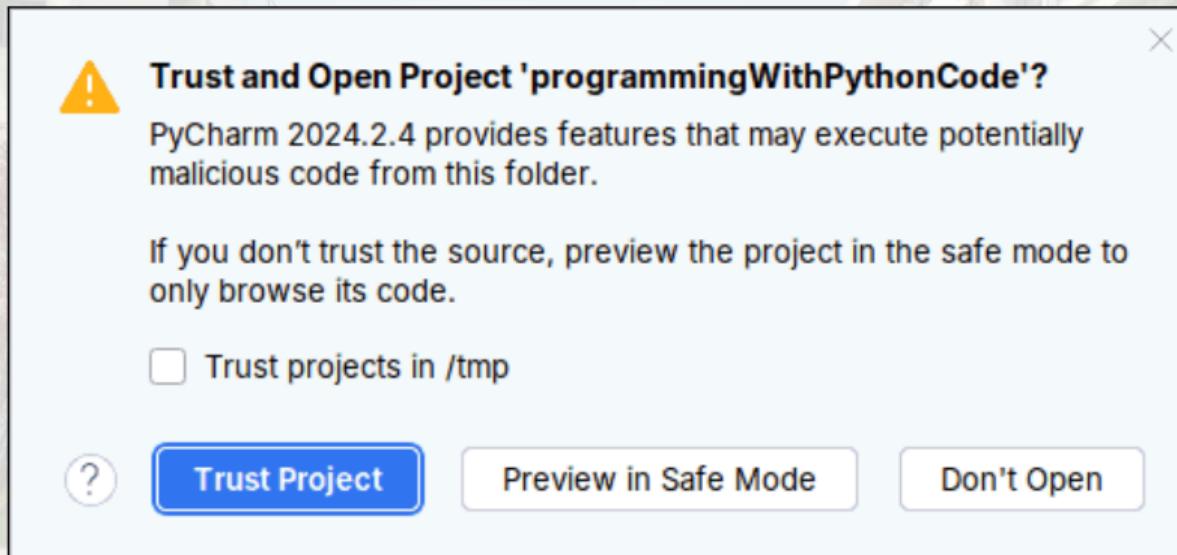
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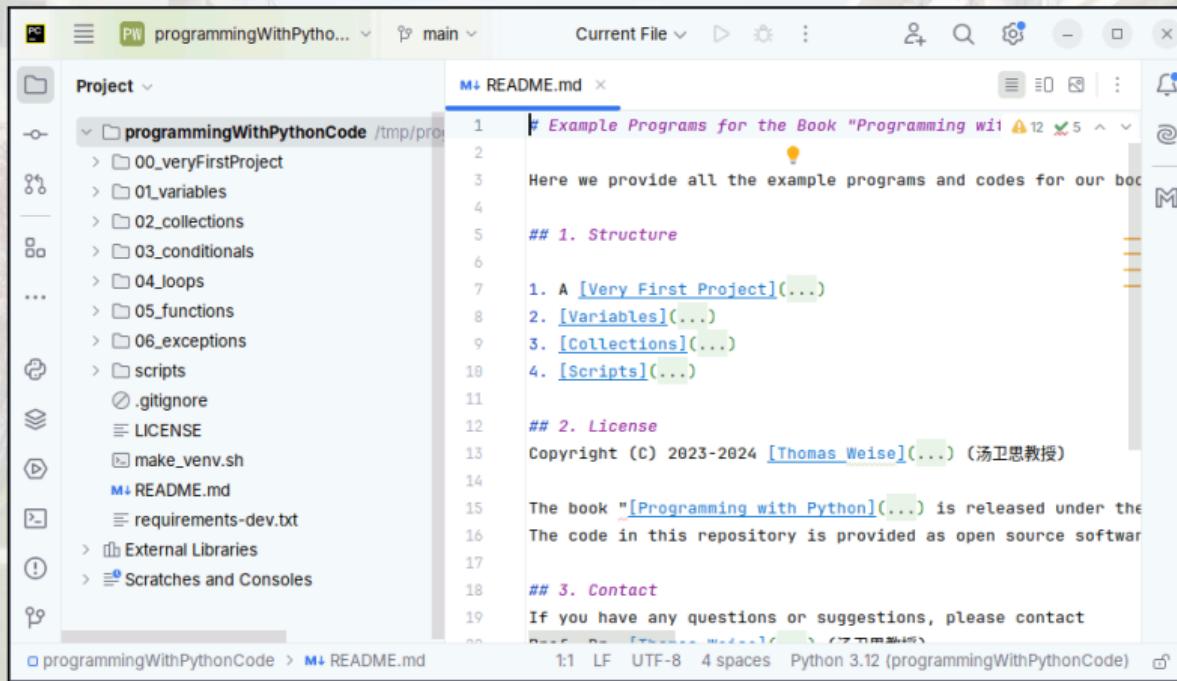
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Clone Repository in PyCharm

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<https://github.com/thomasWeise/programmingWithPythonCode> in PyCharm.



The screenshot shows the PyCharm interface with the following details:

- Project View:** On the left, the project structure is displayed under "programmingWithPythonCode". It includes subfolders like "00_veryFirstProject", "01_variables", "02_collections", "03_conditionals", "04_loops", "05_functions", "06_exceptions", and "scripts".
- File View:** The main editor window shows the "README.md" file. The content of the file is as follows:

```
# Example Programs for the Book "Programming with Python" by Thomas Weise

Here we provide all the example programs and codes for our book.

## 1. Structure

1. A [Very First Project]...
2. [Variables]...
3. [Collections]...
4. [Scripts]...

## 2. License

Copyright (C) 2023-2024 [Thomas Weise]... (汤卫思教授)

The book "[Programming with Python]" is released under the
The code in this repository is provided as open source software.

## 3. Contact

If you have any questions or suggestions, please contact
```

- Status Bar:** At the bottom, the status bar indicates "1:1 LF UTF-8 4 spaces Python 3.12 (programmingWithPythonCode)".



Summary



Summary



- The optimization algorithms we consider in this lecture are **randomized**.



谢谢您们
Thank you



References I



- [1] Daniel J. Barrett. *Efficient Linux at the Command Line*. Sebastopol, CA, USA: O'Reilly Media, Inc., Feb. 2022. ISBN: 978-1-0981-1340-7 (cit. on pp. 11–23).
- [2] Ed Bott. *Windows 11 Inside Out*. Hoboken, NJ, USA: Microsoft Press, Pearson Education, Inc., Feb. 2023. ISBN: 978-0-13-769132-6 (cit. on pp. 11–23).
- [3] David Clinton and Christopher Negus. *Ubuntu Linux Bible*. 10th ed. Bible Series. Chichester, West Sussex, England, UK: John Wiley and Sons Ltd., Nov. 10, 2020. ISBN: 978-1-119-72233-5 (cit. on pp. 11–23).
- [4] Michael Hausenblas. *Learning Modern Linux*. Sebastopol, CA, USA: O'Reilly Media, Inc., Apr. 2022. ISBN: 978-1-0981-0894-6 (cit. on pp. 11–23).
- [5] Prague, Czech Republic: JetBrains. *pycharm-community: PyCharm Community Edition*. London, England, UK: Canonical Ltd., Dec. 12, 2024. URL: <https://snapcraft.io/pycharm-community> (visited on 2025-01-01) (cit. on pp. 45–52).
- [6] *Python 3 Documentation. Python Setup and Usage*. Beaverton, OR, USA: Python Software Foundation (PSF), 2001–2025. URL: <https://docs.python.org/3/using> (visited on 2024-07-05) (cit. on pp. 25–30).
- [7] Anna Skoulikari. *Learning Git*. Sebastopol, CA, USA: O'Reilly Media, Inc., May 2023. ISBN: 978-1-0981-3391-7 (cit. on pp. 11–23).
- [8] *Snap Documentation*. London, England, UK: Canonical Ltd., 2025. URL: <https://snapcraft.io/docs> (visited on 2025-01-01) (cit. on pp. 45–52).
- [9] Linus Torvalds. "The Linux Edge". *Communications of the ACM (CACM)* 42(4):38–39, Apr. 1999. New York, NY, USA: Association for Computing Machinery (ACM). ISSN: 0001-0782. doi:10.1145/299157.299165 (cit. on pp. 11–23).
- [10] Mariot Tsitoara. *Beginning Git and GitHub: Version Control, Project Management and Teamwork for the New Developer*. New York, NY, USA: Apress Media, LLC, Mar. 2024. ISBN: 979-8-8688-0215-7 (cit. on pp. 11–23).
- [11] Bruce M. Van Horn II and Quan Nguyen. *Hands-On Application Development with PyCharm*. 2nd ed. Birmingham, England, UK: Packt Publishing Ltd, Oct. 2023. ISBN: 978-1-83763-235-0 (cit. on pp. 11–23).
- [12] Martin Yanev. *PyCharm Productivity and Debugging Techniques*. Birmingham, England, UK: Packt Publishing Ltd, Oct. 2022. ISBN: 978-1-83763-244-2 (cit. on pp. 11–23).