Exercise 2

Working with Python editors

Exercise data

Exercise data for this book can be downloaded from links.esri.com/PythonPro3rdEditionData group called *Python Scripting for ArcGIS Pro – 2024 (Esri Press)*. The data for Exercise 2 is posted as a zip file called PythonScripting_Ex02_Data.zip. Download this file and extract it to a folder of your choice. The instructions use a folder called C:\PythonPro, but you can use a different folder provided you update any paths.

Python editors

This exercise shows you how to install and configure two different Python editors: IDLE and PyCharm. The remaining exercises for this book mostly use IDLE but PyCharm is used for selected tasks. Most of the exercises can also be completed using a different editor, provided it is properly configured to use the default environment arcgispro-py3 or a clone.

This exercise also reviews the use of the Python window to write and test short snippets of code. The Python window is used in some of the remaining exercises, but it does not provide all the functionality of a regular Python editor.

Use the built-in shortcut to use IDLE

IDLE is a basic Python editor that is part of any Python installation. To work with ArcPy, IDLE must be configured to use the default environment arcgispro-py3 or a clone. This environment ensures the correct version of Python is used and that ArcPy is licensed.

The installation of ArcGIS Pro does not create a program shortcut for IDLE, but the following steps will show how to run IDLE and create your own desktop shortcut.

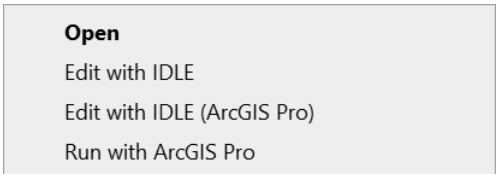
1. **Start File Explorer in Windows, and navigate to the C:\PythonPro\Ex02 folder.**

2. **Locate the file test_script.py**

Being able to see the file extensions is helpful for many tasks. If you see the file test_script instead of test_script.py, make sure file extensions are visible.

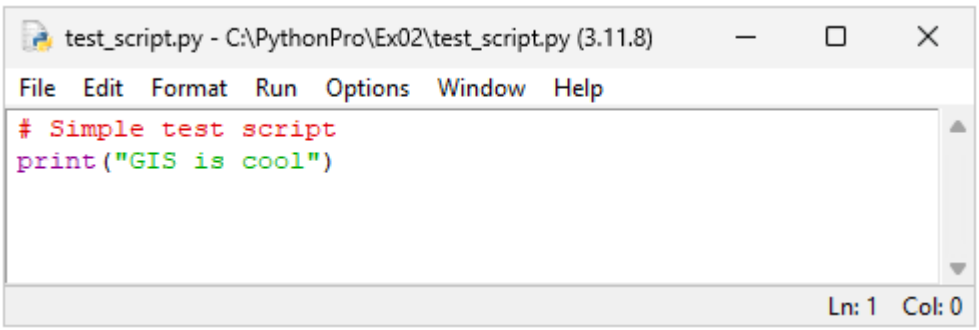
3. **Make file extensions visible.**

4. **Right-click on the test_script.py file, and click Edit with IDLE (ArcGIS Pro).**



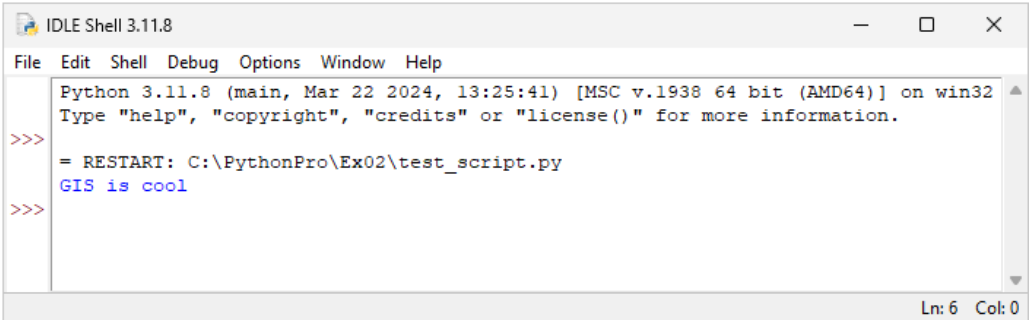
You may have other options showing, depending on the configuration of your computer. For example, the option Edit with IDLE is available if you have ArcGIS Desktop 10.x installed, but it does not use the correct version of IDLE. Use only Edit with IDLE (ArcGIS Pro) to ensure you are using the correct Python environment.

The script file opens in IDLE for Python version 3.11. You can resize the script window.



5. **Click Run > Run Module to run the script.**

The Python Shell opens, and the result prints to the interactive window.



Opening IDLE using this built-in shortcut is convenient because it uses the active environment of ArcGIS Pro, regardless of whether ArcGIS Pro is running or not.

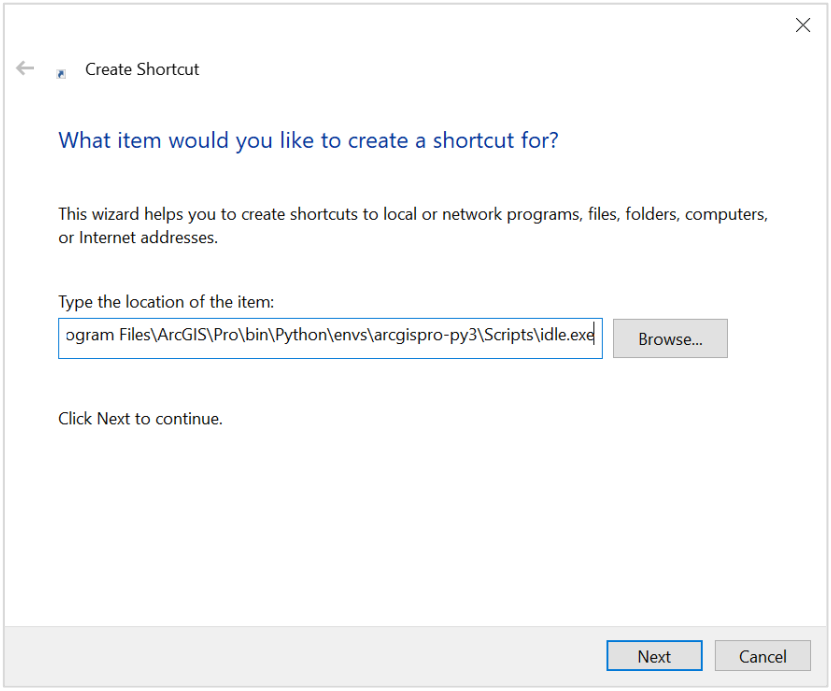
Create a desktop shortcut for IDLE

You can also create a desktop shortcut for IDLE.

1. **Right-click on your desktop, and click New > Shortcut.**

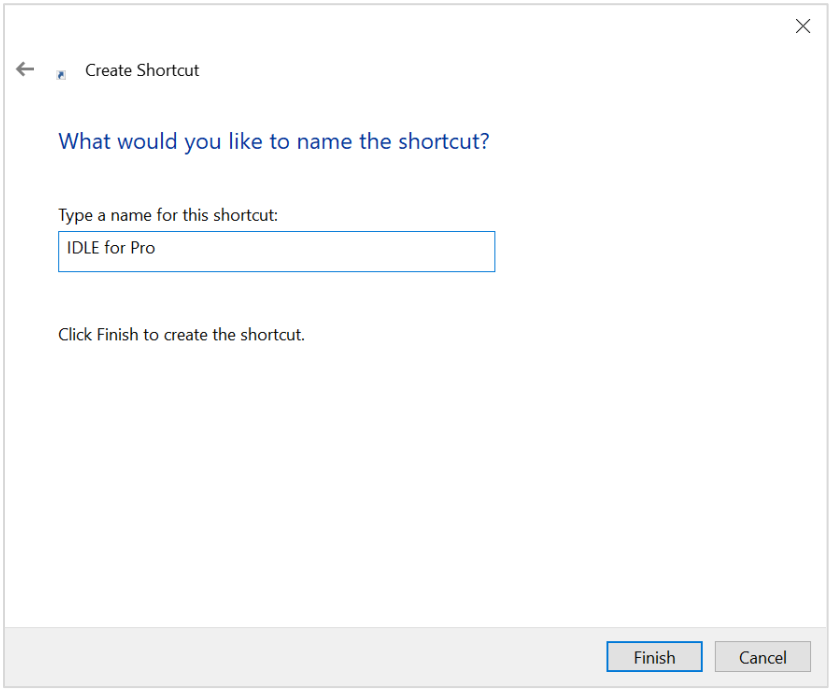
2. **In the Create Shortcut dialog box, enter or browse to the following path:**

C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3\Scripts\idle.exe



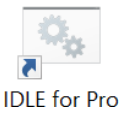
3. **Click Next.**

4. **In the next panel of the dialog box, enter a meaningful name—for example, IDLE for Pro.**



5. **Click Finish.**

   A new shortcut is created on your desktop with a generic icon.



   You can replace this generic icon with the IDLE icon.

6. **Right-click the new shortcut and click Properties.**

7. **In the Properties dialog box, click on the Shortcut tab, and then click Change Icon.**

8. **In the Change Icon dialog box, browse to the following location:**

   C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3\Lib\idlelib\Icons\idle.ico

9. **Click OK to close the Change Icon dialog box.**

10. **Click OK to close the Properties dialog box.**

    The icon is updated for the shortcut.

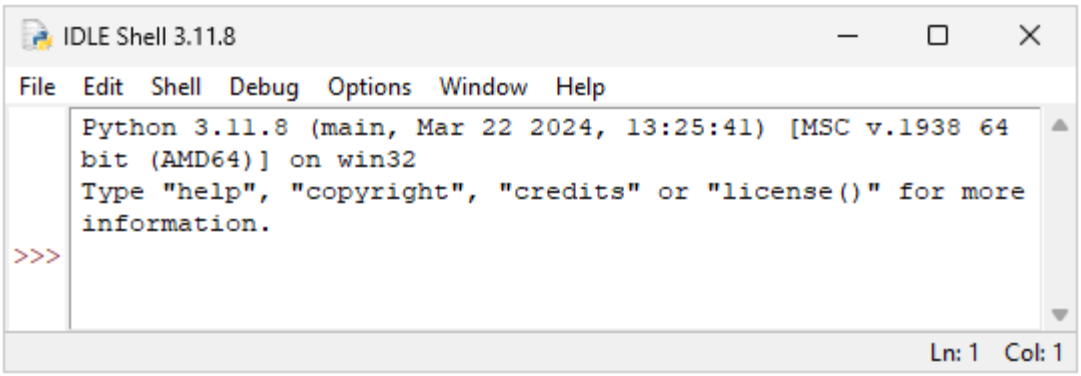
Keep in mind that this shortcut is only for a specific environment. If you have created a different environment, you must create a new shortcut to use this environment.

Run code using IDLE

You can now use the shortcut to start IDLE and practice running simple code.

1. **Double-click the IDLE for Pro desktop shortcut.**

The Python Shell for Python 3.11 opens.



The Python Shell is also referred to as the *interactive window* or the *interactive interpreter* of IDLE.

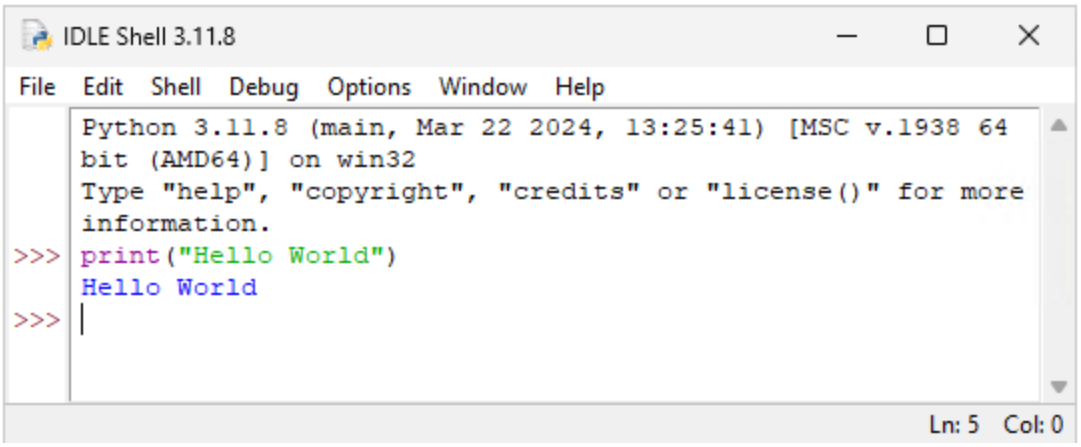
2. **At the prompt, enter the following code:**

```
>>> print("Hello World")
```

There is no need to type the characters >>>. They are shown here to make it clear that you should enter the code in the interactive interpreter at the prompt.

3. **Press Enter at the end of the first line of code.**

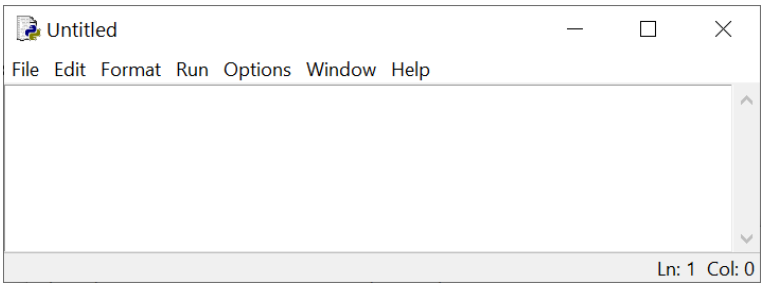
The line of code is executed, and the result is printed to the next line. A new command prompt appears below the result.



Next, you will run the same code by using a script file.

4. **In the Python Shell, click File > New File.**

   A new script window opens. You can resize the script window.

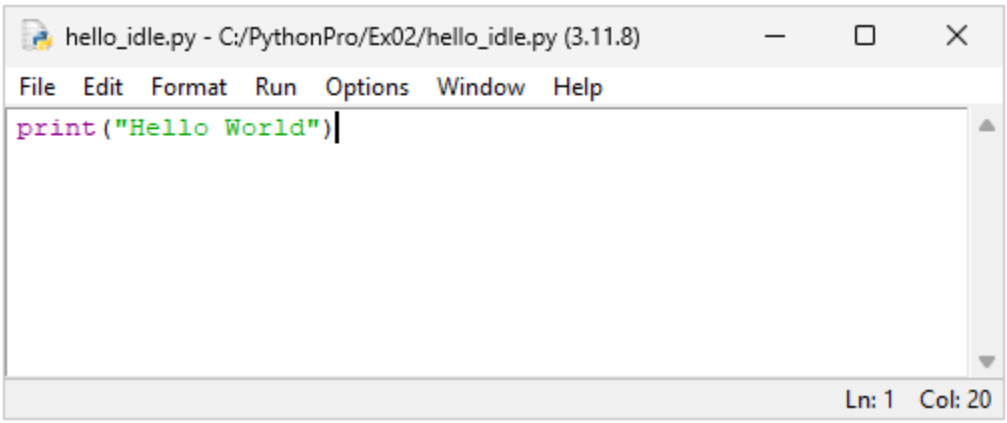


5. **In the script window, enter the following code:**

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

6. **Click File > Save As.**

7. **In the Save As dialog box, navigate to the C:\PythonPro\Ex02 folder, and save the file as hello_idle.py. There is no need to type the .py file extension if the file type is set to Python files.**



8. **Click Run > Run Module.**

The interactive interpreter opens, and a confirmation appears that the script C:\PythonPro\Ex02\hello.py was run. The results of running the script prints below, followed by a new command prompt.

9. **Close all open IDLE windows.**

Note: In these exercises, when the instructions use the >>> symbol, the code should be run in the interactive interpreter. When the instructions do not use the >>> symbol, the code should be run as a stand-alone script.

Install PyCharm

PyCharm is another popular Python editor, with a lot of extra features. It is not a Python package, and it must be downloaded and installed separately from ArcGIS Pro.

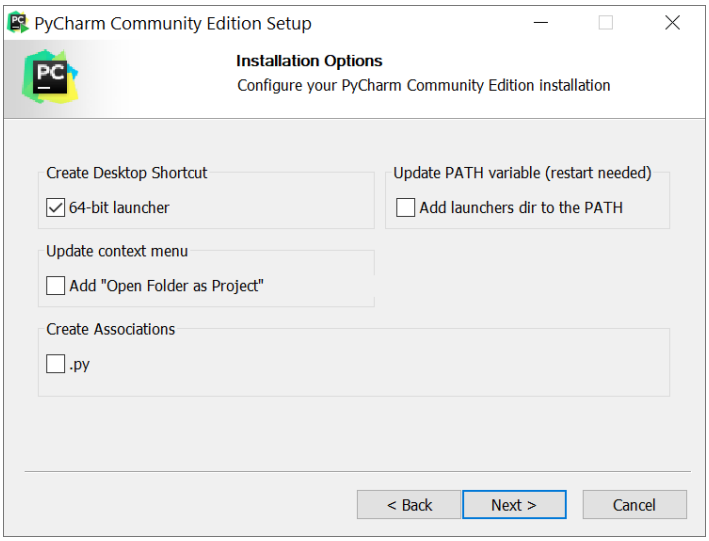
1. **Open a web browser, and navigate to [www.jetbrains.com/pycharm/.](http://www.jetbrains.com/pycharm/)**

2. **Click Download.**

3. **Click on the download option for the Windows Community edition, which is free and open source.**

4. **Follow the on-screen instructions to download and install PyCharm.**

Under Installation Options, you can select the option to create a desktop shortcut (recommended) and create a file association with .py files (recommended only if you plan to make PyCharm your primary editor).



Note: The latest version of PyCharm at the time of writing is 2024.1, but this will change over time as new updates are released. You always should use the latest version of PyCharm even though the version is different from the one referenced in these instructions or the book. Installation instructions can be found at https://www.jetbrains.com/help/pycharm/installation-guide.html. The Standalone installation is recommended.

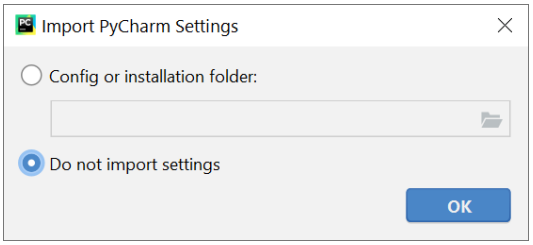
Once installation is complete, a new desktop shortcut is added.

Configure PyCharm

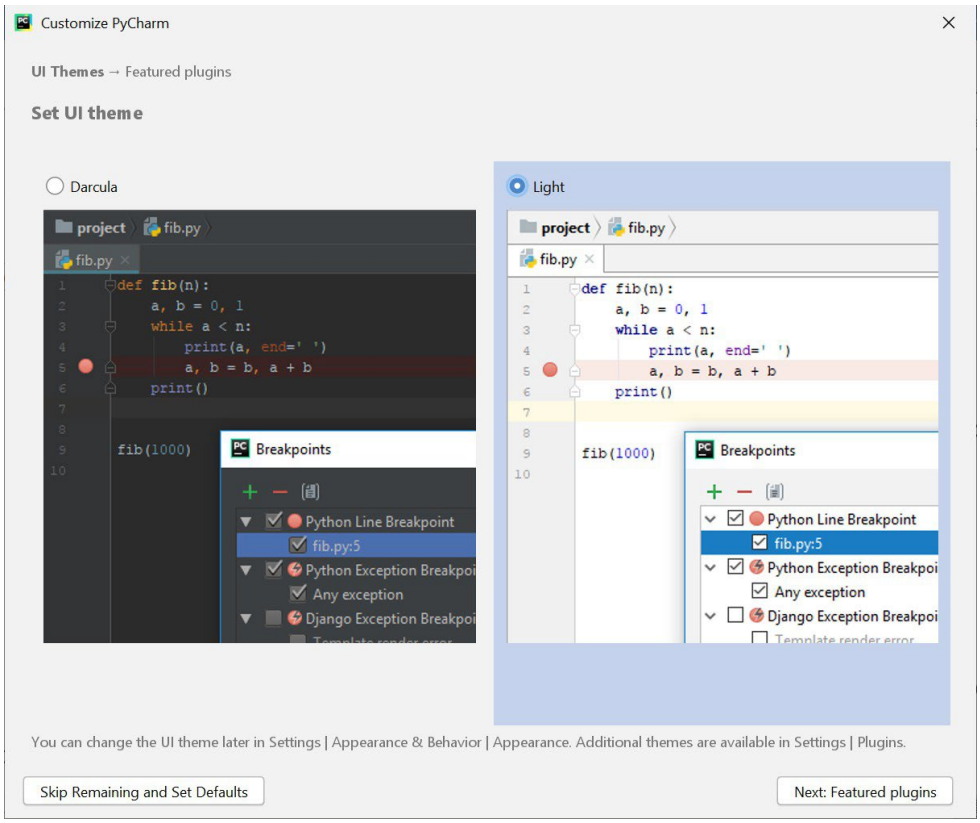
Following installation, PyCharm must be configured to use the correct environment to work with ArcGIS Pro.

1. **Double-click the PyCharm desktop icon.**

2. **If prompted to import settings, select the option "Do not import settings" and click OK.**



3. **You are prompted to set your display theme. The options are Darcula (light text on dark background) and Light (dark text on white background). Select your preference.**

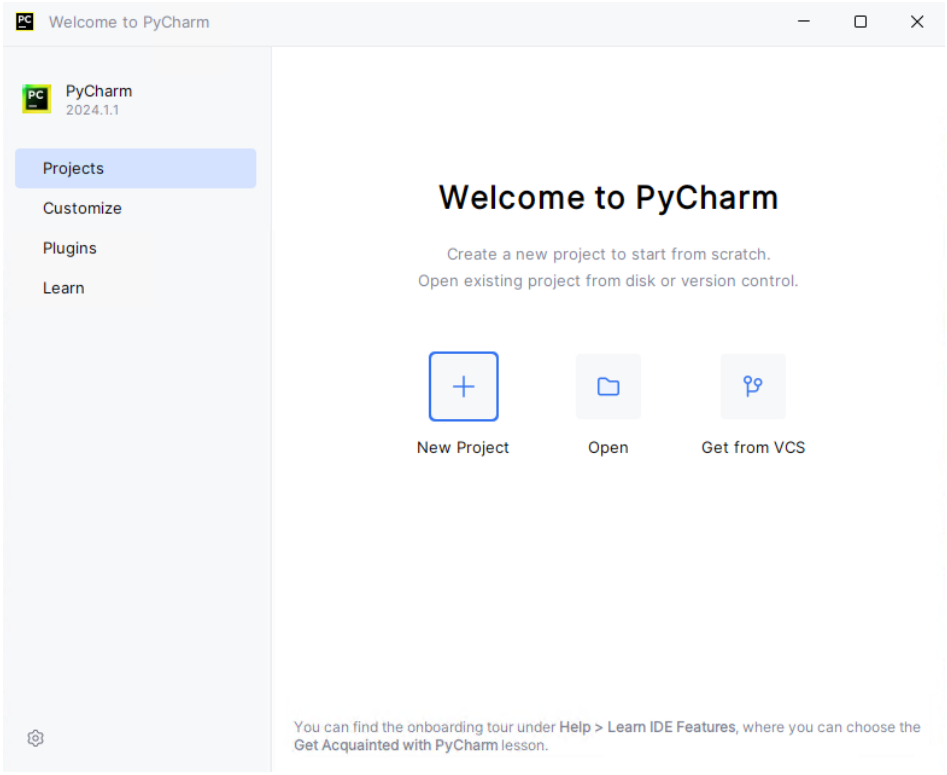


The instructions in this exercise use the Light theme, but either option is fine.

For the remaining setup steps, the default settings will suffice. Once you become more familiar with the functionality of PyCharm, all these settings can be changed.

4. **Click Skip Remaining and Set Defaults.**

Once the initial setup of PyCharm is complete, you are prompted to create a new project or open an existing one.



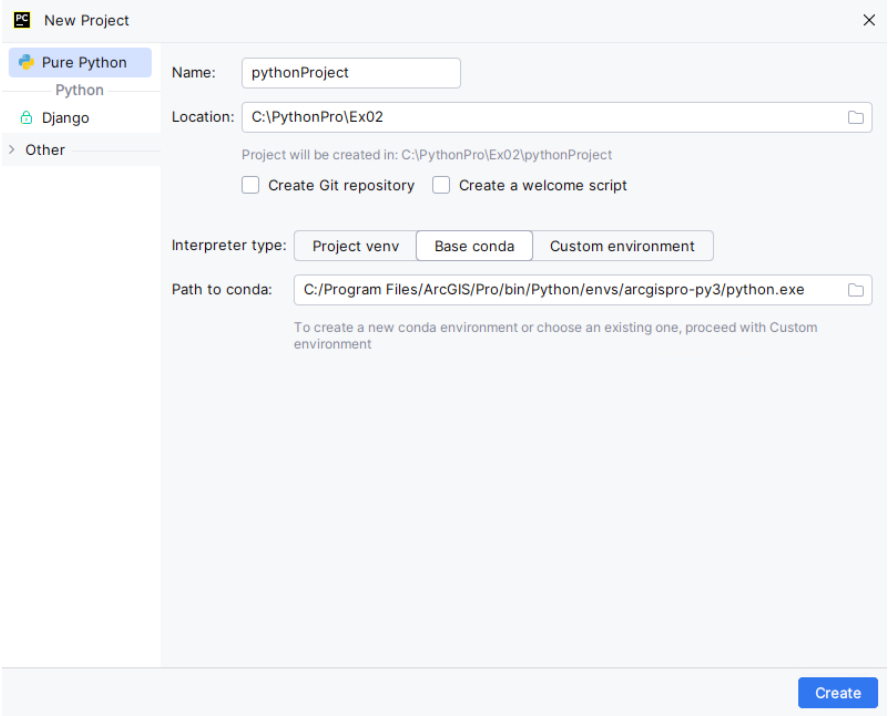
5. **Click Create New Project.**

The New Project dialog box opens. Here is where you set the location of your project and the Python environment (referred to as the *project interpreter* in PyCharm).

6. **For the Location, navigate to the C:\PythonPro\Ex02 folder.**
7. **For the Interpreter Type, select Base conda.**
8. **For Environment, choose Select existing.**
9. **For Path to conda, navigate to the following location:**

   C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3\python.exe

10. **Click Create.**



PyCharm does not automatically recognize the environments created by ArcGIS Pro, so you must select them manually.

11. **In the Project Window, on the bottom right, click on the <No interpreter> button.**

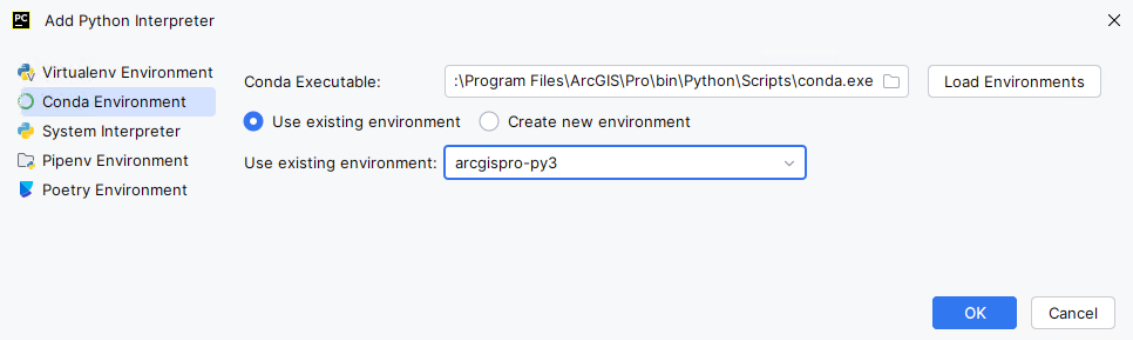
12. **Click Add New Interpreter > Add Local Interpreter.**

13. **In the Add Python Interpreter dialog box, click Conda Environment.**

14. **For Conda Executable, navigate to the following location:**

    C:\Program Files\ArcGIS\Pro\bin\Python\Scripts\conda.exe

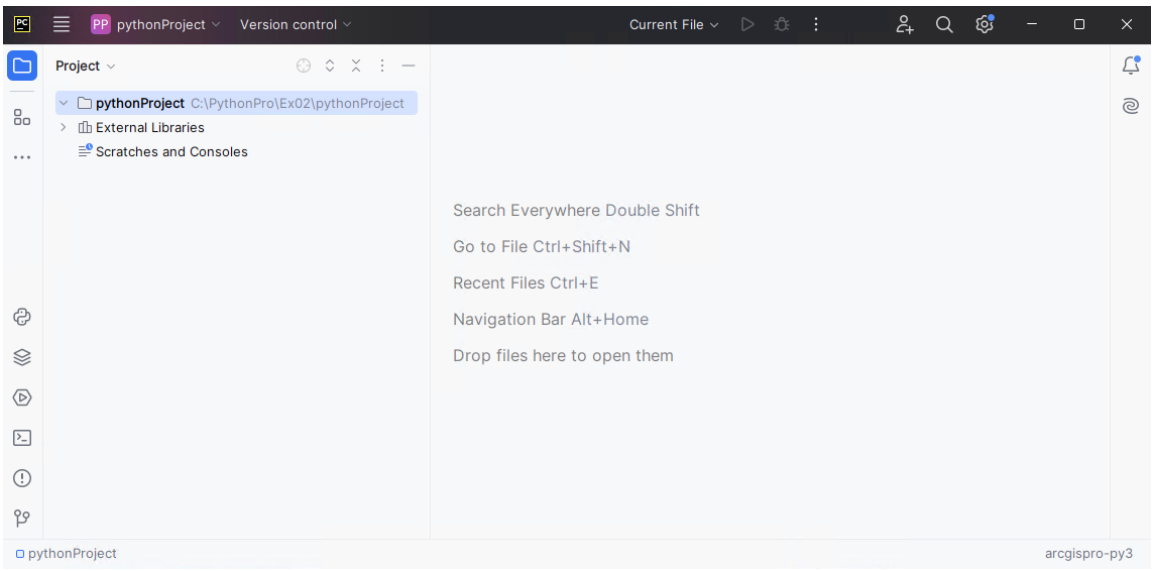
15. **Click Load Environments.**



16. **Click OK.**

17. **If you are prompted that the directory is not empty, click Yes to create a project from existing sources.**

PyCharm opens with a project tab on the left side showing the project folder and any scripts located inside this folder. Notice the arcgispro-py3 interpreter in the bottom right of the window.

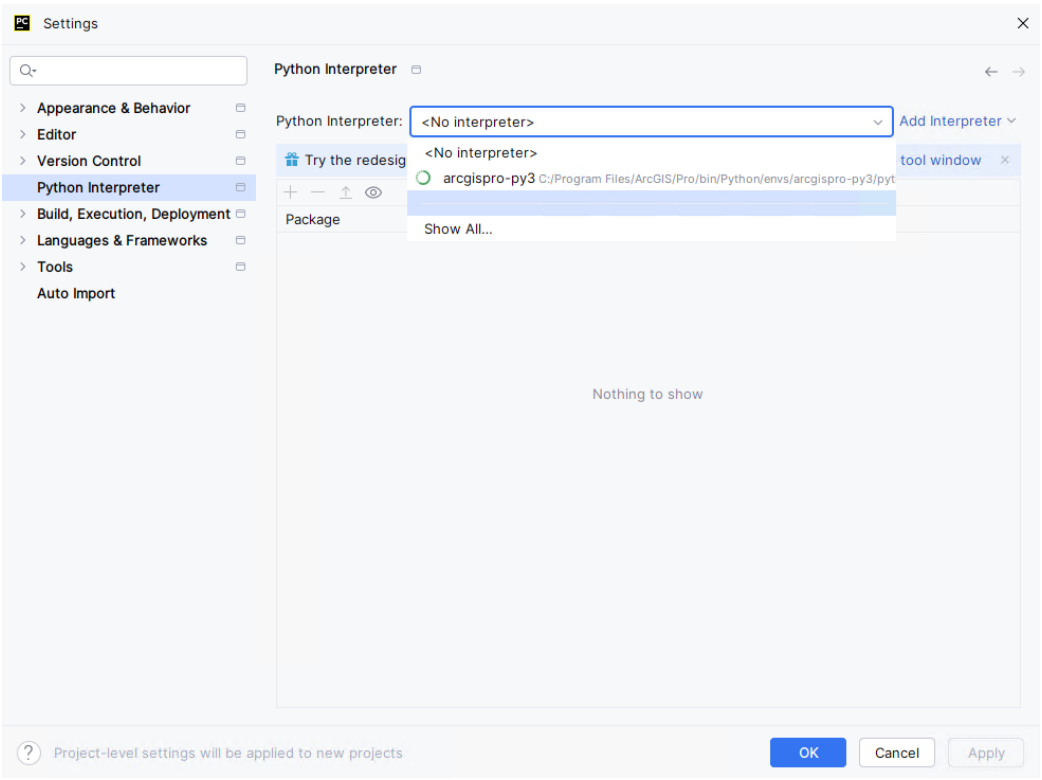


The initial configuration steps are a bit cumbersome, but it is essential that you use the correct environment in PyCharm. Contrary to IDLE, which is configured automatically to use a single environment, PyCharm can use many different environments. This is one of its strengths, but it also implies that you may inadvertently use an incorrect environment. Therefore, when using PyCharm to write Python scripts for ArcGIS Pro, always make sure you are using the arcgispro-py3 environment or a clone.

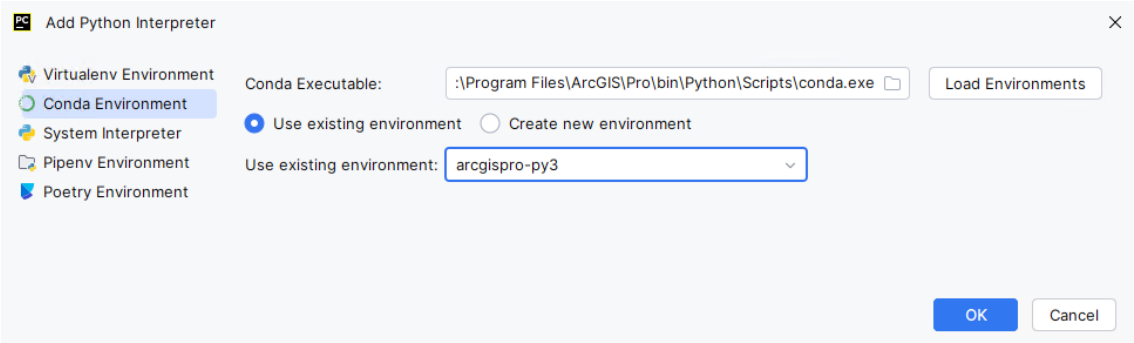
Future projects will automatically use the selected environment, but you can configure PyCharm to use newly created environments as well.

18. Close the Create Project dialog box to return to the current project.

You can also manage the interpreters used by PyCharm by clicking File > New Projects Setups > Settings for New Projects. In the Settings for New Projects dialog box, click Project Interpreter in the left panel. The drop-down option lists all available interpreters.



19. **Click Add Interpreter > Add Local Interpreter to bring up the Add Python Interpreter dialog box. Here, you can point to a new environment—for example, after creating a clone using the Python Package Manager.**



A single installation of PyCharm can employ any number of environments. Contrary to IDLE, you need to install PyCharm only once, and then you can modify the environment within the application.

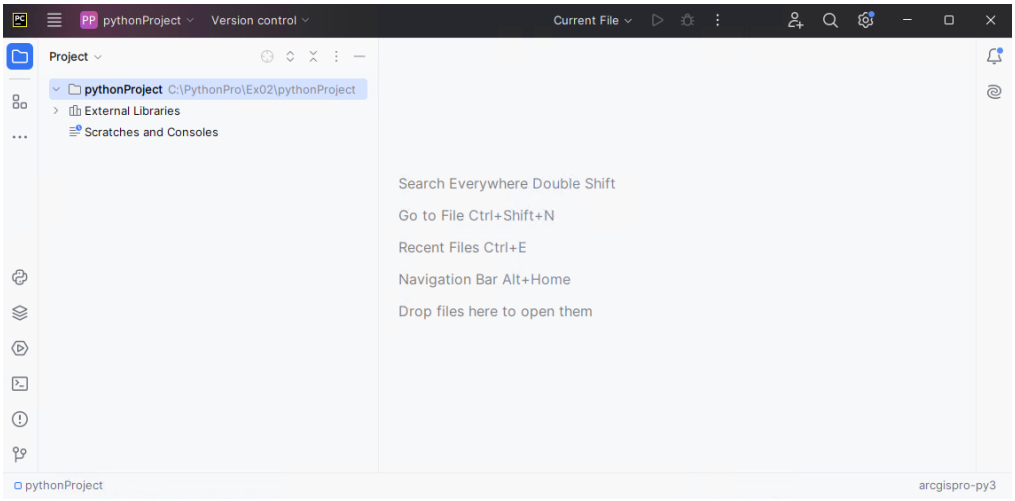
20. **Click Cancel twice to return to the current project in PyCharm.**

The remainder of the exercises that accompany the *Python Scripting for ArcGIS Pro* book use only the default environment. There is no need to switch environments on a regular basis for the exercises.

Run code in PyCharm

Next, you will run some code in PyCharm

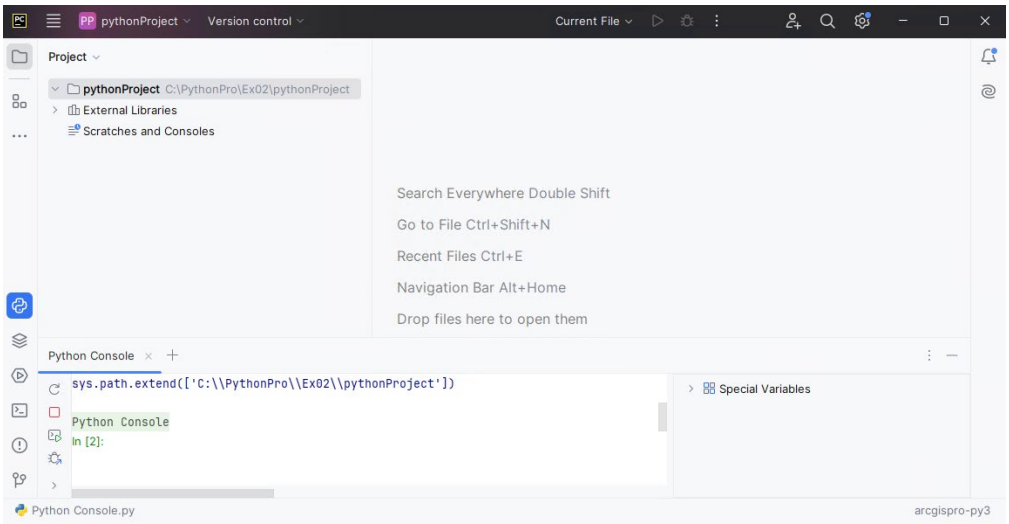
1. **Return to the main interface of PyCharm.**



The Project tab on the left shows the folder where the project resides, including any Python files that have previously been created. Now you need a place to write your code.

2. **On the top menu, click View > Tool Windows > Python Console.**

   This brings up a Python console, like the interactive interpreter in IDLE.



3. **At the prompt in the Python console, enter the following code and press Enter:**

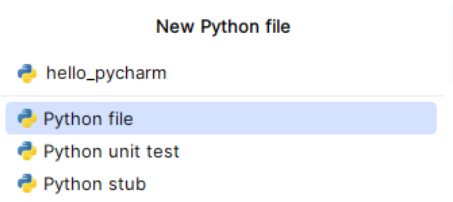
   ```
   print("Hello World")
   ```

The line of code is executed, and the result is printed to the next line. A new input prompt appears below the result. This functionality is identical to IDLE, although the display is slightly different.

Next, you will run the same code by using a script file.

4. **Right-click on the C:\PythonPro\Ex02 folder in the Project panel and click New > Python file.**

5. **In the New Python file dialog box, type hello_pycharm.**



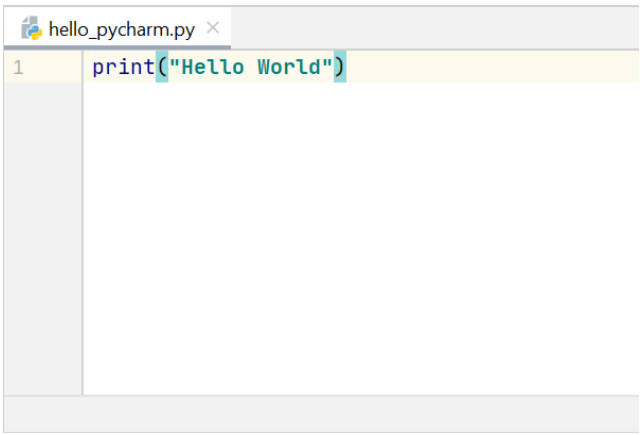
6. **Press Enter to create the new script file.**

The file is added to the project folder and opens in a script window.

7. **Enter the following code in the script:**

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

The script file is saved automatically as you write the code.



8. **Right-click inside the script file and click Run 'hello_pycharm'. Alternatively, on the top menu, click Run > Run 'hello_pycharm.py'.**

A new Run window opens with the results from running the script. This window is separate from the Python console.

9. **On the top menu, click File > Exit to close PyCharm.**

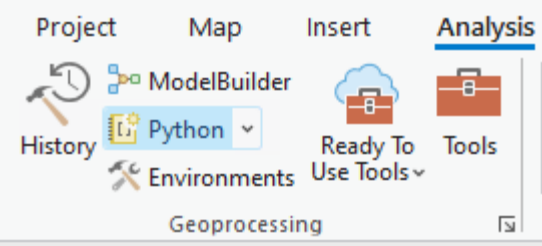
Note: For the remainder of the exercises that accompany the *Python Scripting for ArcGIS Pro* book, whenever you are asked to write a script, you are expected to create a new script (.py file) in a Python editor. You can use IDLE, PyCharm, or another editor of your choice. You are encouraged to try several editors.

Run code in the Python window

An alternative to running Python code in a stand-alone Python editor is to use the Python window in ArcGIS Pro. The Python window is a convenient way to practice writing Python code and test short snippets of code. Longer and more complex scripts are best written in a stand-alone Python editor with more functionality.

1. **Start ArcGIS Pro with a new empty project.**

2. **On the Analysis tab, in the Geoprocessing group, click on Python > Python Window.**



The Python window opens. Since you are running the Python window from within ArcGIS Pro, the active environment in the ArcGIS Pro application is being used here, and no additional configuration is required. This is one of the benefits of using the Python window.

3. **In the prompt section of the Python window, enter the following code, and press Enter:**

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

The line of code is copied to the transcript section of the Python window, and the result appears on the next line in the transcript.

The Python window allows for running individual lines of code, but there is no separate script window. The Python window is therefore comparable to the interactive interpreter in IDLE or the console in PyCharm.

One of the benefits of working in the Python window is that you can interact with the ArcGIS Pro application.

4. **Make sure that the Catalog pane is visible. If it is not visible, on the View tab, click Catalog Pane.**
5. **In the Catalog pane, right-click Folders, and add a folder connection to C:\PythonPro\Ex02.**
6. **Expand the Ex02 folder, right-click on the parks.shp shapefile, and click Add To New > Map.**
7. **In the prompt section of the Python window, enter the following code, and press Enter:**

```
print(arcpy.GetCount_management("parks"))
```

Running the code prints the count of the number of features. Note that you can reference the name of the layer (i.e., parks) without having to specify the location or file extension.

Accomplishing the same task in a stand-alone Python editor requires specifying the full path and file name of the feature class—i.e., C:\PythonPro\Ex02\parks.shp.

Note: The syntax of working with geoprocessing tools is covered in depth in exercise 5.

End of Exercise 2.