Python Programming

LECTURE-2

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Topics Covered

- Installing Python

Setting Up Python

Setting Up Python

- Install the latest version of Python 3 on your computer
- Open **IDLE**, Python's built-in **I**ntegrated **D**evelopment and **L**earning **E**nvironment

Let's get started!

2.1 A Note on Python Versions

Many operating systems, including macOS and Linux, come with Python preinstalled. The version of Python that comes with your operating system is called the **system Python**.

2.2 Windows

Follow these steps to install Python 3 and open IDLE on Windows.

Important

The code in this book is tested only against Python installed as described in this section.

Be aware that if you have installed Python through some other means, such as Anaconda Python, you may encounter problems when running some of the code examples.

Install Python

Windows doesn't typically come with a system Python. Fortunately, installation involves little more than downloading and running the Python installer from the Python.org website.

Step 1: Download the Python 3 Installer

Open a web browser and navigate to the following URL:

https://www.python.org/downloads/windows/

Click *Latest Python 3 Release - Python 3.x.x* located beneath the "Python Releases for Windows" heading near the top of the page. As of this writing, the latest version was Python 3.9.

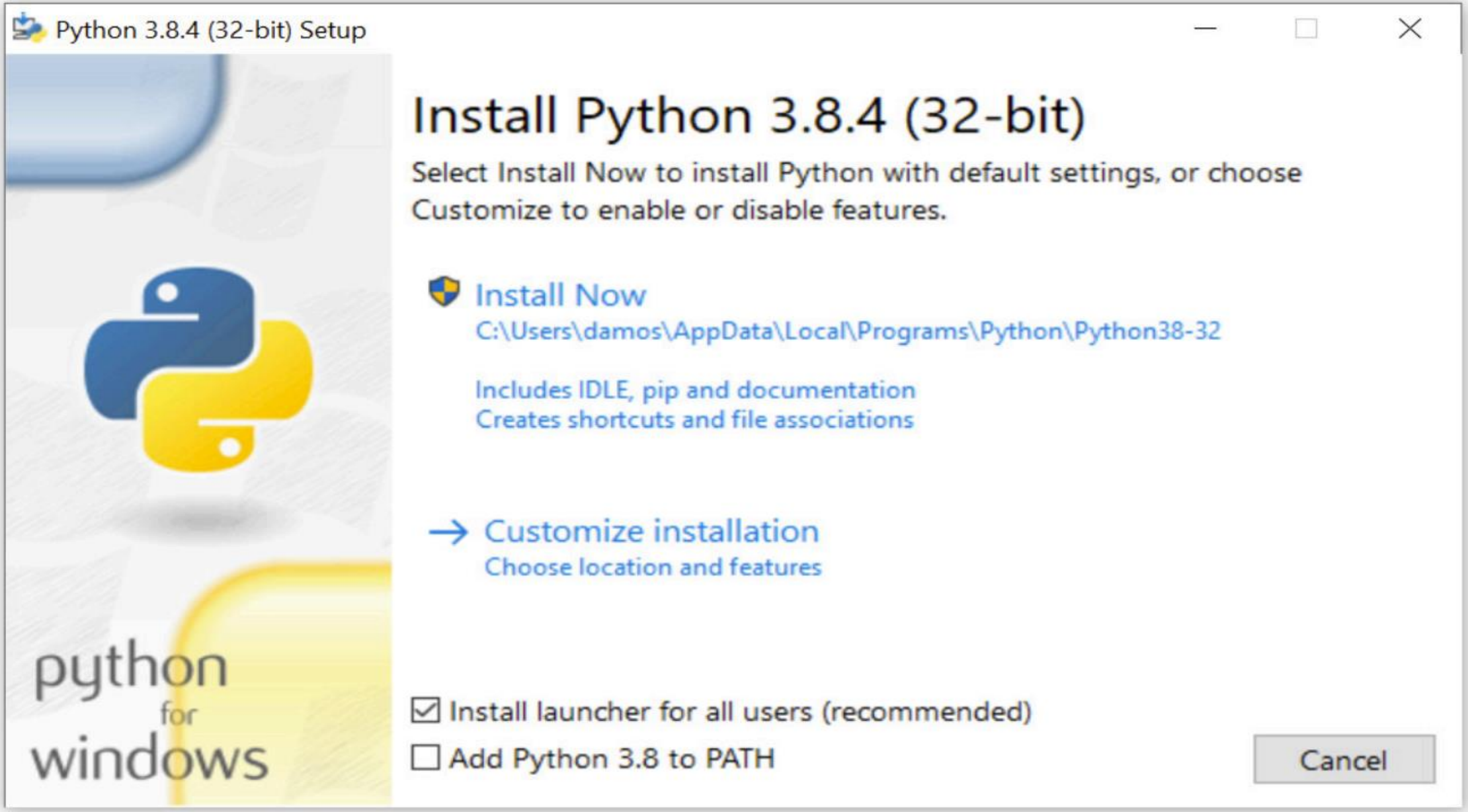
Then scroll to the bottom and click *Windows x86-64 executable installer* to start the download.

Note

If your system has a 32-bit processor, then you should choose the 32-bit installer. If you aren't sure if your computer is 32-bit or 64-bit, stick with the 64-bit installer mentioned above.

Step 2: Run the Installer

Open your Downloads folder in Windows Explorer and double-click the file to run the installer. A dialog that looks like the following one will appear:


Python 3.8.4 (32-bit) Setup
Install Python 3.8.4 (32-bit)
Select Install Now to install Python with default settings, or choose Customize to enable or disable features.
Install Now
C:\Users\damos\AppData\Local\Programs\Python\Python38-32
Includes IDLE, pip and documentation
Creates shortcuts and file associations
Customize installation
Choose location and features
python
for
windows
Install launcher for all users (recommended)
Add Python 3.8 to PATH
Cancel

It's okay if the Python version you see is greater than 3.9.0 as long as the version is not less than 3.

Important

Make sure you select the box that says *Add Python 3.x to PATH*. If you install Python without selecting this box, then you can run the installer again and select it.

Click Install Now to install Python 3. Wait for the installation to finish, then continue to open IDLE.

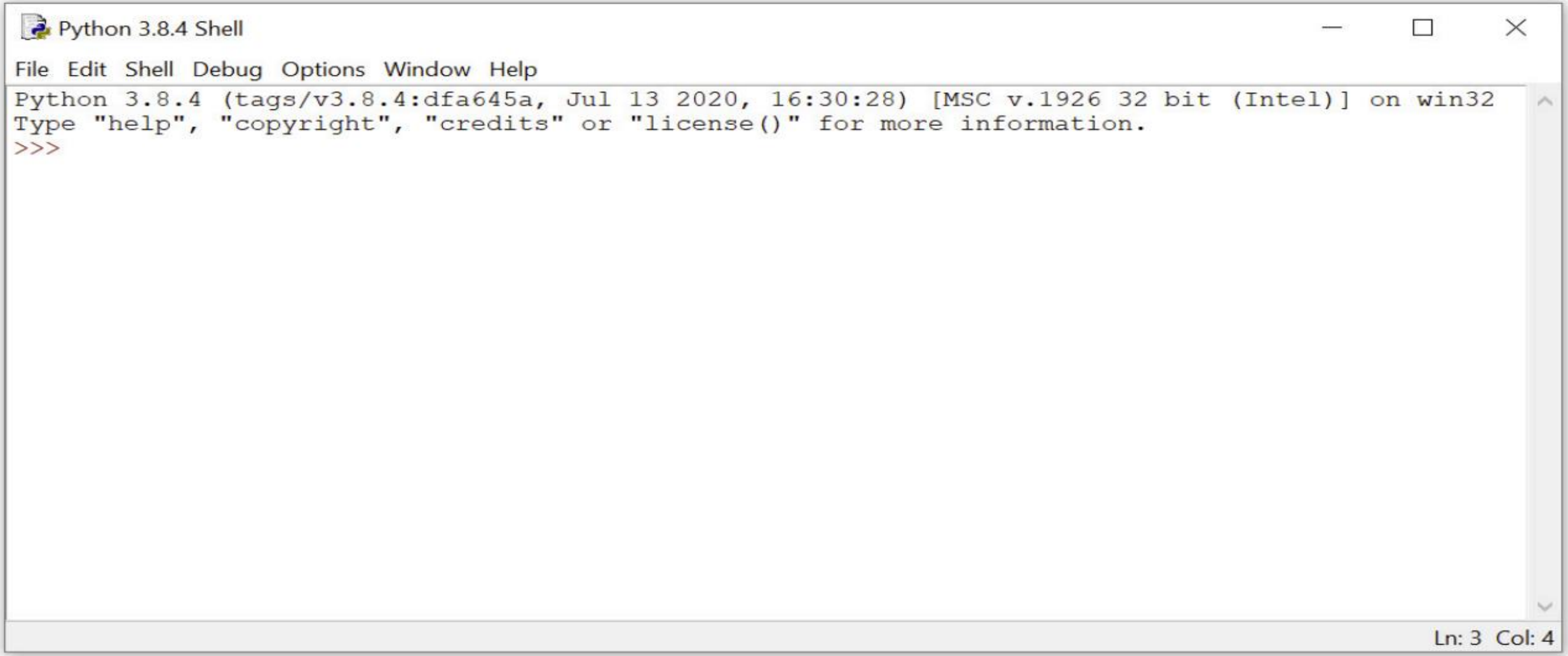
Open IDLE

You can open IDLE in two steps:

1. Click the Start menu and locate the Python 3.9 folder.
2. Open the folder and select *IDLE (Python 3.9)*.

IDLE opens a **Python shell** in a new window. The Python shell is an interactive environment that allows you to type in Python code and execute it immediately. It's a great way to get started with Python!

The Python shell window looks like this:



At the top of the window, you can see the version of Python that is running and some information about the operating system. If you see a version less than 3.9, then you may need to revisit the installation instructions in the previous section.

The >>> symbol that you see is called a **prompt**. Whenever you see this, it means that Python is waiting for you to give it some instructions.

Be aware that if you have installed Python through some other means, such as Anaconda Python, you may encounter problems when running some of the code examples.

2.3 macOS

Follow these steps to install Python 3 and open IDLE on macOS.

Install Python

To install the latest version of Python 3 on macOS, download and run the official installer from the Python.org website.

Step 1: Download the Python 3 Installer

Open a web browser and navigate to the following URL:

https://www.python.org/downloads/mac-osx/

Click *Latest Python 3 Release - Python 3.x.x* located beneath the "Python Releases for Mac OS X" heading near the top of the page. As of this writing, the latest version was Python 3.9.

Then scroll to the bottom of the page and click *macOS 64-bit installer* to start the download.

Step 2: Run the Installer

Open Finder and double-click the downloaded file to run the installer. A dialog box that looks like the following will appear:

Press Continue a few times until you are asked to agree to the software license agreement. Then click Agree.

You'll be shown a window that tells you where Python will be installed and how much space it will take. You most likely don't want to change the default location, so go ahead and click Install to start the installation.

When the installer is finished copying files, click Close to close the installer window.

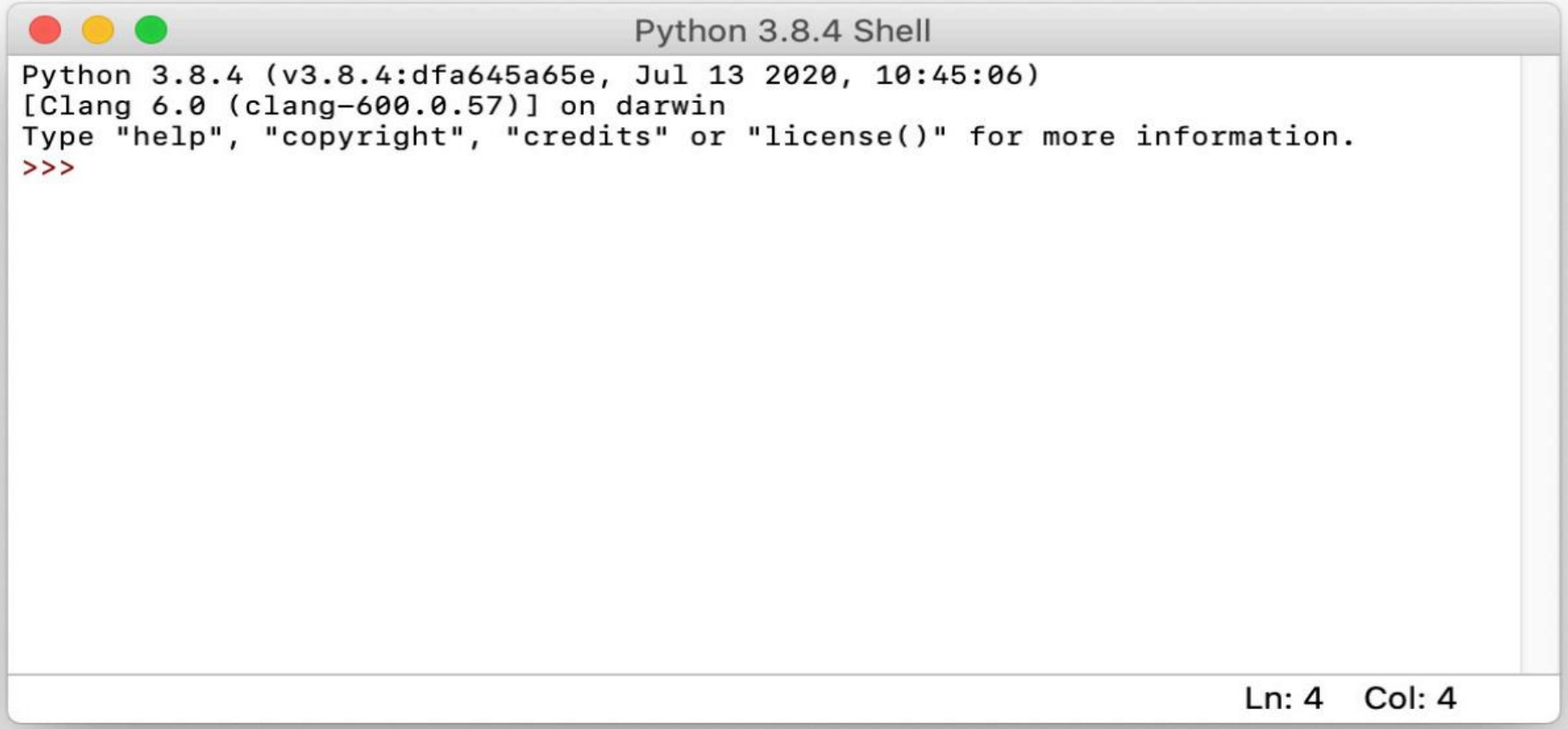
Open IDLE

You can open IDLE in three steps:

1. Open Finder and click *Applications*.
2. Double-click the Python 3.9 folder.
3. Double-click the IDLE icon.

IDLE opens a **Python shell** in a new window. The Python shell is an interactive environment that allows you to type in Python code and execute it immediately. It's a great way to get started with Python!

The Python shell window looks like this:



At the top of the window, you can see the version of Python that is running and some information about the operating system. If you see a version less than 3.9, then you may need to revisit the installation instructions in the previous section.

The >>> symbol that you see is called a **prompt**. Whenever you see this, it means that Python is waiting for you to give it some instructions.

Ubuntu Linux

Ubuntu Linux

Install Python

There's a good chance that your Ubuntu distribution already has Python installed, but it probably won't be the latest version, and it may be Python 2 instead of Python 3.

To find out what version(s) you have, open a terminal window and try the following commands:

```
$ python --version
$ python3 --version
```

One or more of these commands should respond with a version, as below:

```
$ python3 --version
Python 3.9.0
```

Your version number may vary. If the version shown is Python 2.x or a version of Python 3 that is less than 3.9, then you want to install the latest version. How you install Python on Ubuntu depends on which version of Ubuntu you're running. You can determine your local Ubuntu version by running the following command:

```
$ lsb_release -a
No LSB modules are available.
Distributor ID: Ubuntu
Description:    Ubuntu 18.04.1 LTS
Release:        18.04
Codename:       bionic
```

Look at the version number next to `Release` in the console output, and follow the corresponding instructions below.

Ubuntu 18.04 or Greater

Ubuntu version 18.04 does not come with Python 3.9 by default, but it is in the Universe repository. You can install it with the following commands in the Terminal application:

```
$ sudo apt-get update
$ sudo apt-get install python3.9 idle-python3.9 python3-pip
```

Ubuntu 17 and Lower

For Ubuntu versions 17 and lower, Python 3.9 is not in the Universe repository. You need to get it from a Personal Package Archive (PPA). To install Python from the deadsnakes PPA, run the following commands in the Terminal application:

```
$ sudo add-apt-repository ppa:deadsnakes/ppa
$ sudo apt-get update
$ sudo apt-get install python3.9 idle-python3.9 python3-pip
```

You can check that the correct version of Python was installed by running `python3 --version`. If you see a version number less than 3.9, then you may need to type `python3.9 --version`. Now you can open IDLE and get ready to write your first Python program.

Open IDLE

You can open IDLE from the command line by typing the following:

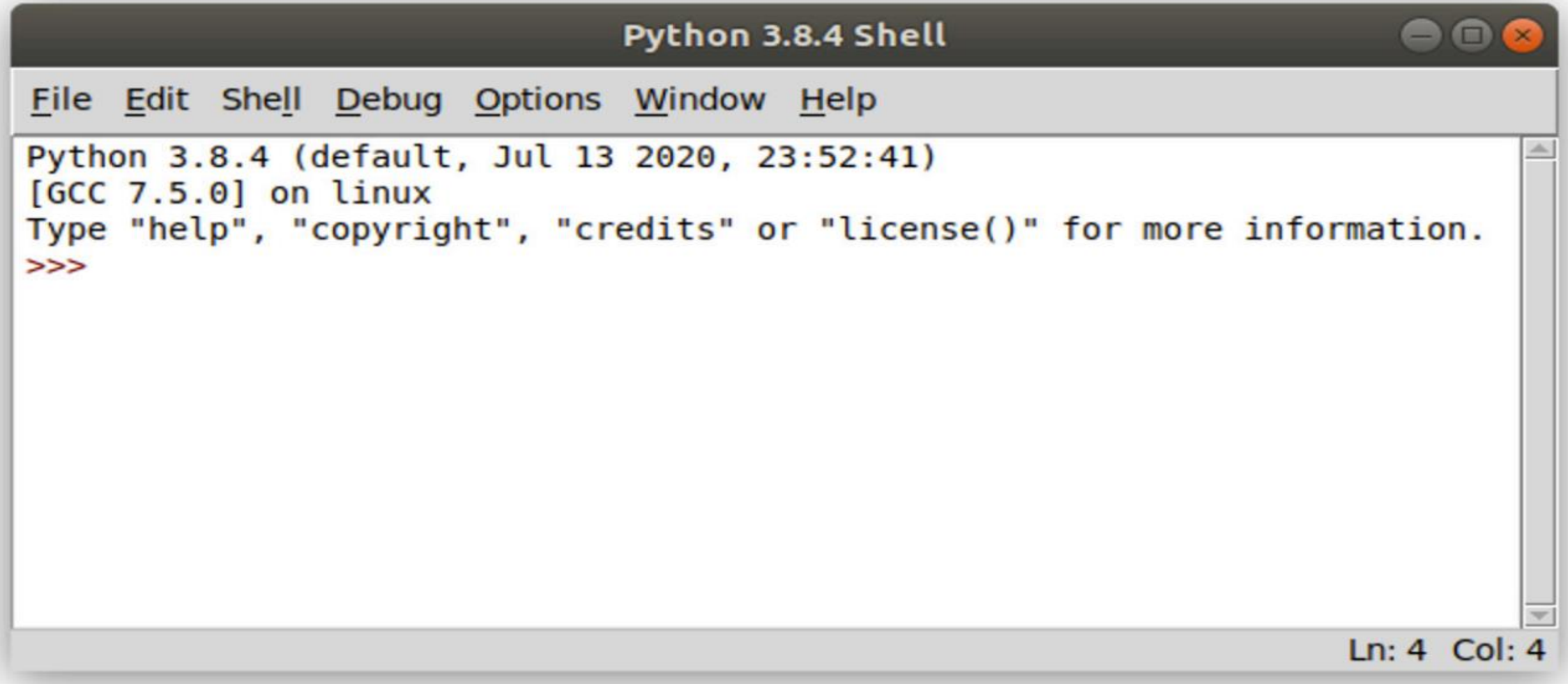
```
$ idle-python3.9
```

On some Linux installations, you can open IDLE with the following shortened command:

```
$ idle3
```

IDLE opens a **Python shell** in a new window. The Python shell is an interactive environment that allows you to type in Python code and execute it immediately. It's a great way to get started with Python!

The Python shell window looks like this:



At the top of the window, you can see the version of Python that is running and some information about the operating system. If you see a version less than 3.9, then you may need to revisit the installation instructions in the previous section.

Important

If you open IDLE with the `idle3` command and see a version less than 3.9 displayed in the Python shell window, then you'll need to open IDLE with the `idle-python3.9` command.

First Python Program

First Python Program

Now that you have the latest version of Python installed on your computer, it's time to start coding!

- Write your first Python program
- Learn what happens when you run a program with an error
- Learn how to declare a variable and inspect its value
- Learn how to write comments

Write a Python Program

If you don't already have IDLE open, then go ahead and open it. There are two main windows that you'll work with in IDLE: the **interactive window**, which is the one that opens when you start IDLE, and the **editor window**.

You can type code into both the interactive window and the editor window. The difference between the two windows is in how they execute code. In this section, you'll learn how to execute Python code in both windows.

The Interactive Window

IDLE's interactive window contains a **Python shell**, which is a textual user interface used to interact with the Python language. You can type a bit of Python code into the interactive window and press Enter to immediately see the results. Hence the name *interactive* window.

The interactive window opens automatically when you start IDLE. You'll see the following text, with some minor differences depending on your setup, displayed at the top of the window:

```
Python 3.9.0 (tags/v3.9.0:1b293b6)
[MSC v.1916 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

This text shows the version of Python that IDLE is running. You can also see information about your operating system and some commands you can use to get help and view information about Python.

The >>> symbol in the last line is called the **prompt**. This is where you'll type in your code.

Go ahead and type `1 + 1` at the prompt and press Enter:

```
>>> 1 + 1
2
>>>
```

Python evaluates the expression, displays the result (2), then displays another prompt. Every time you run some code in the interactive window, a new prompt appears directly below the result.

Executing Python in the interactive window can be described as a loop with three steps:

1. Python **reads** the code entered at the prompt.
2. Python **evaluates** the code.
3. Python **prints** the result and waits for more input.

This loop is commonly referred to as a **r**ead-**e**valuate-**p**rint **l**oop and is abbreviated as **REPL**. Python programmers sometimes refer to the Python shell as the Python REPL, or just “the REPL” for short.

Let’s try something a little more interesting than adding numbers. A rite of passage for every programmer is writing a program that prints the phrase “Hello, World” on the screen.

At the prompt in the interactive window, type the word `print` followed by a set of parentheses with the text `"Hello, World"` inside:

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

A **function** is code that performs some task and can be invoked by a name. The above code invokes, or **calls**, the `print()` function with the text `"Hello, World"` as input.

The parentheses tell Python to call the `print()` function. They also enclose everything that gets sent to the function as input. The quotation marks indicate that `"Hello, World"` really is text and not something else.

Note

IDLE **highlights** parts of your code in different colors as you type to make it easier for you to identify the different parts.

By default, functions are highlighted in purple and text is highlighted in green.

The interactive window executes a single line of code at a time. This is useful for trying out small code examples and exploring the Python language, but it has a major limitation: you have to enter your code one line at a time!

Alternatively, you can save Python code in a text file and execute all of the code in the file to run an entire program.

The Editor Window

You'll write your Python files using IDLE's editor window. You can open the editor window by selecting File > New File from the menu at the top of the interactive window.

The interactive window stays open when you open the editor window. It displays the output generated by code in the editor window, so you'll want to arrange the two windows so that you can see them both at the same time.

In the editor window, type in the same code you used to print `"Hello, World"` in the interactive window:

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

IDLE highlights code typed into the editor window just like in the interactive window.

Important

When you write code in a Python file, you don't need to include the >>> prompt.

Before you run your program, you need to save it. Select File > Save from the menu and save the file as `hello_world.py`.

Note

On some systems, the default directory for saving files in IDLE is the Python installation directory. **Do not** save your files to this directory. Instead, save them to your desktop or to a folder in your user's home directory.

The `.py` extension indicates that a file contains Python code. In fact, saving your file with any other extension removes the code highlighting. IDLE only highlights Python code when it's stored in a `.py` file.

Running Python Programs in the Editor Window

To run your program, select Run > Run Module from the menu in the editor window.

Note

Pressing F5 also runs a program from the editor window.

Program output always appears in the interactive window.

Every time you run code from a file, you'll see something like the following output in the interactive window:

```
>>> ================== RESTART ==================
```

IDLE restarts the Python interpreter, which is the computer program that actually executes your code, every time you run a file. This makes sure that programs are executed the same way each time.

Opening Python Files in the Editor Window

To open an existing file in IDLE, select File > Open from the menu, then select the file you want to open. IDLE opens every file in a new editor window, so you can have several files open at the same time.

You can also open a file from a file manager, such as Windows Explorer or macOS Finder. Right-click the file icon and select Edit with IDLE to open the file in IDLE's editor window.

Double-clicking on a `.py` file from a file manager executes the program. However, this usually runs the file with the system Python, and the program window disappears immediately after the program terminates—often before you can even see any output.

For now, the best way to run your Python programs is to open them in IDLE's editor window and run them from there.