

Using the Python Interpreter

Invoking the Interpreter

The Python interpreter is usually installed as `:file:`usr/local/bin/python3.11`` on those machines where it is available; putting `:file:`usr/local/bin`` in your Unix shell's search path makes it possible to start it by typing the command:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 13); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 13); [backlink](#)

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python3.11

to the shell. [1] Since the choice of the directory where the interpreter lives is an installation option, other places are possible; check with your local Python guru or system administrator. (E.g., `:file:`usr/local/python`` is a popular alternative location.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 21); [backlink](#)

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On Windows machines where you have installed Python from the `ref:Microsoft Store <windows-store>`, the `:file:`python3.11`` command will be available. If you have the `ref:py.exe launcher <launcher>` installed, you can use the `:file:`py`` command. See `ref:setting-envvars` for other ways to launch Python.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 26); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 26); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 26); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 26); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 26); [backlink](#)

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Typing an end-of-file character (`:kbd:`Control-D`` on Unix, `:kbd:`Control-Z`` on Windows) at the primary prompt causes the interpreter to exit with a zero exit status. If that doesn't work, you can exit the interpreter by typing the following command: `quit()`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 31); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 31); [backlink](#)

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The interpreter's line-editing features include interactive editing, history substitution and code completion on systems that support the [GNU Readline](#) library. Perhaps the quickest check to see whether command line editing is supported is typing `:kbd:`Control-P`` to the first Python prompt you get. If it beeps, you have command line editing; see [Appendix :ref:`tut-interacting`](#) for an introduction to the keys. If nothing appears to happen, or if `^P` is echoed, command line editing isn't available; you'll only be able to use backspace to remove characters from the current line.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 36); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 36); [backlink](#)

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The interpreter operates somewhat like the Unix shell: when called with standard input connected to a tty device, it reads and executes commands interactively; when called with a file name argument or with a file as standard input, it reads and executes a *script* from that file.

A second way of starting the interpreter is `python -c command [arg] ...`, which executes the statement(s) in *command*, analogous to the shell's `:option:`-c`` option. Since Python statements often contain spaces or other characters that are special to the shell, it is usually advised to quote *command* in its entirety with single quotes.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 51); [backlink](#)

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Some Python modules are also useful as scripts. These can be invoked using `python -m module [arg] ...`, which executes the source file for *module* as if you had spelled out its full name on the command line.

When a script file is used, it is sometimes useful to be able to run the script and enter interactive mode afterwards. This can be done by passing `:option:`-i`` before the script.

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All command line options are described in [:ref:`using-on-general`](#).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 65); [backlink](#)

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Argument Passing

When known to the interpreter, the script name and additional arguments thereafter are turned into a list of strings and assigned to the `argv` variable in the `sys` module. You can access this list by executing `import sys`. The length of the list is at least one; when no script and no arguments are given, `sys.argv[0]` is an empty string. When the script name is given as `'-'` (meaning standard input), `sys.argv[0]` is set to `'-'`. When `:option:`-c`` *command* is used, `sys.argv[0]` is set to `'-c'`. When `:option:`-m`` *module* is used, `sys.argv[0]` is set to the full name of the located module. Options found after `:option:`-c`` *command* or `:option:`-m`` *module* are not consumed by the Python interpreter's option processing but left in `sys.argv` for the command or module to handle.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 73); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 73); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 73); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 73); [backlink](#)

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Interactive Mode

When commands are read from a tty, the interpreter is said to be in *interactive mode*. In this mode it prompts for the next command with the *primary prompt*, usually three greater-than signs (`>>>`); for continuation lines it prompts with the *secondary prompt*, by default three dots (`...`). The interpreter prints a welcome message stating its version number and a copyright notice before printing the first prompt:

```
$ python3.11
Python 3.11 (default, April 4 2021, 09:25:04)
[GCC 10.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

Continuation lines are needed when entering a multi-line construct. As an example, take a look at this `keyword: if` statement:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 108); [backlink](#)

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```
>>> the_world_is_flat = True
>>> if the_world_is_flat:
...     print("Be careful not to fall off!")
...
Be careful not to fall off!
```

For more on interactive mode, see `ref:tut-interac``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 118); [backlink](#)

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The Interpreter and Its Environment

Source Code Encoding

By default, Python source files are treated as encoded in UTF-8. In that encoding, characters of most languages in the world can be used simultaneously in string literals, identifiers and comments --- although the standard library only uses ASCII characters for identifiers, a convention that any portable code should follow. To display all these characters properly, your editor must recognize that the file is UTF-8, and it must use a font that supports all the characters in the file.

To declare an encoding other than the default one, a special comment line should be added as the *first* line of the file. The syntax is as follows:

```
# -*- coding: encoding -*-
```

where *encoding* is one of the valid `mod:codecs`` supported by Python.

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For example, to declare that Windows-1252 encoding is to be used, the first line of your source code file should be:

```
# -*- coding: cp1252 -*-
```

One exception to the *first line* rule is when the source code starts with a `.ref:UNIX "shebang" line <tut-scripts>`. In this case, the encoding declaration should be added as the second line of the file. For example:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\tutorial\ (cpython-main) (Doc) (tutorial) interpreter.rst, line 152); [backlink](#)

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```
#!/usr/bin/env python3
# -*- coding: cp1252 -*-
```

Footnotes

- [1] On Unix, the Python 3.x interpreter is by default not installed with the executable named `python`, so that it does not conflict with a simultaneously installed Python 2.x executable.