

PYTHON(1)

General Commands Manual

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NAME

python - an interpreted, interactive, object-oriented programming language

SYNOPSIS

```
python [ -B ] [ -b ] [ -d ] [ -E ] [ -h ] [ -i ] [ -l ]  
      [ -m module-name ] [ -q ] [ -O ] [ -OO ] [ -s ] [ -S ] [ -u ]  
      [ -v ] [ -V ] [ -W argument ] [ -x ] [ -X option ] [ -? ]  
      [ --check-hash-based-pycs default | always | never ]  
      [ -c command | script | - ] [ arguments ]
```

DESCRIPTION

Python is an interpreted, interactive, object-oriented programming language that combines remarkable power with very clear syntax. For an introduction to programming in Python, see the [Python Tutorial](#). The [Python Library Reference](#) documents built-in and standard types, constants, functions and modules. Finally, the [Python Reference Manual](#) describes the syntax and semantics of the core language in (perhaps too) much detail. (These documents may be located via the [INTERNET REFINANCE](#) [SOURCES](#) below; they may be installed on your system as well.)

Python is also adaptable as an extension language for existing applications. See the internal documentation for hints.

Documentation for installed Python modules and packages can be viewed by running the pydoc program.

COMMAND LINE OPTIONS

-B Don't write .pyc files on import. See also PYTHONDONTWRITEBYTE? CODE.

-b Issue warnings about str(bytes_instance), str(bytearray_instance) and comparing bytes/bytearray with str. (-bb: issue errors)

-c command

Specify the command to execute (see next section). This terminates the option list (following options are passed as arguments to the command).

--check-hash-based-pycs mode

Configure how Python evaluates the up-to-dateness of hash-based .pyc files.

-d Turn on parser debugging output (for expert only, depending on

-E Ignore environment variables like PYTHONPATH and PYTHONHOME that modify the behavior of the interpreter.

-h , -? , --help

Prints the usage for the interpreter executable and exits.

-i When a script is passed as first argument or the **-c** option is used, enter interactive mode after executing the script or the command. It does not read the \$PYTHONSTARTUP file. This can be useful to inspect global variables or a stack trace when a script raises an exception.

-I Run Python in isolated mode. This also implies **-E** and **-s**. In isolated mode sys.path contains neither the script's directory nor the user's site-packages directory. All PYTHON* environment variables are ignored, too. Further restrictions may be imposed to prevent the user from injecting malicious code.

-m module-name

Searches sys.path for the named module and runs the corresponding .py file as a script. This terminates the option list (following options are passed as arguments to the module).

Linux UBUNTU Manual Pages

of `__debug__`; augment the filename for compiled (bytecode) files by adding `.opt-1` before the `.pyc` extension.

-OO Do `-O` and also discard docstrings; change the filename for compiled (bytecode) files by adding `.opt-2` before the `.pyc` extension.

-q Do not print the version and copyright messages. These messages are also suppressed in non-interactive mode.

-s Don't add user site directory to `sys.path`.

-S Disable the import of the module `site` and the site-dependent manipulations of `sys.path` that it entails. Also disable these manipulations if `site` is explicitly imported later.

-u Force the `stdout` and `stderr` streams to be unbuffered. This option has no effect on the `stdin` stream.

-v Print a message each time a module is initialized, showing the place (filename or built-in module) from which it is loaded. When given twice, print a message for each file that is checked for when searching for a module. Also provides information on module cleanup at exit.

-V , --version

Prints the Python version number of the executable and exits.

When given twice, print more information about the build.

-W argument

Warning control. Python's warning machinery by default prints warning messages to `sys.stderr`.

The simplest settings apply a particular action unconditionally to all warnings emitted by a process (even those that are otherwise ignored by default):

- Wdefault # Warn once per call location**
- Werror # Convert to exceptions**
- Walways # Warn every time**
- Wmodule # Warn once per calling module**
- Wonce # Warn once per Python process**
- Wignore # Never warn**

The action names can be abbreviated as desired and the interpreter will resolve them to the appropriate action name. For example, `-Wi` is the same as `-Wignore`.

The full form of argument is: `action:message:category:mod?`

Empty fields match all values; trailing empty fields may be omitted. For example `-W ignore::DeprecationWarning` ignores all `DeprecationWarning` warnings.

The action field is as explained above but only applies to warnings that match the remaining fields.

The message field must match the whole printed warning message; this match is case-insensitive.

The category field matches the warning category (ex: "`DeprecationWarning`"). This must be a class name; the match test whether the actual warning category of the message is a subclass of the specified warning category.

The module field matches the (fully-qualified) module name; this match is case-sensitive.

The lineno field matches the line number, where zero matches all line numbers and is thus equivalent to an omitted line number.

Multiple `-W` options can be given; when a warning matches more than one option, the action for the last matching option is per?

sage is printed about invalid options when the first warning is issued).

Warnings can also be controlled using the PYTHONWARNINGS environment variable and from within a Python program using the warnings module. For example, the warnings.filterwarnings() function can be used to use a regular expression on the warning message.

-X option

Set implementation specific option. The following options are available:

-X faulthandler: enable faulthandler

-X showrefcount: output the total reference count and number of used

memory blocks when the program finishes or after each statement in the

interactive interpreter. This only works on debug builds

-X tracemalloc: start tracing Python memory allocations using the

tracemalloc module. By default, only the most recent

traceback of a trace. Use `-X tracemalloc=NFRAME` to start tracing with a traceback limit of NFRAME frames

`-X importtime`: show how long each import takes. It shows module name,

cumulative time (including nested imports) and self time (excluding

nested imports). Note that its output may be broken in multi-threaded

application. Typical usage is `python3 -X importtime -c 'import asyncio'`

`-X dev`: enable CPython's "development mode", introducing additional runtime

checks which are too expensive to be enabled by default.

It will not be

more verbose than the default if the code is correct: new warnings are

only emitted when an issue is detected. Effect of the developer mode:

- * Add default warning filter, as `-W default`

- * Install debug hooks on memory allocators: see the

`PyMem_SetupDebugHooks()`

Linux UBUNTU Manual Pages

- * Enable the faulthandler module to dump the Python traceback on a crash

- * Enable asyncio debug mode

- * Set the dev_mode attribute of sys.flags to True

- * io.IOBase destructor logs close() exceptions

-X utf8: enable UTF-8 mode for operating system interfaces, overriding the default

locale-aware mode. **-X utf8=0** explicitly disables UTF-8 mode (even when it would

otherwise activate automatically). See PYTHONUTF8 for more details

-X pycache_prefix=PATH: enable writing .pyc files to a parallel tree rooted at the

given directory instead of to the code tree.

-X warn_default_encoding: enable opt-in EncodingWarning for 'encoding=None'

-X int_max_str_digits=number: limit the size of int<->str conversions.

This helps avoid denial of service attacks when parsing untrusted data.

disables.

- x Skip the first line of the source. This is intended for a DOS specific hack only. Warning: the line numbers in error messages will be off by one!

INTERPRETER INTERFACE

The interpreter interface resembles that of the UNIX shell: when called with standard input connected to a tty device, it prompts for commands and executes them until an EOF is read; when called with a file name argument or with a file as standard input, it reads and executes a script from that file; when called with `-c` command, it executes the Python statement(s) given as command. Here command may contain multiple statements separated by newlines. Leading whitespace is significant in Python statements! In non-interactive mode, the entire input is parsed before it is executed.

If available, the script name and additional arguments thereafter are passed to the script in the Python variable `sys.argv`, which is a list of strings (you must first import `sys` to be able to access it). If no script name is given, `sys.argv[0]` is an empty string; if `-c` is used, `sys.argv[0]` contains the string `'-c'`. Note that options interpreted by the Python interpreter itself are not placed in `sys.argv`.

(which appears when a command is not complete) is `...`. The prompts can be changed by assignment to `sys.ps1` or `sys.ps2`. The interpreter quits when it reads an EOF at a prompt. When an unhandled exception occurs, a stack trace is printed and control returns to the primary prompt; in non-interactive mode, the interpreter exits after printing the stack trace. The interrupt signal raises the `KeyboardInterrupt` exception; other UNIX signals are not caught (except that `SIGPIPE` is sometimes ignored, in favor of the `IOError` exception). Error messages are written to `stderr`.

FILES AND DIRECTORIES

These are subject to difference depending on local installation conventions; `prefix` and `exec_prefix` are installation-dependent and should be interpreted as for GNU software; they may be the same. On Debian GNU/{Hurd,Linux} the default for both is `/usr`.

`exec_prefix/bin/python`

Recommended location of the interpreter.

`prefix/lib/python<version>`

`exec_prefix/lib/python<version>`

Recommended locations of the directories containing the standard modules.

`${exec_prefix}/include/python<version>`

Recommended locations of the directories containing the include files needed for developing Python extensions and embedding the interpreter.

ENVIRONMENT VARIABLES

PYTHONHOME

Change the location of the standard Python libraries. By default, the libraries are searched in `${prefix}/lib/python<version>` and `${exec_prefix}/lib/python<version>`, where `${prefix}` and `${exec_prefix}` are installation-dependent directories, both defaulting to `/usr/local`. When `$PYTHONHOME` is set to a single directory, its value replaces both `${prefix}` and `${exec_prefix}`. To specify different values for these, set `$PYTHONHOME` to `${prefix}:${exec_prefix}`.

PYTHONPATH

Augments the default search path for module files. The format is the same as the shell's `$PATH`: one or more directory path names separated by colons. Non-existent directories are silently ignored. The default search path is installation dependent, but generally begins with `${prefix}/lib/python<version>` (see `PYTHONHOME` above). The default search path is always appended to `$PYTHONPATH`. If a script argument is given, the di?

of `$PYTHONPATH`. The search path can be manipulated from within a Python program as the variable `sys.path`.

PYTHONPLATLIBDIR

Override `sys.platlibdir`.

PYTHONSTARTUP

If this is the name of a readable file, the Python commands in that file are executed before the first prompt is displayed in interactive mode. The file is executed in the same name space where interactive commands are executed so that objects defined or imported in it can be used without qualification in the interactive session. You can also change the prompts `sys.ps1` and `sys.ps2` in this file.

PYTHONOPTIMIZE

If this is set to a non-empty string it is equivalent to specifying the `-O` option. If set to an integer, it is equivalent to specifying `-O` multiple times.

PYTHONDEBUG

If this is set to a non-empty string it is equivalent to specifying the `-d` option. If set to an integer, it is equivalent to specifying `-d` multiple times.

PYTHONDONTWRITEBYTECODE

If this is set to a non-empty string it is equivalent to specifying the `-B` option (don't try to write `.pyc` files).

PYTHONINSPECT

If this is set to a non-empty string it is equivalent to specifying the `-i` option.

PYTHONIOENCODING

If this is set before running the interpreter, it overrides the encoding used for `stdin/stdout/stderr`, in the syntax `encoding?name:errorhandler`. The `errorhandler` part is optional and has the same meaning as in `str.encode`. For `stderr`, the `errorhandler` part is ignored; the handler will always be `?backslashreplace?`.

PYTHONNOUSERSITE

If this is set to a non-empty string it is equivalent to specifying the `-s` option (Don't add the user site directory to `sys.path`).

PYTHONUNBUFFERED

If this is set to a non-empty string it is equivalent to specifying the `-u` option.

If this is set to a non-empty string it is equivalent to specifying the `-v` option. If set to an integer, it is equivalent to specifying `-v` multiple times.

PYTHONWARNINGS

If this is set to a comma-separated string it is equivalent to specifying the `-W` option for each separate value.

PYTHONHASHSEED

If this variable is set to "random", a random value is used to seed the hashes of str and bytes objects.

If PYTHONHASHSEED is set to an integer value, it is used as a fixed seed for generating the hash() of the types covered by the hash randomization. Its purpose is to allow repeatable hashing, such as for selftests for the interpreter itself, or to allow a cluster of python processes to share hash values.

The integer must be a decimal number in the range [0,4294967295]. Specifying the value 0 will disable hash randomization.

PYTHONINTMAXSTRDIGITS

Limit the maximum digit characters in an int value when convert?

value of 0 disables the limit. Conversions to or from bases 2, 4, 8, 16, and 32 are never limited.

PYTHONMALLOC

Set the Python memory allocators and/or install debug hooks. The available memory allocators are malloc and pymalloc. The available debug hooks are debug, malloc_debug, and pymalloc_debug.

When Python is compiled in debug mode, the default is pymalloc_debug and the debug hooks are automatically used. Otherwise, the default is pymalloc.

PYTHONMALLOCSTATS

If set to a non-empty string, Python will print statistics of the pymalloc memory allocator every time a new pymalloc object arena is created, and on shutdown.

This variable is ignored if the \$PYTHONMALLOC environment variable is used to force the malloc(3) allocator of the C library, or if Python is configured without pymalloc support.

PYTHONASYNCIODEBUG

If this environment variable is set to a non-empty string, enable the debug mode of the asyncio module.

PYTHONTRACEMALLOC

If this environment variable is set to a non-empty string, start tracing Python memory allocations using the tracemalloc module.

The value of the variable is the maximum number of frames stored in a traceback of a trace. For example, PYTHONTRACEMALLOC=1 stores only the most recent frame.

PYTHONFAULTHANDLER

If this environment variable is set to a non-empty string, `faulthandler.enable()` is called at startup: install a handler for SIGSEGV, SIGFPE, SIGABRT, SIGBUS and SIGILL signals to dump the Python traceback.

This is equivalent to the `-X faulthandler` option.

PYTHONEXECUTABLE

If this environment variable is set, `sys.argv[0]` will be set to its value instead of the value got through the C runtime. Only works on Mac OS X.

PYTHONUSERBASE

Defines the user base directory, which is used to compute the path of the user site-packages directory and Distutils installa?

PYTHONPROFILEIMPORTTIME

If this environment variable is set to a non-empty string, Python will show how long each import takes. This is exactly equivalent to setting `-X importtime` on the command line.

PYTHONBREAKPOINT

If this environment variable is set to 0, it disables the default fault debugger. It can be set to the callable of your debugger of choice.

Debug-mode variables

Setting these variables only has an effect in a debug build of Python, that is, if Python was configured with the `--with-pydebug` build option.

PYTHONTHREADDEBUG

If this environment variable is set, Python will print threading debug info. The feature is deprecated in Python 3.10 and will be removed in Python 3.12.

PYTHONDUMPREFS

If this environment variable is set, Python will dump objects and reference counts still alive after shutting down the interpreter.

AUTHOR

The Python Software Foundation: <https://www.python.org/psf/>

INTERNET RESOURCES

Main website: <https://www.python.org/>

Documentation: <https://docs.python.org/>

Developer resources: <https://devguide.python.org/>

Downloads: <https://www.python.org/downloads/>

Module repository: <https://pypi.org/>

Newsgroups: [comp.lang.python](#), [comp.lang.python.announce](#)

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PYTHON(1)