
Installing Python Modules

3.7.2

Guido van Rossum
and the Python development team

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Python Software Foundation
Email: docs@python.org

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`distutils-sig@python.org`

Python

Python

Python

Python

:

Python

CHAPTER 1

-
-
- `pip` Python 3.4 Python
 - *virtual environment* Python
 - `venv` Python 3.3 Python Python 3.4 `pip`
 - `virtualenv` `venv` Python 3.4 `venv` `pip`
 - [Python Packaging Index](#) Python
 - [Python Packaging Authority](#) [GitHub](#) [BitBucket](#)
 - `distutils` 1998 Python `distutils`
Python
- 3.6 : `pyvenv` Python 3.3 3.4 [Python 3.6](#)
- 3.5 : `venv`
- :
- Python

CHAPTER 2

Python Packaging Index :

```
python -m pip install SomePackage
```

:	POSIX	Mac OS X	Linux	<i>virtual environment</i>
	Windows	Python	PATH	

>, < :

```
python -m pip install SomePackage==1.0.4 # specific version
python -m pip install "SomePackage>=1.0.4" # minimum version
```

:

```
python -m pip install --upgrade SomePackage
```

pip Python

venv

:

Python Python

...

3.1 ... Python 3.4 Python pip

Python pip Python 3.4 pip “bootstrapped” Python
:
Python

3.2 ...

--user python -m pip install

3.3 ... Python

Python pip pip
:
Python

3.4 ... Python

Linux, Mac OS X POSIX Python -m pip:

```
python2 -m pip install SomePackage # default Python 2
python2.7 -m pip install SomePackage # specifically Python 2.7
python3 -m pip install SomePackage # default Python 3
python3.4 -m pip install SomePackage # specifically Python 3.4
```

pip

Windows py Python -m :

```
py -2 -m pip install SomePackage # default Python 2
py -2.7 -m pip install SomePackage # specifically Python 2.7
py -3 -m pip install SomePackage # default Python 3
py -3.4 -m pip install SomePackage # specifically Python 3.4
```

4.1 Linux Python

Linux Python Python root pip
pip

4.2 pip

pip :

```
python -m ensurepip --default-pip
```

pip

4.3

Python

wheel Python Packaging Index Windows Mac OS X wheel
wheel

:

Python

>>> Python
... Python

2to3 Python 2.x Python 3.x
2to3 lib2to3 Tools/scripts/2to3 2to3-reference

abstract base class – ABC *duck-typing* hasattr() ABC
isinstance() issubclass() abc Python ABC collections.
abc numbers io importlib.abc abc ABC

annotation – *type hint*
__annotations__
variable annotation function annotation **PEP 484** **PEP 526**

argument – *function method*

- : name= ** 3 5 complex() :

`complex(real=3, imag=5)
complex(**{'real': 3, 'imag': 5})`
- : / * *iterable* 3 5 :

`complex(3, 5)
complex(*(3, 5))`

calls
parameter **PEP 362**

asynchronous context manager – __aenter__() __aexit__() async with
PEP 492

asynchronous generator – *asynchronous generator iterator* `async def` `yield`
 `async for`

 `await` `async for` `async with`
 asynchronous generator iterator – *asynchronous generator*
 asynchronous iterator `__anext__()` `yield`
 `yield` (`try`) `__anext__()` **PEP 492** **PEP 525**
 asynchronous iterable – `async for` `__aiter__()` *asynchronous iterator* **PEP 492**
 asynchronous iterator – `__aiter__()` `__anext__()` `__anext__` *awaitable* `async for`
 `__anext__()` `StopAsyncIteration` **PEP 492**
 attribute – `o` `a` `o.a`
 awaitable – `await` *coroutine* `__await__()` **PEP 492**
 BDFL “ ” [Guido van Rossum](#) Python
 binary file – *file object* `'rb'`, `'wb'` or `'rb+'` `sys.stdin.buffer` `sys.stdout`.
 `buffer` `io.BytesIO` `gzip.GzipFile`
 text file `str`
 bytes-like object – `bufferobjects` *C-contiguous* `bytes` `bytearray` `array.array`
 `memoryview`
 “ ” `bytearray` `bytearray` `memoryview` (“ ”)
 `bytes` `bytes` `memoryview`
 bytecode – Python `CPython` Python `.pyc` “ ”
 virtual machine Python Python
 `dis`
 class –
 class variable – ()
 coercion – `int(3.15)` `3` `3+4.5` `int`, `float`
 `TypeError` `float(3)+4.5` `3+4.5`
 complex number – `-1` `i` `j` Python `j`
 `3+1j` `math` `cmath`
 context manager – `with` `__enter__()` `__exit__()` **PEP 343**
 contiguous – *C-* *Fortran* `C` *Fortran* *C-*
 Fortran
 coroutine – `async def` **PEP 492**
 coroutine function – *coroutine* `async def` `await` `async for` `async with`
 PEP 492
 CPython Python [python.org](#) “CPython” `Jython` `IronPython`
 decorator – `@wrapper` `classmethod()` `staticmethod()`
 :


```
def f(...):
    ...
f = staticmethod(f)

@staticmethod
def f(...):
    ...
```

descriptor – `__get__()`, `__set__()`, `__delete__()` *a.b* *a*
b *b* Python
 descriptors

dictionary – `__hash__()`, `__eq__()` Perl hash

dictionary view – `dict.keys()`, `dict.values()`, `dict.items()`
`list(dictview)` dict-views

docstring – `__doc__`

duck-typing – “ ” `type()`
`isinstance()` () `hasattr()` *EAFP*

EAFP “ ” Python `try except` *LBYL* C

expression – *statement* while

extension module – C C++ Python C API

f-string – `f' ' 'F'` “f- ” **PEP 498**

file object – API `read()` `write()` /

`:` , `io` `open()`

file-like object – *file object*

finder – *loader*
 Python 3.3 : `sys.meta_path` *path entry finders* `sys.path_hooks`
PEP 302, PEP 420 PEP 451

floor division – `//` `11 // 4` `2` `2.75` `(-11) // 4` `-3`
`-2.75` **PEP 238**

function – *parameter, method* function

function annotation – *annotation*
`int` `int` :

```
def sum_two_numbers(a: int, b: int) -> int:
    return a + b
```

function
variable annotation **PEP 484**

__future__

__future__ :

```
>>> import __future__
>>> __future__.division
_Feature((2, 2, 0, 'alpha', 2), (3, 0, 0, 'alpha', 0), 8192)
```

garbage collection – Python gc

generator – *generator iterator* yield for- next()

generator iterator – *generator*

yield try

generator expression – for if :

```
>>> sum(i*i for i in range(10)) # sum of squares 0, 1, 4, ... 81
285
```

generic function –

single dispatch functools.singledispatch() PEP 443

GIL *global interpreter lock*

global interpreter lock – CPython Python *bytecode* dict
CPython

GIL I/O GIL

“ ”

hash-based pyc – pyc pyc-invalidation

hashable – __hash__() __eq__()

Python id()

IDLE Python IDE “ ” Python

immutable –

import path – *path based finder* sys.path __path__

importing – Python Python

importer – *finder loader*

interactive – Python python
help(x)

interpreted – Python / *in-*
teractive

interpreter shutdown – Python

__main__

iterable – `list` `str` `tuple` `dict` `__iter__()` *Sequence*
`__getitem__()`
`for` `zip()` `map()` ... `iter()` `iter()`
`for` *iterator sequence* *generator*

iterator – `__next__()` `next()` `StopIteration`
`__next__()` `StopIteration` `__iter__()`
`list` `iter()` `for`

`typeiter`

key function – `locale.strxfrm()`
`Python` `min()`, `max()`, `sorted()`, `list.sort()`, `heapq.merge()`, `heapq.nsmallest()`, `heapq.nlargest()` `itertools.groupby()`
`str.lower()` `lambda` `lambda r: (r[0], r[2])` `operator`
`attrgetter()` `itemgetter()` `methodcaller()`

keyword argument – *argument*

lambda *expression* `lambda` `lambda [parameters]: expression`

LBYL “ ” *EAFP* `if`
`LBYL` “ ” “ ” `if key in mapping: return mapping[key]` *mapping*
`key` `EAFP`

list – `Python` *sequence* `O(1)`

list comprehension – `result = [{':#04x}'.format(x) for x in range(256)`
`if x % 2 == 0]` `0 255` `0x..` `if` `range(256)`

loader – `load_module()` *finder* **PEP 302** *abstract base class* `importlib.abc.Loader`

mapping – `Mapping` `MutableMapping` `dict`, `collections.defaultdict`,
`collections.OrderedDict` `collections.Counter`

meta path finder – `sys.meta_path` *finder* *path entry finders*
`importlib.abc.MetaPathFinder`

metaclass – `Python`
`metaclasses`

method – *argument* (`self`) *function* *nested scope*

method resolution order – `Python 2.3` `2.3` `Python`

module – `Python` `Python` *importing* `Python`
package

module spec – `importlib.machinery.ModuleSpec`

MRO *method resolution order*

mutable – `id()` *immutable*

named tuple – `time.localtime()` *year* `t[0]` `t.`
`tm_year`

`time.struct_time` `collections.namedtuple()`
`Employee(name='jones', title='programmer')`

namespace – `builtins.open` `os.open()`
`random.seed()` `itertools.islice()` `random` `itertools`

namespace package – **PEP 420** *package* *regular package* `__init__.`
`py` *module*

nested scope – `nonlocal`

new-style class – Python Python
`__slots__` `__getattr__()`

object – `object` *new-style class*

package – Python *module* `__path__` Python
regular package *namespace package*

parameter – *function* *argument*

- positional-or-keyword* `foo bar:`

```
def func(foo, bar=None): ...
```
- positional-only* Python `abs()`
- keyword-only* `*` `kw_only1 kw_only2:`

```
def func(arg, *, kw_only1, kw_only2): ...
```
- var-positional* `*` `args:`

```
def func(*args, **kwargs): ...
```
- var-keyword* `**` `kwargs`

argument `inspect.Parameter` *function* **PEP 362**

path entry – *import path* *path based finder*

path entry finder – `sys.path_hooks (path entry hook)` *finder* *path entry*
`importlib.abc.PathEntryFinder`

path entry hook – *path entry* `sys.path_hook` *path entry finder*

path based finder – *import path*

path-like object – `str bytes` `os.PathLike` `os.PathLike`
`os.fspath()` `str bytes` `os.fsdecode()` `os.fsencode()` `str bytes`
PEP 519

PEP “Python ” **PEP** Python Python PEP
PEP Python PEP
PEP 1

portion – zip PEP 420

positional argument – *argument*

provisional API – API API –

API “ ” ____

PEP 411

provisional package – *provisional API*

Python 3000 Python 3.x 3 “Py3k”

Pythonic Python Python for Python

```
for i in range(len(food)):
    print(food[i])
```

Pythonic :

```
for piece in food:
    print(piece)
```

qualified name – “ ” PEP 3155 :

```
>>> class C:
...     class D:
...         def meth(self):
...             pass
...
>>> C.__qualname__
'C'
>>> C.D.__qualname__
'C.D'
>>> C.D.meth.__qualname__
'C.D.meth'
```

email.mime.text:

```
>>> import email.mime.text
>>> email.mime.text.__name__
'email.mime.text'
```

reference count – Python CPython sys
getrefcount()

regular package – *package* __init__.py
namespace package

__slots__

sequence – *iterable* __getitem__() __len__() list str tuple
bytes dict __getitem__() __len__() *immutable*
collections.abc.Sequence __getitem__() __len__() count(), index(),
__contains__() __reversed__() register()

single dispatch – *generic function*

slice – *sequence* [] `variable_name[1:3:5]` slice

special method – Python `specialnames`

statement – “ ” *expression* if while for

struct sequence – *named tuple* `_make()` `_asdict()`
`sys.float_info` `os.stat()`

text encoding – Unicode

text file – `str` *file object* *text encoding* `'r'` `'w'` `sys.`
`stdin` `sys.stdout` `io.StringIO`
binary file

triple-quoted string – “ ” ’

type – Python `__class__` `type(obj)`

type alias –

:

```
from typing import List, Tuple

def remove_gray_shades(
    colors: List[Tuple[int, int, int]]) -> List[Tuple[int, int, int]]:
    pass
```

:

```
from typing import List, Tuple

Color = Tuple[int, int, int]

def remove_gray_shades(colors: List[Color]) -> List[Color]:
    pass
```

typing **PEP 484**

type hint – *annotation*

Python IDE

`typing.get_type_hints()`

typing **PEP 484**

universal newlines – Unix `'\n'` Windows `'\r\n'` Macintosh `'\r'`
PEP 278 **PEP 3116** `bytes.splitlines()`

variable annotation – *annotation*

:

```
class C:
    field: 'annotation'
```

`int` :

count: int = 0

annassign

function annotation **PEP 484** **PEP 526**

virtual environment – Python Python Python
venv

virtual machine – Python *bytecode*

Zen of Python – Python "import this"

Sphinx Python reStructuredText
Python reporting-bugs

- Fred L. Drake, Jr. [Python](#)
- [reStructuredText](#) [Docutils](#)
- Fredrik Lundh [Alternative Python Reference](#) [Sphinx](#)

B.1 Python

Python	Python	Python	Misc/ACKS	Python
Python	Python	-		

History and License

C.1 History of the software

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see <https://www.cwi.nl/>) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see <https://www.cnri.reston.va.us/>) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation; see <http://www.zope.com/>). In 2001, the Python Software Foundation (PSF, see <https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see <https://opensource.org/> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

	Derived from	Year	Owner	GPL compatible?
0.9.0 thru 1.2	n/a	1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	no
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above	2.1.1	2001-now	PSF	yes

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C.3.1 Mersenne Twister

The `_random` module includes code based on a download from <http://www.math.sci.hiroshima-u.ac.jp/~m-mat/MT/MT2002/emt19937ar.html>. The following are the verbatim comments from the original code:

A C-program for MT19937, with initialization improved 2002/1/26.
Coded by Takuji Nishimura and Makoto Matsumoto.

Before using, initialize the state by using `init_genrand(seed)`
or `init_by_array(init_key, key_length)`.

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<http://www.math.sci.hiroshima-u.ac.jp/~m-mat/MT/emt.html>

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C.3.2

The `socket` module uses the functions, `getaddrinfo()`, and `getnameinfo()`, which are coded in separate source files from the WIDE Project, <http://www.wide.ad.jp/>.

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Modified by Jack Jansen, CWI, July 1995:

- Use binascii module to do the actual line-by-line conversion between ascii and binary. This results in a 1000-fold speedup. The C version is still 5 times faster, though.
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C.3.10 SipHash24

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Original location:
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Solution inspired by code from:
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  Jean-Philippe Aumasson (https://131002.net/siphash/siphash24.c)
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C.3.11 strtod and dtoa

The file `Python/dtoa.c`, which supplies C functions `dtoa` and `strtod` for conversion of C doubles to and from strings, is derived from the file of the same name by David M. Gay, currently available from <http://www.netlib.org/fp/>. The original file, as retrieved on March 16, 2009, contains the following copyright and licensing notice:

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C.3.12 OpenSSL

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C.3.16 cfuhash

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