

What's New In Python 3.4

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This article explains the new features in Python 3.4, compared to 3.3. Python 3.4 was released on March 16, 2014. For full details, see the [changelog](#).

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```
.. seealso::  
  
:pep:429` -- Python 3.4 Release Schedule
```

Summary -- Release Highlights

New syntax features:

- No new syntax features were added in Python 3.4.

Other new features:

- [ref](#): `pip` should always be available <whatsnew-pep-453>` ([PEP 453](#)).

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- [ref](#): Newly created file descriptors are non-inheritable <whatsnew-pep-446>` ([PEP 446](#)).

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- command line option for [ref](#): isolated mode <whatsnew-isolated-mode>` (:issue:16499`).

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- [ref](#): improvements in the handling of codecs <codec-handling-improvements>` that are not text encodings (multiple issues).

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resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 91);
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- `ref`: A ModuleSpec Type <whatsnew-pep-451> for the Import System (PEP 451). (Affects importer authors.)

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- The `mod`:`marshal` format has been made `ref`: more compact and efficient <whatsnew-marshal-3> (issue: 16475).

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New library modules:

- `mod`:`asyncio`: `ref`: New provisional API for asynchronous IO <whatsnew-asyncio> (PEP 3156).

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- `mod`:`ensurepip`: `ref`: Bootstrapping the pip installer <whatsnew-ensurepip> (PEP 453).

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[backlink](#)

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- `mod`:`enum`: `ref`: Support for enumeration types <whatsnew-enum> (PEP 435).

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resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 104);
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- `mod:`pathlib``: `ref`Object-oriented filesystem paths <whatsnew-pathlib>`` (PEP 428).

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- `mod:`selectors``: `ref`High-level and efficient I/O multiplexing <whatsnew-selectors>``, built upon the `mod:`select`` module primitives (part of PEP 3156).

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- `mod:`statistics``: A basic `ref`numerically stable statistics library <whatsnew-statistics>`` (PEP 450).

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- `mod:`tracemalloc``: `ref`Trace Python memory allocations <whatsnew-tracemalloc>`` (PEP 454).

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Significantly improved library modules:

- `ref: Single-dispatch generic functions <whatsnew-singledispatch>` in `mod: functools` (PEP 443).

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- New `mod: pickle` `ref: protocol 4 <whatsnew-protocol-4>` (PEP 3154).

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- `mod: multiprocessing` now has `ref: an option to avoid using os.fork on Unix <whatsnew-multiprocessing-no-fork>` (`issue: 8713`).

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- `mod: email` has a new submodule, `mod: ~email.contentmanager`, and a new `mod: ~email.message.Message` subclass (`:class: ~email.contentmanager.EmailMessage`) that `ref: simplify MIME handling <whatsnew_email_contentmanager>` (`issue: 18891`).

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- The `mod:inspect` and `mod:pydoc` modules are now capable of correct introspection of a much wider variety of callable objects, which improves the output of the Python `:func:help` system.

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- The `mod:ipaddress` module API has been declared stable

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Security improvements:

- `:ref:`Secure and interchangeable hash algorithm <whatsnew-pep-456>`` (PEP 456).

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- `:ref:`Make newly created file descriptors non-inheritable <whatsnew-pep-446>`` (PEP 446) to avoid leaking file descriptors to child processes.

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- New command line option for `:ref:`isolated mode <whatsnew-isolated-mode>``, (issue: 16499).

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- `:mod:`multiprocessing`` now has `:ref:`an option to avoid using os.fork on Unix <whatsnew-multiprocessing-no-fork>``. `spawn` and `forkserver` are more secure because they avoid sharing data with child processes.

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- `:mod:`multiprocessing`` child processes on Windows no longer inherit all of the parent's inheritable handles, only the necessary ones.

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- A new `:func:`hashlib.pbkdf2_hmac`` function provides the PKCS#5 password-based key derivation function 2.

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- `:ref:`TLSv1.1 and TLSv1.2 support <whatsnew-tls-11-12>`` for `:mod:`ssl``.

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- `ref`: Retrieving certificates from the Windows system cert store support <whatsnew34-win-cert-store>` for `mod`:`ssl`.

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- `ref`: Server-side SNI (Server Name Indication) support <whatsnew34-sni>` for `mod`:`ssl`.

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- The `class`:`ssl.SSLContext` class has a `ref`:`lot of improvements <whatsnew34-sslcontext>`.

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- All modules in the standard library that support SSL now support server certificate verification, including hostname matching (`func`:`ssl.match_hostname`) and CRLs (Certificate Revocation lists, see `func`:`ssl.SSLContext.load_verify_locations`).

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resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 155);
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CPython implementation improvements:

- [:ref:](#) Safe object finalization <whatsnew-pep-442>` (PEP 442).

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- Leveraging [PEP 442](#), in most cases [:ref:](#) module globals are no longer set to None during finalization <whatsnew-pep-442>` (:issue: 18214`).

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- [:ref:](#) Configurable memory allocators <whatsnew-pep-445>` (PEP 445).

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- [:ref:](#) Argument Clinic <whatsnew-pep-436>` (PEP 436).

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Please read on for a comprehensive list of user-facing changes, including many other smaller improvements, CPython optimizations, deprecations, and potential porting issues.

New Features

PEP 453: Explicit Bootstrapping of PIP in Python Installations

Bootstrapping pip By Default

The new `:mod:'ensurepip'` module (defined in [PEP 453](#)) provides a standard cross-platform mechanism to bootstrap the pip installer into Python installations and virtual environments. The version of `pip` included with Python 3.4.0 is `pip 1.5.4`, and future 3.4.x maintenance releases will update the bundled version to the latest version of `pip` that is available at the time of creating the release candidate.

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By default, the commands `pipX` and `pipX.Y` will be installed on all platforms (where X.Y stands for the version of the Python

installation), along with the `pip` Python package and its dependencies. On Windows and in virtual environments on all platforms, the unversioned `pip` command will also be installed. On other platforms, the system wide unversioned `pip` command typically refers to the separately installed Python 2 version.

The `pyvenv` command line utility and the `.mod:venv` module make use of the `.mod:ensurepip` module to make `pip` readily available in virtual environments. When using the command line utility, `pip` is installed by default, while when using the `.mod:venv` module `ref:venv-api` installation of `pip` must be requested explicitly.

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For CPython `ref:source builds on POSIX systems <building-python-on-unix>`, the `make install` and `make altinstall` commands bootstrap `pip` by default. This behaviour can be controlled through configure options, and overridden through Makefile options.

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On Windows and Mac OS X, the CPython installers now default to installing `pip` along with CPython itself (users may opt out of installing it during the installation process). Window users will need to opt in to the automatic `PATH` modifications to have `pip` available from the command line by default, otherwise it can still be accessed through the Python launcher for Windows as `py -m pip`.

As [discussed in the PEP](#), platform packagers may choose not to install these commands by default, as long as, when invoked, they provide clear and simple directions on how to install them on that platform (usually using the system package manager).

Note

To avoid conflicts between parallel Python 2 and Python 3 installations, only the versioned `pip3` and `pip3.4` commands are bootstrapped by default when `ensurepip` is invoked directly - the `--default-pip` option is needed to also request the unversioned `pip` command. `pyvenv` and the Windows installer ensure that the unqualified `pip` command is made available in those environments, and `pip` can always be invoked via the `-m` switch rather than directly to avoid ambiguity on systems with multiple Python installations.

Documentation Changes

As part of this change, the `ref:installing-index` and `ref:distributing-index` sections of the documentation have been completely redesigned as short getting started and FAQ documents. Most packaging documentation has now been moved out to the Python Packaging Authority maintained [Python Packaging User Guide](#) and the documentation of the individual projects.

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However, as this migration is currently still incomplete, the legacy versions of those guides remaining available as [:ref:install-index](#) and [:ref:distutils-index](#).

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.. seealso::

```
:pep:453 -- Explicit bootstrapping of pip in Python installations
PEP written by Donald Stufft and Nick Coghlan, implemented by
Donald Stufft, Nick Coghlan, Martin von Löwis and Ned Deily.
```

PEP 446: Newly Created File Descriptors Are Non-Inheritable

PEP 446 makes newly created file descriptors [:ref:non-inheritable <fd_inheritance>](#). In general, this is the behavior an application will want: when launching a new process, having currently open files also open in the new process can lead to all sorts of hard to find bugs, and potentially to security issues.

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However, there are occasions when inheritance is desired. To support these cases, the following new functions and methods are available:

- `:func:os.get_inheritable`, `:func:os.set_inheritable`

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 273); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 273); [backlink](#)

Unknown interpreted text role "func".

- `:func:os.get_handle_inheritable`, `:func:os.set_handle_inheritable`

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 274); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 274); [backlink](#)

Unknown interpreted text role "func".

- `.meth:`socket.socket.get_inheritable``, `.meth:`socket.socket.set_inheritable``

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 275); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 275); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 277)

Unknown directive type "seealso".

.. seealso::

:pep:`446` -- Make newly created file descriptors non-inheritable
PEP written and implemented by Victor Stinner.

Improvements to Codec Handling

Since it was first introduced, the `.mod:`codecs`` module has always been intended to operate as a type-neutral dynamic encoding and decoding system. However, its close coupling with the Python text model, especially the type restricted convenience methods on the builtin `.class:`str``, `.class:`bytes`` and `.class:`bytearray`` types, has historically obscured that fact.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 288); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 288); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 288); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 288); [backlink](#)

Unknown interpreted text role "class".

As a key step in clarifying the situation, the `.meth:`codecs.encode`` and `.meth:`codecs.decode`` convenience functions are now properly documented in Python 2.7, 3.3 and 3.4. These functions have existed in the `.mod:`codecs`` module (and have been covered by the regression test suite) since Python 2.4, but were previously only discoverable through runtime introspection.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 295); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 295); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 295); [backlink](#)

Unknown interpreted text role "mod".

Unlike the convenience methods on `class:'str'`, `class:'bytes'` and `class:'bytearray'`, the `mod:'codecs'` convenience functions support arbitrary codecs in both Python 2 and Python 3, rather than being limited to Unicode text encodings (in Python 3) or basestring <-> basestring conversions (in Python 2).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 301); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 301); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 301); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 301); [backlink](#)

Unknown interpreted text role "mod".

In Python 3.4, the interpreter is able to identify the known non-text encodings provided in the standard library and direct users towards these general purpose convenience functions when appropriate:

```
>>> b"abcdef".decode("hex")
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
LookupError: 'hex' is not a text encoding; use codecs.decode() to handle arbitrary codecs

>>> "hello".encode("rot13")
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
LookupError: 'rot13' is not a text encoding; use codecs.encode() to handle arbitrary codecs

>>> open("foo.txt", encoding="hex")
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
LookupError: 'hex' is not a text encoding; use codecs.open() to handle arbitrary codecs
```

In a related change, whenever it is feasible without breaking backwards compatibility, exceptions raised during encoding and decoding operations are wrapped in a chained exception of the same type that mentions the name of the codec responsible for producing the error:

```
>>> import codecs

>>> codecs.decode(b"abcdefgh", "hex")
Traceback (most recent call last):
  File "/usr/lib/python3.4/encodings/hex_codec.py", line 20, in hex_decode
    return (binascii.a2b_hex(input), len(input))
binascii.Error: Non-hexadecimal digit found
```

The above exception was the direct cause of the following exception:

```
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
binascii.Error: decoding with 'hex' codec failed (Error: Non-hexadecimal digit found)

>>> codecs.encode("hello", "bz2")
Traceback (most recent call last):
  File "/usr/lib/python3.4/encodings/bz2_codec.py", line 17, in bz2_encode
    return (bz2.compress(input), len(input))
  File "/usr/lib/python3.4/bz2.py", line 498, in compress
    return comp.compress(data) + comp.flush()
```

TypeError: 'str' does not support the buffer interface

The above exception was the direct cause of the following exception:

```
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
TypeError: encoding with 'bz2' codec failed (TypeError: 'str' does not support the buffer interface)
```

Finally, as the examples above show, these improvements have permitted the restoration of the convenience aliases for the non-Unicode codecs that were themselves restored in Python 3.2. This means that encoding binary data to and from its hexadecimal representation (for example) can now be written as:

```
>>> from codecs import encode, decode
>>> encode(b"hello", "hex")
b'68656c6c6f'
>>> decode(b"68656c6c6f", "hex")
b'hello'
```

The binary and text transforms provided in the standard library are detailed in [ref:'binary-transforms'](#) and [ref:'text-transforms'](#).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 371); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 371); [backlink](#)

Unknown interpreted text role "ref".

(Contributed by Nick Coghlan in [:issue:'7475'](#), [:issue:'17827'](#), [:issue:'17828'](#) and [:issue:'19619'](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 374); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 374); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 374); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 374); [backlink](#)

Unknown interpreted text role "issue".

PEP 451: A ModuleSpec Type for the Import System

[PEP 451](#) provides an encapsulation of the information about a module that the import machinery will use to load it (that is, a module specification). This helps simplify both the import implementation and several import-related APIs. The change is also a stepping stone for [several future import-related improvements](#).

The public-facing changes from the PEP are entirely backward-compatible. Furthermore, they should be transparent to everyone but importer authors. Key finder and loader methods have been deprecated, but they will continue working. New importers should use the new methods described in the PEP. Existing importers should be updated to implement the new methods. See the [ref:'deprecated-3.4'](#) section for a list of methods that should be replaced and their replacements.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 391); [backlink](#)

Unknown interpreted text role "ref".

Other Language Changes

Some smaller changes made to the core Python language are:

- Unicode database updated to UCD version 6.3.
- `:func:`min`` and `:func:`max`` now accept a *default* keyword-only argument that can be used to specify the value they return if the iterable they are evaluating has no elements. (Contributed by Julian Berman in [:issue:`18111`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 407); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 407); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 407); [backlink](#)

Unknown interpreted text role "issue".

- Module objects are now `:mod:`weakref``able.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 412); [backlink](#)

Unknown interpreted text role "mod".

- Module `__file__` attributes (and related values) should now always contain absolute paths by default, with the sole exception of `__main__.__file__` when a script has been executed directly using a relative path. (Contributed by Brett Cannon in [:issue:`18416`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 414); [backlink](#)

Unknown interpreted text role "issue".

- All the UTF-* codecs (except UTF-7) now reject surrogates during both encoding and decoding unless the `surrogatepass` error handler is used, with the exception of the UTF-16 decoder (which accepts valid surrogate pairs) and the UTF-16 encoder (which produces them while encoding non-BMP characters). (Contributed by Victor Stinner, Kang-Hao (Kenny) Lu and Serhiy Storchaka in [:issue:`12892`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 419); [backlink](#)

Unknown interpreted text role "issue".

- New German EBCDIC `:ref:`codec <standard-encodings>` cp273`. (Contributed by Michael Bierenfeld and Andrew Kuchling in [:issue:`1097797`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 426); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 426); [backlink](#)

Unknown interpreted text role "issue".

- New Ukrainian `:ref:`codec <standard-encodings>` cp1125`. (Contributed by Serhiy Storchaka in `:issue:`19668``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 429); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 429); [backlink](#)

Unknown interpreted text role "issue".

- `:class:`bytes`.join()` and `:class:`bytearray`.join()` now accept arbitrary buffer objects as arguments. (Contributed by Antoine Pitrou in `:issue:`15958``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 432); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 432); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 432); [backlink](#)

Unknown interpreted text role "issue".

- The `:class:`int`` constructor now accepts any object that has an `__index__` method for its *base* argument. (Contributed by Mark Dickinson in `:issue:`16772``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 436); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 436); [backlink](#)

Unknown interpreted text role "issue".

- Frame objects now have a `:func:`~frame.clear`` method that clears all references to local variables from the frame. (Contributed by Antoine Pitrou in `:issue:`17934``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 440); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 440); [backlink](#)

Unknown interpreted text role "issue".

- `:class:`memoryview`` is now registered as a `:class:`Sequence <collections.abc>``, and supports the `:func:`reversed`` builtin. (Contributed by Nick Coghlan and Claudiu Popa in [:issue:`18690`](#) and [:issue:`19078`](#).)

System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 444); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 444); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 444); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 444); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 444); [backlink](#)

Unknown interpreted text role "issue".

- Signatures reported by `:func:`help`` have been modified and improved in several cases as a result of the introduction of Argument Clinic and other changes to the `:mod:`inspect`` and `:mod:`pydoc`` modules.

System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 448); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 448); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 448); [backlink](#)

Unknown interpreted text role "mod".

- `:meth:`~object.__length_hint__`` is now part of the formal language specification (see [PEP 424](#)). (Contributed by Armin Ronacher in [:issue:`16148`](#).)

System Message: ERROR/3 (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 452); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 452); [backlink](#)

Unknown interpreted text role "issue".

New Modules

asyncio

The new `mod:`asyncio`` module (defined in [PEP 3156](#)) provides a standard pluggable event loop model for Python, providing solid asynchronous IO support in the standard library, and making it easier for other event loop implementations to interoperate with the standard library and each other.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 466); [backlink](#)

Unknown interpreted text role "mod".

For Python 3.4, this module is considered a `term:`provisional API``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 471); [backlink](#)

Unknown interpreted text role "term".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 473)

Unknown directive type "seealso".

.. seealso::

:pep:`3156` -- Asynchronous IO Support Rebooted: the "asyncio" Module
PEP written and implementation led by Guido van Rossum.

ensurepip

The new `mod:`ensurepip`` module is the primary infrastructure for the [PEP 453](#) implementation. In the normal course of events end users will not need to interact with this module, but it can be used to manually bootstrap `pip` if the automated bootstrapping into an installation or virtual environment was declined.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 484); [backlink](#)

Unknown interpreted text role "mod".

`mod:`ensurepip`` includes a bundled copy of `pip`, up-to-date as of the first release candidate of the release of CPython with which it ships (this applies to both maintenance releases and feature releases). `ensurepip` does not access the internet. If the installation has internet access, after `ensurepip` is run the bundled `pip` can be used to upgrade `pip` to a more recent release than the bundled one. (Note that such an upgraded version of `pip` is considered to be a separately installed package and will not be removed if Python is uninstalled.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 490); [backlink](#)

Unknown interpreted text role "mod".

The module is named `ensurepip` because if called when `pip` is already installed, it does nothing. It also has an `--upgrade` option that will cause it to install the bundled copy of `pip` if the existing installed version of `pip` is older than the bundled copy.

enum

The new `mod:`enum`` module (defined in [PEP 435](#)) provides a standard implementation of enumeration types, allowing other modules (such as `mod:`socket``) to provide more informative error messages and better debugging support by replacing opaque

integer constants with backwards compatible enumeration values.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 510); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 510); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 516)

Unknown directive type "seealso".

```
.. seealso::

:pep:`435` -- Adding an Enum type to the Python standard library
PEP written by Barry Warsaw, Eli Bendersky and Ethan Furman,
implemented by Ethan Furman.
```

pathlib

The new `mod: 'pathlib'` module offers classes representing filesystem paths with semantics appropriate for different operating systems. Path classes are divided between *pure paths*, which provide purely computational operations without I/O, and *concrete paths*, which inherit from pure paths but also provide I/O operations.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 528); [backlink](#)

Unknown interpreted text role "mod".

For Python 3.4, this module is considered a `term: 'provisional API'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 534); [backlink](#)

Unknown interpreted text role "term".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 536)

Unknown directive type "seealso".

```
.. seealso::

:pep:`428` -- The pathlib module -- object-oriented filesystem paths
PEP written and implemented by Antoine Pitrou.
```

selectors

The new `mod: 'selectors'` module (created as part of implementing [PEP 3156](#)) allows high-level and efficient I/O multiplexing, built upon the `mod: 'select'` module primitives.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 547); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 547); [backlink](#)

Unknown interpreted text role "mod".

statistics

The new `mod:statistics` module (defined in [PEP 450](#)) offers some core statistics functionality directly in the standard library. This module supports calculation of the mean, median, mode, variance and standard deviation of a data series.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 557); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 562)

Unknown directive type "seealso".

.. seealso::

:pep:`450` -- Adding A Statistics Module To The Standard Library
PEP written and implemented by Steven D'Aprano

tracemalloc

The new `mod:tracemalloc` module (defined in [PEP 454](#)) is a debug tool to trace memory blocks allocated by Python. It provides the following information:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 573); [backlink](#)

Unknown interpreted text role "mod".

- Trace where an object was allocated
- Statistics on allocated memory blocks per filename and per line number: total size, number and average size of allocated memory blocks
- Compute the differences between two snapshots to detect memory leaks

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 581)

Unknown directive type "seealso".

.. seealso::

:pep:`454` -- Add a new tracemalloc module to trace Python memory allocations
PEP written and implemented by Victor Stinner

Improved Modules

abc

New function `func:abc.get_cache_token` can be used to know when to invalidate caches that are affected by changes in the object graph. (Contributed by Łukasz Langa in [issue:16832](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 595); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 595); [backlink](#)

Unknown interpreted text role "issue".

New class `class:~abc.ABC` has `class:~abc.ABCMeta` as its meta class. Using `ABC` as a base class has essentially the same effect as specifying `metaclass=abc.ABCMeta`, but is simpler to type and easier to read. (Contributed by Bruno Dupuis in [issue:16049](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 599); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 599); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 599); [backlink](#)

Unknown interpreted text role "issue".

aifc

The `.meth:~aifc.aifc.getparams` method now returns a `namedtuple` rather than a plain tuple. (Contributed by Claudiu Popa in [issue:17818](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 608); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 608); [backlink](#)

Unknown interpreted text role "issue".

`.func:aifc.open` now supports the context management protocol: when used in a `.keyword:with` block, the `.meth:~aifc.aifc.close` method of the returned object will be called automatically at the end of the block. (Contributed by Serhiy Storchaka in [issue:16486](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 611); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 611); [backlink](#)

Unknown interpreted text role "keyword".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 611); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 611); [backlink](#)

Unknown interpreted text role "issue".

The `.meth:~aifc.aifc.writeframesraw` and `.meth:~aifc.aifc.writeframes` methods now accept any `.term:bytes-like object`. (Contributed by Serhiy Storchaka in [issue:8311](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 616); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 616); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 616); [backlink](#)

Unknown interpreted text role "term".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 616); [backlink](#)

Unknown interpreted text role "issue".

argparse

The `:class:`~argparse.FileType`` class now accepts *encoding* and *errors* arguments, which are passed through to `:func:`open``. (Contributed by Lucas Maystre in [issue: 11175](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 624); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 624); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 624); [backlink](#)

Unknown interpreted text role "issue".

audioop

`mod:`audioop`` now supports 24-bit samples. (Contributed by Serhiy Storchaka in [issue: 12866](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 632); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 632); [backlink](#)

Unknown interpreted text role "issue".

New `:func:`~audioop.byteswap`` function converts big-endian samples to little-endian and vice versa. (Contributed by Serhiy Storchaka in [issue: 19641](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 635); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 635); [backlink](#)

Unknown interpreted text role "issue".

All `mod:`audioop`` functions now accept any `:term:`bytes-like object``. Strings are not accepted: they didn't work before, now they raise an error right away. (Contributed by Serhiy Storchaka in [issue: 16685](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 639); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 639); [backlink](#)

Unknown interpreted text role "term".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 639); [backlink](#)

Unknown interpreted text role "issue".

base64

The encoding and decoding functions in `mod:base64` now accept any `term:bytes-like object` in cases where it previously required a `class:bytes` or `class:bytearray` instance. (Contributed by Nick Coghlan in `issue:17839`.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 647); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 647); [backlink](#)

Unknown interpreted text role "term".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 647); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 647); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 647); [backlink](#)

Unknown interpreted text role "issue".

New functions `func:~base64.a85encode`, `func:~base64.a85decode`, `func:~base64.b85encode`, and `func:~base64.b85decode` provide the ability to encode and decode binary data from and to `Ascii85` and the `git/mercurial Base85` formats, respectively. The `a85` functions have options that can be used to make them compatible with the variants of the `Ascii85` encoding, including the Adobe variant. (Contributed by Martin Morrison, the Mercurial project, Serhiy Storchaka, and Antoine Pitrou in `issue:17618`.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 652); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 652); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 652); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-

main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 652); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 652); [backlink](#)

Unknown interpreted text role "issue".

collections

The `meth:'.ChainMap.new_child'` method now accepts an *m* argument specifying the child map to add to the chain. This allows an existing mapping and/or a custom mapping type to be used for the child. (Contributed by Vinay Sajip in [issue: 16613](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 664); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 664); [backlink](#)

Unknown interpreted text role "issue".

colorsys

The number of digits in the coefficients for the RGB --- YIQ conversions have been expanded so that they match the FCC NTSC versions. The change in results should be less than 1% and may better match results found elsewhere. (Contributed by Brian Landers and Serhiy Storchaka in [issue: 14323](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 673); [backlink](#)

Unknown interpreted text role "issue".

contextlib

The new `:class:'contextlib.suppress'` context manager helps to clarify the intent of code that deliberately suppresses exceptions from a single statement. (Contributed by Raymond Hettinger in [issue: 15806](#) and Zero Piraeus in [issue: 19266](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 682); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 682); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 682); [backlink](#)

Unknown interpreted text role "issue".

The new `:func:'contextlib.redirect_stdout'` context manager makes it easier for utility scripts to handle inflexible APIs that write their output to `:data:'sys.stdout'` and don't provide any options to redirect it. Using the context manager, the `:data:'sys.stdout'` output can be redirected to any other stream or, in conjunction with `:class:'io.StringIO'`, to a string. The latter can be especially useful, for example, to capture output from a function that was written to implement a command line interface. It is recommended only for utility scripts because it affects the global state of `:data:'sys.stdout'`. (Contributed by Raymond Hettinger in [issue: 15805](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 687); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 687); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 687); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 687); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 687); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 687); [backlink](#)

Unknown interpreted text role "issue".

The `:mod:`contextlib`` documentation has also been updated to include a `:ref:`discussion <single-use-reusable-and-reentrant-cms>`` of the differences between single use, reusable and reentrant context managers.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 698); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 698); [backlink](#)

Unknown interpreted text role "ref".

dbm

`:func:`dbm.open`` objects now support the context management protocol. When used in a `:keyword:`with`` statement, the `close` method of the database object will be called automatically at the end of the block. (Contributed by Claudiu Popa and Nick Coghlan in `:issue:`19282``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 706); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 706); [backlink](#)

Unknown interpreted text role "keyword".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 706); [backlink](#)

Unknown interpreted text role "issue".

dis

Functions `:func:`~dis.show_code``, `:func:`~dis.dis``, `:func:`~dis.distb``, and `:func:`~dis.disassemble`` now accept a keyword-only *file* argument that controls where they write their output.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-

main\Doc\whatsnew\cpython-main] [Doc] [whatsnew] 3.4.rst, line 715); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew] 3.4.rst, line 715); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew] 3.4.rst, line 715); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew] 3.4.rst, line 715); [backlink](#)

Unknown interpreted text role "func".

The `mod:dis` module is now built around an `class:~dis.Instruction` class that provides object oriented access to the details of each individual bytecode operation.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew] 3.4.rst, line 719); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew] 3.4.rst, line 719); [backlink](#)

Unknown interpreted text role "class".

A new method, `func:~dis.get_instructions`, provides an iterator that emits the Instruction stream for a given piece of Python code. Thus it is now possible to write a program that inspects and manipulates a bytecode object in ways different from those provided by the `mod:dis` module itself. For example:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew] 3.4.rst, line 723); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew] 3.4.rst, line 723); [backlink](#)

Unknown interpreted text role "mod".

```
>>> import dis
>>> for instr in dis.get_instructions(lambda x: x + 1):
...     print(instr.opname)
LOAD_FAST
LOAD_CONST
BINARY_ADD
RETURN_VALUE
```

The various display tools in the `mod:dis` module have been rewritten to use these new components.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew] 3.4.rst, line 737); [backlink](#)

Unknown interpreted text role "mod".

In addition, a new application-friendly class `class:~dis.Bytecode` provides an object-oriented API for inspecting bytecode in both in human-readable form and for iterating over instructions. The `class:~dis.Bytecode` constructor takes the same arguments that `func:~dis.get_instructions` does (plus an optional *current_offset*), and the resulting object can be iterated to produce `class:~dis.Instruction` objects. But it also has a `mod:~dis.Bytecode.dis` method, equivalent to calling `mod:~dis.dis` on the constructor argument, but returned as a multi-line string:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 740); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 740); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 740); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 740); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 740); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 740); [backlink](#)

Unknown interpreted text role "mod".

```
>>> bytecode = dis.Bytecode(lambda x: x + 1, current_offset=3)
>>> for instr in bytecode:
...     print('{} {} {}'.format(instr.opname, instr.opcode))
LOAD_FAST (124)
LOAD_CONST (100)
BINARY_ADD (23)
RETURN_VALUE (83)
>>> bytecode.dis().splitlines()          # doctest: +NORMALIZE_WHITESPACE
[' 1          0 LOAD_FAST          0 (x)',
 '          --> 3 LOAD_CONST       1 (1)',
 '              6 BINARY_ADD',
 '              7 RETURN_VALUE']
```

:class:`~dis.Bytecode` also has a class method, `meth`~dis.Bytecode.from_traceback``, that provides the ability to manipulate a traceback (that is, `print(Bytecode.from_traceback(tb).dis())` is equivalent to `distb(tb)`).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 762); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 762); [backlink](#)

Unknown interpreted text role "meth".

(Contributed by Nick Coghlan, Ryan Kelly and Thomas Kluyver in `issue:11816` and Claudiu Popa in `issue:17916`.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 767); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 767); [backlink](#)

Unknown interpreted text role "issue".

New function `:func:`~dis.stack_effect`` computes the effect on the Python stack of a given opcode and argument, information that is not otherwise available. (Contributed by Larry Hastings in [:issue:`19722`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 770); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 770); [backlink](#)

Unknown interpreted text role "issue".

doctest

A new `:ref` option flag <doctest-options>``, `:data:`~doctest.FAIL_FAST``, halts test running as soon as the first failure is detected. (Contributed by R. David Murray and Daniel Urban in [:issue:`16522`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 778); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 778); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 778); [backlink](#)

Unknown interpreted text role "issue".

The `:mod:`doctest`` command line interface now uses `:mod:`argparse``, and has two new options, `-o` and `-f`. `-o` allows `:ref` doctest options <doctest-options>`` to be specified on the command line, and `-f` is a shorthand for `-o FAIL_FAST` (to parallel the similar option supported by the `:mod:`unittest`` CLI). (Contributed by R. David Murray in [:issue:`11390`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 782); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 782); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 782); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 782); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 782); [backlink](#)

Unknown interpreted text role "issue".

`:mod:`doctest`` will now find doctests in extension module `__doc__` strings. (Contributed by Zachary Ware in [:issue:`3158`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-

main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 788); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 788); [backlink](#)

Unknown interpreted text role "issue".

email

`meth:~email.message.Message.as_string` now accepts a *policy* argument to override the default policy of the message when generating a string representation of it. This means that `as_string` can now be used in more circumstances, instead of having to create and use a `mod:~email.generator` in order to pass formatting parameters to its `flatten` method. (Contributed by R. David Murray in [:issue:18600](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 795); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 795); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 795); [backlink](#)

Unknown interpreted text role "issue".

New method `meth:~email.message.Message.as_bytes` added to produce a bytes representation of the message in a fashion similar to how `as_string` produces a string representation. It does not accept the *maxheaderlen* argument, but does accept the *unixfrom* and *policy* arguments. The `class:~email.message.Message meth:~email.message.Message.__bytes__` method calls it, meaning that `bytes(mymsg)` will now produce the intuitive result: a bytes object containing the fully formatted message. (Contributed by R. David Murray in [:issue:18600](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 802); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 802); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 802); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 802); [backlink](#)

Unknown interpreted text role "issue".

The `meth:.Message.set_param` message now accepts a *replace* keyword argument. When specified, the associated header will be updated without changing its location in the list of headers. For backward compatibility, the default is `False`. (Contributed by R. David Murray in [:issue:18891](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 811); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 811); [backlink](#)

Unknown interpreted text role "issue".

A pair of new subclasses of `:class:`~email.message.Message`` have been added (`:class:`.EmailMessage`` and `:class:`.MIMEPart``), along with a new sub-module, `:mod:`~email.contentmanager`` and a new `:mod:`~email.policy`` attribute `:attr:`~email.policy.EmailPolicy.content_manager``. All documentation is currently in the new module, which is being added as part of email's new `:term:`provisional API``. These classes provide a number of new methods that make extracting content from and inserting content into email messages much easier. For details, see the `:mod:`~email.contentmanager`` documentation and the `:ref:`email-examples``. These API additions complete the bulk of the work that was planned as part of the email6 project. The currently provisional API is scheduled to become final in Python 3.5 (possibly with a few minor additions in the area of error handling). (Contributed by R. David Murray in `:issue:`18891``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 819); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 819); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 819); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 819); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 819); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 819); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 819); [backlink](#)

Unknown interpreted text role "term".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 819); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 819); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 819); [backlink](#)

Unknown interpreted text role "issue".

filecmp

A new `:func:`~filecmp.clear_cache`` function provides the ability to clear the `:mod:`filecmp`` comparison cache, which uses `:func:`os.stat`` information to determine if the file has changed since the last compare. This can be used, for example, if the file might have been changed and re-checked in less time than the resolution of a particular filesystem's file modification time field. (Contributed by Mark Levitt in [:issue:`18149`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 837); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 837); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 837); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 837); [backlink](#)

Unknown interpreted text role "issue".

New module attribute `:data:`~filecmp.DEFAULT_IGNORES`` provides the list of directories that are used as the default value for the `ignore` parameter of the `:func:`~filecmp.dircmp`` function. (Contributed by Eli Bendersky in [:issue:`15442`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 844); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 844); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 844); [backlink](#)

Unknown interpreted text role "issue".

functools

The new `:func:`~functools.partialmethod`` descriptor brings partial argument application to descriptors, just as `:func:`~functools.partial`` provides for normal callables. The new descriptor also makes it easier to get arbitrary callables (including `:func:`~functools.partial`` instances) to behave like normal instance methods when included in a class definition. (Contributed by Alon Horev and Nick Coghlan in [:issue:`4331`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 853); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 853); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 853); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 853); [backlink](#)

Unknown interpreted text role "issue".

The new `:func:`~functools.singledispatch`` decorator brings support for single-dispatch generic functions to the Python standard library. Where object oriented programming focuses on grouping multiple operations on a common set of data into a class, a generic function focuses on grouping multiple implementations of an operation that allows it to work with *different* kinds of data.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 862); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 869)

Unknown directive type "seealso".

```
.. seealso::

   :pep:`443` -- Single-dispatch generic functions
   PEP written and implemented by Łukasz Langa.
```

`:func:`~functools.total_ordering`` now supports a return value of `:const:`NotImplemented`` from the underlying comparison function. (Contributed by Katie Miller in `:issue:`10042``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 874); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 874); [backlink](#)

Unknown interpreted text role "const".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 874); [backlink](#)

Unknown interpreted text role "issue".

A pure-python version of the `:func:`~functools.partial`` function is now in the stdlib; in CPython it is overridden by the C accelerated version, but it is available for other implementations to use. (Contributed by Brian Thorne in `:issue:`12428``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 878); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 878); [backlink](#)

Unknown interpreted text role "issue".

gc

New function `:func:`~gc.get_stats`` returns a list of three per-generation dictionaries containing the collections statistics since interpreter startup. (Contributed by Antoine Pitrou in `:issue:`16351``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 887); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 887); [backlink](#)

Unknown interpreted text role "issue".

glob

A new function `:func:`~glob.escape`` provides a way to escape special characters in a filename so that they do not become part of the globbing expansion but are instead matched literally. (Contributed by Serhiy Storchaka in [:issue:`8402`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 895); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 895); [backlink](#)

Unknown interpreted text role "issue".

hashlib

A new `:func:`hashlib.pbkdf2_hmac`` function provides the PKCS#5 password-based key derivation function 2. (Contributed by Christian Heimes in [:issue:`18582`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 903); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 903); [backlink](#)

Unknown interpreted text role "issue".

The `:attr:`~hashlib.hash.name`` attribute of `:mod:`hashlib`` hash objects is now a formally supported interface. It has always existed in CPython's `:mod:`hashlib`` (although it did not return lower case names for all supported hashes), but it was not a public interface and so some other Python implementations have not previously supported it. (Contributed by Jason R. Coombs in [:issue:`18532`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 908); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 908); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 908); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 908); [backlink](#)

Unknown interpreted text role "issue".

hmac

`:mod:`hmac`` now accepts `bytearray` as well as `bytes` for the `key` argument to the `:func:`~hmac.new`` function, and the `msg` parameter to both the `:func:`~hmac.new`` function and the `:meth:`~hmac.HMAC.update`` method now accepts any type supported by the `:mod:`hashlib`` module. (Contributed by Jonas Borgström in [:issue:`18240`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 919); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 919); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 919); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 919); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 919); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 919); [backlink](#)

Unknown interpreted text role "issue".

The *digestmod* argument to the `func:'hmac.new'` function may now be any hash digest name recognized by `mod:'hashlib'`. In addition, the current behavior in which the value of *digestmod* defaults to MD5 is deprecated: in a future version of Python there will be no default value. (Contributed by Christian Heimes in [issue:'17276'](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 925); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 925); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 925); [backlink](#)

Unknown interpreted text role "issue".

With the addition of `attr:'~hmac.HMAC.block_size'` and `attr:'~hmac.HMAC.name'` attributes (and the formal documentation of the `attr:'~hmac.HMAC.digest_size'` attribute), the `mod:'hmac'` module now conforms fully to the PEP 247 API. (Contributed by Christian Heimes in [issue:'18775'](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 931); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 931); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-

main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 931); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 931); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 931); [backlink](#)

Unknown interpreted text role "issue".

html

New function `:func:`~html.unescape`` function converts HTML5 character references to the corresponding Unicode characters. (Contributed by Ezio Melotti in `:issue:`2927``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 940); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 940); [backlink](#)

Unknown interpreted text role "issue".

`:class:`~html.parser.HTMLParser`` accepts a new keyword argument `convert_charrefs` that, when `True`, automatically converts all character references. For backward-compatibility, its value defaults to `False`, but it will change to `True` in a future version of Python, so you are invited to set it explicitly and update your code to use this new feature. (Contributed by Ezio Melotti in `:issue:`13633``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 944); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 944); [backlink](#)

Unknown interpreted text role "issue".

The `strict` argument of `:class:`~html.parser.HTMLParser`` is now deprecated. (Contributed by Ezio Melotti in `:issue:`15114``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 951); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 951); [backlink](#)

Unknown interpreted text role "issue".

http

`:meth:`~http.server.BaseHTTPRequestHandler.send_error`` now accepts an optional additional `explain` parameter which can be used to provide an extended error description, overriding the hardcoded default if there is one. This extended error description will be formatted using the `:attr:`~http.server.HTTP.error_message_format`` attribute and sent as the body of the error response. (Contributed by Karl Cow in `:issue:`12921``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 958); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 958); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 958); [backlink](#)

Unknown interpreted text role "issue".

The `mod:'http.server'` `ref:'command line interface <http-server-cli>'` now has a `-b/--bind` option that causes the server to listen on a specific address. (Contributed by Malte Swart in `issue:'17764'`.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 965); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 965); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 965); [backlink](#)

Unknown interpreted text role "issue".

idlelib and IDLE

Since idlelib implements the IDLE shell and editor and is not intended for import by other programs, it gets improvements with every release. See `file:'Lib/idlelib/NEWS.txt'` for a cumulative list of changes since 3.3.0, as well as changes made in future 3.4.x releases. This file is also available from the IDLE `menuselection:'Help --> About IDLE'` dialog.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 973); [backlink](#)

Unknown interpreted text role "file".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 973); [backlink](#)

Unknown interpreted text role "menuselection".

importlib

The `class:'~importlib.abc.InspectLoader'` `ABC` defines a new method, `meth:'~importlib.abc.InspectLoader.source_to_code'` that accepts source data and a path and returns a code object. The default implementation is equivalent to `compile(data, path, 'exec', dont_inherit=True)`. (Contributed by Eric Snow and Brett Cannon in `issue:'15627'`.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 983); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 983); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 983); [backlink](#)

Unknown interpreted text role "issue".

`:class:~importlib.abc.InspectLoader` also now has a default implementation for the `:meth:~importlib.abc.InspectLoader.get_code` method. However, it will normally be desirable to override the default implementation for performance reasons. (Contributed by Brett Cannon in [:issue:18072](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 989); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 989); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 989); [backlink](#)

Unknown interpreted text role "issue".

The `:func:~importlib.reload` function has been moved from `:mod:~imp` to `:mod:~importlib` as part of the `:mod:~imp` module deprecation. (Contributed by Berker Peksag in [:issue:18193](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 994); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 994); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 994); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 994); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 994); [backlink](#)

Unknown interpreted text role "issue".

`:mod:~importlib.util` now has a `:data:~importlib.util.MAGIC_NUMBER` attribute providing access to the bytecode version number. This replaces the `:func:~imp.get_magic` function in the deprecated `:mod:~imp` module. (Contributed by Brett Cannon in [:issue:18192](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 998); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 998); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-

main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 998); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 998); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 998); [backlink](#)

Unknown interpreted text role "issue".

New `:mod:`importlib.util`` functions `:func:`~importlib.util.cache_from_source`` and `:func:`~importlib.util.source_from_cache`` replace the same-named functions in the deprecated `:mod:`imp`` module. (Contributed by Brett Cannon in [:issue:`18194`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1003); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1003); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1003); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1003); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1003); [backlink](#)

Unknown interpreted text role "issue".

The `:mod:`importlib`` bootstrap `:class:`.NamespaceLoader`` now conforms to the `:class:`.InspectLoader`` ABC, which means that `runpy` and `python -m` can now be used with namespace packages. (Contributed by Brett Cannon in [:issue:`18058`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1008); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1008); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1008); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1008); [backlink](#)

Unknown interpreted text role "issue".

`mod: 'importlib.util'` has a new function `func: '~importlib.util.decode_source'` that decodes source from bytes using universal newline processing. This is useful for implementing `meth: 'InspectLoader.get_source'` methods.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1013); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1013); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1013); [backlink](#)

Unknown interpreted text role "meth".

`class: 'importlib.machinery.ExtensionFileLoader'` now has a `meth: '~importlib.machinery.ExtensionFileLoader.get_filename'` method. This was inadvertently omitted in the original implementation. (Contributed by Eric Snow in [issue: '19152'](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1017); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1017); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1017); [backlink](#)

Unknown interpreted text role "issue".

inspect

The `mod: 'inspect'` module now offers a basic `ref: 'command line interface <inspect-module-cli>'` to quickly display source code and other information for modules, classes and functions. (Contributed by Claudiu Popa and Nick Coghlan in [issue: '18626'](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1026); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1026); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1026); [backlink](#)

Unknown interpreted text role "issue".

`func: '~inspect.unwrap'` makes it easy to unravel wrapper function chains created by `func: 'functools.wraps'` (and any other API that sets the `__wrapped__` attribute on a wrapper function). (Contributed by Daniel Urban, Aaron Iles and Nick Coghlan in [issue: '13266'](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1031); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1031); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1031); [backlink](#)

Unknown interpreted text role "issue".

As part of the implementation of the new `mod:enum` module, the `mod:inspect` module now has substantially better support for custom `__dir__` methods and dynamic class attributes provided through metaclasses. (Contributed by Ethan Furman in `:issue:18929` and `:issue:19030`.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1036); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1036); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1036); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1036); [backlink](#)

Unknown interpreted text role "issue".

`:func:~inspect.getfullargspec` and `:func:~inspect.getargspec` now use the `:func:~inspect.signature` API. This allows them to support a much broader range of callables, including those with `__signature__` attributes, those with metadata provided by argument clinic, `:func:functools.partial` objects and more. Note that, unlike `:func:~inspect.signature`, these functions still ignore `__wrapped__` attributes, and report the already bound first argument for bound methods, so it is still necessary to update your code to use `:func:~inspect.signature` directly if those features are desired. (Contributed by Yury Selivanov in `:issue:17481`.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1042); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1042); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1042); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1042); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1042); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1042); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1042); [backlink](#)

Unknown interpreted text role "issue".

`:func:`~inspect.signature`` now supports duck types of CPython functions, which adds support for functions compiled with Cython. (Contributed by Stefan Behnel and Yury Selivanov in [:issue: 17159](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1053); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1053); [backlink](#)

Unknown interpreted text role "issue".

ipaddress

`:mod:`ipaddress`` was added to the standard library in Python 3.3 as a `:term:`provisional API``. With the release of Python 3.4, this qualification has been removed: `:mod:`ipaddress`` is now considered a stable API, covered by the normal standard library requirements to maintain backwards compatibility.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1061); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1061); [backlink](#)

Unknown interpreted text role "term".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1061); [backlink](#)

Unknown interpreted text role "mod".

A new `:attr:`~ipaddress.IPv4Address.is_global`` property is `True` if an address is globally routeable. (Contributed by Peter Moody in [:issue: 17400](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1067); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1067); [backlink](#)

Unknown interpreted text role "issue".

logging

The `:class:`~logging.handlers.TimedRotatingFileHandler`` has a new `atTime` parameter that can be used to specify the time of day when rollover should happen. (Contributed by Ronald Oussoren in [:issue: 9556](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1075); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1075); [backlink](#)

Unknown interpreted text role "issue".

`:class:`~logging.handlers.SocketHandler`` and `:class:`~logging.handlers.DatagramHandler`` now support Unix domain sockets (by setting `port` to `None`). (Contributed by Vinay Sajip in commit ce46195b56a9.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1079); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1079); [backlink](#)

Unknown interpreted text role "class".

`:func:`~logging.config.fileConfig`` now accepts a `:class:`~configparser.RawConfigParser`` subclass instance for the `fname` parameter. This facilitates using a configuration file when logging configuration is just a part of the overall application configuration, or where the application modifies the configuration before passing it to `:func:`~logging.config.fileConfig``. (Contributed by Vinay Sajip in [issue:16110](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1084); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1084); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1084); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1084); [backlink](#)

Unknown interpreted text role "issue".

Logging configuration data received from a socket via the `:func:`~logging.config.listen`` function can now be validated before being processed by supplying a verification function as the argument to the new `verify` keyword argument. (Contributed by Vinay Sajip in [issue:15452](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1092); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1092); [backlink](#)

Unknown interpreted text role "issue".

marshal

The default `:mod:`~marshal`` version has been bumped to 3. The code implementing the new version restores the Python2 behavior of recording only one copy of interned strings and preserving the interning on deserialization, and extends this "one copy" ability to any object type (including handling recursive references). This reduces both the size of `.pyc` files and the amount of memory a module occupies in memory when it is loaded from a `.pyc` (or `.pyo`) file. (Contributed by Kristján Valur Jónsson in [issue:16475](#), with additional speedups by Antoine Pitrou in [issue:19219](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1103); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1103); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1103); [backlink](#)

Unknown interpreted text role "issue".

mmap

mmap objects can now be `mod:weakref`ed. (Contributed by Valerie Lambert in `issue:4885`.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1116); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1116); [backlink](#)

Unknown interpreted text role "issue".

multiprocessing

On Unix two new `ref:start methods <multiprocessing-start-methods>`, `spawn` and `forkserver`, have been added for starting processes using `mod:multiprocessing`. These make the mixing of processes with threads more robust, and the `spawn` method matches the semantics that multiprocessing has always used on Windows. New function `func:~multiprocessing.get_all_start_methods` reports all start methods available on the platform, `func:~multiprocessing.get_start_method` reports the current start method, and `func:~multiprocessing.set_start_method` sets the start method. (Contributed by Richard Oudkerk in `issue:8713`.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1125); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1125); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1125); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1125); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1125); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-

main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1125); [backlink](#)

Unknown interpreted text role "issue".

`mod: multiprocessing` also now has the concept of a `context`, which determines how child processes are created. New function `:func: multiprocessing.get_context` returns a context that uses a specified start method. It has the same API as the `mod: multiprocessing` module itself, so you can use it to create `:class: multiprocessing.pool.Pool`'s and other objects that will operate within that context. This allows a framework and an application or different parts of the same application to use multiprocessing without interfering with each other. (Contributed by Richard Oudkerk in [issue: 18999](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1135); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1135); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1135); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1135); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1135); [backlink](#)

Unknown interpreted text role "issue".

Except when using the old *fork* start method, child processes no longer inherit unneeded handles/file descriptors from their parents (part of [issue: 8713](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1145); [backlink](#)

Unknown interpreted text role "issue".

`mod: multiprocessing` now relies on `mod: runpy` (which implements the `-m` switch) to initialise `_main` appropriately in child processes when using the `spawn` or `forkserver` start methods. This resolves some edge cases where combining multiprocessing the `-m` command line switch, and explicit relative imports could cause obscure failures in child processes. (Contributed by Nick Coghlan in [issue: 19946](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1149); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1149); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1149); [backlink](#)

Unknown interpreted text role "issue".

operator

New function `:func:`~operator.length_hint`` provides an implementation of the specification for how the `:meth:`~object.__length_hint__`` special method should be used, as part of the [PEP 424](#) formal specification of this language feature. (Contributed by Armin Ronacher in [:issue:`16148`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1160); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1160); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1160); [backlink](#)

Unknown interpreted text role "issue".

There is now a pure-python version of the `:mod:`operator`` module available for reference and for use by alternate implementations of Python. (Contributed by Zachary Ware in [:issue:`16694`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1165); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1165); [backlink](#)

Unknown interpreted text role "issue".

os

There are new functions to get and set the `:ref:`inheritable flag <fd_inheritance>`` of a file descriptor (`:func:`os.get_inheritable``, `:func:`os.set_inheritable``) or a Windows handle (`:func:`os.get_handle_inheritable``, `:func:`os.set_handle_inheritable``).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1173); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1173); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1173); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1173); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1173); [backlink](#)

Unknown interpreted text role "func".

New function `:func:`~os.cpu_count`` reports the number of CPUs available on the platform on which Python is running (or `None` if the count can't be determined). The `:func:`multiprocessing.cpu_count`` function is now implemented in terms of this function). (Contributed by Trent Nelson, Yogesh Chaudhari, Victor Stinner, and Charles-François Natali in [:issue:`17914`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1178); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1178); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1178); [backlink](#)

Unknown interpreted text role "issue".

`:func:`os.path.samestat`` is now available on the Windows platform (and the `:func:`os.path.samefile`` implementation is now shared between Unix and Windows). (Contributed by Brian Curtin in [issue`11939`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1184); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1184); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1184); [backlink](#)

Unknown interpreted text role "issue".

`:func:`os.path.ismount`` now recognizes volumes mounted below a drive root on Windows. (Contributed by Tim Golden in [issue:`9035`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1188); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1188); [backlink](#)

Unknown interpreted text role "issue".

`:func:`os.open`` supports two new flags on platforms that provide them, `:data:`~os.O_PATH`` (un-opened file descriptor), and `:data:`~os.O_TMPFILE`` (unnamed temporary file; as of 3.4.0 release available only on Linux systems with a kernel version of 3.11 or newer that have uapi headers). (Contributed by Christian Heimes in [issue`18673`](#) and Benjamin Peterson, respectively.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1191); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1191); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1191); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1191); [backlink](#)

Unknown interpreted text role "issue".

pdb

`mod: 'pdb'` has been enhanced to handle generators, `keyword: 'yield'`, and `yield from` in a more useful fashion. This is especially helpful when debugging `mod: 'asyncio'` based programs. (Contributed by Andrew Svetlov and Xavier de Gaye in [issue: '16596'](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1201); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1201); [backlink](#)

Unknown interpreted text role "keyword".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1201); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1201); [backlink](#)

Unknown interpreted text role "issue".

The `print` command has been removed from `mod: 'pdb'`, restoring access to the Python `func: 'print'` function from the `pdb` command line. Python2's `pdb` did not have a `print` command; instead, entering `print` executed the `print` statement. In Python3 `print` was mistakenly made an alias for the `pdbcmd: 'p'` command. `p`, however, prints the `repr` of its argument, not the `str` like the Python2 `print` command did. Worse, the Python3 `pdb print` command shadowed the Python3 `print` function, making it inaccessible at the `pdb` prompt. (Contributed by Connor Osborn in [issue: '18764'](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1206); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1206); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1206); [backlink](#)

Unknown interpreted text role "pdbcmd".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1206); [backlink](#)

Unknown interpreted text role "issue".

pickle

`mod: 'pickle'` now supports (but does not use by default) a new pickle protocol, protocol 4. This new protocol addresses a number of issues that were present in previous protocols, such as the serialization of nested classes, very large strings and containers, and classes whose `meth: '__new__'` method takes keyword-only arguments. It also provides some efficiency improvements.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1222); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1222); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1228)

Unknown directive type "seealso".

```
.. seealso::

    :pep:`3154` -- Pickle protocol 4
    PEP written by Antoine Pitrou and implemented by Alexandre Vassalotti.
```

plistlib

`mod:~plistlib` now has an API that is similar to the standard pattern for stdlib serialization protocols, with new `func:~plistlib.load`, `func:~plistlib.dump`, `func:~plistlib.loads`, and `func:~plistlib.dumps` functions. (The older API is now deprecated.) In addition to the already supported XML plist format (`data:~plistlib.FMT_XML`), it also now supports the binary plist format (`data:~plistlib.FMT_BINARY`). (Contributed by Ronald Oussoren and others in `issue:14455`.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1237); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1237); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1237); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1237); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1237); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1237); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1237); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1237); [backlink](#)

Unknown interpreted text role "issue".

poplib

Two new methods have been added to `mod:~poplib:~meth:~poplib.POP3.capa`, which returns the list of capabilities advertised by the POP server, and `meth:~poplib.POP3.stls`, which switches a clear-text POP3 session into an encrypted POP3 session if the POP server supports it. (Contributed by Lorenzo Catucci in [issue:~4473](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1249); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1249); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1249); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1249); [backlink](#)

Unknown interpreted text role "issue".

pprint

The `mod:~pprint` module's `class:~pprint.PrettyPrinter` class and its `func:~pprint.pformat`, and `func:~pprint.pprint` functions have a new option, *compact*, that controls how the output is formatted. Currently setting *compact* to `True` means that sequences will be printed with as many sequence elements as will fit within *width* on each (indented) line. (Contributed by Serhiy Storchaka in [issue:~19132](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1259); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1259); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1259); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1259); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1259); [backlink](#)

Unknown interpreted text role "issue".

Long strings are now wrapped using Python's normal line continuation syntax. (Contributed by Antoine Pitrou in [issue:~17150](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1266); [backlink](#)

Unknown interpreted text role "issue".

pty

`:func:`pty.spawn`` now returns the status value from `:func:`os.waitpid`` on the child process, instead of `None`. (Contributed by Gregory P. Smith.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1273); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1273); [backlink](#)

Unknown interpreted text role "func".

pydoc

The `:mod:`pydoc`` module is now based directly on the `:func:`inspect.signature`` introspection API, allowing it to provide signature information for a wider variety of callable objects. This change also means that `__wrapped__` attributes are now taken into account when displaying help information. (Contributed by Larry Hastings in [:issue:`19674`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1280); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1280); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1280); [backlink](#)

Unknown interpreted text role "issue".

The `:mod:`pydoc`` module no longer displays the `self` parameter for already bound methods. Instead, it aims to always display the exact current signature of the supplied callable. (Contributed by Larry Hastings in [:issue:`20710`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1286); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1286); [backlink](#)

Unknown interpreted text role "issue".

In addition to the changes that have been made to `:mod:`pydoc`` directly, its handling of custom `__dir__` methods and various descriptor behaviours has also been improved substantially by the underlying changes in the `:mod:`inspect`` module.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1291); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1291); [backlink](#)

Unknown interpreted text role "mod".

As the `:func:`help`` builtin is based on `:mod:`pydoc``, the above changes also affect the behaviour of `:func:`help``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-

main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1296); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1296); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1296); [backlink](#)

Unknown interpreted text role "func".

re

New `:func:`~re.fullmatch`` function and `:meth:`.regex.fullmatch`` method anchor the pattern at both ends of the string to match. This provides a way to be explicit about the goal of the match, which avoids a class of subtle bugs where `$` characters get lost during code changes or the addition of alternatives to an existing regular expression. (Contributed by Matthew Barnett in [:issue:`16203`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1303); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1303); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1303); [backlink](#)

Unknown interpreted text role "issue".

The repr of `ref`regex objects`<re-objects>` now includes the pattern and the flags; the repr of `ref`match objects`<match-objects>` now includes the start, end, and the part of the string that matched. (Contributed by Hugo Lopes Tavares and Serhiy Storchaka in [:issue:`13592`](#) and [:issue:`17087`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1310); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1310); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1310); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1310); [backlink](#)

Unknown interpreted text role "issue".

resource

New `:func:`~resource.prlimit`` function, available on Linux platforms with a kernel version of 2.6.36 or later and glibc of 2.13 or later, provides the ability to query or set the resource limits for processes other than the one making the call. (Contributed by Christian Heimes in [:issue:`16595`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1320); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1320); [backlink](#)

Unknown interpreted text role "issue".

On Linux kernel version 2.6.36 or later, there are also some new Linux specific constants: `:attr:~resource.RLIMIT_MSGQUEUE`, `:attr:~resource.RLIMIT_NICE`, `:attr:~resource.RLIMIT_RTPRIO`, `:attr:~resource.RLIMIT_RTTIME`, and `:attr:~resource.RLIMIT_SIGPENDING`. (Contributed by Christian Heimes in [issue:19324](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1325); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1325); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1325); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1325); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1325); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1325); [backlink](#)

Unknown interpreted text role "issue".

On FreeBSD version 9 and later, there some new FreeBSD specific constants: `:attr:~resource.RLIMIT_SBSIZE`, `:attr:~resource.RLIMIT_SWAP`, and `:attr:~resource.RLIMIT_NPTS`. (Contributed by Claudiu Popa in [issue:19343](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1331); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1331); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1331); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1331); [backlink](#)

Unknown interpreted text role "issue".

select

`:class:~select.epoll` objects now support the context management protocol. When used in a `:keyword:'with'` statement, the `:meth:~select.epoll.close` method will be called automatically at the end of the block. (Contributed by Serhiy Storchaka in [:issue:16488](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1340); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1340); [backlink](#)

Unknown interpreted text role "keyword".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1340); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1340); [backlink](#)

Unknown interpreted text role "issue".

`:class:~select.devpoll` objects now have `:meth:~select.devpoll.fileno` and `:meth:~select.devpoll.close` methods, as well as a new attribute `:attr:~select.devpoll.closed`. (Contributed by Victor Stinner in [:issue:18794](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1345); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1345); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1345); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1345); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1345); [backlink](#)

Unknown interpreted text role "issue".

shelve

`:class:~shelve.Shelf` instances may now be used in `:keyword:'with'` statements, and will be automatically closed at the end of the `:keyword:'!with'` block. (Contributed by Filip Gruszczyński in [:issue:13896](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1354); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1354); [backlink](#)

Unknown interpreted text role "keyword".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1354); [backlink](#)

Unknown interpreted text role "keyword".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1354); [backlink](#)

Unknown interpreted text role "issue".

shutil

`:func:`~shutil.copyfile`` now raises a specific `:exc:`~shutil.Error`` subclass, `:exc:`~shutil.SameFileError``, when the source and destination are the same file, which allows an application to take appropriate action on this specific error. (Contributed by Atsuo Ishimoto and Hynek Schlawack in [:issue:`1492704`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1362); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1362); [backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1362); [backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1362); [backlink](#)

Unknown interpreted text role "issue".

smtpd

The `:class:`~smtpd.SMTPServer`` and `:class:`~smtpd.SMTPChannel`` classes now accept a `map` keyword argument which, if specified, is passed in to `:class:`asynchat.async_chat`` as its `map` argument. This allows an application to avoid affecting the global socket map. (Contributed by Vinay Sajip in [:issue:`11959`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1372); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1372); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1372); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1372); [backlink](#)

Unknown interpreted text role "issue".

smtplib

`:exc:~smtplib.SMTPException` is now a subclass of `:exc:~OSError`, which allows both socket level errors and SMTP protocol level errors to be caught in one try/except statement by code that only cares whether or not an error occurred. (Contributed by Ned Jackson Lovely in [:issue:2118](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1382); [backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1382); [backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1382); [backlink](#)

Unknown interpreted text role "issue".

socket

The socket module now supports the `:data:~socket.CAN_BCM` protocol on platforms that support it. (Contributed by Brian Thorne in [:issue:15359](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1391); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1391); [backlink](#)

Unknown interpreted text role "issue".

Socket objects have new methods to get or set their `:ref:inheritable` flag `<fd_inheritance>`, `:meth:~socket.socket.get_inheritable` and `:meth:~socket.socket.set_inheritable`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1394); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1394); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1394); [backlink](#)

Unknown interpreted text role "meth".

The `socket.AF_*` and `socket.SOCK_*` constants are now enumeration values using the new `:mod:enum` module. This allows meaningful names to be printed during debugging, instead of integer "magic numbers".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1398); [backlink](#)

Unknown interpreted text role "mod".

The `:data:~socket.AF_LINK` constant is now available on BSD and OSX.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1402); [backlink](#)

Unknown interpreted text role "data".

`:func:~socket.inet_pton` and `:func:~socket.inet_ntop` are now supported on Windows. (Contributed by Atsuo Ishimoto in [issue:~7171](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1404); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1404); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1404); [backlink](#)

Unknown interpreted text role "issue".

sqlite3

A new boolean parameter to the `:func:~sqlite3.connect` function, `uri`, can be used to indicate that the `database` parameter is a `uri` (see the [SQLite URI documentation](#)). (Contributed by poq in [issue:~13773](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1411); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1411); [backlink](#)

Unknown interpreted text role "issue".

ssl

`:data:~ssl.PROTOCOL_TLSv1_1` and `:data:~ssl.PROTOCOL_TLSv1_2` (TLSv1.1 and TLSv1.2 support) have been added; support for these protocols is only available if Python is linked with OpenSSL 1.0.1 or later. (Contributed by Michele Orrù and Antoine Pitrou in [issue:~16692](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1422); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1422); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1422); [backlink](#)

Unknown interpreted text role "issue".

New function `:func:~ssl.create_default_context` provides a standard way to obtain an `:class:~ssl.SSLContext` whose settings are intended to be a reasonable balance between compatibility and security. These settings are more stringent than the defaults provided by the `:class:~ssl.SSLContext` constructor, and may be adjusted in the future, without prior deprecation, if best-practice security requirements change. The new recommended best practice for using stdlib libraries that support SSL is to use `:func:~ssl.create_default_context` to obtain an `:class:~ssl.SSLContext` object, modify it if needed, and then pass it as the `context` argument of the appropriate stdlib API. (Contributed by Christian Heimes in [issue:~19689](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1429); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1429); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1429); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1429); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1429); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1429); [backlink](#)

Unknown interpreted text role "issue".

`:class:`~ssl.SSLContext`` method `:meth:`~ssl.SSLContext.load_verify_locations`` accepts a new optional argument *cadata*, which can be used to provide PEM or DER encoded certificates directly via strings or bytes, respectively. (Contributed by Christian Heimes in `:issue:`18138``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1441); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1441); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1441); [backlink](#)

Unknown interpreted text role "issue".

New function `:func:`~ssl.get_default_verify_paths`` returns a named tuple of the paths and environment variables that the `:meth:`~ssl.SSLContext.set_default_verify_paths`` method uses to set OpenSSL's default *cafile* and *capath*. This can be an aid in debugging default verification issues. (Contributed by Christian Heimes in `:issue:`18143``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1446); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1446); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-

main\Doc\whatsnew\cpython-main] [Doc] [whatsnew]3.4.rst, line 1446); [backlink](#)

Unknown interpreted text role "issue".

`:class:~ssl.SSLContext` has a new method, `:meth:~ssl.SSLContext.cert_store_stats`, that reports the number of loaded x.509 certs, x.509 CA certs, and certificate revocation lists (crls), as well as a `:meth:~ssl.SSLContext.get_ca_certs` method that returns a list of the loaded CA certificates. (Contributed by Christian Heimes in `:issue:18147`.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew]3.4.rst, line 1453); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew]3.4.rst, line 1453); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew]3.4.rst, line 1453); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew]3.4.rst, line 1453); [backlink](#)

Unknown interpreted text role "issue".

If OpenSSL 0.9.8 or later is available, `:class:~ssl.SSLContext` has a new attribute `:attr:~ssl.SSLContext.verify_flags` that can be used to control the certificate verification process by setting it to some combination of the new constants `:data:~ssl.VERIFY_DEFAULT`, `:data:~ssl.VERIFY_CRL_CHECK_LEAF`, `:data:~ssl.VERIFY_CRL_CHECK_CHAIN`, or `:data:~ssl.VERIFY_X509_STRICT`. OpenSSL does not do any CRL verification by default. (Contributed by Christien Heimes in `:issue:8813`.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew]3.4.rst, line 1460); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew]3.4.rst, line 1460); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew]3.4.rst, line 1460); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew]3.4.rst, line 1460); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew]3.4.rst, line 1460); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main] [Doc] [whatsnew]3.4.rst, line 1460); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1460); [backlink](#)

Unknown interpreted text role "issue".

New `:class:`~ssl.SSLContext`` method `:meth:`~ssl.SSLContext.load_default_certs`` loads a set of default "certificate authority" (CA) certificates from default locations, which vary according to the platform. It can be used to load both TLS web server authentication certificates (`purpose=:data:`~ssl.Purpose.SERVER_AUTH``) for a client to use to verify a server, and certificates for a server to use in verifying client certificates (`purpose=:data:`~ssl.Purpose.CLIENT_AUTH``). (Contributed by Christian Heimes in [issue:`19292`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1468); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1468); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1468); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1468); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1468); [backlink](#)

Unknown interpreted text role "issue".

Two new windows-only functions, `:func:`~ssl.enum_certificates`` and `:func:`~ssl.enum_crls`` provide the ability to retrieve certificates, certificate information, and CRLs from the Windows cert store. (Contributed by Christian Heimes in [issue:`17134`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1479); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1479); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1479); [backlink](#)

Unknown interpreted text role "issue".

Support for server-side SNI (Server Name Indication) using the new `:meth:`ssl.SSLContext.set_servername_callback`` method. (Contributed by Daniel Black in [issue:`8109`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1486); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1486); [backlink](#)

Unknown interpreted text role "issue".

The dictionary returned by `meth:'.SSLSocket.getpeercert'` contains additional X509v3 extension items: `crlDistributionPoints`, `calIssuers`, and `OCSP URIs`. (Contributed by Christian Heimes in [issue:18379](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1490); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1490); [backlink](#)

Unknown interpreted text role "issue".

stat

The `mod:stat` module is now backed by a C implementation in `mod:stat`. A C implementation is required as most of the values aren't standardized and are platform-dependent. (Contributed by Christian Heimes in [issue:11016](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1498); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1498); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1498); [backlink](#)

Unknown interpreted text role "issue".

The module supports new `mod:~stat.ST_MODE` flags, `mod:~stat.S_IFDOOR`, `attr:~stat.S_IFPORT`, and `attr:~stat.S_IFWHT`. (Contributed by Christian Heimes in [issue:11016](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1502); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1502); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1502); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1502); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1502); [backlink](#)

Unknown interpreted text role "issue".

struct

New function `mod:~struct.iter_unpack` and a new `meth:struct.Struct.iter_unpack` method on compiled formats provide streamed

unpacking of a buffer containing repeated instances of a given format of data. (Contributed by Antoine Pitrou in [:issue:`17804`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1510); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1510); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1510); [backlink](#)

Unknown interpreted text role "issue".

subprocess

`:func:`~subprocess.check_output`` now accepts an `input` argument that can be used to provide the contents of `stdin` for the command that is run. (Contributed by Zack Weinberg in [:issue:`16624`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1519); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1519); [backlink](#)

Unknown interpreted text role "issue".

`:func:`~subprocess.getstatus`` and `:func:`~subprocess.getstatusoutput`` now work on Windows. This change was actually inadvertently made in 3.3.4. (Contributed by Tim Golden in [:issue:`10197`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1523); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1523); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1523); [backlink](#)

Unknown interpreted text role "issue".

sunau

The `:meth:`~sunau.getparams`` method now returns a `namedtuple` rather than a plain tuple. (Contributed by Claudiu Popa in [:issue:`18901`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1531); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1531); [backlink](#)

Unknown interpreted text role "issue".

`meth:~sunau.open` now supports the context management protocol: when used in a `keyword:~with` block, the `close` method of the returned object will be called automatically at the end of the block. (Contributed by Serhiy Storchaka in [issue:~18878](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1534); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1534); [backlink](#)

Unknown interpreted text role "keyword".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1534); [backlink](#)

Unknown interpreted text role "issue".

`meth:~AU_write.setsampwidth` now supports 24 bit samples, thus adding support for writing 24 sample using the module. (Contributed by Serhiy Storchaka in [issue:~19261](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1539); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1539); [backlink](#)

Unknown interpreted text role "issue".

The `meth:~sunau.AU_write.writeframesraw` and `meth:~sunau.AU_write.writeframes` methods now accept any `term` bytes-like object. (Contributed by Serhiy Storchaka in [issue:~8311](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1543); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1543); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1543); [backlink](#)

Unknown interpreted text role "term".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1543); [backlink](#)

Unknown interpreted text role "issue".

sys

New function `func:~sys.getallocatedblocks` returns the current number of blocks allocated by the interpreter. (In CPython with the default `--with-pymalloc` setting, this is allocations made through the `func:~PyObject_Malloc` API.) This can be useful for tracking memory leaks, especially if automated via a test suite. (Contributed by Antoine Pitrou in [issue:~13390](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1551); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1551); [backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1551); [backlink](#)

Unknown interpreted text role "issue".

When the Python interpreter starts in `ref: interactive mode <tut-interactive>`, it checks for an `:data:~sys.__interactivehook__` attribute on the `:mod:sys` module. If the attribute exists, its value is called with no arguments just before interactive mode is started. The check is made after the `:envvar:PYTHONSTARTUP` file is read, so it can be set there. The `:mod:site` module `ref: sets it <rlcompleter-config>` to a function that enables tab completion and history saving (in `:file:~/.python-history`) if the platform supports `:mod:readline`. If you do not want this (new) behavior, you can override it in `:envvar:PYTHONSTARTUP`, `:mod:sitcustomize`, or `:mod:usercustomize` by deleting this attribute from `:mod:sys` (or setting it to some other callable). (Contributed by Éric Araujo and Antoine Pitrou in `:issue:5845`.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1558); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1558); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1558); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1558); [backlink](#)

Unknown interpreted text role "envvar".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1558); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1558); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1558); [backlink](#)

Unknown interpreted text role "file".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1558); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 1558); [backlink](#)

Unknown interpreted text role "envvar".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-

main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1558); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1558); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1558); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1558); [backlink](#)

Unknown interpreted text role "issue".

tarfile

The `:mod:`tarfile`` module now supports a simple `:ref:`tarfile-commandline`` when called as a script directly or via `-m`. This can be used to create and extract tarfile archives. (Contributed by Berker Peksag in `:issue:`13477``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1575); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1575); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1575); [backlink](#)

Unknown interpreted text role "issue".

textwrap

The `:class:`~textwrap.TextWrapper`` class has two new attributes/constructor arguments: `:attr:`~textwrap.TextWrapper.max_lines``, which limits the number of lines in the output, and `:attr:`~textwrap.TextWrapper.placeholder``, which is a string that will appear at the end of the output if it has been truncated because of `max_lines`. Building on these capabilities, a new convenience function `:func:`~textwrap.shorten`` collapses all of the whitespace in the input to single spaces and produces a single line of a given *width* that ends with the *placeholder* (by default, `[...]`). (Contributed by Antoine Pitrou and Serhiy Storchaka in `:issue:`18585`` and `:issue:`18725``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1583); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1583); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1583); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1583); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1583); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1583); [backlink](#)

Unknown interpreted text role "issue".

threading

The `:class:`~threading.Thread`` object representing the main thread can be obtained from the new `:func:`~threading.main_thread`` function. In normal conditions this will be the thread from which the Python interpreter was started. (Contributed by Andrew Svetlov in [:issue:`18882`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1597); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1597); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1597); [backlink](#)

Unknown interpreted text role "issue".

traceback

A new `:func:`traceback.clear_frames`` function takes a traceback object and clears the local variables in all of the frames it references, reducing the amount of memory consumed. (Contributed by Andrew Kuchling in [:issue:`1565525`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1606); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1606); [backlink](#)

Unknown interpreted text role "issue".

types

A new `:func:`~types.DynamicClassAttribute`` descriptor provides a way to define an attribute that acts normally when looked up through an instance object, but which is routed to the `class __getattr__` when looked up through the class. This allows one to have properties active on a class, and have virtual attributes on the class with the same name (see `mod:`Enum`` for an example). (Contributed by Ethan Furman in [:issue:`19030`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1615); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1615); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1615); [backlink](#)

Unknown interpreted text role "issue".

urllib

`mod:~urllib.request` now supports `data`: URLs via the `:class:~urllib.request.DataHandler` class. (Contributed by Mathias Panzenböck in [issue:16423](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1626); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1626); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1626); [backlink](#)

Unknown interpreted text role "issue".

The `http` method that will be used by a `:class:~urllib.request.Request` class can now be specified by setting a `:class:~urllib.request.Request.method` class attribute on the subclass. (Contributed by Jason R Coombs in [issue:18978](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1630); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1630); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1630); [backlink](#)

Unknown interpreted text role "issue".

`:class:~urllib.request.Request` objects are now reusable: if the `:attr:~urllib.request.Request.full_url` or `:attr:~urllib.request.Request.data` attributes are modified, all relevant internal properties are updated. This means, for example, that it is now possible to use the same `:class:~urllib.request.Request` object in more than one `:meth:~urllib.request.OpenerDirector.open` call with different `data` arguments, or to modify a `:class:~urllib.request.Request`'s `url` rather than recomputing it from scratch. There is also a new `:meth:~urllib.request.Request.remove_header` method that can be used to remove headers from a `:class:~urllib.request.Request`. (Contributed by Alexey Kachayev in [issue:16464](#), Daniel Wozniak in [issue:17485](#), and Damien Brecht and Senthil Kumaran in [issue:17272](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1635); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1635); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1635); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1635); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1635); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1635); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1635); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1635); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1635); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1635); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1635); [backlink](#)

Unknown interpreted text role "issue".

`:class:`~urllib.error.HTTPError`` objects now have a `:attr:`~urllib.error.HTTPError.headers`` attribute that provides access to the HTTP response headers associated with the error. (Contributed by Berker Peksag in `:issue:`15701``.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1648); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1648); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1648); [backlink](#)

Unknown interpreted text role "issue".

unittest

The `:class:`~unittest.TestCase`` class has a new method, `:meth:`~unittest.TestCase.subTest``, that produces a context manager whose `:keyword:`with`` block becomes a "sub-test". This context manager allows a test method to dynamically generate subtests by, say, calling the `subTest` context manager inside a loop. A single test method can thereby produce an indefinite number of separately-identified and separately-counted tests, all of which will run even if one or more of them fail. For example:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 1657); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 1657); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 1657); [backlink](#)

Unknown interpreted text role "keyword".

```
class NumbersTest(unittest.TestCase):
    def test_even(self):
        for i in range(6):
            with self.subTest(i=i):
                self.assertEqual(i % 2, 0)
```

will result in six subtests, each identified in the unittest verbose output with a label consisting of the variable name `i` and a particular value for that variable (`i=0`, `i=1`, etc). See [ref`subtests`](#) for the full version of this example. (Contributed by Antoine Pitrou in [issue:`16997`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 1671); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 1671); [backlink](#)

Unknown interpreted text role "issue".

`:func:`unittest.main`` now accepts an iterable of test names for `defaultTest`, where previously it only accepted a single test name as a string. (Contributed by Jyrki Pulliainen in [issue:`15132`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 1676); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 1676); [backlink](#)

Unknown interpreted text role "issue".

If `:class:`~unittest.SkipTest`` is raised during test discovery (that is, at the module level in the test file), it is now reported as a skip instead of an error. (Contributed by Zach Ware in [issue:`16935`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 1680); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 1680); [backlink](#)

Unknown interpreted text role "issue".

`:meth:`~unittest.TestLoader.discover`` now sorts the discovered files to provide consistent test ordering. (Contributed by Martin Melin and Jeff Ramnani in [issue:`16709`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew]3.4.rst, line 1684); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1684); [backlink](#)

Unknown interpreted text role "issue".

`:class:`~unittest.TestSuite`` now drops references to tests as soon as the test has been run, if the test is successful. On Python interpreters that do garbage collection, this allows the tests to be garbage collected if nothing else is holding a reference to the test. It is possible to override this behavior by creating a `:class:`~unittest.TestSuite`` subclass that defines a custom `_removeTestAtIndex` method. (Contributed by Tom Wardill, Matt McClure, and Andrew Svetlov in [issue:`11798`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1688); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1688); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1688); [backlink](#)

Unknown interpreted text role "issue".

A new test assertion context-manager, `:meth:`~unittest.TestCase.assertLogs``, will ensure that a given block of code emits a log message using the `:mod:`logging`` module. By default the message can come from any logger and have a priority of `INFO` or higher, but both the logger name and an alternative minimum logging level may be specified. The object returned by the context manager can be queried for the `:class:`~logging.LogRecord``'s and/or formatted messages that were logged. (Contributed by Antoine Pitrou in [issue:`18937`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1696); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1696); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1696); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1696); [backlink](#)

Unknown interpreted text role "issue".

Test discovery now works with namespace packages (Contributed by Claudiu Popa in [issue:`17457`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1705); [backlink](#)

Unknown interpreted text role "issue".

`:mod:`unittest.mock`` objects now inspect their specification signatures when matching calls, which means an argument can now be matched by either position or name, instead of only by position. (Contributed by Antoine Pitrou in [issue:`17015`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-

main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1708); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1708); [backlink](#)

Unknown interpreted text role "issue".

`:func:~mock.mock_open` objects now have `readline` and `readlines` methods. (Contributed by Toshio Kuratomi in [issue:17467](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1713); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1713); [backlink](#)

Unknown interpreted text role "issue".

venv

`:mod:venv` now includes activation scripts for the `csh` and `fish` shells. (Contributed by Andrew Svetlov in [issue:15417](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1720); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1720); [backlink](#)

Unknown interpreted text role "issue".

`:class:~venv.EnvBuilder` and the `:func:~venv.create` convenience function take a new keyword argument `with_pip`, which defaults to `False`, that controls whether or not `:class:~venv.EnvBuilder` ensures that `pip` is installed in the virtual environment. (Contributed by Nick Coghlan in [issue:19552](#) as part of the [PEP 453](#) implementation.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1723); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1723); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1723); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1723); [backlink](#)

Unknown interpreted text role "issue".

wave

The `:meth:~wave.getparams` method now returns a `namedtuple` rather than a plain tuple. (Contributed by Claudiu Popa in [issue:17487](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1733); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1733); [backlink](#)

Unknown interpreted text role "issue".

`meth:~wave.open` now supports the context management protocol. (Contributed by Claudiu Popa in [issue:~17616](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1736); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1736); [backlink](#)

Unknown interpreted text role "issue".

`mod:~wave` can now `ref:~` write output to unseekable files `<wave-write-objects>`. (Contributed by David Jones, Guilherme Polo, and Serhiy Storchaka in [issue:~5202](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1739); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1739); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1739); [backlink](#)

Unknown interpreted text role "issue".

The `meth:~wave.Wave_write.writeframesraw` and `meth:~wave.Wave_write.writeframes` methods now accept any `term:~bytes-like object`. (Contributed by Serhiy Storchaka in [issue:~8311](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1743); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1743); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1743); [backlink](#)

Unknown interpreted text role "term".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1743); [backlink](#)

Unknown interpreted text role "issue".

New `:class:`~weakref.WeakMethod`` class simulates weak references to bound methods. (Contributed by Antoine Pitrou in [issue: 14631](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1751); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1751); [backlink](#)

Unknown interpreted text role "issue".

New `:class:`~weakref.finalize`` class makes it possible to register a callback to be invoked when an object is garbage collected, without needing to carefully manage the lifecycle of the weak reference itself. (Contributed by Richard Oudkerk in [issue: 15528](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1754); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1754); [backlink](#)

Unknown interpreted text role "issue".

The callback, if any, associated with a `:class:`~weakref.ref`` is now exposed via the `:attr:`~weakref.ref.__callback__`` attribute. (Contributed by Mark Dickinson in [issue: 17643](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1759); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1759); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1759); [backlink](#)

Unknown interpreted text role "issue".

xml.etree

A new parser, `:class:`~xml.etree.ElementTree.XMLPullParser``, allows a non-blocking applications to parse XML documents. An example can be seen at [:ref:`elementtree-pull-parsing`](#). (Contributed by Antoine Pitrou in [issue: 17741](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1767); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1767); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew] 3.4.rst, line 1767); [backlink](#)

Unknown interpreted text role "issue".

The `:mod:`xml.etree.ElementTree`` `:func:`~xml.etree.ElementTree.tostring`` and `:func:`~xml.etree.ElementTree.tostringlist`` functions,

and the `:class:`~xml.etree.ElementTree.ElementTree`` `:meth:`~xml.etree.ElementTree.ElementTree.write`` method, now have a `short_empty_elements` `ref`:keyword-only parameter `<keyword-only_parameter>` providing control over whether elements with no content are written in abbreviated (`<tag />`) or expanded (`<tag></tag>`) form. (Contributed by Ariel Poliak and Serhiy Storchaka in [:issue:14377](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1772); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1772); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1772); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1772); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1772); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1772); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1772); [backlink](#)

Unknown interpreted text role "issue".

zipfile

The `:meth:`~zipfile.PyZipFile.writepy`` method of the `:class:`~zipfile.PyZipFile`` class has a new `filterfunc` option that can be used to control which directories and files are added to the archive. For example, this could be used to exclude test files from the archive. (Contributed by Christian Tismer in [:issue:19274](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1785); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1785); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1785); [backlink](#)

Unknown interpreted text role "issue".

The `allowZip64` parameter to `:class:`~zipfile.ZipFile`` and `:class:`~zipfile.PyZipFile`` is now `True` by default. (Contributed by William Mallard in [:issue:17201](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1791); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1791); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1791); [backlink](#)

Unknown interpreted text role "issue".

CPython Implementation Changes

PEP 445: Customization of CPython Memory Allocators

[PEP 445](#) adds new C level interfaces to customize memory allocation in the CPython interpreter.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1809)

Unknown directive type "seealso".

```
.. seealso::

:pep:`445` -- Add new APIs to customize Python memory allocators
    PEP written and implemented by Victor Stinner.
```

PEP 442: Safe Object Finalization

[PEP 442](#) removes the current limitations and quirks of object finalization in CPython. With it, objects with `meth: '__del__'` methods, as well as generators with `keyword: finally` clauses, can be finalized when they are part of a reference cycle.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1820); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1820); [backlink](#)

Unknown interpreted text role "keyword".

As part of this change, module globals are no longer forcibly set to `const:None` during interpreter shutdown in most cases, instead relying on the normal operation of the cyclic garbage collector. This avoids a whole class of interpreter-shutdown-time errors, usually involving `__del__` methods, that have plagued Python since the cyclic GC was first introduced.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1825); [backlink](#)

Unknown interpreted text role "const".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1832)

Unknown directive type "seealso".

```
.. seealso::

:pep:`442` -- Safe object finalization
    PEP written and implemented by Antoine Pitrou.
```

PEP 456: Secure and Interchangeable Hash Algorithm

PEP 456 follows up on earlier security fix work done on Python's hash algorithm to address certain DOS attacks to which public facing APIs backed by dictionary lookups may be subject. (See [:issue:`14621`](#) for the start of the current round of improvements.) The PEP unifies CPython's hash code to make it easier for a packager to substitute a different hash algorithm, and switches Python's default implementation to a SipHash implementation on platforms that have a 64 bit data type. Any performance differences in comparison with the older FNV algorithm are trivial.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1843); [backlink](#)

Unknown interpreted text role "issue".

The PEP adds additional fields to the `:attr:`sys.hash_info`` named tuple to describe the hash algorithm in use by the currently executing binary. Otherwise, the PEP does not alter any existing CPython APIs.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1852); [backlink](#)

Unknown interpreted text role "attr".

PEP 436: Argument Clinic

"Argument Clinic" (PEP 436) is now part of the CPython build process and can be used to simplify the process of defining and maintaining accurate signatures for builtins and standard library extension modules implemented in C.

Some standard library extension modules have been converted to use Argument Clinic in Python 3.4, and `:mod:`pydoc`` and `:mod:`inspect`` have been updated accordingly.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1867); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1867); [backlink](#)

Unknown interpreted text role "mod".

It is expected that signature metadata for programmatic introspection will be added to additional callables implemented in C as part of Python 3.4 maintenance releases.

Note

The Argument Clinic PEP is not fully up to date with the state of the implementation. This has been deemed acceptable by the release manager and core development team in this case, as Argument Clinic will not be made available as a public API for third party use in Python 3.4.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1881)

Unknown directive type "seealso".

```
.. seealso::
```

```
:pep:`436` -- The Argument Clinic DSL
    PEP written and implemented by Larry Hastings.
```

Other Build and C API Changes

- The new `:c:func:`PyType_GetSlot`` function has been added to the stable ABI, allowing retrieval of function pointers from named type slots when using the limited API. (Contributed by Martin von Löwis in [:issue:`17162`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\[cpython-main] [Doc] [whatsnew]3.4.rst, line 1890); [backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1890); [backlink](#)

Unknown interpreted text role "issue".

- The new `c:func:Py_SetStandardStreamEncoding` pre-initialization API allows applications embedding the CPython interpreter to reliably force a particular encoding and error handler for the standard streams. (Contributed by Bastien Montagne and Nick Coghlan in [issue:16129](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1894); [backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1894); [backlink](#)

Unknown interpreted text role "issue".

- Most Python C APIs that don't mutate string arguments are now correctly marked as accepting `const char *` rather than `char *`. (Contributed by Serhiy Storchaka in [issue:1772673](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1899); [backlink](#)

Unknown interpreted text role "issue".

- A new shell version of `python-config` can be used even when a python interpreter is not available (for example, in cross compilation scenarios).
- `c:func:PyUnicode_FromFormat` now supports width and precision specifications for `%s`, `%A`, `%U`, `%V`, `%S`, and `%R`. (Contributed by Ysj Ray and Victor Stinner in [issue:7330](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1906); [backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1906); [backlink](#)

Unknown interpreted text role "issue".

- New function `c:func:PyStructSequence_InitType2` supplements the existing `c:func:PyStructSequence_InitType` function. The difference is that it returns 0 on success and -1 on failure.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1910); [backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1910); [backlink](#)

Unknown interpreted text role "c:func".

- The CPython source can now be compiled using the address sanity checking features of recent versions of GCC and clang: the false alarms in the small object allocator have been silenced. (Contributed by Dhru Kholia in [:issue:18596](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1914); [backlink](#)

Unknown interpreted text role "issue".

- The Windows build now uses [Address Space Layout Randomization](#) and [Data Execution Prevention](#). (Contributed by Christian Heimes in [:issue:16632](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1919); [backlink](#)

Unknown interpreted text role "issue".

- New function `:c:func:PyObject_LengthHint` is the C API equivalent of `:func:operator.length_hint`. (Contributed by Armin Ronacher in [:issue:16148](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1924); [backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1924); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1924); [backlink](#)

Unknown interpreted text role "issue".

Other Improvements

- The `:ref:python<using-on-cmdline>` command has a new `:ref:option<using-on-misc-options>`, `-I`, which causes it to run in "isolated mode", which means that `:data:sys.path` contains neither the script's directory nor the user's `site-packages` directory, and all `:envvar:PYTHON*` environment variables are ignored (it implies both `-s` and `-E`). Other restrictions may also be applied in the future, with the goal being to isolate the execution of a script from the user's environment. This is appropriate, for example, when Python is used to run a system script. On most POSIX systems it can and should be used in the `#!` line of system scripts. (Contributed by Christian Heimes in [:issue:16499](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1936); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1936); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1936); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1936); [backlink](#)

Unknown interpreted text role "envvar".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1936); [backlink](#)

Unknown interpreted text role "issue".

- Tab-completion is now enabled by default in the interactive interpreter on systems that support `:mod:'readline'`. History is also enabled by default, and is written to (and read from) the file `:file:'~/.python-history'`. (Contributed by Antoine Pitrou and Éric Araujo in [:issue:'5845'](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1947); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1947); [backlink](#)

Unknown interpreted text role "file".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1947); [backlink](#)

Unknown interpreted text role "issue".

- Invoking the Python interpreter with `--version` now outputs the version to standard output instead of standard error ([:issue:'18338'](#)). Similar changes were made to `:mod:'argparse'` ([:issue:'18920'](#)) and other modules that have script-like invocation capabilities ([:issue:'18922'](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1952); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1952); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1952); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1952); [backlink](#)

Unknown interpreted text role "issue".

- The CPython Windows installer now adds `.py` to the `:envvar:'PATHEXT'` variable when extensions are registered, allowing users to run a python script at the windows command prompt by just typing its name without the `.py` extension. (Contributed

by Paul Moore in [:issue:'18569'](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1957); [backlink](#)

Unknown interpreted text role "envvar".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1957); [backlink](#)

Unknown interpreted text role "issue".

- A new `make` target `coverage-report` will build python, run the test suite, and generate an HTML coverage report for the C codebase using `gcov` and `lcov`.
- The `-R` option to the `ref`python regression test suite <regtest>`` now also checks for memory allocation leaks, using `:func:`sys.getallocatedblocks()``. (Contributed by Antoine Pitrou in [:issue:'13390'](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1968); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1968); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1968); [backlink](#)

Unknown interpreted text role "issue".

- `python -m` now works with namespace packages.
- The `mod:stat`` module is now implemented in C, which means it gets the values for its constants from the C header files, instead of having the values hard-coded in the python module as was previously the case.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1975); [backlink](#)

Unknown interpreted text role "mod".

- Loading multiple python modules from a single OS module (`.so`, `.dll`) now works correctly (previously it silently returned the first python module in the file). (Contributed by Václav Šmilauer in [:issue:'16421'](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1979); [backlink](#)

Unknown interpreted text role "issue".

- A new opcode, `:opcode:'LOAD_CLASSDEREF'`, has been added to fix a bug in the loading of free variables in class bodies that could be triggered by certain uses of `ref`__prepare__ <prepare>``. (Contributed by Benjamin Peterson in [:issue:'17853'](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1983); [backlink](#)

Unknown interpreted text role "opcode".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1983); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1983); [backlink](#)

Unknown interpreted text role "issue".

- A number of MemoryError-related crashes were identified and fixed by Victor Stinner using his [PEP 445](#)-based pyfailmalloc tool ([:issue:18408](#), [:issue:18520](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1988); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1988); [backlink](#)

Unknown interpreted text role "issue".

- The `pyenv` command now accepts a `--copies` option to use copies rather than symlinks even on systems where symlinks are the default. (Contributed by Vinay Sajip in [:issue:18807](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1992); [backlink](#)

Unknown interpreted text role "issue".

- The `pyenv` command also accepts a `--without-pip` option to suppress the otherwise-automatic bootstrapping of pip into the virtual environment. (Contributed by Nick Coghlan in [:issue:19552](#) as part of the [PEP 453](#) implementation.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 1996); [backlink](#)

Unknown interpreted text role "issue".

- The encoding name is now optional in the value set for the `:envvar:PYTHONIOENCODING` environment variable. This makes it possible to set just the error handler, without changing the default encoding. (Contributed by Serhiy Storchaka in [:issue:18818](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2001); [backlink](#)

Unknown interpreted text role "envvar".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2001); [backlink](#)

Unknown interpreted text role "issue".

- The `:mod: bz2`, `:mod: lzma`, and `:mod: gzip` module `open` functions now support `x` (exclusive creation) mode. (Contributed by Tim Heaney and Vajrasky Kok in [:issue:19201](#), [:issue:19222](#), and [:issue:19223](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2006);
[backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2006);
[backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2006);
[backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2006);
[backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2006);
[backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2006);
[backlink](#)

Unknown interpreted text role "issue".

Significant Optimizations

- The UTF-32 decoder is now 3x to 4x faster. (Contributed by Serhiy Storchaka in [:issue:14625](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2014);
[backlink](#)

Unknown interpreted text role "issue".

- The cost of hash collisions for sets is now reduced. Each hash table probe now checks a series of consecutive, adjacent key/hash pairs before continuing to make random probes through the hash table. This exploits cache locality to make collision resolution less expensive. The collision resolution scheme can be described as a hybrid of linear probing and open addressing. The number of additional linear probes defaults to nine. This can be changed at compile-time by defining `LINEAR_PROBES` to be any value. Set `LINEAR_PROBES=0` to turn-off linear probing entirely. (Contributed by Raymond Hettinger in [:issue:18771](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2017);
[backlink](#)

Unknown interpreted text role "issue".

- The interpreter starts about 30% faster. A couple of measures lead to the speedup. The interpreter loads fewer modules on startup, e.g. the `mod:re`, `mod:collections` and `mod:locale` modules and their dependencies are no longer imported by default. The marshal module has been improved to load compiled Python code faster. (Contributed by Antoine Pitrou, Christian Heimes and Victor Stinner in [:issue:19219](#), [:issue:19218](#), [:issue:19209](#), [:issue:19205](#) and [:issue:9548](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-

resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2028);
[backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2028);
[backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2028);
[backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2028);
[backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2028);
[backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2028);
[backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2028);
[backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2028);
[backlink](#)

Unknown interpreted text role "issue".

- :class:`bz2.BZ2File` is now as fast or faster than the Python2 version for most cases. :class:`lzma.LZMAFile` has also been optimized. (Contributed by Serhiy Storchaka and Nadeem Vawda in :issue:`16034`.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2036);
[backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2036);
[backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2036);

[backlink](#)

Unknown interpreted text role "issue".

- `:func:`random.getrandbits`` is 20%-40% faster for small integers (the most common use case). (Contributed by Serhiy Storchaka in [:issue:`16674`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2040);
[backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2040);
[backlink](#)

Unknown interpreted text role "issue".

- By taking advantage of the new storage format for strings, pickling of strings is now significantly faster. (Contributed by Victor Stinner and Antoine Pitrou in [:issue:`15596`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2043);
[backlink](#)

Unknown interpreted text role "issue".

- A performance issue in `:meth:`io.FileIO.readall`` has been solved. This particularly affects Windows, and significantly speeds up the case of piping significant amounts of data through `:mod:`subprocess``. (Contributed by Richard Oudkerk in [:issue:`15758`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2047);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2047);
[backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2047);
[backlink](#)

Unknown interpreted text role "issue".

- `:func:`html.escape`` is now 10x faster. (Contributed by Matt Bryant in [:issue:`18020`](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2052);
[backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2052);
[backlink](#)

Unknown interpreted text role "issue".

- On Windows, the native `VirtualAlloc` is now used instead of the CRT `malloc` in `obmalloc`. Artificial benchmarks show about a 3% memory savings.

- `:func:'os.urandom'` now uses a lazily-opened persistent file descriptor so as to avoid using many file descriptors when run in parallel from multiple threads. (Contributed by Antoine Pitrou in [:issue:'18756'](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2059); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2059); [backlink](#)

Unknown interpreted text role "issue".

Deprecated

This section covers various APIs and other features that have been deprecated in Python 3.4, and will be removed in Python 3.5 or later. In most (but not all) cases, using the deprecated APIs will produce a `:exc:'DeprecationWarning'` when the interpreter is run with deprecation warnings enabled (for example, by using `-Wd`).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2069); [backlink](#)

Unknown interpreted text role "exc".

Deprecations in the Python API

- As mentioned in [:ref:'whatsnew-pep-451'](#), a number of `:mod:'importlib'` methods and functions are deprecated: `:meth:'importlib.find_loader'` is replaced by `:func:'importlib.util.find_spec'`; `:meth:'importlib.machinery.PathFinder.find_module'` is replaced by `:meth:'importlib.machinery.PathFinder.find_spec'`; `:meth:'importlib.abc.MetaPathFinder.find_module'` is replaced by `:meth:'importlib.abc.MetaPathFinder.find_spec'`; `:meth:'importlib.abc.PathEntryFinder.find_loader'` and `:meth:'~importlib.abc.PathEntryFinder.find_module'` are replaced by `:meth:'importlib.abc.PathEntryFinder.find_spec'`; all of the `xxxLoader.ABC.load_module` methods (`:meth:'importlib.abc.Loader.load_module'`, `:meth:'importlib.abc.InspectLoader.load_module'`, `:meth:'importlib.abc.FileLoader.load_module'`, `:meth:'importlib.abc.SourceLoader.load_module'`) should no longer be implemented, instead loaders should implement an `exec_module` method (`:meth:'importlib.abc.Loader.exec_module'`, `:meth:'importlib.abc.InspectLoader.exec_module'`, `:meth:'importlib.abc.SourceLoader.exec_module'`) and let the import system take care of the rest; and `:meth:'importlib.abc.Loader.module_repr'`, `:meth:'importlib.util.module_for_loader'`, `:meth:'importlib.util.set_loader'`, and `:meth:'importlib.util.set_package'` are no longer needed because their functions are now handled automatically by the import system.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2079); [backlink](#)

Unknown interpreted text role "meth".

- The `mod:imp` module is pending deprecation. To keep compatibility with Python 2/3 code bases, the module's removal is currently not scheduled.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2104); [backlink](#)

Unknown interpreted text role "mod".

- The `mod:formatter` module is pending deprecation and is slated for removal in Python 3.6.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2107); [backlink](#)

Unknown interpreted text role "mod".

- MD5 as the default `digestmod` for the `func:hmac.new` function is deprecated. Python 3.6 will require an explicit digest name or constructor as `digestmod` argument.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2110); [backlink](#)

Unknown interpreted text role "func".

- The internal `Netrc` class in the `mod:`ftplib`` module has been documented as deprecated in its docstring for quite some time. It now emits a `:exc:`DeprecationWarning`` and will be removed completely in Python 3.5.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2114); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2114); [backlink](#)

Unknown interpreted text role "exc".

- The undocumented `endtime` argument to `meth:`subprocess.Popen.wait`` should not have been exposed and is hopefully not in use; it is deprecated and will mostly likely be removed in Python 3.5.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2118); [backlink](#)

Unknown interpreted text role "meth".

- The `strict` argument of `:class:`~html.parser.HTMLParser`` is deprecated.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2122); [backlink](#)

Unknown interpreted text role "class".

- The `mod:`plistlib`` `:func:`~plistlib.readPlist``, `:func:`~plistlib.writePlist``, `:func:`~plistlib.readPlistFromBytes``, and `:func:`~plistlib.writePlistToBytes`` functions are deprecated in favor of the corresponding new functions `:func:`~plistlib.load``, `:func:`~plistlib.dump``, `:func:`~plistlib.loads``, and `:func:`~plistlib.dumps``. `:func:`~plistlib.Data`` is deprecated in favor of just using the `:class:`bytes`` constructor.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2124); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2124); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2124); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2124); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2124); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2124); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2124); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2124); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2124); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2124); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2124); [backlink](#)

Unknown interpreted text role "class".

- The `mod:sysconfig` key so is deprecated, it has been replaced by `EXT_SUFFIX`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2131); [backlink](#)

Unknown interpreted text role "mod".

- The `U` mode accepted by various `open` functions is deprecated. In Python3 it does not do anything useful, and should be replaced by appropriate uses of `class:io.TextIOWrapper` (if needed) and its `newline` argument.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2134); [backlink](#)

Unknown interpreted text role "class".

- The `parser` argument of `func:xml.etree.ElementTree.iterparse` has been deprecated, as has the `html` argument of `func:~xml.etree.ElementTree.XMLParser`. To prepare for the removal of the latter, all arguments to `XMLParser` should be passed by keyword.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2139); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2139); [backlink](#)

Unknown interpreted text role "func".

Deprecated Features

- Running `ref`idle`` with the `-n` flag (no subprocess) is deprecated. However, the feature will not be removed until `:issue:`18823`` is resolved.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2148); [backlink](#)

Unknown interpreted text role "ref".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2148); [backlink](#)

Unknown interpreted text role "issue".

- The site module adding a "site-python" directory to `sys.path`, if it exists, is deprecated (`:issue:`19375``).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2151); [backlink](#)

Unknown interpreted text role "issue".

Removed

Operating Systems No Longer Supported

Support for the following operating systems has been removed from the source and build tools:

- OS/2 (`:issue:`16135``).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2166); [backlink](#)

Unknown interpreted text role "issue".

- Windows 2000 (changeset e52df05b496a).
- Windows systems where COMSPEC points to `command.com` (`:issue:`14470``).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2168); [backlink](#)

Unknown interpreted text role "issue".

- VMS (`:issue:`16136``).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2169); [backlink](#)

Unknown interpreted text role "issue".

API and Feature Removals

The following obsolete and previously deprecated APIs and features have been removed:

- The `unmaintained` `Misc/TextMate` and `Misc/vim` directories have been removed (see the [devguide](#) for suggestions on what to use instead).
- The `SO` makefile macro is removed (it was replaced by the `SHLIB_SUFFIX` and `EXT_SUFFIX` macros) ([issue: 16754](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2182); [backlink](#)

Unknown interpreted text role "issue".

- The `PyThreadState.tick_counter` field has been removed; its value has been meaningless since Python 3.2, when the "new GIL" was introduced ([issue: 19199](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2185); [backlink](#)

Unknown interpreted text role "issue".

- `PyLoader` and `PyPycLoader` have been removed from `mod: 'importlib'`. (Contributed by Taras Lyapun in [issue: 15641](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2189); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2189); [backlink](#)

Unknown interpreted text role "issue".

- The `strict` argument to `:class: ~http.client.HTTPConnection` and `:class: ~http.client.HTTPSConnection` has been removed. HTTP 0.9-style "Simple Responses" are no longer supported.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2192); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2192); [backlink](#)

Unknown interpreted text role "class".

- The deprecated `mod: 'urllib.request.Request'` getter and setter methods `add_data`, `has_data`, `get_data`, `get_type`, `get_host`, `get_selector`, `set_proxy`, `get_origin_req_host`, and `is_unverifiable` have been removed (use direct attribute access instead).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2196); [backlink](#)

Unknown interpreted text role "mod".

- Support for loading the deprecated `TYPE_INT64` has been removed from `mod: 'marshal'`. (Contributed by Dan Riti in

:issue:'15480'.)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2201);
[backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2201);
[backlink](#)

Unknown interpreted text role "issue".

- :class:'inspect.Signature': positional-only parameters are now required to have a valid name.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2204);
[backlink](#)

Unknown interpreted text role "class".

- :meth:'object.__format__' no longer accepts non-empty format strings, it now raises a :exc:'TypeError' instead. Using a non-empty string has been deprecated since Python 3.2. This change has been made to prevent a situation where previously working (but incorrect) code would start failing if an object gained a `__format__` method, which means that your code may now raise a :exc:'TypeError' if you are using an 's' format code with objects that do not have a `__format__` method that handles it. See :issue:'7994' for background.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2207);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2207);
[backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2207);
[backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2207);
[backlink](#)

Unknown interpreted text role "issue".

- :meth:'difflib.SequenceMatcher.isbjunk' and :meth:'difflib.SequenceMatcher.isbpopular' were deprecated in 3.2, and have now been removed: use `x in sm.bjunk` and `x in sm.bpopular`, where *sm* is a :class:'~difflib.SequenceMatcher' object (:issue:'13248').

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2216);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2216);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2216); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2216); [backlink](#)

Unknown interpreted text role "issue".

Code Cleanups

- The unused and undocumented internal `Scanner` class has been removed from the `mod:'pydoc'` module.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2226); [backlink](#)

Unknown interpreted text role "mod".

- The private and effectively unused `_gestalt` module has been removed, along with the private `mod:'platform'` functions `_mac_ver_lookup`, `_mac_ver_gstalt`, and `_bcd2str`, which would only have ever been called on badly broken OSX systems (see [:issue:'18393'](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2229); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2229); [backlink](#)

Unknown interpreted text role "issue".

- The hardcoded copies of certain `mod:'stat'` constants that were included in the `mod:'tarfile'` module namespace have been removed.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2234); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2234); [backlink](#)

Unknown interpreted text role "mod".

Porting to Python 3.4

This section lists previously described changes and other bugfixes that may require changes to your code.

Changes in 'python' Command Behavior

- In a posix shell, setting the `envvar:'PATH'` environment variable to an empty value is equivalent to not setting it at all. However, setting `envvar:'PYTHONPATH'` to an empty value was *not* equivalent to not setting it at all: setting `envvar:'PYTHONPATH'` to an empty value was equivalent to setting it to `.`, which leads to confusion when reasoning by analogy to how `envvar:'PATH'` works. The behavior now conforms to the posix convention for `envvar:'PATH'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2249); [backlink](#)

Unknown interpreted text role "envvar".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2249); [backlink](#)

Unknown interpreted text role "envvar".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2249); [backlink](#)

Unknown interpreted text role "envvar".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2249); [backlink](#)

Unknown interpreted text role "envvar".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2249); [backlink](#)

Unknown interpreted text role "envvar".

- The [X refs, Y blocks] output of a debug (`--with-pydebug`) build of the CPython interpreter is now off by default. It can be re-enabled using the `-X showrefcount` option. (Contributed by Ezio Melotti in [issue: 17323](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2257); [backlink](#)

Unknown interpreted text role "issue".

- The python command and most stdlib scripts (as well as `mod: argparse`) now output `--version` information to `stdout` instead of `stderr` (for issue list see [ref: other-improvements-3.4](#) above).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2261); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2261); [backlink](#)

Unknown interpreted text role "ref".

Changes in the Python API

- The ABCs defined in `mod: importlib.abc` now either raise the appropriate exception or return a default value instead of raising `exc: NotImplementedError` blindly. This will only affect code calling `func: super` and falling through all the way to the ABCs. For compatibility, catch both `exc: NotImplementedError` or the appropriate exception as needed.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2269); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2269); [backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2269); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2269); [backlink](#)

Unknown interpreted text role "exc".

- The module type now initializes the `attr: __package__` and `attr: __loader__` attributes to `None` by default. To determine if these attributes were set in a backwards-compatible fashion, use e.g. `getattr(module, '__loader__', None)` is not `None`. (:issue:17115)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2275); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2275); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2275); [backlink](#)

Unknown interpreted text role "issue".

- `meth: importlib.util.module_for_loader` now sets `__loader__` and `__package__` unconditionally to properly support reloading. If this is not desired then you will need to set these attributes manually. You can use `func: importlib.util.module_to_load` for module management.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2280); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2280); [backlink](#)

Unknown interpreted text role "func".

- `Import` now resets relevant attributes (e.g. `__name__`, `__loader__`, `__package__`, `__file__`, `__cached__`) unconditionally when reloading. Note that this restores a pre-3.3 behavior in that it means a module is re-found when re-loaded (:issue:19413).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2285); [backlink](#)

Unknown interpreted text role "issue".

- Frozen packages no longer set `__path__` to a list containing the package name, they now set it to an empty list. The previous behavior could cause the import system to do the wrong thing on submodule imports if there was also a directory with the same name as the frozen package. The correct way to determine if a module is a package or not is to use `hasattr(module, '__path__')` ([issue: 18065](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 2290); [backlink](#)

Unknown interpreted text role "issue".

- Frozen modules no longer define a `__file__` attribute. It's semantically incorrect for frozen modules to set the attribute as they are not loaded from any explicit location. If you must know that a module comes from frozen code then you can see if the module's `__spec__.location` is set to 'frozen', check if the loader is a subclass of `:class:`importlib.machinery.FrozenImporter``, or if Python 2 compatibility is necessary you can use `:func:`imp.is_frozen``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 2297); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 2297); [backlink](#)

Unknown interpreted text role "func".

- `:func:`py_compile.compile`` now raises `:exc:`FileExistsError`` if the file path it would write to is a symlink or a non-regular file. This is to act as a warning that import will overwrite those files with a regular file regardless of what type of file path they were originally.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 2305); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 2305); [backlink](#)

Unknown interpreted text role "exc".

- `:meth:`importlib.abc.SourceLoader.get_source`` no longer raises `:exc:`ImportError`` when the source code being loaded triggers a `:exc:`SyntaxError`` or `:exc:`UnicodeDecodeError``. As `:exc:`ImportError`` is meant to be raised only when source code cannot be found but it should, it was felt to be over-reaching/overloading of that meaning when the source code is found but improperly structured. If you were catching `ImportError` before and wish to continue to ignore syntax or decoding issues, catch all three exceptions now.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 2310); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 2310); [backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\cpython-main [Doc] [whatsnew] 3.4.rst, line 2310);

[backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2310);
[backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2310);
[backlink](#)

Unknown interpreted text role "exc".

- `:func:`functools.update_wrapper`` and `:func:`functools.wraps`` now correctly set the `__wrapped__` attribute to the function being wrapped, even if that function also had its `__wrapped__` attribute set. This means `__wrapped__` attributes now correctly link a stack of decorated functions rather than every `__wrapped__` attribute in the chain referring to the innermost function. Introspection libraries that assumed the previous behaviour was intentional can use `:func:`inspect.unwrap`` to access the first function in the chain that has no `__wrapped__` attribute.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2319);
[backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2319);
[backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2319);
[backlink](#)

Unknown interpreted text role "func".

- `:func:`inspect.getfullargspec`` has been reimplemented on top of `:func:`inspect.signature`` and hence handles a much wider variety of callable objects than it did in the past. It is expected that additional builtin and extension module callables will gain signature metadata over the course of the Python 3.4 series. Code that assumes that `:func:`inspect.getfullargspec`` will fail on non-Python callables may need to be adjusted accordingly.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2329);
[backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2329);
[backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2329);
[backlink](#)

Unknown interpreted text role "func".

- `:class:`importlib.machinery.PathFinder`` now passes on the current working directory to objects in `:data:`sys.path_hooks`` for the empty string. This results in `:data:`sys.path_importer_cache`` never containing `''`, thus iterating through

`:data:'sys.path_importer_cache'` based on `:data:'sys.path'` will not find all keys. A module's `__file__` when imported in the current working directory will also now have an absolute path, including when using `-m` with the interpreter (except for `__main__.__file__` when a script has been executed directly using a relative path) (Contributed by Brett Cannon in `:issue:'18416'`). is specified on the command-line) (`:issue:'18416'`).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2337); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2337); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2337); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2337); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2337); [backlink](#)

Unknown interpreted text role "data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2337); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2337); [backlink](#)

Unknown interpreted text role "issue".

- The removal of the `strict` argument to `:class:`~http.client.HTTPConnection`` and `:class:`~http.client.HTTPSConnection`` changes the meaning of the remaining arguments if you are specifying them positionally rather than by keyword. If you've been paying attention to deprecation warnings your code should already be specifying any additional arguments via keywords.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2348); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2348); [backlink](#)

Unknown interpreted text role "class".

- Strings between `from __future__ import ...` statements now *always* raise a `:exc:`SyntaxError``. Previously if there was

no leading docstring, an interstitial string would sometimes be ignored. This brings CPython into compliance with the language spec; Jython and PyPy already were. (:issue:17434').

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2354);
[backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2354);
[backlink](#)

Unknown interpreted text role "issue".

- `meth:'ssl.SSLSocket.getpeercert'` and `meth:'ssl.SSLSocket.do_handshake'` now raise an `:exc:'OSError'` with `ENOTCONN` when the `SSLSocket` is not connected, instead of the previous behavior of raising an `:exc:'AttributeError'`. In addition, `meth:'~ssl.SSLSocket.getpeercert'` will raise a `:exc:'ValueError'` if the handshake has not yet been done.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2360);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2360);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2360);
[backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2360);
[backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2360);
[backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2360);
[backlink](#)

Unknown interpreted text role "exc".

- `:func:'base64.b32decode'` now raises a `:exc:'binascii.Error'` when the input string contains non-b32-alphabet characters, instead of a `:exc:'TypeError'`. This particular `:exc:'TypeError'` was missed when the other `:exc:'TypeError'`'s were converted. (Contributed by Serhiy Storchaka in :issue:18011'.) Note: this change was also inadvertently applied in Python 3.3.3.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2366);
[backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2366); [backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2366); [backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2366); [backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2366); [backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2366); [backlink](#)

Unknown interpreted text role "issue".

- The `attr:~cgi.FieldStorage.file` attribute is now automatically closed when the creating `class:~cgi.FieldStorage` instance is garbage collected. If you were pulling the file object out separately from the `class:~cgi.FieldStorage` instance and not keeping the instance alive, then you should either store the entire `class:~cgi.FieldStorage` instance or read the contents of the file before the `class:~cgi.FieldStorage` instance is garbage collected.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2373); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2373); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2373); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2373); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2373); [backlink](#)

Unknown interpreted text role "class".

- Calling `read` or `write` on a closed SSL socket now raises an informative `:exc:ValueError` rather than the previous more mysterious `:exc:AttributeError` (`:issue:9177`).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2380); [backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2380); [backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2380); [backlink](#)

Unknown interpreted text role "issue".

- `:meth:slice.indices` no longer produces an `:exc:OverflowError` for huge values. As a consequence of this fix, `:meth:slice.indices` now raises a `:exc:ValueError` if given a negative length; previously it returned nonsense values (`:issue:14794`).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2384); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2384); [backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2384); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2384); [backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2384); [backlink](#)

Unknown interpreted text role "issue".

- The `:class:complex` constructor, unlike the `:mod:cmath` functions, was incorrectly accepting `:class:float` values if an object's `__complex__` special method returned one. This now raises a `:exc:TypeError` (`:issue:16290`).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2389); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2389); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2389); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2389); [backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2389); [backlink](#)

Unknown interpreted text role "issue".

- The `:class:`int`` constructor in 3.2 and 3.3 erroneously accepts `:class:`float`` values for the *base* parameter. It is unlikely anyone was doing this, but if so, it will now raise a `:exc:`TypeError`` (*issue:* 16772).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2394); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2394); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2394); [backlink](#)

Unknown interpreted text role "exc".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2394); [backlink](#)

Unknown interpreted text role "issue".

- Defaults for keyword-only arguments are now evaluated *after* defaults for regular keyword arguments, instead of before. Hopefully no one wrote any code that depends on the previous buggy behavior (*issue:* 16967).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2398); [backlink](#)

Unknown interpreted text role "issue".

- Stale thread states are now cleared after `:func:`~os.fork``. This may cause some system resources to be released that previously were incorrectly kept perpetually alive (for example, database connections kept in thread-local storage). (*issue:* 17094).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2402); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2402); [backlink](#)

Unknown interpreted text role "issue".

- Parameter names in `__annotations__` dicts are now mangled properly, similarly to `__kwdefaults__`. (Contributed by Yury Selivanov in [issue:20625](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2407); [backlink](#)

Unknown interpreted text role "issue".

- `:attr:`hashlib.hash.name`` now always returns the identifier in lower case. Previously some builtin hashes had uppercase names, but now that it is a formal public interface the naming has been made consistent ([issue:18532](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2411); [backlink](#)

Unknown interpreted text role "attr".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2411); [backlink](#)

Unknown interpreted text role "issue".

- Because `:mod:`unittest.TestSuite`` now drops references to tests after they are run, test harnesses that re-use a `:class:`~unittest.TestSuite`` to re-run a set of tests may fail. Test suites should not be re-used in this fashion since it means state is retained between test runs, breaking the test isolation that `:mod:`unittest`` is designed to provide. However, if the lack of isolation is considered acceptable, the old behavior can be restored by creating a `:mod:`~unittest.TestSuite`` subclass that defines a `_removeTestAtIndex` method that does nothing (see `:meth:`.TestSuite.__iter__``) ([issue:11798](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2415); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2415); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2415); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2415); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2415); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2415); [backlink](#)

Unknown interpreted text role "issue".

- `:mod:`unittest`` now uses `:mod:`argparse`` for command line parsing. There are certain invalid command forms that used to work that are no longer allowed; in theory this should not cause backward compatibility issues since the disallowed command forms didn't make any sense and are unlikely to be in use.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2425); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2425); [backlink](#)

Unknown interpreted text role "mod".

- The `:func:`re.split``, `:func:`re.findall``, and `:func:`re.sub`` functions, and the `:meth:`~re.match.group`` and `:meth:`~re.match.groups`` methods of `match` objects now always return a `bytes` object when the string to be matched is a `:term:`bytes-like object``. Previously the return type matched the input type, so if your code was depending on the return value being, say, a `bytearray`, you will need to change your code.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2430); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2430); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2430); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2430); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2430); [backlink](#)

Unknown interpreted text role "meth".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2430); [backlink](#)

Unknown interpreted text role "term".

- `:mod:`audioop`` functions now raise an error immediately if passed string input, instead of failing randomly later on ([:issue:`16685`](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2437); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2437); [backlink](#)

Unknown interpreted text role "issue".

- The new `convert_charrefs` argument to `:class:`~html.parser.HTMLParser`` currently defaults to `False` for backward compatibility, but will eventually be changed to default to `True`. It is recommended that you add this keyword, with the appropriate value, to any `:class:`~html.parser.HTMLParser`` calls in your code ([:issue:`13633`](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2440); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2440); [backlink](#)

Unknown interpreted text role "class".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2440); [backlink](#)

Unknown interpreted text role "issue".

- Since the `digestmod` argument to the `:func:`hmac.new`` function will in the future have no default, all calls to `:func:`hmac.new`` should be changed to explicitly specify a `digestmod` ([:issue:`17276`](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2446); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2446); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2446); [backlink](#)

Unknown interpreted text role "issue".

- Calling `:func:`sysconfig.get_config_var`` with the `so` key, or looking `so` up in the results of a call to

`:func:'sysconfig.get_config_vars'` is deprecated. This key should be replaced by `EXT_SUFFIX` or `SHLIB_SUFFIX`, depending on the context ([:issue: 19555](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2450); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2450); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2450); [backlink](#)

Unknown interpreted text role "issue".

- Any calls to `open` functions that specify `U` should be modified. `U` is ineffective in Python3 and will eventually raise an error if used. Depending on the function, the equivalent of its old Python2 behavior can be achieved using either a `newline` argument, or if necessary by wrapping the stream in `:mod:`~io.TextIOWrapper`` to use its `newline` argument ([:issue: 15204](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2455); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2455); [backlink](#)

Unknown interpreted text role "issue".

- If you use `pyenv` in a script and desire that `pip` *not* be installed, you must add `--without-pip` to your command invocation.
- The default behavior of `:func:'json.dump'` and `:func:'json.dumps'` when an indent is specified has changed: it no longer produces trailing spaces after the item separating commas at the ends of lines. This will matter only if you have tests that are doing white-space-sensitive comparisons of such output ([:issue: 16333](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2466); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2466); [backlink](#)

Unknown interpreted text role "func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2466); [backlink](#)

Unknown interpreted text role "issue".

- `:mod:'doctest'` now looks for doctests in extension module `__doc__` strings, so if your doctest test discovery includes extension modules that have things that look like doctests in them you may see test failures you've never seen before when running your tests ([:issue: 3158](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2472); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2472); [backlink](#)

Unknown interpreted text role "issue".

- The `mod: collections.abc` module has been slightly refactored as part of the Python startup improvements. As a consequence of this, it is no longer the case that importing `mod: collections` automatically imports `mod: collections.abc`. If your program depended on the (undocumented) implicit import, you will need to add an explicit `import collections.abc` (:issue:20784).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2477); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2477); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2477); [backlink](#)

Unknown interpreted text role "mod".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2477); [backlink](#)

Unknown interpreted text role "issue".

Changes in the C API

- `:c:func: PyEval_EvalFrameEx`, `:c:func: PyObject_Repr`, and `:c:func: PyObject_Str`, along with some other internal C APIs, now include a debugging assertion that ensures they are not used in situations where they may silently discard a currently active exception. In cases where discarding the active exception is expected and desired (for example, because it has already been saved locally with `:c:func: PyErr_Fetch` or is being deliberately replaced with a different exception), an explicit `:c:func: PyErr_Clear` call will be needed to avoid triggering the assertion when invoking these operations (directly or indirectly) and running against a version of Python that is compiled with assertions enabled.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2488); [backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2488); [backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2488);

[backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2488);
[backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2488);
[backlink](#)

Unknown interpreted text role "c:func".

- `c:func:PyErr_SetImportError` now sets `exc:TypeError` when its `msg` argument is not set. Previously only `NULL` was returned with no exception set.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2500);
[backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2500);
[backlink](#)

Unknown interpreted text role "exc".

- The result of the `c:data:PyOS_ReadlineFunctionPointer` callback must now be a string allocated by `c:func:PyMem_RawMalloc` or `c:func:PyMem_RawRealloc`, or `NULL` if an error occurred, instead of a string allocated by `c:func:PyMem_Malloc` or `c:func:PyMem_Realloc` (issue:16742)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2504);
[backlink](#)

Unknown interpreted text role "c:data".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2504);
[backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2504);
[backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2504);
[backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2504);
[backlink](#)

Unknown interpreted text role "c:func".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2504); [backlink](#)

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- `:cfunc:PyThread_set_key_value` now always set the value. In Python 3.3, the function did nothing if the key already exists (if the current value is a non-NULL pointer).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2510); [backlink](#)

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- The `f_tstate` (thread state) field of the `:ctype:PyFrameObject` structure has been removed to fix a bug; see `:issue:14432` for the rationale.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2514); [backlink](#)

Unknown interpreted text role "ctype".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2514); [backlink](#)

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Changed in 3.4.3

PEP 476: Enabling certificate verification by default for stdlib http clients

`:mod:http.client` and modules which use it, such as `:mod:urllib.request` and `:mod:xmlrpc.client`, will now verify that the server presents a certificate which is signed by a CA in the platform trust store and whose hostname matches the hostname being requested by default, significantly improving security for many applications.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2526); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2526); [backlink](#)

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System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ [cpython-main] [Doc] [whatsnew] 3.4.rst, line 2526); [backlink](#)

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For applications which require the old previous behavior, they can pass an alternate context:

```
import urllib.request
import ssl

# This disables all verification
context = ssl._create_unverified_context()

# This allows using a specific certificate for the host, which doesn't need
# to be in the trust store
context = ssl.create_default_context(cafile="/path/to/file.crt")

urllib.request.urlopen("https://invalid-cert", context=context)
```