

# What's New In Python 3.7

Editor: Elvis Pranskevichus <[elvis@magic.io](mailto:elvis@magic.io)>

This article explains the new features in Python 3.7, compared to 3.6. Python 3.7 was released on June 27, 2018. For full details, see the [ref`changelog` <changelog>](#).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 47); [backlink](#)

Unknown interpreted text role "ref".

## Summary -- Release Highlights

New syntax features:

- [ref`PEP 563` <whatsnew37-pep563>](#), postponed evaluation of type annotations.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 60); [backlink](#)

Unknown interpreted text role "ref".

Backwards incompatible syntax changes:

- `:keyword:`async`` and `:keyword:`await`` are now reserved keywords.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 64); [backlink](#)

Unknown interpreted text role "keyword".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 64); [backlink](#)

Unknown interpreted text role "keyword".

New library modules:

- `:mod:`contextvars``: [ref`PEP 567 -- Context Variables` <whatsnew37-pep567>](#)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 68); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 68); [backlink](#)

Unknown interpreted text role "ref".

- `:mod:`dataclasses``: [ref`PEP 557 -- Data Classes` <whatsnew37-pep557>](#)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 69); [backlink](#)

Unknown interpreted text role "mod".

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

resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 69);  
[backlink](#)

Unknown interpreted text role "ref".

- `ref`whatsnew37_importlib_resources``

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 70);  
[backlink](#)

Unknown interpreted text role "ref".

New built-in features:

- `ref`PEP 553 <whatsnew37-pep553>``, the new `func:`breakpoint`` function.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 74);  
[backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 74);  
[backlink](#)

Unknown interpreted text role "func".

Python data model improvements:

- `ref`PEP 562 <whatsnew37-pep562>``, customization of access to module attributes.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 78);  
[backlink](#)

Unknown interpreted text role "ref".

- `ref`PEP 560 <whatsnew37-pep560>``, core support for typing module and generic types.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 81);  
[backlink](#)

Unknown interpreted text role "ref".

- the insertion-order preservation nature of `ref`dict <typesmapping>`` objects [has been declared](#) to be an official part of the Python language spec.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 84);  
[backlink](#)

Unknown interpreted text role "ref".

Significant improvements in the standard library:

- The `mod:`asyncio`` module has received new features, significant `ref`usability and performance improvements <whatsnew37_asyncio>``.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 92);  
[backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 92); [backlink](#)

Unknown interpreted text role "ref".

- The `mod:time` module gained support for `ref` functions with nanosecond resolution <whatsnew37-pep564>.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 95); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 95); [backlink](#)

Unknown interpreted text role "ref".

CPython implementation improvements:

- Avoiding the use of ASCII as a default text encoding
  - `ref` PEP 538 <whatsnew37-pep538>, legacy C locale coercion

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 102); [backlink](#)

Unknown interpreted text role "ref".

- `ref` PEP 540 <whatsnew37-pep540>, forced UTF-8 runtime mode

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 103); [backlink](#)

Unknown interpreted text role "ref".

- `ref` PEP 552 <whatsnew37-pep552>, deterministic .pycs

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 104); [backlink](#)

Unknown interpreted text role "ref".

- `ref` New Python Development Mode <whatsnew37-devmode>

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 105); [backlink](#)

Unknown interpreted text role "ref".

- `ref` PEP 565 <whatsnew37-pep565>, improved `exc:DeprecationWarning` handling

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 106); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 106);

[backlink](#)

Unknown interpreted text role "exc".

C API improvements:

- [:ref:`PEP 539 <whatsnew37-pep539>`](#), new C API for thread-local storage

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 111); [backlink](#)

Unknown interpreted text role "ref".

Documentation improvements:

- [:ref:`PEP 545 <whatsnew37-pep545>`](#), Python documentation translations

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 115); [backlink](#)

Unknown interpreted text role "ref".

- New documentation translations: [Japanese](#), [French](#), and [Korean](#).

This release features notable performance improvements in many areas. The [:ref:`whatsnew37-perf`](#) section lists them in detail.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 120); [backlink](#)

Unknown interpreted text role "ref".

For a list of changes that may affect compatibility with previous Python releases please refer to the [:ref:`porting-to-python-37`](#) section.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 123); [backlink](#)

Unknown interpreted text role "ref".

## New Features

### PEP 563: Postponed Evaluation of Annotations

The advent of type hints in Python uncovered two glaring usability issues with the functionality of annotations added in [PEP 3107](#) and refined further in [PEP 526](#):

- annotations could only use names which were already available in the current scope, in other words they didn't support forward references of any kind; and
- annotating source code had adverse effects on startup time of Python programs.

Both of these issues are fixed by postponing the evaluation of annotations. Instead of compiling code which executes expressions in annotations at their definition time, the compiler stores the annotation in a string form equivalent to the AST of the expression in question. If needed, annotations can be resolved at runtime using [:func:`typing.get\\_type\\_hints`](#). In the common case where this is not required, the annotations are cheaper to store (since short strings are interned by the interpreter) and make startup time faster.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 146); [backlink](#)

Unknown interpreted text role "func".

Usability-wise, annotations now support forward references, making the following syntax valid:

```
class C:
    @classmethod
    def from_string(cls, source: str) -> C:
        ...

    def validate_b(self, obj: B) -> bool:
```

```
...  
  
class B:  
    ...
```

Since this change breaks compatibility, the new behavior needs to be enabled on a per-module basis in Python 3.7 using a `mod: `__future__`` import:

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 169); [backlink](#)

Unknown interpreted text role "mod".

```
from __future__ import annotations
```

It will become the default in Python 3.10.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 176)

Unknown directive type "seealso".

```
.. seealso::
```

```
:pep:`563` -- Postponed evaluation of annotations  
PEP written and implemented by Łukasz Langa.
```

## PEP 538: Legacy C Locale Coercion

An ongoing challenge within the Python 3 series has been determining a sensible default strategy for handling the "7-bit ASCII" text encoding assumption currently implied by the use of the default C or POSIX locale on non-Windows platforms.

[PEP 538](#) updates the default interpreter command line interface to automatically coerce that locale to an available UTF-8 based locale as described in the documentation of the new `envvar: 'PYTHONCOERCECLOCALE'` environment variable. Automatically setting `LC_CTYPE` this way means that both the core interpreter and locale-aware C extensions (such as `mod: 'readline'`) will assume the use of UTF-8 as the default text encoding, rather than ASCII.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 192); [backlink](#)

Unknown interpreted text role "envvar".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 192); [backlink](#)

Unknown interpreted text role "mod".

The platform support definition in [PEP 11](#) has also been updated to limit full text handling support to suitably configured non-ASCII based locales.

As part of this change, the default error handler for `:data: `~sys.stdin`` and `:data: `~sys.stdout`` is now `surrogateescape` (rather than `strict`) when using any of the defined coercion target locales (currently `C.UTF-8`, `C.utf8`, and `UTF-8`). The default error handler for `:data: `~sys.stderr`` continues to be `backslashreplace`, regardless of locale.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 203); [backlink](#)

Unknown interpreted text role "data".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 203); [backlink](#)

Unknown interpreted text role "data".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 203); [backlink](#)

Unknown interpreted text role "data".

Locale coercion is silent by default, but to assist in debugging potentially locale related integration problems, explicit warnings (emitted directly on `:data:~sys.stderr`) can be requested by setting `PYTHONCOERCECLOCALE=warn`. This setting will also cause the Python runtime to emit a warning if the legacy C locale remains active when the core interpreter is initialized.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 209); [backlink](#)

Unknown interpreted text role "data".

While [PEP 538](#)'s locale coercion has the benefit of also affecting extension modules (such as GNU `readline`), as well as child processes (including those running non-Python applications and older versions of Python), it has the downside of requiring that a suitable target locale be present on the running system. To better handle the case where no suitable target locale is available (as occurs on RHEL/CentOS 7, for example), Python 3.7 also implements [ref`whatsnew37-pep540`](#).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 215); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 223)

Unknown directive type "seealso".

```
.. seealso::

:pep:`538` -- Coercing the legacy C locale to a UTF-8 based locale
PEP written and implemented by Nick Coghlan.
```

## PEP 540: Forced UTF-8 Runtime Mode

The new `:option:`-X` utf8` command line option and `:envvar:`PYTHONUTF8`` environment variable can be used to enable the [ref`Python UTF-8 Mode <utf8-mode>](#).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 234); [backlink](#)

Unknown interpreted text role "option".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 234); [backlink](#)

Unknown interpreted text role "envvar".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 234); [backlink](#)

Unknown interpreted text role "ref".

When in UTF-8 mode, CPython ignores the locale settings, and uses the UTF-8 encoding by default. The error handlers for `:data:`sys.stdin`` and `:data:`sys.stdout`` streams are set to `surrogateescape`.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 238); [backlink](#)

Unknown interpreted text role "data".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 238); [backlink](#)

Unknown interpreted text role "data".

The forced UTF-8 mode can be used to change the text handling behavior in an embedded Python interpreter without changing the locale settings of an embedding application.

While [PEP 540](#)'s UTF-8 mode has the benefit of working regardless of which locales are available on the running system, it has the

downside of having no effect on extension modules (such as GNU `readline`), child processes running non-Python applications, and child processes running older versions of Python. To reduce the risk of corrupting text data when communicating with such components, Python 3.7 also implements [ref:whatsnew37-pep540](#)).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 246); [backlink](#)

Unknown interpreted text role "ref".

The UTF-8 mode is enabled by default when the locale is `C` or `POSIX`, and the [PEP 538](#) locale coercion feature fails to change it to a UTF-8 based alternative (whether that failure is due to `PYTHONCOERCECLOCALE=0` being set, `LC_ALL` being set, or the lack of a suitable target locale).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 258)

Unknown directive type "seealso".

```
.. seealso::

:pep:`540` -- Add a new UTF-8 mode
    PEP written and implemented by Victor Stinner
```

## PEP 553: Built-in `breakpoint()`

Python 3.7 includes the new built-in [func:breakpoint](#) function as an easy and consistent way to enter the Python debugger.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 269); [backlink](#)

Unknown interpreted text role "func".

Built-in `breakpoint()` calls [func:sys.breakpointhook](#). By default, the latter imports [mod:pdb](#) and then calls `pdb.set_trace()`, but by binding `sys.breakpointhook()` to the function of your choosing, `breakpoint()` can enter any debugger. Additionally, the environment variable [envvar:PYTHONBREAKPOINT](#) can be set to the callable of your debugger of choice. Set `PYTHONBREAKPOINT=0` to completely disable built-in `breakpoint()`.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 272); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 272); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 272); [backlink](#)

Unknown interpreted text role "envvar".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 280)

Unknown directive type "seealso".

```
.. seealso::

:pep:`553` -- Built-in breakpoint()
    PEP written and implemented by Barry Warsaw
```

## PEP 539: New C API for Thread-Local Storage

While Python provides a C API for thread-local storage support; the existing [ref:Thread Local Storage \(TLS\) API](#) `<thread-local-`



`storage-api>` has used `:c:type:'int'` to represent TLS keys across all platforms. This has not generally been a problem for officially-support platforms, but that is neither POSIX-compliant, nor portable in any practical sense.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 291); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 291); [backlink](#)

Unknown interpreted text role "c:type".

PEP 539 changes this by providing a new `:ref: Thread Specific Storage (TSS) API <thread-specific-storage-api>` to CPython which supersedes use of the existing TLS API within the CPython interpreter, while deprecating the existing API. The TSS API uses a new type `:c:type:'Py_tss_t'` instead of `:c:type:'int'` to represent TSS keys--an opaque type the definition of which may depend on the underlying TLS implementation. Therefore, this will allow to build CPython on platforms where the native TLS key is defined in a way that cannot be safely cast to `:c:type:'int'`.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 297); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 297); [backlink](#)

Unknown interpreted text role "c:type".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 297); [backlink](#)

Unknown interpreted text role "c:type".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 297); [backlink](#)

Unknown interpreted text role "c:type".

Note that on platforms where the native TLS key is defined in a way that cannot be safely cast to `:c:type:'int'`, all functions of the existing TLS API will be no-op and immediately return failure. This indicates clearly that the old API is not supported on platforms where it cannot be used reliably, and that no effort will be made to add such support.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 306); [backlink](#)

Unknown interpreted text role "c:type".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 312)

Unknown directive type "seealso".

.. seealso::

:pep:539 -- A New C-API for Thread-Local Storage in CPython  
PEP written by Erik M. Bray; implementation by Masayuki Yamamoto.

## PEP 562: Customization of Access to Module Attributes

Python 3.7 allows defining `:meth:'__getattr__'` on modules and will call it whenever a module attribute is otherwise not found. Defining `:meth:'__dir__'` on modules is now also allowed.

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



main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 323); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 323); [backlink](#)

Unknown interpreted text role "meth".

A typical example of where this may be useful is module attribute deprecation and lazy loading.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 330)

Unknown directive type "seealso".

```
.. seealso::

:pep:`562` -- Module ``__getattr__`` and ``__dir__``
PEP written and implemented by Ivan Levkivskyi
```

## PEP 564: New Time Functions With Nanosecond Resolution

The resolution of clocks in modern systems can exceed the limited precision of a floating point number returned by the `:func:`time.time`` function and its variants. To avoid loss of precision, [PEP 564](#) adds six new "nanosecond" variants of the existing timer functions to the `:mod:`time`` module:

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 341); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 341); [backlink](#)

Unknown interpreted text role "mod".

- `:func:`time.clock_gettime_ns``

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 347); [backlink](#)

Unknown interpreted text role "func".

- `:func:`time.clock_settime_ns``

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 348); [backlink](#)

Unknown interpreted text role "func".

- `:func:`time.monotonic_ns``

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 349); [backlink](#)

Unknown interpreted text role "func".

- `:func:`time.perf_counter_ns``

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 350);

[backlink](#)

Unknown interpreted text role "func".

- `:func:`time.process_time_ns``

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 351);

[backlink](#)

Unknown interpreted text role "func".

- `:func:`time.time_ns``

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 352);

[backlink](#)

Unknown interpreted text role "func".

The new functions return the number of nanoseconds as an integer value.

[Measurements](#) show that on Linux and Windows the resolution of `:func:`time.time_ns`` is approximately 3 times better than that of `:func:`time.time``.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 356); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 356); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 360)

Unknown directive type "seealso".

.. seealso::

```
:pep:`564` -- Add new time functions with nanosecond resolution
    PEP written and implemented by Victor Stinner
```

## PEP 565: Show DeprecationWarning in `__main__`

The default handling of `:exc:`DeprecationWarning`` has been changed such that these warnings are once more shown by default, but only when the code triggering them is running directly in the `:mod:`__main__`` module. As a result, developers of single file scripts and those using Python interactively should once again start seeing deprecation warnings for the APIs they use, but deprecation warnings triggered by imported application, library and framework modules will continue to be hidden by default.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 371); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 371); [backlink](#)

Unknown interpreted text role "mod".

As a result of this change, the standard library now allows developers to choose between three different deprecation warning behaviours:

- `:exc:`FutureWarning``: always displayed by default, recommended for warnings intended to be seen by application end users (e.g. for deprecated application configuration settings).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 382); [backlink](#)

Unknown interpreted text role "exc".

- `:exc:DeprecationWarning`: displayed by default only in `mod: '__main__'` and when running tests, recommended for warnings intended to be seen by other Python developers where a version upgrade may result in changed behaviour or an error.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 385); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 385); [backlink](#)

Unknown interpreted text role "mod".

- `:exc:PendingDeprecationWarning`: displayed by default only when running tests, intended for cases where a future version upgrade will change the warning category to `:exc:DeprecationWarning` or `:exc:FutureWarning`.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 389); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 389); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 389); [backlink](#)

Unknown interpreted text role "exc".

Previously both `:exc:DeprecationWarning` and `:exc:PendingDeprecationWarning` were only visible when running tests, which meant that developers primarily writing single file scripts or using Python interactively could be surprised by breaking changes in the APIs they used.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 393); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 393); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 398)

Unknown directive type "seealso".

.. seealso::

:pep:565 -- Show DeprecationWarning in ``\_\_main\_\_``  
PEP written and implemented by Nick Coghlan

## PEP 560: Core Support for `typing` module and Generic Types

Initially [PEP 484](#) was designed in such way that it would not introduce *any* changes to the core CPython interpreter. Now type hints and the `mod:`typing`` module are extensively used by the community, so this restriction is removed. The PEP introduces two special methods `meth:`__class_getitem__`` and `__mro_entries__`, these methods are now used by most classes and special constructs in `mod:`typing``. As a result, the speed of various operations with types increased up to 7 times, the generic types can be used without metaclass conflicts, and several long standing bugs in `mod:`typing`` module are fixed.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 409); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 409); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 409); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 409); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 419)

Unknown directive type "seealso".

.. seealso::

:pep:`560` -- Core support for typing module and generic types  
PEP written and implemented by Ivan Levkivskyi

## PEP 552: Hash-based `.pyc` Files

Python has traditionally checked the up-to-dateness of bytecode cache files (i.e., `.pyc` files) by comparing the source metadata (last-modified timestamp and size) with source metadata saved in the cache file header when it was generated. While effective, this invalidation method has its drawbacks. When filesystem timestamps are too coarse, Python can miss source updates, leading to user confusion. Additionally, having a timestamp in the cache file is problematic for [build reproducibility](#) and content-based build systems.

[PEP 552](#) extends the `pyc` format to allow the hash of the source file to be used for invalidation instead of the source timestamp. Such `.pyc` files are called "hash-based". By default, Python still uses timestamp-based invalidation and does not generate hash-based `.pyc` files at runtime. Hash-based `.pyc` files may be generated with `mod:`py_compile`` or `mod:`compileall``.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 439); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 439); [backlink](#)

Unknown interpreted text role "mod".

Hash-based `.pyc` files come in two variants: checked and unchecked. Python validates checked hash-based `.pyc` files against the corresponding source files at runtime but doesn't do so for unchecked hash-based `pycs`. Unchecked hash-based `.pyc` files are a useful performance optimization for environments where a system external to Python (e.g., the build system) is responsible for keeping `.pyc` files up-to-date.

See [ref:`pyc-invalidation`](#) for more information.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 452); [backlink](#)**

Unknown interpreted text role "ref".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 454)**

Unknown directive type "seealso".

```
.. seealso::

:pep:`552` -- Deterministic pycs
    PEP written and implemented by Benjamin Peterson
```

## PEP 545: Python Documentation Translations

[PEP 545](#) describes the process of creating and maintaining Python documentation translations.

Three new translations have been added:

- Japanese: <https://docs.python.org/ja/>
- French: <https://docs.python.org/fr/>
- Korean: <https://docs.python.org/ko/>

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 474)**

Unknown directive type "seealso".

```
.. seealso::

:pep:`545` -- Python Documentation Translations
    PEP written and implemented by Julien Palard, Inada Naoki, and
    Victor Stinner.
```

## Python Development Mode (-X dev)

The new `:option:`-X` dev` command line option or the new `:envvar:`PYTHONDEVMODE`` environment variable can be used to enable `:ref:`Python Development Mode <devmode>``. When in development mode, Python performs additional runtime checks that are too expensive to be enabled by default. See `:ref:`Python Development Mode <devmode>`` documentation for the full description.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 486); [backlink](#)**

Unknown interpreted text role "option".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 486); [backlink](#)**

Unknown interpreted text role "envvar".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 486); [backlink](#)**

Unknown interpreted text role "ref".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 486); [backlink](#)**

Unknown interpreted text role "ref".

## Other Language Changes

- An `:keyword:`await`` expression and comprehensions containing an `:keyword:`async for`` clause were illegal in the expressions in `:ref:`formatted string literals <f-strings>`` due to a problem with the implementation. In Python 3.7 this restriction was lifted.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 497); [backlink](#)

Unknown interpreted text role "keyword".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 497); [backlink](#)

Unknown interpreted text role "keyword".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 497); [backlink](#)

Unknown interpreted text role "ref".

- More than 255 arguments can now be passed to a function, and a function can now have more than 255 parameters. (Contributed by Serhiy Storchaka in [:issue:12844](#) and [:issue:18896](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 502); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 502); [backlink](#)

Unknown interpreted text role "issue".

- `meth:'bytes.fromhex'` and `meth:'bytearray.fromhex'` now ignore all ASCII whitespace, not only spaces. (Contributed by Robert Xiao in [:issue:28927](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 506); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 506); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 506); [backlink](#)

Unknown interpreted text role "issue".

- `:class:'str'`, `:class:'bytes'`, and `:class:'bytearray'` gained support for the new `meth:'isascii()' <str.isascii>` method, which can be used to test if a string or bytes contain only the ASCII characters. (Contributed by INADA Naoki in [:issue:32677](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 509); [backlink](#)

Unknown interpreted text role "class".

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

**resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 509);**  
[backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 509);**  
[backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 509);**  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 509);**  
[backlink](#)

Unknown interpreted text role "issue".

- `:exc:'ImportError'` now displays module name and module `__file__` path when `from ... import ...` fails. (Contributed by Matthias Bussonnier in [:issue:'29546'](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 514);**  
[backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 514);**  
[backlink](#)

Unknown interpreted text role "issue".

- Circular imports involving absolute imports with binding a submodule to a name are now supported. (Contributed by Serhiy Storchaka in [:issue:'30024'](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 518);**  
[backlink](#)

Unknown interpreted text role "issue".

- `object.__format__(x, '')` is now equivalent to `str(x)` rather than `format(str(self), '')`. (Contributed by Serhiy Storchaka in [:issue:'28974'](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 522);**  
[backlink](#)

Unknown interpreted text role "issue".

- In order to better support dynamic creation of stack traces, `:class:'types.TracebackType'` can now be instantiated from Python code, and the `tb_next` attribute on `:ref:'tracebacks <traceback-objects>'` is now writable. (Contributed by Nathaniel J. Smith in [:issue:'30579'](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 526);**  
[backlink](#)

Unknown interpreted text role "class".



**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 526); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 526); [backlink](#)

Unknown interpreted text role "issue".

- When using the `:option:`-m`` switch, `sys.path[0]` is now eagerly expanded to the full starting directory path, rather than being left as the empty directory (which allows imports from the *current* working directory at the time when an import occurs) (Contributed by Nick Coghlan in [:issue:`33053`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 532); [backlink](#)

Unknown interpreted text role "option".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 532); [backlink](#)

Unknown interpreted text role "issue".

- The new `:option:`-X`` `importtime` option or the `:envvar:`PYTHONPROFILEIMPORTTIME`` environment variable can be used to show the timing of each module import. (Contributed by Inada Naoki in [:issue:`31415`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 538); [backlink](#)

Unknown interpreted text role "option".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 538); [backlink](#)

Unknown interpreted text role "envvar".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 538); [backlink](#)

Unknown interpreted text role "issue".

## New Modules

### contextvars

The new `:mod:`contextvars`` module and a set of [ref`new C APIs <contextvarsojects>`](#) introduce support for *context variables*. Context variables are conceptually similar to thread-local variables. Unlike TLS, context variables support asynchronous code correctly.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 552); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 552); [backlink](#)

Unknown interpreted text role "ref".

The `mod:~asyncio` and `mod:~decimal` modules have been updated to use and support context variables out of the box. Particularly the active decimal context is now stored in a context variable, which allows decimal operations to work with the correct context in asynchronous code.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 558); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 558); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 563)

Unknown directive type "seealso".

```
.. seealso::

    :pep:`567` -- Context Variables
    PEP written and implemented by Yury Selivanov
```

## dataclasses

The new `func:~dataclasses.dataclass` decorator provides a way to declare *data classes*. A data class describes its attributes using class variable annotations. Its constructor and other magic methods, such as `meth:~object.__repr__`, `meth:~object.__eq__`, and `meth:~object.__hash__` are generated automatically.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 574); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 574); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 574); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 574); [backlink](#)

Unknown interpreted text role "meth".

Example:

```
@dataclass
class Point:
    x: float
    y: float
    z: float = 0.0

p = Point(1.5, 2.5)
print(p)    # produces "Point(x=1.5, y=2.5, z=0.0)"
```

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 591)

Unknown directive type "seealso".

```
.. seealso::

    :pep:`557` -- Data Classes
    PEP written and implemented by Eric V. Smith
```

## importlib.resources

The new `mod:importlib.resources` module provides several new APIs and one new ABC for access to, opening, and reading *resources* inside packages. Resources are roughly similar to files inside packages, but they needn't be actual files on the physical file system. Module loaders can provide a `meth:get_resource_reader()` function which returns a `class:importlib.abc.ResourceReader` instance to support this new API. Built-in file path loaders and zip file loaders both support this.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 602); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 602); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 602); [backlink](#)

Unknown interpreted text role "class".

Contributed by Barry Warsaw and Brett Cannon in `issue:32248`.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 610); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 612)

Unknown directive type "seealso".

```
.. seealso::

    `importlib_resources <http://importlib-resources.readthedocs.io/en/latest/>`_
    -- a PyPI backport for earlier Python versions.
```

## Improved Modules

### argparse

The new `meth:ArgumentParser.parse_intermixed_args()` `<argparse.ArgumentParser.parse_intermixed_args>` method allows intermixing options and positional arguments. (Contributed by paulj3 in `issue:14191`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 625); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 625); [backlink](#)

Unknown interpreted text role "issue".

### asyncio

The `mod:asyncio` module has received many new features, usability and `ref:performance improvements` `<whatsnew37-asyncio-`

perf>'. Notable changes include:

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 636); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 636); [backlink](#)

Unknown interpreted text role "ref".

- The new `term` provisional `<provisional API>` `.func: asyncio.run` function can be used to run a coroutine from synchronous code by automatically creating and destroying the event loop. (Contributed by Yury Selivanov in [issue: 32314](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 640); [backlink](#)

Unknown interpreted text role "term".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 640); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 640); [backlink](#)

Unknown interpreted text role "issue".

- `asyncio` gained support for `mod: contextvars`. `meth: loop.call_soon()` `<asyncio.loop.call_soon>`, `meth: loop.call_soon_threadsafe()` `<asyncio.loop.call_soon_threadsafe>`, `meth: loop.call_later()` `<asyncio.loop.call_later>`, `meth: loop.call_at()` `<asyncio.loop.call_at>`, and `meth: Future.add_done_callback()` `<asyncio.Future.add_done_callback>` have a new optional keyword-only `context` parameter. `class: Tasks` `<asyncio.Task>` now track their context automatically. See [PEP 567](#) for more details. (Contributed by Yury Selivanov in [issue: 32436](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 645); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 645); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 645); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 645); [backlink](#)

Unknown interpreted text role "meth".

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

**resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 645);**  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 645);**  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 645);**  
[backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 645);**  
[backlink](#)

Unknown interpreted text role "issue".

- The new `:func:`asyncio.create_task`` function has been added as a shortcut to `asyncio.get_event_loop().create_task()`. (Contributed by Andrew Svetlov in [:issue:`32311`](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 656);**  
[backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 656);**  
[backlink](#)

Unknown interpreted text role "issue".

- The new `:meth:`loop.start_tls() <asyncio.loop.start_tls>`` method can be used to upgrade an existing connection to TLS. (Contributed by Yuri Selivanov in [:issue:`23749`](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 660);**  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 660);**  
[backlink](#)

Unknown interpreted text role "issue".

- The new `:meth:`loop.sock_recv_into() <asyncio.loop.sock_recv_into>`` method allows reading data from a socket directly into a provided buffer making it possible to reduce data copies. (Contributed by Antoine Pitrou in [:issue:`31819`](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.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) 3.7.rst, line 664);**  
[backlink](#)

Unknown interpreted text role "issue".

- The new `:func:`asyncio.current_task`` function returns the currently running `:class:`~asyncio.Task`` instance, and the new `:func:`asyncio.all_tasks`` function returns a set of all existing `Task` instances in a given loop. The `:meth:`Task.current_task()` `<asyncio.Task.current_task>` and `:meth:`Task.all_tasks()` `<asyncio.Task.all_tasks>` methods have been deprecated. (Contributed by Andrew Svetlov in [:issue:`32250`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 669); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 669); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 669); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 669); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 669); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 669); [backlink](#)

Unknown interpreted text role "issue".

- The new *provisional* `:class:`~asyncio.BufferedProtocol`` class allows implementing streaming protocols with manual control over the receive buffer. (Contributed by Yuri Selivanov in [:issue:`32251`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 676); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 676); [backlink](#)

Unknown interpreted text role "issue".

- The new `:func:`asyncio.get_running_loop`` function returns the currently running loop, and raises a `:exc:`RuntimeError`` if no loop is running. This is in contrast with `:func:`asyncio.get_event_loop``, which will *create* a new event loop if none is running. (Contributed by Yuri Selivanov in [:issue:`32269`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 680);

[backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 680);**  
[backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 680);**  
[backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 680);**  
[backlink](#)

Unknown interpreted text role "issue".

- The new `meth:~StreamWriter.wait_closed()` `<asyncio.StreamWriter.wait_closed>` coroutine method allows waiting until the stream writer is closed. The new `meth:~StreamWriter.is_closing()` `<asyncio.StreamWriter.is_closing>` method can be used to determine if the writer is closing. (Contributed by Andrew Svetlov in `issue:~32391`.)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 686);**  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 686);**  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 686);**  
[backlink](#)

Unknown interpreted text role "issue".

- The new `meth:~loop.sock_sendfile()` `<asyncio.loop.sock_sendfile>` coroutine method allows sending files using `mod:~os.sendfile` when possible. (Contributed by Andrew Svetlov in `issue:~32410`.)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 692);**  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 692);**  
[backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 692);**  
[backlink](#)

Unknown interpreted text role "issue".



- The new `meth:'Future.get_loop() <asyncio.Future.get_loop>'` and `Task.get_loop()` methods return the instance of the loop on which a task or a future were created. `meth:'Server.get_loop() <asyncio.Server.get_loop>'` allows doing the same for `class:'asyncio.Server'` objects. (Contributed by Yury Selivanov in `issue:'32415'` and Srinivas Reddy Thatiparthi in `issue:'32418'`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 696);  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 696);  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 696);  
[backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 696);  
[backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 696);  
[backlink](#)

Unknown interpreted text role "issue".

- It is now possible to control how instances of `class:'asyncio.Server'` begin serving. Previously, the server would start serving immediately when created. The new `start_serving` keyword argument to `meth:'loop.create_server() <asyncio.loop.create_server>'` and `meth:'loop.create_unix_server() <asyncio.loop.create_unix_server>'`, as well as `meth:'Server.start_serving() <asyncio.Server.start_serving>'`, and `meth:'Server.serve_forever() <asyncio.Server.serve_forever>'` can be used to decouple server instantiation and serving. The new `meth:'Server.is_serving() <asyncio.Server.is_serving>'` method returns `True` if the server is serving. `class:'~asyncio.Server'` objects are now asynchronous context managers:

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 704);  
[backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 704);  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 704);  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 704);  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 704); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 704); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 704); [backlink](#)

Unknown interpreted text role "class".

```
srv = await loop.create_server(...)
```

```
async with srv:  
    # some code
```

```
# At this point, srv is closed and no longer accepts new connections.
```

(Contributed by Yury Selivanov in :issue:`32662`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 723); [backlink](#)

Unknown interpreted text role "issue".

- Callback objects returned by :func:`loop.call\_later()` <:func:`loop.call\_later`> gained the new :meth:`when()` <:meth:`when`> method which returns an absolute scheduled callback timestamp. (Contributed by Andrew Svetlov in :issue:`32741`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 725); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 725); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 725); [backlink](#)

Unknown interpreted text role "issue".

- The :meth:`loop.create\_datagram\_endpoint()` <:meth:`loop.create\_datagram\_endpoint`> method gained support for Unix sockets. (Contributed by Quentin Dawans in :issue:`31245`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 731); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 731); [backlink](#)

Unknown interpreted text role "issue".

- The `.func:'asyncio.open_connection'`, `.func:'asyncio.start_server'` functions, `.meth:'loop.create_connection() <asyncio.loop.create_connection>'`, `.meth:'loop.create_server() <asyncio.loop.create_server>'`, `.meth:'loop.create_accepted_socket() <asyncio.loop.connect_accepted_socket>'` methods and their corresponding UNIX socket variants now accept the `ssl_handshake_timeout` keyword argument. (Contributed by Neil Aspinall in [:issue:29970](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 736); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 736); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 736); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 736); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 736); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 736); [backlink](#)

Unknown interpreted text role "issue".

- The new `.meth:'Handle.cancelled() <asyncio.Handle.cancelled>'` method returns `True` if the callback was cancelled. (Contributed by Marat Sharafutdinov in [:issue:31943](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 744); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 744); [backlink](#)

Unknown interpreted text role "issue".

- The `asyncio` source has been converted to use the `:keyword:'async'/:keyword:'await'` syntax. (Contributed by Andrew Svetlov in [:issue:32193](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 748); [backlink](#)

Unknown interpreted text role "keyword".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 748); [backlink](#)

Unknown interpreted text role "keyword".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 748); [backlink](#)

Unknown interpreted text role "issue".

- The new `meth:ReadTransport.is_reading()` `<asyncio.ReadTransport.is_reading>` method can be used to determine the reading state of the transport. Additionally, calls to `meth:ReadTransport.resume_reading()` `<asyncio.ReadTransport.resume_reading>` and `meth:ReadTransport.pause_reading()` `<asyncio.ReadTransport.pause_reading>` are now idempotent. (Contributed by Yury Selivanov in [issue:32356](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 752); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 752); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 752); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 752); [backlink](#)

Unknown interpreted text role "issue".

- Loop methods which accept socket paths now support passing `term:path-like objects` `<path-like object>`. (Contributed by Yury Selivanov in [issue:32066](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 760); [backlink](#)

Unknown interpreted text role "term".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 760); [backlink](#)

Unknown interpreted text role "issue".

- In `mod:asyncio` TCP sockets on Linux are now created with `TCP_NODELAY` flag set by default. (Contributed by Yury Selivanov and Victor Stinner in [issue:27456](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 764); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 764); [backlink](#)

Unknown interpreted text role "issue".

- Exceptions occurring in cancelled tasks are no longer logged. (Contributed by Yury Selivanov in :issue:`30508`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 768); [backlink](#)

Unknown interpreted text role "issue".

- New `WindowsSelectorEventLoopPolicy` and `WindowsProactorEventLoopPolicy` classes. (Contributed by Yury Selivanov in :issue:`33792`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 771); [backlink](#)

Unknown interpreted text role "issue".

Several `asyncio` APIs have been `ref`: deprecated `<whatsnew37-asyncio-deprecated>`.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 775); [backlink](#)

Unknown interpreted text role "ref".

## binascii

The `:func:`~binascii.b2a_uu`` function now accepts an optional *backtick* keyword argument. When it's true, zeros are represented by `' '` instead of spaces. (Contributed by Xiang Zhang in :issue:`30103`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 782); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 782); [backlink](#)

Unknown interpreted text role "issue".

## calendar

The `:class:`~calendar.HTMLCalendar`` class has new class attributes which ease the customization of CSS classes in the produced HTML calendar. (Contributed by Oz Tiram in :issue:`30095`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 790); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 790); [backlink](#)

Unknown interpreted text role "issue".

## collections

`collections.namedtuple()` now supports default values. (Contributed by Raymond Hettinger in [:issue:`32320`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 798); [backlink](#)

Unknown interpreted text role "issue".

## compileall

`:func:`compileall.compile_dir`` learned the new `invalidation_mode` parameter, which can be used to enable `ref`hash-based .pyc invalidation <whatsnew37-pep552>`. The invalidation mode can also be specified on the command line using the new `--invalidation-mode` argument. (Contributed by Benjamin Peterson in [:issue:`31650`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 805); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 805); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 805); [backlink](#)

Unknown interpreted text role "issue".

## concurrent.futures

`:class:`ProcessPoolExecutor <concurrent.futures.ProcessPoolExecutor>`` and `:class:`ThreadPoolExecutor <concurrent.futures.ThreadPoolExecutor>`` now support the new `initializer` and `initargs` constructor arguments. (Contributed by Antoine Pitrou in [:issue:`21423`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 816); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 816); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 816); [backlink](#)

Unknown interpreted text role "issue".

The `:class:`ProcessPoolExecutor <concurrent.futures.ProcessPoolExecutor>`` can now take the multiprocessing context via the new `mp_context` argument. (Contributed by Thomas Moreau in [:issue:`31540`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 821); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 821); [backlink](#)

Unknown interpreted text role "issue".

## contextlib

The new `.func:~contextlib.nullcontext` is a simpler and faster no-op context manager than `.class:~contextlib.ExitStack`. (Contributed by Jesse-Bakker in [:issue:10049](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 829); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 829); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 829); [backlink](#)

Unknown interpreted text role "issue".

The new `.func:~contextlib.asynccontextmanager`, `.class:~contextlib.AbstractAsyncContextManager`, and `.class:~contextlib.AsyncExitStack` have been added to complement their synchronous counterparts. (Contributed by Jelle Zijlstra in [:issue:29679](#) and [:issue:30241](#), and by Alexander Mohr and Ilya Kulakov in [:issue:29302](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 833); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 833); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 833); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 833); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 833); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 833); [backlink](#)

Unknown interpreted text role "issue".

## cProfile

The `.mod:cProfile` command line now accepts `-m module_name` as an alternative to script path. (Contributed by Sanyam Khurana in [:issue:21862](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 844); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 844); [backlink](#)



Unknown interpreted text role "issue".

## crypt

The `mod: 'crypt'` module now supports the Blowfish hashing method. (Contributed by Serhiy Storchaka in [:issue: 31664](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 851); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 851); [backlink](#)

Unknown interpreted text role "issue".

The `func: '~crypt.mksalt'` function now allows specifying the number of rounds for hashing. (Contributed by Serhiy Storchaka in [:issue: 31702](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 854); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 854); [backlink](#)

Unknown interpreted text role "issue".

## datetime

The new `meth: 'datetime.fromisoformat()' <datetime.datetime.fromisoformat>` method constructs a `class: '~datetime.datetime'` object from a string in one of the formats output by `meth: 'datetime.isoformat()' <datetime.datetime.isoformat>`. (Contributed by Paul Ganssle in [:issue: 15873](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 861); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 861); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 861); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 861); [backlink](#)

Unknown interpreted text role "issue".

The `class: 'tzinfo <datetime.tzinfo>` class now supports sub-minute offsets. (Contributed by Alexander Belopolsky in [:issue: 5288](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 867); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 867); [backlink](#)

Unknown interpreted text role "issue".

## dbm

`mod:dbm.dumb` now supports reading read-only files and no longer writes the index file when it is not changed.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 874); [backlink](#)

Unknown interpreted text role "mod".

## decimal

The `mod:decimal` module now uses `ref:context variables <whatsnew37-pep567>` to store the decimal context. (Contributed by Yury Selivanov in `issue:32630`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 881); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 881); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 881); [backlink](#)

Unknown interpreted text role "issue".

## dis

The `func:~dis.dis` function is now able to disassemble nested code objects (the code of comprehensions, generator expressions and nested functions, and the code used for building nested classes). The maximum depth of disassembly recursion is controlled by the new `depth` parameter. (Contributed by Serhiy Storchaka in `issue:11822`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 889); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 889); [backlink](#)

Unknown interpreted text role "issue".

## distutils

`README.rst` is now included in the list of distutils standard READMEs and therefore included in source distributions. (Contributed by Ryan Gonzalez in `issue:11913`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 900); [backlink](#)

Unknown interpreted text role "issue".

## enum

The `class:Enum<enum.Enum>` learned the new `ignore_class` property, which allows listing the names of properties which should not become enum members. (Contributed by Ethan Furman in `issue:31801`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 908); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 908); [backlink](#)

Unknown interpreted text role "issue".

In Python 3.8, attempting to check for non-Enum objects in `:class:`Enum`` classes will raise a `:exc:`TypeError`` (e.g. 1 in Color); similarly, attempting to check for non-Flag objects in a `:class:`Flag`` member will raise `:exc:`TypeError`` (e.g. 1 in Perm.RW); currently, both operations return `:const:`False`` instead and are deprecated. (Contributed by Ethan Furman in [:issue:`33217`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 913); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 913); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 913); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 913); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 913); [backlink](#)

Unknown interpreted text role "const".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 913); [backlink](#)

Unknown interpreted text role "issue".

## functools

`:func:`functools.singledispatch`` now supports registering implementations using type annotations. (Contributed by Łukasz Langa in [:issue:`32227`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 924); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 924); [backlink](#)

Unknown interpreted text role "issue".

## gc

The new `:func:`gc.freeze`` function allows freezing all objects tracked by the garbage collector and excluding them from future collections. This can be used before a POSIX `fork()` call to make the GC copy-on-write friendly or to speed up collection. The new `:func:`gc.unfreeze`` functions reverses this operation. Additionally, `:func:`gc.get_freeze_count`` can be used to obtain the number of frozen objects. (Contributed by Li Zekun in [:issue:`31558`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 932); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 932); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 932); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 932); [backlink](#)

Unknown interpreted text role "issue".

## hmac

The `:mod:`hmac`` module now has an optimized one-shot `:func:`~hmac.digest`` function, which is up to three times faster than `:func:`~hmac.HMAC``. (Contributed by Christian Heimes in [:issue:`32433`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 944); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 944); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 944); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 944); [backlink](#)

Unknown interpreted text role "issue".

## http.client

`:class:`~http.client.HTTPConnection`` and `:class:`~http.client.HTTPSConnection`` now support the new *blocksize* argument for improved upload throughput. (Contributed by Nir Soffer in [:issue:`31945`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 952); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 952); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 952); [backlink](#)

Unknown interpreted text role "issue".

## http.server

`:class:`~http.server.SimpleHTTPRequestHandler`` now supports the HTTP *If-Modified-Since* header. The server returns the 304 response status if the target file was not modified after the time specified in the header. (Contributed by Pierre Quentel in [:issue:`29654`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 960); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 960); [backlink](#)

Unknown interpreted text role "issue".

`:class:`~http.server.SimpleHTTPRequestHandler`` accepts the new *directory* argument, in addition to the new `--directory` command line argument. With this parameter, the server serves the specified directory, by default it uses the current working directory. (Contributed by Stéphane Wirtel and Julien Palard in [issue`28707`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 965); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 965); [backlink](#)

Unknown interpreted text role "issue".

The new `:class:`ThreadingHTTPServer <http.server.ThreadingHTTPServer>`` class uses threads to handle requests using `:class:`~socketserver.ThreadingMixin``. It is used when `http.server` is run with `-m`. (Contributed by Julien Palard in [issue`31639`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 971); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 971); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 971); [backlink](#)

Unknown interpreted text role "issue".

## idlelib and IDLE

Multiple fixes for autocompletion. (Contributed by Louie Lu in [issue`15786`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 980); [backlink](#)

Unknown interpreted text role "issue".

Module Browser (on the File menu, formerly called Class Browser), now displays nested functions and classes in addition to top-level functions and classes. (Contributed by Guilherme Polo, Cheryl Sabella, and Terry Jan Reedy in [issue`1612262`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 982); [backlink](#)

Unknown interpreted text role "issue".

The Settings dialog (Options, Configure IDLE) has been partly rewritten to improve both appearance and function. (Contributed by Cheryl Sabella and Terry Jan Reedy in multiple issues.)

The font sample now includes a selection of non-Latin characters so that users can better see the effect of selecting a particular font. (Contributed by Terry Jan Reedy in [issue`13802`](#).) The sample can be edited to include other characters. (Contributed by Serhiy Storchaka in [issue`31860`](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 992); [backlink](#)**

Unknown interpreted text role "issue".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 992); [backlink](#)**

Unknown interpreted text role "issue".

The IDLE features formerly implemented as extensions have been reimplemented as normal features. Their settings have been moved from the Extensions tab to other dialog tabs. (Contributed by Charles Wohlganger and Terry Jan Reedy in [:issue:27099](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 998); [backlink](#)**

Unknown interpreted text role "issue".

Editor code context option revised. Box displays all context lines up to maxlines. Clicking on a context line jumps the editor to that line. Context colors for custom themes is added to Highlights tab of Settings dialog. (Contributed by Cheryl Sabella and Terry Jan Reedy in [:issue:33642](#), [:issue:33768](#), and [:issue:33679](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1003); [backlink](#)**

Unknown interpreted text role "issue".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1003); [backlink](#)**

Unknown interpreted text role "issue".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1003); [backlink](#)**

Unknown interpreted text role "issue".

On Windows, a new API call tells Windows that tk scales for DPI. On Windows 8.1+ or 10, with DPI compatibility properties of the Python binary unchanged, and a monitor resolution greater than 96 DPI, this should make text and lines sharper. It should otherwise have no effect. (Contributed by Terry Jan Reedy in [:issue:33656](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1009); [backlink](#)**

Unknown interpreted text role "issue".

New in 3.7.1:

Output over N lines (50 by default) is squeezed down to a button. N can be changed in the PyShell section of the General page of the Settings dialog. Fewer, but possibly extra long, lines can be squeezed by right clicking on the output. Squeezed output can be expanded in place by double-clicking the button or into the clipboard or a separate window by right-clicking the button. (Contributed by Tal Einat in [:issue:1529353](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1017); [backlink](#)**

Unknown interpreted text role "issue".

The changes above have been backported to 3.6 maintenance releases.

NEW in 3.7.4:

Add "Run Customized" to the Run menu to run a module with customized settings. Any command line arguments entered are added to sys.argv. They re-appear in the box for the next customized run. One can also suppress the normal Shell main module restart. (Contributed by Cheryl Sabella, Terry Jan Reedy, and others in [:issue:5680](#) and [:issue:37627](#).)

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



main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1028); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1028); [backlink](#)

Unknown interpreted text role "issue".

New in 3.7.5:

Add optional line numbers for IDLE editor windows. Windows open without line numbers unless set otherwise in the General tab of the configuration dialog. Line numbers for an existing window are shown and hidden in the Options menu. (Contributed by Tal Einat and Saimadhav Heblikar in :issue:`17535`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1036); [backlink](#)

Unknown interpreted text role "issue".

## importlib

The `:class:`importlib.abc.ResourceReader`` ABC was introduced to support the loading of resources from packages. See also `ref:`whatsnew37_importlib_resources``. (Contributed by Barry Warsaw, Brett Cannon in :issue:`32248`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1046); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1046); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1046); [backlink](#)

Unknown interpreted text role "issue".

`:func:`importlib.reload`` now raises `:exc:`ModuleNotFoundError`` if the module lacks a spec. (Contributed by Garvit Khatri in :issue:`29851`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1051); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1051); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1051); [backlink](#)

Unknown interpreted text role "issue".

`:func:`importlib.find_spec`` now raises `:exc:`ModuleNotFoundError`` instead of `:exc:`AttributeError`` if the specified parent module is not a package (i.e. lacks a `__path__` attribute). (Contributed by Milan Oberkirch in :issue:`30436`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1055); [backlink](#)

Unknown interpreted text role "func".



**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1055); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1055); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1055); [backlink](#)

Unknown interpreted text role "issue".

The new `:func:`importlib.source_hash`` can be used to compute the hash of the passed source. A `:ref:`hash-based .pyc file <whatsnew37-pep552>`` embeds the value returned by this function.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1060); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1060); [backlink](#)

Unknown interpreted text role "ref".

## io

The new `:meth:`TextIOWrapper.reconfigure() <io.TextIOWrapper.reconfigure>`` method can be used to reconfigure the text stream with the new settings. (Contributed by Antoine Pitrou in [:issue:`30526`](#) and INADA Naoki in [:issue:`15216`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1068); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1068); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1068); [backlink](#)

Unknown interpreted text role "issue".

## ipaddress

The new `subnet_of()` and `supernet_of()` methods of `:class:`ipaddress.IPv6Network`` and `:class:`ipaddress.IPv4Network`` can be used for network containment tests. (Contributed by Michel Albert and Cheryl Sabella in [:issue:`20825`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1077); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1077); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1077); [backlink](#)

Unknown interpreted text role "issue".

## itertools

`:func:`itertools.islice`` now accepts `:meth:`integer-like objects <object.__index__>`` as start, stop, and slice arguments. (Contributed by Will Roberts in [:issue:`30537`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1086); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1086); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1086); [backlink](#)

Unknown interpreted text role "issue".

## locale

The new *monetary* argument to `:func:`locale.format_string`` can be used to make the conversion use monetary thousands separators and grouping strings. (Contributed by Garvit in [:issue:`10379`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1095); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1095); [backlink](#)

Unknown interpreted text role "issue".

The `:func:`locale.getpreferredencoding`` function now always returns `'UTF-8'` on Android or when in the `:ref:`forced UTF-8 mode <whatsnew37-pep540>``.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1099); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1099); [backlink](#)

Unknown interpreted text role "ref".

## logging

`:class:`~logging.Logger`` instances can now be pickled. (Contributed by Vinay Sajip in [:issue:`30520`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1106); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1106); [backlink](#)

Unknown interpreted text role "issue".

The new `:meth:`StreamHandler.setStream() <logging.StreamHandler.setStream>`` method can be used to replace the logger stream

after handler creation. (Contributed by Vinay Sajip in [:issue:30522](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1109); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1109); [backlink](#)

Unknown interpreted text role "issue".

It is now possible to specify keyword arguments to handler constructors in configuration passed to `:func:logging.config.fileConfig`. (Contributed by Preston Landers in [:issue:31080](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1113); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1113); [backlink](#)

Unknown interpreted text role "issue".

## math

The new `:func:math.reminder` function implements the IEEE 754-style remainder operation. (Contributed by Mark Dickinson in [:issue:29962](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1121); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1121); [backlink](#)

Unknown interpreted text role "issue".

## mimetypes

The MIME type of .bmp has been changed from 'image/x-ms-bmp' to 'image/bmp'. (Contributed by Nitish Chandra in [:issue:22589](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1128); [backlink](#)

Unknown interpreted text role "issue".

## msilib

The new `:meth:Database.Close() <msilib.Database.Close>` method can be used to close the `:abbr:MSI` database. (Contributed by Berker Peksag in [:issue:20486](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1136); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1136); [backlink](#)

Unknown interpreted text role "abbr".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1136); [backlink](#)

Unknown interpreted text role "issue".

## multiprocessing

The new `meth:Process.close()` `<multiprocessing.Process.close>` method explicitly closes the process object and releases all resources associated with it. `:exc:ValueError` is raised if the underlying process is still running. (Contributed by Antoine Pitrou in `:issue:30596`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1144); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1144); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1144); [backlink](#)

Unknown interpreted text role "issue".

The new `meth:Process.kill()` `<multiprocessing.Process.kill>` method can be used to terminate the process using the `:data:SIGKILL` signal on Unix. (Contributed by Vitor Pereira in `:issue:30794`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1150); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1150); [backlink](#)

Unknown interpreted text role "data".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1150); [backlink](#)

Unknown interpreted text role "issue".

Non-daemonic threads created by `:class:~multiprocessing.Process` are now joined on process exit. (Contributed by Antoine Pitrou in `:issue:18966`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1154); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1154); [backlink](#)

Unknown interpreted text role "issue".

## os

`:func:os.fwalk` now accepts the `path` argument as `:class:bytes`. (Contributed by Serhiy Storchaka in `:issue:28682`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1162); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1162); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1162); [backlink](#)

Unknown interpreted text role "issue".

`:func:`os.scandir`` gained support for `ref`file descriptors <path_fd>``. (Contributed by Serhiy Storchaka in `:issue:`25996``.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1165); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1165); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1165); [backlink](#)

Unknown interpreted text role "issue".

The new `:func:`~os.register_at_fork`` function allows registering Python callbacks to be executed at process fork. (Contributed by Antoine Pitrou in `:issue:`16500``.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1168); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1168); [backlink](#)

Unknown interpreted text role "issue".

Added `:func:`os.preadv`` (combine the functionality of `:func:`os.readv`` and `:func:`os.pread``) and `:func:`os.pwritev`` functions (combine the functionality of `:func:`os.writev`` and `:func:`os.pwrite``). (Contributed by Pablo Galindo in `:issue:`31368``.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1172); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1172); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1172); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1172); [backlink](#)

Unknown interpreted text role "func".

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

main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1172); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1172); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1172); [backlink](#)

Unknown interpreted text role "issue".

The mode argument of `:func:`os.makedirs`` no longer affects the file permission bits of newly-created intermediate-level directories. (Contributed by Serhiy Storchaka in [:issue:`19930`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1177); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1177); [backlink](#)

Unknown interpreted text role "issue".

`:func:`os.dup2`` now returns the new file descriptor. Previously, `None` was always returned. (Contributed by Benjamin Peterson in [:issue:`32441`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1181); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1181); [backlink](#)

Unknown interpreted text role "issue".

The structure returned by `:func:`os.stat`` now contains the `:attr:`~os.stat_result.st_fstype`` attribute on Solaris and its derivatives. (Contributed by Jesús Cea Avi3n in [:issue:`32659`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1185); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1185); [backlink](#)

Unknown interpreted text role "attr".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1185); [backlink](#)

Unknown interpreted text role "issue".

## pathlib

The new `:meth:`Path.is_mount()` [\(<pathlib.Path.is\\_mount>`\)](#) method is now available on POSIX systems and can be used to determine whether a path is a mount point. (Contributed by Cooper Ry Lees in [:issue:`30897`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1193); [backlink](#)



Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1193); [backlink](#)

Unknown interpreted text role "issue".

## pdb

`:func: pdb.set_trace` now takes an optional *header* keyword-only argument. If given, it is printed to the console just before debugging begins. (Contributed by Barry Warsaw in [issue:31389](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1201); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1201); [backlink](#)

Unknown interpreted text role "issue".

`:mod: pdb` command line now accepts `-m module_name` as an alternative to script file. (Contributed by Mario Corchero in [issue:32206](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1205); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1205); [backlink](#)

Unknown interpreted text role "issue".

## py\_compile

`:func: py_compile.compile` -- and by extension, `:mod: compileall` -- now respects the `:envvar: SOURCE_DATE_EPOCH` environment variable by unconditionally creating `.pyc` files for hash-based validation. This allows for guaranteeing [reproducible builds](#) of `.pyc` files when they are created eagerly. (Contributed by Bernhard M. Wiedemann in [issue:29708](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1212); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1212); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1212); [backlink](#)

Unknown interpreted text role "envvar".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1212); [backlink](#)

Unknown interpreted text role "issue".

## pydoc

The `pydoc` server can now bind to an arbitrary hostname specified by the new `-n` command-line argument. (Contributed by Feanil Patel in [issue:31128](#).)



**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1224); [backlink](#)

Unknown interpreted text role "issue".

## queue

The new `:class:`~queue.SimpleQueue`` class is an unbounded `:abbr:`FIFO`` queue. (Contributed by Antoine Pitrou in [:issue:`14976`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1232); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1232); [backlink](#)

Unknown interpreted text role "abbr".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1232); [backlink](#)

Unknown interpreted text role "issue".

## re

The flags `:const:`re.ASCII``, `:const:`re.LOCALE`` and `:const:`re.UNICODE`` can be set within the scope of a group. (Contributed by Serhiy Storchaka in [:issue:`31690`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1239); [backlink](#)

Unknown interpreted text role "const".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1239); [backlink](#)

Unknown interpreted text role "const".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1239); [backlink](#)

Unknown interpreted text role "const".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1239); [backlink](#)

Unknown interpreted text role "issue".

`:func:`re.split`` now supports splitting on a pattern like `r'\b'`, `'^$'` or `(?=)` that matches an empty string. (Contributed by Serhiy Storchaka in [:issue:`25054`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1243); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1243); [backlink](#)

Unknown interpreted text role "issue".

Regular expressions compiled with the `:const:`re.LOCALE`` flag no longer depend on the locale at compile time. Locale settings are applied only when the compiled regular expression is used. (Contributed by Serhiy Storchaka in [:issue:`30215`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1247); [backlink](#)

Unknown interpreted text role "const".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1247); [backlink](#)

Unknown interpreted text role "issue".

`:exc:'FutureWarning'` is now emitted if a regular expression contains character set constructs that will change semantically in the future, such as nested sets and set operations. (Contributed by Serhiy Storchaka in [:issue:'30349'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1252); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1252); [backlink](#)

Unknown interpreted text role "issue".

Compiled regular expression and match objects can now be copied using `:func:'copy.copy'` and `:func:'copy.deepcopy'`. (Contributed by Serhiy Storchaka in [:issue:'10076'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1257); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1257); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1257); [backlink](#)

Unknown interpreted text role "issue".

## signal

The new `warn_on_full_buffer` argument to the `:func:'signal.set_wakeup_fd'` function makes it possible to specify whether Python prints a warning on stderr when the wakeup buffer overflows. (Contributed by Nathaniel J. Smith in [:issue:'30050'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1265); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1265); [backlink](#)

Unknown interpreted text role "issue".

## socket

The new `:func:'socket.getblocking() <socket.socket.getblocking>'` method returns `True` if the socket is in blocking mode and `False` otherwise. (Contributed by Yury Selivanov in [:issue:'32373'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1274); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1274); [backlink](#)

Unknown interpreted text role "issue".

The new `:func:`socket.close`` function closes the passed socket file descriptor. This function should be used instead of `:func:`os.close`` for better compatibility across platforms. (Contributed by Christian Heimes in [:issue:`32454`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1278); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1278); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1278); [backlink](#)

Unknown interpreted text role "issue".

The `:mod:`socket`` module now exposes the `:data:`socket.TCP_CONGESTION`` (Linux 2.6.13), `:data:`socket.TCP_USER_TIMEOUT`` (Linux 2.6.37), and `:data:`socket.TCP_NOTSENT_LOWAT`` (Linux 3.12) constants. (Contributed by Omar Sandoval in [:issue:`26273`](#) and Nathaniel J. Smith in [:issue:`29728`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1283); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1283); [backlink](#)

Unknown interpreted text role "data".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1283); [backlink](#)

Unknown interpreted text role "data".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1283); [backlink](#)

Unknown interpreted text role "data".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1283); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1283); [backlink](#)

Unknown interpreted text role "issue".

Support for `:data:`socket.AF_VSOCK`` sockets has been added to allow communication between virtual machines and their hosts. (Contributed by Cathy Avery in [:issue:`27584`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1289); [backlink](#)

Unknown interpreted text role "data".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1289); [backlink](#)

Unknown interpreted text role "issue".

Sockets now auto-detect family, type and protocol from file descriptor by default. (Contributed by Christian Heimes in [:issue:`28134`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1293); [backlink](#)

Unknown interpreted text role "issue".

## socketserver

`meth:`socketserver.ThreadingMixIn.server_close`` now waits until all non-daemon threads complete.

`meth:`socketserver.ForkingMixIn.server_close`` now waits until all child processes complete.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1301); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1301); [backlink](#)

Unknown interpreted text role "meth".

Add a new `attr:`socketserver.ForkingMixIn.block_on_close`` class attribute to `class:`socketserver.ForkingMixIn`` and `class:`socketserver.ThreadingMixIn`` classes. Set the class attribute to `False` to get the pre-3.7 behaviour.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1305); [backlink](#)

Unknown interpreted text role "attr".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1305); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1305); [backlink](#)

Unknown interpreted text role "class".

## sqlite3

`class:`sqlite3.Connection`` now exposes the `meth:`~sqlite3.Connection.backup`` method when the underlying SQLite library is at version 3.6.11 or higher. (Contributed by Lele Gaifax in [:issue:`27645`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1313); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1313); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1313); [backlink](#)

Unknown interpreted text role "issue".

The `database` argument of `:func:`sqlite3.connect`` now accepts any `:term:`path-like object``, instead of just a string. (Contributed by Anders Lorentsen in [:issue:`31843`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1317); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1317); [backlink](#)

Unknown interpreted text role "term".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1317); [backlink](#)

Unknown interpreted text role "issue".

## ssl

The `:mod:`ssl`` module now uses OpenSSL's builtin API instead of `:func:`~ssl.match_hostname`` to check a host name or an IP address. Values are validated during TLS handshake. Any certificate validation error including failing the host name check now raises `:exc:`~ssl.SSLCertVerificationError`` and aborts the handshake with a proper TLS Alert message. The new exception contains additional information. Host name validation can be customized with `:attr:`SSLContext.hostname_checks_common_name`` `<ssl.SSLContext.hostname_checks_common_name>`. (Contributed by Christian Heimes in [:issue:`31399`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1325); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1325); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1325); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.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) 3.7.rst, line 1325); [backlink](#)

Unknown interpreted text role "issue".

### Note

The improved host name check requires a *libssl* implementation compatible with OpenSSL 1.0.2 or 1.1. Consequently, OpenSSL 0.9.8 and 1.0.1 are no longer supported (see [:ref:`37-platform-support-removals`](#) for more details). The `ssl` module is mostly compatible with LibreSSL 2.7.2 and newer.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1336); [backlink](#)

Unknown interpreted text role "ref".

The `ssl` module no longer sends IP addresses in SNI TLS extension. (Contributed by Christian Heimes in [:issue:`32185`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1341); [backlink](#)

Unknown interpreted text role "issue".

`:func:`~ssl.match_hostname`` no longer supports partial wildcards like `www*.example.org`. (Contributed by Mandeep Singh in [:issue:`23033`](#) and Christian Heimes in [:issue:`31399`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1344); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1344); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1344); [backlink](#)

Unknown interpreted text role "issue".

The default cipher suite selection of the `ssl` module now uses a blacklist approach rather than a hard-coded whitelist. Python no longer re-enables ciphers that have been blocked by OpenSSL security updates. Default cipher suite selection can be configured at compile time. (Contributed by Christian Heimes in [:issue:`31429`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1349); [backlink](#)

Unknown interpreted text role "issue".

Validation of server certificates containing internationalized domain names (IDNs) is now supported. As part of this change, the `attr:`SSLSocket.server_hostname <ssl.SSLSocket.server_hostname>`` attribute now stores the expected hostname in A-label form ("`xn--pythn-mua.org`"), rather than the U-label form ("`python.org`"). (Contributed by Nathaniel J. Smith and Christian Heimes in [:issue:`28414`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1355); [backlink](#)

Unknown interpreted text role "attr".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1355); [backlink](#)

Unknown interpreted text role "issue".

The `ssl` module has preliminary and experimental support for TLS 1.3 and OpenSSL 1.1.1. At the time of Python 3.7.0 release, OpenSSL 1.1.1 is still under development and TLS 1.3 hasn't been finalized yet. The TLS 1.3 handshake and protocol behaves slightly differently than TLS 1.2 and earlier, see [ref:ssl-tls1\\_3](#). (Contributed by Christian Heimes in [:issue:`32947`](#), [:issue:`20995`](#), [:issue:`29136`](#), [:issue:`30622`](#) and [:issue:`33618`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1362); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1362); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1362); [backlink](#)



Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1362); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1362); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1362); [backlink](#)

Unknown interpreted text role "issue".

`:class:~ssl.SSLSocket` and `:class:~ssl.SSLObject` no longer have a public constructor. Direct instantiation was never a documented and supported feature. Instances must be created with `:class:~ssl.SSLContext` methods `:meth:~ssl.SSLContext.wrap_socket` and `:meth:~ssl.SSLContext.wrap_bio`. (Contributed by Christian Heimes in [:issue:32951](#))

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1370); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1370); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1370); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1370); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1370); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1370); [backlink](#)

Unknown interpreted text role "issue".

OpenSSL 1.1 APIs for setting the minimum and maximum TLS protocol version are available as `:attr:SSLContext.minimum_version <ssl.SSLContext.minimum_version>` and `:attr:SSLContext.maximum_version <ssl.SSLContext.maximum_version>`. Supported protocols are indicated by several new flags, such as `:data:~ssl.HAS_TLSv1_1`. (Contributed by Christian Heimes in [:issue:32609](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1376); [backlink](#)

Unknown interpreted text role "attr".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1376); [backlink](#)



Unknown interpreted text role "attr".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1376); [backlink](#)

Unknown interpreted text role "data".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1376); [backlink](#)

Unknown interpreted text role "issue".

## string

`:class:'string.Template'` now lets you to optionally modify the regular expression pattern for braced placeholders and non-braced placeholders separately. (Contributed by Barry Warsaw in [issue:'1198569'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1387); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1387); [backlink](#)

Unknown interpreted text role "issue".

## subprocess

The `:func:'subprocess.run'` function accepts the new `capture_output` keyword argument. When true, stdout and stderr will be captured. This is equivalent to passing `:data:'subprocess.PIPE'` as `stdout` and `stderr` arguments. (Contributed by Bo Bayles in [issue:'32102'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1395); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1395); [backlink](#)

Unknown interpreted text role "data".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1395); [backlink](#)

Unknown interpreted text role "issue".

The `subprocess.run` function and the `:class:'subprocess.Popen'` constructor now accept the `text` keyword argument as an alias to `universal_newlines`. (Contributed by Andrew Clegg in [issue:'31756'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1401); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1401); [backlink](#)

Unknown interpreted text role "issue".

On Windows the default for `close_fds` was changed from `False` to `True` when redirecting the standard handles. It's now possible to set `close_fds` to `true` when redirecting the standard handles. See `:class:'subprocess.Popen'`. This means that `close_fds` now defaults to `True` on all supported platforms. (Contributed by Segev Finer in [issue:'19764'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1406); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1406); [backlink](#)

Unknown interpreted text role "issue".

The subprocess module is now more graceful when handling `:exc:`KeyboardInterrupt`` during `:func:`subprocess.call``, `:func:`subprocess.run``, or in a `:class:`~subprocess.Popen`` context manager. It now waits a short amount of time for the child to exit, before continuing the handling of the `KeyboardInterrupt` exception. (Contributed by Gregory P. Smith in [:issue:`25942`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1413); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1413); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1413); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1413); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1413); [backlink](#)

Unknown interpreted text role "issue".

## sys

The new `:func:`sys.breakpointhook`` hook function is called by the built-in `:func:`breakpoint``. (Contributed by Barry Warsaw in [:issue:`31353`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1425); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1425); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1425); [backlink](#)

Unknown interpreted text role "issue".

On Android, the new `:func:`sys.getandroidapilevel`` returns the build-time Android API version. (Contributed by Victor Stinner in [:issue:`28740`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.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) 3.7.rst, line 1429); [backlink](#)

Unknown interpreted text role "issue".

The new `:func:`sys.get_coroutine_origin_tracking_depth`` function returns the current coroutine origin tracking depth, as set by the new `:func:`sys.set_coroutine_origin_tracking_depth``. `:mod:`asyncio`` has been converted to use this new API instead of the deprecated `:func:`sys.set_coroutine_wrapper``. (Contributed by Nathaniel J. Smith in `:issue:`32591``.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1433); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1433); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1433); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1433); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1433); [backlink](#)

Unknown interpreted text role "issue".

## time

PEP 564 adds six new functions with nanosecond resolution to the `:mod:`time`` module:

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1444); [backlink](#)

Unknown interpreted text role "mod".

- `:func:`time.clock_gettime_ns``

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1447); [backlink](#)

Unknown interpreted text role "func".

- `:func:`time.clock_settime_ns``

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1448); [backlink](#)

Unknown interpreted text role "func".

- `:func:`time.monotonic_ns``

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1449);

[backlink](#)

Unknown interpreted text role "func".

- `:func:`time.perf_counter_ns``

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1450);

[backlink](#)

Unknown interpreted text role "func".

- `:func:`time.process_time_ns``

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1451);

[backlink](#)

Unknown interpreted text role "func".

- `:func:`time.time_ns``

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1452);

[backlink](#)

Unknown interpreted text role "func".

New clock identifiers have been added:

- `:data:`time.CLOCK_BOOTTIME`` (Linux): Identical to `:data:`time.CLOCK_MONOTONIC``, except it also includes any time that the system is suspended.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1456);

[backlink](#)

Unknown interpreted text role "data".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1456);

[backlink](#)

Unknown interpreted text role "data".

- `:data:`time.CLOCK_PROF`` (FreeBSD, NetBSD and OpenBSD): High-resolution per-process CPU timer.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1459);

[backlink](#)

Unknown interpreted text role "data".

- `:data:`time.CLOCK_UPTIME`` (FreeBSD, OpenBSD): Time whose absolute value is the time the system has been running and not suspended, providing accurate uptime measurement.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1461);

[backlink](#)

Unknown interpreted text role "data".

The new `:func:`time.thread_time`` and `:func:`time.thread_time_ns`` functions can be used to get per-thread CPU time measurements. (Contributed by Antoine Pitrou in [:issue:`32025`](#).)

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

main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1465); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1465); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1465); [backlink](#)

Unknown interpreted text role "issue".

The new `:func:`time.thread_getcpuclockid`` function returns the clock ID of the thread-specific CPU-time clock.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1469); [backlink](#)

Unknown interpreted text role "func".

## tkinter

The new `:class:`tkinter.ttk.Spinbox`` class is now available. (Contributed by Alan Moore in [issue:32585](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1476); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1476); [backlink](#)

Unknown interpreted text role "issue".

## tracemalloc

`:class:`tracemalloc.Traceback`` behaves more like regular tracebacks, sorting the frames from oldest to most recent. `:meth:`Traceback.format() <tracemalloc.Traceback.format>` now accepts negative *limit*, truncating the result to the `abs(limit)` oldest frames. To get the old behaviour, use the new *most\_recent\_first* argument to `Traceback.format()`. (Contributed by Jesse Bakker in [issue:32121](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1483); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1483); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1483); [backlink](#)

Unknown interpreted text role "issue".

## types

The new `:class:`~types WrapperDescriptorType``, `:class:`~types.MethodWrapperType``, `:class:`~types.MethodDescriptorType``, and `:class:`~types.ClassMethodDescriptorType`` classes are now available. (Contributed by Manuel Krebber and Guido van Rossum in [issue:29377](#), and Serhiy Storchaka in [issue:32265](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1495); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1495); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1495); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1495); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1495); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1495); [backlink](#)

Unknown interpreted text role "issue".

The new `:func:`types.resolve_bases`` function resolves MRO entries dynamically as specified by [PEP 560](#). (Contributed by Ivan Levkivskyi in [:issue:`32717`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1501); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1501); [backlink](#)

Unknown interpreted text role "issue".

## unicodedata

The internal `:mod:`unicodedata`` database has been upgraded to use [Unicode 11](#). (Contributed by Benjamin Peterson.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1509); [backlink](#)

Unknown interpreted text role "mod".

## unittest

The new `-k` command-line option allows filtering tests by a name substring or a Unix shell-like pattern. For example, `python -m unittest -k foo` runs `foo_tests.SomeTest.test_something`, `bar_tests.SomeTest.test_foo`, but not `bar_tests.FooTest.test_something`. (Contributed by Jonas Haag in [:issue:`32071`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1517); [backlink](#)

Unknown interpreted text role "issue".

## unittest.mock

The `:const:`~unittest.mock.sentinel`` attributes now preserve their identity when they are `:mod:`copied <copy>`` or `:mod:`pickled <pickle>``. (Contributed by Serhiy Storchaka in [:issue:`20804`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1528); [backlink](#)

Unknown interpreted text role "const".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1528); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1528); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1528); [backlink](#)

Unknown interpreted text role "issue".

The new `:func:`~unittest.mock.seal`` function allows sealing `:class:`~unittest.mock.Mock`` instances, which will disallow further creation of attribute mocks. The seal is applied recursively to all attributes that are themselves mocks. (Contributed by Mario Corchero in [issue:30541](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1532); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1532); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1532); [backlink](#)

Unknown interpreted text role "issue".

## urllib.parse

`:func:`~urllib.parse.quote`` has been updated from [RFC 2396](#) to [RFC 3986](#), adding ~ to the set of characters that are never quoted by default. (Contributed by Christian Theune and Ratnadeep Debnath in [issue:16285](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1542); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1542); [backlink](#)

Unknown interpreted text role "issue".

## uu

The `:func:`~uu.encode`` function now accepts an optional *backtick* keyword argument. When it's true, zeros are represented by `` `` instead of spaces. (Contributed by Xiang Zhang in [issue:30103](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1550); [backlink](#)

Unknown interpreted text role "func".

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



main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1550); [backlink](#)

Unknown interpreted text role "issue".

## uuid

The new `:attr:`UUID.is_safe <uuid.UUID.is_safe>`` attribute relays information from the platform about whether generated UUIDs are generated with a multiprocessing-safe method. (Contributed by Barry Warsaw in [:issue:`22807`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1558); [backlink](#)

Unknown interpreted text role "attr".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1558); [backlink](#)

Unknown interpreted text role "issue".

`:func:`uuid.getnode`` now prefers universally administered MAC addresses over locally administered MAC addresses. This makes a better guarantee for global uniqueness of UUIDs returned from `:func:`uuid.uuid1``. If only locally administered MAC addresses are available, the first such one found is returned. (Contributed by Barry Warsaw in [:issue:`32107`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1563); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1563); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1563); [backlink](#)

Unknown interpreted text role "issue".

## warnings

The initialization of the default warnings filters has changed as follows:

- warnings enabled via command line options (including those for `:option:`-b`` and the new CPython-specific `:option:`-X`` `dev` option) are always passed to the warnings machinery via the `:data:`sys.warnoptions`` attribute.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1576); [backlink](#)

Unknown interpreted text role "option".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1576); [backlink](#)

Unknown interpreted text role "option".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1576); [backlink](#)

Unknown interpreted text role "data".

- warnings filters enabled via the command line or the environment now have the following order of precedence:
  - the `BytesWarning` filter for `:option:`-b`` (or `-bb`)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1583); [backlink](#)

Unknown interpreted text role "option".

- any filters specified with the `:option:-W` option

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1584); [backlink](#)

Unknown interpreted text role "option".

- any filters specified with the `:envvar:PYTHONWARNINGS` environment variable

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1585); [backlink](#)

Unknown interpreted text role "envvar".

- any other CPython specific filters (e.g. the default filter added for the new `-X dev` mode)
- any implicit filters defined directly by the warnings machinery
- in `:ref:CPython debug builds <debug-build>`, all warnings are now displayed by default (the implicit filter list is empty)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1591); [backlink](#)

Unknown interpreted text role "ref".

(Contributed by Nick Coghlan and Victor Stinner in `:issue:20361`, `:issue:32043`, and `:issue:32230`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1594); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1594); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1594); [backlink](#)

Unknown interpreted text role "issue".

Deprecation warnings are once again shown by default in single-file scripts and at the interactive prompt. See `:ref:whatsnew37-pep565` for details. (Contributed by Nick Coghlan in `:issue:31975`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1597); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1597); [backlink](#)

Unknown interpreted text role "issue".

`:ref:'ElementPath <elementtree-xpath>'` predicates in the `:meth:'find'` methods can now compare text of the current node with `[. = "text"]`, not only text in children. Predicates also allow adding spaces for better readability. (Contributed by Stefan Behnel in [:issue:'31648'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1605); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1605); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1605); [backlink](#)

Unknown interpreted text role "issue".

## xmlrpc.server

`:meth:'SimpleXMLRPCDispatcher.register_function <xmlrpc.server.SimpleXMLRPCDispatcher>'` can now be used as a decorator. (Contributed by Xiang Zhang in [:issue:'7769'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1614); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1614); [backlink](#)

Unknown interpreted text role "issue".

## zipapp

Function `:func:'~zipapp.create_archive'` now accepts an optional *filter* argument to allow the user to select which files should be included in the archive. (Contributed by Irmien de Jong in [:issue:'31072'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1622); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1622); [backlink](#)

Unknown interpreted text role "issue".

Function `:func:'~zipapp.create_archive'` now accepts an optional *compressed* argument to generate a compressed archive. A command line option `--compress` has also been added to support compression. (Contributed by Zhiming Wang in [:issue:'31638'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1626); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1626); [backlink](#)

Unknown interpreted text role "issue".

## zipfile

`:class:'~zipfile.ZipFile'` now accepts the new *compresslevel* parameter to control the compression level. (Contributed by Bo Bayles in [:issue:'21417'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.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) 3.7.rst, line 1635); [backlink](#)

Unknown interpreted text role "issue".

Subdirectories in archives created by `ZipFile` are now stored in alphabetical order. (Contributed by Bernhard M. Wiedemann in [issue: 30693](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1639); [backlink](#)

Unknown interpreted text role "issue".

## C API Changes

A new API for thread-local storage has been implemented. See [ref: whatsnew37-pep539](#) for an overview and [ref: thread-specific-storage-api](#) for a complete reference. (Contributed by Masayuki Yamamoto in [issue: 25658](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1647); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1647); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1647); [backlink](#)

Unknown interpreted text role "issue".

The new [ref: context variables <whatsnew37-pep567>](#) functionality exposes a number of [ref: new C APIs <contextvarsobjects>](#).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1652); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1652); [backlink](#)

Unknown interpreted text role "ref".

The new [c:func: PyImport\\_GetModule](#) function returns the previously imported module with the given name. (Contributed by Eric Snow in [issue: 28411](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1655); [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) 3.7.rst, line 1655); [backlink](#)

Unknown interpreted text role "issue".

The new [c:macro: Py\\_RETURN\\_RICHCOMPARE](#) macro eases writing rich comparison functions. (Contributed by Petr Victorin

in :issue:`23699`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1659); [backlink](#)

Unknown interpreted text role "c:macro".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1659); [backlink](#)

Unknown interpreted text role "issue".

The new :c:macro:`Py\_UNREACHABLE` macro can be used to mark unreachable code paths. (Contributed by Barry Warsaw in :issue:`31338`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1663); [backlink](#)

Unknown interpreted text role "c:macro".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1663); [backlink](#)

Unknown interpreted text role "issue".

The :mod:`tracemalloc` now exposes a C API through the new :c:func:`PyTraceMalloc\_Track` and :c:func:`PyTraceMalloc\_Untrack` functions. (Contributed by Victor Stinner in :issue:`30054`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1667); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1667); [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) 3.7.rst, line 1667); [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) 3.7.rst, line 1667); [backlink](#)

Unknown interpreted text role "issue".

The new :c:func:`import\_\_find\_\_load\_\_start` and :c:func:`import\_\_find\_\_load\_\_done` static markers can be used to trace module imports. (Contributed by Christian Heimes in :issue:`31574`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1672); [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) 3.7.rst, line 1672); [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) 3.7.rst, line 1672); [backlink](#)

Unknown interpreted text role "issue".

The fields `:c.member:'name'` and `:c.member:'doc'` of structures `:c.type:'PyMemberDef'`, `:c.type:'PyGetSetDef'`, `:c.type:'PyStructSequence_Field'`, `:c.type:'PyStructSequence_Desc'`, and `:c.type:'wrapperbase'` are now of type `const char *` rather of `char *`. (Contributed by Serhiy Storchaka in [issue:'28761'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1677); [backlink](#)

Unknown interpreted text role "c:member".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1677); [backlink](#)

Unknown interpreted text role "c:member".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1677); [backlink](#)

Unknown interpreted text role "c:type".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1677); [backlink](#)

Unknown interpreted text role "c:type".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1677); [backlink](#)

Unknown interpreted text role "c:type".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1677); [backlink](#)

Unknown interpreted text role "c:type".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1677); [backlink](#)

Unknown interpreted text role "c:type".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1677); [backlink](#)

Unknown interpreted text role "issue".

The result of `:c.func:'PyUnicode_AsUTF8AndSize'` and `:c.func:'PyUnicode_AsUTF8'` is now of type `const char *` rather of `char *`. (Contributed by Serhiy Storchaka in [issue:'28769'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1683); [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) 3.7.rst, line 1683); [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) 3.7.rst, line 1683); [backlink](#)

Unknown interpreted text role "issue".

The result of `:c.func:'PyMapping_Keys'`, `:c.func:'PyMapping_Values'` and `:c.func:'PyMapping_Items'` is now always a list, rather



than a list or a tuple. (Contributed by Oren Milman in :issue:`28280`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1687); [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) 3.7.rst, line 1687); [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) 3.7.rst, line 1687); [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) 3.7.rst, line 1687); [backlink](#)

Unknown interpreted text role "issue".

Added functions `c:func:PySlice_Unpack` and `c:func:PySlice_AdjustIndices`. (Contributed by Serhiy Storchaka in :issue:`27867`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1691); [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) 3.7.rst, line 1691); [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) 3.7.rst, line 1691); [backlink](#)

Unknown interpreted text role "issue".

`c:func:PyOS_AfterFork` is deprecated in favour of the new functions `c:func:PyOS_BeforeFork`, `c:func:PyOS_AfterFork_Parent` and `c:func:PyOS_AfterFork_Child`. (Contributed by Antoine Pitrou in :issue:`16500`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1694); [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) 3.7.rst, line 1694); [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) 3.7.rst, line 1694); [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) 3.7.rst, line 1694); [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) 3.7.rst, line 1694); [backlink](#)



Unknown interpreted text role "issue".

The `PyExc_RecursionErrorInst` singleton that was part of the public API has been removed as its members being never cleared may cause a segfault during finalization of the interpreter. Contributed by Xavier de Gaye in [:issue:22898](#) and [:issue:30697](#).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1699); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1699); [backlink](#)

Unknown interpreted text role "issue".

Added C API support for timezones with timezone constructors `:c:func:PyTimeZone_FromOffset` and `:c:func:PyTimeZone_FromOffsetAndName`, and access to the UTC singleton with `:c:data:PyDateTime_TimeZone_UTC`. Contributed by Paul Ganssle in [:issue:10381](#).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1704); [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) 3.7.rst, line 1704); [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) 3.7.rst, line 1704); [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) 3.7.rst, line 1704); [backlink](#)

Unknown interpreted text role "issue".

The type of results of `:c:func:PyThread_start_new_thread` and `:c:func:PyThread_get_thread_ident`, and the `id` parameter of `:c:func:PyThreadState_SetAsyncExc` changed from `:c:type:long` to `:c:type:unsigned long`. (Contributed by Serhiy Storchaka in [:issue:6532](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1709); [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) 3.7.rst, line 1709); [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) 3.7.rst, line 1709); [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) 3.7.rst, line 1709); [backlink](#)

Unknown interpreted text role "c:type".

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

main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1709); [backlink](#)

Unknown interpreted text role "c:type".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1709); [backlink](#)

Unknown interpreted text role "issue".

`:c:func:`PyUnicode_AsWideCharString`` now raises a `:exc:`ValueError`` if the second argument is `NULL` and the `:c:type:`wchar_t*`` string contains null characters. (Contributed by Serhiy Storchaka in [issue:`30708`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1715); [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) 3.7.rst, line 1715); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1715); [backlink](#)

Unknown interpreted text role "c:type".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1715); [backlink](#)

Unknown interpreted text role "issue".

Changes to the startup sequence and the management of dynamic memory allocators mean that the long documented requirement to call `:c:func:`Py_Initialize`` before calling most C API functions is now relied on more heavily, and failing to abide by it may lead to segfaults in embedding applications. See the [ref:`porting-to-python-37`](#) section in this document and the [ref:`pre-init-safe`](#) section in the C API documentation for more details.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1719); [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) 3.7.rst, line 1719); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1719); [backlink](#)

Unknown interpreted text role "ref".

The new `:c:func:`PyInterpreterState_GetID`` returns the unique ID for a given interpreter. (Contributed by Eric Snow in [issue:`29102`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1727); [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) 3.7.rst, line 1727); [backlink](#)

Unknown interpreted text role "issue".

`:c:func:'Py_DecodeLocale'`, `:c:func:'Py_EncodeLocale'` now use the UTF-8 encoding when the `.ref:'UTF-8 mode <whatsnew37-pep540>'` is enabled. (Contributed by Victor Stinner in [issue:'29240'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1731); [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) 3.7.rst, line 1731); [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) 3.7.rst, line 1731); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1731); [backlink](#)

Unknown interpreted text role "issue".

`:c:func:'PyUnicode_DecodeLocaleAndSize'` and `:c:func:'PyUnicode_EncodeLocale'` now use the current locale encoding for `surrogateescape` error handler. (Contributed by Victor Stinner in [issue:'29240'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1735); [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) 3.7.rst, line 1735); [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) 3.7.rst, line 1735); [backlink](#)

Unknown interpreted text role "issue".

The *start* and *end* parameters of `:c:func:'PyUnicode_FindChar'` are now adjusted to behave like string slices. (Contributed by Xiang Zhang in [issue:'28822'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1739); [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) 3.7.rst, line 1739); [backlink](#)

Unknown interpreted text role "issue".

## Build Changes

Support for building `--without-threads` has been removed. The `.mod:'threading'` module is now always available. (Contributed by Antoine Pitrou in [issue:'31370'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1747); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1747); [backlink](#)

Unknown interpreted text role "issue".

A full copy of libffi is no longer bundled for use when building the `:mod: ctypes <ctypes>` module on non-OSX UNIX platforms. An installed copy of libffi is now required when building `_ctypes` on such platforms. (Contributed by Zachary Ware in [issue:27979](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1751); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1751); [backlink](#)

Unknown interpreted text role "issue".

The Windows build process no longer depends on Subversion to pull in external sources, a Python script is used to download zipfiles from GitHub instead. If Python 3.6 is not found on the system (via `py -3.6`), NuGet is used to download a copy of 32-bit Python for this purpose. (Contributed by Zachary Ware in [issue:30450](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1756); [backlink](#)

Unknown interpreted text role "issue".

The `:mod: ssl` module requires OpenSSL 1.0.2 or 1.1 compatible libssl. OpenSSL 1.0.1 has reached end of lifetime on 2016-12-31 and is no longer supported. LibreSSL is temporarily not supported as well. LibreSSL releases up to version 2.6.4 are missing required OpenSSL 1.0.2 APIs.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1762); [backlink](#)

Unknown interpreted text role "mod".

## Optimizations

The overhead of calling many methods of various standard library classes implemented in C has been significantly reduced by porting more code to use the `METH_FASTCALL` convention. (Contributed by Victor Stinner in [issue:29300](#), [issue:29507](#), [issue:29452](#), and [issue:29286](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1773); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1773); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1773); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1773); [backlink](#)

Unknown interpreted text role "issue".

Various optimizations have reduced Python startup time by 10% on Linux and up to 30% on macOS. (Contributed by Victor Stinner, INADA Naoki in [issue:29585](#), and Ivan Levkivskiy in [issue:31333](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1779); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1779); [backlink](#)

Unknown interpreted text role "issue".

Method calls are now up to 20% faster due to the bytecode changes which avoid creating bound method instances. (Contributed by Yury Selivanov and INADA Naoki in [issue:26110](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1784); [backlink](#)

Unknown interpreted text role "issue".

The `mod: 'asyncio'` module received a number of notable optimizations for commonly used functions:

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1790); [backlink](#)

Unknown interpreted text role "mod".

- The `func: 'asyncio.get_event_loop'` function has been reimplemented in C to make it up to 15 times faster. (Contributed by Yury Selivanov in [issue:32296](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1793); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1793); [backlink](#)

Unknown interpreted text role "issue".

- `class: 'asyncio.Future'` callback management has been optimized. (Contributed by Yury Selivanov in [issue:32348](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1797); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1797); [backlink](#)

Unknown interpreted text role "issue".

- `func: 'asyncio.gather'` is now up to 15% faster. (Contributed by Yury Selivanov in [issue:32355](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1800); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1800); [backlink](#)

Unknown interpreted text role "issue".

- `:func:`asyncio.sleep`` is now up to 2 times faster when the *delay* argument is zero or negative. (Contributed by Andrew Svetlov in [:issue:`32351`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1803); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1803); [backlink](#)

Unknown interpreted text role "issue".

- The performance overhead of asyncio debug mode has been reduced. (Contributed by Antoine Pitrou in [:issue:`31970`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1807); [backlink](#)

Unknown interpreted text role "issue".

As a result of [:ref:`PEP 560 work <whatsnew37-pep560>`](#), the import time of `:mod:`typing`` has been reduced by a factor of 7, and many typing operations are now faster. (Contributed by Ivan Levkivskyi in [:issue:`32226`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1810); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1810); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1810); [backlink](#)

Unknown interpreted text role "issue".

`:func:`sorted`` and `:meth:`list.sort`` have been optimized for common cases to be up to 40-75% faster. (Contributed by Elliot Gorokhovskiy in [:issue:`28685`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1815); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1815); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1815); [backlink](#)

Unknown interpreted text role "issue".

`:meth:`dict.copy`` is now up to 5.5 times faster. (Contributed by Yury Selivanov in [:issue:`31179`](#).)

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



main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1819); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1819); [backlink](#)

Unknown interpreted text role "issue".

`:func:`hasattr`` and `:func:`getattr`` are now about 4 times faster when *name* is not found and *obj* does not override `:meth:`object.__getattr__`` or `:meth:`object.__getattr__``. (Contributed by INADA Naoki in [issue:32544](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1822); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1822); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1822); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1822); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1822); [backlink](#)

Unknown interpreted text role "issue".

Searching for certain Unicode characters (like Ukrainian capital "Є") in a string was up to 25 times slower than searching for other characters. It is now only 3 times slower in the worst case. (Contributed by Serhiy Storchaka in [issue:24821](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1827); [backlink](#)

Unknown interpreted text role "issue".

The `:func:`collections.namedtuple`` factory has been reimplemented to make the creation of named tuples 4 to 6 times faster. (Contributed by Jelle Zijlstra with further improvements by INADA Naoki, Serhiy Storchaka, and Raymond Hettinger in [issue:28638](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1832); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1832); [backlink](#)

Unknown interpreted text role "issue".

`:meth:`date.fromordinal`` and `:meth:`date.fromtimestamp`` are now up to 30% faster in the common case. (Contributed by Paul Ganssle in [issue:32403](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1837); [backlink](#)



Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1837); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1837); [backlink](#)

Unknown interpreted text role "issue".

The `:func:`os.fwalk`` function is now up to 2 times faster thanks to the use of `:func:`os.scandir``. (Contributed by Serhiy Storchaka in [issue:25996](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1841); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1841); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1841); [backlink](#)

Unknown interpreted text role "issue".

The speed of the `:func:`shutil.rmtree`` function has been improved by 20--40% thanks to the use of the `:func:`os.scandir`` function. (Contributed by Serhiy Storchaka in [issue:28564](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1845); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1845); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1845); [backlink](#)

Unknown interpreted text role "issue".

Optimized case-insensitive matching and searching of `:mod:`regular expressions <re>``. Searching some patterns can now be up to 20 times faster. (Contributed by Serhiy Storchaka in [issue:30285](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1849); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1849); [backlink](#)

Unknown interpreted text role "issue".

`:func:`re.compile`` now converts `flags` parameter to int object if it is `RegexFlag`. It is now as fast as Python 3.5, and faster than Python 3.6 by about 10% depending on the pattern. (Contributed by INADA Naoki in [issue:31671](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1853); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1853); [backlink](#)

Unknown interpreted text role "issue".

The `meth:~selectors.BaseSelector.modify`` methods of classes `:class:~selectors.EpollSelector``, `:class:~selectors.PollSelector`` and `:class:~selectors.DevpollSelector`` may be around 10% faster under heavy loads. (Contributed by Giampaolo Rodola' in `:issue:~30014``)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1858); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1858); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1858); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1858); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1858); [backlink](#)

Unknown interpreted text role "issue".

Constant folding has been moved from the peephole optimizer to the new AST optimizer, which is able perform optimizations more consistently. (Contributed by Eugene Toder and INADA Naoki in `:issue:~29469`` and `:issue:~11549``.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1863); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1863); [backlink](#)

Unknown interpreted text role "issue".

Most functions and methods in `:mod:~abc`` have been rewritten in C. This makes creation of abstract base classes, and calling `:func:~isinstance`` and `:func:~issubclass`` on them 1.5x faster. This also reduces Python start-up time by up to 10%. (Contributed by Ivan Levkivskiy and INADA Naoki in `:issue:~31333``)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1868); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1868); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1868); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1868); [backlink](#)

Unknown interpreted text role "issue".

Significant speed improvements to alternate constructors for `:class:`datetime.date`` and `:class:`datetime.datetime`` by using fast-path constructors when not constructing subclasses. (Contributed by Paul Ganssle in [:issue:`32403`](#))

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1874); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1874); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1874); [backlink](#)

Unknown interpreted text role "issue".

The speed of comparison of `:class:`array.array`` instances has been improved considerably in certain cases. It is now from 10x to 70x faster when comparing arrays holding values of the same integer type. (Contributed by Adrian Wielgosik in [:issue:`24700`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1879); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1879); [backlink](#)

Unknown interpreted text role "issue".

The `:func:`math.erf`` and `:func:`math.erfc`` functions now use the (faster) C library implementation on most platforms. (Contributed by Serhiy Storchaka in [:issue:`26121`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1884); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1884); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1884); [backlink](#)

Unknown interpreted text role "issue".

## Other CPython Implementation Changes

- Trace hooks may now opt out of receiving the `line` and opt into receiving the `opcode` events from the interpreter by setting the corresponding new `f_trace_lines` and `f_trace_opcodes` attributes on the frame being traced. (Contributed by Nick

Coghlan in [issue: '31344'](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1892);**  
[backlink](#)

Unknown interpreted text role "issue".

- Fixed some consistency problems with namespace package module attributes. Namespace module objects now have an `__file__` that is set to `None` (previously unset), and their `__spec__.origin` is also set to `None` (previously the string `"namespace"`). See [issue: '32305'](#). Also, the namespace module object's `__spec__.loader` is set to the same value as `__loader__` (previously, the former was set to `None`). See [issue: '32303'](#).

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1897);**  
[backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1897);**  
[backlink](#)

Unknown interpreted text role "issue".

- The `:func:`locals`` dictionary now displays in the lexical order that variables were defined. Previously, the order was undefined. (Contributed by Raymond Hettinger in [issue: '32690'](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1905);**  
[backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1905);**  
[backlink](#)

Unknown interpreted text role "issue".

- The `:mod:`distutils`` `upload` command no longer tries to change CR end-of-line characters to CRLF. This fixes a corruption issue with sdist's that ended with a byte equivalent to CR. (Contributed by Bo Bayles in [issue: '32304'](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1909);**  
[backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1909);**  
[backlink](#)

Unknown interpreted text role "issue".

## Deprecated Python Behavior

Yield expressions (both `yield` and `yield from` clauses) are now deprecated in comprehensions and generator expressions (aside from the iterable expression in the leftmost `:keyword:`!for`` clause). This ensures that comprehensions always immediately return a container of the appropriate type (rather than potentially returning a `:term:`generator iterator`` object), while generator expressions won't attempt to interleave their implicit output with the output from any explicit `yield` expressions. In Python 3.7, such expressions emit `:exc:`DeprecationWarning`` when compiled, in Python 3.8 this will be a `:exc:`SyntaxError``. (Contributed by Serhiy Storchaka in [issue: '10544'](#).)

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

main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1918); [backlink](#)

Unknown interpreted text role "keyword".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1918); [backlink](#)

Unknown interpreted text role "term".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1918); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1918); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1918); [backlink](#)

Unknown interpreted text role "issue".

Returning a subclass of `class: 'complex'` from `meth: 'object.__complex__'` is deprecated and will be an error in future Python versions. This makes `__complex__()` consistent with `meth: 'object.__int__'` and `meth: 'object.__float__'`. (Contributed by Serhiy Storchaka in [issue: '28894'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1929); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1929); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1929); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1929); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1929); [backlink](#)

Unknown interpreted text role "issue".

## Deprecated Python modules, functions and methods

### aifc

`func: 'aifc.openfp'` has been deprecated and will be removed in Python 3.9. Use `func: 'aifc.open'` instead. (Contributed by Brian Curtin in [issue: '31985'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1943); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1943); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1943); [backlink](#)

Unknown interpreted text role "issue".

## asyncio

Support for directly `await`-ing instances of `:class:`asyncio.Lock`` and other asyncio synchronization primitives has been deprecated. An asynchronous context manager must be used in order to acquire and release the synchronization resource. (Contributed by Andrew Svetlov in [:issue:`32253`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1953); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1953); [backlink](#)

Unknown interpreted text role "issue".

The `:meth:`asyncio.Task.current_task`` and `:meth:`asyncio.Task.all_tasks`` methods have been deprecated. (Contributed by Andrew Svetlov in [:issue:`32250`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1959); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1959); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1959); [backlink](#)

Unknown interpreted text role "issue".

## collections

In Python 3.8, the abstract base classes in `:mod:`collections.abc`` will no longer be exposed in the regular `:mod:`collections`` module. This will help create a clearer distinction between the concrete classes and the abstract base classes. (Contributed by Serhiy Storchaka in [:issue:`25988`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1967); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1967); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1967); [backlink](#)

Unknown interpreted text role "issue".



## dbm

`mod:dbm.dumb` now supports reading read-only files and no longer writes the index file when it is not changed. A deprecation warning is now emitted if the index file is missing and recreated in the `'r'` and `'w'` modes (this will be an error in future Python releases). (Contributed by Serhiy Storchaka in [issue:28847](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1977); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1977); [backlink](#)

Unknown interpreted text role "issue".

## enum

In Python 3.8, attempting to check for non-Enum objects in a `:class:Enum` classes will raise a `:exc:TypeError` (e.g. 1 in Color); similarly, attempting to check for non-Flag objects in a `:class:Flag` member will raise `:exc:TypeError` (e.g. 1 in Perm.RW); currently, both operations return `:const:False` instead. (Contributed by Ethan Furman in [issue:33217](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1987); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1987); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1987); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1987); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1987); [backlink](#)

Unknown interpreted text role "const".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1987); [backlink](#)

Unknown interpreted text role "issue".

## gettext

Using non-integer value for selecting a plural form in `mod:gettext` is now deprecated. It never correctly worked. (Contributed by Serhiy Storchaka in [issue:28692](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1998); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 1998); [backlink](#)

Unknown interpreted text role "issue".



## importlib

Methods `meth: 'MetaPathFinder.find_module()' <importlib.abc.MetaPathFinder.find_module>` (replaced by `meth: 'MetaPathFinder.find_spec()' <importlib.abc.MetaPathFinder.find_spec>`) and `meth: 'PathEntryFinder.find_loader()' <importlib.abc.PathEntryFinder.find_loader>` (replaced by `meth: 'PathEntryFinder.find_spec()' <importlib.abc.PathEntryFinder.find_spec>`) both deprecated in Python 3.4 now emit `:exc: 'DeprecationWarning'`. (Contributed by Matthias Bussonnier in `:issue: '29576'`)

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2006); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2006); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2006); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2006); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2006); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2006); [backlink](#)

Unknown interpreted text role "issue".

The `:class: 'importlib.abc.ResourceLoader'` ABC has been deprecated in favour of `:class: 'importlib.abc.ResourceReader'`.

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2017); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2017); [backlink](#)

Unknown interpreted text role "class".

## locale

`:func: 'locale.format'` has been deprecated, use `meth: 'locale.format_string'` instead. (Contributed by Garvit in `:issue: '10379'`.)

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2024); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2024); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2024); [backlink](#)

Unknown interpreted text role "issue".

## macpath

The `mod:macpath` is now deprecated and will be removed in Python 3.8. (Contributed by Chi Hsuan Yen in [issue:9850](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2031); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2031); [backlink](#)

Unknown interpreted text role "issue".

## threading

`mod:dummy_threading` and `mod:dummy_thread` have been deprecated. It is no longer possible to build Python with threading disabled. Use `mod:threading` instead. (Contributed by Antoine Pitrou in [issue:31370](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2038); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2038); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2038); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2038); [backlink](#)

Unknown interpreted text role "issue".

## socket

The silent argument value truncation in `func:socket.htons` and `func:socket.ntohs` has been deprecated. In future versions of Python, if the passed argument is larger than 16 bits, an exception will be raised. (Contributed by Oren Milman in [issue:28332](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2047); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2047); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2047); [backlink](#)

Unknown interpreted text role "issue".

`:func:`ssl.wrap_socket`` is deprecated. Use `:meth:`ssl.SSLContext.wrap_socket`` instead. (Contributed by Christian Heimes in [:issue:`28124`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2056); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2056); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2056); [backlink](#)

Unknown interpreted text role "issue".

## sunau

`:func:`sunau.openfp`` has been deprecated and will be removed in Python 3.9. Use `:func:`sunau.open`` instead. (Contributed by Brian Curtin in [:issue:`31985`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2064); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2064); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2064); [backlink](#)

Unknown interpreted text role "issue".

## sys

Deprecated `:func:`sys.set_coroutine_wrapper`` and `:func:`sys.get_coroutine_wrapper``.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2072); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2072); [backlink](#)

Unknown interpreted text role "func".

The undocumented `sys.callstats()` function has been deprecated and will be removed in a future Python version. (Contributed by Victor Stinner in [:issue:`28799`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2075); [backlink](#)

Unknown interpreted text role "issue".

## wave

`:func:`wave.openfp`` has been deprecated and will be removed in Python 3.9. Use `:func:`wave.open`` instead. (Contributed by Brian Curtin in [:issue:`31985`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2083); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2083); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2083); [backlink](#)

Unknown interpreted text role "issue".

## Deprecated functions and types of the C API

Function `:c:func:'PySlice_GetIndicesEx'` is deprecated and replaced with a macro if `Py_LIMITED_API` is not set or set to a value in the range between `0x03050400` and `0x03060000` (not inclusive), or is `0x03060100` or higher. (Contributed by Serhiy Storchaka in [:issue:'27867'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2091); [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) 3.7.rst, line 2091); [backlink](#)

Unknown interpreted text role "issue".

`:c:func:'PyOS_AfterFork'` has been deprecated. Use `:c:func:'PyOS_BeforeFork'`, `:c:func:'PyOS_AfterFork_Parent'` or `:c:func:'PyOS_AfterFork_Child()'` instead. (Contributed by Antoine Pitrou in [:issue:'16500'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2096); [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) 3.7.rst, line 2096); [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) 3.7.rst, line 2096); [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) 3.7.rst, line 2096); [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) 3.7.rst, line 2096); [backlink](#)

Unknown interpreted text role "issue".

## Platform Support Removals

- FreeBSD 9 and older are no longer officially supported.
- For full Unicode support, including within extension modules, \*nix platforms are now expected to provide at least one of

C.UTF-8 (full locale), C.utf8 (full locale) or UTF-8 (LC\_CTYPE-only locale) as an alternative to the legacy ASCII-based C locale.

- OpenSSL 0.9.8 and 1.0.1 are no longer supported, which means building CPython 3.7 with SSL/TLS support on older platforms still using these versions requires custom build options that link to a more recent version of OpenSSL.

Notably, this issue affects the Debian 8 (aka "jessie") and Ubuntu 14.04 (aka "Trusty") LTS Linux distributions, as they still use OpenSSL 1.0.1 by default.

Debian 9 ("stretch") and Ubuntu 16.04 ("xenial"), as well as recent releases of other LTS Linux releases (e.g. RHEL/CentOS 7.5, SLES 12-SP3), use OpenSSL 1.0.2 or later, and remain supported in the default build configuration.

CPython's own `:source:CI configuration file <.travis.yml>` provides an example of using the SSL `:source:compatibility testing infrastructure <Tools/ssl/multissltests.py>` in CPython's test suite to build and link against OpenSSL 1.1.0 rather than an outdated system provided OpenSSL.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2123);  
[backlink](#)

Unknown interpreted text role "source".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2123);  
[backlink](#)

Unknown interpreted text role "source".

## API and Feature Removals

The following features and APIs have been removed from Python 3.7:

- The `os.stat_float_times()` function has been removed. It was introduced in Python 2.3 for backward compatibility with Python 2.2, and was deprecated since Python 3.1.
- Unknown escapes consisting of `'\ '` and an ASCII letter in replacement templates for `:func:re.sub` were deprecated in Python 3.5, and will now cause an error.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2139);  
[backlink](#)

Unknown interpreted text role "func".

- Removed support of the `exclude` argument in `:meth:tarfile.TarFile.add`. It was deprecated in Python 2.7 and 3.2. Use the `filter` argument instead.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2143);  
[backlink](#)

Unknown interpreted text role "meth".

- The `splitunc()` function in the `:mod:ntpath` module was deprecated in Python 3.1, and has now been removed. Use the `:func:~os.path.splitdrive` function instead.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2146);  
[backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2146);  
[backlink](#)

Unknown interpreted text role "func".

- `:func:'collections.namedtuple'` no longer supports the *verbose* parameter or `_source` attribute which showed the generated source code for the named tuple class. This was part of an optimization designed to speed-up class creation. (Contributed by Jelle Zijlstra with further improvements by INADA Naoki, Serhiy Storchaka, and Raymond Hettinger in `:issue:'28638'`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2150); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2150); [backlink](#)

Unknown interpreted text role "issue".

- Functions `:func:'bool'`, `:func:'float'`, `:func:'list'` and `:func:'tuple'` no longer take keyword arguments. The first argument of `:func:'int'` can now be passed only as positional argument.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2156); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2156); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2156); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2156); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2156); [backlink](#)

Unknown interpreted text role "func".

- Removed previously deprecated in Python 2.4 classes `Plist`, `Dict` and `_InternalDict` in the `:mod:'plistlib'` module. Dict values in the result of functions `:func:'~plistlib.readPlist'` and `:func:'~plistlib.readPlistFromBytes'` are now normal dicts. You no longer can use attribute access to access items of these dictionaries.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2160); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2160); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2160);**  
[backlink](#)

Unknown interpreted text role "func".

- The `asyncio.windows_utils.socketpair()` function has been removed. Use the `:func:`socket.socketpair`` function instead, it is available on all platforms since Python 3.5. `asyncio.windows_utils.socketpair` was just an alias to `socket.socketpair` on Python 3.5 and newer.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2166);**  
[backlink](#)

Unknown interpreted text role "func".

- `:mod:`asyncio`` no longer exports the `:mod:`selectors`` and `:mod:`_overlapped`` modules as `asyncio.selectors` and `asyncio._overlapped`. Replace `from asyncio import selectors` with `import selectors`.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2172);**  
[backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2172);**  
[backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2172);**  
[backlink](#)

Unknown interpreted text role "mod".

- Direct instantiation of `:class:`ssl.SSLSocket`` and `:class:`ssl.SSLObject`` objects is now prohibited. The constructors were never documented, tested, or designed as public constructors. Users were supposed to use `:func:`ssl.wrap_socket`` or `:class:`ssl.SSLContext``. (Contributed by Christian Heimes in [:issue:`32951`](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2177);**  
[backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2177);**  
[backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2177);**  
[backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2177);**  
[backlink](#)

Unknown interpreted text role "class".



**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2177); [backlink](#)

Unknown interpreted text role "issue".

- The unused `mod:'distutils'` `install_misc` command has been removed. (Contributed by Eric N. Vander Weele in [issue:'29218'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2183); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2183); [backlink](#)

Unknown interpreted text role "issue".

## Module Removals

The `fpectl` module has been removed. It was never enabled by default, never worked correctly on x86-64, and it changed the Python ABI in ways that caused unexpected breakage of C extensions. (Contributed by Nathaniel J. Smith in [issue:'29137'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2190); [backlink](#)

Unknown interpreted text role "issue".

## Windows-only Changes

The python launcher, (`py.exe`), can accept 32 & 64 bit specifiers **without** having to specify a minor version as well. So `py -3-32` and `py -3-64` become valid as well as `py -3.7-32`, also the `-m-64` and `-m.n-64` forms are now accepted to force 64 bit python even if 32 bit would have otherwise been used. If the specified version is not available `py.exe` will error exit. (Contributed by Steve Barnes in [issue:'30291'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2199); [backlink](#)

Unknown interpreted text role "issue".

The launcher can be run as `py -0` to produce a list of the installed pythons, *with default marked with an asterisk*. Running `py -0p` will include the paths. If `py` is run with a version specifier that cannot be matched it will also print the *short form* list of available specifiers. (Contributed by Steve Barnes in [issue:'30362'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2206); [backlink](#)

Unknown interpreted text role "issue".

## Porting to Python 3.7

This section lists previously described changes and other bugfixes that may require changes to your code.

### Changes in Python Behavior

- `keyword:'async'` and `keyword:'await'` names are now reserved keywords. Code using these names as identifiers will now raise a `exc:'SyntaxError'`. (Contributed by Jelle Zijlstra in [issue:'30406'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2225); [backlink](#)

Unknown interpreted text role "keyword".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2225); [backlink](#)

Unknown interpreted text role "keyword".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2225); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2225); [backlink](#)

Unknown interpreted text role "issue".

- [PEP 479](#) is enabled for all code in Python 3.7, meaning that `:exc:'StopIteration'` exceptions raised directly or indirectly in coroutines and generators are transformed into `:exc:'RuntimeError'` exceptions. (Contributed by Yury Selivanov in [:issue:'32670'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2229); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2229); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2229); [backlink](#)

Unknown interpreted text role "issue".

- `:meth:'object.__aiter__'` methods can no longer be declared as asynchronous. (Contributed by Yury Selivanov in [:issue:'31709'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2235); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2235); [backlink](#)

Unknown interpreted text role "issue".

- Due to an oversight, earlier Python versions erroneously accepted the following syntax:

```
f(1 for x in [1],)

class C(1 for x in [1]):
    pass
```

Python 3.7 now correctly raises a `:exc:'SyntaxError'`, as a generator expression always needs to be directly inside a set of parentheses and cannot have a comma on either side, and the duplication of the parentheses can be omitted only on calls.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2246); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2246); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2246); [backlink](#)

Unknown interpreted text role "issue".

- When using the :option:`-m` switch, the initial working directory is now added to :data:`sys.path`, rather than an empty string (which dynamically denoted the current working directory at the time of each import). Any programs that are checking for the empty string, or otherwise relying on the previous behaviour, will need to be updated accordingly (e.g. by also checking for `os.getcwd()` or `os.path.dirname(__main__.__file__)`, depending on why the code was checking for the empty string in the first place).

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2252); [backlink](#)

Unknown interpreted text role "option".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2252); [backlink](#)

Unknown interpreted text role "data".

## Changes in the Python API

- :meth:`socketserver.ThreadingMixIn.server\_close` now waits until all non-daemon threads complete. Set the new :attr:`socketserver.ThreadingMixIn.block\_on\_close` class attribute to `False` to get the pre-3.7 behaviour. (Contributed by Victor Stinner in :issue:`31233` and :issue:`33540`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2264); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2264); [backlink](#)

Unknown interpreted text role "attr".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2264); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2264); [backlink](#)

Unknown interpreted text role "issue".

- `meth:'socketserver.ForkingMixIn.server_close'` now waits until all child processes complete. Set the new `attr:'socketserver.ForkingMixIn.block_on_close'` class attribute to `False` to get the pre-3.7 behaviour. (Contributed by Victor Stinner in [:issue:'31151'](#) and [:issue:'33540'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2270); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2270); [backlink](#)

Unknown interpreted text role "attr".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2270); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2270); [backlink](#)

Unknown interpreted text role "issue".

- The `func:'locale.localeconv'` function now temporarily sets the `LC_CTYPE` locale to the value of `LC_NUMERIC` in some cases. (Contributed by Victor Stinner in [:issue:'31900'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2276); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2276); [backlink](#)

Unknown interpreted text role "issue".

- `meth:'pkgutil.walk_packages'` now raises a `exc:'ValueError'` if `path` is a string. Previously an empty list was returned. (Contributed by Sanyam Khurana in [:issue:'24744'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.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) 3.7.rst, line 2280); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2280); [backlink](#)

Unknown interpreted text role "issue".

- A format string argument for `meth: 'string.Formatter.format'` is now `ref: positional-only <positional-only_parameter>`. Passing it as a keyword argument was deprecated in Python 3.5. (Contributed by Serhiy Storchaka in [issue:29193](#).)

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2284); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2284); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2284); [backlink](#)

Unknown interpreted text role "issue".

- Attributes `attr: ~http.cookies.Morsel.key`, `attr: ~http.cookies.Morsel.value` and `attr: ~http.cookies.Morsel.coded_value` of class `class: 'http.cookies.Morsel'` are now read-only. Assigning to them was deprecated in Python 3.5. Use the `meth: ~http.cookies.Morsel.set` method for setting them. (Contributed by Serhiy Storchaka in [issue:29192](#).)

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2289); [backlink](#)

Unknown interpreted text role "attr".

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2289); [backlink](#)

Unknown interpreted text role "attr".

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2289); [backlink](#)

Unknown interpreted text role "attr".

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2289); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2289); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D: \onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2289); [backlink](#)

Unknown interpreted text role "issue".

- The `mode` argument of `func: 'os.makedirs'` no longer affects the file permission bits of newly-created intermediate-level directories. To set their file permission bits you can set the `umask` before invoking `makedirs()`. (Contributed by Serhiy

Storchaka in :issue:`19930`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2297); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2297); [backlink](#)

Unknown interpreted text role "issue".

- The `attr:struct.Struct.format` type is now `class:str` instead of `class:bytes`. (Contributed by Victor Stinner in :issue:`21071`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2303); [backlink](#)

Unknown interpreted text role "attr".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2303); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2303); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2303); [backlink](#)

Unknown interpreted text role "issue".

- `func:~cgi.parse_multipart` now accepts the *encoding* and *errors* arguments and returns the same results as `class:~FieldStorage`; for non-file fields, the value associated to a key is a list of strings, not bytes. (Contributed by Pierre Quentel in :issue:`29979`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2306); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2306); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2306); [backlink](#)

Unknown interpreted text role "issue".

- Due to internal changes in `mod:socket`, calling `func:socket.fromshare` on a socket created by `func:socket.share` <socket.socket.share> in older Python versions is not supported.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2312); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2312); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2312); [backlink](#)

Unknown interpreted text role "func".

- repr for `:exc:`BaseException`` has changed to not include the trailing comma. Most exceptions are affected by this change. (Contributed by Serhiy Storchaka in [:issue:`30399`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2316); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2316); [backlink](#)

Unknown interpreted text role "issue".

- repr for `:class:`datetime.timedelta`` has changed to include the keyword arguments in the output. (Contributed by Utkarsh Upadhyay in [:issue:`30302`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2320); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2320); [backlink](#)

Unknown interpreted text role "issue".

- Because `:func:`shutil.rmtree`` is now implemented using the `:func:`os.scandir`` function, the user specified handler *onerror* is now called with the first argument `os.scandir` instead of `os.listdir` when listing the directory is failed.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2323); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2323); [backlink](#)

Unknown interpreted text role "func".

- Support for nested sets and set operations in regular expressions as in [Unicode Technical Standard #18](#) might be added in the future. This would change the syntax. To facilitate this future change a `:exc:`FutureWarning`` will be raised in ambiguous cases



for the time being. That include sets starting with a literal '[' or containing literal character sequences '--', '&&', '~', and '|'. To avoid a warning, escape them with a backslash. (Contributed by Serhiy Storchaka in [:issue:'30349'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2328); [backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2328); [backlink](#)

Unknown interpreted text role "issue".

- The result of splitting a string on a [:mod:'regular expression <re>'](#) that could match an empty string has been changed. For example splitting on `r'\s+'` will now split not only on whitespaces as it did previously, but also on empty strings before all non-whitespace characters and just before the end of the string. The previous behavior can be restored by changing the pattern to `r'\s+'`. A [:exc:'FutureWarning'](#) was emitted for such patterns since Python 3.5.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2339); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2339); [backlink](#)

Unknown interpreted text role "exc".

For patterns that match both empty and non-empty strings, the result of searching for all matches may also be changed in other cases. For example in the string `'a\n\n'`, the pattern `r'(?m)^\s*?$'` will not only match empty strings at positions 2 and 3, but also the string `'\n'` at positions 2--3. To match only blank lines, the pattern should be rewritten as `r'(?m)^[^\S\n]*$'`.

[:func:'re.sub\(\)'](#) now replaces empty matches adjacent to a previous non-empty match. For example `re.sub('x*', '-', 'abxd')` returns now `'-a-b--d-'` instead of `'-a-b-d-'` (the first minus between 'b' and 'd' replaces 'x', and the second minus replaces an empty string between 'x' and 'd').

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2355); [backlink](#)

Unknown interpreted text role "func".

(Contributed by Serhiy Storchaka in [:issue:'25054'](#) and [:issue:'32308'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2361); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2361); [backlink](#)

Unknown interpreted text role "issue".

- Change [:func:'re.escape'](#) to only escape regex special characters instead of escaping all characters other than ASCII letters, numbers, and `'_'`. (Contributed by Serhiy Storchaka in [:issue:'29995'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2363);

[backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2363);  
[backlink](#)

Unknown interpreted text role "issue".

- `:class:`tracemalloc.Traceback`` frames are now sorted from oldest to most recent to be more consistent with `:mod:`traceback``. (Contributed by Jesse Bakker in [issue:`32121`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2367);  
[backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2367);  
[backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2367);  
[backlink](#)

Unknown interpreted text role "issue".

- On OSes that support `:const:`socket.SOCK_NONBLOCK`` or `:const:`socket.SOCK_CLOEXEC`` bit flags, the `:attr:`socket.type <socket.socket.type>` no longer has them applied. Therefore, checks like `if sock.type == socket.SOCK_STREAM` work as expected on all platforms. (Contributed by Yury Selivanov in [issue:`32331`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2371);  
[backlink](#)

Unknown interpreted text role "const".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2371);  
[backlink](#)

Unknown interpreted text role "const".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2371);  
[backlink](#)

Unknown interpreted text role "attr".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2371);  
[backlink](#)

Unknown interpreted text role "issue".

- On Windows the default for the `close_fds` argument of `:class:`subprocess.Popen`` was changed from `:const:`False`` to `:const:`True`` when redirecting the standard handles. If you previously depended on handles being inherited when using `:class:`subprocess.Popen`` with standard io redirection, you will have to pass `close_fds=False` to preserve the previous behaviour, or use `:attr:`STARTUPINFO.lpAttributeList <subprocess.STARTUPINFO.lpAttributeList>`.

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

**resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2378);**  
[backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2378);**  
[backlink](#)

Unknown interpreted text role "const".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2378);**  
[backlink](#)

Unknown interpreted text role "const".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2378);**  
[backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2378);**  
[backlink](#)

Unknown interpreted text role "attr".

- `meth:'importlib.machinery.PathFinder.invalidate_caches'` -- which implicitly affects `:func:'importlib.invalidate_caches'` -- now deletes entries in `:data:'sys.path_importer_cache'` which are set to `None`. (Contributed by Brett Cannon in `:issue:'33169'`.)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2386);**  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2386);**  
[backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2386);**  
[backlink](#)

Unknown interpreted text role "data".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2386);**  
[backlink](#)

Unknown interpreted text role "issue".

- In `mod:'asyncio'`, `meth:'loop.sock_recv()' <asyncio.loop.sock_recv>`, `meth:'loop.sock_sendall()' <asyncio.loop.sock_sendall>`, `meth:'loop.sock_accept()' <asyncio.loop.sock_accept>`, `meth:'loop.getaddrinfo()' <asyncio.loop.getaddrinfo>`, `meth:'loop.getnameinfo()' <asyncio.loop.getnameinfo>` have been changed to be proper coroutine methods to match their documentation. Previously, these methods returned `:class:'asyncio.Future'` instances. (Contributed by Yury Selivanov in `:issue:'32327'`.)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2391);**

[backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2391);**  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2391);**  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2391);**  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2391);**  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2391);**  
[backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2391);**  
[backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2391);**  
[backlink](#)

Unknown interpreted text role "issue".

- `:attr:'asyncio.Server.sockets'` now returns a copy of the internal list of server sockets, instead of returning it directly. (Contributed by Yury Selivanov in [:issue:'32662'](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2402);**  
[backlink](#)

Unknown interpreted text role "attr".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2402);**  
[backlink](#)

Unknown interpreted text role "issue".

- `:attr:'Struct.format <struct.Struct.format>'` is now a `:class:'str'` instance instead of a `:class:'bytes'` instance. (Contributed by Victor Stinner in [:issue:'21071'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2406); [backlink](#)

Unknown interpreted text role "attr".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2406); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2406); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2406); [backlink](#)

Unknown interpreted text role "issue".

- `mod:argparse` subparsers can now be made mandatory by passing `required=True` to `meth:ArgumentParser.add_subparsers()` `<argparse.ArgumentParser.add_subparsers>`. (Contributed by Anthony Sottile in `issue:26510`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2410); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2410); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2410); [backlink](#)

Unknown interpreted text role "issue".

- `meth:ast.literal_eval()` is now stricter. Addition and subtraction of arbitrary numbers are no longer allowed. (Contributed by Serhiy Storchaka in `issue:31778`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2414); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2414); [backlink](#)

Unknown interpreted text role "issue".

- `meth:Calendar.itermonthdates <calendar.Calendar.itermonthdates>` will now consistently raise an exception when a date falls outside of the 0001-01-01 through 9999-12-31 range. To support applications that cannot tolerate such exceptions, the new `meth:Calendar.itermonthdays3 <calendar.Calendar.itermonthdays3>` and `meth:Calendar.itermonthdays4`

`<calendar.Calendar.itermonthdays4>` can be used. The new methods return tuples and are not restricted by the range supported by `:class:`datetime.date``. (Contributed by Alexander Belopolsky in [:issue:`28292`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2418); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2418); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2418); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2418); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2418); [backlink](#)

Unknown interpreted text role "issue".

- `:class:`collections.ChainMap`` now preserves the order of the underlying mappings. (Contributed by Raymond Hettinger in [:issue:`32792`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2428); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2428); [backlink](#)

Unknown interpreted text role "issue".

- The `submit()` method of `:class:`concurrent.futures.ThreadPoolExecutor`` and `:class:`concurrent.futures.ProcessPoolExecutor`` now raises a `:exc:`RuntimeError`` if called during interpreter shutdown. (Contributed by Mark Nemec in [:issue:`33097`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2431); [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2431); [backlink](#)

Unknown interpreted text role "class".

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

**resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2431);**  
[backlink](#)

Unknown interpreted text role "exc".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2431);**  
[backlink](#)

Unknown interpreted text role "issue".

- The `:class:`configparser.ConfigParser`` constructor now uses `read_dict()` to process the default values, making its behavior consistent with the rest of the parser. Non-string keys and values in the defaults dictionary are now being implicitly converted to strings. (Contributed by James Tocknell in [:issue:`23835`](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2436);**  
[backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2436);**  
[backlink](#)

Unknown interpreted text role "issue".

- Several undocumented internal imports were removed. One example is that `os.errno` is no longer available; use `import errno` directly instead. Note that such undocumented internal imports may be removed any time without notice, even in micro version releases.

## Changes in the C API

The function `:c:func:`PySlice_GetIndicesEx`` is considered unsafe for resizable sequences. If the slice indices are not instances of `:class:`int``, but objects that implement the `:meth:`!__index__`` method, the sequence can be resized after passing its length to `:c:func:`!PySlice_GetIndicesEx``. This can lead to returning indices out of the length of the sequence. For avoiding possible problems use new functions `:c:func:`PySlice_Unpack`` and `:c:func:`PySlice_AdjustIndices``. (Contributed by Serhiy Storchaka in [:issue:`27867`](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2452);** [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) 3.7.rst, line 2452);** [backlink](#)

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2452);** [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2452);** [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) 3.7.rst, line 2452);** [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) 3.7.rst, line 2452); [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) 3.7.rst, line 2452); [backlink](#)

Unknown interpreted text role "issue".

## CPython bytecode changes

There are two new opcodes: `:opcode:'LOAD_METHOD'` and `:opcode:'CALL_METHOD'`. (Contributed by Yuri Selivanov and INADA Naoki in [:issue:'26110'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2465); [backlink](#)

Unknown interpreted text role "opcode".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2465); [backlink](#)

Unknown interpreted text role "opcode".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2465); [backlink](#)

Unknown interpreted text role "issue".

The `:opcode:'STORE_ANNOTATION'` opcode has been removed. (Contributed by Mark Shannon in [:issue:'32550'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2468); [backlink](#)

Unknown interpreted text role "opcode".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2468); [backlink](#)

Unknown interpreted text role "issue".

## Windows-only Changes

The file used to override `:data:'sys.path'` is now called `<python-executable>._pth` instead of `'sys.path'`. See [ref:'windows\\_finding\\_modules'](#) for more information. (Contributed by Steve Dower in [:issue:'28137'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2475); [backlink](#)

Unknown interpreted text role "data".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2475); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2475); [backlink](#)

Unknown interpreted text role "issue".

## Other CPython implementation changes

In preparation for potential future changes to the public CPython runtime initialization API (see [PEP 432](#) for an initial, but somewhat outdated, draft), CPython's internal startup and configuration management logic has been significantly refactored. While these updates are intended to be entirely transparent to both embedding applications and users of the regular CPython CLI, they're being mentioned

here as the refactoring changes the internal order of various operations during interpreter startup, and hence may uncover previously latent defects, either in embedding applications, or in CPython itself. (Initially contributed by Nick Coghlan and Eric Snow as part of [:issue:'22257'](#), and further updated by Nick, Eric, and Victor Stinner in a number of other issues). Some known details affected:

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2484); [backlink](#)**

Unknown interpreted text role "issue".

- `:c:func:'PySys_AddWarnOptionUnicode'` is not currently usable by embedding applications due to the requirement to create a Unicode object prior to calling `Py_Initialize`. Use `:c:func:'PySys_AddWarnOption'` instead.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2497); [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) 3.7.rst, line 2497); [backlink](#)**

Unknown interpreted text role "c:func".

- warnings filters added by an embedding application with `:c:func:'PySys_AddWarnOption'` should now more consistently take precedence over the default filters set by the interpreter

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2501); [backlink](#)**

Unknown interpreted text role "c:func".

Due to changes in the way the default warnings filters are configured, setting `:c:data:'Py_BytesWarningFlag'` to a value greater than one is no longer sufficient to both emit `:exc:'BytesWarning'` messages and have them converted to exceptions. Instead, the flag must be set (to cause the warnings to be emitted in the first place), and an explicit `error::BytesWarning` warnings filter added to convert them to exceptions.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2505); [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) 3.7.rst, line 2505); [backlink](#)**

Unknown interpreted text role "exc".

Due to a change in the way docstrings are handled by the compiler, the implicit `return None` in a function body consisting solely of a docstring is now marked as occurring on the same line as the docstring, not on the function's header line.

The current exception state has been moved from the frame object to the co-routine. This simplified the interpreter and fixed a couple of obscure bugs caused by having swap exception state when entering or exiting a generator. (Contributed by Mark Shannon in [:issue:'25612'](#).)

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2517); [backlink](#)**

Unknown interpreted text role "issue".

## Notable changes in Python 3.7.1

Starting in 3.7.1, `:c:func:'Py_Initialize'` now consistently reads and respects all of the same environment settings as `:c:func:'Py_Main'` (in earlier Python versions, it respected an ill-defined subset of those environment variables, while in Python 3.7.0 it didn't read any of them due to [:issue:'34247'](#)). If this behavior is unwanted, set `:c:data:'Py_IgnoreEnvironmentFlag'` to 1 before calling `:c:func:'Py_Initialize'`.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2525); [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) 3.7.rst, line 2525); [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) 3.7.rst, line 2525); [backlink](#)

Unknown interpreted text role "issue".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2525); [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) 3.7.rst, line 2525); [backlink](#)

Unknown interpreted text role "c:func".

In 3.7.1 the C API for Context Variables `:ref:` was updated `<contextvarobjects_pointertype_change>` to use `:c:type:` `PyObject*` pointers. See also `:issue:` `34762`.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2532); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2532); [backlink](#)

Unknown interpreted text role "c:type".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2532); [backlink](#)

Unknown interpreted text role "issue".

In 3.7.1 the `:mod:` `tokenize` module now implicitly emits a `NEWLINE` token when provided with input that does not have a trailing new line. This behavior now matches what the C tokenizer does internally. (Contributed by Ammar Askar in `:issue:` `33899`.)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2536); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2536); [backlink](#)

Unknown interpreted text role "issue".

## Notable changes in Python 3.7.2

In 3.7.2, `:mod:` `venv` on Windows no longer copies the original binaries, but creates redirector scripts named `python.exe` and `pythonw.exe` instead. This resolves a long standing issue where all virtual environments would have to be upgraded or recreated with each Python update. However, note that this release will still require recreation of virtual environments in order to get the new scripts.

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

main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2544); [backlink](#)

Unknown interpreted text role "mod".

## Notable changes in Python 3.7.6

Due to significant security concerns, the `reuse_address` parameter of `meth:'asyncio.loop.create_datagram_endpoint'` is no longer supported. This is because of the behavior of the socket option `SO_REUSEADDR` in UDP. For more details, see the documentation for `loop.create_datagram_endpoint()`. (Contributed by Kyle Stanley, Antoine Pitrou, and Yury Selivanov in [issue:'37228'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2554); [backlink](#)

Unknown interpreted text role "meth".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2554); [backlink](#)

Unknown interpreted text role "issue".

## Notable changes in Python 3.7.10

Earlier Python versions allowed using both `;` and `&` as query parameter separators in `:func:'urllib.parse.parse_qs'` and `:func:'urllib.parse.parse_qs'`. Due to security concerns, and to conform with newer W3C recommendations, this has been changed to allow only a single separator key, with `&` as the default. This change also affects `:func:'cgi.parse'` and `:func:'cgi.parse_multipart'` as they use the affected functions internally. For more details, please see their respective documentation. (Contributed by Adam Goldschmidt, Senthil Kumaran and Ken Jin in [issue:'42967'](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2564); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2564); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2564); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2564); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Doc\whatsnew\ (cpython-main) (Doc) (whatsnew) 3.7.rst, line 2564); [backlink](#)

Unknown interpreted text role "issue".