Creating :class:`sqlite3.Connection` objects now also produces sqlite3.connect and sqlite3.connect/handle :ref:`auditing events <auditing>`. Previously these events were only produced by :func:`sqlite3.connect` calls. Patch by Erlend E. Aasland.

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 7**); *backlink*
>
> Unknown interpreted text role "class".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 7**); *backlink*
>
> Unknown interpreted text role "ref".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 7**); *backlink*
>
> Unknown interpreted text role "func".

The :mod:`ssl` module sets more secure cipher suites defaults. Ciphers without forward secrecy and with SHA-1 MAC are disabled by default. Security level 2 prohibits weak RSA, DH, and ECC keys with less than 112 bits of security. :class:`~ssl.SSLContext` defaults to minimum protocol version TLS 1.2. Settings are based on Hynek Schlawack's research.

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 19**); *backlink*
>
> Unknown interpreted text role "mod".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 19**); *backlink*
>
> Unknown interpreted text role "class".

The presence of newline or tab characters in parts of a URL could allow some forms of attacks.

Following the controlling specification for URLs defined by WHATWG :func:`urllib.parse` now removes ASCII newlines and tabs from URLs, preventing such attacks.

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 35**); *backlink*
>
> Unknown interpreted text role "func".

Ensures interpreter-level audit hooks receive the cpython.PyInterpreterState_New event when called through the _xxsubinterpreters module.

Fix invalid free in _sha3 module. The issue was introduced in 3.10.0a1. Python 3.9 and earlier are not affected.

Add audit events for :func:`sqlite3.connect/handle`, :meth:`sqlite3.Connection.enable_load_extension`, and :meth:`sqlite3.Connection.load_extension`. Patch by Erlend E. Aasland.

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 67**); *backlink*
>
> Unknown interpreted text role "func".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 67**); *backlink*
>
> Unknown interpreted text role "meth".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 67**); *backlink*
>
> Unknown interpreted text role "meth".

Add new audit event glob.glob/2 to incorporate the new *root_dir* and *dir_fd* arguments added to :func:`glob.glob` and :func:`glob.iglob`.

:mod:`ipaddress` module no longer accepts any leading zeros in IPv4 address strings. Leading zeros are ambiguous and interpreted as octal notation by some libraries. For example the legacy function :func:`socket.inet_aton` treats leading zeros as octal notation. glibc implementation of modern :func:`~socket.inet_pton` does not accept any leading zeros. For a while the :mod:`ipaddress` module used to accept ambiguous leading zeros.

Fix Regular Expression Denial of Service (ReDoS) vulnerability in :class:`urllib.request.AbstractBasicAuthHandler`. The ReDoS-vulnerable regex has quadratic worst-case complexity and it allows cause a denial of service when identifying crafted invalid RFCs. This ReDoS issue is on the client side and needs remote attackers to control the HTTP server.

Audit hooks are now fired for frame.f_code, traceback.tb_frame, and generator code/frame attribute access.

Add audit events to the :mod:`http.client` module.

Prevent classes being both a sequence and a mapping when pattern matching.

Use :c:member:`~PyTypeObject.tp_flags` on the class object to determine if the subject is a sequence or mapping when pattern matching. Avoids the need to import :mod:`collections.abc` when pattern matching.

Unknown interpreted text role "mod".

Restore proper validation of complex literal value patterns when parsing :keyword:`!match` blocks.

Set frame.f_lineno to the line number of the 'with' kweyword when executing the call to __exit__.

If the current position in a frame has no line number then set the f_lineno attribute to None, instead of -1, to conform to PEP 626. This should not normally be possible, but might occur in some unusual circumstances.

Importing the :mod:`_signal` module in a subinterpreter has no longer side effects.

The internal representation of line number tables is changed to not use sentinels, and an explicit length parameter is added to the out of process API function `PyLineTable_InitAddressRange`. This makes the handling of line number tables more robust in some circumstances.

Make :mod:`re` types immutable. Patch by Erlend E. Aasland.

Make the :class:`array.array` type immutable. Patch by Erlend E. Aasland.

Change class and module objects to lazy-create empty annotations dicts on demand. The annotations dicts are stored in the object's __dict__ for backwards compatibility.

Match patterns now use new dedicated AST nodes (`MatchValue`, `MatchSingleton`, `MatchSequence`, `MatchStar`, `MatchMapping`, `MatchClass`) rather than reusing expression AST nodes. `MatchAs` and `MatchOr` are now defined as pattern nodes rather than as expression nodes. Patch by Nick Coghlan.

Usage of `await`/`yield`/`yield from` and named expressions within an annotation is now forbidden when PEP 563 is activated.

When performing structural pattern matching (PEP 634), captured names are now left unbound until the *entire* pattern has matched successfully.

Annotations for complex targets (everything beside simple names) no longer cause any runtime effects with `from __future__ import annotations`.

:exc:`SyntaxError` exceptions raised by the interpreter will highlight the full error range of the expression that consistutes the syntax error itself, instead of just where the problem is detected. Patch by Pablo Galindo.

Revert making `from __future__ import annotations` the default. This follows the Steering Council decision to postpone PEP 563 changes to at least Python 3.11. See the original email for more information regarding the decision: https://mail.python.org/archives/list/python-dev@python.org/thread/CLVXXPQ2T2LQ5MP2Y53VVQFCXYWQJHKZ/. Patch by Pablo Galindo.

Hashes of NaN values now depend on object identity. Formerly, they always hashed to 0 even though NaN values are not equal to one another. Having the same hash for unequal values caused pile-ups in hash tables.

Improve the error message for :exc:`IndentationError` exceptions. Patch by Pablo Galindo

Constant tuple folding in bytecode optimizer now reuses tuple in constant table.

Data stack usage is much reduced for large literal and call expressions.

When printing :exc:`NameError` raised by the interpreter, :c:func:`PyErr_Display` will offer suggestions of similar variable names in the function that the exception was raised from. Patch by Pablo Galindo

Improve syntax errors for invalid dictionary literals. Patch by Pablo Galindo.

Improve syntax errors in the parser for missing commas between expressions. Patch by Pablo Galindo.

:class:`ast.alias` nodes now include source location metadata attributes e.g. lineno, col_offset.

Improve `SyntaxError` error messages for invalid comparisons. Patch by Pablo Galindo.

Move the flag for checking whether tracing is enabled to the C stack, from the heap. Should speed up dispatch in the interpreter.

Static methods (:func:`@staticmethod <staticmethod>`) and class methods (:func:`@classmethod <classmethod>`) now inherit the method attributes (`__module__`, `__name__`, `__qualname__`, `__doc__`, `__annotations__`) and have a new `__wrapped__` attribute. Patch by Victor Stinner.

Fixed a bug where `anext(ait, default)` would erroneously return None.

:data:`~object.__match_args__` is no longer allowed to be a list.

Add GEN_START opcode. Marks start of generator, including async, or coroutine and handles sending values to a newly created generator or coroutine.

Importlib now resolves relative paths when creating module spec objects from file locations.

Static methods (:func:`@staticmethod <staticmethod>`) are now callable as regular functions. Patch by Victor Stinner.

Prevented crashes in the AST validator and optimizer when compiling some absurdly long expressions like `"+0"*1000000`. :exc:`RecursionError` is now raised instead.

> **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, line 467);** *backlink*
>
> Unknown interpreted text role "exc".

When printing :exc:`AttributeError`, :c:func:`PyErr_Display` will offer suggestions of similar attribute names in the object that the exception was raised from. Patch by Pablo Galindo

> **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, line 478);** *backlink*
>
> Unknown interpreted text role "exc".

> **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, line 478);** *backlink*
>
> Unknown interpreted text role "c:func".

In @dataclass(), raise a TypeError if KW_ONLY is specified more than once.

Added a *total()* method to collections.Counter() to compute the sum of the counts.

Change :class:`netrc.netrc` to use UTF-8 encoding before using locale encoding.

> **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, line 508);** *backlink*
>
> Unknown interpreted text role "class".

Removed an unnecessary list comprehension before looping from :func:`urllib.parse.parse_qsl`. Patch by Christoph Zwerschke and Dong-hee Na.

> **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, line 518);** *backlink*
>
> Unknown interpreted text role "func".

Update bundled pip to 21.1.1.

[Enum] Deprecate `TypeError` when non-member is used in a containment check; In 3.12 `True` or `False` will be returned instead, and containment will return `True` if the value is either a member of that enum or one of its members' value.

For backwards compatibility with previous minor versions of Python, if :func:`typing.get_type_hints` receives no namespace dictionary arguments, :func:`typing.get_type_hints` will search through the global then local namespaces during evaluation of stringized type annotations (string forward references) inside a class.

> **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, line 550);** *backlink*
>
> Unknown interpreted text role "func".

> **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, line 550);** *backlink*
>
> Unknown interpreted text role "func".

[Enum] Deprecate non-standard mixin format() behavior: in 3.12 the enum member, not the member's value, will be used for format() calls.

Deprecate undocumented `cgi.log()` API.

Fixed the :mod:`turtle` module working with non-default root window.

> **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, line 582);** *backlink*

Unknown interpreted text role "mod".

Update bundled pip to 21.1 and setuptools to 56.0.0

Fix a bug in the pure-Python pickle implementation when using protocol 5, where bytearray instances that occur several time in the pickled object graph would incorrectly unpickle into repeated copies of the bytearray object.

In `importlib.metadata`, provide a uniform interface to `Description`, allow for any field to be encoded with multiline values, remove continuation lines from multiline values, and add a `.json` property for easy access to the PEP 566 JSON-compatible form. Sync with `importlib_metadata 4.0`.

OpenSSL 3.0.0: :meth:`~ssl.SSLContext.load_verify_locations` now returns a consistent error message when cadata contains no valid certificate.

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 624); *backlink*
>
> Unknown interpreted text role "meth".

:mod:`urllib` can now convert Windows paths with `\\?\` prefixes into URL paths.

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 634); *backlink*
>
> Unknown interpreted text role "mod".

Add :func:`inspect.get_annotations`, which safely computes the annotations defined on an object. It works around the quirks of accessing the annotations from various types of objects, and makes very few assumptions about the object passed in. :func:`inspect.get_annotations` can also correctly un-stringize stringized annotations.

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 644); *backlink*
>
> Unknown interpreted text role "func".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 644); *backlink*
>
> Unknown interpreted text role "func".

:func:`inspect.signature`, :func:`inspect.from_callable`, and :func:`inspect.from_function` now call :func:`inspect.get_annotations` to retrieve annotations. This means :func:`inspect.signature` and :func:`inspect.from_callable` can now un-stringize stringized annotations, too.

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 650); *backlink*
>
> Unknown interpreted text role "func".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 650); *backlink*
>
> Unknown interpreted text role "func".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 650); *backlink*
>
> Unknown interpreted text role "func".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 650); *backlink*
>
> Unknown interpreted text role "func".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 650); *backlink*

Unknown interpreted text role "func".

platform.win32_ver derives the windows version from sys.getwindowsversion().platform_version which in turn derives the version from kernel32.dll (which can be of a different version than Windows itself). Therefore change the platform.win32_ver to determine the version using the platform module's _syscmd_ver private function to return an accurate version.

The :mod:`ssl` module now uses SSL_read_ex and SSL_write_ex internally. The functions support reading and writing of data larger than 2 GB. Writing zero-length data no longer fails with a protocol violation error.

Port _ssl extension module to multiphase initialization.

:mod:`ssl` now raises DeprecationWarning for OP_NO_SSL/TLS* options, old TLS versions, old protocols, and other features that have been deprecated since Python 3.6, 3.7, or OpenSSL 1.1.0.

PEP 612 is now implemented purely in Python; builtin types.GenericAlias objects no longer include typing.ParamSpec in __parameters__ (with the exception of collections.abc.Callable's GenericAlias). This means previously invalid uses of ParamSpec (such as list[P]) which worked in earlier versions of Python 3.10 alpha, will now raise TypeError during substitution.

The :mod:`multiprocessing` Server class now explicitly catches :exc:`SystemExit` and closes the client connection in this case. It happens when the Server.serve_client() method reaches the end of file (EOF).

Remove unused imports: pyclbr no longer uses copy, and typing no longer uses ast. Patch by Victor Stinner.

Remove an unneeded copy of the namespace passed to dataclasses.make_dataclass().

Add __iter__() method to :class:`bz2.BZ2File`, :class:`gzip.GzipFile`, and :class:`lzma.LZMAFile`. It makes iterating them about 2x faster. Patch by Inada Naoki.

Deprecate io.OpenWrapper and _pyio.OpenWrapper: use io.open and _pyio.open instead. Until Python 3.9, _pyio.open was not a static method and builtins.open was set to OpenWrapper to not become a bound method when set to a class variable. _io.open is a built-in function whereas _pyio.open is a Python function. In Python 3.10, _pyio.open() is now a static method, and builtins.open() is now io.open().

The Python :func:`_pyio.open` function becomes a static method to behave as :func:`io.open` built-in function: don't become a bound method when stored as a class variable. It becomes possible since static methods are now callable in Python 3.10. Moreover, :func:`_pyio.OpenWrapper` becomes a simple alias to :func:`_pyio.open`. Patch by Victor Stinner.

> **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 779); *backlink***
>
> Unknown interpreted text role "func".

> **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 779); *backlink***
>
> Unknown interpreted text role "func".

> **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 779); *backlink***
>
> Unknown interpreted text role "func".

> **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 779); *backlink***
>
> Unknown interpreted text role "func".

Fix :exc:`KeyError` raised in :func:`typing.get_type_hints` due to synthetic modules that don't appear in `sys.modules`.

> **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 792); *backlink***
>
> Unknown interpreted text role "exc".

> **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 792); *backlink***
>
> Unknown interpreted text role "func".

When :class:`subprocess.Popen` args are provided as a string or as :class:`pathlib.Path`, the Popen instance repr now shows the right thing.

> **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 802); *backlink***
>
> Unknown interpreted text role "class".

> **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 802); *backlink***
>
> Unknown interpreted text role "class".

[Enum] ensure exceptions raised in `_missing__` are released

fix issue with enum member name matching the start of a private variable name

Fixed the return value of `TypeVar.__ror__`. Patch by Jelle Zijlstra.

Add match_args parameter to @dataclass decorator to allow suppression of __match_args__ generation.

OpenSSL 3.0.0: define `OPENSSL_API_COMPAT` 1.1.1 to suppress deprecation warnings. Python requires OpenSSL 1.1.1 APIs.

Mocks can no longer be used as the specs for other Mocks. As a result, an already-mocked object cannot have an attribute mocked using `autospec=True` or be the subject of a `create_autospec(...)` call. This can uncover bugs in tests since these Mock-derived Mocks will always pass certain tests (e.g. :func:`isinstance`) and builtin assert functions (e.g. assert_called_once_with) will unconditionally pass.

Add :data:`ssl.OP_IGNORE_UNEXPECTED_EOF` constants (OpenSSL 3.0.0)

Improve `bz2.BZ2File` performance by removing the RLock from BZ2File. This makes BZ2File thread unsafe in the face of multiple simultaneous readers or writers, just like its equivalent classes in :mod:`gzip` and :mod:`lzma` have always been. Patch by Inada Naoki.

OpenSSL 3.0.0: Don't call the password callback function a second time when first call has signaled an error condition.

The header files for :mod:`ssl` error codes are now OpenSSL version-specific. Exceptions will now show correct reason and library codes. The `make_ssl_data.py` script has been rewritten to use OpenSSL's text file with error codes.

Implement PEP 647 in the :mod:`typing` module by adding :data:`TypeGuard`.

:func:`os.path.realpath` now accepts a *strict* keyword-only argument. When set to `True`, :exc:`OSError` is raised if a path doesn't exist or a symlink loop is encountered.

In `importlib.metadata`, incorporate changes from importlib_metadata 3.10: Add mtime-based caching during distribution discovery. Flagged use of dict result from `entry_points()` as deprecated.

The `P.args` and `P.kwargs` attributes of :class:`typing.ParamSpec` are now instances of the new classes :class:`typing.ParamSpecArgs` and :class:`typing.ParamSpecKwargs`, which enables a more useful `repr()`. Patch by Jelle Zijlstra.

Add an `encoding` parameter :func:`logging.fileConfig()`.

Add `encoding` and `errors` parameters to :func:`fileinput.input` and :class:`fileinput.FileInput`.

A `simple_enum` decorator is added to the `enum` module to convert a normal class into an Enum. `test_simple_enum` added to test simple enums against a corresponding normal Enum. Standard library modules updated to use `simple_enum`.

Fix an issue where :data:`~object.__match_args__` generation could fail for some :mod:`dataclasses`.

Fix :mod:`sqlite3` regression for zero-sized blobs with converters, where `b""` was returned instead of `None`. The regression was introduced by GH-24723. Patch by Erlend E. Aasland.

:mod:`tkinter` dialog windows are now recognized as dialogs by window managers on macOS and X Window.

The following `threading` methods are now deprecated and should be replaced:

- currentThread => :func:`threading.current_thread`

  > **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 1026); *backlink***
  >
  > Unknown interpreted text role "func".

- activeCount => :func:`threading.active_count`

  > **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 1028); *backlink***
  >
  > Unknown interpreted text role "func".

- Condition.notifyAll => :meth:`threading.Condition.notify_all`

  > **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 1030); *backlink***
  >
  > Unknown interpreted text role "meth".

- Event.isSet => :meth:`threading.Event.is_set`

  > **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 1032); *backlink***
  >
  > Unknown interpreted text role "meth".

- Thread.setName => :attr:`threading.Thread.name`

  > **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 1034); *backlink***
  >
  > Unknown interpreted text role "attr".

- thread.getName => :attr:`threading.Thread.name`

  > **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 1036); *backlink***
  >
  > Unknown interpreted text role "attr".

- Thread.isDaemon => :attr:`threading.Thread.daemon`

  > **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 1038); *backlink***
  >
  > Unknown interpreted text role "attr".

- Thread.setDaemon => :attr:`threading.Thread.daemon`

  > **System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, line 1040); *backlink***
  >
  > Unknown interpreted text role "attr".

Patch by Jelle Zijlstra.

Deprecate find_module() and find_loader() implementations in importlib and zipimport.

:func:`turtle.textinput` and :func:`turtle.numinput` create now a transient window working on behalf of the canvas window.

Add the ability to specify keyword-only fields to dataclasses. These fields will become keyword-only arguments to the generated __init__.

Fix problem with :attr:`~ssl.SSLContext.hostname_checks_common_name`. OpenSSL does not copy hostflags from *struct SSL_CTX* to *struct SSL*.

Improve error message for :func:`tarfile.open` when :mod:`lzma` / :mod:`bz2` are unavailable. Patch by Anthony Sottile.

Allow :class:`bytes` separator argument in urllib.parse.parse_qs and urllib.parse.parse_qsl when parsing :class:`str` query strings. Previously, this raised a TypeError.

Improve :mod:`sqlite3` error handling: sqlite3_value_blob() errors that set SQLITE_NOMEM now raise :exc:`MemoryError`. Patch by Erlend E. Aasland.

Unknown interpreted text role "exc".

New functions :func:`sysconfig.get_preferred_scheme` and :func:`sysconfig.get_default_scheme` are added to query a platform for its preferred "user", "home", and "prefix" (default) scheme names.

Improve :meth:`sqlite3.Connection.backup` error handling. The error message for non-existent target database names is now `unknown database <database name>` instead of `SQL logic error`. Patch by Erlend E. Aasland.

Install schemes in :mod:`distutils.command.install` are now loaded from :mod:`sysconfig`.

:mod:`distutils.sysconfig` has been merged to :mod:`sysconfig`.

Fixed processing of a dataclass that inherits from a frozen dataclass with no fields. It is now correctly detected as an error.

:mod:`pprint` now has support for :class:`dataclasses.dataclass`. Patch by Lewis Gaul.

Add *pathlib.Path.hardlink_to()* method that supersedes *link_to()*. The new method has the same argument order as *symlink_to()*.

:func:`typing.get_type_hints` now checks the local namespace of a class when evaluating PEP 563 annotations inside said class.

Add `slots` parameter to `dataclasses.dataclass` decorator to automatically generate `__slots__` for class. Patch provided by Yurii Karabas.

Deprecated use of :func:`asyncio.get_event_loop` without running event loop. Emit deprecation warning for :mod:`asyncio` functions which implicitly create a :class:`~asyncio.Future` or :class:`~asyncio.Task` objects if there is no running event loop and no explicit *loop* argument is passed: :func:`~asyncio.ensure_future`, :func:`~asyncio.wrap_future`, :func:`~asyncio.gather`, :func:`~asyncio.shield`, :func:`~asyncio.as_completed` and constructors of :class:`~asyncio.Future`, :class:`~asyncio.Task`, :class:`~asyncio.StreamReader`, :class:`~asyncio.StreamReaderProtocol`.

Unknown interpreted text role "class".

Certificate and PrivateKey classes were added to the ssl module. Certificates and keys can now be loaded from memory buffer, too.

Use a new output buffer management code for :mod:`bz2` / :mod:`lzma` / :mod:`zlib` modules, and add `.readall()` function to `_compression.DecompressReader` class. These bring some performance improvements. Patch by Ma Lin.

The :func:`ssl.get_server_certificate` function now has a *timeout* parameter.

Fix thread locks in zlib module may go wrong in rare case. Patch by Ma Lin.

Fix dataclasses with `InitVar`s and :func:`~dataclasses.replace()`. Patch by Claudiu Popa.

Expose X509_V_FLAG_PARTIAL_CHAIN ssl flag

:func:`ssl.RAND_status` now returns a boolean value (as documented) instead of `1` or `0`.

:meth:`pathlib.Path.stat` and :meth:`~pathlib.Path.chmod` now accept a *follow_symlinks* keyword-only argument for consistency with corresponding functions in the :mod:`os` module.

main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d)3.10.0b1.rst, line 1302); *backlink*

Unknown interpreted text role "meth".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-`
`main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d)3.10.0b1.rst`**, line 1302);** *backlink*

Unknown interpreted text role "mod".

:func:`os.path.expanduser()` now refuses to guess Windows home directories if the basename of current user's home directory does not match their username.

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-`
`main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d)3.10.0b1.rst`**, line 1313);** *backlink*

Unknown interpreted text role "func".

:meth:`pathlib.Path.expanduser()` and :meth:`~pathlib.Path.home()` now consistently raise :exc:`RuntimeError` exception when a home directory cannot be resolved. Previously a :exc:`KeyError` exception could be raised on Windows when the `USERNAME` environment variable was unset.

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-`
`main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d)3.10.0b1.rst`**, line 1317);** *backlink*

Unknown interpreted text role "meth".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-`
`main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d)3.10.0b1.rst`**, line 1317);** *backlink*

Unknown interpreted text role "meth".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-`
`main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d)3.10.0b1.rst`**, line 1317);** *backlink*

Unknown interpreted text role "exc".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-`
`main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d)3.10.0b1.rst`**, line 1317);** *backlink*

Unknown interpreted text role "exc".

Added SNI support to :func:`ssl.get_server_certificate`.

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-`
`main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d)3.10.0b1.rst`**, line 1329);** *backlink*

Unknown interpreted text role "func".

Covariance, Pearson's correlation, and simple linear regression functionality was added to statistics module. Patch by Tymoteusz WoÅ,odÅ°ko.

Provide a locale.localize() function, which converts a normalized number string into a locale format.

Fix a regression in the handling of ctypes' :data:`ctypes.c_wchar_p` type: embedded null characters would cause a :exc:`ValueError` to be raised. Patch by Zackery Spytz.

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-`
`main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d)3.10.0b1.rst`**, line 1358);** *backlink*

Unknown interpreted text role "data".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-`
`main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d)3.10.0b1.rst`**, line 1358);** *backlink*

Unknown interpreted text role "exc".

Add "Annotations Best Practices" document as a new HOWTO.

Document the new :const:`Py_TPFLAGS_MAPPING` and :const:`Py_TPFLAGS_SEQUENCE` type flags.

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, **line 1378**); *backlink*
>
> Unknown interpreted text role "const".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, **line 1378**); *backlink*
>
> Unknown interpreted text role "const".

The documentation on the PyContextVar C-API was clarified.

Update dataclasses documentation to express that FrozenInstanceError is derived from AttributeError.

Fix the Sphinx glossary_search extension: create the _static/ sub-directory if it doesn't exist.

Update documentation to reflect that unparenthesized lambda expressions can no longer be the expression part in an `if` clause in comprehensions and generator expressions since Python 3.9.

Fixing the example code in Doc/extending/extending.rst to declare and initialize the pmodule variable to be of the right type.

Fix test_logging.test_namer_rotator_inheritance() on Windows: use :func:`os.replace` rather than :func:`os.rename`. Patch by Victor Stinner.

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, **line 1438**); *backlink*
>
> Unknown interpreted text role "func".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, **line 1438**); *backlink*
>
> Unknown interpreted text role "func".

Fix a race condition in the SMTP test of test_logging. Don't close a file descriptor (socket) from a different thread while asyncore.loop() is polling the file descriptor. Patch by Victor Stinner.

:mod:`test.libregrtest` now marks a test as ENV_CHANGED (altered the execution environment) if a thread raises an exception but does not catch it. It sets a hook on :func:`threading.excepthook`. Use `--fail-env-changed` option to mark the test as failed. Patch by Victor Stinner.

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, **line 1459**); *backlink*
>
> Unknown interpreted text role "mod".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, **line 1459**); *backlink*
>
> Unknown interpreted text role "func".

Tests multiple OpenSSL versions on GitHub Actions. Use ccache to speed up testing.

OpenSSL 3.0.0: Disable testing of legacy protocols TLS 1.0 and 1.1. Tests are failing with TLSV1_ALERT_INTERNAL_ERROR.

Improved generated code refresh (AST/tokens/opcodes/keywords) on Windows.

Implement PEP 644. Python now requires OpenSSL 1.1.1 or newer.

Adds additional arguments to :func:`os.startfile` function.

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, **line 1510**); *backlink*
>
> Unknown interpreted text role "func".

Avoid raising errors from :meth:`pathlib.Path.exists()` when passed an invalid filename.

Fixed :func:`os.stat` failing on inaccessible directories with a trailing slash, rather than falling back to the parent directory's metadata. This implicitly affected :func:`os.path.exists` and :func:`os.path.isdir`.

Fixed decoding of host names in :func:`socket.gethostbyaddr` and :func:`socket.gethostbyname_ex`.

Updated pegen regeneration script on Windows to find and use Python 3.8 or higher. Prior to this, pegen regeneration already required 3.8 or higher, but the script may have used lower versions of Python.

Actually updates Windows release to OpenSSL 1.1.1k. Earlier releases were mislabelled and actually included 1.1.1i again.

Update Tcl and Tk to 8.6.11 in Windows installer.

Upgrade Windows installer to use SQLite 3.35.5.

Fix `WindowsConsoleIO` errors in the presence of fd redirection. Patch by Segev Finer.

Fix check for macOS SDK paths when building Python. Narrow search to match contents of SDKs, namely only files in `/System/Library`, `/System/IOSSupport`, and `/usr` other than `/usr/local`. Previously, anything under `/System` was assumed to be in an SDK which causes problems with the new file system layout in 10.15+ where user file systems may appear to be mounted under `/System`. Paths in `/Library` were also incorrectly treated as SDK locations.

Drop support for MACOSX_DEPLOYMENT_TARGET < 10.3

Provide "python3.x-intel64" executable to allow reliably forcing macOS universal2 framework builds to run under Rosetta 2 Intel-64 emulation on Apple Silicon Macs. This can be useful for testing or when universal2 wheels are not yet available.

Build SQLite with `SQLITE_OMIT_AUTOINIT` on macOS. Patch by Erlend E. Aasland.

Update macOS installer to use SQLite 3.35.4.

`Mac/BuildScript/build-installer.py` will now use "--enable-optimizations" and `--with-lto` when building on macOS 10.15 or later.

Add mouse actions to the shell sidebar. Left click and optional drag selects one or more lines, as with the editor line number sidebar. Right click after selecting raises a context menu with 'copy with prompts'. This zips together prompts from the sidebar with lines from the selected text.

Fix reference leak in test_sidebar and test_squeezer. Patches by Terry Jan Reedy and Pablo Galindo

Indent IDLE Shell input with spaces instead of tabs

IDLE dialog windows are now recognized as dialogs by window managers on macOS and X Window.

IDLE's shell now shows prompts in a separate side-bar.

Add a new :c:data:`Py_TPFLAGS_DISALLOW_INSTANTIATION` type flag to disallow creating type instances. Patch by Victor Stinner.

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 1714**); *backlink*

Unknown interpreted text role "c:data".

Remove the now unused `PYMALLOC_DEBUG` macro. Debug hooks on memory allocators are now installed by default if Python is built in debug mode (if `Py_DEBUG` macro is defined). Moreover, they can now be used on Python build in release mode (ex: using `PYTHONMALLOC=debug` environment variable).

_PyInterpreterState_IDIncref() now calls _PyInterpreterState_IDInitref() and always increments id_refcount. Previously, calling _xxsubinterpreters.get_current() could create an id_refcount inconsistency when a _xxsubinterpreters.InterpreterID object was deallocated. Patch by Victor Stinner.

Add new C-API functions to control the state of the garbage collector: :c:func:`PyGC_Enable()`, :c:func:`PyGC_Disable()`, :c:func:`PyGC_IsEnabled()`, corresponding to the functions in the :mod:`gc` module.

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 1750**); *backlink*

Unknown interpreted text role "c:func".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 1750**); *backlink*

Unknown interpreted text role "c:func".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 1750**); *backlink*

Unknown interpreted text role "c:func".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 1750**); *backlink*

Unknown interpreted text role "mod".

Introduce :const:`Py_TPFLAGS_IMMUTABLETYPE` flag for immutable type objects, and modify :c:func:`PyType_Ready` to set it for static types. Patch by Erlend E. Aasland.

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 1762**); *backlink*

Unknown interpreted text role "const".

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 1762**); *backlink*

Unknown interpreted text role "c:func".

:c:func:`PyMem_Calloc` is now available in the limited C API (`Py_LIMITED_API`).

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 1773**); *backlink*

Unknown interpreted text role "c:func".

:c:func:`PyOS_ReadlineFunctionPointer` is no longer exported by limited C API headers and by `python3.dll` on Windows. Like any function that takes `FILE*`, it is not part of the stable ABI.

System Message: ERROR/3 (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main) (Misc) (NEWS.d) 3.10.0b1.rst`, **line 1783**); *backlink*

Unknown interpreted text role "c:func".

Stable ABI and limited API definitions are generated from a central manifest (PEP 652).

Add the :c:func:`Py_Is(x, y) <Py_Is>` function to test if the *x* object is the *y* object, the same as `x is y` in Python. Add also the :c:func:`Py_IsNone`, :c:func:`Py_IsTrue`, :c:func:`Py_IsFalse` functions to test if an object is, respectively, the `None` singleton, the `True` singleton or the `False` singleton. Patch by Victor Stinner.

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, **line 1804);** *backlink*
>
> Unknown interpreted text role "c:func".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, **line 1804);** *backlink*
>
> Unknown interpreted text role "c:func".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, **line 1804);** *backlink*
>
> Unknown interpreted text role "c:func".

> **System Message: ERROR/3** (`D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\(cpython-main)(Misc)(NEWS.d)3.10.0b1.rst`, **line 1804);** *backlink*
>
> Unknown interpreted text role "c:func".