

`mod:runpy` now uses `meth:io.open_code` to open code files. Patch by Jason Killen.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 7); [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] 3.9.0a1.rst, line 7); [backlink](#)

Unknown interpreted text role "meth".

Add additional audit events for the `mod:ctypes` module.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 17); [backlink](#)

Unknown interpreted text role "mod".

Fixes audit event for `func:os.system` to be named `os.system`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 26); [backlink](#)

Unknown interpreted text role "func".

Escape the server title of `class:xmllrpc.server.DocXMLRPCServer` when rendering the document page as HTML. (Contributed by Dong-hee Na in [issue:38243](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 35); [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] 3.9.0a1.rst, line 35); [backlink](#)

Unknown interpreted text role "issue".

Update vendorized expat library version to 2.2.8, which resolves CVE-2019-15903.

Fixes `email_header_value_parser.get_unstructured` going into an infinite loop for a specific case in which the email header does not have trailing whitespace, and the case in which it contains an invalid encoded word. Patch by Ashwin Ramaswami.

Fix an infinite loop when parsing specially crafted email headers. Patch by Abhilash Raj.

Adds audit events for the range of supported run commands (see [ref:using-on-general](#)).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 78); [backlink](#)

Unknown interpreted text role "ref".

`ssl.match_hostname()` no longer accepts IPv4 addresses with additional text after the address and only quad-dotted notation without trailing whitespaces. Some `inet_aton()` implementations ignore whitespace and all data after whitespace, e.g. '127.0.0.1 whatever'.

Adds audit events for `mod:ensurepip`, `mod:ftplib`, `mod:glob`, `mod:imaplib`, `mod:ntplib`, `mod:pdb`, `mod:poplib`, `mod:shutil`, `mod:smtplib`, `mod:sqlite3`, `mod:subprocess`, `mod:telnetlib`, `mod:tempfile` and `mod:webbrowser`, as well as `func:os.listdir`, `func:os.scandir` and `func:breakpoint`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 100); [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] 3.9.0a1.rst, line 100); [backlink](#)

main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 100); [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] 3.9.0a1.rst, line 100); [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] 3.9.0a1.rst, line 100); [backlink](#)

Unknown interpreted text role "func".

:func:`io.open_code` is now used when reading :file:`.pth` files.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 113); [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] 3.9.0a1.rst, line 113); [backlink](#)

Unknown interpreted text role "file".

Updated OpenSSL to 1.1.1c in Windows installer

Fix parsing of invalid email addresses with more than one @ (e.g. a@b@c.com) to not return the part before 2nd @ as valid email address. Patch by maxking & jpic.

Replace `Py_FatalError()` call with a regular :exc:`RuntimeError` exception in :meth:`float.__getformat__`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 142); [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] 3.9.0a1.rst, line 142); [backlink](#)

Unknown interpreted text role "meth".

Optimized :func:`math.floor()`, :func:`math.ceil()` and :func:`math.trunc()` for floats.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 152); [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] 3.9.0a1.rst, line 152); [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] 3.9.0a1.rst, line 152); [backlink](#)

Unknown interpreted text role "func".

Fixed a bug in the compiler that was causing to raise in the presence of break statements and continue statements inside always false while loops. Patch by Pablo Galindo.

Optimized some set operations (e.g. |, ^, and -) of `dict_keys.d.keys()` | other was slower than `set(d) | other` but they are almost same performance for now.

`"".replace("", s, n)` now returns `s` instead of an empty string for all non-zero `n`. There are similar changes for :class:`bytes` and

`:class:'bytearray'` objects.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 184); [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] 3.9.0a1.rst, line 184); [backlink](#)

Unknown interpreted text role "class".

Fixed line numbers and column offsets for AST nodes for calls without arguments in decorators.

Fix a segmentation fault when using reverse iterators of empty `dict` objects. Patch by Dong-hee Na and Inada Naoki.

`:class:'bytearray'`, `:class:'~array.array'` and `:class:'~mmap.mmap'` objects allow now to export more than 2^{*31} buffers at a time.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 215); [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] 3.9.0a1.rst, line 215); [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] 3.9.0a1.rst, line 215); [backlink](#)

Unknown interpreted text role "class".

Fixed a bug where the scope of named expressions was not being resolved correctly in the presence of the `global` keyword. Patch by Pablo Galindo.

Activate the `GC_DEBUG` macro for debug builds of the interpreter (when `Py_DEBUG` is set). Patch by Pablo Galindo.

When the garbage collector makes a collection in which some objects resurrect (they are reachable from outside the isolated cycles after the finalizers have been executed), do not block the collection of all objects that are still unreachable. Patch by Pablo Galindo and Tim Peters.

When cyclic garbage collection (gc) runs finalizers that resurrect unreachable objects, the current gc run ends, without collecting any cyclic trash. However, the statistics reported by `collect()` and `get_stats()` claimed that all cyclic trash found was collected, and that the resurrected objects were collected. Changed the stats to report that none were collected.

In debug mode, `:cfunc:'PyObject_GC_Track'` now calls `tp_traverse()` of the object type to ensure that the object is valid: test that objects visited by `tp_traverse()` are valid.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 271); [backlink](#)

Unknown interpreted text role "c:func".

Remove unnecessary intersection and update set operation in dictview with empty set. (Contributed by Dong-hee Na in [issue:'38210'](#).)

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 282); [backlink](#)

Unknown interpreted text role "issue".

Check the error from the system's underlying `crypt` or `crypt_r`.

On FreeBSD, Python no longer calls `fedisableexcept()` at startup to control the floating point control mode. The call became useless since FreeBSD 6: it became the default mode.

Fix a bug due to the interaction of weakrefs and the cyclic garbage collector. We must clear any weakrefs in garbage in order to prevent their callbacks from executing and causing a crash.

Fix warnings options priority: `PyConfig.warnoptions` has the highest priority, as stated in the [PEP 587](#).

Predict `BUILD_MAP_UNPACK_WITH_CALL -> CALL_FUNCTION_EX` opcode pairs in the main interpreter loop. Patch by Brandt Bucher.

Improve error handling for the `assert_has_calls` and `assert_has_awaits` methods of mocks. Fixed a bug where any errors encountered while binding the expected calls to the mock's spec were silently swallowed, leading to misleading error output.

Better control over symbol visibility is provided through use of the visibility attributes available in gcc >= 4.0, provided in a uniform way across POSIX and Windows. The POSIX build files have been updated to compile with `-fvisibility=hidden`, minimising exported symbols.

Optimized the `class:dict` constructor and the `meth:~dict.update` method for the case when the argument is a dict.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 367); [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] 3.9.0a1.rst, line 367); [backlink](#)

Unknown interpreted text role "meth".

Python now dumps path configuration if it fails to import the Python codecs of the filesystem and stdio encodings.

Allow to call `async_generator_athrow().throw(...)` even for non-started async generator helper. It fixes annoying warning at the end of `func:asyncio.run` call.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 387); [backlink](#)

Unknown interpreted text role "func".

Fix an off-by-one error in `PyState_AddModule` that could cause out-of-bounds memory access.

The `select` module is now PEP-384 compliant and no longer has static state

`ast` module updated to PEP-384 and all statics removed

The `struct` module is now PEP-384 compatible

The `random` module is now PEP-384 compatible

`zlib` module made PEP-384 compatible

Make `pwd` extension module PEP-384 compatible

`grp` module made PEP-384 compatible

Make `_posixsubprocess` PEP-384 compatible

Make `termios` extension module PEP-384 compatible

Fixed comparing and creating of `InterpreterID` and `ChannelID`.

Fix possible signed integer overflow when handling slices. Patch by hongweipeng.

Fixed silencing arbitrary errors if an attribute lookup fails in several sites. Only `AttributeError` should be silenced.

Optimize `set difference_update` for the case when the other set is much larger than the base set. (Suggested by Evgeny Kapun with code contributed by Michele OrrÃ).

The implementation of `func:~unicodedata.is_normalized` has been greatly sped up on strings that aren't normalized, by implementing the full normalization-quick-check algorithm from the Unicode standard.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 529); [backlink](#)

Unknown interpreted text role "func".

Adjust correctly the recursion level in the syntable generation for named expressions. Patch by Pablo Galindo.

The `CHECK_SMALL_INT` macro used inside `file:Object/longobject.c` has been replaced with an explicit `return` at each call site.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 550); [backlink](#)

Unknown interpreted text role "file".

Fix `:func:`codecs.lookup`` to normalize the encoding name the same way than `:func:`encodings.normalize_encoding``, except that `:func:`codecs.lookup`` also converts the name to lower case.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 560); [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] 3.9.0a1.rst, line 560); [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] 3.9.0a1.rst, line 560); [backlink](#)

Unknown interpreted text role "func".

Fixed compilation of `keyword:`break`` and `keyword:`continue`` in the `keyword:`finally`` block when the corresponding `keyword:`try`` block contains `keyword:`return`` with a non-constant value.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 571); [backlink](#)

Unknown interpreted text role "keyword".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 571); [backlink](#)

Unknown interpreted text role "keyword".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 571); [backlink](#)

Unknown interpreted text role "keyword".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 571); [backlink](#)

Unknown interpreted text role "keyword".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 571); [backlink](#)

Unknown interpreted text role "keyword".

Improve import error message for partially initialized module on circular `from imports` - by Anthony Sottile.

Fix handling of negative indices in `:c:member:`~PySequenceMethods.sq_item`` of `:class:`bytearray``. Patch by Sergey Fedoseev.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 592); [backlink](#)

Unknown interpreted text role "c:member".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 592); [backlink](#)

Unknown interpreted text role "class".

Slightly improve performance of `:c:func:`PyLong_FromUnsignedLong``, `:c:func:`PyLong_FromUnsignedLongLong`` and `:c:func:`PyLong_FromSize_t``. Patch by Sergey Fedoseev.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 602); [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] 3.9.0a1.rst, line 602); [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] 3.9.0a1.rst, line 602); [backlink](#)

Unknown interpreted text role "c:func".

Ensure explicit relative imports from interactive sessions and scripts (having no parent package) always raise `ImportError`, rather than treating the current module as the package. Patch by Ben Lewis.

Reverted `:issue:`32912``: emitting `:exc:`SyntaxWarning`` instead of `:exc:`DeprecationWarning`` for invalid escape sequences in string and bytes literals.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 624); [backlink](#)

Unknown interpreted text role "issue".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 624); [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] 3.9.0a1.rst, line 624); [backlink](#)

Unknown interpreted text role "exc".

[PEP 572](#): As described in the PEP, assignment expressions now raise `:exc:`SyntaxError`` when their interaction with comprehension scoping results in an ambiguous target scope.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 635); [backlink](#)

Unknown interpreted text role "exc".

The `TargetScopeError` subclass originally proposed by the PEP has been removed in favour of just raising regular syntax errors for the disallowed cases.

Fix potential use of uninitialized memory in `:func:`os.wait3``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 650); [backlink](#)

Unknown interpreted text role "func".

Decoding bytes objects larger than 2GiB is faster and no longer fails when a multibyte characters spans a chunk boundary.

The `:keyword:`assert`` statement now works properly if the `:exc:`AssertionError`` exception is being shadowed. Patch by Zackery Spytz

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 669); [backlink](#)

Unknown interpreted text role "keyword".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 669); [backlink](#)

Unknown interpreted text role "exc".

Removed object cache (`free_list`) for bound method objects. Temporary bound method objects are less used than before thanks to the `LOAD_METHOD` opcode and the `_PyObject_VectorcallMethod` C API.

Fixed minor inconsistency in `meth:'.list.__contains__'`, `meth:'.tuple.__contains__'` and a few other places. The collection's item is now always at the left and the needle is on the right of `==`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 690); [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] 3.9.0a1.rst, line 690); [backlink](#)

Unknown interpreted text role "meth".

Update differing exception between `meth:'.builtins.__import__'` and `meth:'.importlib.__import__'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 701); [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] 3.9.0a1.rst, line 701); [backlink](#)

Unknown interpreted text role "meth".

When adding a wrapper descriptor from one class to a different class (for example, setting `__add__ = str.__add__` on an `int` subclass), an exception is correctly raised when the operator is called.

Swap the positions of the `posonlyargs` and `args` parameters in the constructor of `:class:'.ast.parameters'` nodes.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 722); [backlink](#)

Unknown interpreted text role "class".

Optimized `pymalloc` for non PGO build.

Compute allocated `pymalloc` blocks inside `_Py_GetAllocatedBlocks()`. This slows down `_Py_GetAllocatedBlocks()` but gives a small speedup to `_PyObject_Malloc()` and `_PyObject_Free()`.

Fix `:func:'.sys.excepthook'` and `:c:func:'.PyErr_Display'` if a filename is a bytes string. For example, for a `SyntaxError` exception where the `filename` attribute is a bytes string.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 752); [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] 3.9.0a1.rst, line 752); [backlink](#)

Unknown interpreted text role "c:func".

Fix `SyntaxError` indicator printing too many spaces for multi-line strings - by Anthony Sottile.

`meth:'.bytearray.extend'` now correctly handles errors that arise during iteration. Patch by Brandt Bucher.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 773); [backlink](#)

Unknown interpreted text role "meth".

The undocumented `sys.callstats()` function has been removed. Since Python 3.7, it was deprecated and always returned `None`.

It required a special build option `CALL_PROFILE` which was already removed in Python 3.7.

Remove `sys.getcheckinterval()` and `sys.setcheckinterval()` functions. They were deprecated since Python 3.2. Use `:func:'sys.getswitchinterval'` and `:func:'sys.setswitchinterval'` instead. Remove also `check_interval` field of the `PyInterpreterState` structure.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 794); [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] 3.9.0a1.rst, line 794); [backlink](#)

Unknown interpreted text role "func".

In development mode and in debug build, *encoding* and *errors* arguments are now checked on string encoding and decoding operations. Examples: `:func:'open'`, `:meth:'str.encode'` and `:meth:'bytes.decode'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 806); [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] 3.9.0a1.rst, line 806); [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] 3.9.0a1.rst, line 806); [backlink](#)

Unknown interpreted text role "meth".

By default, for best performances, the *errors* argument is only checked at the first encoding/decoding error, and the *encoding* argument is sometimes ignored for empty strings.

Optimized decoding short ASCII string with UTF-8 and `ascii` codecs. `b"foo".decode()` is about 15% faster. Patch by Inada Naoki.

Improved support of the surrogatepass error handler in the UTF-8 and UTF-16 incremental decoders.

`:func:'open'`, `:func:'io.open'`, `:func:'codecs.open'` and `:class:'fileinput.FileInput'` no longer accept `'U'` ("universal newline") in the file mode. This flag was deprecated since Python 3.3.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 841); [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] 3.9.0a1.rst, line 841); [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] 3.9.0a1.rst, line 841); [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] 3.9.0a1.rst, line 841); [backlink](#)

Unknown interpreted text role "class".

Reverse evaluation order of key: value in dict comprehensions as proposed in PEP 572. I.e. in `{k: v for ...}`, `k` will be evaluated before `v`.

Fix the `:func:'PySys_Audit'` call in `:class:'mmap.mmap'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 862); [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] 3.9.0a1.rst, line 862); [backlink](#)

Unknown interpreted text role "class".

Remove an unnecessary `Py_XINCREF` in `classobject.c`.

Fix a bug in the peephole optimizer that was not treating correctly constant conditions with binary operators. Patch by Pablo Galindo.

Python now gets the absolute path of the script filename specified on the command line (ex: "python3 script.py"): the `__file__` attribute of the `__main__` module and `sys.path[0]` become an absolute path, rather than a relative path.

Python's small object allocator (`obmalloc.c`) now allows (no more than) one empty arena to remain available for immediate reuse, without returning it to the OS. This prevents thrashing in simple loops where an arena could be created and destroyed anew on each iteration.

The dispatching of type slots to special methods (for example calling `__mul__` when doing `x * y`) has been made faster.

Implemented separate vectorcall functions for every calling convention of builtin functions and methods. This improves performance for calls.

Handle correctly negative line offsets in the peephole optimizer. Patch by Pablo Galindo.

Remove erroneous optimization for empty set differences.

Implement `:func:'PyBuffer_SizeFromFormat()'` function (previously documented but not implemented): call `:func:'struct.calcsize'`. Patch by Joanna Nanjeyke.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 953); [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] 3.9.0a1.rst, line 953); [backlink](#)

Unknown interpreted text role "func".

Slot functions optimize any callable with `Py_TPFLAGS_METHOD_DESCRIPTOR` instead of only instances of `function`.

The slot `tp_vectorcall_offset` is inherited unconditionally to support `super().__call__()` when the base class uses `vectorcall`.

`:func:'threading.get_native_id'` now also supports NetBSD.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 984); [backlink](#)

Unknown interpreted text role "func".

Add `:func:'threading.get_native_id'` support for AIX. Patch by M. Felt

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 993); [backlink](#)

Unknown interpreted text role "func".

`:func:'sum'` has been optimized for boolean values.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1002); [backlink](#)

Unknown interpreted text role "func".

Add `--upgrade-deps` to `venv` module. Patch by Cooper Ry Lees

`pdb.Pdb` supports `~/.pdbrc` in Windows 7. Patch by Tim Hopper and Dan Lidral-Porter.

Updated encodings: - Removed the "tis260" encoding, which was an alias for the nonexistent "tactic" codec. - Added "mac_centeuro" as an alias for the `mac_latin2` encoding.

The `:class:`classmethod`` decorator can now wrap other descriptors such as property objects. Adapted from a patch written by Graham Dumpleton.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1041); [backlink](#)

Unknown interpreted text role "class".

Improve speed of dictview intersection by directly using set intersection logic. Patch by David Su.

Prohibit parallel running of `aclose()` / `asend()` / `athrow()`. Fix `ag_running` to reflect the actual running status of the AG.

The `:func:`curses.update_lines_cols`` function now returns `None` instead of `1` on success.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1071); [backlink](#)

Unknown interpreted text role "func".

Update `:exc:`TypeError`` messages for `:meth:`os.path.join`` to include `:class:`os.PathLike`` objects as acceptable input types.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1081); [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] 3.9.0a1.rst, line 1081); [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] 3.9.0a1.rst, line 1081); [backlink](#)

Unknown interpreted text role "class".

Add a repr for `subprocess.Popen` objects. Patch by Andrey Doroschenko.

`pydoc` now recognizes and parses HTTPS URLs. Patch by python273.

Prevent `asyncio` from crashing if parent `__init__` is not called from a constructor of object derived from `asyncio.Future`.

`:mod:`pdb`` now uses `:meth:`io.open_code`` to trigger auditing events.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1119); [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] 3.9.0a1.rst, line 1119); [backlink](#)

Unknown interpreted text role "meth".

Allow opening pipes and other non-seekable files in append mode with `:func:`open``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1128); [backlink](#)

Unknown interpreted text role "func".

Simplify the `:mod:`argparse`` usage message for `nargs="*"`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1138); [backlink](#)

Unknown interpreted text role "mod".

WeakSet is now registered as a collections.abc.MutableSet.

logging: change RotatingHandler namer and rotator to class-level attributes. This stops `__init__` from setting them to None in the case where a subclass defines them with eponymous methods.

Add `:data:`os.P_PIDFD`` constant, which may be passed to `:func:`os.waitid`` to wait on a Linux process file descriptor.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1167); [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] 3.9.0a1.rst, line 1167); [backlink](#)

Unknown interpreted text role "func".

Add `:class:`asyncio.PidfdChildWatcher``, a Linux-specific child watcher implementation that polls process file descriptors.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1177); [backlink](#)

Unknown interpreted text role "class".

Expose the Linux `pidfd_open` syscall as `:func:`os.pidfd_open``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1187); [backlink](#)

Unknown interpreted text role "func".

Added constants `:data:`~fcntl.F_OFD_GETLK``, `:data:`~fcntl.F_OFD_SETLK`` and `:data:`~fcntl.F_OFD_SETLKW`` to the `:mod:`fcntl`` module. Patch by Dong-hee Na.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1196); [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] 3.9.0a1.rst, line 1196); [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] 3.9.0a1.rst, line 1196); [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] 3.9.0a1.rst, line 1196); [backlink](#)

Unknown interpreted text role "mod".

Fixed seeking backward on an encrypted `:class:`zipfile.ZipExtFile``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1207); [backlink](#)

Unknown interpreted text role "class".

Add `:func:'curses.get_escdelay'`, `:func:'curses.set_escdelay'`, `:func:'curses.get_tabsize'`, and `:func:'curses.set_tabsize'` functions - by Anthony Sottile.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1216); [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] 3.9.0a1.rst, line 1216); [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] 3.9.0a1.rst, line 1216); [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] 3.9.0a1.rst, line 1216); [backlink](#)

Unknown interpreted text role "func".

Now `:func:'~logging.config.fileConfig'` correctly sets the `.name` of handlers loaded.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1227); [backlink](#)

Unknown interpreted text role "func".

Add new `cache_parameters()` method for `functools.lru_cache()` to better support pickling.

`asyncio.ProactorEventLoop.close()` now only calls `signal.set_wakeup_fd()` in the main thread.

The case the result of `:func:'pathlib.WindowsPath.glob'` matches now the case of the pattern for literal parts.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1257); [backlink](#)

Unknown interpreted text role "func".

Remove misspelled attribute. The 3.8 changelog noted that this would be removed in 3.9.

Fixed erroneous equality comparison in `statistics.NormalDist()`.

Added `:data:'~os.CLD_KILLED'` and `:data:'~os.CLD_STOPPED'` for `:attr:'si_code'`. Patch by Dong-hee Na.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1286); [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] 3.9.0a1.rst, line 1286); [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] 3.9.0a1.rst, line 1286); [backlink](#)

Unknown interpreted text role "attr".

Fixed a bug in `:meth:'inspect.signature.bind'` that was causing it to fail when handling a keyword argument with same name as positional-only parameter. Patch by Pablo Galindo.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1296); [backlink](#)

Unknown interpreted text role "meth".

Fixed *hmac.new* and *hmac.HMAC* to raise `TypeError` instead of `ValueError` when the `digestmod` parameter, now required in 3.8, is omitted. Also clarified the *hmac* module documentation and docstrings.

Parameters *out* and *in* of `:func:'os.sendfile'` was renamed to *out_fd* and *in_fd*.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1318); [backlink](#)

Unknown interpreted text role "func".

Added support for setting the `umask` in the child process to the `subprocess` module on POSIX systems.

Revert GH-15522, which introduces a regression in `:meth:'mimetypes.guess_type'` due to improper handling of filenames as urls.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1338); [backlink](#)

Unknown interpreted text role "meth".

Fix `__repr__` method for `:class:'dataclasses.InitVar'` to support typing objects, patch by Samuel Colvin.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1348); [backlink](#)

Unknown interpreted text role "class".

Add missing `:data:'stat.S_IFDOOR'`, `:data:'stat.S_IFPORT'`, `:data:'stat.S_IFWHT'`, `:func:'stat.S_ISDOOR'`, `:func:'stat.S_ISPORT'`, and `:func:'stat.S_ISWHT'` values to the Python implementation of `:mod:'stat'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.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] 3.9.0a1.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] 3.9.0a1.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] 3.9.0a1.rst, line 1358); [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] 3.9.0a1.rst, line 1358); [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] 3.9.0a1.rst, line 1358); [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] 3.9.0a1.rst, line 1358); [backlink](#)

Unknown interpreted text role "mod".

Clarify docstrings of `pathlib` suffix(es)

Nested subclasses of `:class:`typing.NamedTuple`` are now pickleable.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1378); [backlink](#)

Unknown interpreted text role "class".

Prevent `:exc:`KeyError`` thrown by `:func:`_encoded_words.decode`` when given an encoded-word with invalid content-type encoding from propagating all the way to `:func:`email.message.get``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1387); [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] 3.9.0a1.rst, line 1387); [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] 3.9.0a1.rst, line 1387); [backlink](#)

Unknown interpreted text role "func".

Deprecated the `split()` method in `:class:`_tkinter.TkappType`` in favour of the `splitlist()` method which has more consistent and predictable behavior.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1398); [backlink](#)

Unknown interpreted text role "class".

Add `:exc:`smtplib.SMTPNotSupportedError`` to the `:mod:`smtplib`` exported names.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1409); [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] 3.9.0a1.rst, line 1409); [backlink](#)

Unknown interpreted text role "mod".

`sendfile()` used in `socket` and `shutil` modules was raising `OverflowError` for files ≥ 2 GiB on 32-bit architectures. (patch by Giampaolo Rodola)

Revert the new `asyncio` Streams API

OS native encoding is now used for converting between Python strings and Tcl objects. This allows to display, copy and paste to clipboard emoji and other non-BMP characters. Converting strings from Tcl to Python and back now never fails (except `MemoryError`).

Correctly handle pause/resume reading of closed `asyncio` unix pipe.

Child mocks will now detect their type as either synchronous or asynchronous, asynchronous child mocks will be `AsyncMocks` and synchronous child mocks will be either `MagicMock` or `Mock` (depending on their parent type).

Removes `_AwaitEvent` from `AsyncMock`.

Allow the rare code that wants to send invalid http requests from the `http.client` library a way to do so. The fixes for bpo-30458 led to breakage for some projects that were relying on this ability to test their own behavior in the face of bad requests.

Deprecate opening `:class:`~gzip.GzipFile`` for writing implicitly. Always specify the `mode` argument for writing.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1492); [backlink](#)

Unknown interpreted text role "class".

Any synchronous magic methods on an AsyncMock now return a MagicMock. Any asynchronous magic methods on a MagicMock now return an AsyncMock.

Update the `length` parameter of `:func:`os.pread`` to accept `:ctype:`Py_ssize_t`` instead of `:ctype:`int``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1512); [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] 3.9.0a1.rst, line 1512); [backlink](#)

Unknown interpreted text role "ctype".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1512); [backlink](#)

Unknown interpreted text role "ctype".

`:mod:`compileall`` has a higher default recursion limit and new command-line arguments for path manipulation, symlinks handling, and multiple optimization levels.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1522); [backlink](#)

Unknown interpreted text role "mod".

asyncio: Fix inconsistent immediate Task cancellation

The arguments for the builtin `pow` function are more descriptive. They can now also be passed in as keywords.

Improve efficiency in parts of email package by changing while-pop to a for loop, using `isdisjoint` instead of set intersections.

Constructors of `:class:`~typing.NamedTuple`` and `:class:`~typing.TypedDict`` types now accept arbitrary keyword argument names, including "cls", "self", "typename", "_typename", "fields" and "_fields".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1562); [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] 3.9.0a1.rst, line 1562); [backlink](#)

Unknown interpreted text role "class".

Add `__all__` to `:mod:`datetime``. Patch by Tahia Khan.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1573); [backlink](#)

Unknown interpreted text role "mod".

Fixed case-insensitive string comparison in `:class:`sqlite3.Row`` indexing.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1582); [backlink](#)

Unknown interpreted text role "class".

Changes AsyncMock call count and await count to be two different counters. Now await count only counts when a coroutine has been awaited, not when it has been called, and vice-versa. Update the documentation around this.

Fix default mock name in `:meth:`unittest.mock.Mock.assert_called`` exceptions. Patch by Abraham Toriz Cruz.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1602); [backlink](#)

Unknown interpreted text role "meth".

Fix a memory leak in comparison of `:class:'sqlite3.Row'` objects.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1612); [backlink](#)

Unknown interpreted text role "class".

`_hashlib` no longer calls obsolete OpenSSL initialization function with OpenSSL 1.1.0+.

Preserve subclassing in `inspect.Signature.from_callable`.

Names of hashing algorithms from OpenSSL are now normalized to follow Python's naming conventions. For example OpenSSL uses `sha3-512` instead of `sha3_512` or `blake2b512` instead of `blake2b`.

Fix a bug in `dis.findlinestarts()` where it would return invalid bytecode offsets. Document that a code object's `co_notab` can contain invalid bytecode offsets.

Add slots to `:mod:'asyncio'` transport classes, which can reduce memory usage.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1662); [backlink](#)

Unknown interpreted text role "mod".

The `_hashlib` OpenSSL wrapper extension module is now PEP-384 compliant.

`hashlib` constructors now support `usedforsecurity` flag to signal that a hashing algorithm is not used in a security context.

Fixes a potential incorrect `AttributeError` exception escaping `ZipFile.extract()` in some unsupported input error situations.

Remove obsolete copy of `PBKDF2_HMAC_fast`. All supported OpenSSL versions contain a fast implementation.

The OpenSSL `hashlib` wrapper uses a simpler implementation. Several Macros and pointless caches are gone. The hash name now comes from OpenSSL's EVP. The algorithm name stays the same, except it is now always lower case.

Fix parent class check in protocols to correctly identify the module that provides a builtin protocol, instead of assuming they all come from the `:mod:'collections.abc'` module

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1722); [backlink](#)

Unknown interpreted text role "mod".

For `:mod:'asyncio'`, add a new coroutine `:meth:'loop.shutdown_default_executor'`. The new coroutine provides an API to schedule an executor shutdown that waits on the threadpool to finish closing. Also, `:func:'asyncio.run'` has been updated to utilize the new coroutine. Patch by Kyle Stanley.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1733); [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] 3.9.0a1.rst, line 1733); [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] 3.9.0a1.rst, line 1733); [backlink](#)

Unknown interpreted text role "func".

Fixed regression bug for `socket.getsockname()` for non-CAN_ISOTP AF_CAN address family sockets by returning a 1-tuple instead of string.

Update parameter names on functions in `importlib.metadata` matching the changes in the 0.22 release of `importlib_metadata`.

The `os.closewalk()` implementation now uses the `libc fdwalk()` API on platforms where it is available.

Fixes `AsyncMock` so it doesn't crash when used with `AsyncContextManagers` or `AsyncIterators`.

Add warning to `:meth:`datetime.utcnowetuple``, `:meth:`datetime.utcnowow`` and `:meth:`datetime.utcfrofromtimestamp``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d]3.9.0a1.rst, line 1786); [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]3.9.0a1.rst, line 1786); [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]3.9.0a1.rst, line 1786); [backlink](#)

Unknown interpreted text role "meth".

Allow passing a `:term:`path-like object`` as `directory` argument to the `:class:`http.server.SimpleHTTPRequestHandler`` class. Patch by GÃry Ogam

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d]3.9.0a1.rst, line 1796); [backlink](#)

Unknown interpreted text role "term".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d]3.9.0a1.rst, line 1796); [backlink](#)

Unknown interpreted text role "class".

Update `importlib.metadata` with changes from [importlib_metadata 0.21](#).

Remove `__code__` check in `AsyncMock` that incorrectly evaluated function specs as async objects but failed to evaluate classes with `__await__` but no `__code__` attribute defined as async objects.

Fix reference counters in the `:mod:`signal`` module.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d]3.9.0a1.rst, line 1827); [backlink](#)

Unknown interpreted text role "mod".

Hide internal `asyncio.Stream` methods: `feed_eof()`, `feed_data()`, `set_exception()` and `set_transport()`.

`inspect.py` now uses `sys.exit()` instead of `exit()`

Added command-line interface for the `:mod:`ast`` module.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d]3.9.0a1.rst, line 1855); [backlink](#)

Unknown interpreted text role "mod".

In `:mod:`typing``, improved the `__hash__` and `__eq__` methods for `:class:`ForwardReferences``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d]3.9.0a1.rst, line 1864); [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]3.9.0a1.rst, line 1864); [backlink](#)

Unknown interpreted text role "class".

Fixed `:func:'inspect.getattr_static'` used `isinstance` while it should avoid dynamic lookup.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1874); [backlink](#)

Unknown interpreted text role "func".

Update `:class:'importlib.machinery.BuiltinImporter'` to use `loader._ORIGIN` instead of a hardcoded value. Patch by Dong-hee Na.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1884); [backlink](#)

Unknown interpreted text role "class".

In `importlib.metadata.sync` with `importlib_metadata` 0.20, clarifying behavior of `files()` and fixing issue where only one requirement was returned for `requires()` on `dist-info` packages.

`weakref.WeakValueDictionary` defines a local `remove()` function used as callback for weak references. This function was created with a closure. Modify the implementation to avoid the closure.

Added the `indent` option to `:func:'ast.dump'` which allows it to produce a multiline indented output.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1916); [backlink](#)

Unknown interpreted text role "func".

Fixed a crash in the `:func:'tee'` iterator when re-enter it. `RuntimeError` is now raised in this case.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 1926); [backlink](#)

Unknown interpreted text role "func".

Fix a ctypes regression of Python 3.8. When a `ctypes.Structure` is passed by copy to a function, ctypes internals created a temporary object which had the side effect of calling the structure finalizer (`__del__`) twice. The Python semantics requires a finalizer to be called exactly once. Fix ctypes internals to no longer call the finalizer twice.

`_json.scanstring` is now up to 3x faster when there are many backslash escaped characters in the JSON string.

Prevent `shutil.rmtree` exception when built on non-Windows system without `fd` system call support, like older versions of macOS.

Semaphores and BoundedSemaphores can now release more than one waiting thread at a time.

Subscripts to the `unittest.mock.call` objects now receive the same chaining mechanism as any other custom attributes, so that the following usage no longer raises a `TypeError`:

```
call().foo().__getitem__('bar')
```

Patch by blhsing

Fix C compiler warning caused by `distutils.ccompiler.CCompiler.has_function`.

Add `F_GETPATH` command to `:mod:'fcntl'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2003); [backlink](#)

Unknown interpreted text role "mod".

`repr()` of buffered and text streams now silences only expected exceptions when get the value of "name" and "mode" attributes.

Add a `total_nframe` field to the traces collected by the `tracemalloc` module. This field indicates the original number of frames before it was truncated.

Most features of the `subprocess` module now work again in subinterpreters. Only `preexec_fn` is restricted in subinterpreters.

Fix the `rusage` implementation of `time.process_time()` to correctly report the sum of the system and user CPU time.

Fix `:func:'ast.dump'` when call with incompletely initialized node.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2053); [backlink](#)

Unknown interpreted text role "func".

Restores instantiation of Windows IOCP event loops from the non-main thread.

Add default implementation of the `meth:ast.NodeVisitor.visit_Constant` method which emits a deprecation warning and calls corresponding methods `visit_Num()`, `visit_Str()`, etc.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2071); [backlink](#)

Unknown interpreted text role "meth".

Update test_statistics.py to verify that the statistics module works well for both C and Python implementations. Patch by Dong-hee Na

Added a new status code to the http module: 451 UNAVAILABLE_FOR_LEGAL_REASONS

Fix a segmentation fault that appeared when comparing instances of `datetime.timezone` and `datetime.tzinfo` objects. Patch by Pablo Galindo.

Deprecate having `random.seed()` call hash on arbitrary types.

Add optional keyword argument `exit_on_error` for `class:ArgumentParser`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2122); [backlink](#)

Unknown interpreted text role "class".

The `mod:faulthandler` module no longer allocates its alternative stack at Python startup. Now the stack is only allocated at the first `faulthandler` usage.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2131); [backlink](#)

Unknown interpreted text role "mod".

Fix a duplicated debug message when `meth:smtp.SMTP.connect` is called.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2142); [backlink](#)

Unknown interpreted text role "meth".

venv: Don't generate unset variable warning on deactivate.

Fix `dataclasses.is_dataclass` when given an instance that never raises `AttributeError` in `__getattr__`. That is, an object that returns something for `__dataclass_fields__` even if it's not a dataclass.

Fix `socket` module's `socket.connect(address)` function being unable to establish connection in case of interrupted system call. The problem was observed on all OSes which `poll(2)` system call can take only non-negative integers and -1 as a timeout value.

Optimizations for `Fraction.__hash__` suggested by Tim Peters.

Fix `faulthandler.register(chain=True)` stack. `faulthandler` now allocates a dedicated stack of `SIGSTKSZ*2` bytes, instead of just `SIGSTKSZ` bytes. Calling the previous signal handler in `faulthandler` signal handler uses more than `SIGSTKSZ` bytes of stack memory on some platforms.

Add C fastpath for `statistics.NormalDist.inv_cdf()` Patch by Dong-hee Na

Remove the deprecated method `threading.Thread.isAlive()`. Patch by Dong-hee Na.

Add `Fraction.as_integer_ratio()` to match the corresponding methods in `bool`, `int`, `float`, and `decimal`.

Add an `xml.etree.ElementTree.indent()` function for pretty-printing XML trees. Contributed by Stefan Behnel.

Fix `mod:diff` ? hint in diff output when dealing with tabs. Patch by Anthony Sottile.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2243); [backlink](#)

Unknown interpreted text role "mod".

In `zipfile.Path`, when adding implicit dirs, ensure that ancestral directories are added and that duplicates are excluded.

Renamed and documented `test.bytecode_helper` as `test.support.bytecode_helper`. Patch by Joannah Nanjekye.

Fix `xgettext` warnings in `mod:'argparse'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2273); [backlink](#)

Unknown interpreted text role "mod".

`meth:'writelines'` method of `:class:'io.BytesIO'` is now slightly faster when many small lines are passed. Patch by Sergey Fedoseev.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2282); [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] 3.9.0a1.rst, line 2282); [backlink](#)

Unknown interpreted text role "class".

`ensurepip` now uses `importlib.resources.read_binary()` to read data instead of `pkgutil.get_data()`. Patch by Joannah Nanjekye.

Mark `calendar.py` helper functions as being private. The follows PEP 8 guidance to maintain the style conventions in the module and it addresses a known case of user confusion.

Add definition of `THREAD_STACK_SIZE` for AIX in `Python/thread_pthread.h` The default thread stacksize caused crashes with the default recursion limit Patch by M Felt

The logging `getLogger()` API now returns the root logger when passed the name 'root', whereas previously it returned a non-root logger named 'root'. This could affect cases where user code explicitly wants a non-root logger named 'root', or instantiates a logger using `logging.getLogger(__name__)` in some top-level module called 'root.py'.

Fix the implementation of `curses.addch(str, color_pair)`: pass the color pair to `setcchar()`, instead of always passing 0 as the color pair.

Fix performance regression on regular expression parsing with huge character sets. Patch by Yarn Vaginay.

The function `:c:func:'PyImport_GetModule'` now ensures any module it returns is fully initialized. Patch by Joannah Nanjekye.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2357); [backlink](#)

Unknown interpreted text role "c:func".

Fix `IndexError` in `mod:'email'` package when trying to parse invalid address fields starting with `..`

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2367); [backlink](#)

Unknown interpreted text role "mod".

The `mod:'parser'` module is deprecated and will be removed in future versions of Python.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2377); [backlink](#)

Unknown interpreted text role "mod".

Completing `WSA*` error codes in `mod:'socket'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2387); [backlink](#)

Unknown interpreted text role "mod".

Fixed comparisons of `:class:'datetime.timedelta'` and `:class:'datetime.timezone'`.

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

main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2396); [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] 3.9.0a1.rst, line 2396); [backlink](#)

Unknown interpreted text role "class".

Synchronize `importlib.metadata` with [importlib_metadata 0.19](#), improving handling of EGG-INFO files and fixing a crash when entry point names contained colons.

Correct `.func: curses.unget_wch` error message. Patch by Anthony Sottile.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2418); [backlink](#)

Unknown interpreted text role "func".

Add `meth:is_relative_to` in `:class:PurePath` to determine whether or not one path is relative to another.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2427); [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] 3.9.0a1.rst, line 2427); [backlink](#)

Unknown interpreted text role "class".

Fixed `meth: argparse.ArgumentParser.format_usage` for mutually exclusive groups. Patch by Andrew Nester.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2437); [backlink](#)

Unknown interpreted text role "meth".

Let `math.dist()` accept coordinates as sequences (or iterables) rather than just tuples.

Fixed `__eq__`, `__lt__` etc implementations in some classes. They now return `:data:NotImplemented` for unsupported type of the other operand. This allows the other operand to play role (for example the equality comparison with `:data:~unittest.mock.ANY` will return `True`).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2457); [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] 3.9.0a1.rst, line 2457); [backlink](#)

Unknown interpreted text role "data".

Make `Activate.ps1` Powershell script static to allow for signing it.

Update wheels bundled with `ensurepip` (pip 19.2.3 and `setuptools` 41.2.0)

Bring consistency to `venv` shell activation scripts by always using `__VENV_PROMPT__`.

Allowed the pure Python implementation of `:class:datetime.timezone` to represent sub-minute offsets close to minimum and maximum boundaries, specifically in the ranges (23:59, 24:00) and (-23:59, 24:00). Patch by Ngalm Siregar

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2497); [backlink](#)

Unknown interpreted text role "class".

In `:mod:posix`, use `ttyname_r` instead of `ttyname` for thread safety.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2509); [backlink](#)

Unknown interpreted text role "mod".

Make internal attributes for statistics.NormalDist() private.

Fix `NonCallableMock._call_matcher` returning tuple instead of `_Call` object when `self._spec_signature` exists. Patch by Elizabeth Useton

Make `from tkinter import *` import only the expected objects.

Adding a value error when an invalid value is passed to `nargs` Patch by Robert Leenders

Exceptions from `mod.enum` now use the `__qualname` of the enum class in the exception message instead of the `__name__`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2556); [backlink](#)

Unknown interpreted text role "mod".

Fix `IndexError` when parsing email headers with unexpectedly ending bare-quoted string value. Patch by Abhilash Raj.

Make `json.loads` faster for long strings. (Patch by Marco Paolini)

Recognize "UTF-8" as a valid value for `LC_CTYPE` in `locale._parse_localename`.

Return `:exc:'NotImplemented'` in Python implementation of `__eq__` for `:class:'~datetime.timedelta'` and `:class:'~datetime.time'` when the other object being compared is not of the same type to match C implementation. Patch by Karthikeyan Singaravelan.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2594); [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] 3.9.0a1.rst, line 2594); [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] 3.9.0a1.rst, line 2594); [backlink](#)

Unknown interpreted text role "class".

Record calls to parent when autospecced object is attached to a mock using `:func:'unittest.mock.attach_mock'`. Patch by Karthikeyan Singaravelan.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2606); [backlink](#)

Unknown interpreted text role "func".

"python3 -m test -jN --timeout=TIMEOUT" now kills a worker process if it runs longer than `TIMEOUT` seconds.

Fix serialization of display name in originator or destination address fields with both encoded words and special chars.

Improve error reporting for corrupt zip files with bad zip64 extra data. Patch by Daniel Hillier.

`pickle.loads()` no longer raises `TypeError` when the `buffers` argument is set to `None`

Correct behavior for `zipfile.Path.parent` when the path object identifies a subdirectory.

Fix the `.col_offset` attribute of nested `:class:'ast.BinOp'` instances which had a too large value in some situations.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2666); [backlink](#)

Unknown interpreted text role "class".

Fixes a possible hang when using a timeout on `subprocess.run()` while capturing output. If the child process spawned its own children

or otherwise connected its stdout or stderr handles with another process, we could hang after the timeout was reached and our child was killed when attempting to read final output from the pipes.

Fix `:func:`multiprocessing.util.get_temp_dir`` finalizer: clear also the 'tempdir' configuration of the current process, so next call to `get_temp_dir()` will create a new temporary directory, rather than reusing the removed temporary directory.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2689); [backlink](#)

Unknown interpreted text role "func".

The distutils `bdist_wininst` command is deprecated in Python 3.8, use `bdist_wheel` (wheel packages) instead.

When `Enum.__str__` is overridden in a derived class, the override will be used by `Enum.__format__` regardless of whether mixin classes are present.

`http.client` now enables TLS 1.3 post-handshake authentication for default context or if a `cert_file` is passed to `HTTPSConnection`.

Update vendored expat version to 2.2.7.

`SSLContext.post_handshake_auth = True` no longer sets `SSL_VERIFY_POST_HANDSHAKE` verify flag for client connections. Although the option is documented as ignored for clients, OpenSSL implicitly enables cert chain validation when the flag is set.

`:func:`os.sched_setaffinity`` now correctly handles errors that arise during iteration over its `mask` argument. Patch by Brandt Bucher.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2752); [backlink](#)

Unknown interpreted text role "func".

The `:func:`os.getcwdb`` function now uses the UTF-8 encoding on Windows, rather than the ANSI code page: see [PEP 529](#) for the rationale. The function is no longer deprecated on Windows.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2762); [backlink](#)

Unknown interpreted text role "func".

The `sqlite3` module now raises `TypeError`, rather than `ValueError`, if operation argument type is not str: `execute()`, `executemany()` and calling a connection.

Fix `IndexError` in parsing a header value ending unexpectedly. Patch by Abhilash Raj.

The `dist` argument for `statistics.quantiles()` is now positional only. The current name doesn't reflect that the argument can be either a dataset or a distribution. Marking the parameter as positional avoids confusion and makes it possible to change the name later.

Fix a bug that was causing the `:mod:`queue`` module to fail if the `accelerator` module was not available. Patch by Pablo Galindo.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2806); [backlink](#)

Unknown interpreted text role "mod".

`:mod:`pprint`` now has support for `:class:`types.SimpleNamespace``. Patch by Carl Bordum Hansen.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2816); [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] 3.9.0a1.rst, line 2816); [backlink](#)

Unknown interpreted text role "class".

An `:class:`~argparse.ArgumentParser`` with `allow_abbrev=False` no longer disables grouping of short flags, such as `-vv`, but only disables abbreviation of long flags as documented. Patch by Zac Hatfield-Dodds.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2826); [backlink](#)

Unknown interpreted text role "class".

`:func:`unittest.mock.call`` now preserves the order of keyword arguments in repr output. Patch by Karthikeyan Singaravelan.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2837); [backlink](#)

Unknown interpreted text role "func".

Fix error unpickling `datetime.time` objects from Python 2 with `seconds>=24`. Patch by Justin Blanchard.

Add formal support for UDPLITE sockets. Support was present before, but it is now easier to detect support with `hasattr(socket, 'IPPROTO_UDPLITE')` and there are constants defined for each of the values needed:

`:py:obj:`socket.IPPROTO_UDPLITE``, `:py:obj:`UDPLITE_SEND_CSCOV``, and `:py:obj:`UDPLITE_RECV_CSCOV``. Patch by Gabe Appleton.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2857); [backlink](#)

Unknown interpreted text role "py:obj".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2857); [backlink](#)

Unknown interpreted text role "py:obj".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2857); [backlink](#)

Unknown interpreted text role "py:obj".

Optimized `functools.partial` by using `vectorcall`.

`:meth:`sqlite3.Connection.create_aggregate``, `:meth:`sqlite3.Connection.create_function``, `:meth:`sqlite3.Connection.set_authorizer``, `:meth:`sqlite3.Connection.set_progress_handler``, `:meth:`sqlite3.Connection.set_trace_callback`` methods lead to segfaults if some of these methods are called twice with an equal object but not the same. Now callbacks are stored more carefully. Patch by Aleksandr Balezin.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2879); [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] 3.9.0a1.rst, line 2879); [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] 3.9.0a1.rst, line 2879); [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] 3.9.0a1.rst, line 2879); [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] 3.9.0a1.rst, line 2879); [backlink](#)

Unknown interpreted text role "meth".

The `obj` argument of `:func:`dataclasses.replace`` is positional-only now.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2894); [backlink](#)

Unknown interpreted text role "func".

Add the optional Linux SocketCAN Broadcast Manager constants, used as flags to configure the BCM behaviour, in the socket module. Patch by Karl Ding.

HTMLParser.unescape is removed. It was undocumented and deprecated since Python 3.4.

Add .webmanifest -> application/manifest+json to list of recognized file types and content type headers

aifc.openfp() alias to aifc.open(), sunau.openfp() alias to sunau.open(), and wave.openfp() alias to wave.open() have been removed. They were deprecated since Python 3.7.

Deprecated accepting floats with integral value (like 5.0) in :func:`math.factorial`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2944); [backlink](#)

Unknown interpreted text role "func".

_dummy_thread and dummy_threading modules have been removed. These modules were deprecated since Python 3.7 which requires threading support.

Email with single part but content-type set to multipart/* doesn't raise AttributeError anymore.

Use threadpool for reading from file for sendfile fallback mode.

Fix asyncio sendfile support when sendfile sends extra data in fallback mode.

:func:`ctypes.create_unicode_buffer()` now also supports non-BMP characters on platforms with 16-bit :ctype:`wchar_t` (for example, Windows and AIX).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 2993); [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] 3.9.0a1.rst, line 2993); [backlink](#)

Unknown interpreted text role "ctype".

In a subinterpreter, spawning a daemon thread now raises an exception. Daemon threads were never supported in subinterpreters. Previously, the subinterpreter finalization crashed with a Python fatal error if a daemon thread was still running.

Allow pure Python implementation of :mod:`pickle` to work even when the C :mod:`_pickle` module is unavailable.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3015); [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] 3.9.0a1.rst, line 3015); [backlink](#)

Unknown interpreted text role "mod".

Fix :mod:`lzma`: module decompresses data incompletely. When decompressing a FORMAT_ALONE format file, and it doesn't have the end marker, sometimes the last one to dozens bytes can't be output. Patch by Ma Lin.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3025); [backlink](#)

Unknown interpreted text role "mod".

Fix :meth:`RobotFileParser.crawl_delay` and :meth:`RobotFileParser.request_rate` to return None rather than raise :exc:`AttributeError` when no relevant rule is defined in the robots.txt file. Patch by RÃ©mi Lapeyre.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3036); [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] 3.9.0a1.rst, line 3036); [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] 3.9.0a1.rst, line 3036); [backlink](#)

Unknown interpreted text role "exc".

Change the format of `feature_version` to be a (major, minor) tuple.

Eliminate `:exc: RuntimeError` raised by `:func: asyncio.all_tasks()` if internal tasks weak set is changed by another thread during iteration.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3057); [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] 3.9.0a1.rst, line 3057); [backlink](#)

Unknown interpreted text role "func".

`:class: _pyio.IOWBase` destructor now does nothing if getting the `closed` attribute fails to better mimic `:class: _io.IOWBase` finalizer.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3067); [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] 3.9.0a1.rst, line 3067); [backlink](#)

Unknown interpreted text role "class".

Fix a race condition at Python shutdown when waiting for threads. Wait until the Python thread state of all non-daemon threads get deleted (join all non-daemon threads), rather than just wait until non-daemon Python threads complete.

Default values which cannot be represented as Python objects no longer improperly represented as `None` in function signatures.

Added `encoding` and `errors` keyword parameters to `logging.basicConfig`.

Ensure cookies with `expires` attribute are handled in `:meth: CookieJar.make_cookies`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3109); [backlink](#)

Unknown interpreted text role "meth".

Fix an unintended `ValueError` from `:func: subprocess.run` when checking for conflicting `input` and `stdin` or `capture_output` and `stdout` or `stderr` args when they were explicitly provided but with `None` values within a passed in `**kwargs` dict rather than as passed directly by name. Patch contributed by RÅ©nni Lapeyre.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3119); [backlink](#)

Unknown interpreted text role "func".

The exception message for `inspect.getfile()` now correctly reports the passed class rather than the builtins module.

Give `math.perm()` a one argument form that means the same as `math.factorial()`.

For `math.perm(n, k)`, let `k` default to `n`, giving the same result as `factorial`.

Converted `_collections._count_elements` to use the Argument Clinic.

Do not always create a `:class:'collections.deque'` in `:class:'asyncio.Lock'`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3171); [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] 3.9.0a1.rst, line 3171); [backlink](#)

Unknown interpreted text role "class".

Speed-up statistics.`fmean()` by switching from a function to a generator.

Remove `Enum._convert` method, deprecated in 3.8.

`argparse._ActionsContainer.add_argument` now throws error, if someone accidentally pass `FileType` class object instead of instance of `FileType` as `type` argument

The socket module now has the `:func:'socket.send_fds'` and `:func:'socket.recv_fds'` methods. Contributed by Joannah Nanjekye, Shinya Okano and Victor Stinner.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3209); [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] 3.9.0a1.rst, line 3209); [backlink](#)

Unknown interpreted text role "func".

Support running `asyncio` subprocesses when execution event loop in a thread on UNIX.

Lengthy email headers with UTF-8 characters are now properly encoded when they are folded. Patch by Jeffrey Kintscher.

Fixed a bug in email parsing where a message with invalid bytes in content-transfer-encoding of a multipart message can cause an `AttributeError`. Patch by Andrew Donnellan.

`pathlib.Path` instance's `rename` and `replace` methods now return the new `Path` instance.

`:class:'urllib.request.ProxyHandler'` now lowercases the keys of the passed dictionary.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3261); [backlink](#)

Unknown interpreted text role "class".

Fix `:func:'repr'` on empty `:class:'ZipInfo'` object. Patch by Mickaël Schoentgen.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3271); [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] 3.9.0a1.rst, line 3271); [backlink](#)

Unknown interpreted text role "class".

Email headers containing RFC2047 encoded words are parsed despite the missing whitespace, and a defect registered. Also missing trailing whitespace after encoded words is now registered as a defect.

Port test `_datetime` to VxWorks: skip `zoneinfo` tests on VxWorks

Add parser for Message-ID header and add it to default `HeaderRegistry`. This should prevent folding of Message-ID using RFC 2048 encoded words.

Ensure method signature is used instead of constructor signature of a class while asserting mock object against method calls. Patch by Karthikeyan Singaravelan.

posix.getgrouplist() now works correctly when the user belongs to NGROUPS_MAX supplemental groups. Patch by Jeffrey Kintscher.

Fix race condition in ThreadPoolExecutor when worker threads are created during interpreter shutdown.

Fix `UserString.encode()` to correctly return `bytes` rather than a `UserString` instance.

Deprecate `xml.etree.ElementTree.Element.copy()` in favor of `copy.copy()`.

Patch by Gordon P. Hemsley

Fix infinite loop in email header folding logic that would be triggered when an email policy's `max_line_length` is not long enough to include the required markup and any values in the message. Patch by Paul Ganssle

Removed methods `Element.getchildren()`, `Element.getiterator()` and `ElementTree.getiterator()` and the `xml.etree.cElementTree` module.

Remove the old `plistlib` API deprecated in Python 3.4

`distutils` sorts source file lists so that Extension `.so` files build more reproducibly by default

Ignore `ValueError` from `signal` with `interaction` in non-main thread.

Added `user`, `group` and `extra_groups` parameters to the `subprocess.Popen` constructor. Patch by Patrick McLean.

Fix compile error when `_uuid` headers conflicting included.

Deprecate `smtpd.MailmanProxy` ready for future removal.

`attr: 'shlex.shlex.punctuation_chars'` is now a read-only property.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3441); [backlink](#)

Unknown interpreted text role "attr".

Add support for boolean actions like `--foo` and `--no-foo` to `argparse`. Patch contributed by RÃ©mi Lapeyre.

Fixes a bug in `mod: 'cgi'` module when a multipart/form-data request has no *Content-Length* header.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3460); [backlink](#)

Unknown interpreted text role "mod".

The abstract base classes in `mod: 'collections.abc'` no longer are exposed in the regular `mod: 'collections'` module.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3470); [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] 3.9.0a1.rst, line 3470); [backlink](#)

Unknown interpreted text role "mod".

`Distutils` won't check for `rpm` build in specified paths only.

Division handling of `PurePath` now returns `NotImplemented` instead of raising a `TypeError` when passed something other than an instance of `str` or `PurePath`. Patch by Roger Aiudi.

`func: 'binascii.a2b_base64'` is now up to 2 times faster. Patch by Sergey Fedoseev.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3500); [backlink](#)

Unknown interpreted text role "func".

Add additional aliases for HP Roman 8. Patch by Michael Osipov.

Fix `uuid.getnode()` on platforms with `'.'` as MAC Addr delimiter as well fix for MAC Addr format that omits a leading 0 in MAC Addr values. Currently, AIX is the only know platform with these settings. Patch by Michael Felt.

Add `meth:~pathlib.Path.readlink`. Patch by Girts Folkmanis.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3530); [backlink](#)

Unknown interpreted text role "meth".

Made `func:urllib.parse.unquote()` accept bytes in addition to strings. Patch by Stein Karlsen.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3539); [backlink](#)

Unknown interpreted text role "func".

lib2to3 now recognizes expressions after `*` and `**` like in `f(*[] or [])`.

Update `func:shutil.move` function to allow for Path objects to be used as source argument. Patch by Emily Morehouse and Maxwell "5.13b" McKinnon.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3559); [backlink](#)

Unknown interpreted text role "func".

Added `__format__` to IPv4 and IPv6 classes. Always outputs a fully zero- padded string. Supports b/x/n modifiers (bin/hex/native format). Native format for IPv4 is bin, native format for IPv6 is hex. Also supports `#` and `'_'` modifiers.

Fix `urllib.parse.urlparse()` with numeric paths. A string like "path:80" is no longer parsed as a path but as a scheme ("path") and a path ("80").

Fixed non-deterministic behavior related to mimetypes extension mapping and module reinitialization.

Explicitly mention abc support in `functools.singledispatch`

Provides more details about the interaction between `c:func:fork` and CPython's runtime, focusing just on the C-API. This includes cautions about where `c:func:fork` should and shouldn't be called.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3610); [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] 3.9.0a1.rst, line 3610); [backlink](#)

Unknown interpreted text role "c:func".

Modernize `mod:email` examples from %-formatting to f-strings.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3621); [backlink](#)

Unknown interpreted text role "mod".

Document the fact that `exc:RuntimeError` is raised if `meth:os.fork` is called in a subinterpreter.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3630); [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] 3.9.0a1.rst, line 3630); [backlink](#)

Unknown interpreted text role "meth".

Add Brazilian Portuguese to the language switcher at Python Documentation website.

Add list of no-longer-escaped chars to `re.escape` documentation

Modernized the plistlib documentation

Fix example usage of `c.func:PyModule_AddObject` to properly handle errors.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3668); [backlink](#)

Unknown interpreted text role "c:func".

Fix a dead link in the distutils API Reference.

Warn more strongly and clearly about pickle insecurity

Added a link to `dateutil.parser.isoparse` in the `datetime.fromisoformat` documentation. Patch by Paul Ganssle

Deprecate `info()`, `geturl()`, `getcode()` methods in favor of the `headers`, `url`, and `status` properties, respectively, for `HTTPResponse` and `addinfourl`. Also deprecate the `code` attribute of `addinfourl` in favor of the `status` attribute. Patch by Ashwin Ramaswami

Mention `frame.f_trace` in `func:sys.settrace` docs.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3717); [backlink](#)

Unknown interpreted text role "func".

Make `c.func:PyThreadState_DeleteCurrent` Internal.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3726); [backlink](#)

Unknown interpreted text role "c:func".

Beginning edits to Whatsnew 3.8

Stop recommending `getopt` in the tutorial for command line argument parsing and promote `argparse`.

Remove implementation-specific behaviour of how `venv`'s `Deactivate` works.

Fix wording of arguments for `class:Request` in `mod:urllib.request`

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3763); [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] 3.9.0a1.rst, line 3763); [backlink](#)

Unknown interpreted text role "mod".

Add a brief note to indicate that any new `sys.implementation` required attributes must go through the PEP process.

Documented that `class:mailbox.Maildir` constructor doesn't attempt to verify the `maildir` folder layout correctness. Patch by Sviatoslav Sydorenko.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3782); [backlink](#)

Unknown interpreted text role "class".

Fix `importlib` examples to insert any newly created modules via `importlib.util.module_from_spec()` immediately into `sys.modules` instead of after calling `loader.exec_module()`.

Thanks to Benjamin Mintz for finding the bug.

Slash (`/`) is now part of syntax.

Fix `PyList_GetItem` index description to include 0.

Replace the dead link to the Tkinter 8.5 reference by John Shipman, New Mexico Tech, with a link to the archive.org copy.

Added possible exceptions to the description of `os.chdir()`.

Documented that in `meth:datetime.datetime.strptime()`, the leading zero in some two-digit formats is optional. Patch by Mike Gleen.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3842); [backlink](#)

Unknown interpreted text role "meth".

Add decompression pitfalls to zipfile module documentation.

In the documentation for difflib, a note was added explicitly warning that the results of SequenceMatcher's ratio method may depend on the order of the input strings.

Restructured the `:mod:`datetime`` docs in the interest of making them more user-friendly and improving readability. Patch by Brad Solomon.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3872); [backlink](#)

Unknown interpreted text role "mod".

Make C-API docs clear about what the "main" interpreter is.

The documentation for decimal string formatting using the `:g` specifier has been updated to reflect the correct exponential notation cutoff point. Original patch contributed by Tuomas Sutari.

Document and test that `tempfile` functions may accept a `:term:`path-like object`` for the `dir` argument. Patch by Anthony Sottile.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3902); [backlink](#)

Unknown interpreted text role "term".

Added a note about the intended use of code in `.pth` files.

Fix the Doc/Makefile regarding PAPER environment variable and PDF builds

Add documentation for tkinter modules

Fix `test_communicate()` of `test_asyncio.test_subprocess`: use `support.LONG_TIMEOUT` (5 minutes), instead of just 1 minute.

Add timeout constants to `:mod:`test.support``: `:data:`~test.support.LOOPBACK_TIMEOUT``, `:data:`~test.support.INTERNET_TIMEOUT``, `:data:`~test.support.SHORT_TIMEOUT`` and `:data:`~test.support.LONG_TIMEOUT``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3949); [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] 3.9.0a1.rst, line 3949); [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] 3.9.0a1.rst, line 3949); [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] 3.9.0a1.rst, line 3949); [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] 3.9.0a1.rst, line 3949); [backlink](#)

Unknown interpreted text role "data".

`test.regrtest` now uses process groups in the multiprocessing mode (`-jN` command line option) if process groups are available: if `:func:`os.setsid`` and `:func:`os.killpg`` functions are available.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 3961); [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] 3.9.0a1.rst, line 3961); [backlink](#)

Unknown interpreted text role "func".

Fix a race condition in `test_asyncio.test_start_tls_server_1()`. Previously, there was a race condition between the test `main()` function which replaces the protocol and the test `ServerProto` protocol which sends ANSWER once it gets HELLO. Now, only the test `main()` function is responsible to send data, `ServerProto` no longer sends data.

Fix `test_compileall.test_compile_dir_maxlevels()` on Windows without long path support: only create 3 subdirectories instead of between 20 and 100 subdirectories.

On timeout, `regtest` no longer attempts to call `popen.communicate()` again: it can hang until all child processes using stdout and stderr pipes completes. Kill the worker process and ignores its output. Change also the fault handler timeout of the main process from 1 minute to 5 minutes, for Python slowest buildbots.

Fix `test_gdb` for Link Time Optimization (LTO) builds.

`test_ssl` now handles disabled TLS/SSL versions better. OpenSSL's crypto policy and run-time settings are recognized and tests for disabled versions are skipped. Tests also accept more TLS minimum_versions for platforms that override OpenSSL's default with strict settings.

The private keys for `test_ssl` were encrypted with 3DES in traditional PKCS#5 format. 3DES and the digest algorithm of PKCS#5 are blocked by some strict crypto policies. Use PKCS#8 format with AES256 encryption instead.

`test.support` now has a helper function to check for availability of a hash digest function. Several tests are refactored avoid MD5 and use SHA256 instead. Other tests are marked to use MD5 and skipped when MD5 is disabled.

Multiprocessing test `test_mymanager()` now also expects -SIGTERM, not only exitcode 0. `BaseManager._finalize_manager()` sends SIGTERM to the manager process if it takes longer than 1 second to stop, which happens on slow buildbots.

Multiprocessing tests: increase `test_queue_feeder_donot_stop_onexc()` timeout from 1 to 60 seconds.

Test with OpenSSL 1.1.1d

Increase code coverage for `multiprocessing.shared_memory`.

Add tests for `json.dump(..., skipkeys=True)`. Patch by Dong-hee Na.

Enhance `regtest` multiprocess timeout: write a message when killing a worker process, catch `popen.kill()` and `popen.wait()` exceptions, put a timeout on the second call to `popen.communicate()`.

Add tests for ROT-13 codec.

Added tests for `PyDateTime_XXX_GET_XXX()` macros of the C API of the `:mod:`datetime`` module. Patch by Joannah Nanjeyke.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4121); [backlink](#)

Unknown interpreted text role "mod".

Fix `test_shared_memory_cleaned_after_process_termination` name handling

Add `:func:`test.support.catch_threading_exception``: context manager catching `:class:`threading.Thread`` exception using `:func:`threading.excepthook``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4140); [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] 3.9.0a1.rst, line 4140); [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] 3.9.0a1.rst, line 4140); [backlink](#)

Unknown interpreted text role "func".

test_concurrent_futures now explicitly stops the ForkServer instance if it's running.

multiprocessing tests now stop the ForkServer instance if it's running: close the "alive" file descriptor to ask the server to stop and then remove its UNIX address.

test_distutils.test_build_ext() is now able to remove the temporary directory on Windows: don't import the newly built C extension ("xx") in the current process, but test it in a separated process.

test_concurrent_futures now cleans up multiprocessing to remove immediately temporary directories created by multiprocessing.util.get_temp_dir().

test_winconsoleio doesn't leak a temporary file anymore: use tempfile.TemporaryFile() to remove it when the test completes.

multiprocessing tests now explicitly call _run_finalizers() to immediately remove temporary directories created by tests.

urllib.request tests now call :func:`~urllib.request.urlcleanup` to remove temporary files created by urlretrieve() tests and to clear the _opener global variable set by urlopen() and functions calling indirectly urlopen().

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4212); [backlink](#)

Unknown interpreted text role "func".

Remove Lib/test/outstanding_bugs.py.

Fix test failures when IPv6 is unavailable or disabled.

Replace deprecated method "random.choose" with "random.choice" in "test_pkg_import.py".

Remove no longer necessary code from c locale coercion tests

Fix test_shutil to no longer leak temporary files.

Fix test_wsgiref.testEnviron() to no longer depend on the environment variables (don't fail if "X" variable is set).

Fix test_os.test_chown(): use os.getgroups() rather than grp.getgrall() to get groups. Rename also the test to test_chown_gid().

Add --cleanup option to python3 -m test to remove test_python_* directories of previous failed jobs. Add "make cleantest" to run python3 -m test --cleanup.

test_gdb no longer fails if it gets an "unexpected" message on stderr: it now ignores stderr. The purpose of test_gdb is to test that python-gdb.py commands work as expected, not to test gdb.

Avoid TimeoutError in test_asyncio: test_start_tls_server_1()

Fix test_asyncio ProactorLoopCtrlC: join the thread to prevent leaking a running thread and leaking a reference.

Fix :func:`~test.support.catch_unraisable_exception`: its __exit__() method now ignores unraisable exception raised when clearing its unraisable attribute.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4331); [backlink](#)

Unknown interpreted text role "func".

regtest now uses :func:`~sys.unraisablehook` to mark a test as "environment altered" (ENV_CHANGED) if it emits an "unraisable exception". Moreover, regtest logs a warning in this case.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4342); [backlink](#)

Unknown interpreted text role "func".

Use python3 -m test --fail-env-changed to catch unraisable exceptions in tests.

Fix assertions in test_close and test_events_mask_overflow devpoll tests.

Rewrite _PyObject_IsFreed() unit tests.

test_venv.test_multiprocessing() now explicitly calls pool.terminate() to wait until the pool completes.

Make test_ssl pass with LibreSSL. LibreSSL handles minimum and maximum TLS version differently than OpenSSL.

Make test_source_encoding.test_issue2301 implementation independent. The test will work now for both CPython and IronPython.

Update test.test_importlib.test_abc to test find_spec().

Modify the test_uid logic to test when a program is available AND can be used to obtain a MACADDR as basis for an UUID. Patch by M. Felt

Fallback to a default reason when `:func:'unittest.skip'` is uncalled. Patch by Naitree Zhu.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4424); [backlink](#)

Unknown interpreted text role "func".

On Windows, build scripts will now recognize and use python.exe from an active virtual env.

Fix _hashlib build when Blake2 is disabled, but OpenSSL supports it.

Misc/python-config.in now uses *getvar()* for all still existing *sysconfig.get_config_var()* calls. Patch by Joannah Nanjeyke.

Fix stdatomic.h header check for ICC compiler: the ICC implementation lacks atomic_uintptr_t type which is needed by Python.

In Solaris family, we must be sure to use `-D_REENTRANT`. Patch by JesÅ's Cea AviÅ³n.

Locate llvm-profdata and llvm-ar binaries using `AC_PATH_TOOL` rather than `AC_PATH_TARGET_TOOL`.

The `:file:'.gitignore'` file systematically keeps "rooted", with a non-trailing slash, all the rules that are meant to apply to files in a specific place in the repo. Previously, when the intended file to ignore happened to be at the root of the repo, we'd most often accidentally also ignore files and directories with the same name anywhere in the tree.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4493); [backlink](#)

Unknown interpreted text role "file".

The `:file:'Tools/unicode/makeunicodedata.py'` script, which is used for converting information from the Unicode Character Database into generated code and data used by the methods of `:class:'str'` and by the `:mod:'unicodedata'` module, now handles each character's data as a `dataclass` with named attributes, rather than a length-18 list of different fields.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4506); [backlink](#)

Unknown interpreted text role "file".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4506); [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] 3.9.0a1.rst, line 4506); [backlink](#)

Unknown interpreted text role "mod".

The `:file:'.gitignore'` file no longer applies to any files that are in fact tracked in the Git repository. Patch by Greg Price.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4520); [backlink](#)

Unknown interpreted text role "file".

Change "clean" makefile target to also clean the program guided optimization (PGO) data. Previously you would have to use "make clean" and "make profile-removal", or "make clobber".

Mark some individual tests to skip when `--pgo` is used. The tests marked increase the PGO task time significantly and likely don't help improve optimization of the final executable.

Reduce the number of unit tests run for the PGO generation task. This speeds up the task by a factor of about 15x. Running the full unit test suite is slow. This change may result in a slightly less optimized build since not as many code branches will be executed. If you are willing to wait for the much slower build, the old behavior can be restored using `'./configure [...] PROFILE_TASK="-m test -pgo-extended"'`. We make no guarantees as to which PGO task set produces a faster build. Users who care should run their own relevant benchmarks as results can depend on the environment, workload, and compiler tool chain.

`make install` no longer installs `wininst-*.exe` files used by distutils `bdist_wininst`: `bdist_wininst` only works on Windows.

Many `PyRun_XXX()` functions like `:c:func:'PyRun_String'` were no longer exported in `libpython38.dll` by mistake. Export them

again to fix the ABI compatibility.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4579); [backlink](#)

Unknown interpreted text role "c:func".

Enables use of SSE2 instructions in Windows 32-bit build.

Update optional extension module detection for AIX. ossaudiodev and spwd are not applicable for AIX, and are no longer reported as missing. 3rd-party packaging of ncurses (with ASIS support) conflicts with officially supported AIX curses library, so configure AIX to use libcurses.a. However, skip trying to build _curses_panel.

patch by M Felt

Fixes HTML Help shortcut when Windows is not installed to C drive

Ensure ntpath.realpath() correctly resolves relative paths.

Restores the internal C headers that were missing from the nuget.org and Microsoft Store packages.

Remove pythonw.exe dependency on the Microsoft C++ runtime.

Fix error message in activate.bat

Ensures pyw.exe launcher reads correct registry key.

Fixes ntpath.realpath failing on sys.executable.

Update bundled OpenSSL to 1.1.1d

Reduce overhead when using multiprocessing in a Windows virtual environment.

Allow py.exe launcher to locate installations from the Microsoft Store and improve display of active virtual environments.

The pip.ini is no longer included in the Nuget package.

Set Windows 8 as the minimum required version for API support

:func:`os.cpu_count` now returns active processors rather than maximum processors.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4724); [backlink](#)

Unknown interpreted text role "func".

venv activate.bat now works when the existing variables contain double quote characters.

Prevent error calling :func:`os.path.realpath` on 'NUL'.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4744); [backlink](#)

Unknown interpreted text role "func".

Fix case sensitivity in test_pathlib and test_ntpath.

Fixes distutils not finding vcruntime140.dll with only the v142 toolset installed.

Ensure command-line and unattend.xml setting override previously detected states in Windows installer.

Fixes :func:`os.stat` failing for block devices on Windows

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4782); [backlink](#)

Unknown interpreted text role "func".

Fixes potential crash when calling :func:`os.readlink` (or indirectly through :func:`~os.path.realpath`) on a file that is not a supported link.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4791); [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] 3.9.0a1.rst, line 4791); [backlink](#)

Unknown interpreted text role "func".

Improve the implementation of `winerror_to_errno()`.

`:func:`os.dup`` no longer fails for standard streams on Windows 7.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4810); [backlink](#)

Unknown interpreted text role "func".

The `nul` file on Windows now returns `True` from `:func:`~os.path.exists`` and a valid result from `:func:`os.stat`` with `S_IFCHR` set.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4819); [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] 3.9.0a1.rst, line 4819); [backlink](#)

Unknown interpreted text role "func".

Enable support for following symlinks in `:func:`os.realpath``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4829); [backlink](#)

Unknown interpreted text role "func".

Treat all name surrogate reparse points on Windows in `:func:`os.lstat`` and other reparse points as regular files in `:func:`os.stat``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4838); [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] 3.9.0a1.rst, line 4838); [backlink](#)

Unknown interpreted text role "func".

Add the module name in the formatted error message when DLL load fail happens during module import in `_PyImport_FindSharedFuncptrWindows()`. Patch by Srinivas Nyayapati.

Trying to import the `:mod:`crypt`` module on Windows will result in an `:exc:`ImportError`` with a message explaining that the module isn't supported on Windows. On other platforms, if the underlying `_crypt` module is not available, the `ImportError` will include a message explaining the problem.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4859); [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] 3.9.0a1.rst, line 4859); [backlink](#)

Unknown interpreted text role "exc".

Fixes the icons used for file associations to the Microsoft Store package.

Fix use of registry values to launch Python from Microsoft Store app.

Fix memory leak on Windows in creating an `SSLContext` object or running `urllib.request.urlopen('https://...')`.

Switch Windows Store package's pip to use bundled `:file:'pip.ini'` instead of `:envvar:'PIP_USER'` variable.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4899); [backlink](#)

Unknown interpreted text role "file".

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4899); [backlink](#)

Unknown interpreted text role "envvar".

Officially drop support for creating bdist_wininst installers on non-Windows systems.

Include the `FORMAT_MESSAGE_IGNORE_INSERTS` flag in `FormatMessageW()` calls.

Fixes path for `:data:'sys.executable'` when running from the Microsoft Store.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4929); [backlink](#)

Unknown interpreted text role "data".

Don't collect unfinished processes with `subprocess._active` on Windows to cleanup later. Patch by Ruslan Kuprieiev.

Removes `libpython38.a` from standard Windows distribution.

Update Windows builds to use SQLite 3.28.0.

On Windows, `:func:'os.dup'` no longer creates an inheritable fd when handling a character file.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4966); [backlink](#)

Unknown interpreted text role "func".

Ensure `time.tzname` is correct on Windows when the active code page is set to CP_UTF7 or CP_UTF8.

Make `:data:'winreg.REG_MULTI_SZ'` support zero-length strings.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4986); [backlink](#)

Unknown interpreted text role "data".

Replace use of `:c:func:'strcasecmp'` for the system function `:c:func:'_stricmp'`. Patch by Minmin Gong.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 4995); [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] 3.9.0a1.rst, line 4995); [backlink](#)

Unknown interpreted text role "c:func".

Add native Bluetooth RFCOMM support to socket module.

Updated OpenSSL to 1.1.1d in macOS installer.

Move Azure Pipelines to latest VM versions and make macOS tests optional

Increase the default stack size of threads from 5MB to 16MB on macOS, to match the stack size of the main thread. This avoids crashes on deep recursion in threads.

Avoid test suite failures on macOS by no longer calling `resource.setrlimit` to increase the process stack size limit at runtime. The runtime change is no longer needed since the interpreter is being built with a larger default stack size.

Update macOS installer to use SQLite 3.28.0.

Updated OpenSSL to 1.1.1c in macOS installer.

Stop adding newline when saving an IDLE shell window.

Add an option to toggle IDLE's cursor blink for shell, editor, and output windows. See Settings, General, Window Preferences, Cursor Blink. Patch by Zackery Spytz.

Do not try to compile IDLE shell or output windows

IDLE no longer fails when write non-encodable characters to stderr. It now escapes them with a backslash, as the regular Python interpreter. Added the `errors` field to the standard streams.

When exiting IDLE, catch any `AttributeError`. One happens when `EditorWindow.close` is called twice. Printing a traceback, when IDLE is run from a terminal, is useless and annoying.

To avoid problems, `test_idle` ignores the user config directory. It no longer tries to create or access `.idlerc` or any files within. Users must run IDLE to discover problems with saving settings.

IDLE no longer adds 'argv' to the user namespace when initializing it. This bug only affected 3.7.4 and 3.8.0b2 to 3.8.0b4.

Shell restart lines now fill the window width, always start with '=', and avoid wrapping unnecessarily. The line will still wrap if the included file name is long relative to the width.

To avoid occasional spurious `test_idle` failures on slower machines, increase the `hover_delay` in `test_tooltip`.

Properly handle user input warnings in IDLE shell. Cease turning `SyntaxWarnings` into `SyntaxErrors`.

IDLE Settings dialog now closes properly when there is no shell window.

Add mousewheel scrolling for IDLE module, path, and stack browsers. Patch by George Zhang.

Fixed completions list appearing too high or low when shown above the current line.

Refactor IDLE autocomplete and improve testing.

Reorder the Run menu. Put the most common choice, Run Module, at the top.

Improve highlight config sample with example shell interaction and better labels for shell elements.

Settings dialog no longer expands with font size.

Initialize the Customize Run dialog with the command line arguments most recently entered before. The user can optionally edit before submitting them.

Fix code context not showing the correct context when first toggled on.

Optimize code context to reduce unneeded background activity. Font and highlight changes now occur along with text changes instead of after a random delay.

Cleanup `config.py` by inlining `RemoveFile` and simplifying the handling of `file` in `CreateConfigHandlers`.

Fix tab focus traversal order for help source and custom run dialogs.

Both subprocess connection error messages now refer to the 'Startup failure' section of the IDLE doc.

Add optional line numbers for IDLE editor windows. Windows open without line numbers unless set otherwise in the General tab of the configuration dialog.

To compensate for stack frames added by IDLE and avoid possible problems with low recursion limits, add 30 to limits in the user code execution process. Subtract 30 when reporting recursion limits to make this addition mostly transparent.

Properly 'attach' search dialogs to their main window so that they behave like other dialogs and do not get hidden behind their main window.

Adjust "Zoom Height" to individual screens by momentarily maximizing the window on first use with a particular screen. Changing screen settings may invalidate the saved height. While a window is maximized, "Zoom Height" has no effect.

Make calltip reminder about '/' meaning positional-only less obtrusive by only adding it when there is room on the first line.

Add 'Run... Customized' to the Run menu to run a module with customized settings. Any 'command line arguments' entered are added to `sys.argv`. One can suppress the normal Shell main module restart.

Gather Format menu functions into `format.py`. Combine `paragraph.py`, `rstrip.py`, and `format` methods from `editor.py`.

Update Valgrind suppression file to ignore a false alarm in `:c:func:'PyUnicode_Decode'` when using GCC builtin `strcmp()`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5378); [backlink](#)

Unknown interpreted text role "c:func".

`pathfix.py`: Assume all files that end on '.py' are Python scripts when working recursively.

`pdb`'s `--help` and `--version` long options now work.

Improve `ArgumentClinic` converter for floats.

Remove `Tools/scripts/h2py.py`: use `ctypes` to access a C API in Python.

`2to3` now works when run from a zipped standard library.

Argument Clinic now uses the argument name on errors with keyword-only argument instead of their position. Patch contributed by R  mi Lapeyre.

Add option `-k` to `pathscript.py` script: preserve shebang flags. Add option `-a` to `pathscript.py` script: add flags.

Re-export some function compatibility wrappers for macros in `pythonrun.h`.

Provide `cfunc:Py_EnterRecursiveCall` and `cfunc:Py_LeaveRecursiveCall` as regular functions for the limited API. Previously, there were defined as macros, but these macros didn't work with the limited API which cannot access

`PyThreadState.recursion_depth` field. Remove `_Py_CheckRecursionLimit` from the stable ABI.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5463); [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] 3.9.0a1.rst, line 5463); [backlink](#)

Unknown interpreted text role "c:func".

The global variable `cdata:PyStructSequence_UnnamedField` is now a constant and refers to a constant string.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5476); [backlink](#)

Unknown interpreted text role "c:data".

Fixed possible leak in `cfunc:PyArg_Parse` and similar functions for format units `"es#"` and `"et#"` when the macro `cmacro:PY_SSIZE_T_CLEAN` is not defined.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5486); [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] 3.9.0a1.rst, line 5486); [backlink](#)

Unknown interpreted text role "c:macro".

Fix a crash in `class:weakref.proxy` objects due to incorrect lifetime management when calling some associated methods that may delete the last reference to object being referenced by the proxy. Patch by Pablo Galindo.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5497); [backlink](#)

Unknown interpreted text role "class".

The `_PyObject_CheckConsistency()` function is now also available in release mode. For example, it can be used to debug a crash in the `visit_decref()` function of the GC.

Revert the removal of `PyThreadState_DeleteCurrent()` with documentation.

Update audioop extension module to use the stable ABI (PEP-384). Patch by Tyler Kieft.

`cfunc:Py_SetPath` now sets `cdata:sys.executable` to the program full path (`cfunc:Py_GetProgramFullPath`) rather than to the program name (`cfunc:Py_GetProgramName`).

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5538); [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] 3.9.0a1.rst, line 5538); [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] 3.9.0a1.rst, line 5538); [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] 3.9.0a1.rst, line 5538); [backlink](#)

Unknown interpreted text role "c:func".

Python ignored arguments passed to `:c:func:`Py_SetPath``, `:c:func:`Py_SetPythonHome`` and `:c:func:`Py_SetProgramName``: fix Python initialization to use specified arguments.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5549); [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] 3.9.0a1.rst, line 5549); [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] 3.9.0a1.rst, line 5549); [backlink](#)

Unknown interpreted text role "c:func".

The `:c:func:`Py_UNREACHABLE`` macro now calls `:c:func:`Py_FatalError``.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5560); [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] 3.9.0a1.rst, line 5560); [backlink](#)

Unknown interpreted text role "c:func".

Make dict and weakref offsets opaque for C heap types by passing the offsets through PyMemberDef

The C function `PyGen_NeedsFinalizing` has been removed. It was not documented, tested or used anywhere within CPython after the implementation of [PEP 442](#). Patch by Joannah Nanjekye. (Patch by Joannah Nanjekye)

Options added by `PySys_AddXOption()` are now handled the same way than `PyConfig.xoptions` and command line `-x` options.

Fix a crash in `PySys_SetArgvEx(0, NULL, 0)`.

Fix subtype_dealloc to suppress the type decref when the base type is a C heap type

Add `:c:func:`PyObject_FunctionStr`` to get a user-friendly string representation of a function-like object. Patch by Jeroen Demeyer.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5619); [backlink](#)

Unknown interpreted text role "c:func".

The functions `PyEval_CallObject`, `PyEval_CallFunction`, `PyEval_CallMethod` and `PyEval_CallObjectWithKeywords` are deprecated. Use `:c:func:`PyObject_Call`` and its variants instead.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5629); [backlink](#)

Unknown interpreted text role "c:func".

PyCFunction_Call is now a deprecated alias of :c:func:`PyObject_Call`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5640); [backlink](#)

Unknown interpreted text role "c:func".

The vectorcall protocol now requires that the caller passes only strings as keyword names.

The vectorcall protocol is now enabled for `type` objects: set `tp_vectorcall` to a vectorcall function to be used instead of `tp_new` and `tp_init` when calling the class itself.

Exclude Python-ast.h, ast.h and asdl.h from the limited API.

Add new function `_PyObject_CallOneArg` for calling an object with one positional argument.

Add :c:func:`PyConfig_SetWideStringList` function.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5689); [backlink](#)

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Add fast functions for calling methods: :c:func:`_PyObject_VectorcallMethod`, :c:func:`_PyObject_CallMethodNoArgs` and :c:func:`_PyObject_CallMethodOneArg`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5698); [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] 3.9.0a1.rst, line 5698); [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] 3.9.0a1.rst, line 5698); [backlink](#)

Unknown interpreted text role "c:func".

The :c:const:`METH_FASTCALL` calling convention has been documented.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5709); [backlink](#)

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The new function :c:func:`PyCode_NewWithPosOnlyArgs` allows to create code objects like :c:func:`PyCode_New`, but with an extra *posonlyargcount* parameter for indicating the number of positional-only arguments.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5718); [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] 3.9.0a1.rst, line 5718); [backlink](#)

Unknown interpreted text role "c:func".

Fix dtrace issue introduced by bpo-36842

Add a new public :c:func:`PyObject_CallNoArgs` function to the C API: call a callable Python object without any arguments. It is the most efficient way to call a callback without any argument. On x86-64, for example, `PyObject_CallFunctionObjArgs(func, NULL)` allocates 960 bytes on the stack per call, whereas `PyObject_CallNoArgs(func)` only allocates 624 bytes per call.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5738); [backlink](#)

Unknown interpreted text role "c:func".

Fix the cast on error in :c:func:`PyLong_AsUnsignedLongLongMask()`.

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.9.0a1.rst, line 5752); [backlink](#)

Unknown interpreted text role "c:func".

Convert posixmodule.c statically allocated types `DirEntryType` and `ScandirIteratorType` to heap-allocated types.

Use singular/plural noun in error message when instantiating an abstract class with non-overriden abstract method(s).