

Fixes mishandling of pre-normalization characters in `urlsplit()`.

Address CVE-2019-9740 by disallowing URL paths with embedded whitespace or control characters through into the underlying http client request. Such potentially malicious header injection URLs now cause an `http.client.InvalidURL` exception to be raised.

`:func:`shutil.which`` now uses `os.confstr("CS_PATH")` if available and if the `:envvar:`PATH`` environment variable is not set. Remove also the current directory from `:data:`posixpath.defpath``. On Unix, `:func:`shutil.which`` and the `:mod:`subprocess`` module no longer search the executable in the current directory if the `:envvar:`PATH`` environment variable is not set.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 28); [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] 3.8.0a4.rst, line 28); [backlink](#)

Unknown interpreted text role "envvar".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 28); [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] 3.8.0a4.rst, line 28); [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] 3.8.0a4.rst, line 28); [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] 3.8.0a4.rst, line 28); [backlink](#)

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In debug build, `import` now also looks for C extensions compiled in release mode and for C extensions compiled in the stable ABI.

Fix Python Initialization code on FreeBSD to detect properly when stdin file descriptor (`fd 0`) is invalid.

Remove parser headers and related function declarations that lack implementations after the removal of `pgen`.

`dict.pop()` is now up to 33% faster thanks to Argument Clinic. Patch by Inada Naoki.

Debug memory allocators: disable `serialno` field by default from debug hooks on Python memory allocators to reduce the memory footprint by 5%. Enable `:mod:`tracemalloc`` to get the traceback where a memory block has been allocated when a fatal memory error is logged to decide where to put a breakpoint. Compile Python with `PYMEM_DEBUG_SERIALNO` defined to get back the field.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 81); [backlink](#)

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On AIX, `:attr:`sys.platform`` doesn't contain the major version anymore. Always return `'aix'`, instead of `'aix3'` .. `'aix7'`. Since older Python versions include the version number, it is recommended to always use `sys.platform.startswith('aix')`. Contributed by M. Felt.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 95); [backlink](#)

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Change `str.capitalize` to use titlecase for the first character instead of uppercase.

Implement [PEP 570](#) (Python positional-only parameters). Patch by Pablo Galindo.

`:func:`PyEval_AcquireLock`` and `:func:`PyEval_AcquireThread`` now terminate the current thread if called while the interpreter is

finalizing, making them consistent with `c:func:'PyEval_RestoreThread'`, `c:func:'Py_END_ALLOW_THREADS'`, and `c:func:'PyGILState_Ensure'`.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 127); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 127); [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] 3.8.0a4.rst, line 127); [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] 3.8.0a4.rst, line 127); [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] 3.8.0a4.rst, line 127); [backlink](#)

Unknown interpreted text role "c:func".

Fix signed integer overflow in `_ctypes.c's PyCArrayType_new()`.

Fix running script with encoding cookie and LF line ending may fail on Windows.

Fixed support of the surrogatepass error handler in the UTF-8 incremental decoder.

Changing dict keys during iteration of the dict itself, `keys()`, `values()`, or `items()` will now be detected in certain corner cases where keys are deleted/added so that the number of keys isn't changed. A `RuntimeError` will be raised after `len(dict)` iterations. Contributed by Thomas Perl.

Fix a possible double `PyMem_FREE()` due to `tokenizer.c's tok_nextc()`.

Fixed `TypeError` message in `classmethoddescr_call`.

Fix a possible reference leak in `func:'itertools.count'`.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 199); [backlink](#)

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Include node names in `ParserError` messages, instead of numeric IDs. Patch by A. Skrobov.

Regenerate `mod:'keyword'` from the Grammar and Tokens file using `pgen`. Patch by Pablo Galindo.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 218); [backlink](#)

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Add missing `c:func:'PyObject_GC_Track'` calls in the `mod:'pickle'` module. Patch by Zackery Spytz.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 228); [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] 3.8.0a4.rst, line 228); [backlink](#)

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Fix pythoninfo when the compiler is missing.

The `.find*()` methods of `xml.etree.ElementTree` can now search for wildcards like `{*}tag` and `{ns}*` that match a tag in any namespace or all tags in a namespace. Patch by Stefan Behnel.

`pathlib.path.link_to()` is now implemented. It creates a hard link pointing to a path.

`:class:`fileinput.FileInput`` now uses the input file mode to correctly set the output file mode (previously it was hardcoded to `'w'`) when `inplace=True` is passed to its constructor.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 268); [backlink](#)

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Fix compilation of `faulthandler.c` on HP-UX. Initialize `stack_t current_stack` to zero using `memset()`.

The `xml.etree.ElementTree` packages gained support for C14N 2.0 serialisation. Patch by Stefan Behnel.

Add missing matrix multiplication operator support to `weakref.proxy`.

The `XMLParser()` in `xml.etree.ElementTree` provides namespace prefix context to the parser target if it defines the callback methods `"start_ns()"` and/or `"end_ns()"`. Patch by Stefan Behnel.

The `TreeBuilder` and `XMLPullParser` in `xml.etree.ElementTree` gained support for parsing comments and processing instructions. Patch by Stefan Behnel.

The C version of `functools.lru_cache()` was treating calls with an empty `**kwargs` dictionary as being distinct from calls with no keywords at all. This did not result in an incorrect answer, but it did trigger an unexpected cache miss.

Fix `:mod:`distutils.sysconfig`` if `:data:`sys.executable`` is `None` or an empty string: use `:func:`os.getcwd`` to initialize `project_base`.

Fix also the `distutils` build command: don't use `:data:`sys.executable`` if it is `None` or an empty string.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 341); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 341); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 341); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 341); [backlink](#)

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`:func:`shutil.which`` and `:func:`distutils.spawn.find_executable`` now use `os.confstr("CS_PATH")` if available instead of `:data:`os.defpath``, if the `PATH` environment variable is not set. Moreover, don't use `os.confstr("CS_PATH")` nor `:data:`os.defpath`` if the `PATH` environment variable is set to an empty string.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 353); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 353); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 353); [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] 3.8.0a4.rst, line 353); [backlink](#)**

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improve performance of `IPNetwork.__contains__()`

Path expressions in `xml.etree.ElementTree` can now avoid explicit namespace prefixes for tags (or the "{namespace}tag" notation) by passing a default namespace with an empty string prefix.

Fix `mod:'asyncio'` `wait()` not removing callback if exception

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 386); [backlink](#)**

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Fix `isinstance` check for Mock objects with spec when the code is executed under tracing. Patch by Karthikeyan Singaravelan.

In development mode (`:option:-X dev`) and in debug build, the `:class:'io.IOBase'` destructor now logs `close()` exceptions. These exceptions are silent by default in release mode.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 405); [backlink](#)**

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**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 405); [backlink](#)**

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The `_lsprof` module now uses internal timer same to `time.perf_counter()` by default. `gettimeofday(2)` was used on Unix. New timer has better resolution on most Unix platforms and timings are no longer impacted by system clock updates since `perf_counter()` is monotonic. Patch by Inada Naoki.

`json.loads` now emits `DeprecationWarning` when encoding option is specified. Patch by Matthias Bussonnier.

The random module now prefers the lean internal `_sha512` module over `hashlib` for `seed(version=2)` to optimize import time.

Set `backlog=None` as the default for `socket.create_server`.

Fix `:func:'time.mktime'` error handling on AIX for year before 1970.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 458); [backlink](#)**

Unknown interpreted text role "func".

Improve error message when trying to open existing DBM database that actually doesn't exist. Patch by Marco Rougeth.

Add `statistics.quantiles()`

Optimized `http.client.HTTPResponse.read()` for large response. Patch by Inada Naoki.

If `debuglevel` is set to `>0` in `mod:'http.client'`, print all values for headers with multiple values for the same header name. Patch by Matt Houghum.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 496); [backlink](#)**

Unknown interpreted text role "mod".

Deprecated passing required arguments like `func` as keyword arguments in functions which should accept arbitrary keyword arguments and pass them to other function. Arbitrary keyword arguments (even with names "self" and "func") can now be passed to these functions if the required arguments are passed as positional arguments.

Add `statistics.geometric_mean()`.

`os.path.normcase()` relies on `os.fspath()` to check the type of its argument. Redundant checks have been removed from its

`posixpath.normcase()` and `ntpath.normcase()` implementations. Patch by Wolfgang Maier.

Stop rejecting IPv4 octets for being ambiguously octal. Leading zeros are ignored, and no longer are assumed to specify octal octets. Octets are always decimal numbers. Octets must still be no more than three digits, including leading zeroes.

Errors during writing to a ZIP file no longer prevent to properly close it.

Fixed wrong indentation writing for CDATA section in `xml.dom.minidom`. Patch by Vladimir Surjaninov.

`inspect.getdoc()` can now find docstrings for member objects when `__slots__` is a dictionary.

Calling `stop()` on an unstarted or stopped `.func:unittest.mock.patch` object will now return `None` instead of raising `.exc:RuntimeError`, making the method idempotent. Patch by Karthikeyan Singaravelan.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 582); [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] 3.8.0a4.rst, line 582); [backlink](#)**

Unknown interpreted text role "exc".

The `.meth:imap.IMAP4.logout` method no longer ignores silently arbitrary exceptions.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 593); [backlink](#)**

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Add time module support and fix `test_time` failures for VxWorks.

Added support for keyword arguments `default_namespace` and `xml_declaration` in functions `ElementTree.tostring()` and `ElementTree.tostringlist()`.

Added new alternate constructors `.meth:datetime.date.fromisocalendar` and `.meth:datetime.datetime.fromisocalendar`, which construct date objects from ISO year, week number and weekday; these are the inverse of each class's `isocalendar` method. Patch by Paul Ganssle.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 623); [backlink](#)**

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**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 623); [backlink](#)**

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`.mod:modulefinder` no longer depends on the deprecated `.mod:imp` module, and the initializer for `.class:modulefinder.ModuleFinder` now has immutable default arguments. Patch by Brandt Bucher.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 635); [backlink](#)**

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**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 635); [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] 3.8.0a4.rst, line 635); [backlink](#)**

Unknown interpreted text role "class".

`.mod:modulefinder` correctly handles modules that have the same name as a bad package. Patch by Brandt Bucher.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 646); [backlink](#)

Unknown interpreted text role "mod".

`:mod:`modulefinder`` no longer crashes when encountering syntax errors in followed imports. Patch by Brandt Bucher.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 656); [backlink](#)

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Added `:meth:`~socket.create_server()`` and `:meth:`~socket.has_dualstack_ipv6()`` convenience functions to automate the necessary tasks usually involved when creating a server socket, including accepting both IPv4 and IPv6 connections on the same socket. (Contributed by Giampaolo Rodola in [:issue:17561`](#).)

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 666); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 666); [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] 3.8.0a4.rst, line 666); [backlink](#)

Unknown interpreted text role "issue".

Add support for `:func:`classmethod`` and `:func:`staticmethod`` to `:func:`unittest.mock.create_autospec``. Initial patch by Felipe Ochoa.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 679); [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] 3.8.0a4.rst, line 679); [backlink](#)

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**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 679); [backlink](#)

Unknown interpreted text role "func".

Fix potential resource warnings in distutils. Patch by Mickaël Schoentgen.

Add transparency methods to `:class:`tkinter.PhotoImage``. Patch by Zackery Spytz.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 698); [backlink](#)

Unknown interpreted text role "class".

Don't return deleted attributes when calling `dir` on a `:class:`unittest.mock.Mock``.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 708); [backlink](#)

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`:class:`wsgiref.handlers.BaseHandler`` now handles abrupt client connection terminations gracefully. Patch by Petter Strandmark.



**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 718); [backlink](#)**

Unknown interpreted text role "class".

`:func:`xml.sax.parse`` now supports `:term:`path-like <path-like 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] 3.8.0a4.rst, line 728); [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] 3.8.0a4.rst, line 728); [backlink](#)**

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Remove stale unix datagram socket before binding

Implemented Happy Eyeballs in `asyncio.create_connection()`. Added two new arguments, `happy_eyeballs_delay` and `interleave`, to specify Happy Eyeballs behavior.

Do not raise `AttributeError` when calling the inspect functions `isgeneratorfunction`, `iscoroutinefunction`, `isasyncgenfunction` on a method created from an arbitrary callable. Instead, return `False`.

Fix the `multiprocessing.semaphore_tracker` so it is reused by child processes

Fix `setup.py check --restructuredtext` for files containing `include` directives.

Remove obsolete comments from docstrings in `fractions.Fraction`

Document relative imports

Add docstring for `io.IOBase.writelines()`.

New documentation translation: [Simplified Chinese](#).

Avoid the duplication of code from `Tools/scripts/serve.py` in using the `:rst:dir:`literalinclude`` directive for the basic `wsgiref`-based web server in the documentation of `:mod:`wsgiref``. Contributed by StÃ©phane Wirtel.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 825); [backlink](#)**

Unknown interpreted text role "rst:dir".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 825); [backlink](#)**

Unknown interpreted text role "mod".

Using the code of the `Tools/scripts/serve.py` script as an example in the `:mod:`wsgiref`` documentation. Contributed by StÃ©phane Wirtel.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 836); [backlink](#)**

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Added Documentation for `PyInterpreterState_Main()`.

Updates the docs.python.org page with the addition of a 'Contributing to Docs' link at the end of the page (between 'Reporting Bugs' and 'About Documentation'). Updates the 'Found a Bug' page with additional links and information in the Documentation Bugs section.

`@typing.type_check_only` now allows type stubs to mark functions and classes not available during runtime.

Add glossary entry for 'magic method'.

Added `re.Match.groupdict` example to regex HOWTO.

`regtest` now always detects uncollectable objects. Previously, the check was only enabled by `--findleaks`. The check now also works with `-jN/--multiprocess N`. `--findleaks` becomes a deprecated alias to `--fail-env-changed`.

When using multiprocessing mode (`-jN`), `regtest` now better reports errors if a worker process fails, and it exits immediately on a

worker thread failure or when interrupted.

Change `test_time.test_monotonic()` to test only the lower bound of elapsed time after a sleep command rather than the upper bound. This prevents unnecessary test failures on slow buildbots. Patch by Victor Stinner.

Improve test coverage for `xml.etree.ElementTree`. Patch by Gordon P. Hemsley.

Fix typo in `test_cyclic_gc()` test for `xml.etree.ElementTree`. Patch by Gordon P. Hemsley.

Add a new `mod: '_testinternalcapi'` module to test the internal C API.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 948); [backlink](#)**

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Fix `test_imap4_host_default_value()` of `test_imaplib`: catch also `:data: 'errno.ENETUNREACH'` error.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 957); [backlink](#)**

Unknown interpreted text role "data".

Fix `test_sys.test_getallocatedblocks()` when `mod: 'tracemalloc'` is enabled.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 967); [backlink](#)**

Unknown interpreted text role "mod".

Fix reference leak hunting in `regtest`: compute also deltas (of reference count, allocated memory blocks, file descriptor count) during warmup, to ensure that everything is initialized before starting to hunt reference leaks.

Fix reference hunting (`python3 -m test -R 3:3`) when Python has no built-in `abc` module.

Port `test_resource` to VxWorks: skip tests cases setting `RLIMIT_FSIZE` and `RLIMIT_CPU`.

Fix `test_tabnanny` on VxWorks: adjust `ENOENT` error message.

Fix `testcapi.py.mem_buffer_overflow()`: handle memory allocation failure.

Fix `test_utf8_mode` on VxWorks: Python always use UTF-8 on VxWorks.

Fix tests that may fail with `PermissionError` upon calling `bind()` on `AF_UNIX` sockets.

Remove the stale `scriptsinstall` Makefile target.

On Unix, C extensions are no longer linked to `libpython` except on Android and Cygwin.

It is now possible for a statically linked Python to load a C extension built using a shared library Python.

When Python is embedded, `libpython` must not be loaded with `RTLD_LOCAL`, but `RTLD_GLOBAL` instead. Previously, using `RTLD_LOCAL`, it was already not possible to load C extensions which were not linked to `libpython`, such as C extensions of the standard library built by the `*shared*` section of `Modules/Setup`.

`distutils`, `python-config` and `python-config.py` have been modified.

`./configure --with-pymalloc` no longer adds the `m` flag to `SOABI` (`sys.implementation.cache_tag`). Enabling or disabling `pymalloc` has no impact on the ABI.

Change `PyAPI_FUNC(type)`, `PyAPI_DATA(type)` and `PyMODINIT_FUNC` macros of `pyport.h` when `Py_BUILD_CORE_MODULE` is defined. The `Py_BUILD_CORE_MODULE` define must be now be used to build a C extension as a dynamic library accessing Python internals: export the `PyInit_xxx()` function in DLL exports on Windows.

Don't build the `_crypt` extension on VxWorks.

Add `-fmax-type-align=8` to `CFLAGS` when clang compiler is detected. The `pymalloc` memory allocator aligns memory on 8 bytes. On x86-64, clang expects alignment on 16 bytes by default and so uses `MOVAPS` instruction which can lead to segmentation fault. Instruct clang that Python is limited to alignment on 8 bytes to use `MOVUPS` instruction instead: slower but don't trigger a `SIGSEGV` if the memory is not aligned on 16 bytes. Sadly, the flag must be added to `CFLAGS` and not just `CFLAGS_NODIST`, since third party C extensions can have the same issue.

`make tags` and `make TAGS` now also parse `Modules/_io/*.c` and `Modules/_io/*.h`.

Release builds and debug builds are now ABI compatible: defining the `Py_DEBUG` macro no longer implies the `Py_TRACE_REFS` macro, which introduces the only ABI incompatibility. The `Py_TRACE_REFS` macro, which adds the `:func: 'sys.getobjects'` function and the `envvar: 'PYTHONDUMPREFS'` environment variable, can be set using the new `./configure --with-trace-refs` build option.



**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 1135); [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] 3.8.0a4.rst, line 1135); [backlink](#)**

Unknown interpreted text role "envvar".

setup.py now correctly reports missing OpenSSL headers and libraries again.

Fix regression introduced in bpo-36146 refactoring setup.py

python-config --ldflags no longer includes flags of the LINKFORSHARED variable. The LINKFORSHARED variable must only be used to build executables.

Remove references to "aix3" and "aix4". Patch by M. Felt.

Added platform.win32\_edition() and platform.win32\_is\_iot(). Added support for cross-compiling packages for Windows ARM32. Skip tests that are not expected to work on Windows IoT Core ARM32.

Remove trailing spaces for registry keys when installed via the Store.

Fixed activate.bat to correctly update codepage when chcp.com returns dots in output. Patch by Lorenz Mende.

Added preset-iot layout for Windows IoT ARM containers. This layout doesn't contain UI components like tkinter or IDLE. It also doesn't contain files to support on-target builds since Windows ARM32 builds must be cross-compiled when using MSVC.

enum\_certificates function of the ssl module now returns certificates from all available certificate stores inside windows in a query instead of returning only certificates from the system wide certificate store. This includes certificates from these certificate stores: local machine, local machine enterprise, local machine group policy, current user, current user group policy, services, users. ssl.enum\_crls() function is changed in the same way to return all certificate revocation lists inside the windows certificate revocation list stores.

Fixes creating a venv when debug binaries are installed.

Enable better DLL resolution on Windows by using safe DLL search paths and adding :func:`os.add\_dll\_directory`.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 1254); [backlink](#)**

Unknown interpreted text role "func".

Add the venv standard library module to the nuget distribution for Windows.

Add the following socket module constants on Windows: IPPROTO\_AH IPPROTO\_CBT IPPROTO\_DSTOPTS IPPROTO\_EGP IPPROTO\_ESP IPPROTO\_FRAGMENT IPPROTO\_GGP IPPROTO\_HOPOPTS IPPROTO\_ICLFXBM IPPROTO\_ICMPV6 IPPROTO\_IDP IPPROTO\_IGMP IPPROTO\_IGP IPPROTO\_IPV4 IPPROTO\_IPV6 IPPROTO\_L2TP IPPROTO\_MAX IPPROTO\_ND IPPROTO\_NONE IPPROTO\_PGM IPPROTO\_PIM IPPROTO\_PUP IPPROTO\_RDP IPPROTO\_ROUTING IPPROTO\_SCTP IPPROTO\_ST

Added current version of libffi to cpython-source-deps. Change ctypes to use current version of libffi on Windows.

Report system load when running test suite on Windows. Patch by Ammar Askar. Based on prior work by Jeremy Kloth.

With the Windows 10 Creators Update, non-elevated users can now create symlinks as long as the computer has Developer Mode enabled.

Avoid failures setting macOS stack resource limit with resource.setrlimit. This reverts an earlier fix for bpo-18075 which forced a non-default stack size when building the interpreter executable on macOS.

Fix starting IDLE with pyshell. Add idlelib.pyshell alias at top; remove pyshell alias at bottom. Remove obsolete `__name__ == '__main__'` command.

Fix the argument handling in Tools/scripts/lll.py.

Fix memory leak in :func:`Py\_SetStandardStreamEncoding`: release memory if the function is called twice.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 1347); [backlink](#)**

Unknown interpreted text role "c:func".

:c:macro:`PyDoc\_VAR(name)` and :c:macro:`PyDoc\_STRVAR(name,str)` now create `static const char name[]` instead of `static char name[]`. Patch by Inada Naoki.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 1357); [backlink](#)**

Unknown interpreted text role "c:macro".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 1357); [backlink](#)**

Unknown interpreted text role "c:macro".

Change the value of `CLEANBYTE`, `DEADBYTE` and `FORBIDDENBYTE` internal constants used by debug hooks on Python memory allocators (`:func:PyMem_SetupDebugHooks` function). Byte patterns `0xCB`, `0xDB` and `0xFB` have been replaced with `0xCD`, `0xDD` and `0xFD` to use the same values than Windows CRT debug `malloc()` and `free()`.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 1368); [backlink](#)**

Unknown interpreted text role "c:func".

Since Python 3.7.0, calling `:func:Py_DecodeLocale` before `:func:Py_Initialize` produces mojibake if the `LC_CTYPE` locale is coerced and/or if the UTF-8 Mode is enabled by the user configuration. The `LC_CTYPE` coercion and UTF-8 Mode are now disabled by default to fix the mojibake issue. They must now be enabled explicitly (opt-in) using the new `:func:_Py_PreInitialize` API with `_PyPreConfig`.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 1381); [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] 3.8.0a4.rst, line 1381); [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] 3.8.0a4.rst, line 1381); [backlink](#)**

Unknown interpreted text role "c:func".

Fixed an accidental change to the datetime C API where the arguments to the `:func:PyDate_FromTimestamp` function were incorrectly interpreted as a single timestamp rather than an arguments tuple, which causes existing code to start raising `:exc:TypeError`. The backwards-incompatible change was only present in alpha releases of Python 3.8. Patch by Paul Ganssle.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ [cpython-main] [Misc] [NEWS.d] 3.8.0a4.rst, line 1395); [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] 3.8.0a4.rst, line 1395); [backlink](#)**

Unknown interpreted text role "exc".

Modify `PyObject_Init` to correctly increase the refcount of heap-allocated Type objects. Also fix the refcounts of the heap-allocated types that were either doing this manually or not decreasing the type's refcount in `tp_dealloc`