

Prevented potential DoS attack via CPU and RAM exhaustion when processing malformed Apple Property List files in binary format.

The `mod:plistlib` module no longer accepts entity declarations in XML plist files to avoid XML vulnerabilities. This should not affect users as entity declarations are not used in regular plist files.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 17); [backlink](#)**

Unknown interpreted text role "mod".

If the `nl_langinfo(CODESET)` function returns an empty string, Python now uses UTF-8 as the filesystem encoding. Patch by Victor Stinner.

Fixed a bug in the PEG parser that was causing crashes in debug mode. Now errors are checked in left-recursive rules to avoid cases where such errors do not get handled in time and appear as long-distance crashes in other places.

Fixed a possible crash in the PEG parser when checking for the `'!='` token in the `barry_as_flufl` rule. Patch by Pablo Galindo.

Propagate and raise the errors caused by `:c:func:PyAST_Validate` in the parser.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 60); [backlink](#)**

Unknown interpreted text role "c:func".

The `mod:ast` module internal state is now per interpreter. Patch by Victor Stinner.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 70); [backlink](#)**

Unknown interpreted text role "mod".

Fix handling of errors during creation of `PyFunctionObject`, which resulted in operations on uninitialized memory. Patch by Yonatan Goldschmidt.

Fix a bug in the parser, where a curly brace following a *primary* didn't fail immediately. This led to invalid expressions like `a {b}` to throw a `:exc:SyntaxError` with a wrong offset, or invalid expressions ending with a curly brace like `a {` to not fail immediately in the REPL.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 91); [backlink](#)**

Unknown interpreted text role "exc".

Fix possible buffer overflow in the new parser when checking for continuation lines. Patch by Pablo Galindo.

Run the parser two times. On the first run, disable all the rules that only generate better error messages to gain performance. If there's a parse failure, run the parser a second time with those enabled.

The `LOAD_ATTR` instruction now uses new "per opcode cache" mechanism and it is about 36% faster now. Patch by Pablo Galindo and Yury Selivanov.

Support for the legacy AIX-specific shared library loading support has been removed. All versions of AIX since 4.3 have supported and defaulted to using the common Unix mechanism instead.

The garbage collector now tracks all user-defined classes. Patch by Brandt Bucher.

Fixed potential issues with removing not completely initialized module from `sys.modules` when import fails.

Star-unpacking is now allowed for with item's targets in the PEG parser.

Removed special methods `__int__`, `__float__`, `__floordiv__`, `__mod__`, `__divmod__`, `__rfloordiv__`, `__rmod__` and `__rdivmod__` of the `:class:complex` class. They always raised a `:exc:TypeError`.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 174); [backlink](#)**

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 174); [backlink](#)**

Unknown interpreted text role "exc".

Micro optimization when compute `c.member:~PySequenceMethods.sq_item` and `c.member:~PyMappingMethods.mp_subscript` of `c.class:range`. 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) 3.10.0a2.rst, line 186); [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) 3.10.0a2.rst, line 186); [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) 3.10.0a2.rst, line 186); [backlink](#)

Unknown interpreted text role "class".

When loading a native module and a load failure occurs, prevent a possible UnicodeDecodeError when not running in a UTF-8 locale by decoding the load error message using the current locale's encoding.

Micro optimization for range.index if step is 1. Patch by Dong-hee Na.

Add `sys._current_exceptions()` function to retrieve a dictionary mapping each thread's identifier to the topmost exception currently active in that thread at the time the function is called.

Enable `from __future__ import annotations` (PEP 563) by default. The values found in `attr: __annotations__` dicts are now strings, e.g. `{"x": "int"}` instead of `{"x": int}`.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 228); [backlink](#)

Unknown interpreted text role "attr".

On Solaris, `func:~time.thread_time` is now implemented with `gethrvtime()` because `clock_gettime(CLOCK_THREAD_CPUTIME_ID)` is not always available. Patch by Jakub Kulik.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 239); [backlink](#)

Unknown interpreted text role "func".

The `func:repr` of `mod:typing` types containing `ref:Generic Alias Types <types-genericalias>` previously did not show the parameterized types in the `GenericAlias`. They have now been changed to do so.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 250); [backlink](#)

Unknown interpreted text role "func".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 250); [backlink](#)

Unknown interpreted text role "mod".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 250); [backlink](#)

Unknown interpreted text role "ref".

`binhex.binhex()` consistently writes macOS 9 line endings.

The `class:logging.FileHandler` class now keeps a reference to the builtin `func:open` function to be able to open or reopen the file during Python finalization. Fix errors like: `NameError: name 'open' is not defined`. Patch by Victor Stinner.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 270); [backlink](#)**

Unknown interpreted text role "class".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 270); [backlink](#)**

Unknown interpreted text role "func".

Removed the `unicodedata.ucnhash_CAPI` attribute which was an internal PyCapsule object. The related private `_PyUnicode_Name_CAPI` structure was moved to the internal C API. Patch by Victor Stinner.

Convert the `:mod:'unicodedata'` extension module to the multiphase initialization API ([PEP 489](#)) and convert the `unicodedata.UCD` static type to a heap type. Patch by Mohamed Koubaa and Victor Stinner.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 293); [backlink](#)**

Unknown interpreted text role "mod".

Fix memory leak in `:func:'subprocess.Popen'` in case an uid (gid) specified in `user (group, extra_groups)` overflows `uid_t (gid_t)`.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 304); [backlink](#)**

Unknown interpreted text role "func".

`:exc:'~plistlib.InvalidFileException'` and `:exc:'RecursionError'` are now the only errors caused by loading malformed binary Plist file (previously `ValueError` and `TypeError` could be raised in some specific cases).

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 314); [backlink](#)**

Unknown interpreted text role "exc".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 314); [backlink](#)**

Unknown interpreted text role "exc".

In `importlib.resources`, `.path` method is more aggressive about releasing handles to zipfile objects early, enabling use-cases like `certifi` to leave the context open but delete the underlying zip file.

Pickling heap types implemented in C with protocols 0 and 1 raises now an error instead of producing incorrect data.

In `importlib.metadata.PackageNotFoundError`, make reference to the package metadata being missing to improve the user experience.

`plistlib`: fix parsing XML plists with hexadecimal integer values

Fix an incorrectly formatted error from `:meth:'_codecs.charmap_decode'` when called with a mapped value outside the range of valid Unicode code points. PR by Max Bernstein.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 365); [backlink](#)**

Unknown interpreted text role "meth".

Fix pickling pure Python `:class:'datetime.time'` subclasses. Patch by Dean Inwood.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 376); [backlink](#)**

Unknown interpreted text role "class".

`:meth:'sched.scheduler.cancel()'` will now cancel the correct event, if two events with same priority are scheduled for the same time. Patch by Bar Harel.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 386); [backlink](#)**

Unknown interpreted text role "meth".

`:func:`textwrap.wrap`` now attempts to break long words after hyphens when `break_long_words=True` and `break_on_hyphens=True`.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 397); [backlink](#)**

Unknown interpreted text role "func".

Use `vfork()` instead of `fork()` for `:func:`subprocess.Popen`` on Linux to improve performance in cases where it is deemed safe.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 407); [backlink](#)**

Unknown interpreted text role "func".

Add support for `zipfile.Path` inheritance. `zipfile.Path.is_file()` now returns `False` for non-existent names. `zipfile.Path` objects now expose a `.filename` attribute and rely on that to resolve `.name` and `.parent` when the `Path` object is at the root of the `zipfile`.

Fix possible refleaks in `:mod:`sqlite3`` module init.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 429); [backlink](#)**

Unknown interpreted text role "mod".

Fixed tests using `IsolatedAsyncioTestCase` from hanging on `BaseExceptions`.

Fixed a bug that was causing `:func:`ctypes.util.find_library`` to return `None` when trying to locate a library in an environment when `gcc>=9` is available and `ldconfig` is not. Patch by Pablo Galindo

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Unknown interpreted text role "func".

Fix bug where `TestCase.assertLogs` doesn't correctly filter messages by level.

Implement [PEP 613](#), introducing `:data:`typing.TypeAlias`` annotation.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 468); [backlink](#)**

Unknown interpreted text role "data".

A new function in `abc`: `update_abstractmethods` to re-calculate an abstract class's abstract status. In addition, `dataclass` has been changed to call this function.

Added `newline` parameter to `pathlib.Path.write_text()`.

Tkinter font class repr uses font name

`str()` for the `type` attribute of the `tkinter.Event` object always returns now the numeric code returned by Tk instead of the name of the event type.

`:func:`encodings.normalize_encoding`` now ignores non-ASCII characters.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 517); [backlink](#)**

Unknown interpreted text role "func".

Ensure all methods that generated from `:func:`dataclasses.dataclass`` objects now have the proper `__qualname__` attribute referring to the class they belong to. Patch by Batuhan Taskaya.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 526); [backlink](#)**

Unknown interpreted text role "func".

Handle exceptions caused by unparsable date headers when using email "default" policy. Patch by Tim Bell, Georges Toth

Add F\_SETPIPE\_SZ and F\_GETPIPE\_SZ to fcntl module. Allow setting pipesize on subprocess.Popen.

Add `contextlib.aclosing` for deterministic cleanup of async generators which is analogous to `contextlib.closing` for non-async generators. Patch by Joongi Kim and John Belmonte.

Allow `ctypes.wintypes` to be imported on non-Windows systems.

Add a key function to the bisect module.

`:func:`shutil.which`` now ignores empty entries in `:envvar:`PATHEXT`` instead of treating them as a match.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 586); [backlink](#)**

Unknown interpreted text role "func".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 586); [backlink](#)**

Unknown interpreted text role "envvar".

Fix `--outfile` for `:mod:`cProfile`` / `:mod:`profile`` not writing the output file in the original directory when the program being profiled changes the working directory. PR by Anthony Sottile.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 596); [backlink](#)**

Unknown interpreted text role "mod".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 596); [backlink](#)**

Unknown interpreted text role "mod".

The `:mod:`shelve`` module now uses `:data:`pickle.DEFAULT_PROTOCOL`` by default instead of `:mod:`pickle`` protocol 3.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 607); [backlink](#)**

Unknown interpreted text role "mod".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 607); [backlink](#)**

Unknown interpreted text role "data".

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 607); [backlink](#)**

Unknown interpreted text role "mod".

Fixed KeyError exception when flattening an email to a string attempts to replace a non-existent Content-Transfer-Encoding header.

The `:mod:`http.cookiejar`` module now supports the parsing of cookies in CURL-style cookiejar files through MozillaCookieJar on all platforms. Previously, such cookie entries would be silently ignored when loading a cookiejar with such entries.

**System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 627); [backlink](#)**

Unknown interpreted text role "mod".

Additionally, the HTTP Only attribute is persisted in the object, and will be correctly written to file if the MozillaCookieJar object is

subsequently dumped.

Document `__format__` functionality for IP addresses.

Document the default implementation of `object.__eq__`.

Clarify that subscription expressions are also valid for certain `term`classes <class>`` and `term`types <type>`` in the standard library, and for user-defined classes and types if the classmethod `meth:`__class_getitem__`` is provided.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 661); [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) 3.10.0a2.rst, line 661); [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) 3.10.0a2.rst, line 661); [backlink](#)

Unknown interpreted text role "meth".

Documented `ref:`generic alias type <types-genericalias>`` and `:data:`types.GenericAlias``. Also added an entry in glossary for `term:`generic types <generic type>``.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 673); [backlink](#)

Unknown interpreted text role "ref".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 673); [backlink](#)

Unknown interpreted text role "data".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 673); [backlink](#)

Unknown interpreted text role "term".

Fix tarfile's `extractfile` documentation

Document some restrictions on the default string representations of numeric classes.

Fix `test_logging.test_race_between_set_target_and_flush()`: the test now waits until all threads complete to avoid leaking running threads.

Avoid a test failure in `test_lib2to3` if the module has already imported at the time the test executes. Patch by Pablo Galindo.

Tests for CJK codecs no longer call `eval()` on content received via HTTP.

Fixed a failure in `test_tk.test_widgets.ScaleTest` happening when executing the test with Tk 8.6.10.

Add `-fno-semantic-interposition` to both the compile and link line when building with `--enable-optimizations`. Patch by Victor Stinner and Pablo Galindo.

Updates the icons for IDLE in the Windows Store package.

Use 8-byte step to detect ASCII sequence in 64-bit Windows build.

Update Tcl and Tk to 8.6.10 in Windows installer.

Update Windows installer to use SQLite 3.33.0.

Avoid Unicode errors when accessing certain locale data on Windows.

Ignore invalid prefix lengths in `system proxy excludes`.

Mostly finish using ttk widgets, mainly for editor, settings, and searches. Some patches by Mark Roseman.

Typing opening and closing parentheses inside the parentheses of a function call will no longer cause unnecessary "flashing" off and on of an existing open call-tip, e.g. when typed in a string literal.

Add a 256×256 pixel IDLE icon to the Windows .ico file. Created by Andrew Clover. Remove the low-color gif variations from



the .ico file.

The private `_PyUnicode_Name_CAPI` structure of the PyCapsule API `unicodedata.ucnhash_CAPI` has been moved to the internal C API. Patch by Victor Stinner.

Fix potential crash in deallocating method objects when dynamically allocated *PyMethodDef*'s lifetime is managed through the `self` argument of a *PyCFunction*.

The `mod:subprocess` module and `os.closerange` will now use the `close_range(low, high, flags)` syscall when it is available for more efficient closing of ranges of descriptors.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 860); [backlink](#)

Unknown interpreted text role "mod".

`:c:func:PyObject_GenericGetDict` is available again in the limited API when targeting 3.10 or later.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 871); [backlink](#)

Unknown interpreted text role "c:func".

Add `_Py_closerange` function to provide performant closing of a range of file descriptors.

`:c:data:Py_FileSystemDefaultEncodeErrors` and `:c:data:Py_UTF8Mode` are available again in limited API.

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 891); [backlink](#)

Unknown interpreted text role "c:data".

**System Message: ERROR/3** (D:\onboarding-resources\sample-onboarding-resources\cpython-main\Misc\NEWS.d\ (cpython-main) (Misc) (NEWS.d) 3.10.0a2.rst, line 891); [backlink](#)

Unknown interpreted text role "c:data".

Add `PyIter_Send` function to allow sending value into generator/coroutine/iterator without raising `StopIteration` exception to signal return.

Added `PyUnicode_AsUTF8AndSize` to the limited C API.