

Surprises, Bugs, and Deep Dives: Lessons from a Python Upgrade

PyWeb, July 2025

bit.ly/py312-upgrade

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- Developer on the Core team at **Fortinet**
- We provide cybersecurity protection for emails and more
- Passionate about **Python**, enjoy solving tough **challenges** and understanding things **inside out**



Python 3.9 → 3.12: The Upgrade Journey

Agenda / Upgrade Trail Map

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- Stage 0: Why upgrade? Why 3.12? Strategy?

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- Stage 6: Production rollout & real-world bugs

Day 0

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- Thousands of pods, millions of scans hourly

Stage 0: Why Upgrade? Why 3.12?

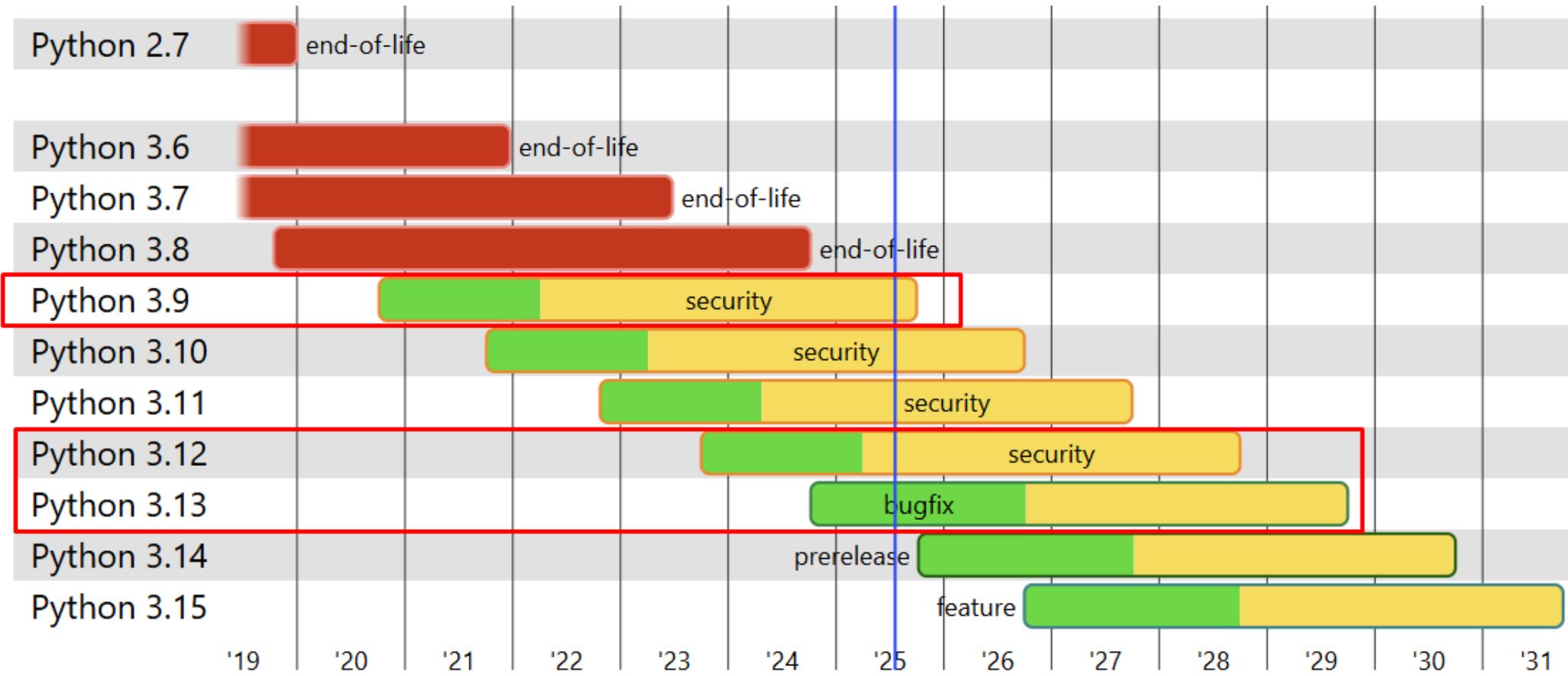
- 3.9 is EOL – security & ecosystem pressure
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- Strategy: 2 full local envs (3.9 & 3.12), side by side
- Compare outputs, debug diffs, document all

Status of Python versions

The `main` branch is currently the future Python 3.15, and is the only branch that accepts new features.
The latest release for each Python version can be found on the [download page](#).



Day 1

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- OpenSSL 3 blocks legacy SMTP servers
- Recompiled Python 3.12 with OpenSSL 1.1.1
- Packed to ZIP → used in Docker build.

Stage 1: Build Details

```
1 # Downloading required python source
2 wget https://www.python.org/ftp/python/3.12.9/Python-3.12.9.tgz
3 tar -xvf Python-3.12.9.tgz
4 cd Python-3.12.9
5
6 # Building python with openssl and pip to dedicated path
7 ./configure -C --with-ensurepip=install --with-openssl=/usr/local/ssl --prefix=/Python-3.12.9
8 make clean
9 make -s -j4
10 ./python -m ensurepip --default-pip
11 make install
12
13 # Saving the compiled python to zip file for later use
14 cd ..
15 tar -cvzf Python-3.12.9-openssl-1.1.1.built.tgz ./Python-3.12.9/compiled
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14 cd ..
15 tar -cvzf Python-3.12.9-openssl-1.1.1.built.tgz ./Python-3.12.9/compiled
```

Stage 1: Build Usage

```
RUN wget https://fake.io/Python-3.12.9-openssl-1.1.1.built.tgz -O Python.tgz &&\\  
tar -xvf Python.tgz && \\  
cp ./Python-3.12.9/compiled/* /usr/local/ -r  
RUN python3 -c "import ssl; assert '1.1.1' in ssl.OPENSSL_VERSION"
```

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- Install packages using `uv sync` (similar to `pip install`)
- Expect install errors due to 3.12 incompatibilities
- Upgrade to latest version if possible
- Otherwise, find first version supporting Python 3.12

cchardet example

longintrepr.h: No such file or directory

```
54.71      C++_penread_no_struct_overflow_nsign_compare_wanreacheable_code
54.71      -DNDEBUG -g -O3 -Wall -fPIC -fPIC -Isrc/ext/uchardet/src
54.71      -I/root/.cache/uv/builds-v0/.tmpgz03a9/include
54.71      -I/root/.local/share/uv/python/cpython-3.12.9-linux-x86_64-gnu/include/python
54.71      -c src/cchardet/_cchardet.cpp -o
54.71      build/temp.linux-x86_64-cpython-312/src/cchardet/_cchardet.o
54.71
54.71      [stderr]
54.71      src/cchardet/_cchardet.cpp:196:12: fatal error: longintrepr.h: No such
54.71      file or directory
54.71      196 | #include "longintrepr.h"
54.71      |          ^
54.71      compilation terminated.
54.71      error: command '/usr/bin/c++' failed with exit code 1
54.71
54.71      hint: This error likely indicates that you need to install a library
54.71      that provides "longintrepr.h" for 'cchardet@2.1.7'
54.71      help: 'cchardet' (v2.1.7) was included because 'mantis' (v1.0.0) depends
54.71      on 'cchardet'
-----
```

 github.com/PyYoshi/cChardet/issues/81

 Open

Failed to Build on Python 3.11.0 #81

What is the problem?

Failed to build.

Expected behavior

Supposed to build.

Actual behavior

fatal error: longintrepr.h: No such file or directory

Steps to reproduce the behavior

Just update to Python 3.11 and attempt to build code results in error.



20



- The non-limited API files `cellobjekt.h`, `classobject.h`, `code.h`, `context.h`, `funcobject.h`, `genobject.h` and `longintrepr.h` have been moved to the `Include/cpython` directory. Moreover, the `eval.h` header file was removed. These files must not be included directly, as they are already included in `Python.h`: [Include Files](#). If they have been included directly, consider including `Python.h` instead. (Contributed by Victor Stinner in [bpo-35134](#).)

Package didn't update in last years

cchardet 2.1.7

pip install cchardet 



[Latest version](#)

Released: Oct 27, 2020

cChardet is high speed universal character encoding detector.

But there is a pre-release version

Release history

[Release notifications](#) | [RSS feed](#) 

2.2.0a2 PRE-RELEASE

Jun 6, 2024

THIS VERSION

2.1.7

Oct 27, 2020

There is also a fork option

cChardet

NOTICE: This is a fork of the original project at <https://github.com/PyYoshi/cChardet> since the original project is no longer maintained.

To install:

```
pip install faust-cchardet
```

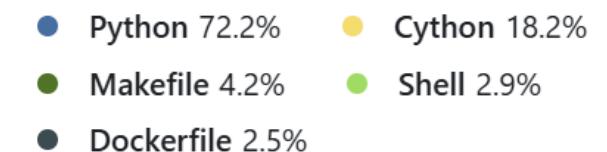


6 forks

13 years old

v2.1.19 Latest

on Aug 9, 2023



[Report repository](#)

Untitled query

Run Save Download Share

```
1 SELECT project, file.version, count(*) as count
2 FROM `bigquery-public-data.pypi.file_downloads`
3 WHERE timestamp >= TIMESTAMP_SUB(CURRENT_TIMESTAMP(), INTERVAL 30 DAY)
4 AND project = 'cchardet'
5 GROUP BY project, file.version
6 order by count desc
```

Query results

Row	project	version	count
1	cchardet	2.1.7	606845
2	cchardet	2.1.5	27459
3	cchardet	2.2.0a2	25740
4	cchardet	2.1.6	9942
5	cchardet	2.1.4	6384

Query results

Job information [Results](#) [Chart](#) [JSON](#) [Execution details](#) [Execution history](#)

Row	project ▾	version ▾	count ▾
1	faust-cchardet	2.1.19	435618
2	faust-cchardet	2.1.18	25573
3	faust-cchardet	2.1.13	2073
4	faust-cchardet	2.1.16	1796
5	faust-cchardet	2.1.15	994
6	faust-cchardet	2.1.14	796
7	faust-cchardet	2.1.9rc5	762
8	faust-cchardet	2.1.12	719
9	faust-cchardet	2.1.12rc0	716
10	faust-cchardet	2.1.9	710
11	faust-cchardet	2.1.11	546
	

Although a popular fork exists, I chose to stick with the original `cchardet` after verifying that the pre-release only included safe recompilation changes — switching packages entirely felt riskier.

numpy example

```
> [build 4/5] RUN --mount=type=cache,target=/root/.cache/uv      uv --directory /opt/app sync:  
1.487 Downloading cpython-3.12.9-linux-x86_64-gnu (20.3MiB)  
8.039 Downloaded cpython-3.12.9-linux-x86_64-gnu  
8.502 Using CPython 3.12.9  
8.506 Creating virtual environment at: venv  
9.356 Building numpy==1.22.4  
9.414 Building pycountry==17.5.14  
9.417 Building scikit-learn==1.1.1  
9.418 Building pylzma==0.5.0  
9.421 Building capstone==3.0.4  
9.422 Building pcre2==0.4.0  
9.424 Building regex==2021.3.17  
9.425 Building brotli==1.0.9  
9.428 Building snowflake-connector-python==3.0.1  
9.429 Building psycopg2==2.9.3  
9.431 Building xmlsec==1.3.13  
9.658 Downloading xgboost (184.0MiB)  
9.730 Downloading opencv-python (59.0MiB)  
9.732 Downloading pymupdfb (15.2MiB)  
9.734 Downloading scipy (36.4MiB)  
9.738 Downloading pyqt5-qt5 (58.3MiB)  
9.898 Downloading ddtrace (6.0MiB)  
18.79 x Failed to build 'numpy==1.22.4'  
18.79 └─> The build backend returned an error  
18.79   └─> Call to `setuptools.build_meta:__legacy__.build_wheel` failed (exit  
18.79     status: 1)
```

Python 3.12 removed distutils

```
18.79      hint: 'distutils' was removed from the standard library in Python 3.12.  
18.79      Consider adding a constraint (like 'numpy >1.22.4') to avoid building a  
18.79      version of 'numpy' that depends on 'distutils'.  
18.79  help: 'numpy' (v1.22.4) was included because 'mantis' (v1.0.0) depends on  
18.79      'numpy'  
-----
```

```
Dockerfile:99  
-----
```

```
98 |     COPY pyproject.toml uv.lock $APP_DIR  
99 | >>> RUN --mount=type=cache,target=/root/.cache/uv \  
100 | >>>     uv --directory $APP_DIR sync  
101 |     RUN cd $APP_DIR &&\
```

We can't upgrade numpy because an internal dependency is pinned to this specific version

```
> $ uv lock
  x No solution found when resolving dependencies for split:
    ↳ Because some-internal-package==1.0.67 depends on numpy==1.22.4 and your project depends
      on numpy>1.22.4,
      we can conclude that your project and some-internal-package==1.0.67 are incompatible.
      And because your project depends on some-internal-package==1.0.67,
      we can conclude that your project's requirements are unsatisfiable.
```

Code

Blame

35 lines (32 loc) · 754 Bytes

```
1     from setuptools import setup
2
3     ✓ REQUIREMENTS = [
4         "networkx",
5         "numpy==1.22.4",
6         "oletools==0.60",
7         "pyparsing==2.3.0",
8         "xgboost==1.6.1",
9         "scikit-learn==1.1.1",
10    ]
11
```

uv to the rescue!

Dependency overrides

Dependency overrides allow bypassing unsuccessful or undesirable resolutions by overriding a package's declared dependencies. Overrides are a useful last resort for cases in which you know that a dependency is compatible with a certain version of a package, despite the metadata indicating otherwise.

Unblocked upgrade with `override-metadata`; sent PR to fix deps.

```
[[tool.uv.dependency-metadata]]
name = "some-internal-package"
version = "1.0.67"
requires-dist = [
    #...
    "numpy>1.22.4",
    #...
]
```

Day 3

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- First full run under Python 3.12 exposed multiple issues
- This stage is mostly trial-and-error: issues only revealed themselves at runtime, requiring quick investigation and targeted fixes
- Common problems: missing imports, deprecated APIs, incompatible packages
- After several iterations:  system booted and app ran locally

pinecone example

```
File "/opt/app/venv/lib/python3.12/site-packages/django/__init__.py", line 27, in setup
    apps.populate(settings.INSTALLED_APPS)
File "/opt/app/venv/lib/python3.12/site-packages/django/apps/registry.py", line 116, in populate
    app_config.import_models()
File "/opt/app/venv/lib/python3.12/site-packages/django/apps/config.py", line 269, in import_models
    self.models_module = import_module(models_module_name)
                               ^^^^^^^^^^^^^^^^^^^^^^^^^^
File "/usr/local/lib/python3.12/importlib/__init__.py", line 90, in import_module
    return _bootstrap._gcd_import(name[level:], package, level)
                               ^^^^^^^^^^^^^^^^^^^^^^^^^^
File "<frozen importlib._bootstrap>", line 1387, in _gcd_import
File "<frozen importlib._bootstrap>", line 1360, in _find_and_load
File "<frozen importlib._bootstrap>", line 1331, in _find_and_load_unlocked
File "<frozen importlib._bootstrap>", line 935, in _load_unlocked
File "<frozen importlib._bootstrap_external>", line 999, in exec_module
File "<frozen importlib._bootstrap>", line 488, in _call_with_frames_removed
File "/opt/app/.../signatures/models.py", line 40, in <module>
    from .core.pinecone_client import (
File "/opt/app/.../core/pinecone_client.py", line 1, in <module>
    import pinecone
File "/opt/app/venv/lib/python3.12/site-packages/pinecone/__init__.py", line 11, in <module>
    from .core.grpc import *
File "/opt/app/venv/lib/python3.12/site-packages/pinecone/core/grpc/index_grpc.py", line 23, in <module>
    from pinecone.core.grpc.protos.vector_service_pb2 import Vector as GRPCVector, \
File "/opt/app/venv/lib/python3.12/site-packages/pinecone/core/grpc/protos/vector_service_pb2.py", line 19, in <module>
    from google.api import annotations_pb2 as google_dot_api_dot_annotations__pb2
File "/opt/app/venv/lib/python3.12/site-packages/google/api/annotations_pb2.py", line 31, in <module>
    from google.api import http_pb2 as google_dot_api_dot_http__pb2
File "/opt/app/venv/lib/python3.12/site-packages/google/api/http_pb2.py", line 36, in <module>
    _HTTP = DESCRIPTOR.message_types_by_name["Http"]
                               ^^^^^^
AttributeError: 'NoneType' object has no attribute 'message_types_by_name'
exit status 1
make[1]: *** [Makefile:255: setup_deploy_mantis] Error 1
```

```
--  
name = "pinecone-client"  
version = "2.2.1"  
source = { registry = "https://pypi.org/simple" }  
dependencies = [  
    { name = "dnspython" },  
    { name = "loguru" },  
    { name = "numpy" },  
    { name = "python-dateutil" },  
    { name = "pyyaml" },  
    { name = "requests" },  
    { name = "tqdm" },  
    { name = "typing-extensions" },  
    { name = "urllib3" },  
]  
sdist = { url = "https://files.pythonhosted.org/packages"
```

pinecone-client 6.0.0

✓ [Latest version](#)

`pip install pinecone-client` 

Released: Feb 21, 2025

Pinecone client (DEPRECATED)

Pinecone Python Client (DEPRECATED)

The official Pinecone python package has been renamed from `pinecone-client` to `pinecone`. To upgrade, please **remove** `pinecone-client` from your project dependencies and then **add** the `pinecone` package to get the latest updates.

pinecone 7.3.0



[Latest version](#)

pip install pinecone 

Released: Jun 27, 2025

Pinecone client and SDK

But, why we failed on pinecone[grpc] which we didn't install?

Looks good, no?

```
1  #
2  # Copyright (c) 2020-2021 Pinecone Systems Inc. All right reserved.
3  #
4  from pinecone.core.utils.constants import CLIENT_VERSION as __version__
5  from .config import *
6  from .exceptions import *
7  from .info import *
8  from .manage import *
9  from .index import *
10 try:
11     from .core.grpc.index_grpc import *
12 except ImportError:
13     pass # ignore for non-[grpc] installations
```

[pyproject.toml](#)[Dockerfile](#)[image_annotator_pb2.py](#)[index_grpc.py](#)[vector_service_pb2.py](#)[__init__.py](#)

```
1  #
2  # Copyright (c) 2020-2021 Pinecone Systems Inc. All rights reserved.
3  #
4  import logging
5  import numbers
6  from abc import ABC, abstractmethod
7  from functools import wraps
8  from importlib.util import find_spec
9  from typing import NamedTuple, Optional, Dict, Iterable, Union, List, Tuple, Any
10 from collections.abc import Mapping
11
12 import certifi
13
14 import grpc
15 from google.protobuf import json_format
16
17 from grpc._channel import _InactiveRpcError, _MultiThreadedRendezvous
18 from tqdm.autonotebook import tqdm
19 import json
20
21 from pinecone import FetchResponse, QueryResponse, ScoredVector, SingleQueryResults, DescribeIndexStatsResponse
22 from pinecone.config import Config
23 from pinecone.core.client.model.namespace_summary import NamespaceSummary
24 from pinecone.core.client.model.vector import Vector as _Vector
25 from pinecone.core.grpc.protos.vector_service_pb2 import Vector as GRPCVector, \
    QueryVector as GRPCQueryVector, UpsertRequest, UpsertResponse, DeleteRequest, QueryRequest, \
    FetchRequest, UpdateRequest, DescribeIndexStatsRequest, DeleteResponse, UpdateResponse,
```

Pinecone expected a missing `grpc` to raise `ImportError`, but it was installed via an unrelated package with the wrong version — leading to `AttributeError` instead

Day 5

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Stage 4: Running 4k Tests — Reality Check

- Ran full test suite on GitHub & locally
- Most tests passed, but some (~100) failed
- Next: digging into a few tricky and interesting issues found

patool example

Tests are failing with an IndexError for some reason...

```
E ...Full output truncated (3 lines hidden), use '-vv' to show
=====
E   ...Full output truncated (3 lines hidden), use '-vv' to show
=====
== short test summary info ==
=====
FAILED ./tests/test_core/test_mark_as_failed.py::test_mark_as_failed_passes_mal_verdict_to_root[leaf mal, leaf -> child -> root, leaf started] - IndexError: list index out of range
FAILED ./tests/test_core/test_mark_as_failed.py::test_mark_as_failed_passes_mal_verdict_to_root[leaf mal, root -> leaf -> child, leaf started] - IndexError: list index out of range
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FAILED ./tests/test_core/test_mark_as_failed.py::test_mark_as_failed_passes_mal_verdict_to_root[leaf mal, leaf -> child -> root, leaf not started] - IndexError: list index out of range
FAILED ./tests/test_core/test_mark_as_failed.py::test_mark_as_failed_passes_mal_verdict_to_root[leaf mal, root -> leaf -> child, leaf not started] - IndexError: list index out of range
FAILED ./tests/test_core/test_mark_as_failed.py::test_mark_as_failed_passes_mal_verdict_to_root[child mal, leaf -> child -> root, leaf not started] - IndexError: list index out of range
FAILED ./tests/test_core/test_mark_as_failed.py::test_mark_as_failed_passes_mal_verdict_to_root[child mal, root -> leaf -> child, leaf not started] - IndexError: list index out of range
E   ...Full output truncated (3 lines hidden), use '-vv' to show
=====
```

Let's debug it with pytest --trace

```
$BIN_PATH/pytest ./tests --lf -k test_mark_as_failed_passes_mal_verdict_to_root --trace
```

```
85     def _extract_to_outdir(self):
86         try:
87             result = patoolib.extract_archive(self.file_path, outdir=self.output_dir, verbosity=-1, interactive=False)
88             self._handle_extract_result(result)
89             return True
90         except RuntimeError as e:
91             self.logger.warning('Archive is encrypted and currently not supported. msg={}'.format(e))
92         except patoolib.util.PatoolError as e:
93             self.logger.warning('Archive read error. msg={}. Attempting to extract files with additional software:{}'.format(e))
94             if isinstance(e, patoolib.util.PatoolCommandError):
95                 return self._try_handle_extract_errors(e.command_result)
96             return False
97     return False
PatoolError: unknown archive format for file '/tmp/tmpxhyejsxy'
(Pdb++)
```

```
PatoolError: unknown archive format for file `/tmp/tmpxhyejsxy'
```

Verified in both environments that the patool version **did not** change

```
97         return False
PatooleError: unknown archive format for file '/tmp/tmpxhyejsxy'
(Pdb++) patoolib
<module 'patoolib' from '/opt/app/venv/lib/python3.12/site-packages/patoolib/__init__.py'>
(Pdb++) patoolib.__version__
'1.13.11'
(Pdb++) import hashlib
(Pdb++) from pathlib import Path
(Pdb++) hashlib.sha256(Path(self.file_path).read_bytes()).hexdigest()
'44bf95cc3e01c398960e6275f94ba5aa30700fe0a2cfab8b77c93cc799875a90'
(Pdb++)
```

```
(Pdb++) w
[0]   /usr/local/lib/python3.9/bdb.py(623)runcall()
-> res = func(*args, **kwds)
[1]   /opt/app/.tests/test_core/test_mark_as_failed.py(71)test_mark_as_failed_passes_mal_verdict_to_root()
-> scan_tree = _create_scan_tree()
[2]   /opt/app/.tests/test_core/test_mark_as_failed.py(38)_create_scan_tree()
-> child_scan = _extract(scan)
[3]   /opt/app/.tests/test_core/test_mark_as_failed.py(25)_extract()
-> children = extract_scan(scan=scan, logger=scan.logger, create_children=True,
[4]   /opt/app/.unpackers extractors/_init__.py(230)extract_scan()
-> extractor_children = extractor.extract() or []
[5]   /opt/app/.unpackers extractors/archive.py(75)extract()
-> successfully_extracted = self._extract_to_outdir()
[6] > /opt/app/.unpackers extractors/archive.py(88)_extract_to_outdir()
-> self._handle_extract_result(result)
(Pdb++) patoolib.__version__
'1.13.11'
(Pdb++) self.file_path
'/tmp/tmpyyd70u13'
(Pdb++) import hashlib
(Pdb++) #hashlib.sha256(
*** SyntaxError: unexpected EOF while parsing
(Pdb++) from pathlib import Path
(Pdb++) hashlib.sha256(Path(self.file_path).read_bytes()).hexdigest()
'44bf95cc3e01c398960e6275f94ba5aa30700fe0a2cfab8b77c93cc799875a90'
(Pdb++)
```

Confirmed that the input file used was **exactly the same**

Let's go deeper...

```
patoolib.get_archive_format(self.file_path)
```

```
(Pdb++) patoolib.util.check_existing_filename(self.file_path)
(Pdb++) patoolib.get_archive_format(self.file_path)
*** patoolib.util.PatoolError: unknown archive format for file '/tmp/tmpxhyejsxy'
Traceback (most recent call last):
  File "/opt/app/venv/lib/python3.12/site-packages/patoolib/__init__.py", line 316, in get_archive_format
    raise util.PatoolError("unknown archive format for file '%s'" % filename)
(Pdb++)
```

```
(Pdb++) patoolib.get_archive_format(self.file_path)
('zip', None)
(Pdb++)
```

```
11
12 def get_archive_format(filename):
13     """Detect filename archive format and optional compression."""
14     mime, compression = util.guess_mime(filename)
15     if not (mime or compression):
16         raise util.PatoolError("unknown archive format for file '%s'" % filename)
17     if mime in ArchiveMimetypes:
18         format = ArchiveMimetypes[mime]
19     else:
20         raise util.PatoolError("unknown archive format for file '%s' (mime-type is '%s')" % (fi
21     if format == compression:
22         # file cannot be in same format compressed
23         compression = None
24     return format, compression
```

```
patoolib.util.guess_mime(self.file_path)
```

```
(Pdb++) patoolib.util.guess_mime(self.file_path)
(None, None)
```

```
(Pdb++) patoolib.util.guess_mime(self.file_path)
('application/zip', None)
(Pdb++)
```

```
--  
241     @memoized  
242     def guess_mime (filename):  
243         """Guess the MIME type of given filename using file(1) and if that  
244         fails by looking at the filename extension with the Python mimetypes  
245         module.  
246  
247         The result of this function is cached.  
248         """  
249         mime, encoding = guess_mime_file(filename)  
250         if mime is None:  
251             mime, encoding = guess_mime_mimedb(filename)  
252         assert mime is not None or encoding is None  
253         return mime, encoding  
254
```

```
django@dd8aee805609:/opt/app$ which file
django@dd8aee805609:/opt/app$ ls -la /usr/bin/file
ls: cannot access '/usr/bin/file': No such file or directory
django@dd8aee805609:/opt/app$
```

```
django@PP109-YonatanB:/opt/app$ which file
/usr/bin/file
```

```
django@PP109-YonatanB:/opt/app$ file --version
file-5.41
```

We don't install **file** explicitly, so where it come from?

Checking for **reverse** dependency on **file**

```
$ apt-cache rdepends --installed file  
file  
Reverse Depends:  
  libmagic1  
  mailcap
```

```
django@PP109-YonatanB:/opt/app$ apt-cache rdepends --installed file
file
Reverse Depends:
libmagic1
mailcap
django@PP109-YonatanB:/opt/app$ apt-cache rdepends --installed libmagic1
libmagic1
Reverse Depends:
libmagic-mgc
libmagic-mgc
file
django@PP109-YonatanB:/opt/app$ apt-cache rdepends --installed libmagic-mgc
libmagic-mgc
Reverse Depends:
libmagic1
django@PP109-YonatanB:/opt/app$ apt-cache rdepends --installed mailcap
mailcap
Reverse Depends:
mime-support
django@PP109-YonatanB:/opt/app$ apt-cache rdepends --installed mime-support
mime-support
Reverse Depends:
mailcap
python3.9
python3.10
media-types
media-types
mailcap
libpython3.10-stdlib
libpython3.9-stdlib
...
```

Since no python3.9, must install mime-support explicitly

```
root@dd8aee805609:/opt/app# apt install mime-support
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  file mailcap
The following NEW packages will be installed:
  file mailcap mime-support
0 upgraded, 3 newly installed, 0 to remove and 13 not upgraded.
Need to get 49.0 kB of archives.
After this operation, 194 kB of additional disk space will be used.
Do you want to continue? [Y/n] ■
```

And indeed, after the fix, the tests are passing successfully

```
/usr/bin/file
django@dd8aee805609:/opt/app$ $BIN_PATH/pytest ./tests --lf -k test_mark_as_failed_passes_mal_verdict_to_root
/opt/app/venv/lib/python3.12/site-packages/sqlalchemy/orm/query.py:196: SyntaxWarning: "is not" with 'tuple' literal. Did you mean "!="?
  if entities is not ():
=====
platform linux -- Python 3.12.9, pytest-7.2.2, pluggy-0.13.1 -- /opt/app/venv/bin/python3
cachedir: /tmp/.cache
django: settings: config.settings.local (from env)
metadata: {'Python': '3.12.9', 'Platform': 'Linux-5.15.153.1-microsoft-standard-WSL2-x86_64-with-glibc2.35', 'Packages': {'pytest': '7.2.2', 'pluggy': '0.13.0', 'ddtrace': '3.1.0', 'xdist': '3.2.1', 'django': '3.10.0', 'allure-pytest': '2.6.0', 'cov': '2.4.0', 'rerunfailures': '14.0', 'mock': '2.0.0', 'timeout': 'adata': '3.1.1', 'factoryboy': '2.5.1', 'requests-mock': '1.10.0', 'flaky': '3.8.1', 'env': '0.6.2', 'typeguard': '4.3.0'}, 'AWS_REGION': 'us-east-1'}
rootdir: /opt/app
./tests, configfile: pytest.ini
plugins: anyio-4.7.0, ddtrace-3.1.0, xdist-3.2.1, django-3.10.0, allure-pytest-2.6.0, cov-2.4.0, rerunfailures-14.0, mock-2.0.0, timeout-1.3.4, html-1.22.1, 1, requests-mock-1.10.0, flaky-3.8.1, env-0.6.2, typeguard-4.3.0
collected 474 items / 466 deselected / 8 selected
run-last-failure: rerun previous 8 failures (skipped 218 files)

./tests/test_core/test_mark_as_failed.py::test_mark_as_failed_passes_mal_verdict_to_root[leaf mal, leaf -> child -> root, leaf started] PASSED
./tests/test_core/test_mark_as_failed.py::test_mark_as_failed_passes_mal_verdict_to_root[leaf mal, root -> leaf -> child, leaf started] PASSED
./tests/test_core/test_mark_as_failed.py::test_mark_as_failed_passes_mal_verdict_to_root[child mal, leaf -> child -> root, leaf started] PASSED
./tests/test_core/test_mark_as_failed.py::test_mark_as_failed_passes_mal_verdict_to_root[child mal, root -> leaf -> child, leaf started] PASSED
./tests/test_core/test_mark_as_failed.py::test_mark_as_failed_passes_mal_verdict_to_root[leaf mal, leaf -> child -> root, leaf not started] PASSED
./tests/test_core/test_mark_as_failed.py::test_mark_as_failed_passes_mal_verdict_to_root[leaf mal, root -> leaf -> child, leaf not started] PASSED
./tests/test_core/test_mark_as_failed.py::test_mark_as_failed_passes_mal_verdict_to_root[child mal, leaf -> child -> root, leaf not started] PASSED
./tests/test_core/test_mark_as_failed.py::test_mark_as_failed_passes_mal_verdict_to_root[child mal, root -> leaf -> child, leaf not started] PASSED

=====
===== 8 passed, 466 deselected in 16.65s =====
```

URL parsing example

--00000000006937e605c0507a5d

Content-Type: text/plain; charset="UTF-8"

http:\\google.com -

ftp://localhost/ -

http://google.com

https://google.com

ftp:/google.com

http:google.com

```
# python3.9
>>> find_urls_in_data("http:google.com")
[
    'http://google.com'
]
```

```
# python3.12
>>> find_urls_in_data("http:google.com")
[
    'http:google.com'
]
```

```
def find_urls_in_data(data)
    results = []
    ....
    for url in found_urls:
        # Until now, the same result on both versions
        results.append(
            # Meaning the problem is here...
            safe_url_decode(url)
        )
    return results
```

```
def safe_url_decode(data)
...
furl_url = furl.furl(url).url
...
```

```
In [1]: import sys; sys.version
Out[1]: '3.9.18 (main, Sep  5 2023, 22:42:59) \n[GCC 11.4.0]'

In [2]: import furl

In [3]: furl.furl("http:google.com").url
Out[3]: 'http://google.com'

In [4]: furl.__version__
Out[4]: '2.1.3'
```

```
In [1]: import sys; sys.version
Out[1]: '3.12.9 (main, Mar  5 2025, 02:25:27) [GCC 11.4.0]'

In [2]: import furl

In [3]: furl.furl("http:google.com").url
Out[3]: 'http:google.com'

In [4]: furl.__version__
Out[4]: '2.1.3'
```

```
1337     class furl(URLPathCompositionInterface, QueryCompositionInterface,
1822         def tostr(self, query_delimiter='&', query_quote_plus=True,
1823                  query_unquote_=True):
1824             encoded_query = self.query.encode(
1825                 query_delimiter, query_quote_plus, query_dont_quote)
1826             url = urllib.parse.urlunsplit((
1827                 self.scheme or '', # Must be text type in Python 3.
1828                 self.netloc,
1829                 str(self.path),
1830                 encoded_query,
1831                 str(self.fragment),
1832             ))
```

```
In [7]: import sys; sys.version  
Out[7]: '3.9.18 (main, Sep 5 2023, 22:42:59) \n[GCC 11.4.0]'
```

```
In [8]: import urllib
```

```
In [9]: print(urllib.parse.urlunsplit(("http", "", "google.com", "", "")))  
http://google.com
```

```
In [5]: import sys; sys.version  
Out[5]: '3.12.9 (main, Mar  5 2025, 02:25:27) [GCC 11.4.0]'
```

```
In [6]: import urllib
```

```
In [7]: print(urllib.parse.urlunsplit(("http", "", "google.com", "", ""))  
http:google.com
```

```
for i in {9..12}; \
do uvx --python 3.$i ipython -c \
'import sys; print(sys.version); import urllib; urllib.parse.urlunsplit(("http", "", "google"
done
```

```
3.9.18 (main, Feb 25 2024, 04:21:36)
[Clang 17.0.6 ]
Out[1]: 'http://google.com'
3.10.15 (main, Oct 16 2024, 04:37:23) [Clang 18.1.8 ]
Out[1]: 'http://google.com'
3.11.10 (main, Oct 16 2024, 04:38:48) [Clang 18.1.8 ]
Out[1]: 'http://google.com'
3.12.10 (main, Apr 9 2025, 04:03:51) [Clang 20.1.0 ]
Out[1]: 'http:google.com'
```



```
for i in {1..9}; \
do uvx --python 3.12.$i ipython -c \
'import sys; print(sys.version); import urllib; urllib.parse.urlunsplit(("http", "", "google"
done
```

```
'3.12.1 (main, Jan 8 2024, 05:57:25) [Clang 17.0.6 ]
Out[1]: 'http://google.com'
3.12.2 (main, Feb 25 2024, 04:38:01) [Clang 17.0.6 ]
Out[1]: 'http://google.com'
3.12.3 (main, Apr 15 2024, 18:25:56) [Clang 17.0.6 ]
Out[1]: 'http://google.com'
3.12.4 (main, Jul 25 2024, 22:42:01) [Clang 18.1.8 ]
Out[1]: 'http://google.com'
3.12.5 (main, Aug 14 2024, 05:08:31) [Clang 18.1.8 ]
Out[1]: 'http://google.com'
3.12.6 (main, Sep 9 2024, 22:11:19) [Clang 18.1.8 ]
Out[1]: 'http:google.com' ←
```

18 years ago	 Merged revisions 55328-55341 v...	536	<code>def urlunsplit(components):</code>
15 years ago	 Merged revisions 82324 via svn...	537	<code> """Combine the elements of a tuple as returned by urlsplit() into a</code>
		538	<code>complete URL as a string. The data argument can be any five-item iterable.</code>
		539	<code>This may result in a slightly different, but equivalent URL, if the URL that</code>
		540	<code>was parsed originally had unnecessary delimiters (for example, a ? with an</code>
		541	<code>empty query; the RFC states that these are equivalent)."""</code>
15 years ago	 Issue 9873: the URL parsing func...	542	<code>scheme, netloc, url, query, fragment, _coerce_result = (</code>
		543	<code> _coerce_args(*components))</code>
6 months ago	 [3.13] gh-85110: Preserve relativ...	544	<code>if netloc:</code>
25 years ago	 Whitespace normalization. Top I...	545	<code> if url and url[:1] != '/': url = '/' + url</code>
6 months ago	 [3.13] gh-85110: Preserve relativ...	546	<code> url = '//' + netloc + url</code>
		547	<code> elif url[:2] == '//':</code>
		548	<code> url = '//' + url</code>
		549	<code> elif scheme and scheme in uses_netloc and (not url or url[:1] == '/'): </code>
		550	<code> url = '//' + url</code>
25 years ago	 Whitespace normalization. Top I...	551	<code> if scheme:</code>
		552	<code> url = scheme + ':' + url</code>
		553	<code> if query:</code>

urllib.parse.urlunsplit makes relative path to absolute (http:g -> http:///g) #85110

✓ Closed



openandclose (Open Close) mannequin opened on Jun 10, 2020 · edited by bedevere-app

Edits ▾

Mannequin

...

Assignees

No one assigned

Beautiful Soup Example

Test failed because email output is different

```
Everything Else ▾ ANSI ▾ PC
Return-Path: <automation@test.com>
MIME-Version: 1.0
Reply-To: Reply-to test2 <reply@to.com>
Sender: [REDACTED] <automation@test.com>
Message-ID: 1234
Date: Thu, 02 Jun 2022 06:12:35 +0000
Subject: whitelist-none
From: [REDACTED] <automation@test.com>
To: [REDACTED]
Content-Type: multipart/alternative; boundary="0000000000000000e0c05d80dfb95"

--0000000000000000e0c05d80dfb95
MIME-Version: 1.0
Content-Type: text/plain; charset="UTF-8"
Content-Transfer-Encoding: base64
[REDACTED]

--0000000000000000e0c05d80dfb95
MIME-Version: 1.0
Content-Type: text/html; charset="UTF-8"
Content-Transfer-Encoding: base64
PGh0bWw+CiA8Ym9keT4KICA8ZG12IGRpck0ibHRyIj4KICAgSEVMTE8KICABL2Rpdj4KIDwvYm9k
eT4KPC9odG1sPgo=
--0000000000000000e0c05d80dfb95--
```



```
Everything Else ▾ ANSI ▾ PC
Return-Path: <automation@test.com>
MIME-Version: 1.0
Reply-To: Reply-to test2 <reply@to.com>
Sender: [REDACTED] <automation@test.com>
Message-ID: 1234
Date: Thu, 02 Jun 2022 06:12:35 +0000
Subject: whitelist-none
From: [REDACTED] <automation@test.com>
To: [REDACTED]
Content-Type: multipart/alternative; boundary="0000000000000000e0c05d80dfb95"

--0000000000000000e0c05d80dfb95
MIME-Version: 1.0
Content-Type: text/plain; charset="UTF-8"
Content-Transfer-Encoding: base64
[REDACTED]

--0000000000000000e0c05d80dfb95
MIME-Version: 1.0
Content-Type: text/html; charset="UTF-8"
Content-Transfer-Encoding: base64
PGh0bWw+PGJvZHk+PGRpdjBkaXI9Imx0ciI+SEVMTE/CoDwvZG12Pgo8L2JvZHk+PC9odG1sPg==

--0000000000000000e0c05d80dfb95--
```

```
# python3.9
<html><body><div dir="ltr">HELLO </div>
</body></html>
```

```
# python 3.12
<html>
  <body>
    <div dir="ltr">
      HELLO
    </div>
  </body>
</html>
```

```
18 --0000000000000080e0c05d80dfb95
19 Content-Type: text/html; charset="UTF-8"
20 Content-Transfer-Encoding: quoted-printable
21
22 <div dir=3D"ltr">HELL0=C2=A0</div>
23
24 --0000000000000080e0c05d80dfb95--
25
```

Before `set_payload`, the payload looks the same

```
179  ->      new_msg.set_payload(  
180          payload,  
181          charset=EMLHandler.get_charset(old_msg),  
182          )  
183  
184      # Set headers to new_msg  
185      _copy_headers(old_msg, new_msg)  
186      return new_msg  
(Pdb++) payload  
<html><body><div dir="ltr">HELLO </div>  
</body></html>  
(Pdb++)
```

```
179         new_msg.set_payload(
180             payload,
181             charset=EMLHandler.get_charset(old_msg),
182         )
183
184     # Set headers to new_msg
185     ->     _copy_headers(old_msg, new_msg)
186     return new_msg
(Pdb++) str(new_msg)
'MIME-Version: 1.0\r\nContent-Type: text/plain; charset="utf-8"\r\nContent-Transfer-
eT4KPC9odG1sPgo=\r\n'
(Pdb++) print(str(new_msg))
MIME-Version: 1.0
Content-Type: text/plain; charset="utf-8"
Content-Transfer-Encoding: base64
```

```
PGh0bWw+CiA8Ym9keT4KICA8ZGl2IGRp ej0ibHRyIj4KICAgSEVMTE8KICA8L2Rpdj4KIDwvYm9k
eT4KPC9odG1sPgo=
```

```
(Pdb++)
```

But after `set_payload`, the payload looks different

```
b'<html>\n <body>\n   <div dir="ltr">\n     HELLO\n   </div>\n </body>\n</html>\n(Pdb++) print(base64.b64decode(b"PGh0bWw+CiA8Ym9keT4KICA8ZG12IGRpcj0ibHRyIj4KICAgSEVMT<html>\n<body>\n<div dir="ltr">\n  HELLO\n</div>\n</body>\n</html>\n")
```

Let's try minimal repro in notebook...

Didn't work

```
msg = EmailMessage()

msg.set_payload("""<html><body><div dir="ltr">HELLO </div>
</body></html>""", charset="utf-8")

print(str(msg))

MIME-Version: 1.0
Content-Type: text/plain; charset="utf-8"
Content-Transfer-Encoding: base64

PGh0bWw+PGJvZHk+PGRpdIBkaXI9Imx0ciI+SEVMTE/CoDwvZG12Pgo8L2JvZHk+PC9odG1sPg==

import base64

print(base64.b64decode(b"PGh0bWw+PGJvZHk+PGRpdIBkaXI9Imx0ciI+SEVMTE/CoDwvZG12Pgo8L2JvZHk+PC9odG1sPg==").decode())

<html><body><div dir="ltr">HELLO </div>
</body></html>
```

There is an hidden byte in HELLO last char... trying with bytes

```
(Pdb++) msg3 = Message()
(Pdb++) msg3.set_payload(b'<html><body><div dir="ltr">HELLO\xc2\xa0</div>\n</body></html>'.decode(),
(Pdb++) print(str(msg3))
MIME-Version: 1.0
Content-Type: text/plain; charset="utf-8"
Content-Transfer-Encoding: base64

PGh0bWw+PGJvZHk+PGRpdjBkaXI9Imx0ciI+SEVMTE/CoDwvZGl2Pgo8L2JvZHk+PC9odG1sPg==
```

Let's use pickle to be sure it's the **real same object**

This is weird... this is NOT simple string

```
import pickle
pickle.dumps(payload)

b'\x80\x04\x95W\x04\x00\x00\x00\x00\x00\x8c\x03bs4\x94\x8c\rBeautifulSoup\x94\x93\x94)\x81\x94}\x94(\x8c\x0felement_c
lder._lxmll\x94\x8c\x0fLXMLTreeBuilder\x94\x93\x94\x8c\x06is_xml\x94\x89\x8c\tnknown_xml\x94\x89\x8c\x0b_namespaces\x94}\x94
amespace\x94s\x8c\nparse_only\x94N\x8c\x06markup\x94\x8c7<html><body><div dir="ltr">HELLO\xc2\xa0</div>\n</body>
</html>\x94\x8c\x11original_encoding\x94N\x8c\x16declared_html_encoding\x94N\x8c\x1fcontains_replacement_characters\x94\x8
c\n[document]\x94\x8c\tnamespace\x94N\x8c\x06prefix\x94N\x8c\x05attrs\x94}\x94\x8c\x08contents\x94]\x94\x8c\x06parent\x94
nt\x94N\x8c\x0cnext_sibling\x94N\x8c\x10previous_sibling\x94N\x8c\x06hidden\x94K\x01\x8c\x14can_be_empty_element\x94\x89\
94]\x94(\x8c\x05class\x94\x8c\taccesskey\x94\x8c\x08dropzone\x94e\x8c\x01a\x94]\x94(\x8c\x03rel\x94\x8c\x03rev\x94e\x8c\x0
eaders\x94a\x8c\x02th\x94]\x94h6a\x8c\x04form\x94]\x94\x8c\x0eaccept-
charset\x94a\x8c\x06object\x94]\x94\x8c\x07archive\x94a\x8c\x04area\x94]\x94h0a\x8c\x04icon\x94]\x94\x8c\x05sizes\x94a\x8c
utput\x94]\x94\x8c\x03for\x94au\x8c\x18preserve_whitespace_tags\x94\x8f\x94(\x8c\x03pre\x94\x8c\x08textarea\x94\x90\x8c\x
\x94\x8c\x0fNavigableString\x94\x93\x94h0\x8c\x05CData\x94\x93\x94\x86\x94\x8c\x0ccurrent_data\x94]\x94\x8c\ncurrentTag\x
n_tag_counter\x94\x8c\x0bcollections\x94\x8c\x07Counter\x94\x93\x94}\x94(\x8c\x04html\x94K\x00\x8c\x04body\x94K\x00\x8c\x
espace_tag_stack\x94]\x94\x8c\x16string_container_stack\x94]\x94ub.'
```

What??

```
[10]: pickle.loads(b'\x80\x04\x95W\x04\x00\x00\x00\x00\x00\x00\x00\x8c\x03bs4\x94\x8c\rBeautifulSoup\x94
```

```
ModuleNotFoundError
```

```
Cell In[10], line 1
```

```
----> 1 pickle.loads( \x80\x04\x95 \x04\x00\x00\x00\x00\x00\x00\x8c\x03 \x94\x8c\r
    \x94\x8c\x0f \x94\x93\x94\x8c\x06 \x94\x89\x8c\t \x94\x89\x8c\x0f
c\x06 \x94\x8c \x94\x8c\x0c \x94 \x02\x8c\x04 \x94\x8c\n \x94\x8c\t \x94\x8c\x06
\x8c\x0c \x94 \x8c\x0c \x94 \x8c\x10 \x94 \x8c\x06
\x05 \x94\x8c\t \x94\x8c\x08 \x94 \x8c\x01 \x94 \x8c\x03 \x94\x8c\
4 \x94 \x94\x8c\x0e \x94 \x8c\x06 \x94 \x94\x8c\x07 \x94 \x8c\x04
\x94 \x94\x8c\x03 \x94 \x8c\x18 \x94\x8f\x94 \x8c\x03 \x94\x8c\
94\x93\x94 \x8c\x05 \x94\x93\x94\x86\x94\x8c\x0c \x94 \x94\x8c\n \x94
4\x93\x94 \x94 \x8c\x04 \x94 \x00\x8c\x04 \x94 \x00\x8c\x03 \x94 \x00 \x85\x94 \x94\x8c\x03
```

```
Traceback (most recent call last)
```

```
ModuleNotFoundError: No module named 'bs4'
```



```
(Pdb++) type(payload)
<class 'bs4.BeautifulSoup'>
```

What's happening inside `set_payload`?

We call encode on the payload variable

```
335     *     def set_payload(self, payload, charset=None):
336         """Set the payload to the given value.
337
338         Optional charset sets the message's default character set. See
339         set_charset() for details.
340         """
341
342         if hasattr(payload, 'encode'):
343             if charset is None:
344                 self._payload = payload
345                 return
346             if not isinstance(charset, Charset):
347                 charset = Charset(charset)
348                 payload = payload.encode(charset.output_charset, errors: 'surrogateescape')
349
350         if hasattr(payload, 'decode'):
```

Encoding bs4.BeautifulSoup vs encoding simple str

```
[95]: print(payload.encode("utf-8", 'surrogateescape').decode())
```

```
<html>
  <body>
    <div dir="ltr">
      HELLO
    </div>
  </body>
</html>
```

```
[89]: type(payload)
```

```
[89]: bs4.BeautifulSoup
```

```
[98]: print(str(payload).encode("utf-8", 'surrogateescape').decode())
```

```
<html><body><div dir="ltr">HELLO </div>
</body></html>
```

```
1662
1663     def encode(self, encoding=DEFAULT_OUTPUT_ENCODING,
1664                 indent_level=None, formatter="minimal",
1665                 errors="xmlcharrefreplace"):
1666         """Render a bytestring representation of this PageElement and its
1667         contents.
1668
1669         :param encoding: The destination encoding.
1670         :param indent_level: Each line of the rendering will be
1671             indented this many levels. (The formatter decides what a
1672             'level' means in terms of spaces or other characters
1673             output.) Used internally in recursive calls while
1674             pretty-printing.
1675         :param formatter: A Formatter object, or a string naming one of
1676             the standard formatters.
1677         :param errors: An error handling strategy such as
1678             'xmlcharrefreplace'. This value is passed along into
1679             encode() and its value should be one of the constants
1680             defined by Python.
1681         :return: A bytestring.
1682
1683         """
1684         # Turn the data structure into Unicode, then encode the
1685         # Unicode.
1686         u = self.decode(indent_level, encoding, formatter)
1687         return u.encode(encoding, errors)
```

18 years ago



Copying the email package back, ...

```
334
335     def set_payload(self, payload, charset=None):
336         """Set the payload to the given value.
337
338         Optional charset sets the message's default character set. See
339         set_charset() for details.
340         """
341
342
343
344
345
346
```

12 years ago



#20531: Apply the 3.3 version of...

```
341     if hasattr(payload, 'encode'):
342         if charset is None:
343             self._payload = payload
344             return
345         if not isinstance(charset, Charset):
346             charset = Charset(charset)
```

last year



gh-76511: Fix email.Message.as_...

```
347             payload = payload.encode(charset.output_charset, 'surrogateescape')
```

12 years ago



#20531: Apply the 3.3 version of...

```
348     if hasattr(payload, 'decode'):
349         self._payload = payload.decode('ascii', 'surrogateescape')
350     else:
```

The commit set errors value to surrogateescape

gh-76511: Fix email.Message.as_string() for non-ASCII message with ASCII charset #116125 0 / 4 files viewed Ask Copilot Review in codespace Review char

Merged all commits File filter Conversations Viewed

Filter changed files

Lib Lib/email Lib/email/generator.py

```
246 ..... msg.set_payload(payload, charset)
246 ..... msg.set_payload(msg._payload, charset)
247 ..... payload = msg.get_payload()
248 248 + ..... self._munge_cte = (msg['content-transfer-encoding'],
249 ..... msg['content-type'])

...+.....
```

Lib Lib/email Lib/email/message.py

```
.... @@ -340,7 +340,7 @@ def set_payload(self, payload, charset=None):
340 ..... return
341 ..... if not isinstance(charset, Charset):
342 .....     charset = Charset(charset)
343 .....     payload = payload.encode(charset.output_charset)
343 .....     payload = payload.encode(charset.output_charset, 'surrogateescape')
344 .....     if hasattr(payload, 'decode'):
345 .....         self._payload = payload.decode('ascii', 'surrogateescape')
346 .....     else:
```

How this errors is related at all? why only on bs4 object?

```
[22]: print(payload.encode("utf-8", 'surrogateescape').decode())
```

```
<html>
  <body>
    <div dir="ltr">
      HELLO
    </div>
  </body>
</html>
```

```
[27]: print(payload.encode("utf-8").decode())
```

```
<html><body><div dir="ltr">HELLO </div>
</body></html>
```

```
[25]: print(str(payload).encode("utf-8", 'surrogateescape').decode())
```

```
<html><body><div dir="ltr">HELLO </div>
</body></html>
```

```
[26]: print(str(payload).encode("utf-8").decode())
```

```
<html><body><div dir="ltr">HELLO </div>
</body></html>
```

The surrogateescape string is going to indent_level variable...

```
1663     def encode(self, encoding=DEFAULT_OUTPUT_ENCODING,
1664                  indent_level=None, formatter="minimal",
1665                  errors="xmlcharrefreplace"):
1666         """Render a bytestring representation of this PageElement and its
1667         contents.
1668
1669         :param encoding: The destination encoding.
1670         :param indent_level: Each line of the rendering will be
1671             indented this many levels. (The formatter decides what a
1672             'level' means in terms of spaces or other characters
1673             output.) Used internally in recursive calls while
1674             pretty-printing.
1675         :param formatter: A Formatter object, or a string naming one of
1676             the standard formatters.
1677         :param errors: An error handling strategy such as
1678             'xmlcharrefreplace'. This value is passed along into
1679             encode() and its value should be one of the constants
1680             defined by Python.
1681         :return: A bytestring.
1682
1683         """
1684         # Turn the data structure into Unicode, then encode the
1685         # Unicode.
-> 1686         u = self.decode(indent_level, encoding, formatter)
1687         return u.encode(encoding, errors)
```

No matter what string we use

```
[15]: print(payload.encode("utf-8", 'surrogateescape').decode())
```

```
<html>
<body>
<div dir="ltr">
    HELLO
</div>
</body>
</html>
```

```
[16]: print(payload.encode("utf-8", 'blablabla').decode())
```

```
<html>
<body>
<div dir="ltr">
    HELLO
</div>
</body>
</html>
```

It evaluates to True in a boolean context

```
777     def decode(self, pretty_print=False,
778                 eventual_encoding=DEFAULT_OUTPUT_ENCODING,
779                 formatter="minimal", iterator=None):
780         """Returns a string or Unicode representation of the parse tree
781             as an HTML or XML document.
782
783         :param pretty_print: If this is True, indentation will be used to
784             make the document more readable.
785         :param eventual_encoding: The encoding of the final document.
786             If this is None, the document will be a Unicode string.
787         """
788         if self.is_xml:
789             # Print the XML declaration
790             encoding_part = ''
791             if eventual_encoding in PYTHON_SPECIFIC_ENCODINGS:
792                 # This is a special Python encoding; it can't actually
793                 # go into an XML document because it means nothing
794                 # outside of Python.
795                 eventual_encoding = None
796             if eventual_encoding != None:
797                 encoding_part = ' encoding="%s"' % eventual_encoding
798                 prefix = '<?xml version="1.0"%s?>\n' % encoding_part
799             else:
800                 prefix = ''
801             if not pretty_print:
802                 indent_level = None
803             else:
804                 indent_level = 0
805             return prefix + super(BeautifulSoup, self).decode(
806                 indent_level, eventual_encoding, formatter, iterator)
(Pdb++) pretty_print
'surrogateescape'
(Pdb++)
```

Day 20

Stage 5: QA & End-to-End Testing



Stage 5: QA & End-to-End Testing

- Deployed to full-scale **testing environment**, mirroring production

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Stage 5: QA & End-to-End Testing

- Deployed to full-scale **testing environment**, mirroring production
- **5 days** of QA: human exploratory testing + ~500 automated E2E tests
- Monitored failures via Sentry, logs, and runtime alerts

SMTP starttls example

Issues >  #12345678901234567890

TypeError

| SMTP.starttls() got an unexpected keyword argument 'keyfile'

Escalating | core.mail in open

Stack Trace

Most Relevant

Full

TypeError

SMTP.starttls() got an unexpected keyword argument 'keyfile'

mechanism logging handled true

/core/mail.py in open at line 274

```
269
270      # TLS/SSL are mutually exclusive, so only attempt TLS over
271      # non-secure connections.
272      if not self.use_ssl and self.use_tls:
273          self.connection.ehlo(name=settings.NAT_DNS_NAME)
274          self.connection.starttls(keyfile=self.ssl_keyfile, certfile=self.ssl_certfile)
275          self.connection.ehlo(name=settings.NAT_DNS_NAME)
276      if self.username and self.password:
277          self.connection.login(self.username, self.password)
278      return True
```

`SMTP.starttls(*, context=None)`

Put the SMTP connection in TLS (Transport Layer Security) mode. All SMTP commands that follow will be encrypted. You should then call [`ehlo\(\)`](#) again.

If `keyfile` and `certfile` are provided, they are used to create an [`ssl.SSLContext`](#).

Optional `context` parameter is an [`ssl.SSLContext`](#) object; This is an alternative to using a keyfile and a certfile and if specified both `keyfile` and `certfile` should be `None`.

If there has been no previous `EHLO` or `HELO` command this session, this method tries ESMTP `EHLO` first.

Changed in version 3.12: The deprecated `keyfile` and `certfile` parameters have been removed.

```
1 if not self.use_ssl and self.use_tls:
2     self.connection.ehlo()
3     context = None
4     if self.ssl_certfile and self.ssl_keyfile:
5         context = ssl.create_default_context()
6         context.load_cert_chain(certfile=self.ssl_certfile, keyfile=self.ssl_keyfile)
7     self.connection.starttls(context=context)
8     self.connection.ehlo()
```

```
1 if not self.use_ssl and self.use_tls:
2     self.connection.ehlo()
3     context = None
4     if self.ssl_certfile and self.ssl_keyfile:
5         context = ssl.create_default_context()
6         context.load_cert_chain(certfile=self.ssl_certfile, keyfile=self.ssl_keyfile)
7     self.connection.starttls(context=context)
8     self.connection.ehlo()
```

SAML example

502 Bad Gateway

No exception in Sentry, only the worker died suddenly 🤦

Worker (pid:44) was sent code 136!

(No error message)

 -TESTING-191D1 | gunicorn.error

14s ago

2hr

Escalating

No logs either

```
testing-master- [web-internal-debug-67cf96c7c8-jnhg8] -[web-internal-debug 10.10.119.27 -- [20/Apr/2025:11:59:15 +0000] "GET /metrics HTTP/1.1"]
testing-master- [web-internal-559576fc7b-x34mm] -[web internal 10.10.119.27 -- [20/Apr/2025:11:59:15 +0000] "GET /metrics HTTP/1.1"
testing-master- [web-69588b7b89-sfmk7] -[web [2025-04-20 11:59:17 +0000] [9] [ERROR] Worker (pid:1083) was sent code 136!
testing-master- [web-69588b7b89-sfmk7] -[web [2025-04-20 11:59:17 +0000] [1794] [INFO] Booting worker with pid: 1794
testing-master- [web-internal-559576fc7b-mjq7q] -[web-internal 10.10.119.27 -- [20/Apr/2025:11:59:17 +0000] "GET /metrics HTTP/1.1"
testing-master- metrics web-internal xdp 5572767d96111bb metrics web-internal xdp 10.10.119.27 -- [20/Apr/2025:11:59:17 +0000] "GET /metrics HTTP/1.1"
```

Let's try to reproduce the issue in shell

```
factory = APIRequestFactory()
user = User.objects.get(pk=12674)
payload = urlencode({'SAMLResponse': ''})
request = factory.post(
    '/api/saml_login/foobar/?acs',
    data=payload,
    content_type='application/x-www-form-urlencoded',
    HTTP_HOST="api.foo.bar.io",
    wsgi_url_scheme='https',
    SERVER_PORT='443',
)
force_authenticate(request, user=User.objects.get(pk=12674))
view = SamlAuthTokenViewSet.as_view({'post': 'post'})
view(request, uuid_id="f042fb42-4ac1-4e5a-bdb3-db286af56873")
```

Floating point exception?!

```
.... middleware.process_request(request)
.... request.session.save()
.... view = SamlAuthTokenViewSet.as_view({'post': 'post'})
.... view(request, uuid_id="f042fd42-4ac1-4e5a-bdb3-db286af56873")
Floating point exception (core dumped)
django@testing-yobitton2-master-7d99b54665-qf5xv:/tmp$ ls -la
total 503908
drwxrwxrwt 1 root    root          23 Apr 20 17:42 .
drwxr-xr-x 1 root    root          86 Apr 20 15:04 ..
-rw----- 1 django  django  589205504 Apr 20 17:42 core.2874
-rwxrwxrwx 1 root    root          0 Apr 20 12:27 uv-6143060865219c88.lock
```

```
gdb $BIN_PATH/python core.2874
```

```
root@7631fff5c551:/opt/app# gdb $BIN_PATH/python core.2874
GNU gdb (Ubuntu 12.1-0ubuntu1~22.04.2) 12.1
Copyright (C) 2022 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.html>
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.
Type "show copying" and "show warranty" for details.
This GDB was configured as "x86_64-linux-gnu".
Type "show configuration" for configuration details.
For bug reporting instructions, please see:
<https://www.gnu.org/software/gdb/bugs/>.
Find the GDB manual and other documentation resources online at:
  <http://www.gnu.org/software/gdb/documentation/>.
```

```
For help, type "help".
Type "apropos word" to search for commands related to "word"...
Reading symbols from venv/bin/python...
[New LWP 2874]
[New LWP 2881]
[New LWP 2877]
[New LWP 2876]
[New LWP 2900]
[New LWP 2875]
```

Related to xmlsec package

```
[New LWP 2905]
[Thread debugging using libthread_db enabled]
Using host libthread_db library "/lib/x86_64-linux-gnu/libthread_db.so.1".
Core was generated by `/opt/app/venv/bin/python /opt/app/manage.py shell'.
Program terminated with signal SIGFPE, Arithmetic exception.
#0  0x00007fce0a197ac1 in ?? () from /lib/x86_64-linux-gnu/libxml2.so.2
[Current thread is 1 (Thread 0x7fce34042740 (LWP 2874))]
(gdb) bt
#0  0x00007fce0a197ac1 in ?? () from /lib/x86_64-linux-gnu/libxml2.so.2
#1  0x00007fce0a092ca0 in xmlHashLookup3 () from /lib/x86_64-linux-gnu/libxml2.so.2
#2  0x00007fce0a09ffd7 in xmlGetID () from /lib/x86_64-linux-gnu/libxml2.so.2
#3  0x00007fcdb3cea49 in xmlSecAddIDs () from /lib/x86_64-linux-gnu/libxmlsec1.so.1
#4  0x00007fcde2a41dc4 in PyXmlSec_TreeAddIds (<optimized out>, <optimized out>, <optimized out>
    at /root/.cache/uv/sdists-v8/pypi/xmlsec/1.3.13/yz7dV7XYQgBxhXxL3Xsjk/src/src/tree.c:192
#5  0x000056420197cb73 in cfunction_call (<optimized out>, <optimized out>, <optimized out>) at Objects/methodobject.c:240
#6  0x000056420191eb40 in _PyObject_MakeTpCall (tstate=0x564201e84610 <_PyRuntime+458992>, callable=callable@entry=0x7fcdb429da0,
    keywords=0x0) at Objects/call.c:240
#7  0x000056420191f496 in _PyObject_VectorcallTstate (kwnames=<optimized out>, nargsf=<optimized out>, args=0x7fce3435a0a8, callable=callable@entry=0x7fcdb429da0,
    at ./Include/internal/pycore_call.h:90
#8  0x00005642018b8fac in _PyEval_EvalFrameDefault (tstate=<optimized out>, frame=0x7fce34359ff8, throwflag=<optimized out>) at Python/eval.c:1322
#9  0x0000564201923678 in _PyObject_VectorcallTstate (kwnames=0x7fcdd0fb73d0, nargsf=2, args=0x7fcdd0172230, callable=0x7fcdb5aa34,
    at ./Include/internal/pycore_call.h:92
#10 method_vectorcall (method=<optimized out>, args=0x7fcdd0172238, nargsf=<optimized out>, kwnames=0x7fcdd0fb73d0) at Objects/classobject.c:100
#11 0x000056420192175b in PyObject_Call () at Objects/call.c:388
#12 0x00005642018b45d7 in _PyEval_EvalFrameDefault (tstate=<optimized out>, frame=0x7fce34359b60, throwflag=<optimized out>) at Python/eval.c:1322
#13 0x0000564201923678 in _PyObject_VectorcallTstate (kwnames=0x7fcdb49e6e0, nargsf=2, args=0x7fcdd15eccf0, callable=0x7fcdb5aa2a0)
```

🔗 python-xmlsec

 pypi | v1.3.16

 pre-commit.ci | passed

 manylinux | passing

 macOS | passing

 linuxbrew | passing

 codecov | 92%

 docs | passing

Python bindings for the [XML Security Library](#).

We use this package as part of with SAML signature validation process

```
[[package]]
name = "python3-saml"
version = "1.16.0"
source = { registry = "https://pypi.org/simple" }
dependencies = [
    { name = "isodate" },
    { name = "lxml" },
    { name = "xmlsec" },
]
```

```
56     class OneLogin_Saml2_Utils(object):
790         def validate_sign(xml, cert=None, fingerprint=None, fingerprintalg='sha1', validatecert=False, debug=False):
814             """
815             :param multicerts: Multiple public certs
816             :type: list
817
818             :param raise_exceptions: Whether to return false on failure or raise an exception
819             :type raise_exceptions: Boolean
820             """
821             if xml is None or xml == '':
822                 raise Exception('Empty string supplied as input')
823
824             elem = OneLogin_Saml2_XML.to_etree(xml)
825             xmlsec.enable_debug_trace(debug)
826             xmlsec.tree.add_ids(elem, ids: ["ID"])
827
```

lxml 5.0.0 incompatibility - Arithmetic exception #277

Closed



eljeffeg (ElJeffe) opened on Jan 4, 2024

...

lxml 5.0.0 was released on Dec 29th 2023. This update causes an Arithmetic exception (core dumped) when using python-xmlsec.

Example code that would fail..

```
import xmlsec
from lxml import etree
root = None
with open("sign4-in.xml") as f:
    root = etree.parse(f).getroot()
xmlsec.tree.add_ids(root, ["ID"])
```



5



Assignees

No one assigned

Labels

No labels

Type

No type

Projects

No projects

Milestone

Minimal reproduce

```
import io
import xmlsec
from lxml import etree

stream = io.BytesIO(b"""<?xml version="1.0" encoding="UTF-8"?>
<Envelope xmlns="urn:envelope" ID="ef115a20-cf73-11e5-aed1-3c15c2c2cc88">
  <Data>
    Hello, World!
  </Data>
</Envelope>
""")
root = etree.parse(stream).getroot()
xmlsec.tree.add_ids(root, ["ID"])
print(etree.tostring(root, pretty_print=True).decode())
```

We use lxml to create xml object and then sending this object to xmlsec

```
Python 3.12.9 (main, Mar  5 2025, 02:25:27) [GCC 11.4.0]
Type 'copyright', 'credits' or 'license' for more information
IPython 8.5.0 -- An enhanced Interactive Python. Type '?' for help.

In [1]: import io
....: import xmlsec
....: from lxml import etree
....:
....: stream = io.BytesIO(b"""<?xml version="1.0" encoding="UTF-8"?>
....: <Envelope xmlns="urn:envelope" ID="ef115a20-cf73-11e5-aed1-3c15c2c2cc88">
....:   <Data>
....:     ^IHello, World!
....:   </Data>
....: </Envelope>
....: """)
....: root = etree.parse(stream).getroot()
....: xmlsec.tree.add_ids(root, ["ID"])
....: print(etree.tostring(root, pretty_print=True).decode())
Floating point exception (core dumped)
```

But why does this cause a crash?

Using different libxml2 versions together...

Block lxml binaries to avoid libxml2 incompatibilities #246

Closed `xmlsec:master` ← `nosnilmot:lxml-nobinaries`

Conversation 3 Commits 1 Checks 0 Files changed 1

nosnilmot (Stu Tomlinson) on Dec 16, 2022 Contributor ...

When `xmlsec` and `lxml` are linked to different libxml2 versions there can be subtle compatibility issues. Forcing `lxml` to install from source causes it to link to same system version of libxml2 as `xmlsec`.

See bugs.launchpad.net/lxml/+bug/1960668 for the sorts of issues this should solve.

This problem occurs because `xmlsec` is linked to system libxml2 library, but `lxml` binaries bundle and link to a private copy of libxml2 that may be a different and incompatible version.

Reviewers – [review now](#)

Notifications None

3 participants

Required Dependency

You need to install `python3-saml`, this is included in the `saml` extra when installing `social-core`.

In case you run into `lxml & xmlsec libxml2 library version mismatch` error, it is caused by `lxml` being built against a different version of `libxml2` than `xmlsec`. To avoid this, please install both packages from the source and build them against system libraries:

```
# Install system dependencies
sudo apt install libxmlsec1-dev

# Install Python packages from the source
pip install --no-binary lxml --no-binary xmlsec -e 'social-core[saml]'
```

Fix was to build `lxml` from source, so it will use the same system `libxml2` library

```
# This is done since lxml is using bundled libxml2 and not the one installed in system which cause issues with xmlsec  
# which use the system installed one. So we build lxml from source and not using the binary wheel file,  
# so it will use the same libxml2 as xmlsec package  
ENV UV_NO_BINARY_PACKAGE="lxml"
```

```
8 ▶ def test__lxml_is_using_the_system_libxml2(): ± Yonatan Bitton
9     libxml2 = ctypes.CDLL("libxml2.so.2")
10    libxml2_version = ctypes.c_char_p.in_dll(libxml2, "xmlParserVersion").value.decode()
11    libxml2_version_tuple = int(libxml2_version[0]), int(libxml2_version[1:3]), int(libxml2_version[3:5])
12
13    assert libxml2_version_tuple == lxml.etree.LIBXML_VERSION == lxml.etree.LIBXML_COMPILED_VERSION
14
15
16 ▶ def test__xmlsec_not_crash_on_xml_parsing(): ± Yonatan Bitton
17     stream = io.BytesIO(
18         b"""\n<?xml version="1.0" encoding="UTF-8"?>\n<Envelope xmlns="urn:envelope" ID="ef115a20-cf73-11e5-aed1-3c15c2c2cc88">\n    <Data>Hello, World!</Data>\n</Envelope>\n"""
19     )
20
21     root = lxml.etree.parse(stream).getroot()
22
23
24     # This crash the python with `Floating point exception (core dumped)`
25     # in case of mismatch between libxml2 used by lxml and xmlsec
26     # Example in our case was:
27
28     # libxml2          : 2.9.13
29     # lxml version      : 5.3.1
30     # lxml libxml used   : (2, 12, 9)
31     # lxml libxml compiled : (2, 12, 9)
32     # xmlsec version       : 1.3.13
33
34     xmlsec.tree.add_ids(root, ids: ["ID"])
35
```

Stage 6: Production Rollout



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 - No customer complaints

Stage 6: Production Rollout

- QA approved, all checks passed 
- Begin with partial rollout (e.g., APM pods)
- Gradual deployment by region — smallest to largest
- Continuous monitoring:
 - No Sentry errors
 - No customer complaints
 - System behaving as expected

Day 27

APM went well

Day 27

Australia too

Day 28

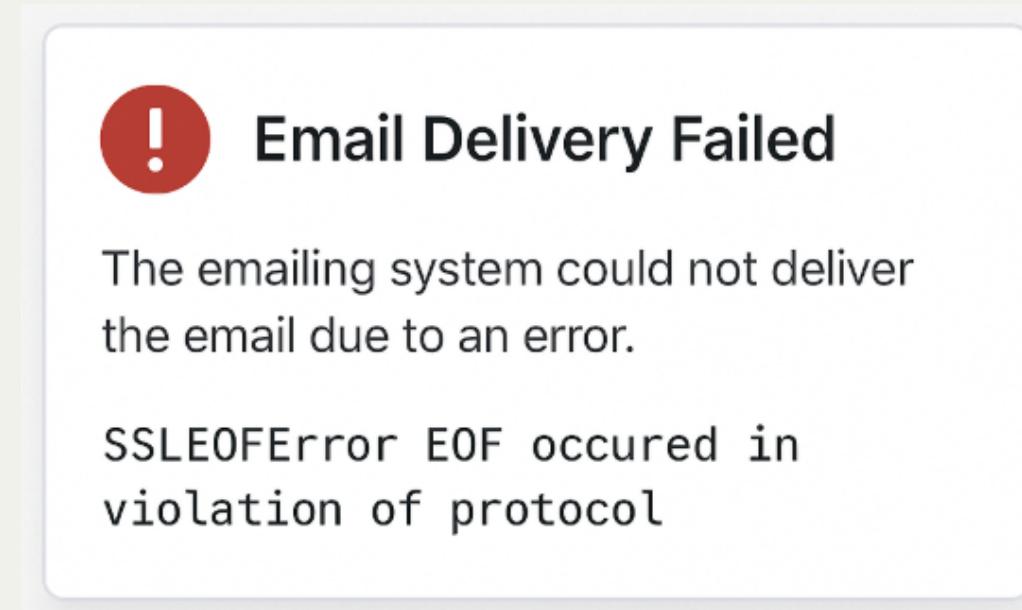
Even Europe...

Day 28

If all goes well until tomorrow, we will continue with US 🙌...

...But Things Didn't Go As Planned 😬

New SSL Errors, customers complains they don't get their emails...



Rollback all production 😞

Failing when we use STARTTLS, the context here is None

```
282     # non-secure connections.  
283     if not self.use_ssl and self.use_tls:  
284         self.connection.ehlo(name=settings.NAT_DNS_NAME)  
285         context = None  
286         if self.ssl_certfile and self.ssl_keyfile:  
287             context = ssl.create_default_context()  
288             context.load_cert_chain(certfile=self.ssl_certfile, keyfile=self.ssl_keyfile)  
289             self.connection.starttls(context=context)  
290             self.connection.ehlo(name=settings.NAT_DNS_NAME)  
291         if self.username and self.password:
```

It's using the stdlib context method

```
...
769         self.ehlo_or_helo_if_needed()
770     if not self.has_extn("starttls"):
771         raise SMTPNotSupportedError(
772             "STARTTLS extension not supported by server.")
773     (resp, reply) = self.docmd("STARTTLS")
774     if resp == 220:
775         if not _have_ssl:
776             raise RuntimeError("No SSL support included in this Python")
777     if context is None:
778         context = ssl._create_stdlib_context()
779     self.sock = context.wrap_socket(self.sock,
...
```

Shouldn't it work, assuming the context is less restricted?

```
777
778     # Backwards compatibility alias, even though it's not a public name.
779     _create_stdlib_context = _create_unverified_context
780
781     """
782         Create a SSLContext object for Python stdlib modules
783
784         All Python stdlib modules shall use this function to create SSLContext
785         objects in order to keep common settings in one place. The configuration
786         is less restrict than create_default_context()'s to increase backward
787         compatibility.
788     """
```

```
682     * def create_default_context(purpose=Purpose.SERVER_AUTH, *, cafile=None,
683                                     capath=None, cadata=None):
684         """Create a SSLContext object with default settings.
685
686         NOTE: The protocol and settings may change anytime without prior
687               deprecation. The values represent a fair balance between maximum
688               compatibility and security.
689         """
```

```
openssl s_client -connect fake.domain:25 -starttls smtp
```

```
---  
New, SSLv3, Cipher is DHE-RSA-AES256-SHA  
Server public key is 4096 bit  
Secure Renegotiation IS supported  
Compression: NONE  
Expansion: NONE  
No ALPN negotiated  
SSL-Session:  
    Protocol : TLSv1  
    Cipher   : DHE-RSA-AES256-SHA  
    Session-ID: 313B18B4F0944999D9F8F71354EA35210DF683DCD2B79FF977FBDE  
    Session-ID-ctx:  
    Master-Key: 8FB2E215E997197DFD32019200C2CBC9E0104545FACAB2A15E133A  
    PSK identity: None  
    PSK identity hint: None  
    SRP username: None  
    Start Time: 1745393387  
    Timeout   : 7200 (sec)  
    Verify return code: 10 (certificate has expired)  
    Extended master secret: no  
---  
250 STARTTLS
```

```
server = smtplib.SMTP('fake.domain', local_hostname=settings.NAT_DNS_NAME)
server.set_debuglevel(1)
server.ehlo(name=settings.NAT_DNS_NAME)
context = ssl._create_stdlib_context()
context.minimum_version = ssl.TLSVersion.TLSv1
server.starttls(context=context)
server.quit()
```

```
1318         self.settimeout(None)
-> 1319     self._sslobj.do_handshake()
1320 finally:
1321     self.settimeout(timeout)

SSLError: [SSL: SSLV3_ALERT_HANDSHAKE_FAILURE] sslv3 alert handshake failure (_ssl.c:1010)
```

Maybe cipher related? looking for DHE-RSA-AES256-SHA

```
import ssl
context = ssl._create_stdlib_context()
print("\n".join(cipher['name'] for cipher in context.get_ciphers()))
```

Indeed not supported...

```
TLS_AES_256_GCM_SHA384
TLS_CHACHA20_POLY1305_SHA256
TLS_AES_128_GCM_SHA256
ECDHE-ECDSA-AES256-GCM-SHA384
ECDHE-RSA-AES256-GCM-SHA384
ECDHE-ECDSA-AES128-GCM-SHA256
ECDHE-RSA-AES128-GCM-SHA256
ECDHE-ECDSA-CHACHA20-POLY1305
ECDHE-RSA-CHACHA20-POLY1305
ECDHE-ECDSA-AES256-SHA384
ECDHE-RSA-AES256-SHA384
ECDHE-ECDSA-AES128-SHA256
ECDHE-RSA-AES128-SHA256
DHE-RSA-AES256-GCM-SHA384
DHE-RSA-AES128-GCM-SHA256
DHE-RSA-AES256-SHA256
DHE-RSA-AES128-SHA256
```

Weak
HA

TLS_DHE_RSA_WITH_AES_256_CBC_S

IANA name:

TLS_DHE_RSA_WITH_AES_256_CBC_SHA

OpenSSL name:

DHE-RSA-AES256-SHA

GnuTLS name:

- DHE-RSA-AES256-SHA uses **SHA-1**
- DHE-RSA-AES256-SHA256 uses **SHA-256**

But our installed openssl is supporting this type of cipher

```
In [24]: !openssl ciphers -v | grep DHE-RSA-AES256-SHA
ECDHE-RSA-AES256-SHA384 TLSv1.2 Kx=ECDH      Au=RSA  Enc=AES(256)  Mac=SHA384
DHE-RSA-AES256-SHA256   TLSv1.2 Kx=DH       Au=RSA  Enc=AES(256)  Mac=SHA256
ECDHE-RSA-AES256-SHA   TLSv1 Kx=ECDH      Au=RSA  Enc=AES(256)  Mac=SHA1
DHE-RSA-AES256-SHA    SSLv3 Kx=DH       Au=RSA  Enc=AES(256)  Mac=SHA1
```

Let's try again with missing cipher...

```
server = smtplib.SMTP('fake.domain', local_hostname=settings.NAT_DNS_NAME)
server.set_debuglevel(1)
server.ehlo(name=settings.NAT_DNS_NAME)
context = ssl._create_stdlib_context()
context.minimum_version = ssl.TLSVersion.TLSv1
context.options &= ~ssl.OP_NO_SSLv3
context.check_hostname = False
context.verify_mode = ssl.CERT_NONE
context.set_ciphers(":.".join([x["name"] for x in context.get_ciphers()]) + [
    'DHE-RSA-AES256-SHA',
])
server.starttls(context=context)
server.quit()
```

```
-> 1319      self._sslobj.do_handshake()
1320 finally:
1321     self.settimeout(timeout)

SSLError: [SSL: DH_KEY_TOO_SMALL] dh key too small (_ssl.c:1010)
```

In [42]:

```
---  
No client certificate CA names sent  
Peer signing digest: MD5-SHA1  
Peer signature type: RSA  
Server Temp Key: DH, 1024 bits  
---  
SSL handshake has read 2715 bytes and written 552 bytes  
Verification error: certificate has expired  
---  
New, SSLv3, Cipher is DHE-RSA-AES256-SHA  
Server public key is 4096 bit  
Secure Renegotiation IS supported  
Compression: NONE  
Expansion: NONE  
No ALPN negotiated  
SSL-Session:  
    Protocol : TLSv1  
    Cipher   : DHE-RSA-AES256-SHA  
    Session-ID: E162D0531E5FF74FC7BC4CA14C2E0DD2D79789F73B4EDBF57D6  
    Session-ID-ctx:
```

But wait — we're already using OpenSSL v1, which is less strict by default. So why did these errors appear only in Python 3.12, but not in 3.9?

bpo-43998: Default to TLS 1.2 and increase cipher suite security (GH-25778) #25778

Merged · python:master · tiran:bpo-43998-tls12 · on May 1, 2021 · v3.10.0b1 · ⚙

Conversation 3

Commits 1

Checks 0

Files changed 8



tiran (Christian Heimes) on May 1, 2021 · edited

Member

...

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

Reviewers – [review now](#)



hynek

Notifications

None

All

▼ ⌂ 43 Modules/_ssl.c

```
@@ -152,15 +152,27 @@ extern const SSL_METHOD *TLSv1_2_method(void);  
152    152    ···#ifndef PY_SSL_DEFAULT_CIPHER_STRING  
153    153    ······#error "Py_SSL_DEFAULT_CIPHERS 0 needs Py_SSL_DEFAULT_CIPHER_STRING"  
154    154 + ···#endif  
155    ···#ifndef PY_SSL_MIN_PROTOCOL  
156    ······#define PY_SSL_MIN_PROTOCOL TLS1_2_VERSION  
157    ···#endif
```

```
162 171    */
163     ···#define PY_SSL_DEFAULT_CIPHER_STRING "DEFAULT:!aNULL:!eNULL:!MD5:!3DES:!DES:!RC4:!IDEA:!SEED:!aDSS:!SRP:!PSK"
172 +     ···#define PY_SSL_DEFAULT_CIPHER_STRING "@SECLEVEL=2:ECDH+AESGCM:ECDH+CHACHA20:ECDH+AES:DHE+AES:!aNULL:!eNULL:!aDSS:!SHA1:!AESCCM"
173     ···#ifndef PY_SSL_MIN_PROTOCOL
174     ·····#define PY_SSL_MIN_PROTOCOL TLS1_2_VERSION
```

In Python 3.9, the default OpenSSL security level was 1. Starting from Python 3.10, the default is level 2 — even when using OpenSSL 1



SSL_CTX_set_security_level



Search

[Home](#) [FIPS-140](#) [Commands](#) [Libraries](#) [File Formats](#) [Overviews](#)

Libraries

[SSL_CTX_set_post_handshake...](#)
[SSL_CTX_set_psk_client_callba...](#)
[SSL_CTX_set_psk_find_session...](#)
[SSL_CTX_set_psk_server_callb...](#)
[SSL_CTX_set_psk_use_session...](#)
[SSL_CTX_set_quiet_shutdown](#)
[SSL_CTX_set_read_ahead](#)
[SSL_CTX_set_record_padding...](#)
[SSL_CTX_set_record_padding...](#)
[SSL_CTX_set_recv_max_early...](#)
[SSL_CTX_set_security_callback](#)

Security level set to 256 bits of security. As a result RSA, DSA and DH keys shorter than 15360 bits and ECC keys shorter than 512 bits are prohibited.

APPLICATION DEFINED SECURITY CALLBACKS

Documentation to be provided.

NOTES

The default security level can be configured when OpenSSL is compiled by setting -DOPENSSL_TLS_SECURITY_LEVEL=level. If not set then 1 is used.



CIPHER SUITES NOT OFFERING FORWARD SECURITY ARE PROHIBITED. SESSION TICKETS ARE DISADVISABLE.

Libraries

- [SSL_CTX_set_post_handshake...](#)
- [SSL_CTX_set_psk_client_callback...](#)
- [SSL_CTX_set_psk_find_session...](#)
- [SSL_CTX_set_psk_server_callback...](#)
- [SSL_CTX_set_psk_use_session...](#)
- [SSL_CTX_set_purpose](#)
- [SSL_CTX_set_quiet_shutdown](#)
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- [SSL_CTX_set_record_padding...](#)
- [SSL_CTX_set_record_padding...](#)
- [SSL_CTX_set_recv_max_early...](#)
- [SSL_CTX_set_security_callback](#)
- [SSL_CTX_set_security_level](#)
- [SSL_CTX_set_session_cache...](#)
- [SSL_CTX_set_session_id_context...](#)
- [SSL_CTX_set_session_ticket_cb](#)
- [SSL_CTX_set_split_send_fragment...](#)

- **Level 4**

Security level set to 192 bits of security. As a result RSA, DSA and DH keys shorter than 7680 bits and ECC keys shorter than 384 bits are prohibited. Cipher suites using SHA1 for the MAC are prohibited.

- **Level 5**

Security level set to 256 bits of security. As a result RSA, DSA and DH keys shorter than 15360 bits and ECC keys shorter than 512 bits are prohibited.

APPLICATION DEFINED SECURITY CALLBACKS

Documentation to be provided.

NOTES

The default security level can be configured when OpenSSL is compiled by setting -DOPENSSL_TLS_SECURITY_LEVEL=level. If not set then 2 is used.

So, for legacy SMTP servers, we explicitly allow weaker SSL connections
— but the default configuration is now much stricter

```
if self.use_weak_ssl_encryption:  
    # Setting @SECLEVEL=1  
    # Adding missing ciphers removed in python3.10  
    # Support minimum TLSv1 version  
    # etc.  
    context = self.create_weak_ssl_context()  
else:  
    context = ssl.create_default_context()
```

Day 30

-  **Python 3.12 fully deployed and stable in production.**

Takeaways

Stage 1 Takeaways: Planning & Environment Setup

- Plan before you start: prepare robust local environments for debugging
- Audit your steps – documenting the path helps later troubleshooting
- Prefer the official Python builds when possible; if compiling yourself, verify it thoroughly

Stage 2 Takeaways: Installing & Updating Packages

- Update to the latest package versions when compatible
- Find the first version that supports Python 3.12 if needed
- Some edge cases require manual overrides and patching
- Be cautious with indirect dependencies — they may introduce silent conflicts

Stage 3 Takeaways: Runtime Failures & Debugging

- Many issues appear only at runtime — trial and error is inevitable
- Compare behavior across versions to pinpoint changes

Stage 4 Takeaways: Testing in CI & Local

- Run your full test suite in **both** local and CI environments
- If a test fails: don't patch blindly — it might hide a deeper problem
- Treat differences seriously — don't ignore failing test
- Even small Python upgrades may introduce meaningful changes in behavior

Stage 5 Takeaways: QA & Monitoring

- Use the full power of the QA team – they'll catch what tests missed
- Expect bugs in edge cases and workflows you didn't simulate
- Monitoring (logs, Sentry, metrics, customer feedback) is your safety net

Stage 6 Takeaways: Production Deployment

- Deploy slowly and incrementally — start with low-risk services
- Production is always the **best testing environment** (for better or worse)
- Stay alert and respond quickly — be ready with hotfixes as needed

Final Recap: Key Lessons from the Upgrade

- Upgrades are a journey, not a switch – plan, test, iterate
- Python version changes can expose hidden tech debt
- Good tooling (like uv, Sentry, CI) makes the process manageable
- Stay curious, cautious, and collaborative

Thank You!
Any Questions?

bit.ly/py312-upgrade

Yonatan Bitton
@bityob

