What's new in tox 4?

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Open Source Update:
tox

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Open Source Update – tox

- Documentation at https://tox.wiki
- It's a (Python) environment orchestrator, 18.6M downloads/month

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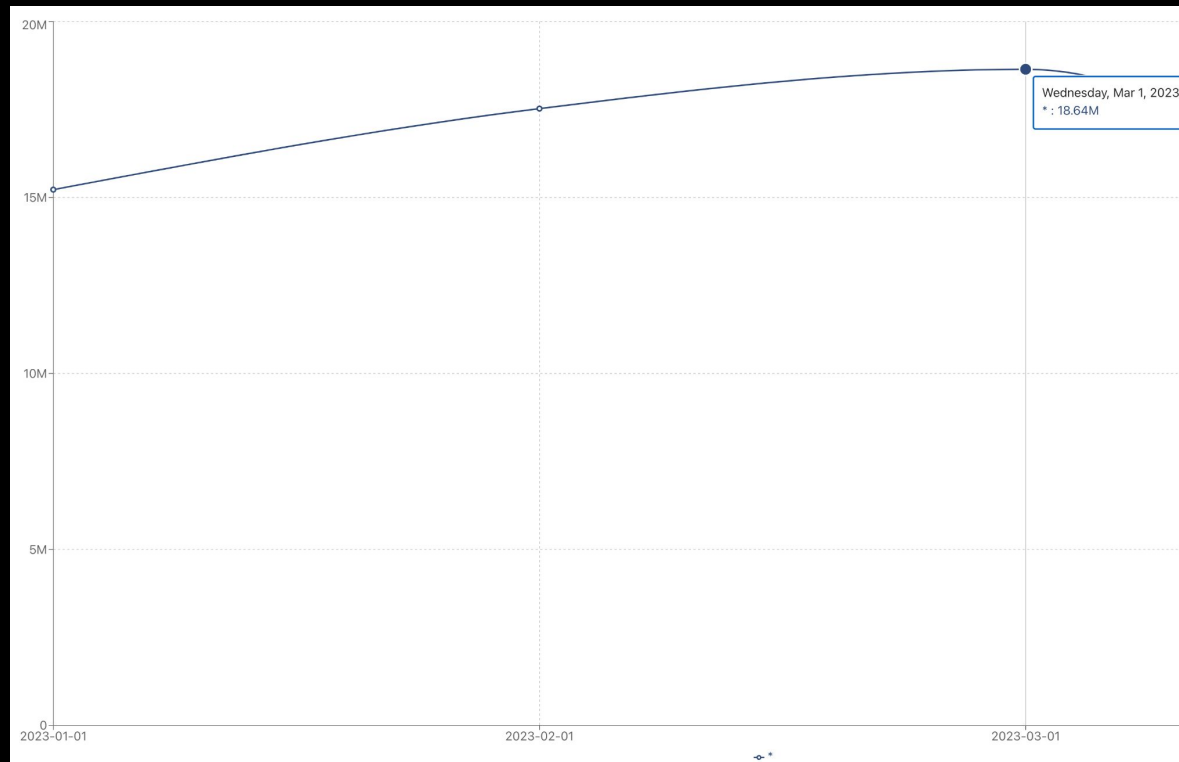
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- Given a config, it will:
    - Set up a test environment
    - Invoke your test commands

```
[tox]
env_list = py{311,310}, type

[testenv]
description = run unit tests
deps =
    pytest>=7
    pytest-sugar
commands =  pytest {posargs:tests}

[testenv:type]
description = run type checks
deps =  mypy==1.1.1
commands =  mypy {posargs:src tests}
```

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- Has multiple sub-commands (similar to git), such as list available targets

```
~/git/github/py-filelock on ⚡ main
❯ tox list
default environments:
fix        → format the code base to adhere to our styles, and complain about what we cannot do automatically
py311      → run tests with py311
py310      → run tests with py310
py39       → run tests with py39
py38       → run tests with py38
py37       → run tests with py37
pypy3      → run tests with pypy3
type       → run type check on code base
coverage   → combine coverage files and generate diff (against DIFF_AGAINST defaulting to origin/main)
docs       → build documentation
readme     → check that the long description is valid (need for PyPI)

additional environments:
dev        → generate a DEV environment
```

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- Run a test environment via tox run

```
) tox run -e type
type: install_deps> python -I -m pip install mypy==1.1.1
.pkg: install_requires> python -I -m pip install 'hatch-vcs≥0.3' 'hatchling≥1.13'
.pkg: _optional_hooks> python /Users/bgabor8/.local/pipx/venvs/tox/lib/python3.11/site-packages/pyproject_api/_backend.py True hatchling.build
.pkg: get_requires_for_build_editable> python /Users/bgabor8/.local/pipx/venvs/tox/lib/python3.11/site-packages/pyproject_api/_backend.py True hatchling.build
.pkg: get_requires_for_build_wheel> python /Users/bgabor8/.local/pipx/venvs/tox/lib/python3.11/site-packages/pyproject_api/_backend.py True hatchling.build
.pkg: build_wheel> python /Users/bgabor8/.local/pipx/venvs/tox/lib/python3.11/site-packages/pyproject_api/_backend.py True hatchling.build
type: install_package_deps> python -I -m pip install 'covdefaults≥2.3' 'coverage≥7.2.2' 'diff-cover≥7.5' 'pytest-cov≥4' 'pytest-mock≥3.10' 'pytest-timeou
t≥2.1' 'pytest≥7.2.2'
type: install_package> python -I -m pip install --force-reinstall --no-deps /private/tmp/py-filelock/.tox/.tmp/package/1/filelock-3.10.7-py3-none-any.whl
type: commands[0]> mypy --strict src/filelock
Success: no issues found in 8 source files
type: commands[1]> mypy --strict tests
Success: no issues found in 2 source files
.pkg: _exit> python /Users/bgabor8/.local/pipx/venvs/tox/lib/python3.11/site-packages/pyproject_api/_backend.py True hatchling.build
  type: OK (22.59=setup[6.26]+cmd[14.28,2.05] seconds)
  congratulations :) (22.62 seconds)
```

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● Run all test environments in parallel via tox run-parallel

```
❯ tox run-parallel
type: OK ✅in 1.49 seconds
docs: OK ✅in 2.64 seconds
fix: OK ✅in 4.05 seconds
py39: OK ✅in 4.22 seconds
py37: OK ✅in 4.46 seconds
py311: OK ✅in 4.54 seconds
py310: OK ✅in 4.59 seconds
py38: OK ✅in 4.65 seconds
readme: OK ✅in 7.57 seconds
pypy3: OK ✅in 56.58 seconds
coverage: commands[0]> coverage combine
Combined data file .tox/.coverage.py311
Combined data file .tox/.coverage.py310
Combined data file .tox/.coverage.pypy3
Combined data file .tox/.coverage.py38
Combined data file .tox/.coverage.py39
Combined data file .tox/.coverage.py37
coverage: commands[1]> coverage report --skip-covered --show-missing
Name                        Stmts   Miss Branch BrPart   Cover   Missing
-----------------------------------------------------------------------
src/filelock/__init__.py       18      3      2      1     80%   31-33
src/filelock/_api.py           95      1     34      0     99%   80
src/filelock/_soft.py          23      2      0      0     91%   39-40
src/filelock/_unix.py          32      4      0      0     88%   26-27, 39-40
src/filelock/_util.py          12      0      4      1     94%   13→exit
tests/test_filelock.py        323      1    136      1     99%   445
-----------------------------------------------------------------------
TOTAL                         551     11    178      3     98%

4 files skipped due to complete coverage.
```

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- In 2021, gave a [lightning](#) talk about "tox 4 - call to arms"

- Following another 18 months and 22 days of development and feedback, tox 4.0.0 released on 🎉 December 7, 2022 🎉

- Prepare as much as you can, you'll never think of every edge case, so took another 44 releases to get to a stable point

4.0.0
Dec 7, 2022

4.4.4
Jan 31, 2023

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- Major updates with this release: colorful output

```
❭ tox run -e type
type: install_deps> python -I -m pip install mypy==1.1.1
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● Major updates with this release: subcommands

```
subcommands:
  tox command to execute (by default legacy)

  {run,r,run-parallel,p,depends,de,list,l,devenv,d,config,c,quickstart,q,exec,e,legacy,le}
    run (r)                     run environments
    run-parallel (p)            run environments in parallel
    depends (de)                visualize tox environment dependencies
    list (l)                    list environments
    devenv (d)                  sets up a development environment at ENVDIR based on the tox configuration specified
    config (c)                  show tox configuration
    quickstart (q)              Command line script to quickly create a tox config file for a Python project
    exec (e)                    execute an arbitrary command within a tox environment
    legacy (le)                 legacy entry-point command
```

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- Major updates with this release: overwrite tox defaults

```
❯ tox -h
```

```
config file '/Users/bgabor8/Library/Application Support/tox/config.ini' missing (change via env var TOX_USER_CONFIG_FILE)
```

For example, tox run-parallel by default uses up to CPU core count parallel, if you prefer to do up to 4 parallel, can create config.ini with:

```
[tox]
parallel = 4
```

```
  -p VAL, --parallel VAL      run tox environments in parallel, the argument controls limit: all, auto - cpu count, some positive number
, zero is turn off (default: 4 → from file)
```

```
config file '/Users/bgabor8/Library/Application Support/tox/config.ini' active (change via env var TOX_USER_CONFIG_FILE)
```

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- Brand new (better) interfaces for plugins
  - Help here is much appreciated, as not all plugins migrated over
  - We also allow now in-line plugins!

```python
from typing import cast
from tox.config.loader.memory import MemoryLoader
from tox.config.sets import CoreConfigSet, EnvConfigSet
from tox.config.types import EnvList
from tox.plugin import impl
from tox.session.state import State


@impl
def tox_add_core_config(core_conf: CoreConfigSet, state: State) -> None:
    core_conf.loaders.insert(0, MemoryLoader(env_list=EnvList(["a", "b"])))


@impl
def tox_add_env_config(env_conf: EnvConfigSet, state: State) -> None:
    env_conf.loaders.insert(0, MemoryLoader(description=f"env for {env_conf.name}"))
```

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- Next potential major features, help wanted
-

    ○ pure pyproject.toml configuration
        ■ define all your packaging/testing setup logic in a single space

    ○ Python code configuration via toxfile.py (similar to how nox works)

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Open Source Update – Other projects

- Also maintaining:
  - [virtualenv](#) - virtual environment creation
  - [py-filelock](#) - acquire a lock via a file
  - [platformdirs](#) - successor of appdirs, determine platform-specific directory locations
  - [pyproject-api](#) - pyproject build back-end/front-end
  - [pyproject-fmt](#) - like black/setup-cfg-fmt, but for your pyproject.toml file
  - [pipdeptree](#) - display your Python environment dependency tree (now via mermaid too!)
  - [sphinx-autodoc-typehints](#) - insert your type annotations into your documentation
  - [sphinx-argparse-cli](#) - generate a linkable documentation from your argparse parsers
  - pytest-memray - pytest wrapping around memray, stay tuned for more information! 😉
  - … https://bernat.tech/about
- Pull requests welcomed and much appreciated!

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