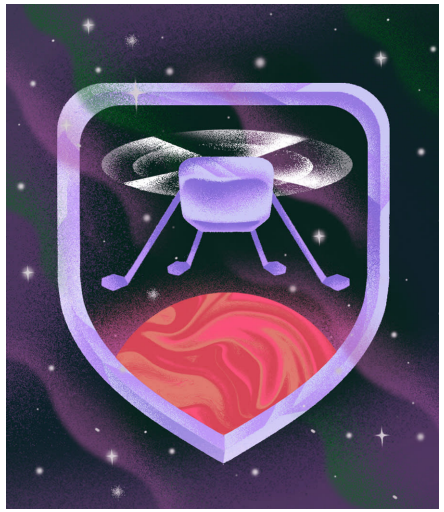
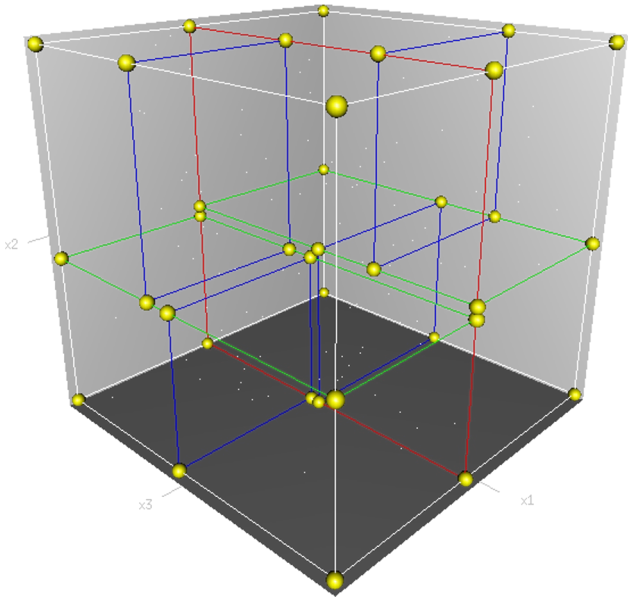
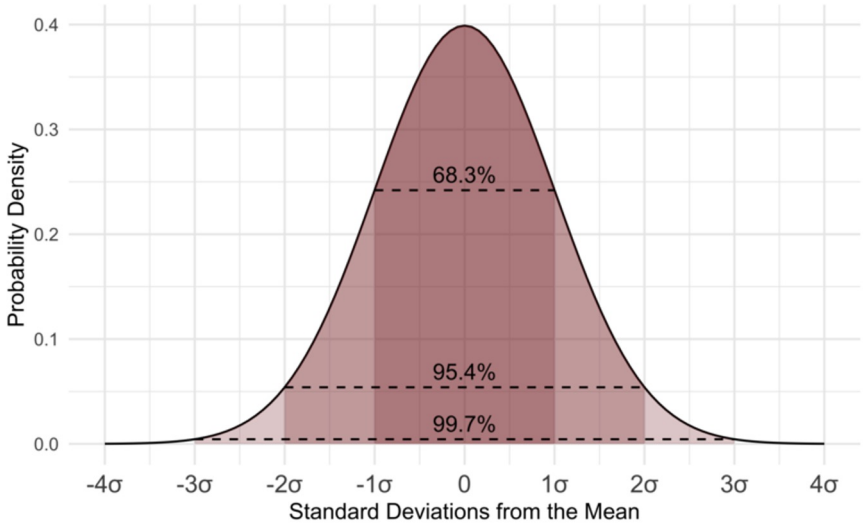
SciPy Library Update

July 13/2022







Meson Source Build Time Improvements

Hardware	Physical Cores	meson: 2 x cores (m:s)	meson: 1 x cores (m:s)	distutils (m:s)	fold speedup
Intel i9-7900X CPU @ 3.30GHz	10	02:04	02:20	11:04	5.4
AMD EPYC 7702 CPU @1.64GHz	128	01:35	01:34	08:19	5.3
ARM Cavium ThunderX2 B0	64	03:37	03:27	32:00	9.3
IBM POWER9	40	03:09	03:09	23:03	7.3

maintenance/1.9.x hash: c545f52 ; GNU compiler toolchain on Linux

`time python dev.py -j {threads} --build-only` vs. `time python setup.py install`

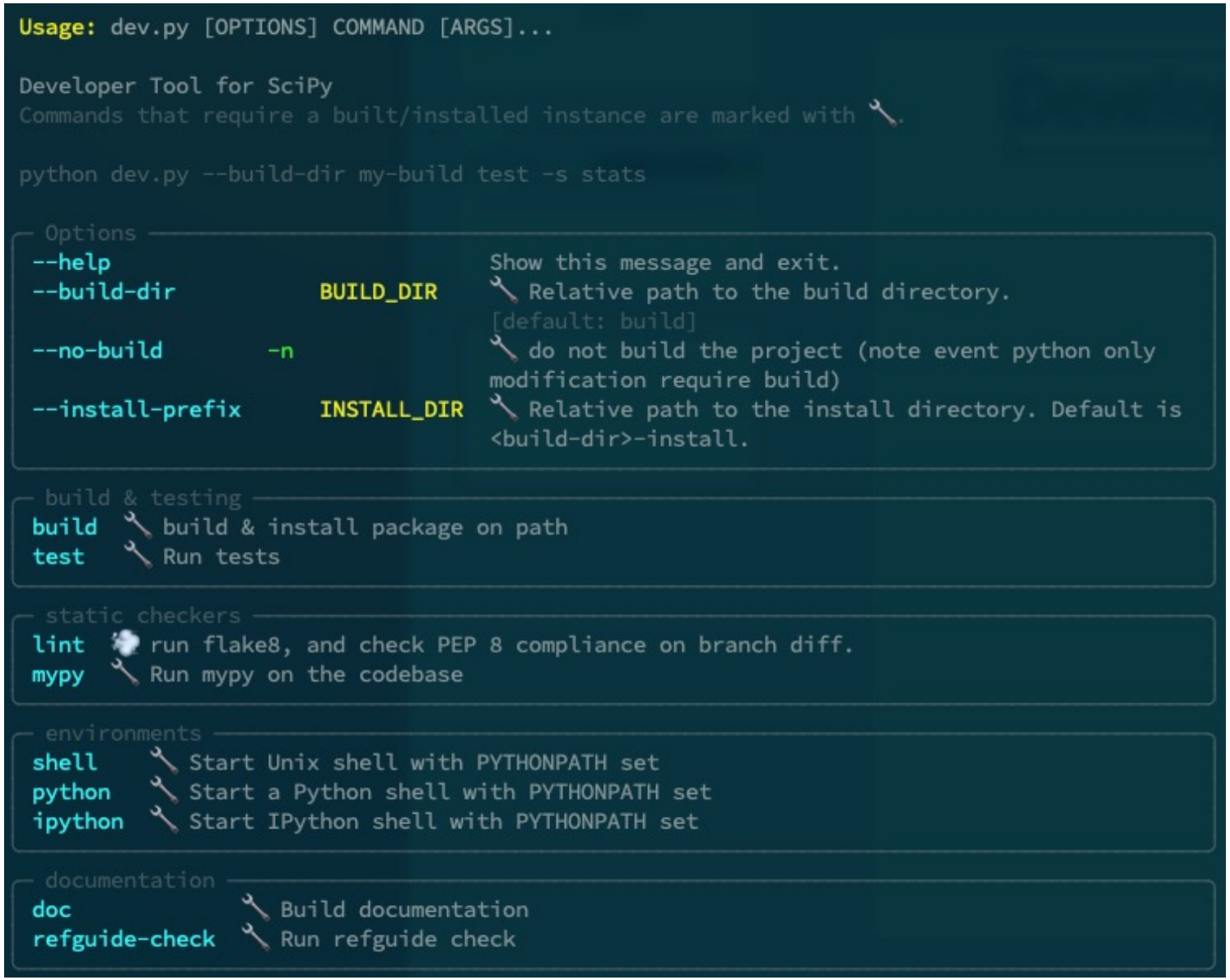
How to get even faster builds?

We could try breaking the C++ code into smaller compilation units, but there are no plans for that at this time.

Developer CLI Experience Improvements

Reusable infrastructure:
https://github.com/pydoit/pydevtool

Broader Adoption in Community?



Highlights From Past Year

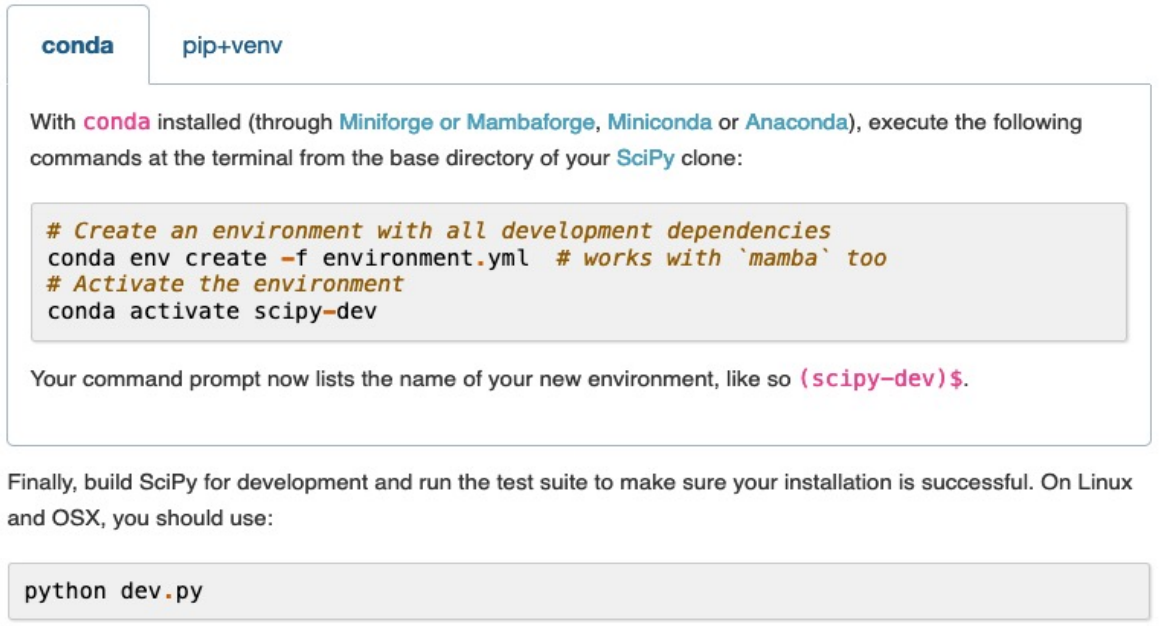
1.8.x

- A sparse array API was added for testing
- The sparse SVD library PROPACK is now vendored with SciPy (default off; set USE_PROPACK=1)
- A new `scipy.stats.sampling` submodule that leverages the UNU.RAN C library to sample from arbitrary univariate non-uniform continuous and discrete distributions
- All namespaces that were private but happened to miss underscores in their names have been deprecated.

  - `scipy.signal.spline`
  - `scipy.ndimage.filters`
  - `scipy.ndimage.fourier`
  - `scipy.ndimage.measurements`
  - `scipy.ndimage.morphology`
  - … many others …

1.9.x

- `scipy.optimize.milp`, new function for mixed-integer linear programming.
- `scipy.stats.fit` for fitting discrete and continuous distributions to data
- Tensor-product spline interpolation modes were added to `scipy.interpolate.RegularGridInterpolator`
- A new global optimizer (DIviding RECTangles algorithm) `scipy.optimize.direct`
- New contributor guide:



Sustainability

- NASA ROSES (+Pandas, NumPy, scikit-learn): Approx. $1.3 M for Quansight (lead), LANL (subaward), CalPoly (subaward)
- 4 x NumFOCUS SDGs: onboarding grant, PROPACK, mixed integer programming solver, joint sphinx docs improvements
- CZI EOSS Cycle 4 grant (+Pandas, NumPy, Matplotlib): Melissa Mendonça (Quansight)—onboarding, contributor experience, community organization, DEI
- Tidelift & Quansight: Build system improvements
- New team members: Atsushi Sakai, Albert Steppi, Tirth Patel
- Sprint this weekend!