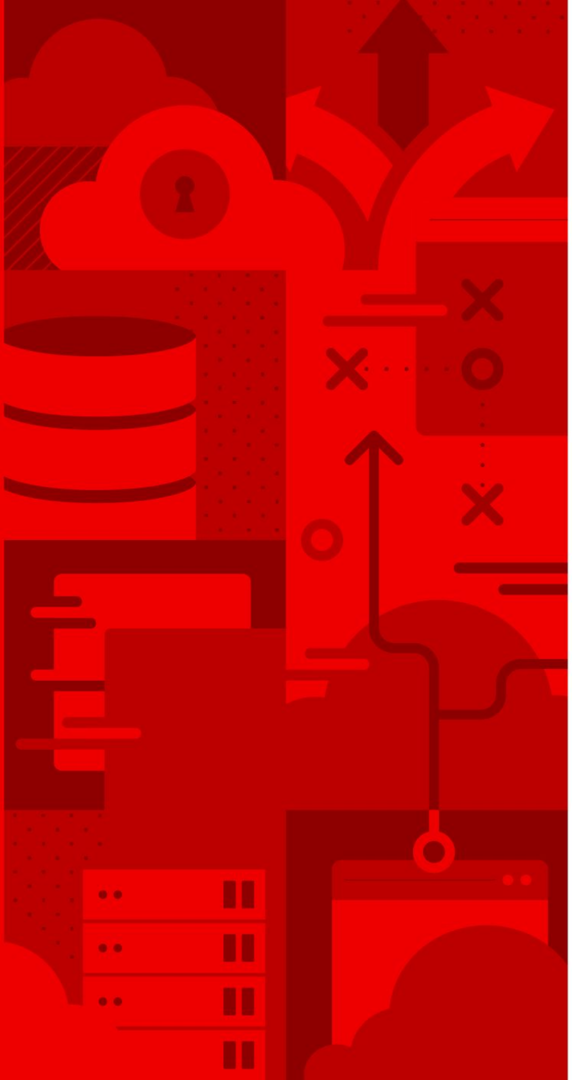

micropipenv

the one installation tool that covers Pipenv, Poetry, and pip-tools

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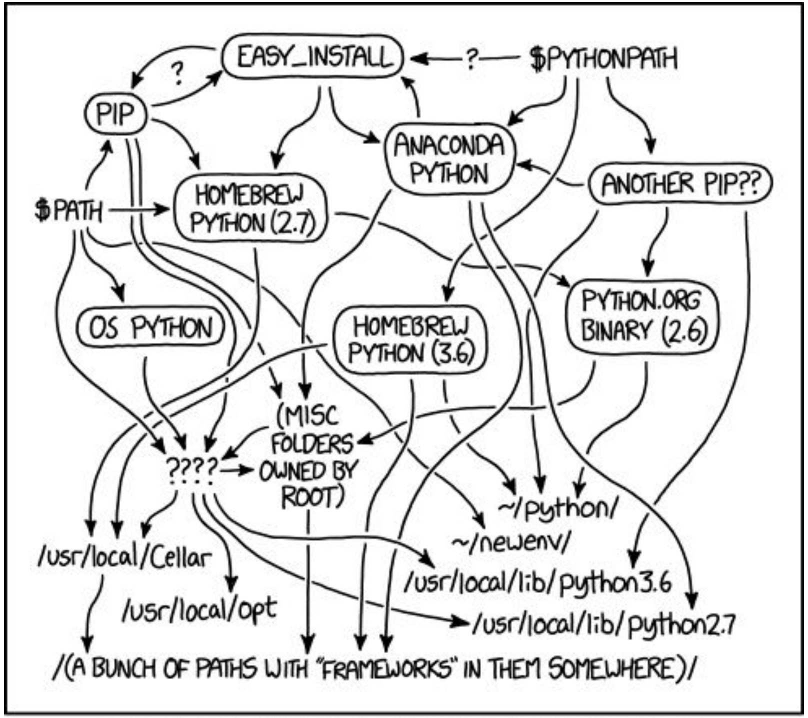
AICoE, Project Thoth

Agenda

- Python packaging
- Existing tools and formats for resolving and installing dependencies
  - pip
  - pip-tools
  - Pipenv
  - Poetry
- micropipenv
  - Why?!
  - Using it in containerized applications
- Best practicies to install a dependency

Python packaging

Python packaging



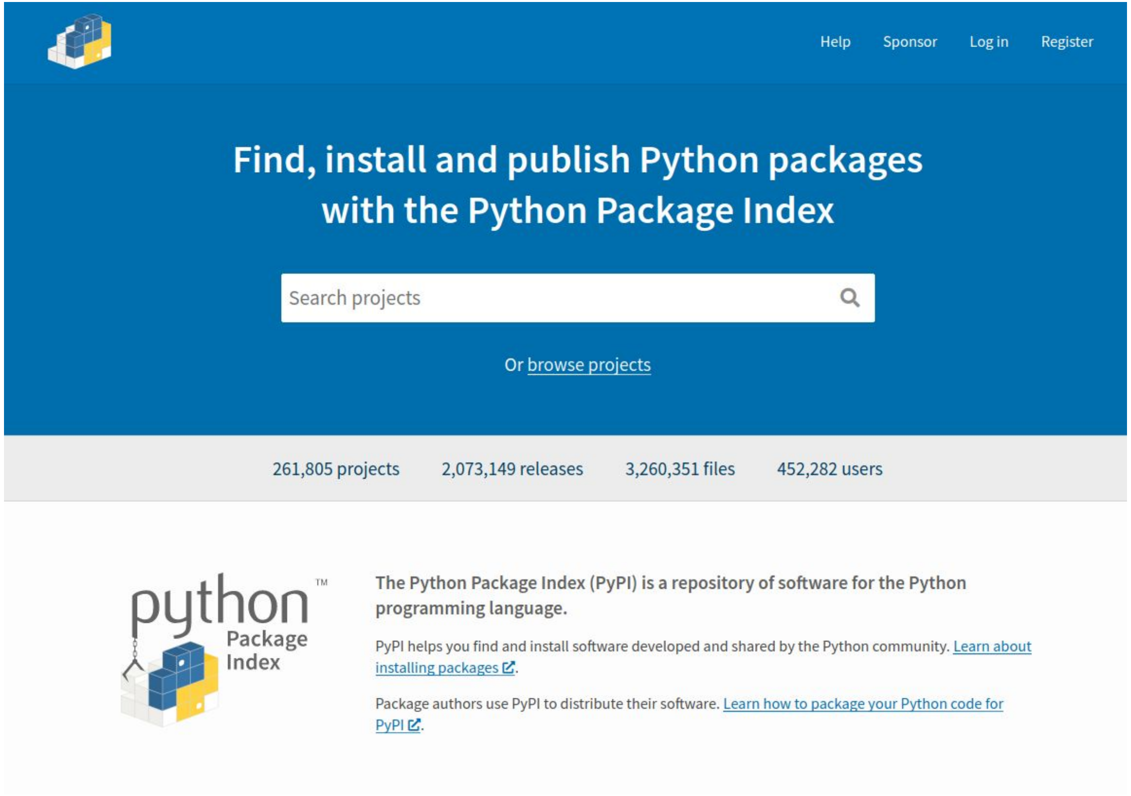
MY PYTHON ENVIRONMENT HAS BECOME SO DEGRADED THAT MY LAPTOP HAS BEEN DECLARED A SUPERFUND SITE.

Source: https://xkcd.com/1987/

Python packaging

- PyPI – The Python Package Index
    - Publicly hosted service by the Python Packaging Association (PyPA)
    - https://pypi.org/
    - Previously a package *index*, now hosting Python artifacts
    - Current implementation: Warehouse

PyPI [🥧π👁]



Find, install and publish Python packages with the Python Package Index

Or browse projects

261,805 projects 2,073,149 releases 3,260,351 files 452,282 users

The Python Package Index (PyPI) is a repository of software for the Python programming language.

PyPI helps you find and install software developed and shared by the Python community. Learn about installing packages.

Package authors use PyPI to distribute their software. Learn how to package your Python code for PyPI.

Python packaging

- PyPI – The Python Package Index
  - Publicly hosted service by the Python Packaging Association
  - https://pypi.org/
  - Previously a package index, now hosting Python artifacts
  - Current implementation: Warehouse
- Own Python hosted artifacts
  - PEP-503
  - Example: http://tensorflow.pypi.thoth-station.ninja/

Existing tools and formats for resolving and installing dependencies

pip

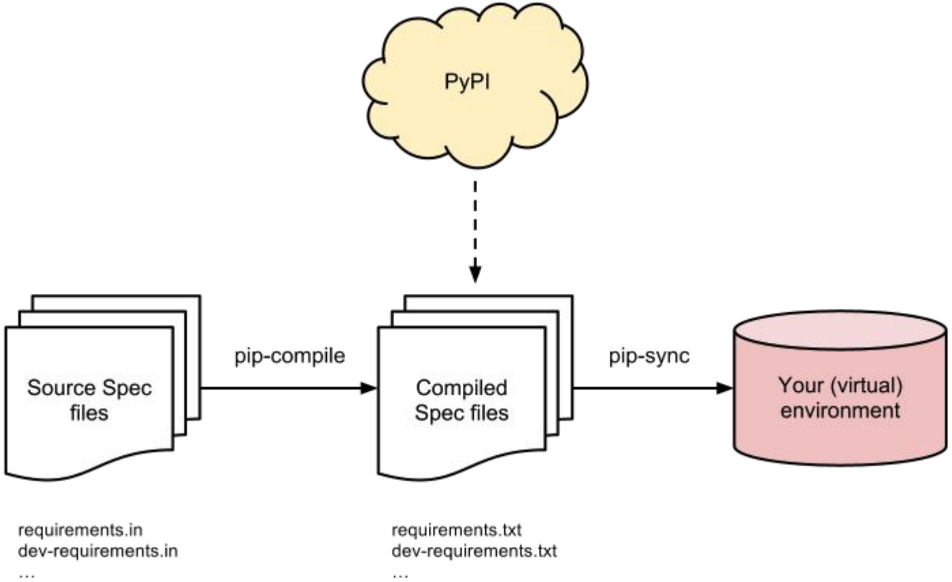
```
pip install micropipenv
```

pip

- ~~easy_install~~, ~~pyinstall~~
  - https://pypi.org/project/pyinstall/
- The PyPA recommended tool for installing packages
- Does not manage lock files
- No way to obtain origin of the installed packages
- Issues when installing packages
  - Multiple installations can create broken environment
- A new resolver is available
  - `--use-feature=2020-resolver`
- Not directly suitable for Python applications that much

pip-tools

pip-tools


PyPI
Source Spec files
pip-compile
Compiled Spec files
pip-sync
Your (virtual) environment
requirements.in
dev-requirements.in
...
requirements.txt
dev-requirements.txt
...

pip-tools

- Files used:
  - requirements.in
  - requirements.txt
  - (dev-requirements, ...)
- Turn on hashes!
  - `pip-compile --generate-hashes`
- pip-compile + pip-sync
- No virtual environment management
  - Virtual environment is managed by the user

pip-tools

```
python3 -m venv venv

source venv/bin/activate

echo ‘requests>=2<=2.24’ > requirements.in

pip-compile

…

python3 -m venv venv

source venv/bin/activate

pip-sync
```

pip-tools

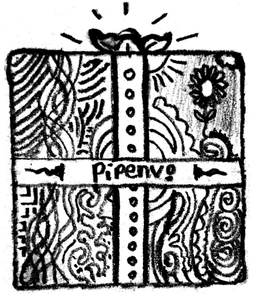
--verbose --verbose

```
python3 -m venv venv

source venv/bin/activate

echo ‘requests>=2<=2.24’ > requirements.in

pip-compile

…

python3 -m venv venv

source venv/bin/activate

pip-sync
```

Pipenv

Pipenv

- The PyPA recommended tool for installing packages with lock file management
  - https://github.com/pypa/pipenv
- Pipenv files
  - Pipfile [TOML]
    - Direct dependencies
    - Addtional configuration (Python version requirements, source configuration)
  - Pipfile.lock [JSON]
- Transparently manages virtual environment and Pipenv files
- Make sure you `--deploy` your application correctly
- Ship Pipfile and Pipfile.lock with your application!



Pipenv

```
pipenv install requests

          ...

pipenv install --deploy
```

Pipenv

--no-verbose --no-verbose

```
pipenv install requests

...

pipenv install --deploy
```

Poetry

Poetry

- A community project to address issues in Python packaging
  - https://python-poetry.org/
- Uses two files
  - pyproject.toml [toml]
  - poetry.lock [toml]
- Manages releases to an index
  - Helps with project lifecycle
- Non-standard version specifiers
- Redundant information

micropipenv

micropipenv

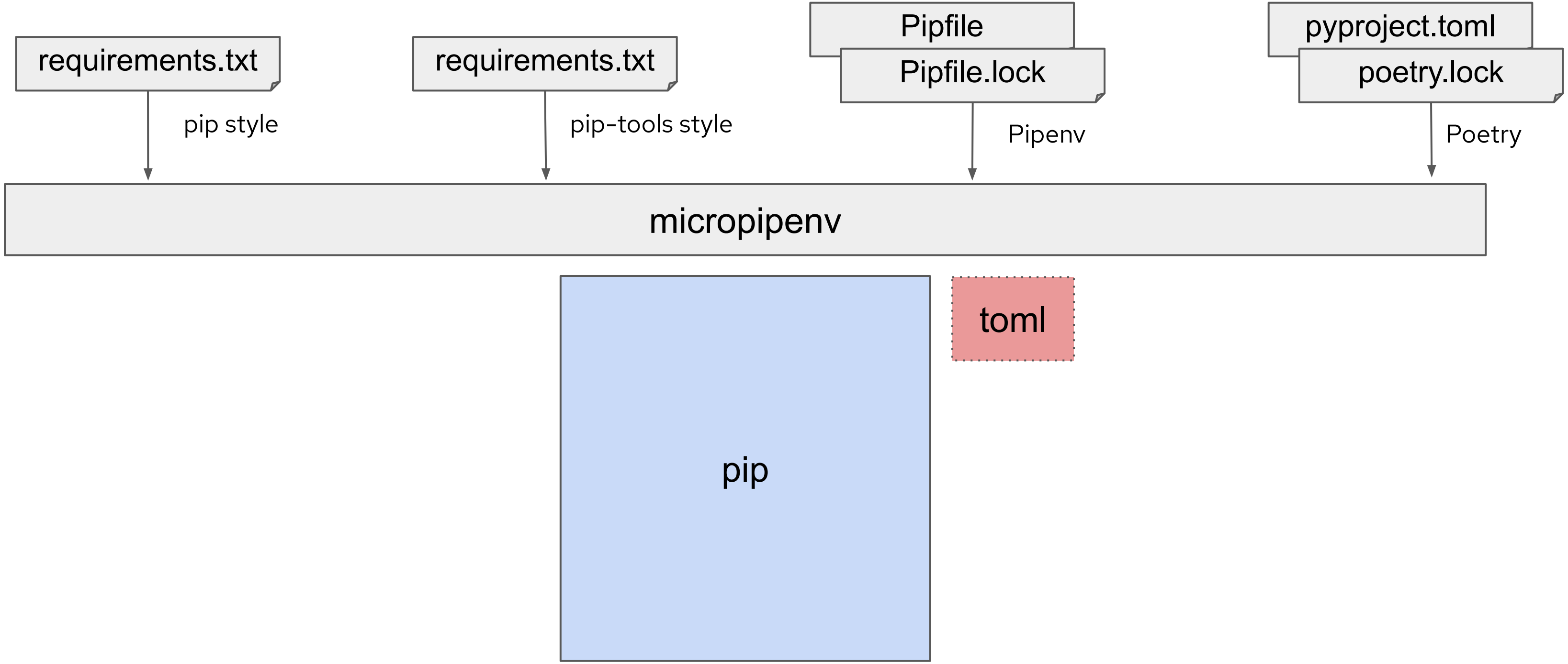
micropipenv

- A lightweight wrapper for pip
  - ~860 CLOC, 48KiB
- One single file
  - Depends on pip
  - Optionally depends on toml/pytoml
- One single Python file

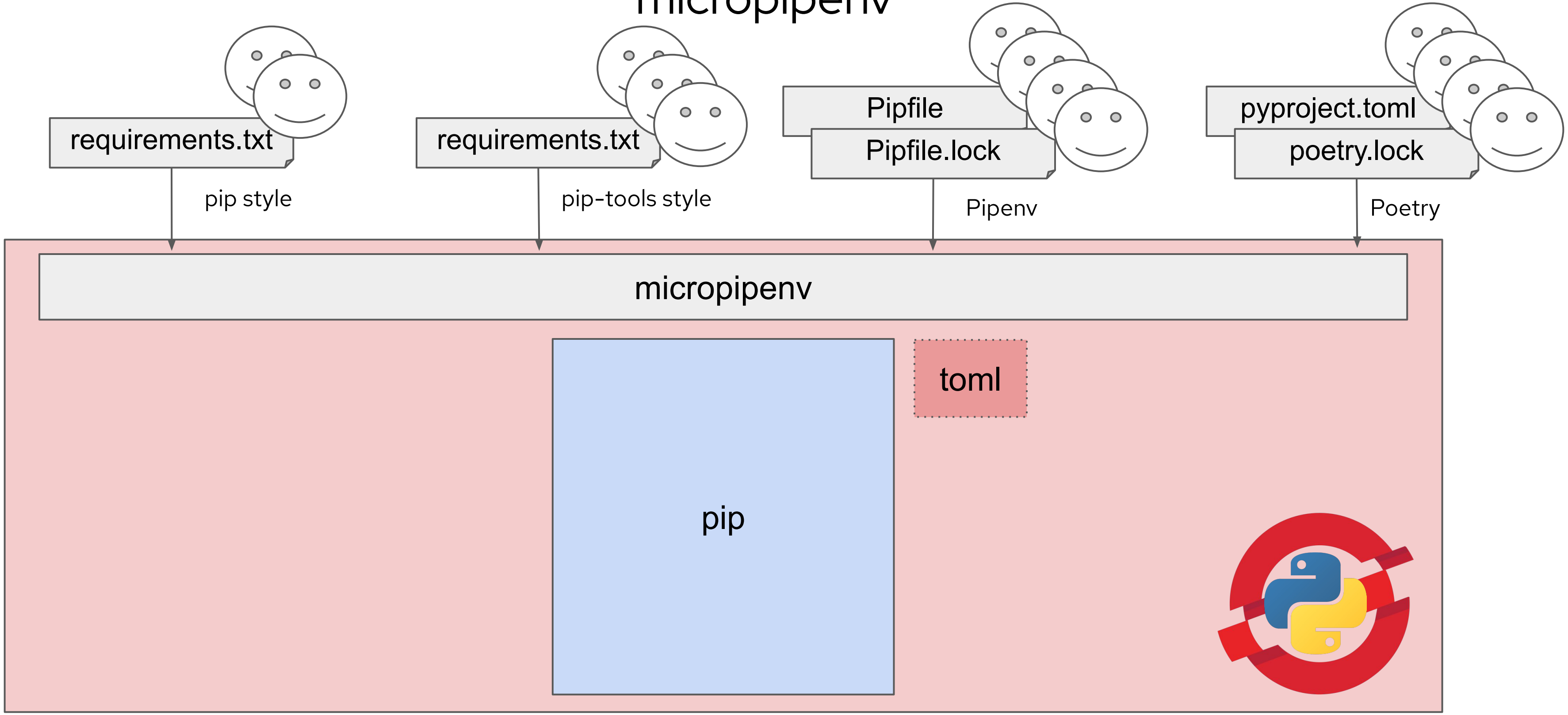
micropipenv

- Does not implement resolver
  - Do not reinvent the *wheel*...
  - Uses already resolved set of dependencies
- Complements all the tools stated, creates a common layer for
  - pip
  - pip-tools
  - pipenv
  - Poetry

micropipenv



micropipenv



micropipenv

- Designed for containerized applications, but not limited to them
  - Originally, our solution to bypass Pipenv issues
  - Introduced a common base for installing dependencies
  - One tool rules them all
  - Reduced container image size when shipping micropipenv instead of Pipenv
    - Reduced by ~30.4MiB
    - https://github.com/fridex/s2i-example-micropipenv
- Neat and unified logs
- Reduces maintenance burden

micropipenv

```
pip install micropipenv[toml]

micropipenv install --deploy
```

micropipenv - no installation

```
curl \
https://raw.githubusercontent.com/thoth-station/micropipenv/master/micropipenv.py | \
python3 - install -- --user
```

micropipenv in Fedora

```
dnf install -y micropipenv
```

Thanks to Lumir Balhar!

micropipenv in Python s2i

- Fedora based Python3 s2i
  - ✨ **`ENABLE_MICROPIPENV=1`** ✨

Thanks to Lumir Balhar!

micropipenv in Python s2i

- Thoth enhanced Python s2i
  - https://github.com/thoth-station/s2i-thoth
- Containers available on quay, see the repo
  - ✨ Just pull & use ✨

Best practices

Best practices

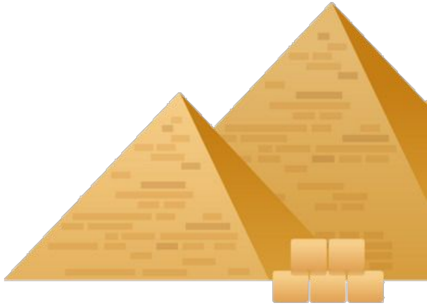
- Use lock files, shipped with your application
  - All dependencies pinned to a specific version
  - Reproducible installations
  - Reduces maintenance burden
  - Integrity checks
  - Provenance checks
  - Configuration of Python indexes
- Available lock file formats
  - requirements.{in,txt} by pip-tools with hashes
  - Pipfile.lock
  - poetry.lock

micropipenv

Project Thoth

Project Thoth

- AICoE, Office of the CTO
- Homepage
    - http://thoth-station.ninja/
- GitHub organization
    - http://github.com/thoth-station/
- Twitter account with updates
    - https://twitter.com/thothstation
- YouTube channel
    - https://www.youtube.com/channel/UClUIDuq_hQ6vlzmqM59B2Lw



Thanks for your attention!

https://github.com/thoth-station

https://twitter.com/thothstation

https://www.youtube.com/channel/UClUIDuq_hQ6vlzmqM59B2Lw

References

Website https://thoth-station.ninja/

Twitter https://twitter.com/thothstation

GitHub https://github.com/thoth-station

in linkedin.com/company/red-hat

youtube.com/user/RedHatVideos

f facebook.com/redhatinc

twitter.com/RedHat