Tools for Python

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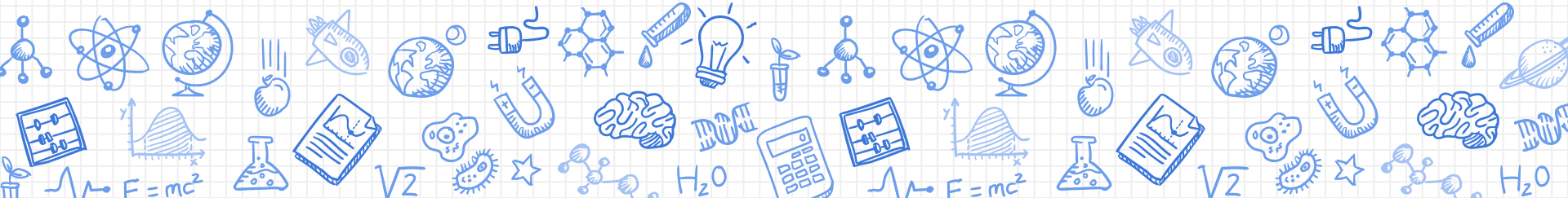
https://github.com/Jnsll/ModelisationScientifique

Managing Python versions

Pyenv



Pyenv

- ✘ https://github.com/pyenv/pyenv
- ✘ Easily switch between multiple versions of Python
- ✘ change the global Python version
- ✘ Provide support for per-project Python versions
- ✘ Allow you to override the Python version with an environment variable
- ✘ Search commands from multiple versions of Python at a time

Pyenv

> Sets the global version of Python to be used in all shells

$ pyenv global

Pyenv

> Sets a local application-specific Python version

$ pyenv local 3.7.0

Pyenv

> Install a specific version

$ pyenv install --list

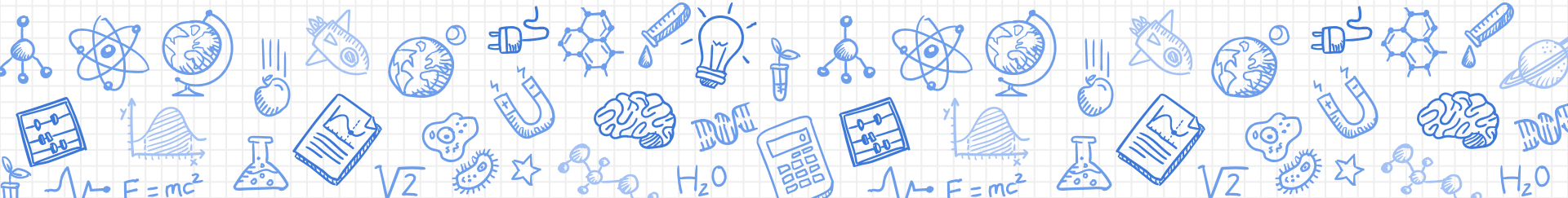
$ pyenv install --3.8.0

> Get installed versions

$ pyenv versions

Managing packages / libraries

Pip



Pip

- ✘ Installs packages from the Python Package Index (PyPI) which is a repository of software for the Python programming language. https://pypi.org/
- ✘ has a number of subcommands: “search”, “install”, “uninstall”, “freeze”, etc
- ✘ lack of synchronisation (with requirements.txt file)

Pip

> Search for a package

$ pip search astronomy

Pip

> Install the latest version of a package by specifying a package's name

$ pip install novas

Pip

> Install a specific version of a package by giving the package name followed by == and the version number

$ pip install requests==2.6.0

Pip

> Upgrade

$ pip install --upgrade requests

Pip

> Uninstall

$ pip uninstall novas

Pip

> Display information about a particular package

$ pip show novas

Pip

> Display all of the packages installed in the environment

$ pip list

Pip

> Display list of packages installed but in the 'pip install' format

$ pip freeze > requirements.txt

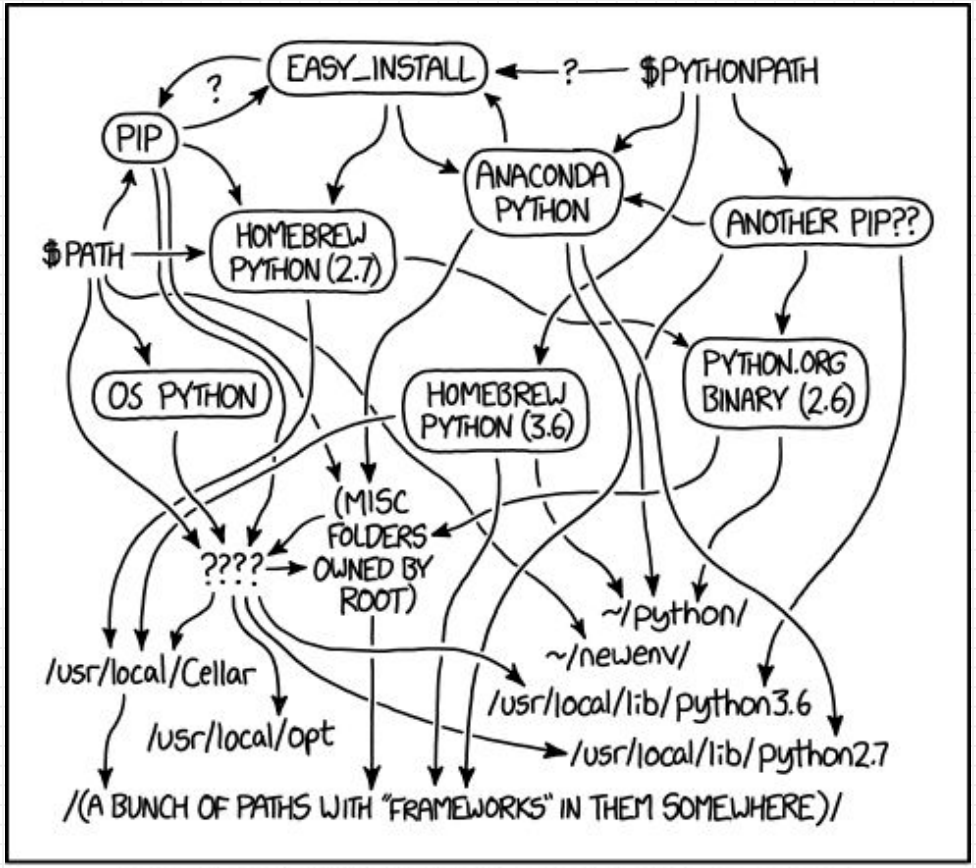
$ cat requirements.txt

Pip

> Installation of all the necessary packages with the requirements file

$ pip install -r requirements.txt

Why using virtual environments ?



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

The need for environments

- ✘ Several versions of Python
- ✘ Specific versions of a library for a particular Python application (conflicts)

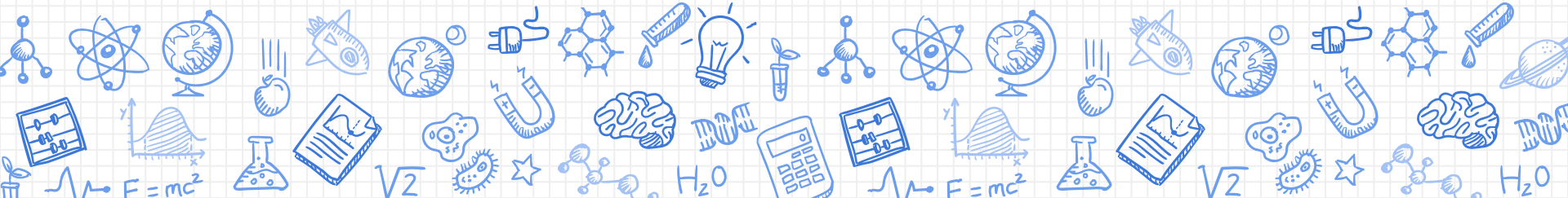
> With Python, all programs share the same global installation.

- ✘ Reproducibility !

The need for environments

> Virtual environment : a self-contained directory tree that contains a Python installation for a particular version of Python, plus a number of additional packages

Virtualenv



Virtualenv

> a tool to create isolated Python environments. virtualenv creates a folder which contains all the necessary executables to use the packages that a Python project would need.

https://pypi.org/project/virtualenv/

Virtualenv

> Create a virtual environment

$ cd project_folder

$ virtualenv venv

Virtualenv

> Start the virtual environment

$ source venv/bin/activate

Virtualenv

> Install packages with pip

$ pip install package

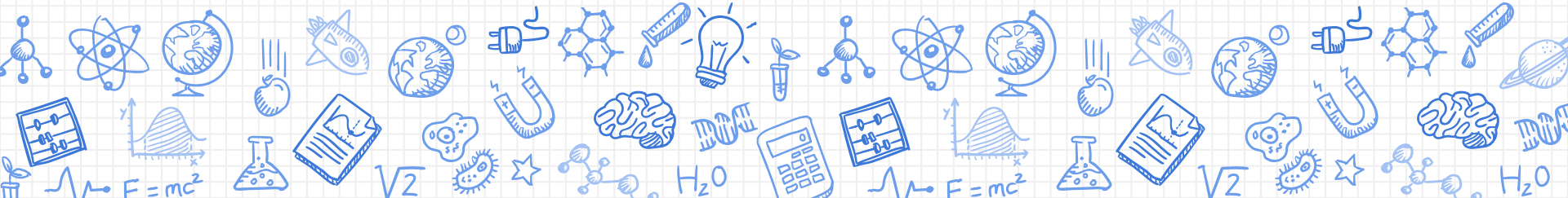
Virtualenv

> Stop the virtual environment

$ deactivate

> To delete the virtual environment, just delete its folder.

Virtualenvwrapper



virtualenvwrapper

> Provides a set of commands which makes working with virtual environments much more pleasant. It also places all your virtual environments in one place.

virtualenvwrapper

> Installation

```
$ pip install virtualenvwrapper
$ export WORKON_HOME=~/Envs
$ source /usr/local/bin/virtualenvwrapper.sh
```

virtualenvwrapper

> Create the virtual environment

$ mkvirtualenv project_folder

This creates the project_folder folder inside ~/Envs.

virtualenvwrapper

> Work on a virtual environment

$ workon project_folder

virtualenvwrapper

> Can make a project, which creates the virtual environment, and also a project directory inside $WORKON_HOME

$ mkproject project_folder

virtualenvwrapper

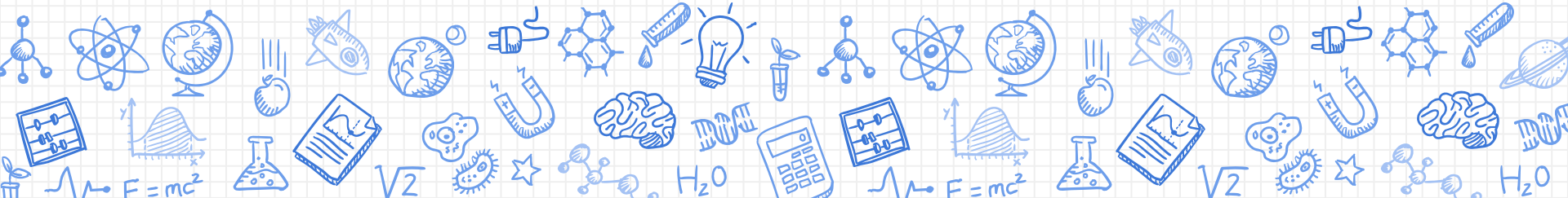
> Deactivate

$ deactivate

> Delete

$ rmvirtualenv venv

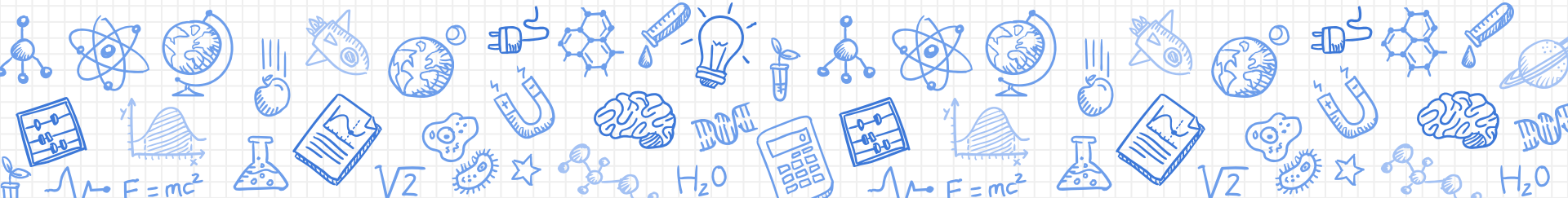
Anaconda / Conda



Anaconda

- popular in the scientific community
- combination of package manager (like pip) & env manager (like virtualenv + virtualenvwrapper)
- easier to use ? (considered)
- does not support all the packages that pip does (e.g beautifulsoup)

Pipenv



Pipenv

> aims to bring the best of all packaging worlds to the Python world. It harnesses Pipfile, pip, and virtualenv into one single toolchain

https://pypi.org/project/pipenv/

Pipenv

> don't need to manipulate you pipfile > pipenv does it for you

> combination of virtualenv + pip

> recommended by PyPA (Python Packaging Authority)

> use it to generate and both create env, install dependencies into env, update pipfile / lock file.

Pipenv

> relies on two seperate files :

- pipfile
    - similar to requirements.in -> requirements.txt
    - human readable
- pipfile.lock
    - real requirements.txt

> pipfile + lock pipfile : used to regenerate env

Pipenv

pipenv install package > install package + update pipfile & lock file

pipenv install --dev package >> separate packages dev / production / etc

Pipenv

> pipenv shell : activating the virtual env, spaws a sub-shell inside your shell, run in the virtual env

> pipenv run python script.py : run the command using the virtual env but only the command. Back to original prompt /shell

> pipenv graph : generate graph of packages installed and their dependencies, shows it

Pipenv

Drawbacks :

- not recommended if you are creating a package/library. Only for programs
- locking can be slow
- by default, update all the dependencies every time a new package is installed
    - can be changed with --selective-upgrade

Pipenv

Pros:

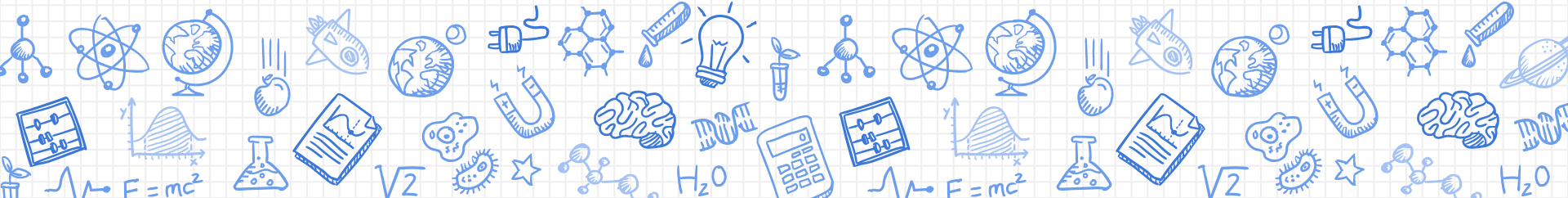
- installs packages and updates lock file in one command
- installs packages concurrently
- prevents dependency conflict
- check for security

Invoking Python

Invoking Python

- By running a python file
  - e.g. python myscript.py
- Through an interactive console
  - Python Interpreter or IPython shell
- In an interactive notebook

The Python Interpreter



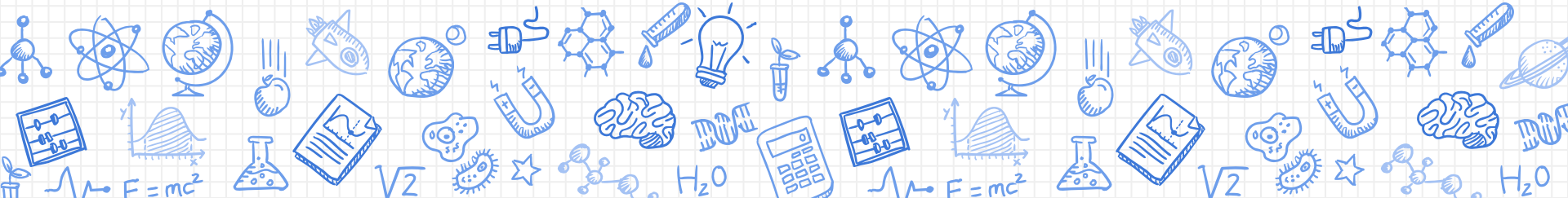
The Python Interpreter

- Usually located in '/usr/local/bin' (Linux)
- 'Python' in shell
- Interactive mode

```
$ python3.8
Python 3.8 (default, Sep 16 2015, 09:25:04)
[GCC 4.8.2] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

- Exit with 'quit()'

IPython

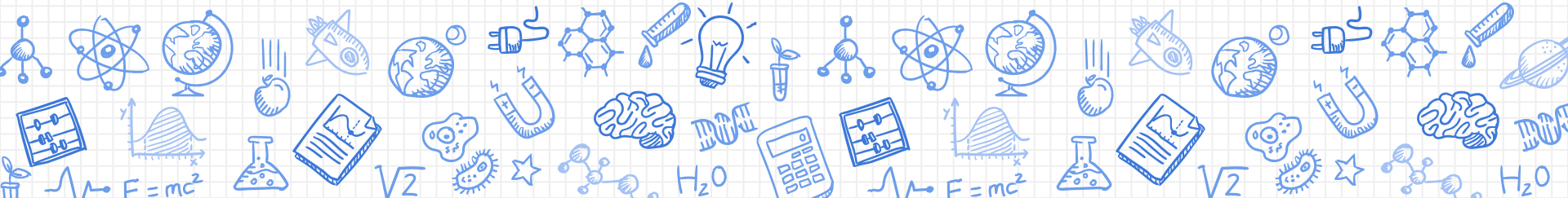


IPython

- ✘ developed by Fernando Perez in 2001 as an enhanced Python interpreter
- ✘ Syntax highlighting
- ✘ Tab completion of keywords, variables and function names
- ✘ Stores the history of interactions
- ✘ Provides access to Python debugger
- ✘ Acts as a main kernel for Jupyter notebook

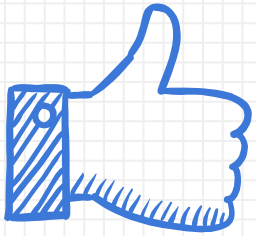
Jupyter Notebook

Demo + TP



References

- https://nbviewer.jupyter.org/github/rabernat/python_teaching/blob/master/one_day_workshop/01_core_python.ipynb
- https://docs.python.org/3.8/tutorial/
- https://www.youtube.com/watch?v=i7_US0Jff30
- https://www.tutorialspoint.com/jupyter/ipython_getting_started.htm
- https://docs.python-guide.org/dev/virtualenvs/



THANKS!

Any questions?